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# **A MIXED METHODS INVESTIGATION INTO ASPECTS OF MEDICATION WASTAGE IN MALTA**

**Lorna Marie West**

[B.Pharm (Hons.), MSc (Clinical Pharmacy), PgCert (Research Methods)]

A thesis submitted in part fulfilment of the requirements of the Robert Gordon  
University for the degree of Doctor of Philosophy

**March 2015**

*"Our belief at the beginning of a doubtful undertaking is the one thing that ensures the successful outcome of the venture"*

William James  
[Philosopher, psychologist, physician  
1842-1910]

## ***Abstract***

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Reducing medication wastage is a paramount objective in promoting appropriate utilisation of finite resources and preventing negative consequences. The aim of this research was to investigate aspects of medication wastage in Malta by applying mixed methods research and, by doing so, contribute original knowledge to this area.

A systematic review was conducted to appraise critically, synthesize and present the available evidence on the possible causative factors associated with medication wastage and the effectiveness of any interventions focusing on wastage reduction as an outcome measure. Findings indicated that only one published paper reported a definition of medication wastage. The main factors contributing to wastage were 'change in medication', 'patient's death', 'resolution of patient's condition' and 'passed expiry date'. Very few studies reported medication wastage as an outcome measure.

The Delphi technique was applied to define 'medication wastage' and its contributory factors in the context of the Maltese population. A definition for medication wastage was generated with 86% of panellists agreeing/totally agreeing and sixty-one possible factors leading to wastage were identified by the panellists.

The perspectives of the Maltese population, healthcare professionals and students on medication wastage were investigated through cross-sectional surveys. Results of questionnaires indicate lack of patient education and knowledge with the free healthcare system and the overstocking of medication by patients due to previous or potential out of stock situations as contributors to medication wastage.

The beliefs and behaviours regarding medication wastage of the Maltese public and healthcare professionals were explored during focus groups. The theoretical domains framework was adopted to design the focus group guide and to interpret

systematically the findings. Five key themes emerged which were proposed as solutions to minimise medication wastage: system effects, practitioner effects, patients effects, political effects and awareness and educational effects

Research results and findings from all four phases will facilitate the systematic development of strategies and policies, with emphasis on prioritisation, with the aim of minimising medication wastage at all levels.

**Keywords:** Awareness, Delphi technique, focus groups, medication wastage, systematic review, theoretical domains framework.

## **Acknowledgements**

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My progress through this research and in preparing this thesis has been made possible with the help of many. My first thanks goes to the Lord who has helped me yet fulfil another dream.

My deep sense of gratitude goes to my principal supervisor, Prof Derek Stewart, for his outstanding guidance to help me develop as a researcher and for dedicating so much time to this research. Words cannot express how grateful I am to him. I have truly never met such a dedicated, efficient and professional person, and I owe any successful outcomes of this research to him. I am sincerely grateful to my other supervisors, Prof Lesley Diack (who willingly and with great enthusiasm temporarily stepped in as principal supervisor in the absence of Prof Stewart) and Prof Maria Cordina, for their illuminating suggestions during the compilation of this thesis.

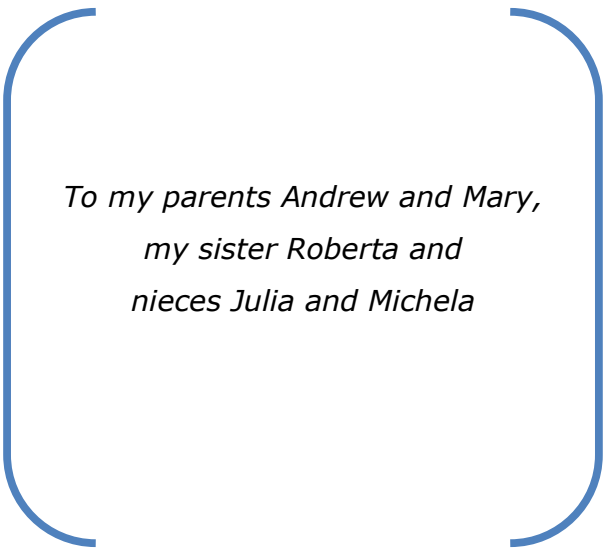
I would also like to extend my gratitude to Prof Victor Grech, Dr Vibhu Paudyal, Dr Antonella Tonna, Dr Patricia Vella Bonanno, Ms Valerie Vella and Mr Mark Zammit for validating the questionnaires and for their priceless advice. I would also like to thank my colleagues and friends Ms Ann-Marie Cassar Flores, Ms Ruth Theuma and Dr Anthony Fenech who, together with Ms Valerie Vella and Mr Mark Zammit, patiently participated in peer debriefing sessions during which they offered their advice and invaluable support and general positive feedback during the study. My appreciation also goes to Mr Colin MacLean for kindly helping me with the systematic review search. His professionalism and timely support were remarkable.

I am also greatly indebted to all those who willingly participated in this project (all participants of the Delphi technique and focus groups as well as questionnaire respondents) or who have helped in one way or another to identify suitable participants during snowball sampling. Without their participation, commitment and enthusiasm this PhD would have never been accomplished. I am also immensely

thankful to the Malta Government Scholarship Scheme for awarding me with a scholarship which made my PhD journey easier than it would have otherwise been.

Getting through this PhD required more than just academic support. No words can express my gratitude towards my parents. To my father who, since I was a young girl, always believed that one day I would be doing a PhD and was willing to do any sacrifice so that one day I could become a 'Doctor'. To my mother who has patiently listened to all my PhD ventures and who took the task of placing questionnaires in envelopes and writing more than a thousand post-it notes for questionnaires in such a short time without even complaining once. This thesis stands as a testament for all those times that you have prayed for me and for your constant encouragement and sacrifices.

I am totally indebted to my sister Roberta who has always been my pillar of strength and was my source of encouragement and praise throughout. Thank you for believing so much in me 'big sis'. Together we always make a great team and for us quitting was and will never be an option. I am also thankful for having had the support of two little buddies, my nieces Julia and Michela, who at times prayed for me when I had a discussion meeting with my supervisors thinking I was having an exam. They were always willing to help; their determination to fix more than a thousand stamps on questionnaire envelopes in one day was impressive. I hope that one day, through this PhD, you will realise that your dreams, if honest, should become your goals in life.



*To my parents Andrew and Mary,  
my sister Roberta and  
nieces Julia and Michela*



## **External outputs**

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At December 2014, results and findings of research presented within this thesis have been disseminated through the following outputs.

### **Full peer reviewed papers**

1. West, L.M., Diack, L., Cordina, M. and Stewart, D. (2014) A systematic review of the literature on 'medication wastage': causative factors and effect of interventions. *International Journal of Clinical Pharmacy*, 36(5), 873-881.

### **Peer reviewed conference abstracts**

1. West, L.M., Diack, L., Cordina, M. and Stewart, D. (2013) Delphi approach to defining and contextualising medication wastage in the Maltese population. *European Journal of Hospital Pharmacy*, 20(Supplement 1), A179.  
(Poster presentation at European Association of Hospital Pharmacists Conference, Paris 2013)

2. West, L.M., Diack, L., Cordina, M. and Stewart, D. (2013) Applying the Delphi approach to defining 'medication wastage' in Malta. *International Journal of Pharmacy Practice*, 21(Supplement), 35.  
(Poster presentation at Health Service Research and Pharmacy Practice Conference, Preston 2013)

3. West, L.M., Diack, L., Cordina, M. and Stewart, D. (2014). Exploring aspects of medication wastage in Malta: survey of healthcare professionals and the general public. *International Journal of Clinical Pharmacy*. In press  
(Poster presentation at European Society of Clinical Pharmacists Conference, Copenhagen 2014)

4. West, L.M., Diack, L., Cordina, M. and Stewart, D. (2014). A qualitative study of the general public and healthcare professionals to understand medication wastage related behaviours and potential reduction strategies. *International Journal of Clinical Pharmacy*. In press  
(Oral presentation at European Society of Clinical Pharmacists Conference, Copenhagen 2014)

The following paper is under review:

Applying the Delphi technique to define 'medication wastage'.

Several other papers are at various stages of preparation for submission to peer reviewed journals.

### **Awards**

I was awarded a scholarship from the Malta Government Scholarship Scheme (MGSS) for this research which was categorised as 'high-priority'.

## **Foreword**

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This thesis describes my research over the past four years or so, exploring issues of medication wastage. This experience has been extremely rewarding and has allowed me to develop my research knowledge and skills, enabling me to make novel contributions to knowledge in this field of work.

I have graduated as a pharmacist from the University of Malta and for the first two years I was based at an out-patient hospital pharmacy. I then applied for a hospital clinical pharmacy post and was appointed clinical pharmacist in respiratory medicine, developing that role for eleven years. During that time I gained an MSc in Clinical Pharmacy from Robert Gordon University. I was also appointed Visiting Assistant Lecturer at the University of Malta and an electronic-tutor to undergraduate students at the Robert Gordon University. All of these activities stirred my enthusiasm for academia and research.

My interest in medication wastage emerged gradually during my work as pharmacist as I became increasingly aware of the extent of wasted medication in the secondary care environment. I was also aware of similar situations in other healthcare settings and the implications of wastage on patient care and the organizations. Reflecting on this issues motivated me to consider undertaking research to provide high quality, meaningful evidence that would have impact at all levels, including policy makers. Around the same time I attended the Health Services Research and Pharmacy Practice conference in Manchester where I had a chance to encounter my future principal supervisor. Discussion immediately turned to the potential of doctoral research at the Robert Gordon University to focus on medication wastage. I also applied for, and was successful in obtaining, a scholarship with MGSS. Selection of this award was carried out by an MGSS board which evaluated a submitted proposal followed by an interview.

While studying for this PhD, my clinical role altered drastically with my appointment to leading and managing the pharmaceutical services of a secondary-care oncology and dermatology hospital. One of the key targets I was initially given was to reduce medication wastage, which further motivated me in my research endeavours (while at the same time increasing my work and research pressures). This strategic position also created great opportunities to attend board meetings held by state officials.

In summary, this research process has provided me with the opportunity to develop as a researcher and collect and generate meaningful data of relevance to healthcare practice in Malta and beyond.

## ***Abbreviations***

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BCW	Behaviour Change Wheel
CDT	Consensus development technique
CINAHL	Cumulative Index to Nursing & Allied Health Literature
CPD	Continuing professional development
CRD	Centre for Reviews and Dissemination
DoH	Department of Health
DPA	Data Protection Act
EBM	Evidence-based medicine
EBP	Evidence-based practice
EU	European Union
FDA	Food and Drug Administration
GFL	Government Formulary List
GPs	General practitioners
HBM	Health Belief Model
HCPs	Healthcare professionals
INIA	International Institute on Ageing
IT	Information technology
MGSS	Malta Government Scholarship Scheme
MMAS-8-Item	8-item Morisky Medication Adherence Scale
MRC	Medical Research Council
MURs	Medication use reviews
NHS	National Health Service
NGT	Nominal Group technique
NPT	Normalisation Process Theory
OTC	Over-the-counter
PICO	Population, Intervention, Comparator, Outcome
POYC	Pharmacy of Your Choice
SCI	Science Citation Index
SPSS	Statistical Package for the Social Sciences

TDF	Theoretical Domains Framework
TTM	Transtheoretical Model of Behaviour Change
UK	United Kingdom
US	United States
WHO	World Health Organization

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# Chapter 1

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*"If we knew what it was we were doing, it would not be called research, would it?"*

Albert Einstein

[Theoretical physicist and philosopher of  
science  
1879-1955]

## ***Introduction***

---

This chapter commences with an overview of healthcare provision in Malta and legislation and practice relating to prescribing and supply of medication, prior to detailing the issue of medication wastage in the Maltese and international context. An overview of the development and evaluation of complex interventions is provided and the research aims stated. The term 'medication' is used throughout this PhD in preference to 'medicine' to prevent any misunderstanding between 'medicine' as it relates to pharmaceutical products and the clinical practice of medicine.

### ***1.1 The Republic of Malta***

The Republic of Malta is a southern European island country consisting of three main islands, Malta, Gozo and Comino, forming an archipelago in the middle of the Mediterranean Sea (Figure 1.1). Malta is one of the smallest and most densely populated countries of 316 square kilometres with a population of 421,364 based on the 2012 census (National Statistics Office, 2013). Malta is divided into six districts: 1) Southern harbour, 2) Northern harbour, 3) South eastern, 4) Western, 5) Northern and, 6) Gozo and Comino, comprising a total of 68 localities.

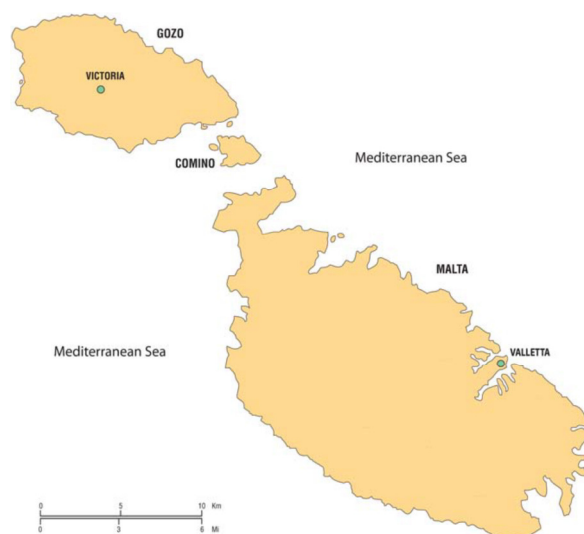


Figure 1.1: The Maltese Islands [Source: Azzopardi Muscat *et al.*, 2014]

Malta obtained independence from Great Britain in 1964 and became a republic in 1974. A liberal parliamentary democracy, Malta holds elections every five years to elect a unicameral parliament made up of 65 representatives. The President is the head of state, while the head of Government is the Prime Minister, who is the leader of the party with the electoral majority. Accession to the European Union (EU) in May 2004 has largely dominated the political agenda in recent years. Malta is also a member of international organizations including the North Atlantic Treaty Organization Partnership for Peace, the United Nations and the World Trade Organization (Azzopardi Muscat *et al.*, 2014).

## **1.2 The Healthcare system in Malta**

The healthcare system in Malta is based upon the Beveridge 'public' model, whereby funding for the system is provided mainly through taxation and is distinguished from other models of healthcare by a centrally organized National Health Service (NHS) (PwC, 2012). The Ministry for Health is responsible for the provision of healthcare services to all persons residing in Malta who are covered by Maltese social security legislation and is also responsible for the provision of health services regulation and standards. The public funded healthcare system also provides services to groups such as irregular immigrants and foreign workers who are in possession of valid work permits. To a lesser extent, private financing through 'out-of-pocket' expenditure and health insurance complement the current system (Azzopardi Muscat *et al.*, 2014).

Primary care is readily accessible, with free of charge health services at the point of delivery, as well as private general practitioners (GPs) who provide independent services. Public and private hospitals provide secondary and tertiary care, with Mater Dei Hospital being the main general hospital on the island. Figure 1.2 depicts the financial flow sustaining the healthcare system in Malta, which is proving to be a challenge in ensuring sustainability in view of an ageing population, rising citizens' expectations and the rising costs of medication (Azzopardi Muscat *et al.*, 2014).



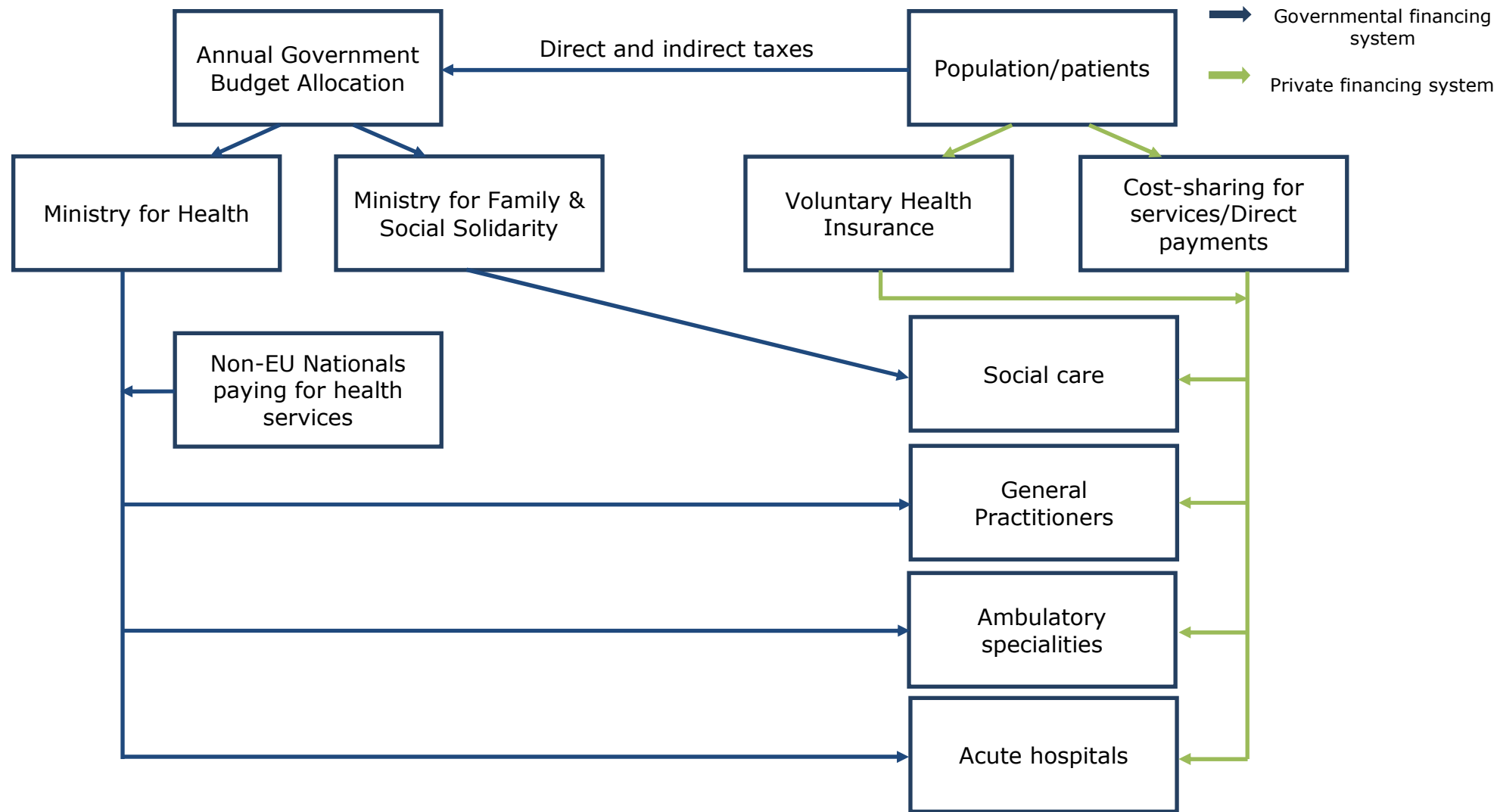
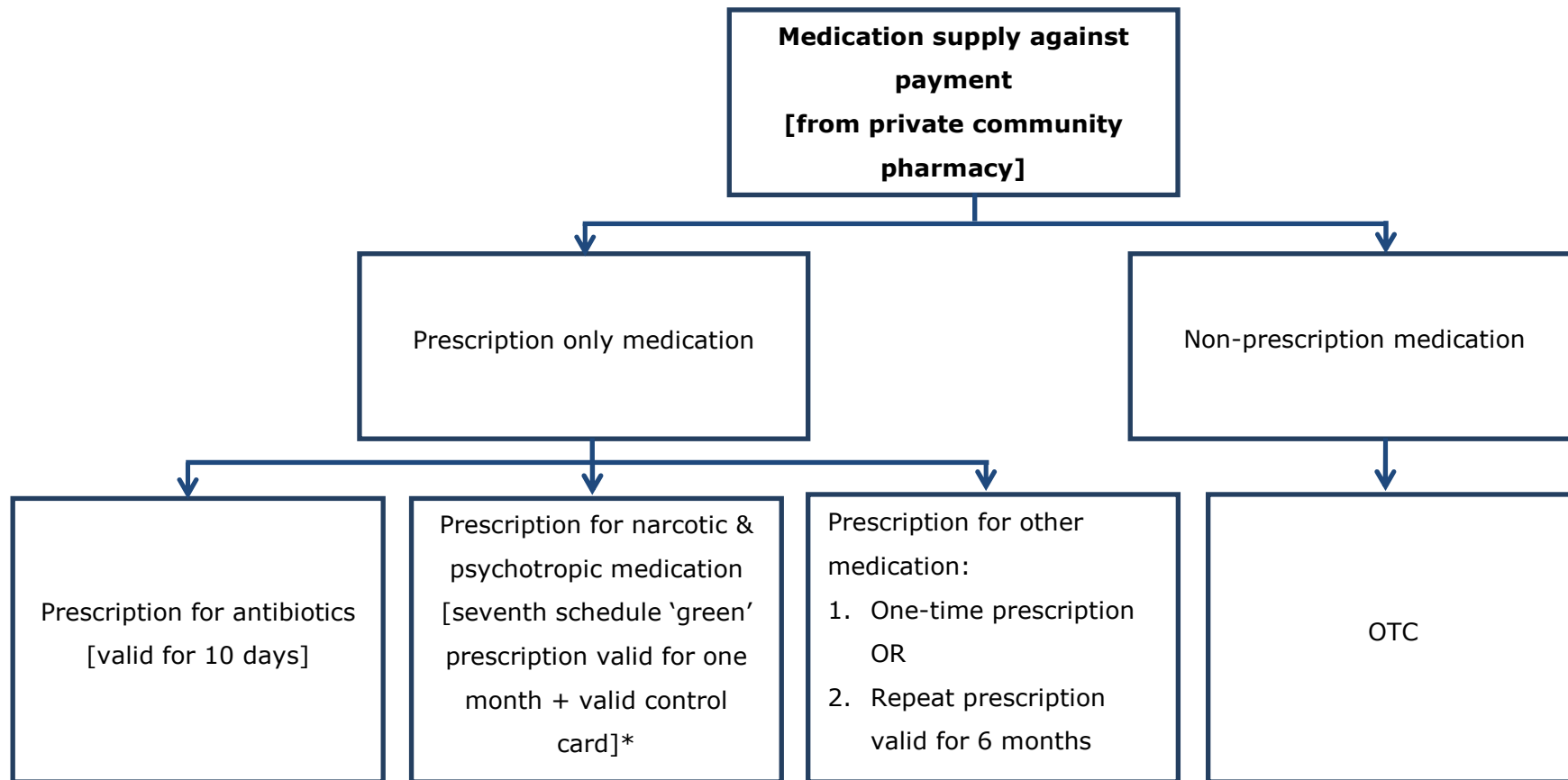


Figure 1.2: Financial flow chart sustaining the healthcare system in Malta [Adapted from Azzopardi Muscat *et al.*, 2014]

### ***1.2.1 Medication supply in Malta***

Medication in Malta is either supplied to the patient against payment, as illustrated in Figure 1.3 or else provided free of charge by the government as shown in Figure 1.4. Prescription and over-the-counter (OTC) medication can be obtained at direct cost to the individual from a private community pharmacy or obtained free of charge from government pharmacies or from private pharmacies through the 'Pharmacy of Your Choice' (POYC) scheme. This is a government subsidised service introduced in 2009 to facilitate patients' access to free medication.

The system for obtaining free of charge medication in Malta is complex. A list of prescribed and OTC medication which can be obtained free of charge from government pharmacies or POYC is found within a Government Formulary List (GFL) which is available online (Ministry for Health, 2014a). The GFL also lists medical conditions for which patients may obtain specific medication. Patients requiring free of charge medication on an out-patient basis must be in possession of a valid entitlement card, as shown in Figure 1.4. The annual expenditure on medication supplied free of charge is approximately 69 million Euro (The Times of Malta, 2012a). There are currently around 1,300 medication which can be supplied free of charge via the GFL (Ministry for Health, 2014a).



\* Legal Notice 22, 1985

Figure 1.3: Medication supplied to patient against payment from a private community pharmacy

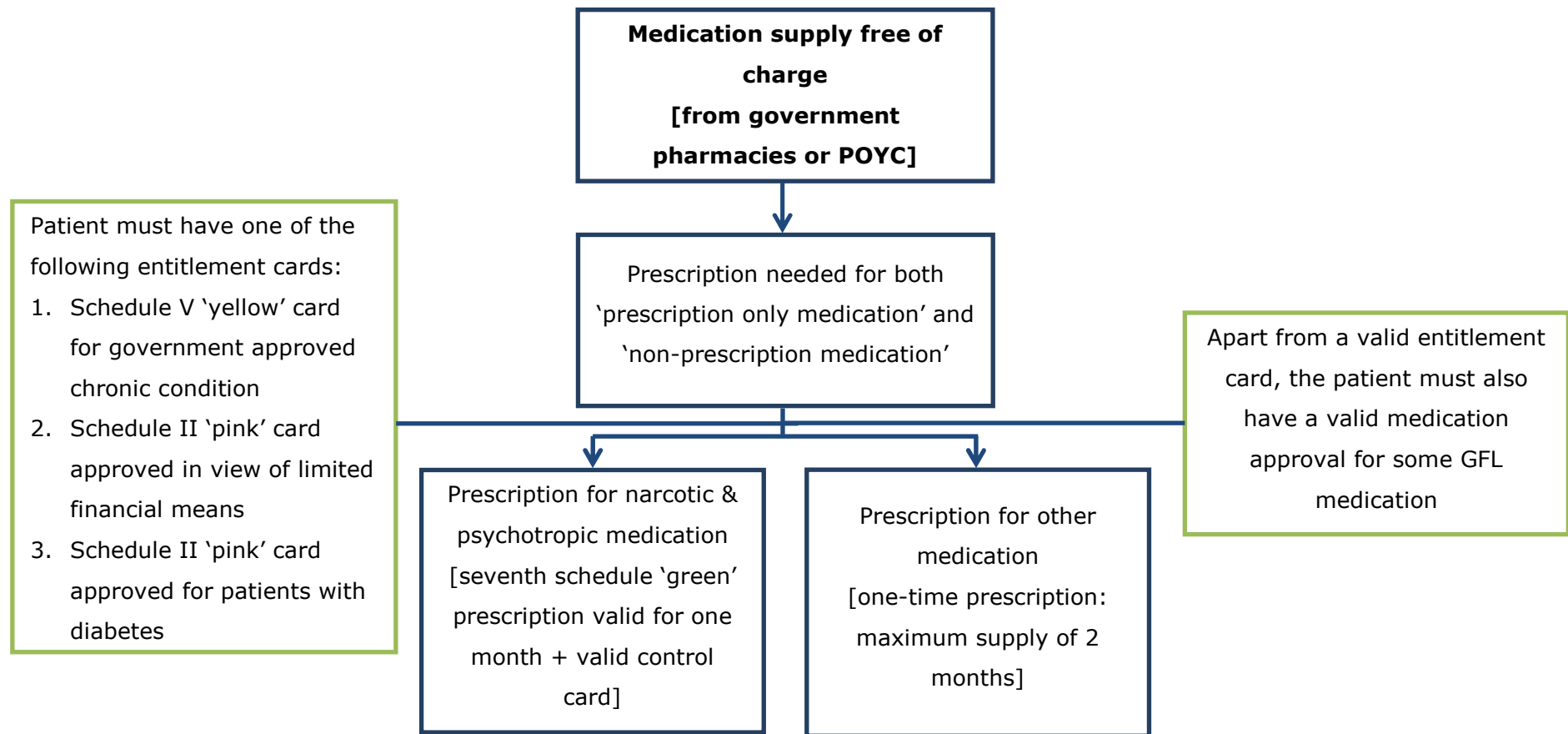


Figure 1.4: Medication provided free of charge to patient from government pharmacies or POYC

### **1.3 Medication wastage: The international scenario**

According to the World Health Organization (WHO) global estimates published in 2004, more than half of all medication is inappropriately prescribed, dispensed or sold with a resultant *"wastage of scarce resources and widespread health hazards"* (World Health Organization, 2004a). A study commissioned by the Department of Health (DoH) in England in 2009, which explored the scale and cost of medication wastage, concluded that direct costs of unused prescription medication to the NHS amounted to £300 million annually (York Health Economics Consortium and School of Pharmacy University of London, 2010).

In 2011, the DoH in England recruited a group of patients, healthcare professionals (HCPs), representatives of NHS organizations and the pharmaceutical industry to consider these findings and to identify measures to minimise wastage, optimise medication taking and improve health outcomes. The DoH Medicines Pharmacy and Industry Group subsequently issued a report 'Making Best Use of Medicines', stating that *"wastage of medicines involves a wide range of different stakeholders who all have a contribution to make to reducing its occurrence and improving quality of care"* (Department of Health Medicines Pharmacy and Industry Group, 2011, p.6).

White (2010) reviewed aspects of the published literature on medication wastage, focusing on estimated costs of medication returned to community pharmacies following patient death. Net ingredient costs of medication and pharmacy costs (i.e. dispensing fees and associated allowances) were assigned at individual patient and national levels. Extrapolated data indicated that, at 2007 prices, around one quarter of the total cost of the medication left behind following death was likely to be equivalent to the total pharmacy costs attributed to dispensing. Acknowledging the limitations and assumptions of the economic modelling, White concluded that the unnecessary spending on pharmacy charges has the potential to outstrip the estimated cost of wastage in the United Kingdom (UK) and that there is an urgent need to examine the cost-effectiveness of interventions aiming to reduce wastage.

### **1.4 Medication wastage: The Maltese scenario**

The scale of medication wastage has been voiced at the highest of political levels in Malta. In an article published in the popular press in Malta in April 2012, the Health Minister expressed concern about medication wastage, urging *"people to act responsibly and to keep in mind that although medicines were given to them free of charge, they were an investment by the government"* (Times of Malta, 2012a). It was noted that *"80 different types of medicine worth around €10,000"* had been returned to government pharmacies by members of the public during a three month period. The Health Minister stated that *"this was likely to be only the tip of the iceberg, since many people kept unused medicine at home"*. Shortage of medication on the NHS formulary was highlighted by the shadow Health Minister as a contributory factor, *"on the other hand, about 632 different medicines were out of stock in 2011. In simple words: shortages lead to hoarding, and hoarding leads to unused medicine"* (Maltatoday, 2012).

Later that year, it was reported that *"just over €29,500 worth of medicines was retrieved from pharmacies in Gozo last month after serious doubts arose as to the ambience in the contractor's carriage of the medicines"* (Times of Malta 2012b). It was further noted that *"in June there had been €893.32 worth of expired or damaged medicines retrieved, as well as €439.72 worth of medicines for redistribution to other pharmacies"*. The following year, the popular press detailed a report revealing 455,000 Euro of expired medication at the Oncology and Dermatology Hospital in Malta (Calleja, 2013). It should, however, be noted that these data have not been scientifically validated and the results have not been published in peer reviewed journals or conference presentations.

In April 2014 the Times of Malta issued findings of a survey study carried out by WasteServ (the company responsible for waste management on the Maltese islands) which concluded that only one tenth of the Maltese population disposed of expired medication and syringes appropriately. WasteServ also added that funds will be sought from the EU to launch a nationwide awareness campaign regarding the civic amenity sites and hazardous waste (Times of Malta, 2014). In September

2014, the Times of Malta reported that three tonnes of medication had been disposed of in civic amenity sites (Micallef, 2014).

### ***1.5 Laws, directives and policies relating to medication wastage***

The EU directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste states that 'waste' refers to *"any substance or object which the holder discards or intends or is required to discard"* (Directive 2008/98/EC, 2008, p.9). The focus of this directive is on management strategies on issues such as disposal and recycling, with lack of guidance focusing specifically on medication. The Medicines Act of Malta (Malta Government Gazette, 2003, p.A205) enacted by the Parliament of Malta legislates in terms of the *"manufacture, preparation and assembly, wholesale distribution, storage, destruction, disposal, advertising and authorisation of medicinal products and any activity connected therewith and the regulation of the sale of medicinal products, pharmacies and related pharmaceutical activities and for any other matters ancillary thereto or connected therewith"*. While this Act prohibits the sale of expired or damaged medication, it provides little guidance on the handling of medication wastage and no guidance at all on minimising wastage.

The Environment and Development Planning Act, under the force of the Malta Environment and Planning Authority, issued waste regulations in 2011 (Environment and Development Planning Act, 2011). 'Healthcare waste' includes medication, categorised as: generated by a pharmacy or a medical, nursing, dental, or veterinary practice within their own premises; or returned from households or by individuals pending disposal at a pharmacy, or any other authorised facility. This Act provides detail only of the maximum amount and duration of storage of wastage.

Following the accession of Malta into the EU, the Ministry for Resources and Rural Affairs (2009) prepared a National Waste Management Plan strategy stipulating a number of implementation aspects to be addressed but with no consideration of medication.

## **1.6 Development and evaluation of complex interventions**

From the above, it is clear that there is a need to reduce medication wastage in Malta and elsewhere. It is likely that such interventions will be complex. Complex interventions are defined by the Medical Research Council (MRC) as *"interventions with several interacting components"* (Medical Research Council, 2008, p.7). The dimensions of complexity can be multiple, such as the:

- *"number of and interactions between components within the experimental and control interventions"*
- *number and difficulty of behaviours required by those delivering or receiving the intervention*
- *number of groups or organizational levels targeted by the intervention*
- *number and variability of outcomes*
- *degree of flexibility or tailoring of the intervention permitted".*

The MRC highlights a number of implications for development and evaluation of complex interventions and emphasises the need for a good theoretical understanding of how an intervention could bring about change. The key elements of the development and evaluation process are illustrated in Figure 1.5.



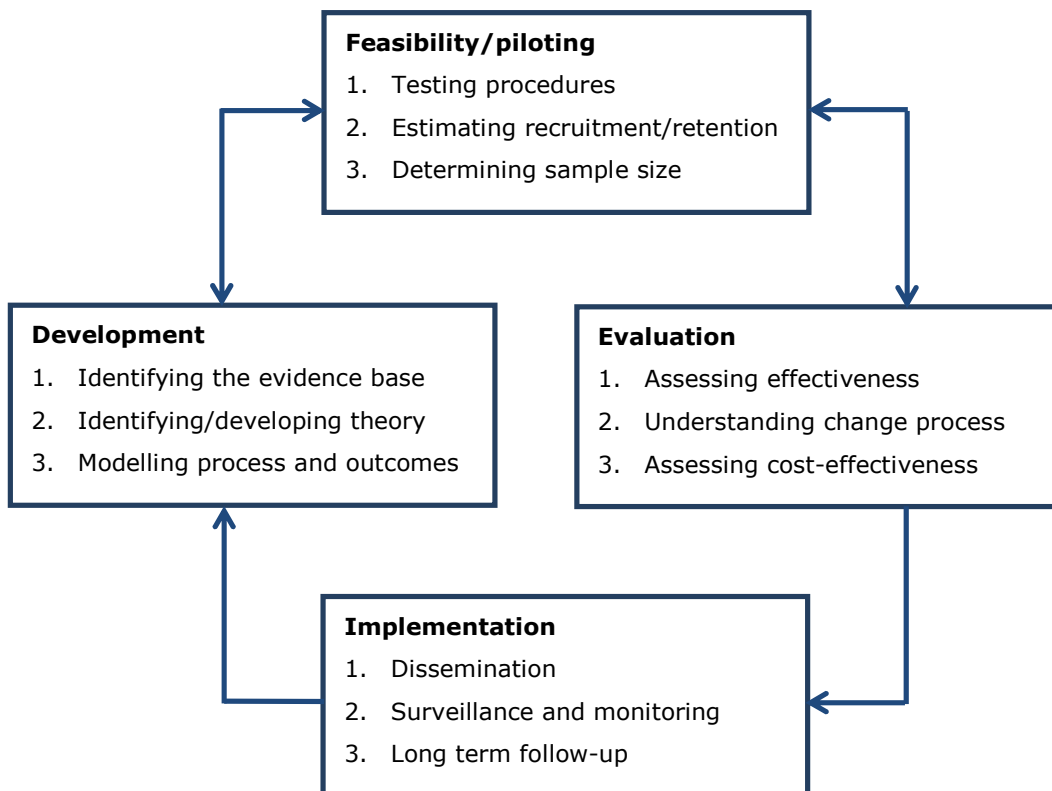


Figure 1.5: Elements of the development and evaluation process [Source: Medical Research Council, 2008]

The development of a complex intervention should be based on relevant, existent evidence such as that identified through a systematic review. This is then followed by the development of a theoretical understanding of the potential process of change, through the use of evidence and theory, supplemented by new primary research. Feasibility and piloting methods are essential to determine acceptability of an intervention, likely rates of recruitment and retention of subjects and to calculate sample sizes. A systematic process of evaluation is then needed to identify implementation problems and ensure successful implementation of interventions. Evaluation of complex interventions should include the effectiveness of the intervention in everyday practice and should establish how the particular intervention exerts its effect. An economic evaluation should be included if possible to assess cost-effectiveness (Medical Research Council, 2008).

This doctoral research focuses on the initial stages of the development of a complex intervention.

### ***1.7 Research aims***

The overall aim of this research was to investigate aspects of medication wastage in Malta by applying mixed methods research.

The research was conducted in four phases, each with aims leading from one phase to the other as described below:

Phase 1: to appraise critically, synthesize and present the available evidence on the possible causative factors associated with medication wastage in all populations and settings and the effectiveness of any interventions focusing on wastage reduction as an outcome measure.

Phase 2: to apply the Delphi technique to define 'medication wastage' and its contributory factors in the context of the Maltese population.

Phase 3: to investigate issues of awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, HCPs and respective students.

Phase 4: to describe and understand the beliefs and behaviours regarding medication wastage of the Maltese public and HCPs and to explore potential solutions to reduce medication wastage.

Specific research questions for each phase will be described in each corresponding chapter.

## Chapter 2

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*"Philosophy is common sense with  
big words"*

James Madison  
[Statesman, political theorist and the  
fourth President of the US  
1751-1836]

## **Methodology**

---

This chapter reviews the research philosophy, methodology and methods that were applied throughout this research. The processes of data collection and generation, sampling and analysis are described along with justification for the choice of specific approaches.

### **2.1 The research process**

Four philosophical dimensions distinguish research paradigms (Creswell and Plano Clark, 2011; Wahyuni, 2012). These fundamental beliefs, which influence how researchers conduct and report their inquiries, are namely:

1. Ontology, which is the view of how one perceives reality (Wahyuni 2012);
2. Epistemology, which is the theory of knowledge that is embedded in the theoretical perspective, also referred to as philosophical paradigm (Crotty 2005);
3. Axiology, which is concerned with ethics and the role of values in research and the researcher's stance (Wahyuni 2012);
4. Methodology, which is the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes (Crotty 2005).

Crotty (2005) describes the research process in terms of four basic elements, one leading to the other: epistemology, theoretical perspective, methodology and methods (Figure 2.1). The theoretical perspective is the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria. Methods are the techniques or procedures used to gather and analyse data related to the research question or hypothesis (Crotty, 2005; Feast and Melles, 2010).

There are three distinct epistemological positions: *objectivism* that asserts that social entities exist in a reality which is independent or external to consciousness and experience, *constructivism* which follows a belief that different individuals construct meaning in different ways, even in relation to the same phenomena

and *subjectivism* which is the understanding of meanings that individuals attach to social phenomena (Crotty, 2005).

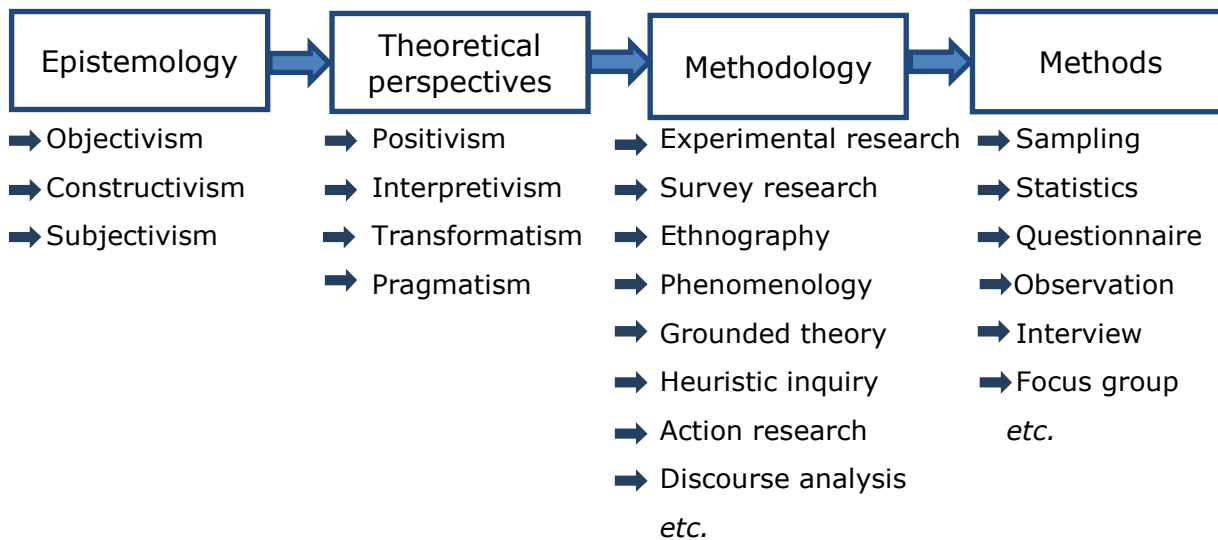


Figure 2.1: The research process [Adapted from Crotty, 2005]

### 2.1.1 Theoretical perspectives: Philosophical paradigms

Guba and Lincoln (1994, p.105) define paradigm as a “*basic belief system or world view that guides the investigation*”. The term was originally described by Kuhn in 1962 (Kuhn, 1962), who later gave a more precise explanation of this general concept (Kuhn, 1970). Morgan (2007) described four different meanings of paradigms, namely: worldviews, epistemological stances, shared beliefs amongst members of a specialty area and model examples of research. Four distinct philosophical paradigms are identified; each of them relating to different epistemological and ontological positions, and are described below.

#### 2.1.1.1 Positivist paradigm

A positivist paradigm maintains that reality is concrete and objectivity is achievable through rigorous methodology, assuming that reality is constant (Broom and Willis, 2007). A positivist stance presumes that knowledge is politically and socially neutral and can be obtained with quantitative precision through an accumulation of facts that build a close approximation to a reality that exists independently of human perception (Rubin and Rubin, 2012). Post-positivism is an offshoot of positivism and a reaction to it. However, to some extent, post-positivists seem less sure than classical positivists that one can

separate the knower from the known and that there is a single shared reality which excludes all others (Rubin and Rubin, 2012). In fact, O'Leary (2004) describes post-positivists as seeing the world as ambiguous, variable and multiple in its realities, which aligns to some extent with the constructivist paradigm (O'Leary, 2004).

#### *2.1.1.2 Interpretivist/Constructivist paradigm*

O'Leary (2004) distinguishes between 'interpretivism' as the acknowledgement and exploration of the cultural and historical interpretations of the social world and 'constructivism' which claims that meaning does not exist in its own right but is constructed by human beings as they interact and engage in interpretation. Therefore, interpretivists/constructivists claim that truth is relative and that it is subject to one's perspective (Baxter and Jack, 2008). Within the interpretive constructionism paradigm, the core knowledge is the understanding of what people make of the world around them, how people interpret what they come across, and how they assign meanings and values to events or objects (Rubin and Rubin, 2012). The interpretivist/constructivist ontological view of the world is advocated by qualitative researchers (Broom and Willis, 2007). Therefore, they are focused less on generalizability or external validity and more on the degree to which the data accurately represent attitudes, perceptions and views of the population being studied (Broom and Willis, 2007).

#### *2.1.1.3 Advocacy/participatory/transformational paradigm*

The advocacy and participatory (later referred to as transformational) stance is reported to have emerged during the 1980s and 1990s through critiques which considered that the positivist paradigm imposed structural laws and theories that did not fit marginalized individuals in society or issues of social justice that needed to be addressed (Creswell, 2014). Inquirers moreover considered that the constructivist stance did not go far enough in advocating for an action agenda. The latter is contained in the advocacy/participatory research to help marginalized individuals. The advocacy/participatory stance finds reality as always being negotiated and cast within a political context (Creswell, 2014). This perspective may utilise qualitative and quantitative approaches (Mackenzie and Knipe, 2006) although it is more often associated with qualitative approaches (Creswell, 2014).

#### ***2.1.1.4 Pragmatic paradigm***

Pragmatism is not committed explicitly to any one philosophy or reality (Mackenzie and Knipe, 2006). The pragmatic paradigm views reality as both singular (positivist) as well as multiple (constructivist) (Creswell and Plano Clark, 2011). Pragmatism is typically associated with mixed methods research, thus integrating the strengths of both methodologies (Onwuegbuzie and Leech, 2005; Creswell, 2014). Pragmatists do not view the world as an absolute unity but assume different worldviews and assumptions and utilise multiple methods and different forms of data collection and analysis (Creswell, 2014). For the pragmatist, contributory facts are a matter of degree, with some more true than the others. The pragmatic researcher rejects traditional dualisms such as subjectivism versus objectivism and favours rational versions of philosophical dualisms based on how well they work in unravelling problems (Johnson and Onwuegbuzie, 2004).

#### ***2.1.2 Overall philosophical paradigm in current research***

This doctoral research was conducted in four phases: systematic review of the literature (chapter 3), consensus-based technique (chapter 4), quantitative, cross-sectional survey study (chapter 5) and qualitative focus groups (chapter 6). A pragmatic stance was therefore adopted, employing mixed methodologies and methods as described below.

### ***2.2 Quantitative versus qualitative methodologies***

Quantitative methodological approaches are most commonly aligned with the positivist stance (Mackenzie and Knipe, 2006). These generate numerical data that are measured in a strictly objective way and described by a set of rules or formulae. Common methodologies that utilise a positivist paradigm include:

- Descriptive research which explores and describes phenomena in real-life situations to determine meanings and frequencies of the phenomenon under investigation, and describe and categorise information related to the phenomenon (Burns and Grove, 2011)
- Correlational research which explores relationships between variables to determine the degree of relationship between the two variables without introducing an intervention (Walker, 2005; Burns and Grove, 2011)

- Causal research which refers to experimental research designs whereby the researcher manipulates an independent variable and observes the outcome on a dependent variable whilst keeping other unrelated variables constant (Walker, 2005).

Qualitative methodological approaches accentuate the importance of multiple subjective realities whilst exploring the psychological approach of human behaviour (Sahu, 2013) and are a means of capturing lived experiences of groups and individuals (Nagy Hesse-Biber, 2010). Common methodologies that utilise an interpretivist paradigm include:

- Phenomenology which provides an in-depth understanding of the distinctive lived experience of individuals by exploring the meaning of a phenomenon (Petty *et al.*, 2012)
- Ethnography which describes and interprets human cultures using methods such as participant-observation or interviews with the aim of getting an in-depth understanding of a particular culture (Teddlie and Tashakkori, 2009)
- Grounded theory which attempts to develop a theory constructed from the data of participants with an experience of the phenomena under investigation, to explain these phenomena (Petty *et al.*, 2012b)
- Case study which explores a case (or multiple cases) through in-depth data collection involving multiple sources of information rich in context (Baxter and Jack, 2008)
- Narrative research which relates to spoken or written text of a single event or a series of events which are chronologically connected (Czarniawska, 2004).

## **2.3 Mixed methods methodology**

The pragmatic philosophy of mixed methods research is a methodological approach to knowledge that strives to consider multiple viewpoints, perspectives, positions, and standpoints (Johnson *et al.*, 2007). In an attempt to define mixed methods research through discussion with several leaders in the field, Johnson *et al.* (2007, p.129) described mixed methods research as:

*"an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with*



*qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results."*

## **2.4 Quantitative versus qualitative methods**

As highlighted earlier, quantitative methods produce numerical data which are analysed and are typically deductive in nature. Data may be collected to test a hypothesis, resulting in accepting or rejecting the null hypothesis of no difference (Johnson and Onwuegbuzie, 2004). Qualitative methods generate data which are in a narrative form and the data are used to build theory, themes, or conclusions; thus inductive in nature (Teddlie and Tashakkori, 2009). Methods that utilise a positivist paradigm include epidemiological/analytical approach design strategies (such as randomized controlled trials and cross-sectional studies), survey research, secondary document analysis (such as content analysis), and systematic reviews that employ a meta-analysis design (Broom and Willis, 2007). Methods utilizing an interpretivist/constructivist paradigm include in-depth, semi-structured or unstructured interviews, participatory or non-participatory observational studies, focus groups and secondary discourse analysis (Broom and Willis, 2007). Table 2.1 summarises the two distinct research paradigms whilst Table 2.2 describes the methods as applied within this research.

Table 2.1: Summary of the distinct research paradigms [Petty *et al.*, 2012]

<b>Characteristic</b>	<b>Positivist view</b>	<b>Interpretivist/ Constructivist view</b>
Ontology	One objective truth exists	There are many subjective truths and realities
Epistemology	Accepts what can be directly observed	Understands multiple social constructs
Knowledge	Background knowledge and beliefs of the researcher influence what is observed	Observation involves interpretation
Research methods	Quantitative (deductive)	Qualitative (inductive)
Research question	Explicitly defined at the start	Broad question refined throughout the study
Research instrument	Valid and reliable tools	The researcher
Study sample	Detailed inclusion and exclusion criteria	Purposive sample
Data collection	Measurable outcomes	Explore, describe and understand
Variables	Controlled	Not controlled
Data analysis	Statistical tests following strict rules and procedures	Iterative process; interpretation of words to gain understanding of phenomena

Table 2.2: Summary of the distinct research paradigms employed in this research

<b>Characteristic</b>	<b>Positivist view</b>	<b>Interpretivist/ Constructivist view</b>
Beliefs	One objective truth exists	There are many subjective truths and realities
Research methods	Quantitative (deductive)	Qualitative (inductive)
Research question	Explicitly defined for Delphi and questionnaire phases in a research protocol	Broad question refined throughout the study for focus groups
Research instrument	Questionnaires used during Delphi and cross-sectional survey phases	The researcher acting as a moderator using semi-structured topic guide during focus groups
Study sample	Detailed inclusion and exclusion criteria	Purposive sample (Delphi and focus groups)
Data collection	Measurable outcomes from Delphi (chapter 4) and questionnaire data (chapter 5)	Descriptive and contextual from data generated through focus group discussions (chapter 6)
Data analysis	Statistical content analysis (chapter 4) and descriptive and inferential statistics (chapter 5)	Framework approach (chapter 6)

## ***2.5 Quantitative methods***

Two common types of quantitative data collection methods are through experimental research and cross-sectional research. An experimental research design assumes that the cases being studied can be manipulated by the researcher in order to measure a change or a difference (Matthews and Ross, 2010). Therefore, the presence of a 'control group' is imperative in experimental research and thus could not be applied to this research. Cross-sectional research designs are associated with survey methods, which utilise sampling of participants (Matthews and Ross, 2010). A cross-sectional survey design was employed in the current research, as it is most appropriate for describing occurrences at a fixed point in time (Polit and Beck, 2008).

### ***2.5.1 Sampling and data analysis in quantitative research***

A representative sample is required to ensure that findings are generalizable, that is they can be widely applied outwith the specific study population (possess external validity). Random sampling ensures that each individual has an equal and fair chance of participating in the study (Newell and Burnard, 2011). Different types of random sampling exist. Table 2.3 describes different random sampling techniques and their advantages and disadvantages (Howitt and Cramer, 2011; Newell and Burnard, 2011).

The survey study used simple random sampling to ensure that each member of the public and each practitioner from the HCP group had an equal chance of being selected.

Table 2.3: Random sampling techniques

<b>Random sampling</b>	<b>Advantages</b>	<b>Disadvantages</b>
Simple random sampling using random numbers which are typically computer generated	Every individual or element studied has an equal chance of being selected	Does not ensure that the sample is representative of the population from which the sample was taken (e.g. if biological sex in the population is 1:1 it might not be the case during simple random sampling)
Stratified sampling which identifies sample numbers in proportions e.g. by biological sex would include both males and females proportionately	Ensures that the sample is representative of the population from which the sample was taken for specific characteristics under investigation (e.g. gender)	Relevant information about the characteristic under investigation is needed
Cluster sampling which randomly selects participants from particular geographical areas	Restricts the amount of time required to draw up sampling lists	Less likely to be representative of the population because individuals within a cluster are likely to be more similar to one another and their behaviours may be influenced by the cluster
Systematic sampling which uses fixed intervals in assigning participants to a study	It is simpler to use with a printed list such as electoral registers; quicker than random sampling; people close together in the list will not be selected, thus avoiding couples or relatives	Not completely random; if list is not sampled this will introduce biases; does not ensure that the sample is representative of the population from which the sample was taken

Quantitative data generate numerical information which can be analysed using different methods, which include (Moule and Goodman, 2014):

- Descriptive statistics which organize numerical data to describe outcomes of study
- Correlation coefficient which measures the strength of association between two variables
- Tablets and charts to present exact and visual representation of figures respectively
- Inferential statistics which use data to make generalisations

Although content analysis is used to interpret data generated through open questions and thus seems qualitative in nature, it is considered to be a quantitative and systematic technique as it counts all the number of tangible and observable occurrences (codes) being studied. It is objective in terms of categorization using defined criteria. During content analysis, the researcher systematically codes, counts and analyses the content following an explicit, precise and replicable procedure (Treadwell, 2014). This technique was used in the data analysis of the open questions in the Delphi research in chapter 4 and the questionnaire phase (chapter 5).

### ***2.5.2 Cross-sectional study: mailed questionnaire survey***

A quantitative design, rather than a qualitative one, was chosen for the questionnaire phase of this research (chapter 5). A cross-sectional design utilising self-administered structured, postal questionnaires assessed awareness, perceptions, attitudes and behaviours. This specific approach was selected based on a number of factors: ability to collect large amounts of data in a short timescale (Mann, 2003); recruiting parts of the population that would be otherwise difficult to include (Owens, 2002), such as busy HCPs; and reduced cost. The survey approach employed a deductive approach within the positivist paradigm.

## **2.6 Qualitative methods**

In qualitative research designs data are predominantly linguistic. Conversation is the most frequent means of generating data, most commonly focus group studies, case studies and one-to-one in-depth interviews, followed by researcher observations (Jonker and Pennink, 2010). One-to-one interviews are suitable for obtaining individual biographies and provide the opportunity to research in-depth an individual's perspective. However, they are considered to be time-consuming (Matthews and Kostelis, 2011) and can be an intensive and intrusive experience (Frith and Gleeson, 2012). Direct observation is considered more suitable for studies of social roles and formal organizations (Kitzinger, 2006). Case studies are useful to explore variables and to bring about new ideas (Siggelkow, 2007), and the phenomena are explored within their real-life context (Yin, 2009). Case studies involve a full variety of evidence, including direct observation of the issue in question, one-to-one and group interviews, documents and artefacts (Yin, 2009). Focus groups are a form of group interview that exploits discussion between research participants to generate data (Kitzinger, 2006). Through focus groups participants may acquire particular perspectives as a consequence of group interaction with others who share similar experiences. Focus groups are considered more appropriate when the researcher wishes to encourage participants to explore issues of importance to them, in their own language, and pursuing their own priorities. They are also suitable for exploring how opinions are developed (Kitzinger, 2006).

### **2.6.1 Qualitative data collection: use of focus groups**

The last phase of this research used an interpretivist phenomenological methodology to explore the meaning of lived experiences of participating individuals in relation to medication wastage. Focus group discussion, as opposed to other qualitative methods, was chosen as the method for this phase of the research as it is considered most suitable to the study of attitudes and experiences. Furthermore, participants' perspectives are elicited through the group debate and therefore focus groups facilitate the expression of ideas and experiences that might be left underdeveloped in a one-to-one interview (Kitzinger, 2006).

Focus groups make use of group dynamics to encourage discussion, gain insights and generate ideas in order to pursue an issue in greater depth (Bowling, 2009). Additionally, they encourage diverse communication between participants and provide insight into the functioning of a group's process in the expression of knowledge. The dynamic interaction between participants of focus groups can be used to highlight participants' attitudes, priorities as well as language and context, which is useful considering that people's knowledge and attitudes go beyond responses to direct questions (Kitzinger, 2006). The earliest published work on focus groups was in 1926 with Bogardus' work describing group interviews (Morgan, 1997). Focus groups were later used in the 1950s to study people's reactions to wartime propaganda and continued to be used as a method throughout the 1970s and 80s (Kitzinger, 1994) and in more recent studies (Jochemsen-van der Leeuw *et al.*, 2011; Badertscher *et al.*, 2012; Bassett-Clarke *et al.*, 2012).

Focus groups are associated with a number of strengths and weaknesses. The dynamic interaction between group participants decreases the influence of the researcher on that group. Different opinions in a group can stimulate discussion and allow elaboration and appraisal of opinions. Generally silent individuals can also be encouraged to express their opinions in focus groups (Frith and Gleeson, 2012). Through focus groups participants can engage in discussion on embarrassing topics with free expression of criticism.

There are also a number of limitations when focus groups are employed. Individuals with a very busy lifestyle or who feel uneasy sharing their opinions with others may be unwilling to participate (Frith and Gleeson, 2012). During the focus group discussions participants might deviate from the specific topic being discussed (Frith and Gleeson, 2012). Some participants who might consider themselves a minority in the group might find it difficult to share their point of view (Frith and Gleeson, 2012).

The focus group study was conceptualised within the interpretative paradigm and phenomenological methodology which maintains that the world is socially constructed and the researcher is party to what is being observed. The



researcher induced themes from the understanding of the perceptions and meanings described by participants. This study sought subjective views and contextual accounts of participants.

### **2.6.2 Sampling and data analysis in qualitative research**

Sampling in qualitative research is multidimensional. Adequate reflection is required during sample size and sampling method selection to ensure that the topic under investigation follows the concept of saturation i.e. data generation continues and new findings are fully uncovered until new data are not generated (Leech, 2005). Non-random sampling techniques are mainly used to recruit participants, with many recommending purposive or theoretical sampling (Coyne, 1997). Table 2.4 describes different non-random sampling techniques and their advantages and disadvantages (Strauss and Corbin, 1998; Bowling, 2009; Draper and Swift, 2011; Howitt and Cramer, 2011; Moule and Goodman, 2014).

Purposive sampling was used to select participants for the focus group and the Delphi technique studies as participants with specific characteristics were required. The Delphi technique also used snowball sampling to recruit further 'expert' individuals who otherwise may not have been identified.

Data generated through qualitative methods are analysed through an iterative process as the researcher keeps going back to interpret and reinterpret the data (Teddlie and Tashakkori, 2009). The data analysis approach varies in terms of basic epistemological assumptions about the nature of qualitative enquiry and aims of the analytical process. Different data analysis approaches include:

- those which focus primarily on language, such as discourse analysis, conversation analysis, symbolic interactionism, ethnomethodology and narrative analysis; and
- those whose primary aim is concerned with capturing and reporting views and culture and interpreting meanings, such as grounded theory and framework approach (Ritchie *et al.*, 2014).

Table 2.4: Non-random sampling techniques

<b>Non-random sampling</b>	<b>Advantages</b>	<b>Disadvantages</b>
Convenience sampling which samples participants in the most convenient way to the researcher because they are easily recruited	Easier to recruit and possibly less expensive	Conclusions limited to type of population studied and subjectivity of researcher
Volunteer sampling which samples individuals volunteering participation in a study	Easier to recruit and possibly less expensive	Conclusions limited to type of population studied and subjectivity of researcher
Quota sampling which recruits participants based on whether they fit one of various researcher specified categories	Reduces chance of over- or under-representation	Researcher needs to find individuals who fulfil specified categories (e.g. males in specific jobs); systematically biased sample
Purposive sampling which selects a group of participants with a specific characteristic which is of theoretical interest to the research	Accesses participants with specific characteristics of interest to the research	Over-representation of specific group being studied and subjectivity of researcher
Snowball sampling which is dependent on an initial group of participants to recruit others	Identifies hidden samples and possibly less expensive	Conclusions limited to type of population studied and subjectivity of researcher

Social network sampling which uses social or other networks to recruit participants	Easier to recruit and possibly less expensive	Conclusions limited to type of population studied; selection is not independent as participants are known to one another
Theoretical sampling which initially includes a small number of similar cases of interest and consequently exceptional cases are selected to test the emerging hypotheses	Explores new areas by enabling the researcher to choose those avenues of sampling which produce the greatest theoretical returns	Conclusions limited to type of population studied

#### *2.6.2.1 Grounded theory to develop code structure*

The code structure in grounded theory is purely inductive. Codes are assigned to each emergent concept from the data (Bradley *et al.*, 2007). Grounded theory uses a systematic 'constant comparison method' first described by Glaser and Strauss (1967) to search for similarities and differences between different groups and thus generate theory. In developing theory, conceptual categories are generated which can then be tested with other comparison groups (Glaser and Strauss, 1967). Since grounded theory is more concerned with the development of theory derived from data through a set of procedures and interconnected stages, it was not appropriate in this research.

#### *2.6.2.2 Framework approach to develop code structure*

A less inductive approach is the framework approach (Bradley *et al.*, 2007), which uses the thematic framework as its central component. It is a matrix based analytic approach which extrapolates data into cases (rows) and codes (columns) (Ritchie *et al.*, 2014). Interpretation of the matrix and generation of descriptions, categories, explanations and typologies are important features of the framework approach (Gale *et al.*, 2013). Since the framework approach is most commonly applied for thematic analysis of semi-structured interview transcripts, and is not aligned with a particular epistemological, philosophical, or theoretical approach but can be easily adapted to different approaches (Gale *et al.*, 2013), it was used to analyse focus group data in chapter 6. This approach was considered most appropriate to analyse the focus group data generated in this research and to reflect the phenomenological methodology.

## **2.7 Evidence synthesis through systematic review of the literature**

### **2.7.1 Evidence-based practice and the hierarchy of evidence**

Farrelly (2013) argues that in an age where quality assurance and clinical governance dominate healthcare systems and new evidence constantly emerging, HCPs must strive to provide the best possible care and must thus follow evidence-based practice (EBP).

Evidence-based medicine (EBM) is the most widely applied form of EBP and refers to *"the use of evidence, specifically in the form of quantitative research data, concerning the effectiveness of a variety of medical interventions, to guide decisions about whether to use those interventions in medical practice"* (Gupta, 2003, p.111).

EBM makes an epistemological claim of being the most effective means of pursuing health by the assumption that the most effective means of achieving health is by following the truth, which is achieved through EBM (Gupta, 2003). EBM follows a hierarchy of evidence, with the strongest evidence lying within the top most layer of systematic reviews and meta-analysis, with the strength of evidence decreasing down the pyramid (Figure 2.2) (Jonas, 2001).

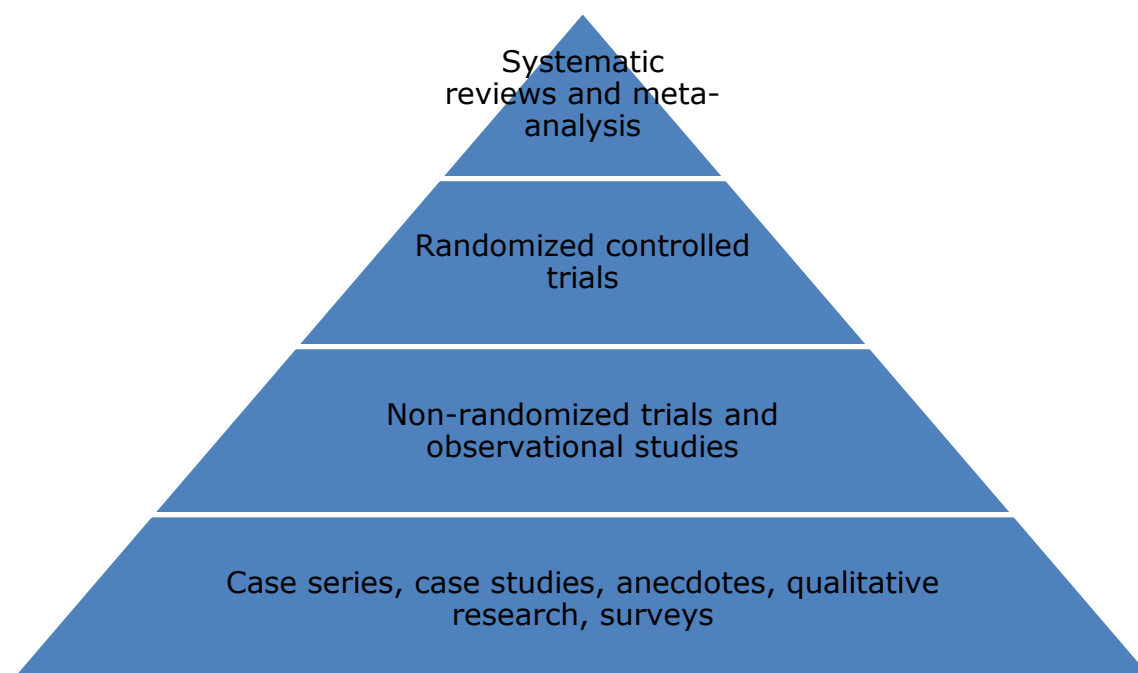


Figure 2.2: Hierarchy of evidence [Adapted from Jonas, 2001]

### **2.7.2 Systematic reviews**

Systematic reviews differ from more traditional, scoping or narrative reviews, collating and synthesising evidence according to pre-specified eligibility criteria in order to address specific research questions, while minimizing bias by adhering to explicit, systematic methods (Lang, 2004; Mickenautsch, 2010; Higgins and Green, 2011; Rosner, 2012).

On the other hand, narrative reviews are mainly descriptive and selection of evidence is based on availability or author selection, introducing selection bias. Moreover, in systematic reviews, as opposed to narrative reviews, contradictory reports are reconciled by combining specific outcome measures (Lindsay, 2011).

Systematic reviews can be carried out to address different types of research questions, such as (Gough *et al.*, 2012):

- to determine the effect of an intervention through, for example, a statistical meta-analysis of experimental data
- to assess the cost of an intervention through a cost-benefit analysis
- to identify the meaning of a phenomenon through meta-ethnography and
- to determine the attributes of an intervention through, for example, framework synthesis.

Systematic reviews can take a deductive approach to help the researcher develop a theoretical or conceptual framework which is subsequently tested using data. An inductive approach in a systematic review explores data to develop theories and subsequently relate these to the literature (Saunders *et al.*, 2009). Criticism of systematic reviews is mainly directed towards the assumption that systematic reviewing is only applicable to quantitative research (Gough *et al.*, 2012), although systematic reviews of qualitative data are now emerging.

#### *2.7.2.1 Systematic review within this research*

The systematic review in this research helped to identify all evidence regarding medication wastage which in turn informed the next phases of the research and thus could be used to inform policy and practice.

#### **2.7.3 Critical appraisal of the literature**

In a systematic review, identified literature is appraised critically with the aid of a pre-selected quality assessment tool, whilst quality is not an initial priority in scoping or narrative reviews. Four critical approach aspects have been discussed in the literature, namely (Mingers, 2000):

- critique of rhetoric, which is the need to use the skills both of making reasoned judgements and of discussing effectively in writing;

- critique of tradition, which refers to the questioning of conventional wisdom;
- critique of authority, which refers to the dominant view portrayed in the literature being reviewed; and
- critique of objectivity, which acknowledges that the knowledge and information in the review are not value free.

Detailed data pertinent to the results of study findings are extracted in a systematic review, clearly highlighting any similarities or differences between studies and exploring the reasons for any variations.

#### **2.7.4 Data synthesis**

Data synthesis in systematic reviews refers to the gathering, combination and summary of the findings of studies that are included in the systematic review. Data synthesis usually takes two forms: an *aggregative* or *configurative* approach. Aggregative reviews, typically employing a *realist* philosophy, assume that there is one reality. This approach uses predefined concepts and tests these to generate empirical statements within predefined conceptual positions and methods. These reviews aggregate similar forms of data and are more considered about homogeneity. Configurative reviews, which fall under the *idealist* philosophy, develop concepts by trying to interpret and understand the world and by exploring patterns provided by heterogeneity. Therefore, aggregative reviews generate empirical statements to inform decision making instrumentally whilst configurative reviews develop concepts. Aggregative reviews follow epistemological and methodological assumptions similar to quantitative research, and configurative reviews have similar assumptions to qualitative research (Gough *et al.*, 2012).

There are diverse distinguishable approaches to reviews such as the quantitative use of formal statistical techniques to aggregate findings in meta-analysis or the use a more textual approach such as that embraced by narrative synthesis. Meta-analysis utilise a positivist paradigm (Broom and Willis, 2007) and generate quantitative outcomes. Mixed-method approaches in systematic reviews combine qualitative and quantitative studies, or use qualitative information to inform decisions made in statistical synthesis.

#### 2.7.4.1 Narrative synthesis

The systematic review carried out in this research (chapter 3) used a narrative synthesis to provide an analysis of relationships within and between studies, and an overall assessment of the robustness of the evidence. Narrative synthesis begins with the development of a theory of how the intervention works, why and for whom and links resources, activities, intermediate outcomes and ultimate goals. The systematic review in this research employed a predominantly configurative approach but included elements of both aggregation and configuration.

## 2.8 Mixed methods

There are two major types of mixed methods research: a *mixed method* and a *mixed-model* research (Johnson and Onwuegbuzie, 2004). A *mixed method* research employs both quantitative and qualitative data collection and analysis techniques either in parallel or sequentially. In a sequential mixed methods design the process begins with either a quantitative study followed by a qualitative study (explanatory sequential design) or a qualitative study followed by a quantitative study (exploratory sequential design) (Baxter and Jack, 2008). A *mixed-model* research makes use of both quantitative and qualitative data collection and analysis techniques within the stages of the research process or across other phases of the research (Saunders *et al.*, 2009).

### 2.8.1 Rationale for the use of mixed methods designs

Greene *et al.*'s (1989) five-purpose conceptual framework for using mixed methods research is:

- for *triangulation* purposes which refers to the convergence of quantitative and qualitative research in order that the findings of these may be mutually corroborated;
- for *complementarity* purposes which seek clarification, enhancement, illustration, explanation of the results from one research strategy with the results from another;
- for *development* whereby the result from one method inform the next method which includes sampling and data collection and data analysis decisions;



- for *initiation* purposes which seek to discover inconsistencies, new perspectives and to modify research questions or findings from one method with questions or findings from the other method; and
- for *expansion* purposes which seek to extend the level of enquiry by using different methods for different inquiry components.

Bryman (2006) later described a more detailed rationale scheme for the use of mixed methods research, namely: a) triangulation, b) to offset weakness of mutual research designs used, c) completeness of study, d) to provide a sense of process as well as an account of structures, e) to answer different research questions, f) to use one method to explain the findings of the other, g) to identify unexpected results, h) one method is used to develop the instrument for the other method, i) for sampling purposes, j) to enhance credibility of findings, k) to provide contextual understanding through a qualitative research coupled with either generalizable, externally valid findings or broad relationships among variables uncovered through a survey, l) to use qualitative data to illustrate quantitative findings, m) to improve the usefulness of findings, n) to generate and test a hypotheses within a single research study, o) to obtain diversity of views and p) to enhance findings.

### **2.8.2 Rationale for the use of mixed methods designs in this research**

The rational for employing a mixed methods design in this research study was to ensure a more iterative process rather than a static one. In this study, the researcher engaged the use of within-stage mixed-model design by combining a summated rating scale and close-ended questions (quantitative data collection) together with open-ended questions (qualitative data collection) in the same research phase (questionnaire [chapter 5]). The current research explored, through the systematic review (chapter 3) and Delphi study (chapter 4), the variables that need to be studied and sequentially studied some of these variables with a random sample of the population. This study also employed a mixed methods sequential explanatory design, whereby the quantitative study enabled the researchers to select cases for their qualitative study, whereby the qualitative component was primary and the quantitative survey provided a sample of selective cases for the focus groups.

A mixed methods design also ensured triangulation. Due to the multifaceted nature of the research study, it was felt that there was no single paradigm that could satisfactorily deal with all of the required methodological aspects. Therefore, the use of mixed methods research enabled the researcher to statistically analyse the quantitative data generated through the questionnaire whilst encompassing the different factors that give rise to wastage from the participants own point of view.

#### *2.8.2.1 A within-stage mixed-model design in this research*

A further application of the mixed methods in this research was the use of a consensus based technique, which is categorised as a within-stage mixed-model design. In a review by Campbell and Cantrill (2001, p.5), consensus techniques are described as group facilitation techniques which seek to determine the level of consensus among a group of experts by "*aggregating opinions into refined agreed opinion*". Moule and Goodman (2014) discuss three main consensus techniques, mainly the Delphi technique, the Nominal Group technique (NGT) and the Consensus development technique (CDT) (Moule and Goodman, 2014). Consensus methods, such as the Delphi technique and NGT, follow pragmatic paradigm, harnessing an interpretivist paradigm generating subjective ideas whilst utilising positivist assumptions through statistical measures to grade consensus (Gallagher *et al.*, 1993; Keeney *et al.*, 2011).

##### *2.8.2.1.1 Consensus techniques*

###### *The Delphi technique*

The Delphi technique originated in 1948 and has been employed by many researchers. The Delphi technique was originally developed by the Rand Corporation for technological forecasting. It takes the name after the famous oracle at Delphi (Hasson *et al.*, 2000). It has been defined by Campbell and Cantrill (2001, p.7) as "*a structured, isolated, indirect, multistage interaction method for deriving consensus using repetitive administration of anonymous questionnaires, usually across two or three postal rounds*".

The classical Delphi technique typically employs a first round qualitative questionnaire to identify a wide array of opinions (Keeney *et al.*, 2006) with

administration of quantitative questionnaires during subsequent rounds. Rowe and Wright (1999) characterize the classical Delphi technique by anonymity of Delphi participants, with the advantage that it prevents the possibility of a group of participants dominating over others (Hsu and Sandford, 2007). Delphi provides a means of communication between a group of individuals without the need for the group to meet (Clayton, 1997). Therefore, through the Delphi technique different participants, some of whom have no prior history of communication with one another, can effectively discuss a topic as a group, yet with sufficient time to generate their opinions at their convenience (Akins *et al.*, 2005). Therefore, the Delphi study can generate a group opinion rather than individuals' opinions. Other characteristics of the Delphi technique are iteration, through a number of questionnaire rounds; controlled feedback where participants can reconsider their responses which could be different from responses of previous questionnaires; and the statistical aggregation of group response which is fed back to all participants (Woudenberg, 1991). Originating from the classical Delphi, nowadays different types of Delphi methods can be employed, such as the modified Delphi, decision Delphi, policy Delphi, real time Delphi, e-Delphi, technological Delphi and online Delphi amongst others (Keeney *et al.*, 2011).

The Delphi technique recruits a panel composed of experts in the field of study. The composition of panellists is crucial as it can affect the final findings (Keeney *et al.*, 2001) and therefore definition of the necessary expertise for a particular Delphi study must be defined *a priori*. Murphy *et al.* (1998) conclude that heterogeneity amongst expert panel members leads to better performance than homogeneous groups. Heterogeneity also helps in preventing as much as possible the 'bandwagon effect' where from one questionnaire round to the next (Linstone and Turoff, 2002), respondents potentially change their views to conform with other respondents rather than because the latter is their true opinion (Geist, 2010).

Different descriptive statistics can be used to measure consensus, ranging from measure of central tendency (median and mean) and dispersion (interquartile range, standard deviation, coefficient of variation). Other measures of consensus

include the *a priori* stipulated number of rounds, subjective analysis (where researchers decide to stop the Delphi technique based on subjective criteria), the “average percent of majority opinions” and certain level of agreement (von der Gracht, 2012, p.1529). von der Gracht (2012) argues that measure of consensus by a certain level of agreement is particularly meaningful if Likert scales are used. There is no published evidence on the level of consensus that needs to be achieved. Different studies have employed different minimum consensus levels. Keeney *et al.* (2006) state that as a minimum, a consensus level of 75% should be adopted. Post-group consensus measures the extent to which panellists agree with the final group aggregate after the Delphi has been completed (von der Gracht, 2012).

A limitation of the Delphi technique, especially compared to qualitative approaches to data generation such as face-to-face unstructured interviews, is that participants cannot be probed by the researcher to explore their opinions or ideas in depth (Sandrey and Bulger, 2008). The participants’ personal and professional responsibilities may have an influence on their responses. While this has been acknowledged as a limitation by others (Sandrey and Bulger, 2008), it is also one of the strengths and attributes of the Delphi technique and emphasises the need for defining the inclusion criteria of panellists. Another limitation of the Delphi technique is that it captures opinion of a specific type of ‘expert’ panel at a specific point in time only (Campbell and Cantrill, 2001). Most of these limitations are not exclusive to the Delphi technique but are also attributed to structured questionnaires.

### *The NGT*

The NGT, developed in the late 1960s in the United States (US) by Van de Ven and Delbecq following research funded by the Institute for Research on Poverty and National Aeronautics and Space Administration, is a structured procedure which brings together views from groups of people who speak a common language and have an understanding of the issue in question (Gallagher *et al.*, 1993). NGT is similar to the Delphi in structure, but involves face-to-face meetings that allow discussion between rounds (Rowe and Wright, 1999) and is highly controlled (Gallagher *et al.*, 1993). However, the generation of ideas and

opinions is rigorously individual and independent of other participants (Clayton, 1997). NGT assembles all participants for a specified period of time and asks them to individually list their own ideas on a specific issue. The ideas are then drawn into a discussion and the participants' views are ranked. During the meeting which follows, experts review the rankings and discuss the differences, with a final ranking of ideas through voting (Moule and Goodman, 2014).

### *CDT*

The US National Institutes of Health developed the CDT whereby a selected group of approximately ten people are assembled in a face-to-face chaired open meeting (Murphy *et al.* 1998), which might potentially carry on over the course of a few days, to reach consensus about a specific issue (Moule and Goodman, 2014). An initial systematic review or scoping of the literature may be undertaken to provide evidence to participants before the initial meeting. The expert panel will then identify gaps in knowledge and research priorities (Moule and Goodman, 2014). The face-to-face setting can influence the group's judgement (Murphy *et al.*, 1998).

Differences between the three consensus techniques are highlighted in Table 2.5.

Table 2.5: Comparison between different consensus techniques

	<b>Delphi technique</b>	<b>NGT</b>	<b>CDT</b>
Aim	To gain consensus among a panel of experts	Combines aspects of Delphi technique with that of focus groups	To gain further understanding or consensus in a particular field
Technique used	A series of rounds using questionnaires where information is fed back to panel members	Face-to-face highly controlled meetings for a specified period of time to generate and rank ideas	Face-to-face chaired open meeting by experts followed by a privately chaired meeting by the decision-making group
Panel of experts	Experts in the field	Experts in the field	Multi-disciplinary
Sample size	Varies	Between five to nine people	Approximately ten people
Anonymity	Yes	No	No
Number of rounds	Varies (until consensus is achieved)	Two	One

Of the three techniques described, the Delphi technique is the most commonly used in healthcare research, whilst the NGT is applied mainly for organizational planning and assessment of management systems, with the CDT used mainly for the development of practice guidelines (Moule and Goodman, 2014). Therefore, the Delphi technique was applied in this research. This research adopted different pragmatic assumptions, but mainly committing to an ontological assumption of a single reality in which the panel of experts aimed to agree to a definition of 'medication wastage'. The first round is coherent with an interpretivist paradigm which relies on participants' views, with subsequent rounds adopting an epistemological basis favouring a positivist paradigm utilising a quantitative approach to data collection and the application of statistical measures to determine consensus (Hanafin, 2004).

## **2.9 Quality assurance in research**

Each paradigm described in this chapter requires paradigm-specific criteria to ensure robustness and rigour (Morse *et al.*, 2002). In quantitative research, robustness is measured by applying elements of validity and reliability. In qualitative research, rigour is measured by adopting elements of trustworthiness (Hasson and Keeney, 2011).

### **2.9.1 Robustness in quantitative research**

The criteria to reach the goal of robustness in quantitative research are internal validity, external validity, reliability, and objectivity.

#### **2.9.1.1 Validity**

Validity refers to *"the accuracy and truth of the data being produced in terms of the concepts being investigated, the people and objects being studied and the methods of data collection and analysis being used"* (Farrelly, 2013, p.81).

Research designs are concerned with two types of validity: internal validity, which is concerned with the confidence placed in the cause and effect relationship, and external validity which measures the generalizability of the findings (Hasson and Keeney, 2011). Different validity measures exist and are described in Table 2.6 (Long and Johnson, 2000; Hasson and Keeney, 2011; Howitt and Cramer, 2011).

Table 2.6: Different type of validity measures

<b>Validity</b>	<b>Description</b>
Content validity	Assesses if a test covers the aspects under investigation – depends largely on sampling and careful construction of the instrument
Face validity	Assesses whether from the appearance of items, the test measures what it claims to measure
Construct validity	The development of theoretical and conceptual understanding of the item being measured and assesses how well a construct is understood
Criterion-related validity	Assesses the effectiveness in predicting criterion or indicators of a construct – assesses the correlation between the instrument and findings and an established standard
Concurrent validity	Assesses whether a test is correlated with another test which measures the same concept when administered at the same time
Predictive validity	Assesses whether the measure predicts accurately some later measure
Triangulation	Assesses area under investigation by using multiple types of measure; can be considered as an additional form of addressing construct validity

#### 2.9.1.2 Reliability

Reliability refers to “*the extent to which methods and settings are consistent over time, across groups and between researchers*” (Farrelly, 2013, p.81). There are distinct types of reliability defined in Table 2.7 (Howitt and Cramer, 2011).



Table 2.7: Different reliability measures

Reliability	Description	Measurement
Internal reliability	The consistency by which all items in a scale measure the concept in question	<ul style="list-style-type: none"> <li>• Split half reliability – summation of the first half items of the test and summation of the second half items; the Pearson correlation between the two halves is then calculated</li> <li>• Odd-even reliability – items are divided into odd and even numbers and a correlation between these two sets of scores is made</li> <li>• Cronbach's coefficient alpha - measures the correlation between each different item and then gives an average of all those individual correlations</li> </ul>
Stability over time	The consistency of an item when measured over a time interval	<ul style="list-style-type: none"> <li>• Test-retest reliability – the same measure administered to the same sample at two different points in time; the two sets of data will then be compared statistically using weighted Kappa for ordinal data and kappa coefficient for nominal data (Bowling, 2009) and the Spearman's Rank Correlation Coefficient for continuous data (Williams, 2003), assuming reliability if there have been no changes</li> </ul>
Stability over different measures	The similarity of measurements across similar versions of a test	<ul style="list-style-type: none"> <li>• Alternate forms reliability – Tests available in two versions containing different items; a correlation between these two tests is then measured</li> </ul>

### 2.9.1.3 Objectivity

One should ensure that the tested measure produces similar outcomes irrespective of who carries out the measure, thus the term objectivity (Howitt and Cramer, 2011).

Attention was paid to aspects of data validity and reliability throughout this research by implementing face and content validity, piloting and triangulation.

### 2.9.2 Rigour in qualitative research

Aspects of trustworthiness in qualitative research include credibility, transferability, dependability and confirmability and are defined in Table 2.8.

Table 2.8: Components of trustworthiness [Adapted from Hasson and Keeney, 2011; Farrelly, 2013]

Trustworthiness	Description
Credibility (comparable to internal validity)	The degree to which meaning or truth of data can be recognised
Transferability (comparable to external validity)	The degree of transferability of the findings to other settings
Dependability (comparable to reliability)	Study findings need to be consistent and correct
Confirmability (comparable to objectivity)	Conveys neutrality which requires an audit or decision trail

Credibility and transferability can be ensured through the following (Long and Johnson, 2000):

- self-description and reflective journal-keeping – researcher reflects on own beliefs regarding area under investigation and makes these beliefs explicit
- respondent validation – checking findings of data collection with members of studied group
- prolonged involvement – spending a significant length of time in contact with members of studied group and with the topic under investigation
- persistent observation – focuses on the observation in more detail

- peer debriefing - discusses emerging findings at intervals with knowledgeable colleagues, or present and defend research at national research conferences, or present the findings and implications to interested groups
- triangulation - employment of multiple data sources, data collection methods, or investigators.

This research used peer debriefing and triangulation to ensure credibility and transferability.

The means by which dependability and confirmability can be ensured is through audit of the decision trail and triangulation (Long and Johnson, 2000). A detailed decision trail was kept, as suggested by Sandelowski (1986), which includes description, explanation and justification of:

- origin of research interest
- researcher views of the study
- the specific purposes of the study
- participants selection and recruitment
- the impact the subjects and the researcher(s) had on each other
- details of data collection
- duration of data collection
- data synthesis, analysis, interpretation, and presentation, including coding instructions and definitions, category development, notes and memos formulated during the study and the way different data were linked to each other
- weighting of various elements of the data
- the techniques used to determine the applicability of the data. The latter was achieved through a detailed description of the research findings to provide adequate information for evaluating the analysis of data.

### ***2.9.3 Bias as a limitation in research***

Bias is a form of systematic error which alters the measurement process, thus compromising validity, reliability and trustworthiness in relation to the degree of the bias. Thus, the goal of any research is to minimise bias while recognising that it can never be completely excluded (Sica, 2006). Biases are categorised into

random biases, concerned with sampling variability or measurement precision and systematic biases, defined as “*reproducible errors that produce a consistently false pattern of differences between the observed and the true values*” (Krishna *et al.*, 2010, p.2320). The most common categories of bias are described in Table 2.9 (Marlowe, 2000; Litosseliti, 2007; Bowling, 2009; Krishna *et al.*, 2010) together with measures taken to minimise bias in this research.

Table 2.9: Most common categories of bias and measures taken to minimise bias in this research

Biases in research	Measures taken to minimise bias in this research
<p>Selection biases</p> <p>1. Volunteer or referral bias - individuals who volunteer or are referred to participate in a study are different than non-volunteers/non-referrals</p> <p>2. Non-respondent bias – those who do not respond to a survey differ from those who respond</p>	<p>1. In Delphi technique (chapter 4) volunteer or referral bias could not be completely excluded, especially when selecting patients who were nominated by patient associations; however, it was minimised by sampling participants occupying the highest position in their field rather than volunteers within the field; participants for questionnaires (chapter 5) were randomly selected and those for focus groups (chapter 6) purposively selected; participants for focus groups were chosen through the questionnaires to minimise selection bias as much as possible</p> <p>2. A number of measures were taken to enhance response rates in questionnaires and are discussed in respective chapters; this bias could not be eliminated completely, particularly in the focus group as those expressing an interest in participation may have been more interested in the topic</p>

3. Respondent order effect (some participants go first and others go last), dominance/shyness bias (dominant or quiet personalities) and acquaintance/stranger bias (participants who know each other thus effecting each other's response)

3. Potentially dominant or reluctant focus participants were managed through effective moderation; rules of behaviour were established at the outset

Measurement biases or other biases during data collection and generation

1. Instrument bias – calibration errors leading to inaccurate recordings

1. Not applicable to this research

2. Insensitive measure bias - when the measurement tool is not sensitive enough to detect important differences in the variable of interest

2. Measurement tools were validated and piloted

3. Expectation bias – when there is no masking or blinding

3. Not applicable to this research

4. Recall or memory bias – outcomes being measured require individuals recalling past events

4. Questionnaires did not require participants to recall events beyond six months

5. Attention bias – individuals are aware of their involvement in study and tend to give more favourable responses or perform better due to the attention received

5. Minimised through the use of self-administered questionnaires. During focus groups bias was minimised by following a topic guide

6. Verification or work-up bias - when the sample used to assess a measurement tool is restricted only to those who

6. Not applicable to this research

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have the condition of factor being measured

7. Acquiescence response set bias where the respondent tends to go with the 'yes-saying'

8. Assumption bias which can arise due to a faulty logic of the researcher

9. Evaluation apprehension where respondents might be anxious in answering specific questions and therefore might not answer truthfully

10. Reporting bias whereby respondents fail to disclose the information that is being asked from them

11. Social desirability bias

12. Interviewer bias

13. Expectancy bias whereby participants have different expectations of the purpose of the study

Intervention biases (mainly associated with research that compares groups)

1. Contamination bias – when participants from control group receive intervention inadvertently

7. Questionnaire items were mainly in the form of Likert scales, semantic differential scales and close-ended questions with standardised options

8. Questionnaire validation, piloting and peer debriefing were employed

9. Minimised through the use of self-administered questionnaires

10. Minimised through the use of self-administered questionnaires

11. Minimised by providing clear purpose of the study

12. Focus group moderator facilitated rather than led the discussions

13. Clear statements of the purpose of the research phases

1. Not applicable to this research

2. Co-intervention bias – when some participants receive other interventions at the same time	2. Not applicable to this research
3. Timing bias – timing of intervention can affect outcomes	3. Less relevant to the study of medication wastage
4. Compliance bias – difference in participants' adherence to intervention	4. Not applicable to this research
5. Withdrawal bias – individuals who leave the study differ from those that remain	5. Not applicable to this research
6. Proficiency bias – when interventions are not applied equally to subjects	6. Not applicable to this research



## **2.10 Philosophy of ethical research**

Ethics is a branch of moral philosophy. Three central branches of ethics have been described by Comstock (2013, p.10):

- "1. descriptive ethics, the empirical study of what people actually do, believe, and value;*
- 2. normative ethics, the evaluative study of how we should behave in particular cases;*
- 3. metaethics, the philosophical study of the foundations of moral language."*

Moral philosophy is guided by normative ethics. Theories of normative ethics guide researchers on how to behave when faced with conflicting interests. Four common theories are: egoism, contractualism, moral rights and utilitarianism. Description of each theory is provided in Figure 2.3. Based on some of these and other philosophical theories, Shamoo and Resnik (2009) suggest 12 principles for ethical conduct in research (Table 2.10). These principles are in line with the quality of evidence described earlier in this chapter and adopted throughout this research.

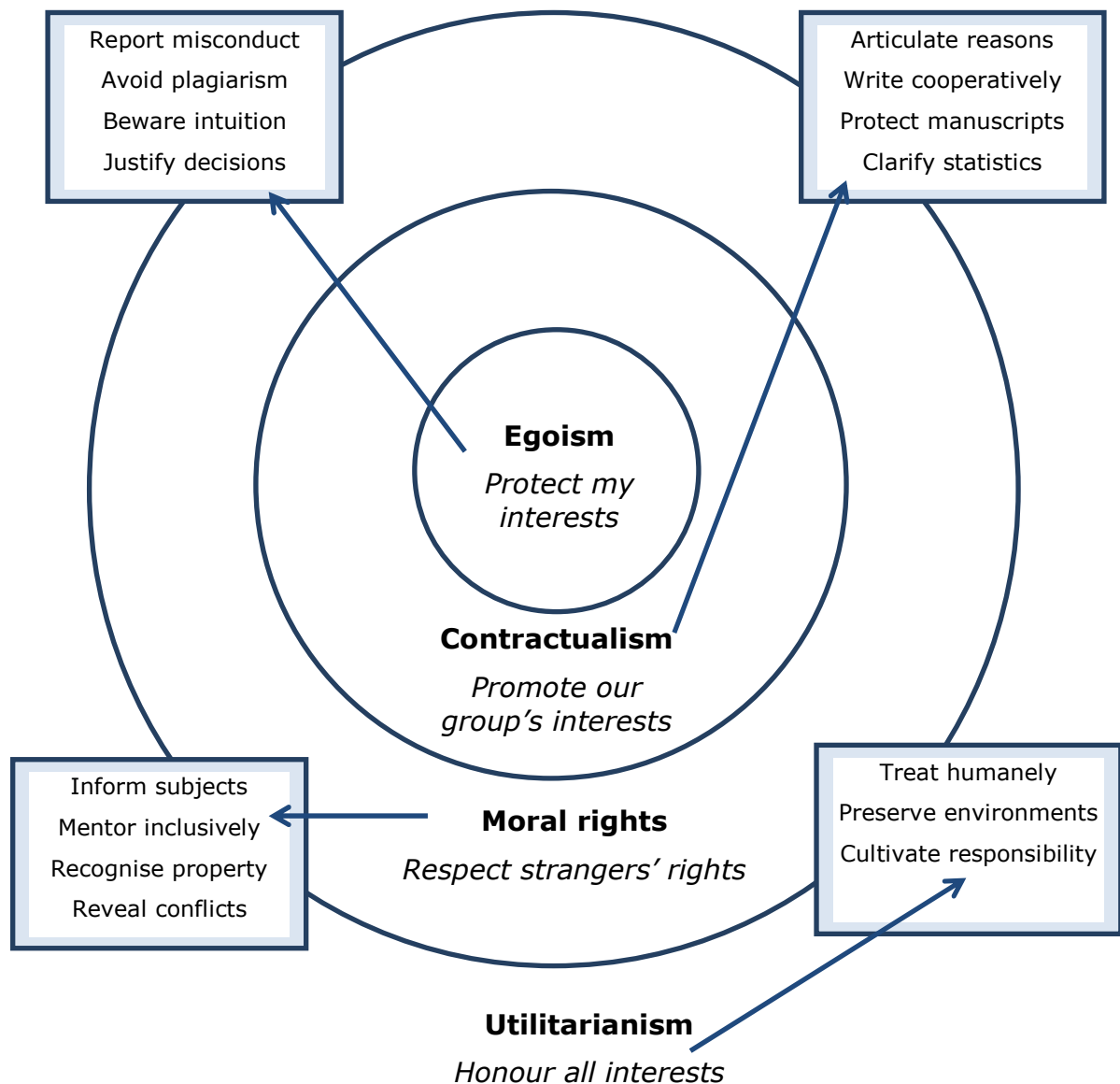


Figure 2.3: The expanding moral circle described by Comstock (2013)

Table 2.10: The twelve principles for ethical conduct in research [Adapted from Shamoo and Resnik, 2009]

<b>Twelve principles for ethical conduct in research</b>	
Honesty	Objectivity
Openness	Confidentiality
Carefulness	Respect for colleagues
Respect for intellectual property	Respect for the law
Respect for research subjects	Stewardship
Social responsibility	Freedom

### **2.11 Schematic summary of the research approaches**

Figure 2.4 illustrates a schematic summary of the research paradigms, methodologies and methods employed for each phase of the research.

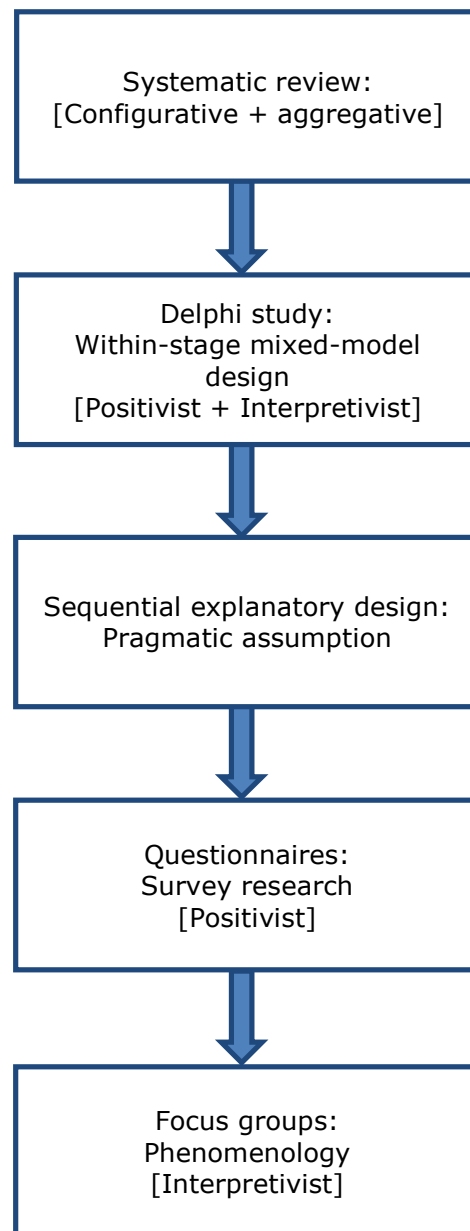


Figure 2.4: Methodological phases of current research

## Chapter 3

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*"The first precept was never to  
accept a thing as true until I knew  
it as such without a single doubt"*

Rene Descartes  
[Philosopher, mathematician and writer  
1596-1650]

## ***Systematic review of the literature on medication wastage: an exploration of causative factors and effect of interventions***

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This chapter provides a detailed account of a systematic review of the literature on medication wastage, with emphasis on introduction, rationale for undertaking a systematic review, method, results, discussion and reflection.

### **3.1 Introduction**

#### **3.1.1 Systematic reviews**

As depicted in Figure 2.2 (chapter 2), systematic reviews occupy the highest echelon in terms of the quality of evidence. Ng and Peh (2010, p.362) describe systematic reviews as the *"best, least biased and most rational way to organise, gather, evaluate and integrate scientific evidence from the rapidly-changing medical and healthcare literature"*. The need for systematic reviews to aid decision-making has been articulated by many. Mulrow (1994) highlights that at a time when policy makers and HCPs are inundated with different sources and amounts of information, systematic reviews assimilate this information and generate data for rational decision making. Mulrow (1994) further describes that systematic reviews determine whether scientific findings are consistent and can be generalised across populations, settings, and treatment variations, or whether there are significant variations between particular subsets.

The systematic review question is framed in terms of the population, intervention(s), comparator(s) and outcomes of the studies that will be included in the review (PICO) (Centre for Reviews and Dissemination, 2009). More recently, focus has been placed on systematic reviews of studies employing qualitative approaches. For qualitative reviews the question frame is around the population, phenomenon of interest and context. A systematic review is conducted by a review team with at least a minimum of two researchers working independently to minimize bias and error at all stages of the review.

### ***3.1.2 Rationale for systematic review***

To date, there have been no systematic reviews focusing on potential and actual causative factors of medication wastage, their relative importance and intervention studies with wastage as a key outcome measure. Thus, the rationale for this systematic review was to collate all evidence regarding these outcome measures and to identify gaps in the literature.

### ***3.1.3 Study aim and research questions***

The overall aim of the systematic review was to appraise critically, synthesize and present the available evidence on the possible causative factors associated with medication wastage in all populations and settings and the effectiveness of any interventions focusing on wastage reduction as an outcome measure.

More specifically, this review sought to answer the following questions:

1. What is the methodological quality of the literature related to medication wastage?
2. What are the definitions and scope of medication wastage?
3. What are the documented factors which give rise to medication wastage?
4. Which interventions are effective in reducing medication wastage?

## ***3.2 Review methods***

### ***3.2.1 Systematic review protocol***

An initial scoping literature review, described in chapter 1, was carried out to obtain a preliminary perspective of this area of interest. A protocol was then developed by the principal researcher in collaboration with the other members of the research team to provide full coverage of the systematic review process. The Centre for Reviews and Dissemination (CRD) guidance on systematic reviews (Centre for Reviews and Dissemination, 2009) and the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2011) were used as reference tools to aid construction of the review protocol. Following several revisions amongst the supervisory team, the protocol was externally reviewed by Professor Peter Reid, Professor of Librarianship and Head of Department of Information Management at Robert Gordon University.

### **3.2.2 Inclusion criteria**

#### *3.2.2.1 Study Population and Setting*

All studies carried out in any setting were included. Both male and female populations of different ethnicity and of all ages, including patients, HCPs (doctors, pharmacists and nurses) and healthcare students, were included.

#### *3.2.2.2 Phenomena of interest*

While there was no intervention (as for reviews of effectiveness or cost-effectiveness), the review considered studies that investigated the phenomenon of medication wastage from a number of different perspectives (e.g. doctors, nurses, pharmacists).

#### *3.2.2.3 Comparators*

There were no comparators in this systematic review.

#### *3.2.2.4 Outcomes*

- Methodological quality of the literature related to medication wastage
- Definition and scope of medication wastage
- Documented factors associated with or contributing to medication wastage
- Any outcome related to reduction of medication wastage

#### *3.2.2.5 Study design*

All study designs using any methodological approach, including qualitative, quantitative and mixed, were considered. Primary research studies, reviews, systematic reviews and meta-analysis were included.

#### *3.2.2.6 Language*

Limiters were used in databases to include only English language records. Due to time constraints it was thought to be impractical to engage a translator to translate non-English literature.

#### *3.2.2.7 Date limit*

The search was limited to literature dated from 1970 to the present. During the scoping review, no key studies were identified preceding 1970 and hence this date limit was chosen.

#### **3.2.3 Exclusion criteria**

Studies describing medical wastage (not pharmacologically related e.g. clinical tissue waste and medical devices) and studies focusing solely on medication storage and disposal were excluded. Studies focusing solely on the potential impact of medication wastage on the environment were also excluded. Studies reported in non-English language (the number of such studies was recorded), grey literature and conference abstracts were also excluded as information was considered to be incomplete.

#### **3.2.4 Search Strategy**

The search was applied to five relevant databases: Cumulative Index to Nursing & Allied Health Literature (CINAHL) (EBSCO Publishing, 2011), Embase (Elsevier, 2011), Medline (U.S. National Library of Medicine, 2011), PubMed (National Center for Biotechnology Information, 2011), Science Citation Index (SCI) (Web of Science<sup>®</sup>, 2011), and The Cochrane Library (The Cochrane Collaboration, 2010). The search commenced at the start of June 2011 and was completed by the end of September 2011.

CINAHL includes some nursing and allied health journals not included in Medline. Embase covers over 24 million indexed records with more than 7,500 journals; 2,000 biomedical titles are not offered by Medline. Medline offers over 18 million references to journal articles, with approximately 5,516 worldwide journals. Medline covers core biomedical subjects; 2,000 journals are not offered by Embase. PubMed comprises over 20 million citations; it is a free resource and provides access to older references. Moreover, PubMed records entries in advance of Medline indexing. SCI includes cited reference searching, with records listing references from original record. The Cochrane Library is a collection of six databases, including a database of systematic reviews containing a high level of



evidence. The search strategy was adapted to meet the specifications of the different databases as described in Appendix 3.1.

Study selection was carried out by an initial screening of all titles, followed by screening of abstracts and by full paper screening against systematic review aim and inclusion/exclusion criteria. Reference lists were scrutinised and any additional relevant titles included. During the title and abstract screening phases, inter-rater reliability was confirmed by two independent researchers (first author and one of the other authors) comparing a random sample of 10% of titles and abstracts.

### **3.2.5 Quality assessment and data extraction**

Quality assessment was performed using two quality assessment forms which were adapted from standard sources, each specific for primary quantitative studies or literature reviews (Kmet *et al.*, 2004; Koufogiannakis *et al.*, 2006; Public Health Resource Unit, 2006; Young and Solomon, 2009) (Appendix 3.2). These modified forms were pilot tested on 10% of the sample of reports to identify any further modifications required. Data extraction tools were developed and included information pertinent to the review aim (Appendix 3.3). Papers were reviewed for quality and data extracted by the principal researcher (first author) and independently by a second researcher (one of the other authors). Any inconsistencies amongst the two reviewers were resolved by consensus.

### **3.2.6 Data synthesis**

Due to differences in study design and the heterogeneous nature of reported data, a meta-analysis was considered inappropriate. A narrative synthesis approach was used to highlight methodological quality and study findings. Attention was paid to the robustness of the synthesis in terms of methodological quality of the included studies and/or the credibility of the product of the synthesis process by reflecting critically on the synthesis process (Centre for Reviews and Dissemination, 2009). A conclusion was then generated relating to the review aim (Brien *et al.*, 2010) and recommendations for further research provided.

### **3.3 Results**

#### **3.3.1 Search results**

Forty-three papers (42 primary quantitative studies and one literature review) were identified. The Prisma flowchart (Liberati *et al.*, 2009) is given in Figure 3.1. A total of 20,356 titles were retrieved from all databases, of which 6,199 were duplicates within the same databases, leaving 14,157 titles to be screened. Of these, 13,450 were excluded as they were not related to medication wastage. A further 274 were duplicates between different databases and were also excluded. Four hundred and thirty-three abstracts were screened, of which 376 were excluded giving a resultant 57 relevant papers. Following full paper screening, 31 fulfilled the inclusion criteria, with another 12 papers derived from the references of these, resulting in a total of 43 for critical appraisal. The list of included papers is presented in Appendix 3.4, whilst excluded studies and the reasons for exclusions are presented in Appendix 3.5.

The review by White (2010) focused on economic modelling rather than on contributing factors hence was excluded from the systematic review. Critical appraisal and data extraction was performed for 42 studies (no studies were excluded on the basis of quality). Papers were published between 1975 and 2010.

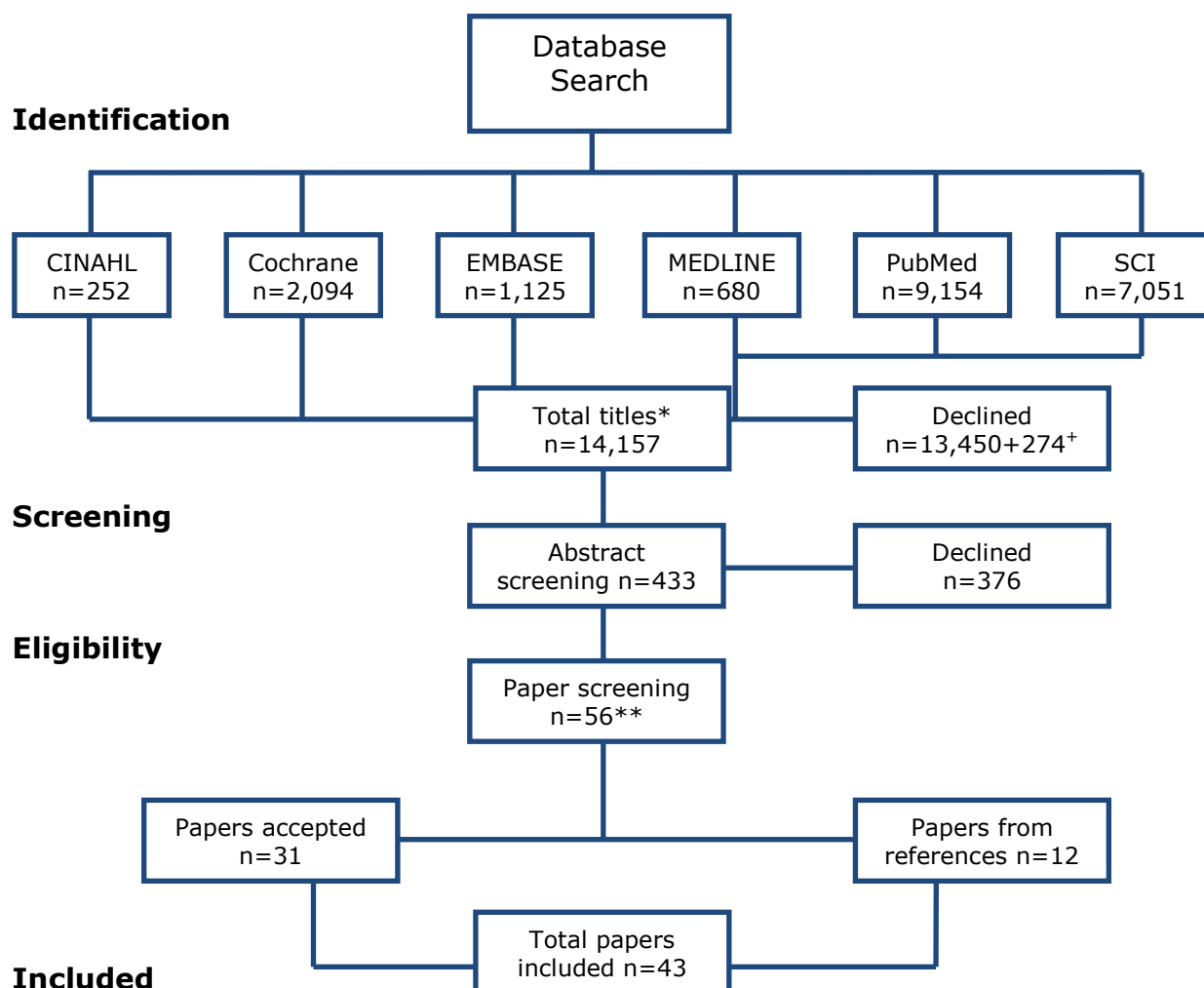


Figure 3.1: Prisma diagram of inclusion and exclusion of identified published literature for systematic review

(\*Number of titles screened after duplicates from each database removed)

<sup>+</sup>274 titles were duplicates in between different databases and were removed

\*\* One other paper could not be retrieved

### 3.3.2 Study design

The 42 studies were all of cross-sectional design, with most using a questionnaire as the data collection tool. Studies largely focused on medication returns, with 31 (74%) (Halloran *et al.*, 1978; David *et al.*, 1979; Henderson, 1984; Longmore *et al.*, 1990; Kiyangi and Lauwo, 1993; Longmore *et al.*, 1995; Cook, 1996; Hawksworth *et al.*, 1996; Isacson and Olofsson, 1999; Bronder and Klimpel, 2001; Grant, 2001; Abou-Auda, 2003; Ekedahl, 2003; Ekedahl *et al.*, 2003; Wasserfallen *et al.*, 2003; Garey *et al.*, 2004; Wongpoowarak *et al.*, 2004; Langley *et al.*, 2005; Zargarzadeh *et al.*, 2005; Ekedahl, 2006; Abahussain and Ball, 2007; Al Siyabi and Al Riyami, 2007; Mackridge and Marriott, 2007; Mackridge *et al.*, 2007; Braund *et al.*, 2008; Coma *et al.*, 2008; Braund *et al.*,

2009a; James *et al.*, 2009; Guirguis, 2010; Pervanas *et al.*, 2010; Sweileh *et al.*, 2010) quantifying medication wastage in terms of packages, containers, items, or units returned over the period of collection.

The majority of the studies which quantified medication wastage (18/40) were undertaken in a community pharmacy setting (David *et al.*, 1979; Harris *et al.*, 1979; Longmore *et al.*, 1995; Cook, 1996; Hawksworth *et al.*, 1996; Boivin, 1997; Isacson and Olofsson, 1999; Bronder and Klimpel, 2001; Grant, 2001; Ekedahl, 2003; Ekedahl *et al.*, 2003; Garey *et al.*, 2004; Ekedahl, 2006; Braund *et al.*, 2007; Braund *et al.*, 2008; Coma *et al.*, 2008; Braund *et al.*, 2009a; James *et al.*, 2009) whilst three were set in both community pharmacies and GP surgeries (Langley *et al.*, 2005; Mackridge and Marriott, 2007; Mackridge *et al.*, 2007). Hospital pharmacy was the setting in another four studies (Henderson, 1984; Abahussain *et al.*, 2006; Al Siyabi *et al.*, 2007; Guirguis, 2010) and two used both community and hospital pharmacies (Bradley and Williams, 1975; Longmore *et al.*, 1990). Nine studies were performed in participants' households (Halloran *et al.*, 1978; Kiyangi and Lauwo, 1993; Abou-Auda, 2003; Wasserfallen *et al.*, 2003; Wongpoowarak *et al.*, 2004; Subratty and Hased Nathire, 2005; Zargarzadeh *et al.*, 2005; Abahussain and Ball, 2007; Sweileh *et al.*, 2010), three in a retirement community/local health plan facility (Brown and Kirk, 1984; Morgan, 2001; Pervanas *et al.*, 2010) and one via a Poisons Centre website (Braund *et al.*, 2009b). The two studies which investigated instalment dispensing as a potential solution to reduce medication wastage were carried out in a general medical practice (Millar *et al.*, 2003; Millar *et al.*, 2009).

### **3.3.3 Quality assessment results**

The methodological strengths and weaknesses of the included papers are reported in Table 3.1 (first 21 studies) and Table 3.2 (the other 21 studies). Y means 'Yes' and indicates that the study fulfils the respective quality assessment question. 'P' refers to 'Partial' and indicates that the study partially fulfils the question. 'N' refers to 'No' which means that the study did not fulfil the criterion, 'U' means the study was 'Unclear' in the respective criterion and 'N/A' means the question was 'Not applicable' for the particular study.

Table 3.1: Methodological strengths and weakness of studies regarding medication wastage

Question	Abahussain and Ball, 2007	Abahussain <i>et al.</i> , 2006	Abou-Auda, 2003	Al Siyabi and Al Riyami, 2007	Boivin, 1997	Bradley and Williams, 1975	Braund <i>et al.</i> , 2008	Braund <i>et al.</i> , 2009a	Braund <i>et al.</i> , 2009b	Braund <i>et al.</i> , 2007	Bronder and Klimpel, 2001	Brown and Kirk, 1984	Coma <i>et al.</i> , 2008	Cook, 1996	David <i>et al.</i> , 1979	Ekedahl, 2003	Ekedahl <i>et al.</i> , 2003	Ekedahl, 2006	Garey <i>et al.</i> , 2004	Guirguis, 2010	Grant, 2001
1. Did the study ask a clearly-focused and relevant question(s) (aims, objectives)?	Y	Y	Y	Y	Y	N	P	Y	P	Y	N	Y	Y	P	P	N	Y	Y	Y	Y	Y
2. Was a definition of waste described?	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3. Was the definition of waste for this study clearly explained?	N	N	Y	P	P	P	P	N	P	Y	P	P	P	P	N	Y	P	P	Y	P	P
4. Was ethics approval reported?	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
5. Was the study design/method justified and appropriate for the research question(s)?	P	N	Y	P	P	P	P	P	P	P	P	Y	Y	P	P	P	P	P	Y	P	Y
6. Were limitations of study design/method considered?	P	P	N	P	N	N	P	P	P	P	N	P	P	N	N	N	Y	P	N	Y	N
7. Was the sampling population and strategy clear and justified?	P	P	N	P	N	P	P	Y	P	Y	Y	P	P	Y	P	P	P	P	N	N	P
8. Was the sample size justified?	N	Y	N	N	N	N	N	N	N	N	N	N	P	P	P	N	P	P	N	N	N

9. Were participant recruitment strategies clearly described?	P	P	N	N	N	N	P	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y	P	N
10. Were the data collection tools described, piloted and validated?	P	Y	Y	P	P	N	P	P	P	P	P	P	P	P	P	N	Y	P	P	N	P
11. Were analysis strategies (quantitative and any open comments) clear and justified?	N	N	P	N	N	Y	P	Y	N	P	N	P	P	P	N	P	P	N	P	P	P
12. Were participant characteristics sufficiently described?	N	Y	N	P	N	N	P	P	N	P	N	N	Y	N	N	N	P	N	N	N	N
13. Is the loss of any of the participants explained?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Y	NA	NA	NA
14. Are the results of the study clearly explained and do the results address the original research question?	P	Y	P	P	P	Y	Y	Y	P	Y	P	P	Y	Y	Y	P	P	P	P	P	Y
15. Were limitations (bias, confounders, generalizability etc.) of findings considered?	P	P	N	N	N	N	Y	Y	N	Y	N	N	P	N	P	P	Y	P	Y	Y	P
16. Were all important outcomes considered so the results can be applied?	P	P	Y	N	N	Y	Y	Y	P	Y	P	P	P	Y	Y	P	Y	Y	P	P	Y
17. Are the conclusions supported by the findings?	P	Y	Y	N	N	N	Y	Y	P	Y	P	P	Y	Y	Y	N	P	Y	Y	P	N
18. Is conflict of interest reported?	Y	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	Y	N

Table 3.2: Methodological strengths and weakness of studies regarding medication wastage

Question	Halloran <i>et al.</i> , 1978	Harris <i>et al.</i> , 1979	Hawksworth <i>et al.</i> , 1996	Henderson, 1984	Isacson and Olofsson, 1999	James <i>et al.</i> , 2009	Kivungi and Lauwo, 1993	Langley <i>et al.</i> , 2005	Longmore <i>et al.</i> , 1990	Longmore <i>et al.</i> , 1995	Mackridge and Marriott, 2007	Mackridge <i>et al.</i> , 2007	Millar <i>et al.</i> , 2003	Millar <i>et al.</i> , 2009	Morgan, 2001	Pervanas <i>et al.</i> , 2010	Subraty and Hassed Nathire, 2005	Sweileh <i>et al.</i> , 2010	Wasserfallen <i>et al.</i> , 2003	Wongpoowarak <i>et al.</i> , 2004	Zargarzadeh <i>et al.</i> , 2005
1. Did the study ask a clearly-focused and relevant question(s) (aims, objectives)?	P	P	U	Y	Y	Y	N	Y	P	P	Y	P	P	Y	Y	P	Y	Y	Y	Y	Y
2. Was a definition of waste described?	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3. Was the definition of waste for this study clearly explained?	Y	N	P	P	P	P	P	P	P	P	P	Y	N	N	Y	Y	N	Y	Y	P	Y
4. Was ethics approval reported?	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y
5. Was the study design/method justified and appropriate for the research question(s)?	Y	P	P	Y	Y	Y	P	Y	P	Y	Y	Y	N	Y	P	P	P	Y	Y	P	Y
6. Were limitations of study design/method considered?	Y	N	P	N	P	N	N	P	P	P	Y	P	N	Y	Y	P	N	N	P	Y	P
7. Was the sampling population and strategy clear and justified?	P	N	P	N	Y	Y	P	P	P	P	Y	Y	U	P	P	Y	P	P	Y	Y	Y
8. Was the sample size justified?	N	N	N	N	N	N	Y	N	N	N	P	P	N	Y	N	N	P	N	N	Y	Y

9. Were participant recruitment strategies clearly described?	P	Y	Y	Y	N	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	P	Y	P	Y
10. Were the data collection tools described, piloted and validated?	P	N	P	P	N	P	P	P	P	P	P	P	N	Y	P	N	P	P	P	Y	P
11. Were analysis strategies (quantitative and any open comments) clear and justified?	P	N	N	N	P	Y	P	N	P	P	P	P	N	N	N	N	P	P	Y	Y	Y
12. Were participant characteristics sufficiently described?	N	N	Y	N	P	N	N	Y	N	N	P	Y	Y	N	Y	N	Y	Y	Y	Y	Y
13. Is the loss of any of the participants explained?	NA	NA	Y	NA	NA	NA	Y	NA	NA	NA	NA	NA	Y	Y	NA	NA	NA	NA	NA	NA	NA
14. Are the results of the study clearly explained and do the results address the original research question?	Y	P	Y	Y	Y	P	P	Y	Y	Y	Y	Y	N	P	P	P	P	Y	Y	Y	Y
15. Were limitations (bias, confounders, generalizability etc.) of findings considered?	Y	N	P	P	N	Y	N	Y	N	N	Y	Y	P	Y	Y	N	N	P	P	Y	N
16. Were all important outcomes considered so the results can be applied?	P	N	Y	Y	Y	Y	P	Y	Y	Y	Y	Y	N	Y	Y	P	Y	Y	Y	Y	Y
17. Are the conclusions supported by the findings?	N	P	N	P	Y	P	P	P	Y	Y	Y	Y	N	Y	P	P	Y	Y	Y	Y	Y
18. Is conflict of interest reported?	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N



Results of the quality assessment of these studies are given in Figure 3.2, highlighting that while 62% (n=26) stated a clear research aim (Brown and Kirk, 1984; Henderson, 1984; Boivin, 1997; Isacson and Olofsson, 1999; Grant, 2001; Morgan, 2001; Abou-Auda, 2003; Ekedahl *et al.*, 2003; Wasserfallen *et al.*, 2003; Garey *et al.*, 2004; Wongpoowarak *et al.*, 2004; Langley *et al.*, 2005; Subratty and Hased Nathire, 2005; Zargarzadeh *et al.*, 2005; Abahussain *et al.*, 2006; Ekedahl, 2006; Abahussain and Ball, 2007; Al Siyabi and Al Riyami, 2007; Braund *et al.*, 2007; Mackridge and Marriott, 2007; Coma *et al.*, 2008; Braund *et al.*, 2009a; James *et al.*, 2009; Millar *et al.*, 2009; Guirguis, 2010; Sweileh *et al.*, 2010), 40% (n=17) adopted an appropriate research design (Halloran *et al.*, 1978; Brown and Kirk, 1984; Henderson, 1984; Longmore *et al.*, 1995; Isacson and Olofsson, 1999; Grant, 2001; Abou-Auda, 2003; Wasserfallen *et al.*, 2003; Garey *et al.*, 2004; Langley *et al.*, 2005; Zargarzadeh *et al.*, 2005; Mackridge and Marriott, 2007; Mackridge *et al.*, 2007; Coma *et al.*, 2008; James *et al.*, 2009; Millar *et al.*, 2009; Sweileh *et al.*, 2010). Research design was considered to be partial or inappropriate for those studies where the method was limited and did not target all of the study's objectives. Two percent (n=1) defined medication wastage or related terms (Abou-Auda, 2003) and 12% (n=5) justified sample size (Kiyangi and Lauwo, 1993; Wongpoowarak *et al.*, 2004; Zargarzadeh *et al.*, 2005; Abahussain *et al.*, 2006; Millar *et al.*, 2009).

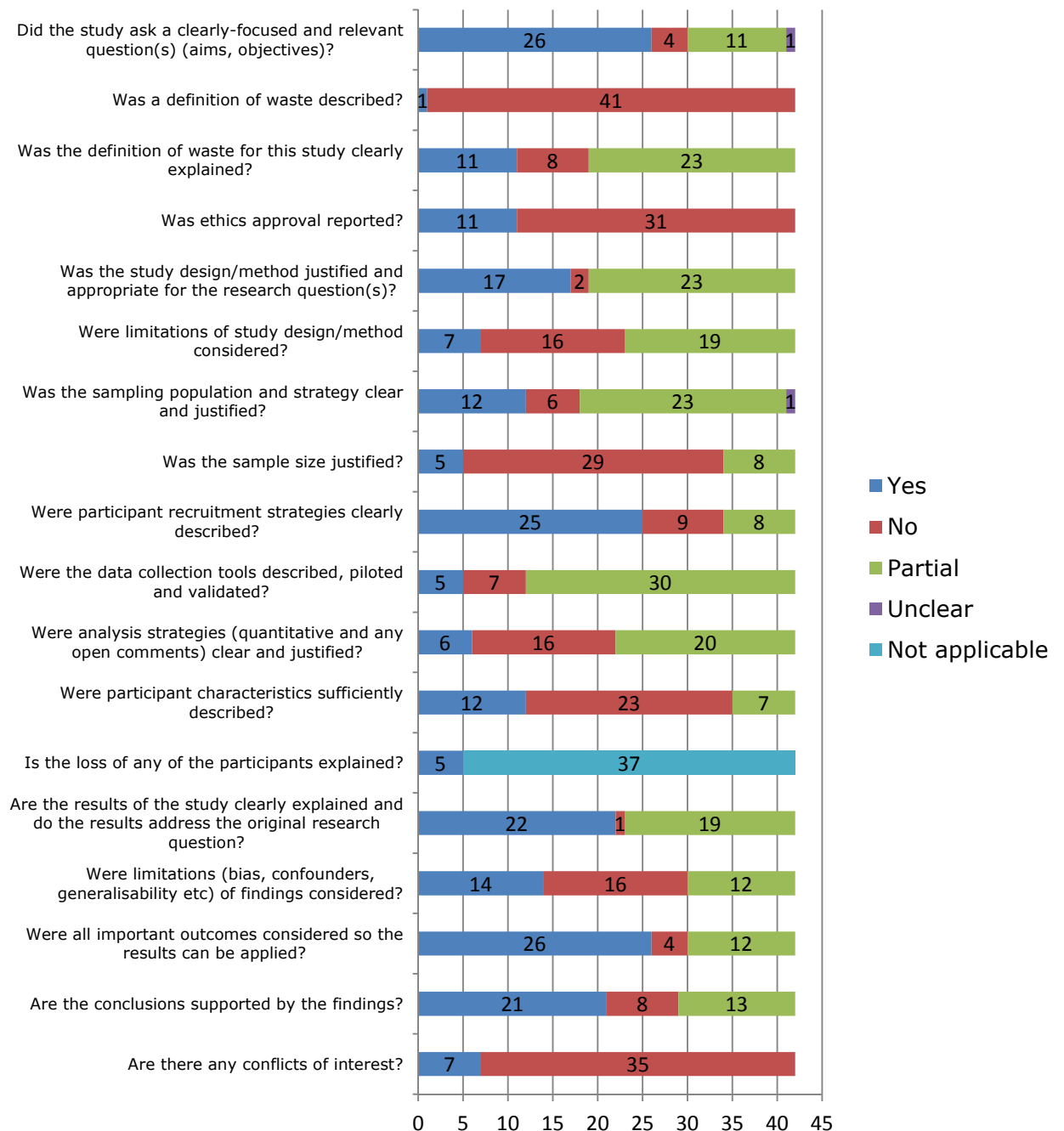


Figure 3.2: Stacked bar chart representing quality of quantitative studies

### 3.3.4 Definition and scope of medication wastage

A general definition of medication wastage (or related terms) was reported only in one (Abou-Auda, 2003, p.1277) primary research paper (2%) and stated that medication wastage refers to *"any drug product, either dispensed by a prescription or purchased over-the-counter (OTC) that is never fully consumed. Medication wastage may be due to poor compliance of patients, excessive and*

*irrational prescribing, or the lack of control of the sales of prescription medications in the community pharmacy".*

The type of wastage that was being studied was described clearly in eleven papers (26%) (Halloran *et al.*, 1978; Morgan, 2001; Abou-Auda, 2003; Ekedahl, 2003; Wasserfallen *et al.*, 2003; Garey *et al.*, 2004; Zargarzadeh *et al.*, 2005; Braund *et al.*, 2007; Mackridge *et al.*, 2007; Pervanas *et al.*, 2010; Sweileh *et al.*, 2010) with little consistency between studies. While all eleven referred to 'medication', five explicitly described medication as 'prescribed and OTC medications' (Abou-Auda, 2003; Wasserfallen *et al.*, 2003; Garey *et al.*, 2004; Zargarzadeh *et al.*, 2005; Pervanas *et al.*, 2010). Some studies mentioned possible causative factors within the scope of the definitions for their study, which is the main focus of this study. Four made reference to the 'expiry date' in the definition for their study (Halloran *et al.*, 1978; Morgan, 2001; Zargarzadeh *et al.*, 2005; Sweileh *et al.*, 2010), with Halloran *et al.* (1978, p.85) referring to wastage as "*drugs which are no longer in use because ... the expiry date of the drug is passed (or it was thought to be too old)*", Morgan (2001, p.779) stating that in their study wastage was defined as "*any medication prescribed within the past year that the study participant did not intend to use before its expiration date*", Sweileh *et al.* (2010, p.60) referring to medication wastage in their study as "*any drug product that had expired or had no clear expiration date or not being used at all*" and Zargarzadeh *et al.* (2005, p.972) describing medication wastage as "*any medication (prescription or over-the-counter [OTC]) that had expired or did not have a clear expiration date on the labelling or package*".

Abou-Auda (2003) made reference to patient 'non-adherence', to 'excessive and irrational prescribing' and to the 'lack of control of the sales of prescription medications in the community pharmacy' in their definition of medication wastage for their study. These inconsistencies limited any direct inter-study comparisons.

### **3.3.5 Factors associated with or contributing to medication wastage**

Table 3.3 summarises studies reporting reasons for medication wastage. Thirteen studies (31%) (Cook, 1996; Hawksworth *et al.*, 1996; Morgan, 2001;

Wongpoowarak *et al.*, 2004; Langley *et al.*, 2005; Abahussain *et al.*, 2006; Ekedahl, 2006; Mackridge and Marriott, 2007; Braund *et al.*, 2008; Coma *et al.*, 2008; Braund *et al.*, 2009a; Braund *et al.*, 2009b; James *et al.*, 2009) investigated reasons associated with or contributing to wastage that were given by patients or their carers. Eight were surveys amongst patients or someone on their behalf (Cook, 1996; Abahussain *et al.*, 2006; Braund *et al.*, 2008; Braund *et al.*, 2009b; James *et al.*, 2009), customers returning medicines (Coma *et al.*, 2008; Braund *et al.*, 2009a) and retirement community residents (Morgan, 2001) ranging from 73 retirement community residents (Morgan, 2001) to 653 individuals returning medicines (Braund *et al.*, 2009a). Three were interviews of individuals from households (n=523) (Wongpoowarak *et al.*, 2004), individuals returning medications to pharmacies and GP surgeries (n=not specified) (Langley *et al.*, 2005), and patients (n=1,022) (Ekedahl, 2006). It was not clear whether the study by Hawksworth *et al.* (1996) (n=366 patients) and Mackridge and Marriott (2007) (n=910 patients) was an interview or self-reported survey. None of the studies focused on collecting data from prescribers, other HCPs, or stakeholders.

Table 3.3: Study design of papers included in the systematic review

<b>Authors Year, Country</b>	<b>Setting and duration of data collection</b>	<b>Method of data collection</b>	<b>Findings (the 3 most commonly reported reasons for wastage)</b>
Abahussain, Ball, Matowe 2006, Kuwait	Outpatient ambulatory pharmacies at 5 large public hospitals Duration: 4 months	Cross-sectional questionnaire (n=300 patients or family members)	1. Medication changed or discontinued by doctor 2. Excessive stock 3. Self-discontinuation of the medication
Braund, Chuah, Gilbert, Gn, Soh, Tan, Tiong, Yuen 2008, New Zealand	Pharmacies Duration: 5 weeks	Cross-sectional questionnaire (n=126 patients), collation of returned medications (n=163 patient medication returns)	1. Medication changed 2. Passed expiry date 3. Condition improved/resolved
Braund, Gn, Matthews 2009a, New Zealand	31 community pharmacies Duration: 4 weeks	Cross-sectional questionnaire (n=653 individuals returning medications), collation of unwanted medications (n=1605 patient medication returns)	1. Passed expiry date 2. Medication changed 3. Condition resolved
Braund, Peake, Shieffebien 2009b, New Zealand	New Zealand National Poisons Centre website Duration: 3 months	Online survey (n=452 individuals)	1. Condition resolved 2. Medication changed 3. Excess supplied

Coma, Modamio, Lastra, Bouvy, Mariño 2008, Spain	38 randomly selected community pharmacies Duration: 3 months	Cross-sectional questionnaire (n=227 customers), collation of returned medications (n=227 patient medication returns)	1. Passed expiry date 2. Condition improved/resolved 3. Patient's death
Cook 1996, England	17 pharmacies Duration: 1 month	Cross-sectional questionnaire (n=133 patients or someone on their behalf), Response rate: n=123 patients or someone on their behalf), collation of returned medications	1. Patient's death 2. Medication changed 3. Passed expiry date
Ekedahl, 2006, Sweden	A random sample of the 59 pharmacies in Sweden Duration: Until number of interviews completed	Cross-sectional study (n=1,557 patients), interviews with patients returning medications (n=1,022 patients), collation of returned medications (n=1,001 patient medication returns)	1. Passed expiry date 2. Patient's death 3. Condition improved/resolved
Hawksworth, Wright, Chrystyn 1996, England	30 community pharmacies Duration: 1 month	Cross-sectional questionnaire (n=366 patients), collation of medications	1. Patient's death 2. Medication changed 3. Excessive stock

James, Helms, Braund 2009, New Zealand	24 community pharmacies Duration: 6 weeks	Cross-sectional study (response rate not specified), collation of returned medications (n=716 patient medication returns)	1. Unknown 2. Patient's death 3. Surplus to requirements 4. Medication changed
Langley, Marriott, Mackridge, Daniszewski 2005, England	8 community pharmacies and 5 GP surgeries Duration: 4 weeks	Cross-sectional observational study (number of patients not specified), collation of returned medications (n=114 patient medication returns)	1. Medication changed or discontinued by doctor 2. Excess supplied or clear out 3. Patient's death
Mackridge, Marriott 2007, England	51/60 pharmacies and 42/61 GP surgeries Duration: 8 weeks	Cross-sectional study (n=910 patients), collation of returned medications (n=910 patient medication returns)	1. Patient's death, 2. Clear-out of old or expired medications 3. Medication changed
Morgan 2001, New Hampshire USA	A convenience sample of a retirement community of residents age 65 years or older Duration: 7 months	Cross-sectional questionnaire (n=73 retirement community residents), collation of unwanted medications	1. Condition resolved 2. Patient-perceived ineffectiveness 3. Medication changed by doctor

Wongpoowarak, Wanakamane, Panpongtham, Trisdikoon, Wongpoowarak, Ngorsuraches 2004, Thailand	Households Duration: In 2000	Cross-sectional interview questionnaire (n=931 households), households with unused medications (n=453 households), response rate: n=523 individuals	<ol style="list-style-type: none"> <li>1. Patients' perception that their symptoms or disease had resolved</li> <li>2. Patients perceived their condition as mild and that it was unnecessary to take all of their medications</li> <li>3. Patients perceived that the person dispensing the medication did not emphasise that all of the medications should be used</li> </ol>
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The most commonly cited reasons are given in Figure 3.3 highlighting the number of studies reporting 'medication changed' (Cook, 1996; Hawksworth *et al.*, 1996; Morgan, 2001; Langley *et al.*, 2005; Abahussain *et al.*, 2006; Mackridge and Marriott, 2007; Braund *et al.*, 2008; Braund *et al.*, 2009a; Braund *et al.*, 2009b; James *et al.*, 2009), 'patient's death' (Cook, 1996; Hawksworth *et al.*, 1996; Langley *et al.*, 2005; Ekedahl, 2006; Mackridge and Marriott, 2007; Coma *et al.*, 2008; James *et al.*, 2009), 'resolution of patient's condition' (Ekedahl, 2006; Mackridge and Marriott, 2007; Braund *et al.*, 2008; Coma *et al.*, 2008; Braund *et al.*, 2009a; Braund *et al.*, 2009b) and 'expired medications' (Cook, 1996; Ekedahl, 2006; Mackridge and Marriott, 2007; Braund *et al.*, 2008; Coma *et al.*, 2008; Braund *et al.*, 2009a). The most commonly cited reason was 'medication changed' by the prescriber (Cook, 1996; Morgan, 2001; Langley *et al.*, 2005; Abahussain *et al.*, 2006; Mackridge and Marriott, 2007). Braund *et al.* (2008) reported that the main reasons for change in patients' medication were due to side-effects of the medication and ineffectiveness of the medication in treating the condition. Other studies (Hawksworth *et al.*, 1996; Coma *et al.*, 2008; Braund *et al.*, 2009a; Braund *et al.*, 2009b; James *et al.*, 2009) stated that the 'medication was changed' to another treatment but did not specify who made the change. Coma *et al.* (2008) also reported that physicians primarily discontinued patient medications, followed by self-discontinuation by the patients. Self-discontinuation was reported for a number of reasons mainly (Wongpoowarak *et al.*, 2004):

- Patients' perceptions that their symptoms or diseases had resolved
- Patients' perceptions that their conditions were mild hence unnecessary to take all of their medications
- Patients' perceptions that HCPs did not emphasise that all of the medications should be used.

Key limitations of these studies are that these factors were based on self-reports by patients or someone on their behalf, with no HCP perspective. None of the studies applied statistical analysis of association of demographic variables (univariate or multivariate analysis) with the outcome of wastage.

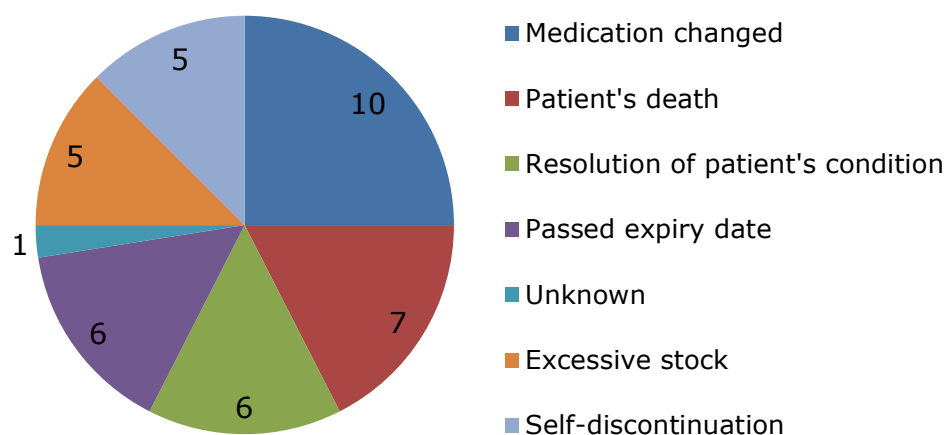


Figure 3.3: Number of times a reason was cited in different publications

### 3.3.6 Interventions to reduce wastage

Only two studies (5%) (Millar *et al.*, 2003; Millar *et al.*, 2009) were identified reporting wastage as a research outcome measure following intervention. Both studies described community pharmacy instalment dispensing as a potential solution to reduce medication wastage. During a four-month study period by Millar *et al.* (2003), doctors issued an 'instalment prescription' for any newly prescribed medication to be taken for longer than two weeks, which was subsequently dispensed in instalments (period of instalment was not specified) following discussion between patient and pharmacists. Medication not dispensed (reasons could include adverse events, medication not required etc.) were recorded. Medication was stopped by doctors in 20.6% of occasions whilst pharmacists advised 10 patients to stop their medication, both on account of adverse drug reactions. Forty-six patients left instalments in the pharmacy with a total of £475.90 worth of drugs remaining undispensed. It was not reported how this cost was calculated. Millar *et al.* (2003) concluded that instalment dispensing for newly prescribed medication to be taken for more than two weeks could be a useful method of reducing medication wastage, thereby reducing the overall general practice drugs bill.

In a later study, Millar *et al.* (2009) reported a randomised controlled design. Intervention and control group patients required a 'new' medication of more than 3 weeks duration. The intervention comprised instalment dispensing of an initial 14 day supply followed by pharmacist assessment and supply of the remainder of the medication (if tolerated), with the control group receiving the full quantity on initial presentation of the prescription. Seven patients did not return to collect the remainder of their prescription, while 13 patients out of the 54 who completed the 1-month follow-up (24%) reported that they had discontinued their medication. There were no reports on quantity of undispensed medication. There was an average difference between prescribed and dispensed drug costs of £0.98 per patient (95% confidence interval £0.14–£1.82), calculated by subtracting the dispensed costs £12.63 (8.96–16.30) from the prescribed costs £13.61 (9.86–17.37) of medication. However, there were no direct measures of reduction in wastage; therefore, reduction in costs cannot be equated to reduction in medication wastage.

### **3.4 Discussion**

#### **3.4.1 Key findings**

The aim of the systematic review was to appraise critically, synthesize and present the available evidence on the possible causative factors associated with medication wastage in all populations and settings and the effectiveness of any interventions focusing on wastage reduction as an outcome measure.

The sampling population and strategy was clear and justified in 12 studies and partially justified in 23. Sample size was only justified in five papers and partially justified in another eight studies.

A definition of medication wastage was reported only in one of 42 papers. There was a significant lack of any standard definition for medication wastage.

The main reasons cited were 'change in medication', 'patient's death', 'resolution of patient's condition' and 'passed expiry date'. Medication was primarily changed by the doctor.

Studies which focused on potential solutions to reduce medication wastage described the implementation of instalment dispensing (Millar *et al.*, 2003; Millar *et al.*, 2009). Millar *et al.* (2003) concluded that instalment dispensing for newly prescribed medication to be taken for more than two weeks could be a useful method of reducing medication wastage, thereby reducing the overall general practice drugs bill. In the study by Millar *et al.* (2009) there were no direct measures of reduction in wastage; therefore, reduction in costs cannot necessarily be equated to reduction in medication wastage.

#### **3.4.2 Strengths and weakness of the systematic review**

This systematic review has a number of strengths and weaknesses. The strengths of this systematic review are the inclusion of a clearly focused research aim and the exhaustive search for evidence. The review protocol was developed in line with best practice and inter-rater reliability checks were undertaken at each stage of screening, critical appraisal and data extraction. Key gaps in the literature have been highlighted.

Weaknesses include restricting the search to peer reviewed studies published in English and excluding grey literature. Using a narrative approach for the data synthesis may lack transparency and is more subjective than a meta-analysis approach hence bias is more likely to occur.

#### **3.4.3 Interpretation of findings**

This systematic review focused on the methodological quality and key findings of the research literature on medication wastage. As described, only thirteen studies reported reasons associated with or contributing to wastage. One key finding of this review is that studies were limited in terms of providing a standard definition for medication wastage with only five clearly justifying the sample size. Seventeen

studies had a fully justified method appropriate for the research question. All thirteen studies reporting reasons for wastage applied a positivist stance and did not utilise qualitative methods to explore in-depth factors which give rise to these reasons or situations associated with wastage. Studies also focused on the patient's perspectives rather than any other stakeholder, such as HCPs. Despite these limitations, key recurring issues appear to be the accumulation of wastage due to change in medication and patient's death, followed by resolution of patient's condition and expired medication. There could be various reasons which warrant a change in medication, such as lack of effectiveness or an adverse event. These factors cannot be predicted and in such situations some wastage is inevitable, however, the amount of wastage will depend on the quantity of medication prescribed and dispensed. Before recommending a minimum supply to prevent excessive wastage, further cost-effective studies need to be undertaken to ensure that this does not incur additional costs through the need for subsequent healthcare visits to obtain further supply of medication.

Notwithstanding the number of reasons that have been attributed as the cause of medication wastage, the factors responsible for these reasons such as the supply or presence of excessive stock or short expiry dates were not explored. Determining these factors will identify the root cause of wastage and can also aid to provide recommendations when implementing policies regarding medication wastage. Additionally, studies investigating medication inappropriateness as an indirect factor responsible for medication wastage were not identified.

Despite the identified extensive literature on pharmaceutical care, few studies reported wastage as an outcome measure. Indeed, only two studies were identified which had specifically measured medication wastage following intervention. There is therefore a need to consider how interventions impact wastage. In addition, further attention should be paid to adopting standard definitions for medication wastage which would aid in the development of valid and reliable study outcome measures. However, while a more consistent approach would strengthen the research evidence

base, cognisance needs to be taken of the differences in healthcare systems, practices and cultures throughout the world.

The findings of this systematic review should be interpreted with caution due to the small sample sizes and often convenience approaches to sampling of many of the included studies. There is a clear absence of qualitative research exploring wastage from the perspectives of key stakeholders (members of the public, patients, HCPs and policy makers). Such research would provide richness of data and allow exploration of the underlying factors associated with wastage.

There are several areas which warrant further research: exploring wastage from the perspectives of key stakeholders; the use of qualitative research methods to gain detailed understanding of the context of wastage; case study approaches to research patient cases where wastage has been identified as a key issue; the attention given to wastage within undergraduate healthcare student educational programmes and continuing professional development (CPD) for professionals; and defining and standardising outcome measures.

### ***3.5 Conclusion***

The systematic review has identified a limited literature on medication wastage with a lack of consistency of terms. While studies reported change in medication, patient's death, resolution of patient's condition and expired medications as key causes of wastage, there is a paucity of robust research focusing on the impact of healthcare interventions on outcomes around medication wastage.

### ***3.6 Reflections and future direction***

Completion of the systematic review of the literature informed the next phases of the research. There was a clear need to use a robust approach to define and scope 'medication wastage' prior to researching different perspectives on wastage. Furthermore, a paucity of research exploring issues relating to medication wastage from the perspectives of patients, HCPs or healthcare students, was identified.

Researching these perspectives, using a theoretical framework of behavioural change, would aid the development of interventions to reduce wastage.

Research was therefore undertaken to define and scope 'medication wastage' in the Maltese context (chapter 4), and apply quantitative (chapter 5) and qualitative (chapter 6) approaches to researching individual perspectives.

Identification of a lack of any standard definition of medication wastage, informed the next phase of the research which employed an expert panel consensus based approach to achieve agreement (Delphi technique) in relation to defining 'medication wastage' in the context of the Maltese population (chapter 4).

The systematic review also identified a lack of published literature related to awareness, perceptions, attitudes and behaviours of the general public, HCPs and students regarding medication wastage which were targeted through questionnaires described in chapter 5.

A number of reasons have been attributed as the cause of medication wastage. Nonetheless, the factors responsible for these reasons such as the supply or presence of excessive stock or short expiry dates were not explored. In-depth assessment of potential factors leading to medication wastage was explored during focus groups with key stakeholders including the general public (chapter 6).

## Chapter 4

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*"The knowledge of anything, since all things have causes, is not acquired or complete unless it is known by its causes"*

Avicenna  
[Philosopher, physician  
c. 980-1037]



## ***Defining 'medication wastage' in the Maltese context: a Delphi technique***

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One key finding of the systematic review discussed in chapter 3 was that studies were limited in terms of providing a standard, or indeed any, definition of 'medication wastage'. This chapter provides a detailed account of applying the Delphi technique to define the term 'medication wastage' and its scope in the Maltese context. Research aims and questions are described followed by consensus methods, results and discussion.

### ***4.1 Introduction***

#### ***4.1.1 Definition of medication wastage***

The lack of standardised terminology, and in particular inconsistencies around the definition and scope of 'medication wastage', limited direct inter-study comparisons when synthesising data from the systematic review studies. One consequence is a weakened evidence base, with potential limitation of generalizability of findings to other healthcare systems, practices and cultures. Prior to conducting research in Malta on aspects of medication wastage, it was essential to adopt a clear definition and detailed scope through consensus.

Consensus, which could also be termed 'collective agreement', usually involves collaboration (Keeney *et al.*, 2011) and its approaches are justified in the following situations:

- Where unanimity of opinion does not exist and is sought in view of a lack of scientific evidence or where there is contradictory evidence on an issue (Jones and Hunter, 1995)
- To enhance decision-making (Hasson *et al.*, 2000), to develop guidelines (Hutchings *et al.*, 2006), as well as develop policies and estimate unknown parameters (Campbell and Cantrill, 2001)
- To develop diagnostic or review criteria (O'Brien *et al.*, 2011)
- To assess or develop quality indicators (Gill *et al.*, 2012; Dancet *et al.*, 2013)

#### **4.1.2 Rationale for Delphi technique**

Of the three techniques described in chapter 2, the Delphi technique is the most commonly used in healthcare research (Moule and Goodman, 2014). Moreover, as opinions were to be sought from a number of individuals with diverse backgrounds, it was considered impractical, expensive and time consuming to organize face-to-face meetings. Group opinions are highly influenced by dominant participants and by the pressure to conform (Clayton, 1997). In light of these reasons, the NGT and the CDT were rejected.

The Delphi paradigm meets three key characteristics: anonymity, iteration and controlled feedback. Woudenberg (1991) stated that the best-known structured, indirect interaction method is the Delphi technique. To formulate a definition of 'medication wastage', subjective judgements and opinions should be gathered and agreed.

#### **4.1.3 Study aim and research questions**

The overall aim of this phase of the research was to apply the Delphi technique to define 'medication wastage' and its contributory factors in the context of the Maltese population.

More specifically, this study sought to answer the following questions:

1. Can consensus be achieved on the definition of medication wastage and views of factors contributing to wastage?
2. If consensus is achieved:
  - i. What is the consensus based definition for 'medication wastage'?
  - ii. What is the consensus view on the factors contributing to wastage?

### **4.2 Delphi technique method**

#### **4.2.1 Panel of experts**

The selection and recruitment of panellists is a crucial step in the Delphi technique. Scheele (2002) describes three types of panellists: the stakeholders, the experts and the facilitators. Elwyn *et al.* (2006) defines four types: decision aid developers and researchers, policy makers, health practitioners and patients. Hsu and Sandford (2007) discuss recommendations by Delbecq, Van de Ven, and

Gustafson to include three types: top management decision makers, professional staff members and their support team, and respondents who can provide judgement. The panel of experts in this study was composed of a heterogeneous sample of academics, practitioners, Government officials, officials of professional organizations, and patients, as recommended by Okoli and Pawlowski (2004).

While there is little evidence for the appropriate panel size, Sandrey and Bulger (2008) argue that minimal change in reliability of findings is likely beyond 30 members. They suggest a panel composed of 15-20 members from a homogeneous population and 5-10 members with a different social or professional background and level of expertise. Iljaž *et al.* (2011) discuss that the panel should include a high percentage of decision makers in the considered field. Notably, a large panel becomes difficult to coordinate, can become complicated and costly (Fink *et al.* 1984). Williams and Webb (1994) note that questionnaire response rate can decrease in inverse proportion to the size of the panel.

The target recruitment number in this study was 26 representing mixed disciplines (academics, practitioners, Government officials, officials of non-governmental professional organizations) and six patients representing a different level of social involvement.

#### **4.2.2 Recruitment of panellists**

An 'invitation to participate letter' (Appendix 4.1) was emailed to each member of the panel. Each member was given two weeks to accept participation, with the possibility of clarifying any queries with the researcher before enrolling and throughout the study period. All members completed a consent form (Appendix 4.2).

##### **4.2.2.1 Academics**

In view of published research related to medication wastage, the two corresponding authors most cited in the systematic review (chapter 3) were invited by email to participate.

#### *4.2.2.2 Government officials, practitioners, and officials of professional organizations*

Six government officials were asked to participate: the Health Minister, Shadow Health Minister, two other members of the Maltese parliament, the EU Health Commissioner and an EU official (or other nominations if unavailable).

Four practitioners were chosen from the Maltese DoH and the Maltese Medicines Authority. The occupant of the highest position in the Malta Medicines Authority and DoH were asked to participate. If unable to participate, he/she were requested to nominate a potential replacement. These individuals were also requested to recommend another individual within their department or organization considered to be suitable in terms of either working directly on aspects of medication wastage or indirectly through experience with medication. Through this snowball sampling technique, further 'expert' individuals were identified for recruitment.

The presidents of the following professional organizations were invited to participate and nominate another key individual within their organizations. In total, fourteen officials from the following organizations were invited to participate:

- Pharmacists: Malta Chamber of Pharmacists, Malta College of Pharmacy Practice
- Medical practitioners: Medical Association of Malta, Association of Physicians of Malta and the Malta College of Family Doctors
- Dental surgeons: Dental Association of Malta
- Nurses and midwives: Malta Union of Midwives and Nurses

These were selected according to the Healthcare Professions Act of Malta (Health Care Professions Act Chapter 464, 2011) to represent general healthcare rather than specialised fields such as ophthalmology. From the three dental associations listed in the Healthcare Professions Act of Malta (Health Care Professions Act Chapter 464, 2011), only the Dental Association of Malta was chosen as this is the umbrella organization for dentistry in Malta, representing over 98% of registered dental surgeons in Malta.

#### 4.2.2.3 Patients

Six patients, who were members of voluntary patient associations or groups, were recruited. These had at least one chronic condition (minimum of two years) and receiving prescribed medication.

Patients were selected from the six most prevalent chronic medical conditions in Malta, according to the DoH Information and Research (2008). Medication was grouped according to British National Formulary (British Medical Association and the Royal Pharmaceutical Society, 2012) chapters: cardiovascular, central nervous system (analgesics), musculoskeletal and joint, central nervous system (depression and anxiety), endocrine, and respiratory disease. Four associations were approached: the Cardiovascular Patient Group, the Association of Arthritis and Rheumatism of Malta (also covering analgesics), the Maltese Diabetes Association and the Asthma Society Malta. These were approached by phone or during group meetings and were asked to nominate a suitable patient(s) (two for cardiovascular and asthma).

Table 4.1 describes the panel of experts invited to participate in this study.

Table 4.1: Panel of experts invited to participate in Delphi technique

<b>Panel of experts</b>	<b>Recruitment source</b>	<b>Number of panellists</b>
Academics	From journal	2
Practitioners	DoH and Medicines Authority	4
Government Officials	Ministries and EU officials	6
Professional Organizations	Malta Chamber of Pharmacists, Malta College of Pharmacy Practice, Medical Association of Malta, Association of Physicians of Malta, Malta College of Family Doctors, Dental Association of Malta, Malta Union of Midwives and Nurses	14
Patients	Patient associations and patient groups	6

### **4.2.3 Delphi technique**

#### *4.2.3.1 Consensus level*

As Sandrey and Bulger (2008) state, there is little guidance regarding the level of agreement required for consensus to be achieved. McKenna (1994) discusses that 51% agreement amongst panellists is considered consensus. Since there is no scientific evidence for setting consensus levels, a minimum level of 75% consensus was applied, as suggested by Keeney *et al.* (2006).

#### *4.2.3.2 Response rates*

Response rates in Delphi studies range from 8% to 100% (Keeney *et al.*, 2011). While there is no universally agreed minimum response rate for questionnaire based research, several recommend that rates of 75% and above are considered to be good (Bowling, 2009; Williams, 2003), with below 60% low (Bowling, 2009). Low response rates in Delphi studies greatly compromise internal and external validity.

A systematic review by Edwards *et al.* (2009) identified the following measures, amongst others, to enhance response rates of studies employing postal questionnaires: monetary and non-monetary incentives; unconditional incentives; pre-study notification as well as follow-up contact; shorter questionnaires; providing a second copy of the questionnaire at follow-up; mentioning an obligation to respond and university sponsorship; personalised invitations; hand-written addresses; use of stamped return enveloped; use of coloured as opposed to blue or black ink; and an assurance of confidentiality.

In this study, an e-Delphi approach was employed, which is similar to the classical Delphi but is administered by email. Measures to enhance response rates of studies employing electronic questionnaires include: non-monetary incentives; lottery with immediate notification results; shorter e-questionnaires; including a statement that others had responded; a more interesting topic; use of a white background; an offer of survey results; personalised invitations; a simple header; including a picture; textual representation of response categories; and giving a deadline for response (Edwards *et al.*, 2009).

Relevant elements from both postal and electronic questionnaire measures were adopted: concise questionnaires with a white background; personalised covering letters; an 'invitation to participate' letter to pre-inform participants; support of a scholarship through MGSS; reassurance of confidentiality throughout; personalised reminder emails with the link to the questionnaire; and an extension of deadlines when requested or required. In addition, a key element of the Delphi technique is to provide all panellists with detailed responses from each round.

#### *4.2.3.3 Controlled feedback*

The rationale for providing controlled feedback is to inform the panel members of all panellists' views, providing opportunity to reflect and either confirm or alter their responses in subsequent rounds (Campbell and Cantrill, 2001; Skulmoski *et al.*, 2007). Response and any comments generated are anonymised when providing feedback.

#### **4.2.4 Delphi round 1 questionnaire**

The questionnaire contained four open-ended questions, derived from the findings of the systematic review in chapter 3. Panellists were requested to propose a definition for 'medication wastage' and to list possible contributing factors. They were given an initial two week deadline and a subsequent one week extension.

##### *4.2.4.1 Pilot study of round 1 questionnaire*

Prior to round 1, a pilot was conducted for several reasons: to identify and resolve any issues with the process of administering the Delphi questionnaire; to obtain feedback to allow refining of the open-ended questions; to familiarise the researcher with process of content analysis (Ryan and Bernard, 2003); and to overall increase study robustness thereby increasing the likelihood of a well-constructed and content-valid questionnaire (Davis, 1992; Clibbens *et al.*, 2012).

Pilot testing was undertaken with a convenience sample of six (one medical practitioner, one pharmacist, one nurse, two academics and one patient). Findings indicated that questions were clear, not too complex, taking around 20

minutes to answer and the process of administration was appropriate. No amendments to the questionnaire were necessary.

#### *4.2.4.2 Conduct of round 1*

A covering letter (Appendix 4.3) was emailed, along with the URL link to the questionnaire (Appendix 4.4), describing the study and its importance, stating the anticipated number of rounds and potential time commitment.

#### *4.2.4.3 Analysis of round 1*

Textual responses generated were analysed using a content analysis approach. Responses were read several times and similar responses grouped into themes and sub-themes. Similarities and differences were highlighted by the use of: word repetitions, key-words, indigenous typologies, metaphors and analogies.

### **4.2.5 Delphi round 2 questionnaire**

The round 2 questionnaire was structured comprising different definitions of medication wastage and statements around contributory factors derived from round 1 (Appendix 4.5). These had been reviewed and agreed by the research team. Panellists were given eight definitions and instructed to rank, in order of preference, the four definitions they considered most appropriate. They were then required to rate their levels of agreement or disagreement with each statement on a 5-point Likert scale (totally disagree, disagree, neither disagree nor agree, agree, totally agree) related to factors contributing to medication wastage. A two week deadline for completion of round 2 was given.

#### *4.2.5.1 Analysis of round 2*

Responses were analysed using descriptive statistics (frequencies and percentages) to determine the number of statements that have reached consensus at this stage. The statistical analysis generated, highlighting levels of consensus, was provided to each panellist with the subsequent questionnaire round along with the panellists' additional *verbatim* comments.

### **4.2.6 Delphi round 3 questionnaire**

The round 3 questionnaire included only those statements that did not meet consensus in round 2. Panellists were asked to reconsider their responses in light



of the feedback and again rate their levels of agreement. In addition, the definition of 'medication wastage' most highly ranked was presented and panellists asked to rate their level of agreement on the 5-point Likert scale (Appendix 4.6). A two week deadline for completion was given.

#### **4.2.7 Promoting quality in research: validity and reliability**

Kanoute *et al.* (2014) suggests the use of an iterative multistage process, such as the Delphi technique, to clarify and strengthen quality of consensus. However, the Delphi technique has been criticised for lack of evidence of validity and reliability. Goodman (1987) states that if panellists are representative of the area of knowledge under investigation then content validity can be assumed. Others have suggested that, following the first Delphi round, researchers should send the consolidated lists and categories to panellists for their feedback to ensure validation.

In the current study a number of measures were taken to promote validity and reliability:

- A heterogenous panel
- A pilot study was conducted
- A peer debriefing was undertaken (Long and Johnson, 2000)
- A clear decision trail was maintained throughout.

#### **4.2.8 Research Governance**

The study was approved by the School of Pharmacy and Life Sciences Research Ethics Committee, Robert Gordon University (Appendix 4.7) and the University of Malta Research Ethics Committee (Appendix 4.8). The UK Data Protection Act (DPA) (The National Archives, 1998), the Maltese DPA (Information and Data Protection Commissioner, 2001) as well as the EU Data Protection Directive (The European Parliament and the Council of the European Union, 1995) were adhered to at all times by the use of password protected databases accessible only by the principal researcher.

## **4.3 Results**

### **4.3.1 Panel of experts**

Out of the original 32 individuals invited to participate, 27 consented: one academic, four practitioners, three Government officials, thirteen officials of non-governmental professional organizations and six patients. The panel composition is summarised in Table 4.2.

One Government Member of Parliament and two from the opposition consented. No recommended EU officials were able to participate due to a busy schedule and perceived lack of expertise. One doctor and three pharmacists, all in leading positions, participated on behalf of the DoH and the Malta Medicines Authority. Only the president of one non-governmental professional organization declined participation, nominating another person. All others from non-governmental professional organizations consented: two pharmacists (also senior lecturers), one senior clinical pharmacist, one community pharmacist, three consultant physicians, two GPs, two dentists and two nurses. With regards to patients, two male members from the cardiovascular patient group, one female member of the rheumatology association, two female members from the asthma society and one male member of the diabetes association were recruited.

Table 4.2: Composition of the panel of experts (n=27)

<b>Panel of experts</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Academic	1	0	1
Practitioners			
• Pharmacist	0	3	3
• Doctor	0	1	1
Government Officials (Members of Parliament)			
• Doctor	1	0	1
• Nurse	1	0	1
• Lawyer	0	1	1
Non-Governmental Professional Organizations			
• Pharmacist	0	4	4
• Doctor	5	0	5
• Dentist	2	0	2
• Nurse	2	0	2
Patients	3	3	6
<b>Total</b>	<b>15</b>	<b>12</b>	<b>27</b>

#### **4.3.2 Round 1 Delphi technique**

Twenty-three panellists (85%) completed round 1; non-respondents were one practitioner, one representative of non-governmental organizations and two Government officials.

##### **4.3.2.1 Definition of medication wastage**

Four themes and ten sub-themes emerged which aided synthesis of definitions of 'medication wastage'. The themes, sub-themes and terms used by panellists are presented in Table 4.3 with the resultant eight definitions presented in Table 4.4.

Table 4.3: Themes and sub-themes for 'medication wastage' definition

Key Theme	Definition	Terms used by panellists
<i>Theme 1</i>	Unused/expired	
Sub-theme	Unused medication	<i>"Not used", "unused", "partly used", "no longer needed", "not required", "end up not being used"</i>
Sub-theme	Expired medication	<i>"Expired", "expiry date", "shelf life"</i>
Sub-theme	Fate of wastage	<i>"Thrown away", "disposed of"</i>
<i>Theme 2</i>	Inappropriate medication and other reasons	
Sub-theme	Inappropriate medication	<i>"Inappropriate use", "non-prescribing of better alternatives, more efficacious, better tolerated", "the prescribing of ineffective medicines, inadequate dosage regimens, and inadequate dosage forms. In a pharmacogenomic/genetic scenario, the prescribing of medication to non-responding patients", "incorrect indications", "over-consumption", "unnecessary", "misuse, abuse, under-use", "when not really needed"</i>
Sub-theme	Educational need	<i>"Education of all people concerned is important", "extraordinarily stupid", "lack of appreciation on the side of those who are in acute need of such resources"</i>
Sub-theme	Other reasons which give rise to medication wastage	<i>"In excess of his requirements", "adherence", "just for the sake of heaving a stock ready", "patient behaviour", "side effects", "change in treatment", "self-medication", "non-adherence to guidelines (unjustified)", "inappropriate prescribing", "over-ordering", "acquired free of charge"</i>

Definition	Key Themes	Terms used by panellists
<i>Theme 3</i>	Healthcare setting factors associated with wastage and other type of wastage	
Sub-theme	Healthcare setting factors associated with wastage	<i>"medication storage scenario, whether at wholesale distribution level, at hospital ward, inpatient and/or outpatient level, at community pharmacy level", "health department and of course government", "in situations", "homes"</i>
Sub-theme	Type of medication wastage	<i>"Dispensed", "free by the state", "bought", "prescribed", "selected", "dispensing.... Issued.... purchased OTC", "procurement", "certain types of medicine"</i>
Sub-theme	Indication for wasted medication	<i>"It's intended and scientifically justified scope", "for a particular condition", "intended for use in the diagnosis, cure, treatment, or prevention of disease", "intended licensed or off-licensed purpose"</i>
<i>Theme 4</i>	Implications for the individual and society	
Sub-theme	Financial implications for the individual and society	<i>"Resources and financial wastage", "unnecessary waste of money", "pays a heavy toll on the patients themselves, on the economy due to bad use of medication resources", "tax payer is paying for it", "I feel it eats a large piece of our financial system"</i>

Table 4.4: Eight definitions of 'medication wastage'

1. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. [Contains themes 1 and 3]
2. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by HCPs. [Contains themes 1, 2 and 3]
3. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by HCPs. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned. [Contains themes 1, 2, 3 and 4]
4. Medication wastage refers to any medication which remains unused or partly used by patients and that needs to be disposed of, either because it is no longer needed or because it has passed its expiry date. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients or incorrect prescribing and dispensing. [Contains themes 1, 2 and 3]
5. Medication wastage refers to the financial burden on patients themselves and the state's economy due to bad use of medication resources. [Contains theme 4]
6. Medication wastage refers to any medication that does not end up fulfilling its intended and scientifically justified scope before its expiry date or which is inappropriately prescribed or dispensed due to unjustified non-adherence to guidelines. [Contains themes 1, 2 and 3]
7. Medication wastage refers to the excessive collection of any medication which is provided free of charge by the state on a periodical basis. [Contains themes 1 and 2]
8. Medication wastage refers to prescribed or OTC medication which is purchased or obtained free of charge which expires or remains unused. [Contains themes 1 and 3]

Some panellists suggested alternative terms to 'any medication':

Option 1: 'prescribed or OTC medication'

Option 2: 'medication intended for licensed or off-licensed purposes'

Option 3: 'medication intended for use in the diagnosis, cure, treatment, or prevention of disease'.

#### 4.3.2.2 Views of factors contributing to wastage

Twenty-one panellists did NOT consider medication commonly found in households and intended to be used only if required or in case of an emergency as wastage. The two panellists who agreed that these should be considered as wastage gave the following comments:

- "... abusing of such medication would be considered as waste".
- "If medications are kept in large amounts that is still a waste".

Panellists' responses in relation to the maximum number of weeks of medication supply (based on regular consumption) that they considered acceptable to have in a household ranged from one week to more than 26 weeks as detailed in Figure 4.1.

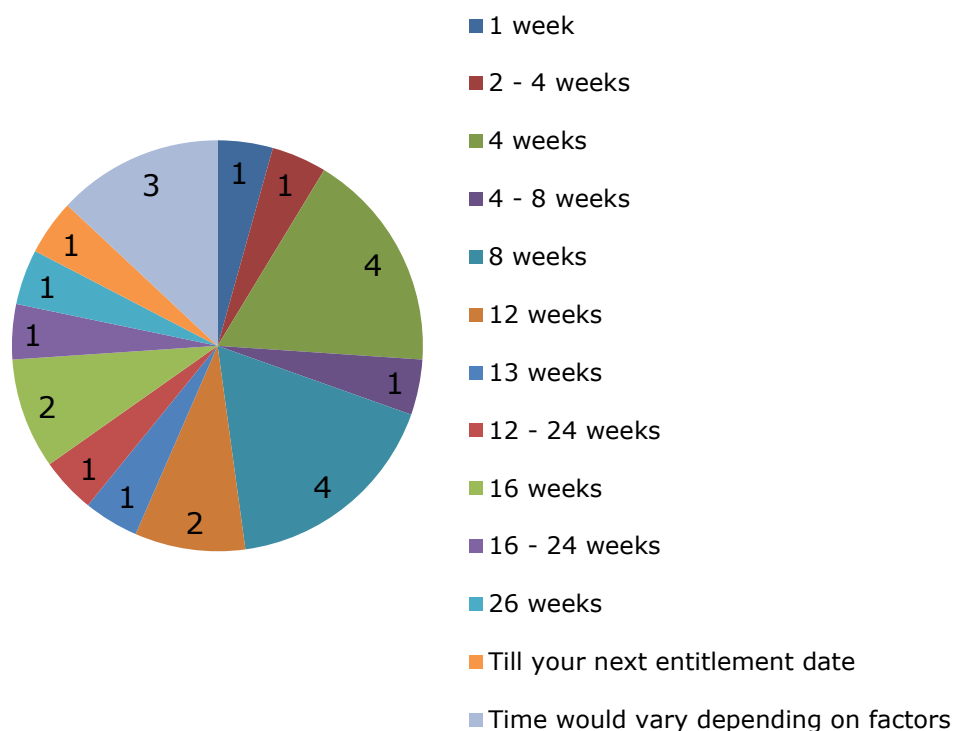


Figure 4.1: Number of weeks of medication supply suggested by panellists

*Possible factors that give rise to medication wastage*

Content analysis of responses identified nine main themes and thirty-six sub-themes (Tables 4.5, 4.6, 4.7 and 4.8). These are categorised as: 'physical and environmental factors'; 'social and psychological patient factors'; 'cultural factors'; and 'practitioner factors'. Sub-themes are listed in order of ranking, with the ones mostly cited listed first within each category.

Table 4.5: Physical and environmental factors contributing to medication wastage

<b>Category 1</b>	<b>Physical and environmental factors</b>
<i>Theme</i>	<i>Storage and expiry dates</i>
Sub-theme	Storage
Sub-theme	Expiry dates
Sub-theme	Lack of rotation
Sub-theme	Overstocking
<i>Theme</i>	<i>Pharmacy logistics</i>
Sub-theme	Returns not accepted
Sub-theme	Inadequate audit of consumption trends
Sub-theme	Inadequate information technology (IT) facilities
Sub-theme	Large pack sizes



Table 4.6: Social and psychological patient factors contributing to medication wastage

<b>Category 2</b>	<b>Social and psychological patient factors</b>
<i>Theme</i>	<i>Lack of patient education</i>
Sub-theme	Hoarding
Sub-theme	Non-adherence
Sub-theme	Lack of patient knowledge and education
Sub-theme	Collecting more supply even though these medication are available at home
Sub-theme	Cost awareness
Sub-theme	Irresponsibility
Sub-theme	Patient's expectation
Sub-theme	Unnecessary self-medication
<i>Theme</i>	<i>Fear of dependency by patient</i>
Sub-theme	Fear of medication unavailability
Sub-theme	Dependency on others
Sub-theme	Refusal of treatment next time
<i>Theme</i>	<i>Lack of communication regarding patient</i>
Sub-theme	Lack of communication between primary and secondary healthcare
Sub-theme	Lack of communication between patients and healthcare system
Sub-theme	Other family members collecting supply
<i>Theme</i>	<i>Patient's Death</i>
Sub-theme	Patient's death

Table 4.7: Cultural factors contributing to medication wastage

<b>Category 3</b>	<b>Cultural factors</b>
<i>Theme</i>	<i>Entitlement system</i>
Sub-theme	Free system
Sub-theme	Out of stock
Sub-theme	Patient's right

Table 4.8: Practitioner factors contributing to medication wastage

<b>Category 4 Practitioner factors</b>	
<i>Theme</i>	<i>Medication inappropriateness or cure</i>
Sub-theme	Unnecessary medication by HCPs
Sub-theme	Adverse events
Sub-theme	Over prescribing or dispensing
Sub-theme	Symptoms or condition resolved
Sub-theme	Stopped by doctor
Sub-theme	Ineffectiveness
Sub-theme	Medication easily purchased
Sub-theme	Inadequate training of HCP students and inadequate CPD
<i>Theme</i>	<i>Lack of medication reviews and inappropriate counselling</i>
Sub-theme	Medication reviews
Sub-theme	Advice from more than one HCP and family and friends

These themes were then used to derive round 2 Delphi questionnaire statements.

### **4.3.3 Round 2 Delphi technique**

Twenty-three panellists (85%) returned Round 2 questionnaire; non-respondents were one patient, one representative of non-governmental organizations and two Government officials.

#### *4.3.3.1 Definition of medication wastage*

Definition 3 was ranked highest ten times (43% of all times) and was the most preferred definition by panellists overall, being chosen by 16 out of 23 panellists (70%) in any of the top four rankings. Table 4.9 gives the ranking of each definition.

*Definition 3: Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned.*

Table 4.9: Ranking results for the eight definitions of medication wastage (n=23)

	Rank 1	Rank 2	Rank 3	Rank 4	Total times chosen (percentage agreement)
Definition 1	2	2	2	3	9 (39%)
Definition 2	2	4	2	3	11 (48%)
Definition 3	10	2	2	2	16 (70%)
Definition 4	2	6	4	3	15 (65%)
Definition 5	0	4	2	4	10 (44%)
Definition 6	3	3	6	2	14 (61%)
Definition 7	2	0	3	5	10 (44%)
Definition 8	2	2	2	1	7 (30%)

In round 2, panellists were asked to indicate whether they preferred to retain the term 'any medication' within the definition or to replace it with one of the three options suggested in round 1:

Option 1: 'prescribed or OTC medication'

Option 2: 'medication intended for licensed or off-licensed purposes'

Option 3: 'medication intended for use in the diagnosis, cure, treatment, or prevention of disease'

Figure 4.2 highlights that the majority of panellists opted for 'any medication'.

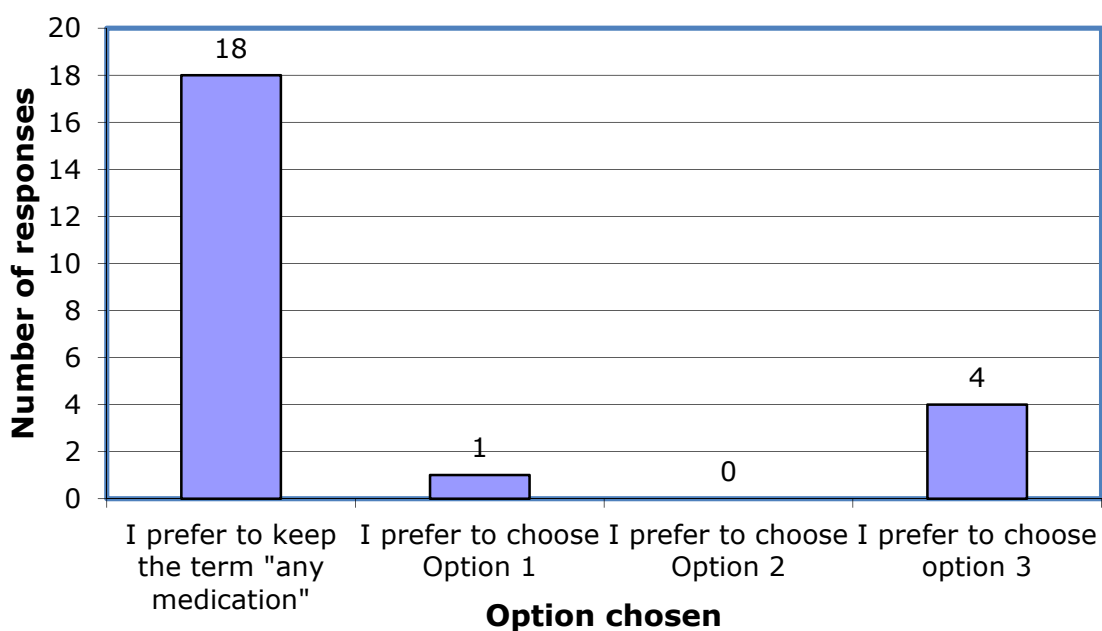


Figure 4.2: Optional statements as opposed to the term 'any medication' in the definition of medication wastage

#### 4.3.3.2 Consensus on factors contributing to wastage

Figure 4.3 illustrates the maximum number of weeks of medication supply that panellists considered acceptable to have in a household. Thirty-nine percent (n=9) of panellists were in favour of a maximum of 5-8 weeks, while 39% (n=9) opted for 9-12 weeks.

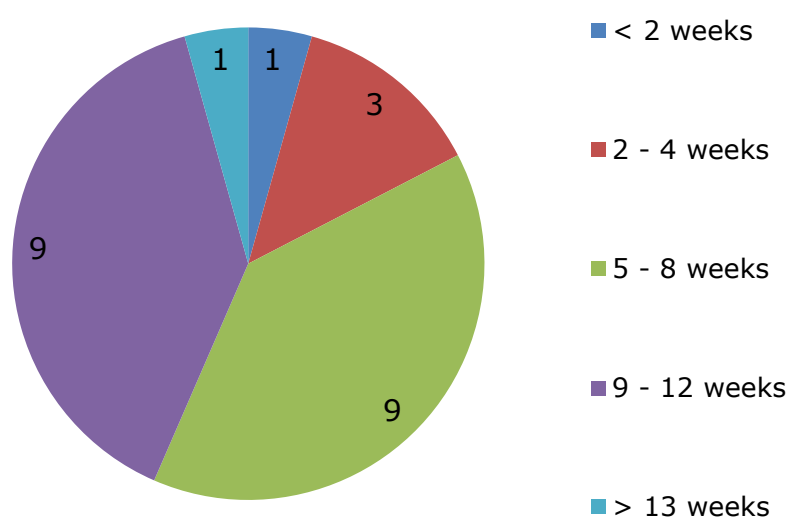


Figure 4.3: Preferred maximum number of weeks of medication supply

### *Potential factors for medication wastage*

The consensus level of 75% was met or exceeded for 22 out of 61 statements (36%) during Round 2.

#### A. Physical and environmental factors

Table 4.10 lists the statements that met consensus, whilst Table 4.11 lists the statements that did not meet consensus.

Table 4.10: Panellists responses (n=23) to physical and environmental factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Medication which should be refrigerated and is left out of refrigeration is considered as wastage	1	0	3	6	13	83% agree
Large pack sizes when patients require only a short course of these medication	0	4	1	5	13	78% agree

Table 4.11: Panellists responses (n=23) to physical and environmental factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Lack of medication rotation on pharmacy shelves	0	1	6	10	6	70% agree
Inadequate computerised audits and medication consumption trends	0	1	7	6	9	65% agree
Government medical stores overstock with medication which subsequently expires	2	1	6	10	4	61% agree
Medication no longer in use and not accepted back by pharmacies	1	1	8	11	2	57% agree
There is an inadequate IT implementation and interoperability across interfaces	0	1	11	4	7	48% neither disagree nor agree
Medication dispensed with short expiry dates	0	6	8	7	2	39% agree

## B. Social and psychological patient factors

Table 4.12 lists the statements related to social and psychological patient factors that met consensus while Table 4.13 lists those not meeting consensus.

Possible reasons cited by participants for excessive stocking of medication by patients were:

- Persons of a more mature age may depend on others to supply them with their necessities. So, they stock medication to a certain excess, to ease their minds that they can always be comfortably self-sufficient.
- Fear of future unavailability of medication.
- Different family members collecting patient's medication supply.
- The lack of patients' knowledge and education about medication and its cost.



Table 4.12: Panellists responses (n=23) to social and psychological patient factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Patients are afraid that their medication will be unavailable when they need it	1	0	0	11	11	96% agree
Patients continue to receive the same amount of medication notwithstanding that their dose has been decreased, due to fear that it will be out of stock in the near future	1	1	1	11	9	87% agree
Patients should ask their family doctor to prescribe the medication that they consume only and not the whole list that is listed on their yellow entitlement card	0	1	2	10	10	87% agree

Persons of a certain mature age may depend on others to supply them with their necessities. So they stock medication to a certain excess to have their minds at rest that they can always be comfortably self sufficient	0	0	3	15	5	87% agree
Patients purchase different medication, especially non-prescription medication, upon the advice of different persons, both healthcare professionals and family/friends (n=22)	0	0	3	12	7	86% agree
Patients regularly receive medication for pain, or other minor ailments, notwithstanding they still have a good supply at home	1	0	3	15	4	83% agree
Non-adherence (when patients do not take their medication as intended) to treatment (n=22)	0	1	3	7	11	82% agree

Different family members collect the medication without taking any notice if the medication is being consumed or not	0	2	3	14	4	78% agree
Patients are not educated about the cost of medication	1	1	3	9	9	78% agree
Patients lack the knowledge about their medication	0	1	4	13	5	78% agree
Patients fail to take the whole course of antibiotics (n=22)	0	1	4	11	6	77% agree

Table 4.13: Panellists responses (n=23) to social and psychological patient factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Many people believe that once they do not collect all of their periodical medication they will automatically be refused the same medication in the future	0	2	4	10	7	74% agree
The healthcare system fails to support medication taking by vulnerable individuals who cannot independently adhere to their treatment regimens	1	1	5	10	6	70% agree
Patients read about illnesses on the internet and they subsequently take medication which they do not require (n=22)	0	2	5	10	5	68% agree

Due to patients' expectation that medication will solve every problem, patients take medication when they could have modified their lifestyle behaviour instead	0	2	6	8	7	65% agree
Due to lack of communication between hospital and community care, patients continue to receive medication even if this has been stopped	0	1	8	9	5	61% agree
Patients get an oversupply of medication through the POYC scheme even though they do not need it	0	5	5	8	5	57% agree
The prevalence of ignorance is a primary cause of almost everything, so it is also the cause of medication wastage	0	4	6	9	4	57% agree
When a person passes away, all his/her medication gets wasted	0	3	7	6	7	57% agree
Irresponsibility and carelessness of patients	1	2	8	10	2	52% agree

Patients tend to throw away medication which is not expired to refill with 'fresh' stock from the pharmacy	0	4	12	5	2	52% neither disagree nor agree
Men with low pain thresholds taking unnecessary medication (n=22)	1	7	10	4	0	45% neither disagree nor agree
Overbearing mothers who mistake their child's mild bout of the common cold for Yellow Fever (n=22)	1	3	8	7	3	45% agree
Healthcare professionals and the healthcare system does not offer the knowledge, education, support and advice regarding medication to patients	0	6	7	7	3	44% agree

### C. Cultural factors

Table 4.14 lists the statements that met consensus and Table 4.15 lists the statements not meeting consensus.

Table 4.14: Panellists responses (n=23) to cultural factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Patients hoard medication as they are afraid that the item will be out of stock and then they will be forced to buy the medication	0	0	3	12	8	87% agree
Medication provided freely by the state and not paid directly from patients' pockets	0	1	3	8	11	83% agree
Some patients believe that once they are entitled for a medication, it is theirs by right even in those cases when they do not need it	0	0	5	11	7	78% agree



Table 4.15: Panellists responses (n=23) to cultural factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
There is lack of stock from the importers	0	5	16	2	0	70% neither disagree nor agree
Greed and hoarding situations by patients, on the welfare system, is a mentality which is difficult to overcome	1	1	6	10	5	65% agree
There should be co-payment of medication (that is patients must pay a fixed fee for their use of specific medication)	0	4	4	7	8	65% agree
Medication regularly out of stock	0	6	5	7	5	52% agree
When entitled for free medication, patients reason that since the medication is 'free' it is good to have lots of different medication	0	2	9	6	6	52% agree

Medication can be easily purchased without the pharmacist questioning the need of such medication	0	3	11	8	1	48% neither disagree nor agree
When entitled for free medication, patients believe that the medication has no value	0	4	8	4	7	48% agree

#### D. Practitioner factors

Table 4.16 lists the statements related to practitioner factors that met consensus and Table 4.17 those not meeting consensus.

Table 4.16: Panellists responses (n=22) to practitioner factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Overprescribing is one of the causes of medication wastage	0	1	2	9	10	86% agree
Pharmacists should be supported by state of the art IT to reduce medication wastage	0	0	3	11	8	86% agree
Pharmacists should have the time to concentrate on the patient and their medication usage	0	0	3	12	7	86% agree
GPs do not always have time to review all their patients' medication and so new medication get added to the patients' list	0	2	2	11	7	82% agree
GPs do not always have time to review all their patients' medication and often those medication that are not required anymore continue to be prescribed	0	2	2	10	8	82% agree

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When prescribing, doctors should ask the patients the quantity of medication they have left at home (n=23)	0	2	3	10	8	78% agree
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Table 4.17: Panellists responses (n=22) to practitioner factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Inadequate medication reviews at the point of dispensing	1	1	4	10	6	73% agree
Inadequate CPD of healthcare professionals in prescribing, dispensing and administration of medication (n=23)	0	2	5	11	5	70% agree
Some doctors are not aware of the monetary costs of medication (n=23)	0	2	5	8	8	70% agree
If symptoms resolve when patients have already collected their medication supply, these medication go wasted	0	1	6	14	1	68% agree
Pharmacists should be supported by well-trained assistants to reduce medication wastage	0	0	7	9	6	68% agree

Prescribing antibiotics for acute bronchitis or mild coughs or asthma attacks is considered as wastage	0	4	3	11	4	68% agree
Doctors stop or change medication when patients have already collected their medication supply	0	2	6	13	1	64% agree
Inadequate stock management training of pharmacists and their assistants (n=23)	0	2	7	8	6	61% agree
Medication have to be changed due to the unexpected development of side-effects, allergies, contra-indications or medication interactions during medication therapy	0	3	6	10	3	59% agree
Inadequate training of HCP students in prescribing, dispensing and administration of medication(n=23)	0	3	7	10	3	57% agree

The fact that pharmacists have to spend their time carrying out bureaucratic and administrative chores	1	5	4	8	4	55% agree
Excessive volumes of medication supplied to patients during repeat prescribing and dispensing	0	3	8	9	2	50% agree
A large volume of medication is dispensed during the treatment initiation phase, that is when the patient has just started the medication	1	3	7	8	3	50% agree



#### 4.3.4 Round 3 Delphi technique

Eighteen panellists (67%) completed round 3. A further three (two from the patients' group and one Member of Parliament) answered only the first question. A representative from the practitioners' group, two members of parliament (Government officials group), two members amongst the non-governmental organizations and one patient did not respond.

##### 4.3.4.1 Definition of medication wastage

Figure 4.4 illustrates the extent of agreement with the final definition for medication wastage:

*'Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned.'*

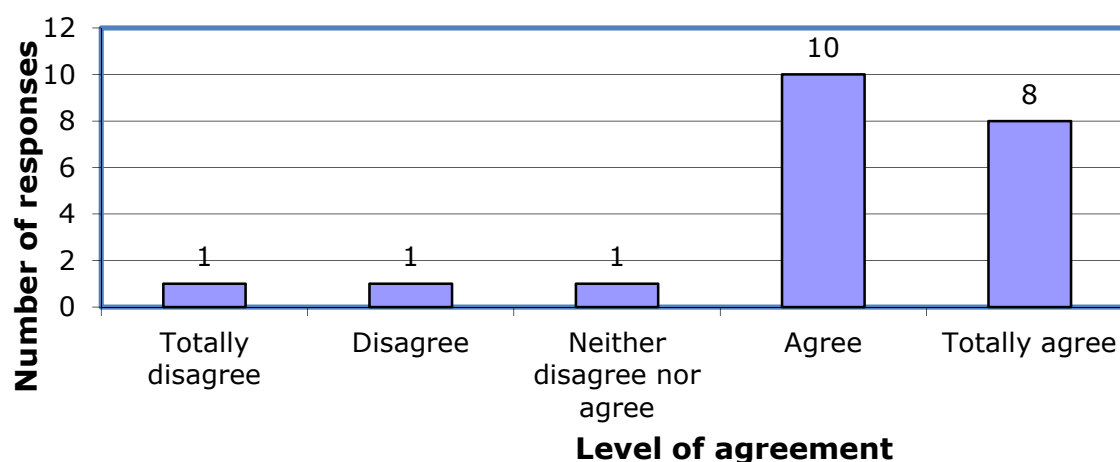


Figure 4.4: Extent of agreement with the definition of medication wastage during round 3 Delphi technique

**Consensus achieved: 86% agreement**

#### 4.3.4.2 Consensus on factors contributing to wastage

Figure 4.5 illustrates the maximum range of weeks of medication supply that panellists found to be acceptable.

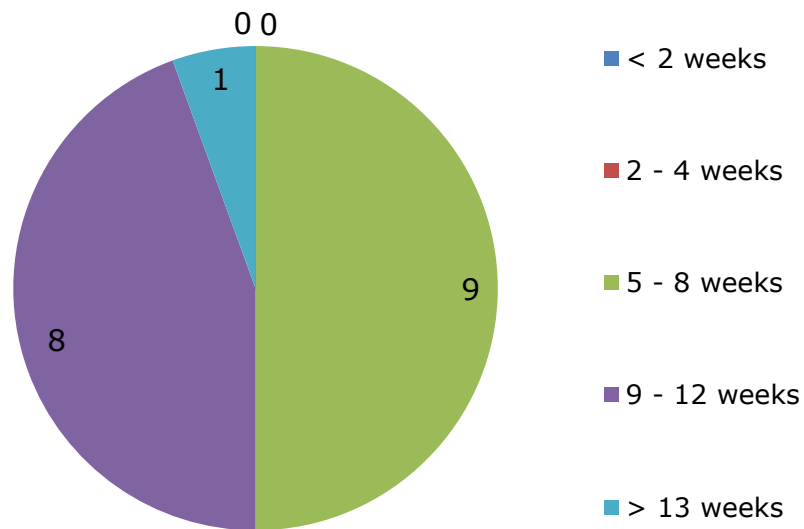


Figure 4.5: Preferred maximum range of weeks of medication supply chosen by panellists during round 3 Delphi technique

#### **Consensus NOT achieved**

##### *Potential factors for medication wastage*

A total of 16 out of 39 statements (41%) met the 75% consensus level, which when considered with round 2 results gives consensus achieved for 38/61 (62%) statements.

##### A. Physical and environmental factors

Statements that met consensus are shown in Table 4.18 and in Table 4.19 those not meeting consensus.

Table 4.18: Panellists responses (n=18) to physical and environmental factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Lack of medication rotation on pharmacy shelves	0	0	3	9	6	83% agree

Table 4.19: Panellists responses (n=18) to physical and environmental factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Inadequate computerised audits and medication consumption trends	0	1	6	3	8	61% agree
Medication no longer in use are not accepted back by pharmacies	2	1	5	7	3	56% agree
Government medical stores overstock with medication which subsequently expires	1	1	7	9	0	50% agree
There is an inadequate IT implementation and interoperability across interfaces	0	1	8	3	6	50% agree
Medication dispensed with short expiry dates	0	3	8	7	0	44% neither disagree nor agree

## B. Social and psychological patient factors

Statements that met consensus are shown in Table 4.20 and in Table 4.21 those not meeting consensus.

Table 4.20: Panellists responses (n=18) to social and psychological patient factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Due to patients' expectation that medication will solve every problem, patients take medication when they could have modified their lifestyle behaviour instead	0	2	0	11	5	89% agree
Due to lack of communication between hospital and community care, patients continue to receive medication even if this has been stopped	0	0	3	12	3	83% agree
The healthcare system fails to support medication taking by vulnerable individuals who cannot independently adhere to their treatment regimens	1	0	2	12	3	83% agree
When a person passes away, all his/her medication gets wasted	0	0	3	8	7	83% agree

Many people believe that once they do not collect all of their periodical medication they will automatically be refused the same medication in the future	0	1	3	10	4	78% agree
Patients read about illnesses on the internet and they subsequently take medication which they do not require	0	1	3	12	2	78% agree

Table 4.21: Panellists responses (n=18) to social and psychological patient factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Irresponsibility and carelessness of patients	1	1	3	13	0	72% agree
Patients tend to throw away medication not expired to refill with 'fresh' stock from the pharmacy	0	2	12	4	0	67% neither disagree nor agree
Overbearing mothers who mistake their child's mild bout of the common cold for Yellow Fever	0	3	11	1	3	61% neither disagree nor agree
Patients get an oversupply of medication through the POYC even though they do not need it	0	1	6	8	3	61% agree
Men with low pain thresholds taking unnecessary medication	2	8	8	0	0	56% disagree



The prevalence of ignorance is a primary cause of almost everything, so it is also the cause of medication wastage	0	3	5	8	2	56% agree
Healthcare professionals and the healthcare system does not offer the knowledge, education, support and advice regarding medication to patients	0	1	8	7	2	50% agree

### C. Cultural factors

Statements that met consensus are shown in Table 4.22 and in Table 4.23 those not meeting consensus.

Table 4.22: Panellists responses (n=18) to cultural factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Greed and hoarding situations by patients, on the welfare system, is a mentality which is difficult to overcome	0	1	2	12	3	83% agree
There should be co-payment of medication (that is patients must pay a fixed fee for their use of specific medication)	0	0	4	4	10	78% agree

Table 4.23: Panellists responses (n=18) to cultural factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
There is lack of stock from the importers	0	0	13	5	0	72% neither disagree nor agree
Medication regularly out of stock	0	1	6	9	2	61% agree
When entitled to free medication, patients reason that since the medication is 'free' it is good to have lots of different medication	0	1	6	8	3	61% agree
Medication can be easily purchased without the pharmacist questioning the need of such medication	0	1	10	6	1	56% neither disagree nor agree
When entitled for free medication, patients believe that the medication has no value	0	2	7	4	5	50% agree

#### D. Practitioner factors

Statements that met consensus are shown in Table 4.24 and in Table 4.25 those not meeting consensus.

Table 4.24: Panellists responses (n=18) to practitioner factors contributing to medication wastage that met consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
If symptoms resolve when patients have already collected their medication supply, these medication go wasted	0	0	2	15	1	89% agree
Doctors stop or change medication when patients have already collected their medication supply	0	0	3	15	0	83% agree
Inadequate CPD of healthcare professionals in prescribing, dispensing and administration of medication	0	2	1	11	4	83% agree
Pharmacists should be supported by well-trained assistants to reduce medication wastage	0	0	3	11	4	83% agree
Prescribing antibiotics for acute bronchitis or mild coughs or asthma attacks is considered as wastage	0	1	2	12	3	83% agree

Inadequate medication reviews at the point of dispensing	1	0	3	9	5	78% agree
Some doctors are not aware of the monetary costs of medication	0	2	2	6	8	78% agree

Table 4.25: Panellists responses (n=18) to practitioner factors contributing to medication wastage that did not meet consensus

<b>Statement</b>	<b>Totally disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally agree</b>	<b>Percentage agreement (%)</b>
Inadequate stock management training of pharmacists and their assistants	0	1	4	12	1	72% agree
Medication changed due to the unexpected development of side-effects, allergies, contra-indications or medication interactions during medication therapy	0	1	4	11	2	72% agree
A large volume of medication is dispensed during the treatment initiation phase (that is when the patient has just started the medication)	0	2	4	11	1	67% agree



Inadequate training of HCP students in prescribing, dispensing and administration of medication	0	2	4	9	3	67% agree
Excessive volumes of medication supplied to patients during repeat prescribing and dispensing	0	3	4	10	1	61% agree
The fact that pharmacists have to spend their time carrying out bureaucratic and administrative chores	1	3	4	9	1	56% agree

## **4.4 Discussion**

### **4.4.1 Key findings**

The aim of this phase of the research was to apply the Delphi technique in relation to defining 'medication wastage' and its contributory factors in the context of the Maltese population.

Consensus was reached with 86% of panellists agreeing (38% of these totally agreeing), with the following definition:

*'Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned.'*

During round 1, 61 possible factors leading to wastage were identified, categorised as: 'physical and environmental factors'; 'social and psychological patient factors'; 'cultural factors'; and 'practitioner factors'. A total of 38 out of 61 statements (62%) met consensus following the three Delphi rounds. The cause which achieved the highest level of consensus was:

- *Patients are afraid that their medication will be unavailable when they need it (96% consensus).*

### **4.4.2 Strengths and weaknesses**

This study has a number of strengths and weaknesses which merit further discussion. This is the first study to use a robust methodological approach to derive a definition of 'medication wastage'. The expert panel comprised strategic individuals, practising professionals and patients, thus providing vast and diverse expertise promoting content validity (Goodman, 1987). High levels of recruitment and participation were achieved throughout thus reducing the likelihood of recruitment and non-respondent biases. Furthermore, there was very little attrition between Delphi rounds. The use of electronic communication facilitated confidentiality (Hsu and Sandford, 2007) and could reach international individuals (Owens, 2002) who could participate as experts at a lower cost.

However, there are study limitations and hence the findings should be interpreted with caution. Snowball sampling, which relies on an initial group of participants to recruit others, could have introduced an element of bias. It is difficult to differentiate between panellists who rated items as 'strongly agree' or 'agree'. Moreover, this Delphi technique was conducted within Malta and given the differences in healthcare structures and processes between different countries and populations, the results are not necessarily generalizable and hence limited in external validity. However, it is likely that the definition and the panellists' views on possibly contributory factors will resonate globally.

#### ***4.4.3 Interpretation of findings***

Following a scoping review of the literature (chapter 1) followed by a systematic review on the possible causative factors associated with medication wastage (chapter 3), only two definitions of medication wastage were identified. These definitions are presented in Table 4.26 together with the definition generated from the current Delphi technique.

Table 4.26: Definitions of medication wastage

Source	Definition of medication wastage
UK DoH (White, 2010, p.132)	<i>"Medicines issued to the patient but not consumed"</i>
Abou-Auda (2003, p.1277)	<i>"Any drug product either dispensed by a prescription or purchased over the counter (OTC) that is never fully consumed. Medication wastage may be due to poor compliance of patients, excessive and irrational prescribing, or the lack of control of the sales of prescription medications in the community pharmacy"</i>
Current Delphi technique	<i>"Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned"</i>

The definition derived through this Delphi study differs in a number of respects from that issued by the UK DoH (White, 2010) and that of Abou-Auda (2003). The Delphi definition considers medication wastage at any point of the medication supply chain and is not restricted to the point following issue to the patient. The Maltese Medicines Authority states that medicines supply chain extends to reaching the consumer (Medicines Authority, 2013) and therefore it is important that wastage is also considered at all levels.

Furthermore, the Delphi definition emphasises the financial impact and educational relevance of wastage. Reducing wastage is a paramount objective in promoting appropriate utilisation of finite resources (Commission of the European Communities, 2005). The study commissioned by the DoH in England in 2009

which explored the scale and cost of medication wastage, and was described in chapter 1, concluded that while not all of the wastage is avoidable, or the result of poor practice, more than half is preventable (York Health Economics Consortium, School of Pharmacy University of London, 2010).

The lack of coverage of inappropriate prescribing, dispensing or consumption of medication within the UK DoH definition has been criticised (White, 2009). Irrational prescribing, consistent with the current Delphi study definition, is considered by Abou-Auda (2003). Inappropriate prescribing and dispensing or consumption of inappropriate medication by patients was considered to be a form of medication wastage by some panellists when defining medication wastage. Inappropriate medication has also been seen as an indirect form of wastage by other authors who describe irrational use of medication such as self-medication to be a waste of resources (Kiyangi and Lauwo, 1993; Abdo-Rabbo *et al.*, 2009a). Cromarty and Downie (2001) discuss that medication wastage extends beyond leftover medication, but it also includes other aspects such as sub-optimal prescribing and failure to give out medication when really needed. In the current Delphi technique 89% of panellists agreed that patients' expectation that medication will solve every problem leads to overuse of medication when lifestyle modification could have been adequate. This was also a key point articulated by Abdo-Rabbo *et al.* (2009b) who claim that one reason for unused medication is that many patients still believe that the result of their visit to public health facilities must be the dispensing of a prescription. Therefore, HCPs have a role to play in reducing the amount of unused medication by prescribing or recommending medication only when necessary.

As described in the 'Introduction' to this chapter, inconsistencies around the definition of 'medication wastage', together with the scope of wastage, limit direct inter-study comparisons. A clear definition and detailed scope was considered to be necessary to strengthen the base of this research and inform future directions of this doctoral research, thus directly impacting the further two research phases (chapter 5 and chapter 6). Moreover, whilst not considered to be necessarily generalizable to other countries, the standardisation of a definition of medication wastage has an academic impact by contributing a backbone for future research in this field. Ultimately, the research has also an economic and

societal impact, defined as "*the demonstrable contribution that excellent research makes to society and the economy*" (Research Councils UK, 2011, p.2), if the findings are likely to be considered by policy makers in an effort to reduce medication wastage.

Some panellists changed their responses from the second to the third round of questionnaires. It is uncertain whether this alteration in the decision-making process is a result of careful reconsideration or the pressure to conform. Notwithstanding this, one can clearly conclude from this Delphi technique that medication wastage cannot be attributed to one single factor but is likely to be a very complex interplay between many, and sometimes very diverse, influencing factors. It is also notable that the Delphi has identified a number of potential factors not highlighted during the systematic review and these merit further consideration.

This research identified a higher number of social and psychological patient and practitioner contributory factors towards wastage, in contrast to physical and cultural factors. There is a substantial volume of literature on social and psychological factors influencing health. Changing individuals' behaviours is a prerequisite to change these contributory factors (Maio *et al.*, 2007). Behaviour, characterised as the result of individual choice and personal responsibility, is linked to social contexts (Locker, 2008). The next phase of this research (chapter 5) focuses in detail on awareness, perception, attitude and behaviour of different stakeholders (HCPs, HCP students and the public) with the support of different theoretical behavioural models (the Health Belief Model (HBM), the Transtheoretical Model of Behaviour Change (TTM) and Rogers' Diffusion of Innovation theory).

## **4.5 Conclusion**

A high level of consensus was achieved on a definition of medication wastage from a diverse panel of academics, practitioners, Government officials, officials from non-Governmental organizations and patients in Malta. The agreed definition was, '*Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication*

*wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned.*' This research identified a number of potentially contributory factors towards wastage, ranging 'physical and environmental factors'; 'social and psychological patient factors'; 'cultural factors'; and 'practitioner factors'. Fear of medication unavailability giving rise to medication wastage was perceived to be a contributory factor by the majority of participants.

#### **4.6 Reflections and future direction**

The definition of 'medication wastage' and potential influencing factors identified by the panellists were applied in all further phases of the research. A quantitative, cross-sectional survey of HCPs, students and the general public (chapter 6) was followed by qualitative focus groups to further explore these issues as a basis for the development of interventions with the ultimate aim of reducing medication wastage.

## Chapter 5

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*"Attitudes are more important than abilities, motives are more important than methods, character is more important than cleverness, and the heart takes precedence over the head"*

Denis Burkitt  
[Surgeon  
1911-1993]



## ***The perspectives of the Maltese population, HCPs and students on medication wastage: cross-sectional surveys***

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The systematic review of published literature, carried out in the first phase of this research, identified a lack of studies relating to awareness, perceptions, attitudes and behaviours of the general public, HCPs and students regarding medication wastage. This chapter provides a detailed account of research aims and objectives, survey methods, results and discussion.

### ***5.1 Introduction***

#### ***5.1.1 Studies employing survey methods in relation to healthcare wastage***

While none of the studies included in the quality assessment and data extraction of medication wastage literature focused on the perspectives outlined above, a number of studies were identified in earlier stages of the review related to other forms of healthcare wastage, including clinical and biomedical wastage such as infected sharps.

Several of these employed survey approaches to research awareness of hospital wastage amongst HCPs. Akter *et al.* (2002) concluded that doctors and nurses were not fully aware of what constituted medical wastage and its management. Similar findings were reported by Massrouje (2001), Danchaivijitrmd *et al.* (2005), Pandit *et al.* (2005), Hassan *et al.* (2008), Rao (2008), Sharma and Chauhan (2008), Verma *et al.* (2008), Amanullah and Uddin (2009), Jarvis *et al.* (2009), Mostafa *et al.* (2009), Ramokate and Basu (2009), Chattopadhyay *et al.* (2010), Ortner and McCullagh (2010), Mochungong *et al.* (2010) and Yadavannavar *et al.* (2010). Jahnavi and Raju (2006), in a study of undergraduate medical students, suggested that appropriate training on aspects of wastage should be included as part of the undergraduate curriculum.

Several reported aspects of medication disposal by patients highlighting poor awareness of proper methods of disposal and lack of awareness of the

implications of improper disposal (Uysal and Tinmaz, 2004; Bound *et al.*, 2006; Persson *et al.*, 2009; Abrons *et al.*, 2010; Tong *et al.*, 2011).

### **5.1.2 Rationale for cross-sectional structured questionnaire**

The general aim of survey research is to predict population attributes or behaviours (Teddle and Tashakkori, 2009) and was thus considered most appropriate to collect data to meet the study aim.

### **5.1.3 Study aim and research questions**

The overall aim of this phase of the research was to investigate issues of awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, HCPs and respective students.

More specifically, this study sought to answer the following questions:

1. What is the level of awareness and interest in medication wastage?
2. Which dependent and independent variables are associated with awareness, attitudes, perceptions and behaviours in relation to medication wastage?
3. Which factors are considered to be contributing towards medication wastage?
4. Which behaviours are possibly contributing towards medication wastage?
5. Which patient groups, classes of drugs and type of medication are considered priority when targeting medication wastage?
6. Is there a need for education on issues of medication wastage?

The study also sought to identify potential participants for the next phase of the research (focus groups).

## **5.2 Method**

### **5.2.1 Inclusion criteria**

#### **5.2.1.1 Maltese population**

Residents of Malta at the time of the study and aged 18 years and over were included.

#### *5.2.1.2 HCPs*

All who had a license to practise in Malta and were listed in the professional registers of dentists, doctors, nurses or pharmacists (2013) were included. These professions were researched as they had direct involvement with the processes of medication prescribing, dispensing or administration. Due to logistical reasons within the newly appointed Council for Nurses and Midwives, nurses had to be excluded from the main study.

#### *5.2.1.3 HCP students*

All students who were pursuing a first degree undergraduate course in dentistry, medicine, nursing or pharmacy with the University of Malta. Students were in their final or pre-final year of their undergraduate course at the time of the study as by then they would have studied most of the curriculum.

### **5.2.2 Exclusion criteria**

Professionals listed with other than a Maltese address were excluded, as were those participating in the pilot study.

### **5.2.3 Sample size**

To determine the sample size, the following were taken into consideration:

1. Three hundred and eighty-four responses for the public and 330 for HCPs were required to give 95% confidence intervals with a 5% margin of error.
2. Response rates from pilot study (see later) [12.0% for public, 13.0% for HCPs and 43.0% for students, with no follow-up of non-respondents].
3. Estimated response rates for the full study, with follow-up of non-respondents.

The total Maltese population (aged 18 years and over) from the electoral register 2013 was 332,644 (i.e. the sampling frame). Assuming a 20% response rate (with follow-up of non-respondents) required a sample size of 1,920 to achieve 384 responses.

There were 210 listed dental practitioners (available online) at the time of the study (Medical Council, 2013). Thirty-five did not have an address listed and eleven had a non-Maltese address thus excluded, giving 164 dentists eligible to participate.

There were 1,667 medical practitioners (available online) at the time of the study (Medical Council, 2013). Two hundred and forty-six did not have an address listed and 169 had a non-Maltese address thus were excluded, giving 1,252 doctors eligible to participate.

Eight hundred and sixteen pharmacists (excluding respondents from the pilot study) were registered (with an email address) with the Pharmacy Council at the time of the study and were eligible to participate.

The total number of HCPs eligible for the study was 2,232. The minimum recommended sample size was 330 (as there was no intention to compare responses between HCP groupings). Assuming a 20% response rate required a sample size of 1,650 to achieve 330 responses. To achieve this:

- All 816 pharmacists were recruited (for logistical reasons to avoid any sampling to be undertaken by the Pharmacy Council).
- All 164 dentists were recruited in view of the small study population.
- Seven hundred doctors were recruited.

Four hundred and thirty-four students in their pre-final and final year who had previously agreed to receive emails through their university account were eligible to participate.

#### **5.2.4 Sampling**

##### *5.2.4.1 General public from the Maltese population*

Participants were selected by random sampling (Random.org, 2014) of the Maltese electoral list 2013, obtained from the Maltese Department of Information.

##### *5.2.4.2 HCPs*

Doctors were selected by random sampling (Random.org, 2014) from the register of medical practitioners, available online (Medical Council, 2013). In view of the small number of practising dentists in Malta, all these were included without sampling. The list of dental practitioners was available online (Medical Council, 2013). All pharmacists were included through the Maltese Pharmacy Council, who held the email details of all practising pharmacists.

#### **5.2.4.3 HCP students**

In Malta, the dental, medical and pharmacy undergraduate courses are of five years' duration (Cauchi and Mamo, 2012). All 434 final and pre-final year students were included.

#### **5.2.5 Questionnaire development**

The questionnaire is the most common data collection method (Mann, 2003). Three similar structured self-completion questionnaires were developed for the Maltese population, HCPs and students.

Draft questionnaires were developed with reference to three key sources:

1. existing literature (Seehusen and Edwards, 2006; Jarvis *et al.*, 2009; Persson *et al.*, 2009; Abrons *et al.*, 2010; Chattopadhyay *et al.*, 2010)
2. findings of the Delphi technique
3. theoretical frameworks, which are described in more detail below.

##### **5.2.5.1 Awareness, perception and attitudes**

Knowledge based questions determine awareness of issues and awareness of desired behaviours (Sayers, 2006). Awareness is thought to occur when 'an experience' becomes 'an individual's experience' (LaBerge, 1998), and raising awareness is thought to attempt to inform attitudes, behaviours and beliefs (Sayers, 2006); hence these concepts are intertwined. However, it is recognised that possessing information and awareness does not automatically lead to behavioural change. Also, one has to distinguish between conscious awareness (explicit perception of a stimulus), that is the individual distinguishing the presence or absence of an issue, and unconscious awareness, that is the perception without awareness of the issue (implicit perception of a stimulus) (Dretske, 2006).

Perception is when a person is confronted with a situation or stimulus, and is interpreted into something meaningful based on prior experiences. It is recognised that perception may be very different from reality (Pickens, 2005). Perception is the process of interpreting messages delivered from our senses to create order and meaning to the environment (Johns and Saks, 2013). Since perception is based on experiences, two individuals with different experiences

may view the same thing and perceive it as being different (Schiff, 1970). While attitudes exert a powerful influence on perception (Kuper and Kuper, 2004), other characteristics, such as motives, existing beliefs and personality, can influence perception (Pickens, 2005).

In 1928, Thurstone described the concept of attitude as "*the sum total of a man's inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats, and convictions about any specified topic*" (Thurstone, 1928, p. 531). Pickens (2005, p.44) defines attitude as "*a mind-set or a tendency to act in a particular way due to both an individual's experience and temperament*".

#### 5.2.5.2 Theoretical frameworks to determine behaviour

There are a number of theoretical frameworks which try to determine individuals' decisions to behave in a certain way. One of the theoretical frameworks used in this study, the HBM, was initially based on four theoretical constructs as a basis for behaviour: perceived seriousness, perceived susceptibility, perceived benefits and perceived barriers. It has now been expanded to include cues to action, motivating factors and self-efficacy (Hayden, 2009). The constructs of the HBM, although originally used to explain public's fear to participate in health screening programs, are also important when dealing with other topics which are health related. This model takes into account the individual's past experiences and characteristics. Perceived seriousness gauges the feelings one has regarding the seriousness of the issue. Perceived susceptibility is an individual's perception of his or her risk of being affected by the issue. Perceived benefits indicate an individual's beliefs regarding the efficacy of appropriate behaviour measures. Perceived barriers refer to an individual's perception of the obstacles to appropriate behaviour measures. Cues to action refer to events, people or things that move individuals to change their behaviour. Self-efficacy refers to an individual's beliefs regarding his or her ability to successfully do something (Hayden, 2009).

Two other theoretical frameworks that relate to behaviours and behavioural change are Rogers' Diffusion of Innovation theory and the TTM, both applied in the design of the survey instrument in this study. The Diffusion of Innovation theory, which relates to social behaviours and change, refers to the process by

which an innovation is communicated through certain channels over time among members of a social system (Valente and Rogers, 1995). Therefore, Diffusion of Innovation refers to the process that occurs as individuals adopt a new idea, product, practice or philosophy. There are five adopter categories: the innovators, the early adopters, early majority, late majority and laggards (Kaminski, 2011). Rogers identified five distinct innovation characteristics which include (Kaminski, 2011):

1. observability (the extent to which the results of an innovation are visible to potential adopters)
2. relative advantage (the extent to which the innovation is perceived to be superior to current practice)
3. compatibility (the extent to which the innovation is perceived to be consistent with socio-cultural values, previous ideas and/or perceived needs)
4. trialability (the extent to which the innovation can be experienced on a limited basis)
5. complexity (the extent to which an innovation is difficult to use or understand).

The Diffusion of Innovation model suggests five stages in the decision making process (Sanson-Fisher, 2004):

1. Knowledge (the individual acquires knowledge about the proposed innovation)
2. Persuasion (the individual is persuaded about the advantages of innovation)
3. Decision (the individual engages in activities that will lead to a choice about adopting or rejecting the innovation)
4. Implementation (the individual tries the innovation)
5. Adoption (the individual reinforces the innovation decision).

There are three types of knowledge that participants require to adopt the innovation (Wadensten and Carlsson, 2007):

1. Awareness knowledge (provision of information whereby a person learns about the innovation)
2. How-to knowledge (which is the information required to use the innovation properly)
3. Principles knowledge (knowledge on the principles underlying how the innovation works).

The TTM is based on stages of change and categorises segments of the population based on where they are in the process of change (Prochaska and Prochaska, 2011). There are six stages of change:

1. Precontemplation (the individual does not intend to take action in the near future, typically measured as the next six months)
2. Contemplation (the individual intends to take action in the next six months. S/he is aware of the advantages of changing but is also aware of the disadvantages)
3. Preparation (the individual intends to take action in the immediate future, typically measured as the next month)
4. Action (the individual has already made overt modifications to his/her behaviour in the last six months)
5. Maintenance (the individual has already made overt modifications to his/her behaviour and is working to prevent relapse)
6. Termination (the individual is not tempted).

Individuals' progress goes through stages through a number of processes:

1. Consciousness raising
2. Dramatic relief
3. Environmental re-evaluation
4. Self-re-evaluation
5. Self-liberation
6. Social liberation
7. Counter conditioning
8. Helping relationships
9. Reinforcement management
10. Stimulus control

Change is based on the decisional balance of reflecting the pros and cons of changing.

#### *5.2.5.3 Measurement scales*

There are a number of scales which are used in the construction of attitudinal response items, namely Thurstone scales, Likert scale, Guttman scales and the Semantic Differential scale (Bucci, 2003). Attitudes typically fall between two



extreme points ranging from extremely negative to extremely positive (Kuper and Kuper, 2004). The Likert scale, originally a five response format ranging from strongly disagree to strongly agree, was developed by Rensis Likert (Dwyer, 1993). Semantic differential scales are concerned with the measurement of meaning, ideas or associations which individuals assign to words or objects. The scale contains two opposing adjectives separated by a range of words (Bucci, 2003). It is reported to be a simple and economical means for obtaining data on people's reactions. The extent of use of both Likert and semantic differential scales in research studies is thought to support their validity for attitude measurement (Heise, 1970).

The 8-item Morisky Medication Adherence Scale (MMAS-8-Item) was used to determine adherence to medication by those patients prescribed regular medication. Approval to use this scale and its equivalent Maltese translation was sought and obtained from Professor Donald Morisky (owner of this scale) (Appendix 5.1).

#### *5.2.5.4 Questionnaire sections and items*

The HCP pre-pilot questionnaire was constructed as five sections:

- Section A requested personal and practice demographics.
- Section B explored issues related to awareness of medication wastage. Questions within this section were in the form of a Likert scale with responses from 1= Strongly disagree to 5= Strongly agree.
- Section C sought opinions on factors potentially leading to medication wastage via a semantic differential scale with bipolar adjectives, 'no contribution' and 'major contribution'.
- Section D investigated current practices, views and experiences, also in the form of five point Likert scales. A further scale was used with response options of never, infrequently, around half the time, usually, always, unsure. This scale was reported by Mort *et al.* (2010) when exploring the effect of an introductory pharmacy practice experience on students' performance. This section also contained an open response item on the medication, therapeutic areas or patient groups to be considered as priority for targeting strategies to reduce medication wastage in Malta.
- Section E explored education and training.

The students' questionnaire was similar in content to that of HCPs but questions from section D and E were combined as one section.

The public questionnaire contained seven sections and was presented as both an English and Maltese version. The content was very similar to the HCP questionnaire, with the following differences:

- Section A requested patient demographics.
- Sections B to D were in the form of the five point Likert scale. Section B focused on awareness of medication wastage and was similar to the HCP one. Sections C and D were about current practices involving medication patients bought or obtained free of charge.
- Section E focused on experiences with medication.
- Section F included the MMAS-8-Item.
- Section G contained a quality of life semantic differential scale between the two opposing statements: 1 = As bad as it could be and 5 = As good as it could be.

#### *5.2.5.5 Face and content validity testing*

Questionnaires were sent by email to a panel of ten senior colleagues and/or Delphi study participants for face and content validity review.

Comments were received from six and these are presented in Appendix 5.2, highlighting subsequent changes.

#### *5.2.5.6 Pilot testing*

A pilot study was carried out for several reasons: to confirm that the research protocol was realistic and workable; to determine the likely study response rates (van Teijlingen and Hundley, 2001); to ensure that responses elicited would meet the aims of the study; and to refine questionnaire items (Clibbens *et al.*, 2012).

Pilot testing was carried out using a random sample of 100 members of the Maltese population and 100 HCPs (30 doctors, 40 nurses and 30 pharmacists), and 30 recently graduated medical students who were still not included in the medical register. Pilot study participants were excluded from the full study. Minor

changes were made to the wording of questionnaire items and response options following the pilot study.

### **5.2.6 Full study**

#### *5.2.6.1 Study information*

A covering letter was included with the questionnaire (Appendices 5.3, 5.4, 5.5) describing: the purpose and importance of the study; sampling of study participants; voluntary nature; fate of results; organizer; funding body; and reminder of confidentiality (Raymond, 2005).

To identify potential participants for the next phase of the research (focus groups) a separate information letter describing the planned focus groups was also included.

#### *5.2.6.2 Questionnaire formatting*

Questionnaires were formatted using SNAP 10 which is an integrated software package used to design questionnaires for either printing or for publishing on the web. Data generated from online questionnaires using SNAP can be transferred directly into Statistical Package for the Social Sciences® (SPSS®) for data analysis (Directorate of Information technology, University of Aberdeen, 2007).

#### *5.2.6.3 Recruitment*

The questionnaire, covering letter, focus group recruitment information letter and a self-addressed envelope were sent by post to the general public, dentists and doctors, requesting that the completed questionnaire be returned to the principal researcher within two weeks.

An email describing the study, with a link to all study materials was sent by the Registrar of the Maltese Pharmacy Council to pharmacists and by the Registrar of the University of Malta to students. Questionnaires completed via email were returned through SNAP which transferred the data directly into SPSS® V21. Email or a postal reminder was sent to non-respondents after two to three weeks.

#### **5.2.6.4 Maximising response rates**

Response rates may vary depending on several factors such as the length of questionnaire, the nature of the sponsorship, the topic and the type of respondent. As discussed in chapter 4, while there is no agreed acceptable minimum response rate, 75% and above is considered to be good (Bowling, 2009; Williams, 2003) and below 60% sub-optimal (Bowling, 2009).

Measures highlighted in a systematic review by Edwards *et al.* (2009) to increase response rates of studies employing postal questionnaires were described in chapter 4. The following measures were adopted in this phase: high quality, short, focused questionnaires with appropriate formatting; an 'invitation to participate' letter; distribution of the student questionnaire to avoid examination periods; support of a scholarship through the MGSS; university logos on letters and questionnaires; reassurance of confidentiality throughout; provision of reply paid envelopes for postal questionnaires; and one reminder. 'Post-it' notes stating "*Your feedback will be greatly appreciated. Thank you. Lorna*" were attached to postal questionnaires to increase further response rates (Garner, 2005).

Questionnaire data collection took place between September and November 2013.

#### **5.2.7 Data handling and analysis**

Data were inputted into SPSS<sup>®</sup> V21, with an independent reliability check undertaken on a sample of 10% of entries. Data were screened for errors by analysing frequencies and checking for outliers.

Data were analysed as follows:

1. Descriptive statistics (frequency, percentage) for categorical data (e.g. demographic variables, Likert scale responses)
2. Inferential statistics to explore any associations. Data from Likert scales were converted to binomial data by combining all agree responses, and all disagree and unsure responses. Chi-square was used to determine any associations between variables (e.g. demographics) and outcomes (e.g. awareness and interest in medication wastage). Variables identified as significant in univariate

analysis were further tested in bivariate logistic regression analysis. P-values  $\leq 0.05$  were considered significant.

3. Textual responses generated through open questions were analysed using a content analysis approach, as described in chapter 4.

#### **5.2.8 Promoting quality in research: validity and reliability**

A number of measures were implemented to promote validity and thus study robustness:

- Face and content validity testing by a panel of expert academics, researchers and practitioners. The combination of experts in the field of study together with experts in instrument construction increased the likelihood of the questionnaire being both well-constructed and content-valid (Davis, 1992).
- Questionnaire items were developed from the published literature, the Delphi technique and theoretical frameworks, and together with using established measurement scales, enhanced criterion validity.
- A pilot study was carried out to ensure robustness.

A number of measures were taken to reduce bias and thus improve validity and reliability.

- Participants (general public, doctors) were randomly selected to prevent selection bias.
- Questionnaires did not require participants to recall events beyond six months to minimise recall or memory bias.
- Attention bias and social desirability bias were minimised through the use of self-administered questionnaires and by emphasising the purpose of the research.
- Questionnaire items were mainly in the form of Likert scales, semantic differential scales and close-ended questions with standardised options to prevent acquiescence response set bias.
- Questionnaires were self-administered to minimise evaluation apprehension.
- Clear statements of the purpose of the research phase were provided to prevent expectancy bias.
- Independent reliability checks were undertaken on a sample of 10% of entries.

### **5.2.9 Research Governance**

The study was approved by the School of Pharmacy and Life Sciences Research Ethics Committee, Robert Gordon University (Appendix 5.6) and the University of Malta Research Ethics Committee (Appendix 5.7). The UK DPA (The National Archives, 1998), the Maltese DPA (Information and Data Protection Commissioner, 2001) as well as the EU Data Protection Directive (The European Parliament and the Council of the European Union, 1995) were adhered to at all times by the use of password protected databases accessible only by the principal researcher.

## 5.3 Results: Maltese public questionnaire

### 5.3.1 Response rate

The response rate following the first mailing was 15.4% (295 responses), higher than the response rate of the pilot study (12.0%), and increased to 20.4% (391/1,920 responses) following one reminder sent to non-respondents. The number of responses exceeded the calculated sample size of 384. Figure 5.1 illustrates the number of responses per day over a 55-day time period.

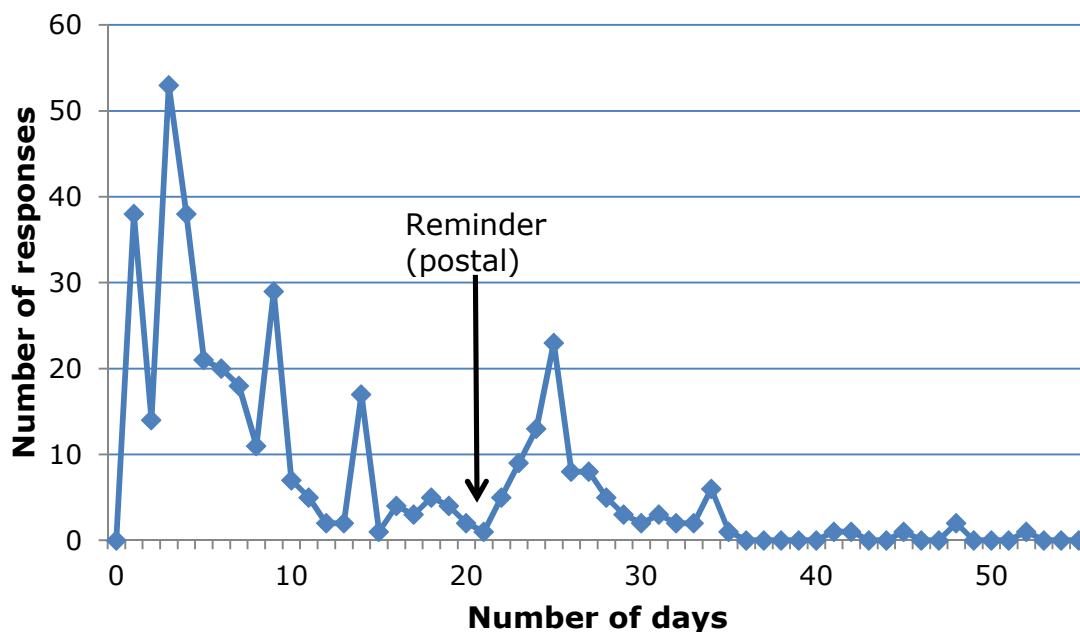


Figure 5.1: Number of public questionnaire responses during 55-day collection

### 5.3.2 Respondent demographics

Table 5.1 provides a description of the respondent demographics, comparing these to Maltese population demographics where available (National Statistics Office, 2012; National Statistics Office, 2013; National Statistics Office, 2014).

Table 5.1: Respondent demographic data (n=391)

<b>Characteristic</b>	<b>Percent (Frequency) % (n)</b>	<b>Maltese Demographics % (n)</b>
<b>Gender</b>		<b>Electoral register 2013</b>
Male	43.5 (170)	49.4 (164,370)
Female	56.5 (221)	50.6 (168,274)
<b>Age (years)</b>		<b>Census 2011</b>
18-24	7.2 (28)	13.3 (55,312)
25-34	13.0 (51)	14.5 (60,462)
35-44	17.1 (67)	13.0 (54,129)
45-54	15.6 (61)	13.8 (57,336)
55-64	23.5 (92)	14.3 (59,470)
65-74	13.6 (53)	(>65 years):
75-84	7.9 (31)	16.3 (67,841)
≥ 85	2.1 (8)	
<b>Highest level of education</b>		<b>Census 2011</b>
No schooling	1.0 (4)	1.6 (5,948)
Primary	17.9 (70)	20.0 (71,254)
Secondary	36.1 (141)	59.0 (209,715)
Post-secondary	18.9 (74)	5.3 (18,792)
Tertiary	17.4 (68)	9.7 (34,306)
Post-graduate	8.2 (32)	4.4 (15,689)
Missing data	0.5 (2)	-
<b>Locality of residence</b>		<b>Electoral register 2013</b>
Southern Harbour	19.4 (76)	19.8 (65,843)
Northern Harbour	31.7 (124)	28.7 (95,377)
South Eastern	15.6 (61)	14.9 (49,711)
Western	12.0 (47)	13.9 (46,292)
Northern	14.1 (55)	14.3 (47,734)
Gozo and Comino	6.9 (27)	8.3 (27,687)
Missing data	0.3 (1)	-



<b>Labour status</b>		<b>2012 Maltese Demographics</b>
Employed	47.6 (186)	48.2 (NA*)
Unemployed	6.7 (26)	3.3 (NA)
Inactive	45.7 (179)	48.5 (NA)
• Pensioner	27.6 (108)	-
• Student	3.8 (15)	-
• Other	14.3 (56)	-

**Respondent or close family member is a dentist, doctor, nurse or pharmacist**

No	72.1 (282)	-
Yes	25.8 (101)	-
Missing data	2.1 (8)	-

\*NA: Not available

While just over half of the respondents (56.5%, n=221) were female the majority (62.6%, n=245) were aged over 44 years, had a level of education of secondary or higher (81.1%, n=317) and were in employment (47.6%, n=186). Respondent demographics were similar to the Maltese population.

### **5.3.3 Medication use**

Sixty-two percent of respondents (n=241) stated that they were taking or using regular medication, defined in the questionnaire as medication that they had to take or use every day. Of these, almost three quarters (70.5% n=170) obtained their medication free of charge, with 53.5% (n=129) purchasing the medication (respondents could have ticked both options: buying some of their regular medication and getting the remainder free). Free samples were given by the doctor to 2.5% (n=6) of respondents.

Of the 150 respondents not taking or using medication every day, 62% (n=93) had been prescribed medication or purchased OTC medication in the previous six months.

The remainder of the questionnaire was completed only by those respondents either taking medication every day or had been prescribed or purchased OTC medication in the previous six months.

Full questionnaire data was therefore obtained from the majority of respondents (85.7%, n=335, including one respondent not specifying regular/prescribed/purchased).

#### **5.3.4 Medication adherence**

The MMAS-8-Item was completed by those either prescribed regular medication or who had a medication prescribed during the two weeks prior to the study (n=269).

Responses to individual scale statements are given in Table 5.2 and summary scores in Table 5.3. Almost half (50.6%, n=136) self-reported forgetting to take their medication, one third (31.2%, n=84) considered sticking to their treatment plan to be a real inconvenience while three quarters (75.1%, n=202) self-reported not being fully adherent.

Table 5.2: Responses to MMAS-8-Item (n=269)

<b>MMAS-8-Item</b>	<b>Yes % (n)</b>
Do you sometimes forget to take your pills?	50.6 (136)
People sometimes miss taking their medication for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?	26.4 (71)
Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	19.0 (51)
When you travel or leave home, do you sometimes forget to bring along your medication?	18.6 (50)
Did you take your medicine yesterday?	85.9 (231)
When you feel like your health is under control, do you sometimes stop taking your medicine?	22.3 (60)
Taking medication everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	31.2 (84)
How often do you have difficulty remembering to take all your medication?	
Never/Rarely	47.2 (127)
Once in a while	38.7 (104)
Sometimes	11.5 (31)
Usually	2.2 (6)
All the time	0.4 (1)

Table 5.3: MMAS-8-Item score (n=269)

<b>Low adherence (score &lt; 6)</b>	<b>Medium adherence (6 = score &lt; 8)</b>	<b>High adherence (score = 8)</b>
43.5% (117)	31.6% (85)	24.9% (67)

### 5.3.5 General health

Figure 5.2 illustrates respondents' state of health, with less than one quarter (22.7%, n=76) stating their health to be as good as it could be.

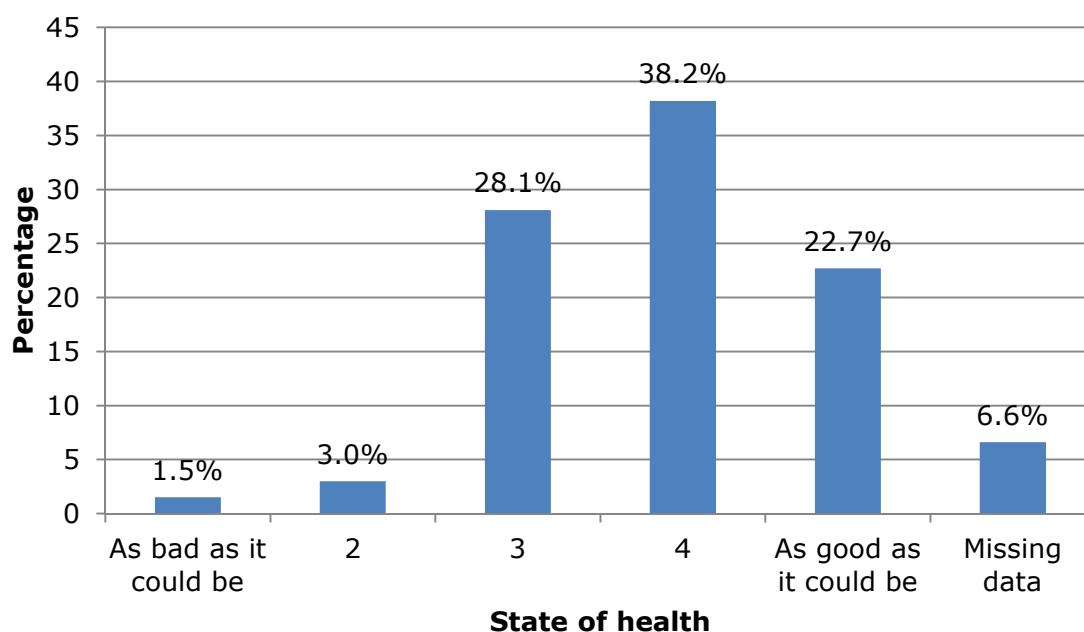


Figure 5.2: Health rating during the previous 6 months (n=335)

### 5.3.6 Awareness of medication wastage

Table 5.4 provides responses to statements on aspects of medication wastage. The majority strongly agreed/agreed that they were fully aware of the issue of medication wastage (70.6%, n=276), its impact on society (65.8%, n=257) and the economy (76.2%, n=298). Just over half were fully aware of the impact on patients (57.3%, n=224) and the environment (55.0%, n=215) but less on HCPs (38.6%, n=151). Some respondents added areas of impact, which included the following categories:

- shortage of medication (n=10)
- hospitals and health in general, tax payers (n=5 each)
- patients who required the medication but were not entitled for free (n=3)
- social services and social care professionals, drug abusers and any type of abuse (n=2 each)
- the poor, Europe, suppliers, resistance to antibiotics, culture, animals, black market, respondent's family and those who are helpless (n=1 for each).

Table 5.4: Awareness of medication wastage (n=391)

<b>Statements</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Missing</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
I am <u>fully aware</u> of the <u>issue</u> of medication wastage in Malta	5.6 (22)	5.9 (23)	15.3 (60)	34.8 (136)	35.8 (140)	2.6 (10)
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>patients</u>	5.4 (21)	8.4 (33)	24.3 (95)	39.9 (156)	17.4 (68)	4.6 (18)
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>healthcare professionals</u>	7.2 (28)	10.7 (42)	37.6 (147)	27.6 (108)	11.0 (43)	5.9 (23)
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>society</u>	4.6 (18)	6.1 (24)	18.9 (74)	42.5 (166)	23.3 (91)	4.6 (18)
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on the <u>economy</u>	2.3 (9)	5.4 (21)	12.5 (49)	40.4 (158)	35.8 (140)	3.6 (14)
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on the <u>environment</u>	4.1 (16)	6.1 (24)	29.2 (114)	35.8 (140)	19.2 (75)	5.6 (22)

Table 5.5 provides responses to statements relating to interest in the impact of medication wastage.

The majority strongly disagreed/disagreed that they had no interest in the issue of medication wastage (71.9%, n=281), and its impact on patients (73.9%, n=289), HCPs (69.1%, n=270), society (75.7%, n=296), the economy (77.5%, n=303), and the environment (72.9%, n=285).

Table 5.5: Interest in the impact of medication wastage (n=391)

<b>Statements</b>	<b>Strongly disagree</b> <b>% (n)</b>	<b>Disagree</b> <b>% (n)</b>	<b>Unsure</b> <b>% (n)</b>	<b>Agree</b> <b>% (n)</b>	<b>Strongly agree</b> <b>% (n)</b>	<b>Missing</b> <b>% (n)</b>
I have <u>no interest</u> in the <u>issue</u> of medication wastage in Malta	40.4 (158)	31.5 (123)	5.6 (22)	7.4 (29)	5.6 (22)	9.5 (37)
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>patients</u>	37.1 (145)	36.8 (144)	9.7 (38)	6.4 (25)	2.0 (8)	7.9 (31)
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>healthcare professionals</u>	32.5 (127)	36.6 (143)	13.0 (51)	5.6 (22)	2.8 (11)	9.5 (37)
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>society</u>	38.6 (151)	37.1 (145)	8.2 (32)	5.6 (22)	2.3 (9)	8.2 (32)
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on the <u>economy</u>	40.9 (160)	36.6 (143)	7.7 (30)	3.8 (15)	3.3 (13)	7.7 (30)
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on the <u>environment</u>	37.6 (147)	35.3 (138)	12.5 (49)	3.8 (15)	2.6 (10)	8.2 (32)

Table 5.6 provides responses to statements on contribution towards medication wastage in Malta.

Whilst a little more than a quarter of respondents (27.2%, n=106) felt that they contributed to the issue of medication wastage, the majority (69.3%, n=271) stated that they felt that other people were contributing to medication wastage. Respondents strongly agreed/agreed that, of all the HCPs, doctors were contributing most to medication wastage (35.0%, n=137), followed by pharmacists (16.6%, n=65), nurses (16.1%, n=63) and dentists (8.2%, n=32). Almost half of respondents (42.4%, n=166) strongly agreed/agreed that the free healthcare system was contributing towards the issue of medication wastage.



Table 5.6: Contribution towards medication wastage (n=391)

<b>Statements</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Missing</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
I feel that <u>I contribute</u> to the <u>issue</u> of medication wastage in Malta	35.8 (140)	21.0 (82)	9.5 (37)	18.2 (71)	9.0 (35)	6.6 (26)
I feel that <u>other people</u> are contributing to the <u>issue</u> of medication wastage in Malta	3.6 (14)	3.6 (14)	17.9 (70)	44.0 (172)	25.3 (99)	5.6 (22)
I feel that the <u>free health system</u> is contributing to the <u>issue</u> of medication wastage in Malta	14.3 (56)	18.7 (73)	18.9 (74)	24.0 (94)	18.4 (72)	5.6 (22)
I feel that <u>dentists</u> are responsible for the <u>issue</u> of medication wastage in Malta	25.1 (98)	34.8 (136)	27.4 (107)	5.1 (20)	3.1 (12)	4.6 (18)
I feel that <u>doctors</u> are responsible for the <u>issue</u> of medication wastage in Malta	14.1 (55)	21.5 (84)	25.1 (98)	27.1 (106)	7.9 (31)	4.3 (17)
I feel that <u>nurses</u> are responsible for the <u>issue</u> of medication wastage in Malta	19.2 (75)	34.5 (135)	25.3 (99)	12.8 (50)	3.3 (13)	4.9 (19)
I feel that <u>pharmacists</u> are responsible for the <u>issue</u> of medication wastage in Malta	18.9 (74)	34.0 (133)	25.8 (101)	11.0 (43)	5.6 (22)	4.6 (18)

Table 5.7 provides responses to statements on the ability to reduce medication wastage in Malta.

While little more than one third (38.6%, n=151) strongly agreed/agreed that they could do more to reduce medication wastage in Malta, only a similar proportion (35.6%, n=139) were confident in their ability to reduce medication wastage. The majority (71.3%, n=279) strongly agreed/agreed that the state could do more to reduce medication wastage.

Some respondents commented on what the state could do to reduce medication wastage, including:

- exercise more control checks (n=35)
- educate (n=20)
- revise the free healthcare system (n=17)
- medication should always be available (n=11)
- there should be payment for medication (n=10)
- patients should be made aware of cost of free medication (n=2)
- patients should be able to exchange closed package medication for other useful medication, the state should give more free medication, the state should enforce more patient reviews, abuse should be penalised, medication should be packed in smaller amounts, the state should ask patients to return unused medication, the state has to understand the Maltese population, the state should enforce laws, introduce policies and have more restrictions, the state should supply good medication, and medication should be delivered to those who need them (n=1 for each)

Respondents strongly agreed/agreed that, of all the HCPs, doctors could do more to reduce medication wastage (62.1%, n=243), followed by pharmacists (46.8%, n=183), nurses (40.4%, n=158) and dentists (19.7%, n=77).

Some respondents commented on HCPs' contributions towards wastage. Themes derived using a content analysis approach included:

- doctors should not issue prescriptions unnecessarily (n=38 [7 of whom commented on the unnecessary prescribing of antibiotics])
- doctors should carry out medication reviews more regularly (n=17)

- doctors are the ones who prescribe medication mostly, therefore they should do this cautiously (n=8)
- the need for doctors to educate patients (n=7)
- doctors "*do whatever the patient tells them to do*", "*doctors should not succumb to patients' pressure, who take medicines that they do not need any longer*" and nurses should not make mistakes when administering medication (n=1 each)

Table 5.7: Confidence in ability (n=391)

<b>Statements</b>	<b>Strongly disagree</b> <b>% (n)</b>	<b>Disagree</b> <b>% (n)</b>	<b>Unsure</b> <b>% (n)</b>	<b>Agree</b> <b>% (n)</b>	<b>Strongly agree</b> <b>% (n)</b>	<b>Missing</b> <b>% (n)</b>
I feel that I could do more to reduce medication wastage in Malta	9.0 (35)	15.6 (61)	28.4 (111)	29.4 (115)	9.2 (36)	8.4 (33)
I feel confident in my ability to reduce medication wastage in Malta	6.4 (25)	12.5 (49)	37.1 (145)	24.3 (95)	11.3 (44)	8.4 (33)
<u>Dentists</u> could do more to reduce medication wastage in Malta	6.6 (26)	16.9 (66)	48.3 (189)	15.9 (62)	3.8 (15)	8.4 (33)
<u>Doctors</u> could do more to reduce medication wastage in Malta	3.1 (12)	6.9 (27)	19.7 (77)	43.7 (171)	18.4 (72)	8.2 (32)
<u>Nurses</u> could do more to reduce medication wastage in Malta	5.9 (23)	14.1 (55)	30.7 (120)	32.7 (128)	7.7 (30)	9.0 (35)
<u>Pharmacists</u> could do more to reduce medication wastage in Malta	4.9 (19)	13.3 (52)	25.8 (101)	35.8 (140)	11.0 (43)	9.2 (36)
<u>The state</u> could do more to reduce medication wastage in Malta	1.5 (6)	3.8 (15)	13.8 (54)	36.8 (144)	34.5 (135)	9.5 (37)

### 5.3.7 Association between demographic characteristics and outcomes

This section provides analysis of associations between a number of demographic variables and key outcome measures of: awareness of medication wastage in Malta; no interest in medication wastage; contribution towards medication wastage; and confidence in ability to reduce medication wastage.

#### 5.3.7.1 Awareness of medication wastage

Demographics and other variables were tested for association with the outcome of awareness of medication wastage. Awareness was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.8.

Association of data for demographic characteristics and awareness of issues of medication wastage (statement in questionnaire: "I am fully aware of the issue of medication wastage in Malta"), revealed that:

- age and awareness of medication wastage were significantly related  $\chi^2=21.223$ ,  $p=0.003$ . Younger respondents were much less likely to self-report awareness of issues of medication wastage.
- type of occupation and awareness of medication wastage were significantly related  $\chi^2=13.111$ ,  $p=0.011$ , with pensioners more likely to self-report awareness of issues of medication wastage and students self-reporting the least.
- whether patients were on regular medication and awareness of medication wastage were significantly related  $\chi^2=5.334$ ,  $p=0.021$ . Respondents who were on regular medication were much more likely to self-report awareness of issues of medication wastage.
- whether patients were obtaining their medication for free and awareness of medication wastage were significantly related  $\chi^2=4.962$ ,  $p=0.026$ . Respondents who were obtaining their medication for free were more likely to self-report awareness of issues of medication wastage.

Variables identified as significant in univariate analysis ( $p \leq 0.05$ ) were entered into bivariate logistic regression. There were no strong predictor(s) for the given outcome.

Table 5.8: Association of data for demographic characteristics and awareness of issues of medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree/strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	72.4 (276)	27.6 (105)	0.090 (0.764)
Female	71.8 (153)	28.2 (60)	
Male	73.2 (123)	26.8 (45)	
Age (years)	72.4 (276)	27.6 (105)	<b>21.223 (0.003)</b>
18-24	39.3 (11)	60.7 (17)	
25-34	64.7 (33)	35.3 (18)	
35-44	74.2 (49)	25.8 (17)	
45-54	75.9 (44)	24.1 (14)	
55-64	79.8 (71)	20.2 (18)	
65-74	76.9 (40)	23.1 (12)	
75-84	72.4 (21)	27.6 (8)	
≥ 85	87.5 (7)	12.5 (1)	
Level of education	72.3 (274)	27.7 (105)	2.908 (0.714)
No schooling	75.0 (3)	25.0 (1)	
Primary	78.3 (54)	21.7 (15)	
Secondary	72.6 (98)	27.4 (37)	
Post-secondary	70.8 (51)	29.2 (21)	
Tertiary	65.7 (44)	34.3 (23)	
Post-graduate	75.0 (24)	25.0 (8)	

Type of occupation	72.4 (276)	27.6 (105)	<b>13.111 (0.011)</b>
Employed	70.7 (130)	29.3 (54)	
Unemployed	64.0 (16)	36.0 (9)	
Pensioner	76.9 (80)	23.1 (24)	
Student	40.0 (6)	60.0 (9)	
Other	83.0 (44)	17.0 (9)	
Locality of residency	72.4 (275)	27.6 (105)	0.863 (0.973)
Southern Harbour	73.7 (56)	26.3 (20)	
Northern Harbour	70.5 (86)	29.5 (36)	
South Eastern	70.0 (42)	30.0 (18)	
Western	76.1 (35)	23.9 (11)	
Northern	73.1 (38)	26.9 (14)	
Gozo & Comino	75.0 (18)	25.0 (6)	
Family member – HCP	72.4 (270)	27.6 (103)	0.766 (0.381)
No	71.2 (195)	28.8 (79)	
Yes	75.8 (75)	24.2 (24)	
On regular medicines	72.4 (275)	27.6 (105)	<b>5.334 (0.021)</b>
No	65.8 (98)	34.2 (51)	
Yes	76.6 (177)	23.4 (54)	
Free:yellow or pink card	72.5 (274)	27.5 (104)	<b>4.962 (0.026)</b>
No	68.1 (147)	31.9 (69)	
Yes	78.4 (127)	21.6 (35)	

Pay for them	72.5 (274)	27.5 (104)	2.062 (0.151)
No	70.2 (179)	29.8 (76)	
Yes	77.2 (95)	22.8 (28)	
MMAS-8-Item score	74.6 (194)	25.4 (66)	4.597 (0.100)
Low adherence	68.4 (80)	31.6 (37)	
Medium adherence	81.3 (65)	18.7 (15)	
High adherence	77.8 (49)	22.2 (14)	
General health	74.3 (226)	25.7 (78)	1.742 (0.783)
As bad as it could be	60.0 (3)	40.0 (2)	
2	77.8 (7)	22.2 (2)	
3	78.3 (72)	21.7 (20)	
4	73.6 (92)	26.4 (33)	
As good as it could be	71.2 (52)	28.8 (21)	



#### 5.3.7.2 *No interest in medication wastage*

Demographics and other variables were tested for association with the outcome of no interest in medication wastage. Interest was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.9.

Association of data for demographic characteristics and interest in issues of medication wastage (statement in questionnaire: "I have no interest in the issue of medication wastage in Malta"), revealed that:

- whether patients were obtaining their medication for free and no interest in medication wastage were significantly related  $\chi^2=5.254$ ,  $p=0.022$ . Respondents who were obtaining their medication for free were more likely to self-report no interest of issue of medication wastage.
- whether patients were purchasing their medication and interest in medication wastage were significantly related  $\chi^2=4.809$ ,  $p=0.028$ . Respondents who were paying for their medication were less likely to self-report no interest of issue of medication wastage.

The fact that those patients paying for their medication were less likely to self-report no interest of issue of medication wastage is in line with the finding that those patients obtaining their medication for free were more likely to self-report no interest of issue of medication wastage.

Variables identified as significant in univariate analysis ( $p \leq 0.05$ ) were entered into bivariate logistic regression. Both variables were retained as significant, as follows:

- medication for free, odds ratio 2.280 (95% CI 1.093-4.758)
- paying for medication, odds ratio 2.041 (95% CI 1.15-3.731)

Table 5.9: Association of data for demographic characteristics and no interest in issues of medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree/strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	14.4 (51)	85.6 (303)	0.003 (0.955)
Female	14.5 (29)	85.5 (171)	
Male	14.3 (22)	85.7 (132)	
Age (years)	14.4 (51)	85.6 (303)	9.547 (0.216)
18-24	17.9 (5)	82.1 (23)	
25-34	11.7 (6)	88.2 (45)	
35-44	7.9 (5)	92.1 (58)	
45-54	14.5 (8)	85.5 (47)	
55-64	12.7 (10)	87.3 (69)	
65-74	25.6 (11)	74.4 (32)	
75-84	21.4 (6)	78.6 (22)	
≥ 85	0.0 (0)	100.0 (7)	
Level of education	14.4 (51)	85.6 (301)	6.716 (0.243)
No schooling	0.0 (0)	100.0 (4)	
Primary	18.3 (11)	81.7 (49)	
Secondary	19.2 (23)	80.8 (97)	
Post-secondary	11.3 (8)	88.7 (63)	
Tertiary	7.6 (5)	92.4 (61)	
Post-graduate	12.9 (4)	87.1 (27)	

Type of occupation	14.4 (51)	85.6 (303)	6.869 (0.143)
Employed	11.9 (21)	88.1 (156)	
Unemployed	14.3 (3)	85.7 (18)	
Pensioner	21.7 (20)	78.3 (72)	
Student	20.0 (3)	80.0 (12)	
Other	8.2 (4)	91.8 (45)	
Locality of residency	14.4 (51)	85.6 (302)	5.973 (0.309)
Southern Harbour	17.6 (12)	82.4 (56)	
Northern Harbour	13.7 (16)	86.3 (101)	
South Eastern	8.8 (5)	91.2 (52)	
Western	24.4 (10)	75.6 (31)	
Northern	10.6 (5)	89.4 (42)	
Gozo & Comino	13.0 (3)	87.0 (20)	
Family member – HCP	14.1 (49)	85.9 (298)	0.120 (0.729)
No	14.5 (37)	85.5 (218)	
Yes	13.0 (12)	87.0 (80)	
On regular medicines	14.4 (51)	85.6 (302)	0.673 (0.412)
No	12.6 (18)	87.4 (125)	
Yes	15.7 (33)	84.3 (177)	
Free:yellow or pink card	14.5 (51)	85.5 (301)	<b>5.254 (0.022)</b>
No	11.0 (23)	89.0 (187)	
Yes	19.7 (28)	80.3 (114)	

Pay for them	14.5 (51)	85.5 (301)	<b>4.809 (0.028)</b>
No	17.4 (41)	82.6 (195)	
Yes	8.6 (10)	91.4 (106)	
MMAS-8-Item score	15.6 (37)	84.4 (200)	1.907 (0.385)
Low adherence	14.8 (16)	85.2 (92)	
Medium adherence	20.3 (14)	79.7 (55)	
High adherence	11.7 (7)	88.3 (53)	
General health	14.7 (41)	85.3 (238)	1.761 (0.780)
As bad as it could be	20.0 (1)	80.0 (4)	
2	14.3 (1)	85.7 (6)	
3	18.6 (16)	81.4 (70)	
4	13.0 (15)	87.0 (100)	
As good as it could be	12.1(8)	87.9 (58)	

#### 5.3.7.3 Contribution towards medication wastage

Demographics and other variables were tested for association with the outcome of contribution towards medication wastage. Contribution was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.10.

Association of data for demographic characteristics and contribution towards medication wastage (statement in questionnaire: "I feel that I contribute to the issue of medication wastage in Malta"), revealed that:

- type of occupation and contribution towards medication wastage were significantly related  $\chi^2=13.274$ ,  $p=0.010$ , with unemployed respondents much more likely to report contribution towards medication wastage.

Table 5.10: Association of data for demographic characteristics and contribution towards medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree/strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	29.0 (106)	71.0 (259)	0.031 (0.861)
Female	29.4 (60)	70.6 (144)	
Male	28.6 (46)	71.4 (115)	
Age (years)	29.0 (106)	71.0 (259)	12.416 (0.088)
18-24	33.3 (9)	66.7 (18)	
25-34	36.0 (18)	64.0 (32)	
35-44	18.8 (12)	81.2 (52)	
45-54	41.8 (23)	58.2 (32)	
55-64	24.4 (21)	75.6 (65)	
65-74	31.2 (15)	68.8 (33)	
75-84	17.9 (5)	82.1 (23)	
≥ 85	42.9 (3)	57.1 (4)	
Level of education	28.9 (105)	71.1 (258)	8.791 (0.118)
No schooling	75.0 (3)	25.0 (1)	
Primary	31.7 (20)	68.3 (43)	
Secondary	26.4 (34)	73.6 (95)	
Post-secondary	22.9 (16)	77.1 (54)	
Tertiary	37.3 (25)	62.7 (42)	
Post-graduate	23.3 (7)	76.7 (23)	

Type of occupation	29.0 (106)	71.0 (259)	<b>13.274 (0.010)</b>
Employed	32.8 (58)	67.2 (119)	
Unemployed	54.5 (12)	45.5 (10)	
Pensioner	23.2 (23)	76.8 (76)	
Student	26.7 (4)	73.3 (11)	
Other	17.3 (9)	82.7 (43)	
Locality of residency	29.1 (106)	70.9 (258)	4.964 (0.420)
Southern Harbour	28.6 (20)	71.4 (50)	
Northern Harbour	27.1 (32)	72.9 (86)	
South Eastern	27.6 (16)	72.4 (42)	
Western	41.9 (18)	58.1 (25)	
Northern	23.1 (12)	76.9 (40)	
Gozo & Comino	34.8 (8)	65.2 (15)	
Family member – HCP	29.0 (104)	71.0 (254)	0.277 (0.599)
No	28.3 (75)	71.7 (190)	
Yes	31.2 (29)	68.8 (64)	
On regular medicines	29.1 (106)	70.9 (258)	0.309 (0.578)
No	27.5 (39)	72.5 (103)	
Yes	30.2 (67)	69.8 (155)	
Free:yellow or pink card	29.0 (105)	71.0 (257)	0.298 (0.585)
No	27.9 (58)	72.1 (150)	
Yes	30.5 (47)	69.5 (107)	

Pay for them	29.0 (105)	71.0 (257)	0.218 (0.640)
No	28.2 (68)	71.8 (173)	
Yes	30.6 (37)	69.4 (84)	
MMAS-8-Item score	31.5 (79)	68.5 (172)	5.060 (0.080)
Low adherence	38.4 (43)	61.6 (69)	
Medium adherence	28.6 (22)	71.4 (55)	
High adherence	22.6 (14)	77.4 (48)	
General health	29.3 (86)	70.7 (208)	1.639 (0.802)
As bad as it could be	40.0 (2)	60.0 (3)	
2	44.4 (4)	55.6 (5)	
3	30.7 (27)	69.3 (61)	
4	27.3 (33)	72.7 (88)	
As good as it could be	28.2 (20)	71.8 (51)	



#### 5.3.7.4 Confidence in ability to medication wastage

Demographics and other variables were tested for association with the outcome of confidence in ability to reduce medication wastage. Confidence was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.11.

Association of data for demographic characteristics and confidence in ability to reduce medication wastage (statement in questionnaire: "I feel confident in my ability to reduce medication wastage in Malta"), revealed that:

- the presence of a HCP as a family member (dentist, doctor, nurse and/or pharmacist) of respondent and confidence in ability to reduce medication wastage were significantly related  $\chi^2=6.807$ ,  $p=0.009$ , with respondents who had a HCP as a family member self-reporting a higher confidence in ability to reduce medication wastage.

Table 5.11: Association of data for demographic characteristics and confidence in ability to reduce medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree/strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	38.8 (139)	61.2 (219)	0.300 (0.584)
Female	40.1 (79)	59.9 (118)	
Male	37.3 (60)	62.7 (101)	
Age (years)	38.8 (139)	61.2 (219)	7.462 (0.382)
18-24	25.0 (7)	75.0 (21)	
25-34	39.2 (20)	60.8 (31)	
35-44	34.4 (21)	65.6 (40)	
45-54	39.3 (22)	60.7 (34)	
55-64	49.4 (41)	50.6 (42)	
65-74	32.6 (15)	67.4 (31)	
75-84	38.5 (10)	61.5 (16)	
≥ 85	42.9 (3)	57.1 (4)	
Level of education	39.0 (139)	71.0 (217)	4.897 (0.429)
No schooling	75.0 (3)	25.0 (1)	
Primary	42.1 (24)	57.9 (33)	
Secondary	40.2 (51)	59.8 (76)	
Post-secondary	37.1 (26)	62.9 (44)	
Tertiary	40.3 (27)	59.7 (40)	
Post-graduate	25.8 (8)	74.2 (23)	

Type of occupation	38.8 (139)	61.2 (219)	5.209 (0.267)
Employed	37.7 (66)	62.3 (109)	
Unemployed	58.3 (14)	41.7 (10)	
Pensioner	40.4 (38)	59.6 (56)	
Student	33.3 (5)	66.7 (10)	
Other	32.0 (16)	68.0 (34)	
Locality of residency	38.7 (138)	61.3 (219)	3.093 (0.686)
Southern Harbour	38.8 (26)	61.2 (41)	
Northern Harbour	40.9 (47)	59.1 (68)	
South Eastern	35.2 (19)	64.8 (35)	
Western	45.7 (21)	54.3 (25)	
Northern	36.5 (19)	63.5 (33)	
Gozo & Comino	26.1 (6)	73.9 (17)	
Family member – HCP	38.4 (135)	61.6 (217)	<b>6.807 (0.009)</b>
No	34.2 (88)	65.8 (169)	
Yes	49.5 (47)	50.5 (48)	
On regular medicines	38.7 (138)	61.3 (219)	0.528 (0.467)
No	36.4 (52)	63.6 (91)	
Yes	40.2 (86)	59.8 (128)	
Free:yellow or pink card	38.3 (136)	61.7 (219)	0.260 (0.610)
No	37.2 (77)	62.8 (130)	
Yes	39.9 (59)	60.1 (89)	

Pay for them	38.3 (136)	61.7 (219)	0.256 (0.613)
No	37.4 (89)	62.6 (149)	
Yes	40.2 (47)	59.8 (70)	
MMAS-8-Item score	38.9 (95)	61.1 (149)	4.139 (0.126)
Low adherence	42.9 (48)	57.1 (64)	
Medium adherence	41.9 (31)	58.1 (43)	
High adherence	27.6 (16)	72.4 (42)	
General health	38.7 (111)	61.3 (176)	3.607 (0.462)
As bad as it could be	60.0 (3)	40.0 (2)	
2	25.0 (2)	75.0 (6)	
3	44.7 (38)	55.3 (47)	
4	37.0 (44)	63.0 (75)	
As good as it could be	34.3 (24)	65.7 (46)	

### **5.3.8 Current practices with medication that patients buy or get for free**

Table 5.12 illustrates the current practices with medication that patients purchased against a prescription or OTC. Twenty-seven respondents stated that this section was not applicable.

Almost one-fifth of respondents (16.9%, n=52) strongly agreed/agreed that they bought all of their medication regularly whether or not they had run out. While 15.9% of respondents (n=49) strongly agreed/agreed that they passed medication that they bought for themselves to other persons, such as relatives, neighbours and friends, only 5.5% (n=17) accepted medication from other people.

Table 5.12: Practice with medication that are purchased against a prescription or OTC (n=308)

<b>Statements</b>	<b>Strongly disagree % (n)</b>	<b>Disagree % (n)</b>	<b>Unsure % (n)</b>	<b>Agree % (n)</b>	<b>Strongly agree % (n)</b>	<b>Missing data % (n)</b>
I buy all my medication regularly whether or not I have run out of them	34.1 (105)	31.8 (98)	2.3 (7)	10.1 (31)	6.8 (21)	14.9 (46)
I buy all my medication only when I run out of them	5.2 (16)	9.7 (30)	1.3 (4)	43.2 (133)	28.2 (87)	12.3 (38)
I buy more medication than I need	47.7 (147)	31.8 (98)	0.6 (2)	2.9 (9)	1.6 (5)	15.3 (47)
I buy medication without checking if I already have a supply at home	46.8 (144)	32.1 (99)	2.3 (7)	2.9 (9)	1.9 (6)	14.0 (43)
I pass medication that I buy for myself to other persons, such as relatives, neighbours and friends	43.5 (134)	25.3 (78)	3.2 (10)	12.7 (39)	3.2 (10)	12.0 (37)
I buy different medication for the same condition as I follow the advice of different people	54.9 (169)	26.0 (80)	1.9 (6)	2.9 (9)	1.3 (4)	13.0 (40)
When I visit the dentist, doctor, pharmacist, nurse, I put them under pressure to supply me medication	55.2 (170)	26.3 (81)	1.3 (4)	3.2 (10)	2.3 (7)	11.7 (36)

I buy medication depending on what I read in books, magazines, internet	61.0 (188)	21.4 (66)	2.6 (8)	2.3 (7)	1.0 (3)	11.7 (36)
I get medication from other people	59.1 (182)	21.8 (67)	1.3 (4)	3.9 (12)	1.6 (5)	12.3 (38)
I am aware of the approximate costs of the medication that I buy	3.2 (10)	5.8 (18)	10.7 (33)	41.2 (127)	26.9 (83)	12.0 (37)

Table 5.13 illustrates the current practices with medication that patients are entitled to get free of charge through the Maltese NHS. One hundred and forty-five respondents stated that this section was not applicable to them.

While slightly more than a quarter of respondents (26.9%, n=51) strongly agreed/agreed that they obtained all their free medication regularly whether or not they had run out, only 4.2% (n=8) of respondents strongly agreed/agreed that they obtained more free medication than needed. The majority of respondents (65.3%, n=124) felt that they were aware of the approximate costs of the medication that they obtained free of charge from the NHS.



Table 5.13: Practice with medication obtained free of charge through the Maltese NHS (n=190)

<b>Statements</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Missing</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
I get all my free medication regularly whether or not I have run out of them	24.7 (47)	25.8 (49)	2.1 (4)	21.1 (40)	5.8 (11)	20.5 (39)
I get all my free medication only when I run out of them	4.7 (9)	13.7 (26)	2.1 (4)	35.8 (68)	25.8 (49)	17.9 (34)
I get more free medication than I need	48.9 (93)	25.3 (48)	2.1 (4)	2.6 (5)	1.6 (3)	19.5 (37)
I get free medication from the pharmacy without checking if I already have a supply at home	45.3 (86)	28.9 (55)	1.1 (2)	4.2 (8)	2.1 (4)	18.4 (35)
I pass medication that I get for free to other persons, such as relatives, neighbours and friends	54.7 (104)	18.9 (36)	1.1 (2)	3.2 (6)	2.1 (4)	20.0 (38)
I am aware of the approximate costs of the medication that I get for free from the NHS	1.6 (3)	3.7 (7)	11.6 (22)	33.7 (64)	31.6 (60)	17.9 (34)

### 5.3.9 Experiences with medication

The majority of all respondents (92.8%, n=311) replied that they were aware that all medication have an expiry date, with only one respondent stating that he was not aware of the 'use-by date'. One-fifth of respondents (21.5%, n=72) either stated that they encountered a problem when trying to read the expiry date, or failed to respond (Figure 5.3).

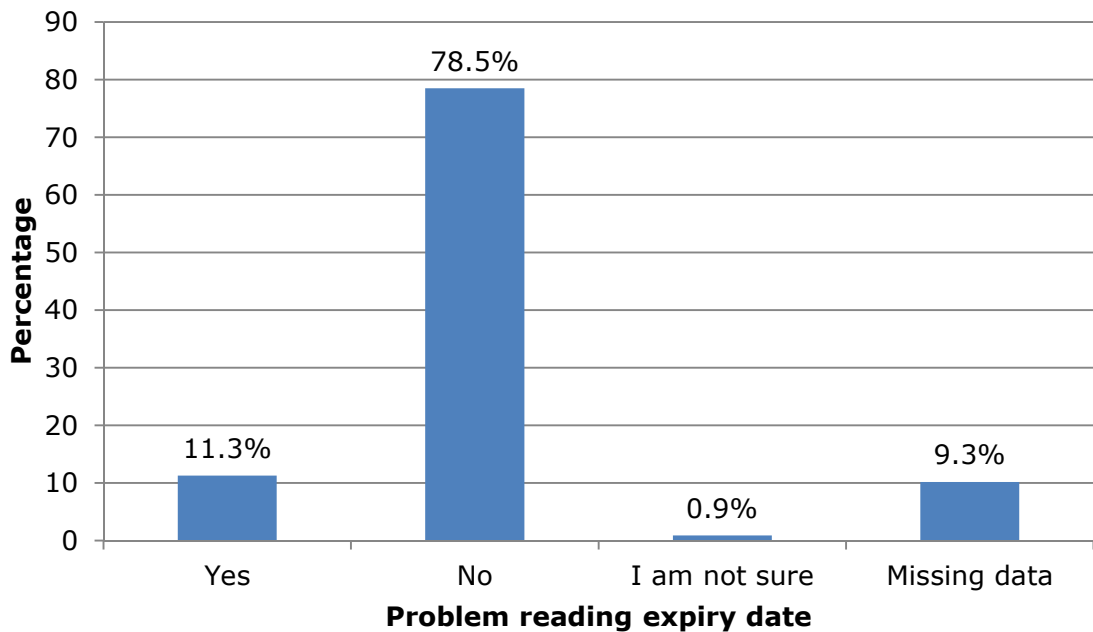


Figure 5.3: Problem reading expiry date (n=335)

Figure 5.4 illustrates responses relating to the reuse of medication. Only half (51.5%, n=201) agreed/strongly agreed that medication supplied to patients and returned within expiry dates to HCPs should be reused. One stated that *"this will reduce the hazard of unused medication being flushed down toilets"*. However, others were not in favour of medication redistribution.

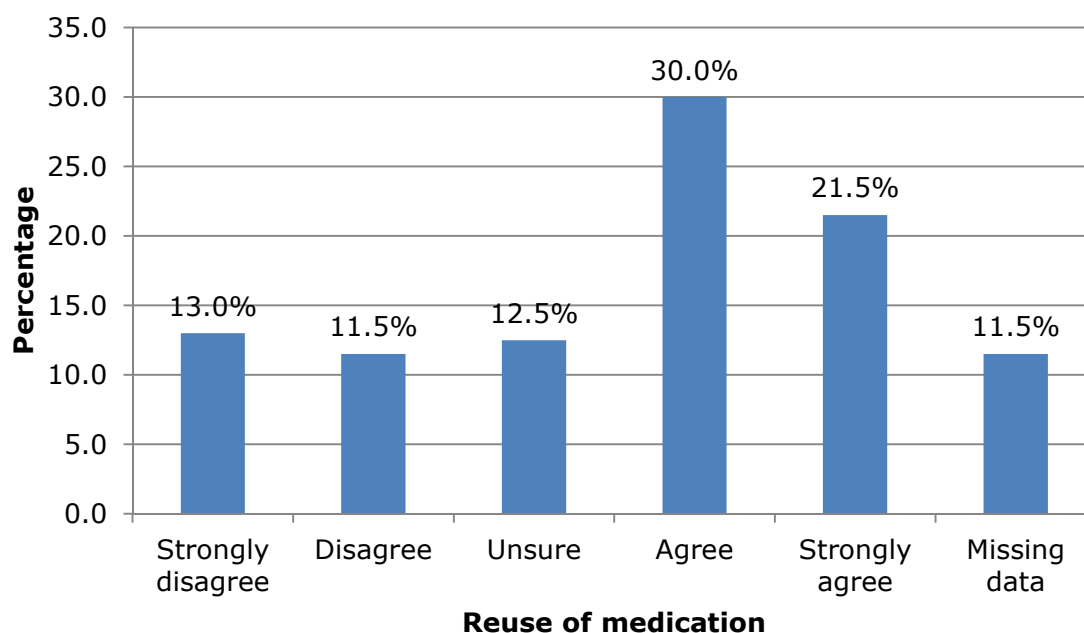


Figure 5.4: Responses relating to the reuse of medication returned within expiry dates (n=391)

Table 5.14 presents responses relating to locations where respondents stored medication.

Table 5.14: Medication storage (n=335)

Storage location	Percent (%)	Frequency
Medication cabinets in kitchen	30.7	103
Medication cabinets in bedroom	18.5	62
Medication cabinets in bathroom	28.4	95
Medication cabinets in garage	0.9	3
Cupboard in kitchen	30.7	103
Cupboard in bedroom	14.0	47
Cupboard in bathroom	12.5	42
Cupboard in garage	0.9	3
Office	3.6	12
Car	2.4	8
Fridge	26.6	89
Carried around by individual	13.7	46
Other	9.2	31
Missing data	7.2	24

'Other' included: the dining room, boardroom, box room, hall, in cool places, cupboard in the corridor, cupboard in the showcase, drawers, in a tin on the fridge, dresser, study cabinet, *"in a fruit bowl on the bench"*, *"next to bedside the ones I take everyday"*, in a box in the wall unit, *"always under lock and key"*, in a pouch in the wardrobe, *"in bag (travel) to find them ready"*, in bulky bags, *"where I can find them most accessible"* and *"the way I think best"*.

Table 5.15 presents the sources of information on medication storage. More than half of respondents (56.4%, n=189) stated that they had never been given any information on medication storage.

Table 5.15: Information regarding storage (n=335)

Information regarding storage	Percent (%)	Frequency
No one	56.4	189
Information leaflet supplied with medication	26.0	87
Pharmacist	19.4	65
Doctor	18.2	61
Other	5.4	18
Nurse	3.9	13
Television/Radio	3.0	10
Magazines/Newspapers	2.7	9
Internet	2.4	8
Friend	1.2	4
Dentist	0.9	3
Missing data	7.8	26

Respondents got information from 'other' sources, including:

- *"From common sense"*
- *"My mother"*
- *"Nursing school"*

Figure 5.5 illustrates whether respondents had any unused medication in their household in the six months prior to the study. Figure 5.6 depicts the reasons why this medication remained unused.

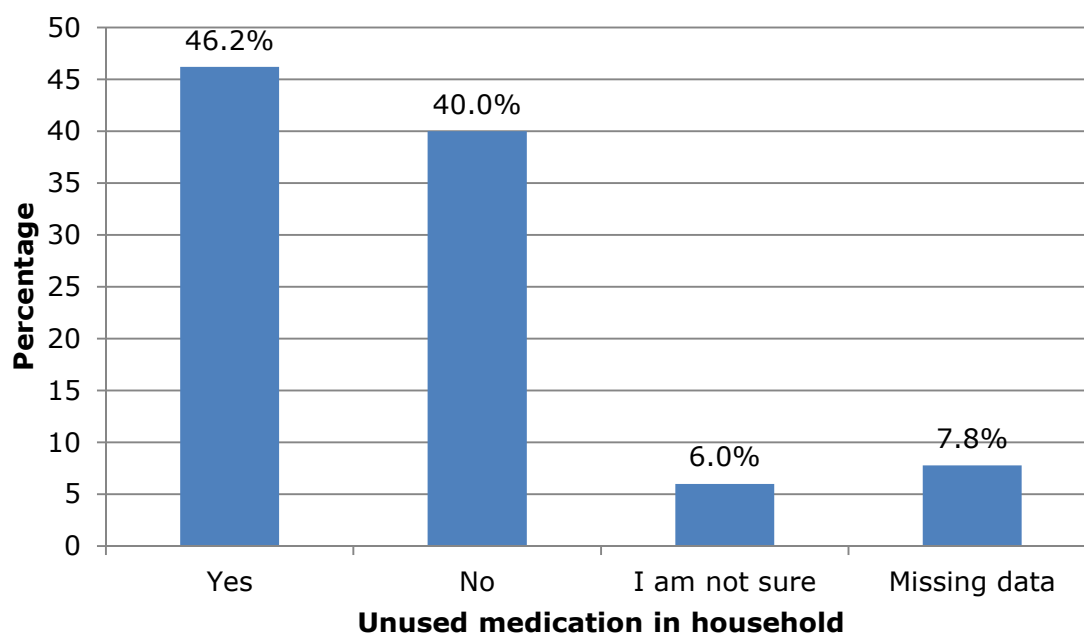


Figure 5.5: Unused medication in household in the last 6 months (n=335)

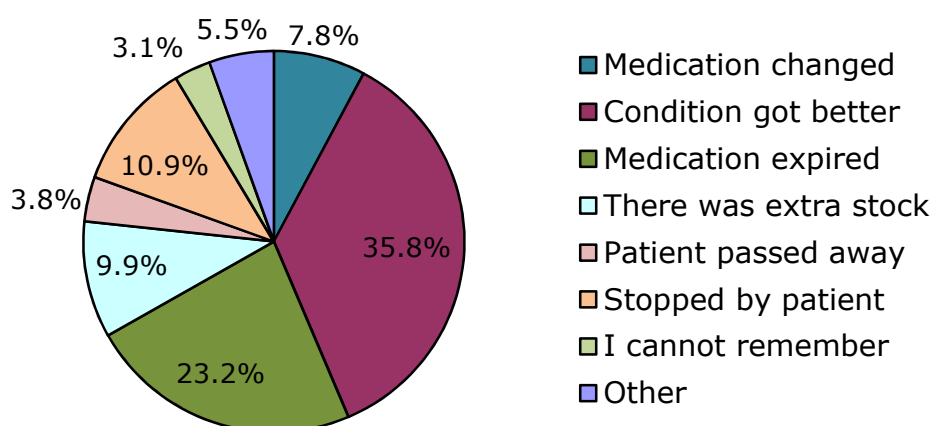


Figure 5.6: Reasons for unused medication (n=335)

'Other' reasons included:

- "Can't use more than doctor tells you"
- "Samples given were not used"
- "Stopped by the doctor"
- "Stopped by the doctor as they were both for the same condition"
- "Sometimes you have to buy more than you require"
- "Sometimes when you buy certain things like eye drops or ointment you have to use them within 3 weeks"
- "Forgot to check what I had in travel bag"

- *"Got allergy to medication"*

Table 5.16 shows the method of disposal respondents employed for unused and expired medication.

Table 5.16: Methods of medication disposal used by respondents (n=335)

Disposal of medication	Unused % (n)	Expired % (n)
Throw them away with the household rubbish	5.1 (17)	46.6 (156)
Throw them down the toilet or sink	6.6 (22)	33.7 (113)
Give them to a pharmacy to give them to someone else	14.9 (50)	1.2 (4)
Give them to another person or friend	9.6 (32)	1.2 (4)
Take them to a medication disposal bring-in-site	2.7 (9)	6.6 (22)
Give them to a pharmacy to dispose of them	8.4 (28)	8.1 (27)
Keep them for possible future use	57.3 (192)	3.3 (11)
Sell these medication	0.0 (0)	0.0 (0)
Give to charity	2.1 (7)	0.6 (2)
None of the above	0.0 (0)	0.0 (0)
I do not know	2.1 (7)	3.0 (10)
Other	8.1 (27)	3.6 (12)
Missing data	9.0 (30)	9.2 (31)

'Other' means of disposal included:

- *"Burn them"*
- *"Give them to a family doctor"*
- *"When I'm due for medicines I calculate the difference"*
- *"Use cardboard box for education purposes"*
- *"Give them to some old people's home"*

Table 5.17 presents the source from where respondents obtained information on medication disposal. Two thirds of respondents (66.6%, n=223) claimed that they had never been given this information.

Table 5.17: Information regarding disposal (n=335)

Information regarding disposal	Percent (%)	Frequency
No one	66.6	223
Pharmacist	6.9	23
Information leaflet supplied with medication	6.0	20
Doctor	5.7	19
Television/Radio	4.2	14
Other	3.9	13
Magazines/Newspapers	2.4	8
Nurse	2.4	8
Friend	1.2	4
Internet	0.6	2
Dentist	0.0	0
Missing data	11.0	37

Respondents got information from 'other' sources, including:

- *"From common sense"*
- *"This is the way I think"*
- *"Education"*
- *"My mother"*
- *"Nursing school"*
- *"My sister"*
- *"What I feel on the spur of the moment"*

Table 5.18 shows whether respondents felt that they had enough information on how to take medication to get most benefit and least side-effects, while Table 5.19 presents the source from where respondents obtained this information.

Table 5.18: Information regarding use of medication (n=335)

	Yes % (n)	No % (n)	I am not sure % (n)	Missing data % (n)
Do you feel you have enough information on how to take all of your medication to get the most benefit from them (including medication which is used only occasionally)?	64.5 (216)	17.6 (59)	9.2 (31)	8.7 (29)
Do you feel you have enough information on how to take all of your medication to get the least side-effects from them (including medication which is used only occasionally)?	56.4 (189)	23.6 (79)	11.9 (40)	8.1 (27)

Table 5.19: Information on use of medication (n=335)

Information on use of medication	Percent (%)	Frequency
Doctor	42.4	142
Information leaflet supplied with medication	36.1	121
Pharmacist	24.5	82
Internet	7.8	26
Nurse	5.4	18
I do not know	3.6	12
Dentist	2.7	9
Other	2.7	9
Television/Radio	2.4	8
Magazines/Newspapers	2.1	7
Friend	0.9	3
Missing data	9.6	32

Respondents got information from 'other' sources, including:

- "Education"



- "My mother"
- "Nursing school"

#### **5.3.10 Factors contributing towards medication wastage**

Analysis of responses (n=391) to the open question on the factors or reasons that could be leading to medication wastage in Malta identified ten key themes. The most commonly cited contributory factor for wastage was the 'free healthcare system', mentioned by 15.6% (n=61) of respondents. The key themes which emerged from the reasons for wastage provided by respondents included:

- The free healthcare system (n=61)
- Collecting/buying medication that you do not need or more than you need (n=29)
- Overprescribing/incorrect prescribing (n=24)
- Lack of education/information (n=20)
- Medication shortages (n=19)
- Large pack sizes (n=18)
- Non-adherence/inappropriate use of medication (n=17)
- Abuse of the free healthcare system (n=12)
- Mismanagement of stock (n=11)
- Lack of responsibility/carelessness by patients (n=10)

#### **5.3.11 Consequences of medication wastage**

Analysis of responses (n=391) to the open question on the consequences of medication wastage identified three key themes. The most commonly cited was the 'financial' one, mentioned by 37.0% (n=145) of respondents. The key themes which emerged from the consequences for wastage provided by respondents included:

- Financial consequences (n=145)
- Medication shortages (n=95)
- Environmental consequences (n=34)

#### **5.3.12 Potential solutions to reduce medication wastage**

Analysis of responses (n=391) to the open question on the potential solutions which could reduce medication wastage identified nine key themes. The most

commonly cited solutions were 'education' and 'more control checks of medication given to patients', both mentioned by 7.4% (n=29) of respondents. The key themes which emerged were:

- Education of HCPs and patients (n=29)
- More control checks of medication given to patients (n=29)
- Medication reviews by HCPs (n=26)
- Careful and accurate prescribing and dispensing of medication (n=21)
- By introducing a small fee on free medication or prescriptions or paying for medication (n=17)
- Better prescribing (n=17)
- More awareness by patients (n=11)
- Patients should return unused sealed medication (n=10)
- Medication should always be available (n=10)

#### ***5.3.13 General comments on medication wastage listed by respondents***

Respondents were given the option to add any additional comments. Some re-emphasised contributory factors and consequences. Analysis of these comments identified five key themes, which were:

- General comments on causes and consequences of medication wastage that were already highlighted above, including free medication through POYC scheme (n=55)
- More information and awareness by patients on medication use, storage, disposal and wastage (n=23)
- More control or reviews by HCPs (n=22)
- Medication shortages, with comments discussing the resultant hoarding, with one respondent suggesting that when medication has to be purchased as a result of an out-of-stock situation, one should not pay the full price (n=16)
- There is no wastage or they do not feel that they are wasting (n=10)

## 5.4 Results: HCP questionnaire

### 5.4.1 Response rate

The response rate following the first mailing was 17.4% (293 responses, exceeding the response rate of the pilot study which was 13.0%) and increased to 26.4% (444/1680 responses) following one reminder sent to non-respondents. This exceeded the calculated sample size of 330 responses. The highest response rate was obtained from doctors (32.0%,  $n=224/700$ ), followed by dentists (27.4%,  $n=45/164$ ) and pharmacists (21.4%,  $n=175/816$ ). As 1.3% ( $n=21$ ) of doctors returned the questionnaire incomplete with a statement indicating that they lived or worked overseas, the response rate is an underestimate. Figure 5.7 illustrates the number of daily responses that were obtained over the 55-day collection period.

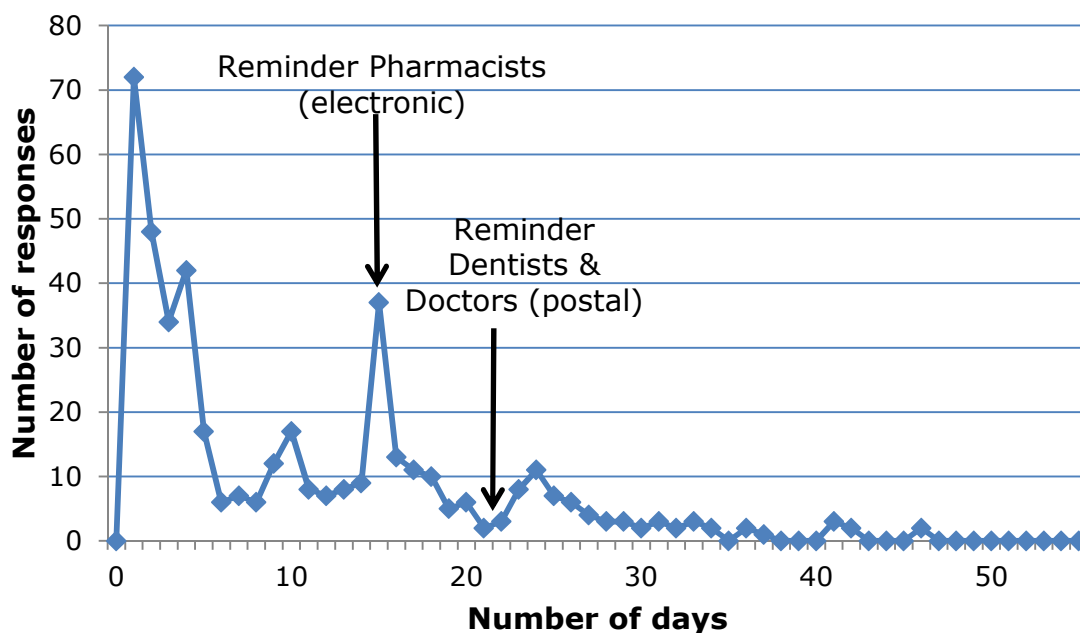


Figure 5.7: Number of HCP questionnaire responses during the 55-day data collection

### 5.4.2 Demographic characteristics

Table 5.20 gives the demographic characteristics of respondents.

Table 5.20: Demographic data of HCP respondents (n=444)

<b>Demographics</b>	<b>Percent (Frequency)</b> <b>% (n)</b>
<b>Gender</b>	
Male	50.0 (222)
Female	49.1 (218)
Missing data	0.9 (4)
<b>Age (years)</b>	
20-29	22.5 (100)
30-39	27.5 (122)
40-49	22.3 (99)
50-59	16.0 (71)
> 59	11.3 (50)
Missing data	0.4 (2)
<b>Profession</b>	
Dentist	10.1 (45)
Doctor	50.5 (224)
Pharmacist	39.4 (175)
<b>Main place of work</b>	
Government services/Public sector	51.1 (227)
Private sector	27.3 (121)
Self-employed	18.7 (83)

Other:	2.2 (10)
<ul style="list-style-type: none"> <li>• Academic</li> <li>• Research</li> </ul>	
Missing data	0.7 (3)
<b>Years practising in profession</b>	
≤ 5	18.5 (82)
6-10	17.1 (76)
11-15	14.9 (66)
16-20	10.1 (45)
21-25	13.0 (58)
26-30	11.3 (50)
31-35	3.6 (16)
> 35	11.3 (50)
Missing data	0.2 (1)
<b>Undergraduate training</b>	
Malta	95.7 (425)
Other	4.1 (18)
<ul style="list-style-type: none"> <li>• Albania, Bulgaria, Czech Republic, Germany, Ireland, Kiev, Moscow, UK</li> </ul>	
Missing data	0.2 (1)

**Postgraduate training**

Yes	51.6 (229)
• Malta	31.0 (71)
• Other: Belgium, Bulgaria, Czech Republic, France, Hungary, Italy, Malta, UK, USA	69.0 (158)
No	44.8 (199)
Missing data	3.6 (16)

**Practised in other countries**

Yes	20.7 (92)
• Australia, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Emirates, France, Germany, Ghana, Italy, Kenya, Libya, Mozambique, Northeast and West Africa, Saudi Arabia, Spain, Sweden, Switzerland, The Netherlands, UK, Ukraine, USA, Zimbabwe	
No	78.2 (347)
Missing data	1.1 (5)

### 5.4.3 Rogers' Diffusion of Innovation theory

Table 5.21 shows the respondents' self-reported innovativeness, with over half (54.5%, n=242) stating that they deliberate for some time before adopting change.

Table 5.21: Willingness of HCPs to adopt change (n=444)

<b>Rogers' Diffusion of Innovation theory</b>	<b>Percentage (%)</b>	<b>Number of respondents (n)</b>
I resist any change	0.2	1
I am cautious in relation to change; I tend to change once most peers have done so	6.8	30
I deliberate for some time before adopting change	54.5	242
I serve as a role model for others in relation to change	8.3	37
I am venturesome and willing to be innovative with change	29.3	130
Missing data	0.9	4

### 5.4.4 Definition of medication wastage

The four statements which composed the definition of medication wastage developed in the Delphi technique stage of the research (chapter 4) were presented separately to respondents. Three out of the four statements exceeded the consensus level of 75.0% stipulated in the Delphi technique (Table 5.22). Almost all respondents (97.7%, n=434) agreed that medication wastage poses a financial burden on patients, the state's economy and requires adequate education of all people concerned. There was less agreement with the statement that 'medication wastage encompasses the unjustified non-adherence to treatment guidelines by HCPs', with around a quarter of respondents (25.9%, n=115) disagreeing or unsure.

Table 5.22: Definition of medication wastage (n=444)

<b>Statements</b>	<b>Strongly disagree</b> <b>% (n)</b>	<b>Disagree</b> <b>% (n)</b>	<b>Unsure</b> <b>% (n)</b>	<b>Agree</b> <b>% (n)</b>	<b>Strongly agree</b> <b>% (n)</b>	<b>Missing data</b> <b>% (n)</b>
Medication wastage encompasses any medication which expires or remains unused throughout the medication supply chain (manufacturing, storage, transport and handling of medication until these reach the consumer) and during use by the patient	0.7 (3)	2.0 (9)	1.6 (7)	44.4 (197)	51.1 (227)	0.2 (1)
Medication wastage encompasses unnecessary or inappropriate consumption of medication by patients	1.6 (7)	5.2 (23)	6.3 (28)	46.6 (207)	39.9 (177)	0.5 (2)
Medication wastage encompasses the unjustified non-adherence to treatment guidelines by <u>healthcare professionals</u>	1.6 (7)	9.9 (44)	14.4 (64)	45.9 (204)	27.5 (122)	0.7 (3)
Medication wastage poses a financial burden on patients themselves, the state's economy and requires adequate education of all people concerned	0.7 (3)	0.2 (1)	0.7 (3)	24.5 (109)	73.2 (325)	0.7 (3)



Respondents commented on other issues which should be considered within the scope of medication wastage as follows:

- The use of medication when equally effective cheaper alternatives are available (n=2)
- Sharing of medication, short expiry dates or labels without expiry dates, free medication, aggressive treatment in terminal patients, poor quality of generic medication leading to higher dose usage, lack of communication between HCPs, inappropriate medication storage, poor transportation and handling of medication, medication shortages, lack of medication inventories on hospital wards, unused medication from clinical trials, HCPs and patients dropping medication and throwing away, and problems with wastage related to cytotoxic/radioactive treatment and industrial medication wastage (n=1 each).

One pharmacist commented, *"if Maltese Governments in the past were unable to control wastage from 7 or so government pharmacies how could wastage ever be controlled from over 200 private pharmacies that have adopted the POYC scheme?!!"* One doctor stated that *"stand by emergency drugs that expire without use are not WASTE"*.

#### **5.4.5 Awareness of issues related to medication wastage**

Table 5.23 gives the extent of awareness on issues related to medication wastage. Less than half of respondents (42.1%, n=187) agreed/strongly agreed that they were fully aware of the extent of medication wastage in Malta.

The majority strongly agreed/agreed that they were fully aware of the consequences of medication wastage on the economy (69.4%, n=308) and on society (60.3%, n=268). Just over half were fully aware of the consequences on patients (54.8%, n=243), the environment (53.4%, n=197), and less on HCPs (40.1%, n=178). Respondents also stated that they were aware of other consequences of medication wastage, including:

- medication shortages (n=6)
- global economy and tax payers, pharmaceutical industry (n=3 each)
- microbial resistance, medical ethics and morality (n=2 each)

- consequences on elderly and vulnerable groups, psychological well-being, free health service, policy makers, and the greater chance of massive doses being ingested in cases of parasuicides (n=1 each)

Only 15.1% (n=67) agreed/strongly agreed that they were fully aware of laws, procedures and policies relating to medication wastage in Malta and just over half (54.0%, n=240) agreed/strongly agreed that they were fully aware of factors potentially leading to medication wastage.

Table 5.23: Awareness of the extent of medication wastage in Malta (n=444)

<b>Statements</b>	<b>Strongly disagree</b> <b>% (n)</b>	<b>Disagree</b> <b>% (n)</b>	<b>Unsure</b> <b>% (n)</b>	<b>Agree</b> <b>% (n)</b>	<b>Strongly agree</b> <b>% (n)</b>	<b>Missing data</b> <b>% (n)</b>
I am <u>fully aware</u> of the <u>extent</u> of medication wastage in Malta	5.9 (26)	18.5 (82)	32.9 (146)	25.7 (114)	16.4 (73)	0.7 (3)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	3.4 (15)	16.0 (71)	25.2 (112)	37.2 (165)	17.6 (78)	0.7 (3)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	3.6 (16)	18.5 (82)	37.6 (167)	28.2 (125)	11.9 (53)	0.2 (1)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>society</u>	2.5 (11)	15.3 (68)	20.5 (91)	37.8 (168)	22.5 (100)	1.4 (6)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	3.6 (16)	13.7 (61)	13.1 (58)	36.7 (163)	32.7 (145)	0.2 (1)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	4.3 (19)	16.0 (71)	25.7 (114)	35.6 (118)	17.8 (79)	0.7 (3)
I am <u>fully aware</u> of <u>factors</u> potentially leading to medication wastage in Malta	1.6 (7)	15.5 (69)	27.9 (124)	43.2 (192)	10.8 (48)	0.9 (4)
I am <u>fully aware</u> of <u>laws, procedures and policies</u> relating to medication wastage in Malta	14.2 (63)	28.6 (127)	41.9 (186)	11.7 (52)	3.4 (15)	0.2 (1)

#### **5.4.6 Interest in issues related to medication wastage**

Table 5.24 gives the extent of interest in issues related to medication wastage. Only 3.2% (n=14) stated that they had no interest in the extent of medication wastage in Malta.

The majority strongly disagreed/disagreed that they had no interest in the consequences of medication wastage on the economy (97.0%, n=431), on society (97.1%, n=431), the environment (95.5%, n=424), patients (94.4%, n=419) and HCPs (93.4%, n=415).

Only a small minority (2.3%, n=10) agreed/strongly agreed that they had no interest in laws, procedures and policies relating to medication wastage in Malta and 2.5% (n=11) no interest in factors potentially leading to medication wastage.

Table 5.24: Interest in the extent of medication wastage in Malta (n=444)

Statements	Strongly disagree % (n)	Disagree % (n)	Unsure % (n)	Agree % (n)	Strongly agree % (n)	Missing data % (n)
I have <u>no interest</u> in the <u>extent</u> of medication wastage in Malta	55.4 (246)	38.7 (172)	2.3 (10)	1.4 (6)	1.8 (8)	0.5 (2)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	60.4 (268)	34.0 (151)	1.6 (7)	0.7 (3)	0.7 (3)	2.7 (12)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	56.5 (251)	36.9 (164)	3.6 (16)	0.9 (4)	0.7 (3)	1.4 (6)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>society</u>	62.6 (278)	34.5 (153)	0.5 (2)	0.9 (4)	0.5 (2)	1.1 (5)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	66.4 (295)	30.6 (136)	0.5 (2)	0.5 (2)	0.7 (3)	1.4 (6)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	62.4 (277)	33.1 (147)	2.5 (11)	0.7 (3)	0.5 (2)	0.9 (4)
I have <u>no interest</u> in the <u>factors</u> potentially leading to medication wastage in Malta	51.6 (229)	43.9 (195)	1.8 (8)	1.8 (8)	0.7 (3)	0.2 (1)
I have <u>no interest</u> in laws, <u>procedures and policies</u> relating to medication wastage in Malta	48.2 (214)	44.1 (196)	5.2 (23)	1.8 (8)	0.5 (2)	0.2 (1)

#### **5.4.7 Factors potentially leading to medication wastage**

Table 5.25 shows responses relating to factors which potentially lead to medication wastage. Respondents attributed the free healthcare system (86.7%, n=385) and the overstocking of medication by patients due to previous or potential out of stock situation (83.1%, n=369) as the two major contributing factors. The factors considered to be contributing least were 'medication stopped by HCP due to ineffectiveness of the medication' (21.0%, n=93), 'medication stopped by HCP due to adverse events of the medication' (20.5%, n=91), and 'medication stopped by HCP due to resolution of patients' symptoms/conditions' (18.3%, n=81).

Table 5.25: Factors which potentially lead to medication wastage (1=No contribution at all; 5=Major contribution) (n=444)

<b>Statements</b>	<b>1 % (n)</b>	<b>2 % (n)</b>	<b>3 % (n)</b>	<b>4 % (n)</b>	<b>5 % (n)</b>	<b>Missing data % (n)</b>
Short medication expiry dates	1.6 (7)	9.2 (41)	27.9 (124)	34.7 (154)	25.7 (114)	0.9 (4)
Large pack sizes when patients need smaller quantities of medication, particularly when starting new medication	1.1 (5)	10.1 (45)	19.8 (88)	41.4 (184)	27.3 (121)	0.2 (1)
Inadequate audit of medication prescribing	0.7 (3)	4.3 (19)	20.5 (91)	33.8 (150)	39.2 (174)	1.6 (7)
Medication that remain unused within their expiry dates are not accepted for reuse by healthcare professionals	8.1 (36)	12.6 (56)	27.3 (121)	30.6 (136)	20.5 (91)	0.9 (4)
Inappropriate storage of medication	3.4 (15)	18.0 (80)	31.3 (139)	28.8 (128)	17.6 (78)	0.9 (4)
Patients' expectations to receive a prescription for medication	4.1 (18)	12.6 (56)	25.7 (114)	27.9 (124)	28.4 (126)	1.4 (6)
Lack of patient education/ knowledge about medication in general	2.0 (9)	6.1 (27)	18.2 (81)	34.2 (152)	38.5 (171)	0.9 (4)
Lack of patient education/ knowledge about monetary cost of medication	1.8 (8)	5.4 (24)	14.2 (63)	30.9 (137)	46.6 (207)	1.1 (5)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Overstocking of medication by patients due to previous or potential out of stock situation	0.7 (3)	3.4 (15)	11.9 (53)	24.5 (109)	58.6 (260)	0.9 (4)
Overstocking of medication by patients due to dependency on others to collect medication supply	1.6 (7)	7.7 (34)	21.8 (97)	35.8 (159)	32.2 (143)	0.9 (4)
Overstocking by patients due to fear of refusal of medication supply due to entitlement problems	0.2 (1)	5.6 (25)	14.6 (65)	30.2 (134)	48.9 (217)	0.5 (2)
Other family members or carers obtaining medication on behalf of patient unaware of stock at home	1.4 (6)	8.1 (36)	25.2 (112)	38.7 (172)	25.5 (113)	1.1 (5)
Patients getting advice from more than one HCP, family and friends regarding use of medication	2.3 (10)	13.1 (58)	32.4 (144)	32.4 (144)	19.1 (85)	0.7 (3)
Non-adherence to medication regimens by patients	1.8 (8)	7.7 (34)	20.9 (93)	42.3 (188)	26.1 (116)	1.1 (5)
Medication stopped by patient due to perceived ineffectiveness	2.7 (12)	11.7 (52)	23.2 (103)	41.9 (186)	20.0 (89)	0.5 (2)
Medication stopped by patient due to perceived adverse events	3.6 (16)	14.9 (66)	25.9 (115)	38.7 (172)	16.0 (71)	0.9 (4)



<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Medication stopped by patient due to perceived resolution of their symptoms/medical condition	2.0 (9)	13.5 (60)	21.6 (96)	43.7 (194)	18.9 (84)	0.2 (1)
Patient's death	15.8 (70)	26.1 (116)	23.9 (106)	20.5 (91)	13.1 (58)	0.7 (3)
Lack of education and training of HCP students about medication wastage	3.8 (17)	15.3 (68)	33.3 (148)	32.4 (144)	14.0 (62)	1.1 (5)
Lack of education and training of HCP students about monetary cost of medication	4.1 (18)	14.0 (62)	28.4 (126)	36.5 (162)	16.7 (74)	0.5 (2)
Lack of CPD of healthcare professionals about medication wastage	4.7 (21)	15.1 (67)	30.6 (136)	34.7 (154)	14.2 (63)	0.7 (3)
Lack of CPD of healthcare professionals about monetary cost of medication	4.7 (21)	17.1 (76)	30.0 (133)	34.2 (152)	13.1 (58)	0.9 (4)
Healthcare professionals lack of awareness of monetary cost of medication	5.4 (24)	18.2 (81)	30.4 (135)	31.5 (140)	14.0 (62)	0.5 (2)
Lack of communication about medication between primary and secondary healthcare	2.3 (10)	13.1 (58)	28.4 (126)	34.5 (153)	20.5 (91)	1.4 (6)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Lack of communication about medication between healthcare providers and patients	1.4 (6)	15.3 (68)	26.6 (118)	39.2 (174)	17.1 (76)	0.5 (2)
Medication stopped by HCP due to ineffectiveness of the medication	7.2 (32)	36.3 (161)	34.2 (152)	15.8 (70)	5.2 (23)	1.4 (6)
Medication stopped by HCP due to adverse events of the medication	9.5 (42)	38.3 (170)	30.6 (136)	16.4 (73)	4.1 (18)	1.1 (5)
Medication stopped by HCP due to resolution of patients' symptoms/conditions	12.6 (56)	35.6 (158)	33.1 (147)	14.2 (63)	4.1 (18)	0.5 (2)
Over-prescribing by healthcare professional	2.5 (11)	13.5 (60)	25.5 (113)	33.8 (150)	23.6 (105)	1.1 (5)
Extra medication supply dispensed to patients	7.0 (31)	21.2 (94)	27.7 (123)	27.3 (121)	16.2 (72)	0.7 (3)
Medication prescribed for no indication	10.8 (48)	25.2 (112)	23.0 (102)	20.5 (91)	19.8 (88)	0.7 (3)
Healthcare professionals' perceptions that patients expect to receive a medication	4.1 (18)	16.0 (71)	27.7 (123)	29.3 (130)	22.1 (98)	0.9 (4)
Inadequate medication reviews by healthcare professionals	1.8 (8)	17.1 (76)	28.6 (127)	27.0 (120)	24.8 (110)	0.7 (3)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Free healthcare system	2.3 (10)	2.7 (12)	7.4 (33)	20.0 (89)	66.7 (296)	0.9 (4)
Medication which are obtained free through the National Health System are regularly out of stock in the pharmacy	4.3 (19)	10.8 (48)	26.1 (116)	27.3 (121)	29.1 (129)	2.5 (11)
Medication that legally require a prescription are easily purchased from pharmacies without the need for a valid prescription	11.9 (53)	18.5 (82)	32.0 (142)	20.3 (90)	16.0 (71)	1.4 (6)

#### **5.4.8 Current practices, views, experiences**

Table 5.26 shows the current practices, views and experiences of HCPs. Just over half of respondents (52.2%, n=232) strongly agreed/agreed that they played an important part in reducing medication wastage in Malta. A similar proportion (59.2%, n=263) noted that they could be more active in reducing wastage. While only 7.0% (n=31) felt that there was little scope for them to further reduce medication wastage, less than half (46.6%, n=207) strongly agreed/agreed that they felt confident in their ability to reduce wastage.

The majority of respondents (66.3%, n=294) stated that they reviewed medication for the management of chronic conditions to ensure their continued indication. Some felt under pressure by patients (35.0%, n=155) or family members of patients (27.5%, n=122) to supply medication they considered unnecessary.

A little more than one third (37.2%, n=165) strongly agreed/agreed that other HCPs had more responsibility in advising patients on use of their medication, and almost half strongly agreed/agreed that other HCPs had more responsibility to advise patients on medication storage (46.0%, n=204) and disposal (43.9%, n=195). Only half (50.5%, n=224) strongly agreed/agreed that medication supplied to patients and returned within their expiry dates to HCPs should be reused. The majority (91.5%, n=406) stated that the provision of medication to patients free of charge could lead to medication wastage.

Table 5.27 shows the responses given by HCPs on advice regarding use, storage and disposal of medication. Whilst 68.0% (n=302) claimed that they always advised their patients on the use of medication, only 16.7% (n=74) and 4.5% (n=20) respectively stated that they always advised on storage and disposal.

Table 5.26: Current practices, views and experiences of HCPs (n=444)

Statements	Strongly disagree % (n)	Disagree % (n)	Unsure % (n)	Agree % (n)	Strongly agree % (n)	Missing data % (n)
I currently play an important part in reducing medication wastage in Malta	4.3 (19)	18.7 (83)	24.1 (107)	44.8 (199)	7.4 (33)	0.7 (3)
I could be more active in reducing medication wastage in Malta	3.4 (15)	12.8 (57)	23.2 (103)	48.2 (214)	11.0 (49)	1.4 (6)
There is little scope for me to further reduce medication wastage in Malta	28.8 (128)	49.1 (218)	14.2 (63)	5.4 (24)	1.6 (7)	0.9 (4)
I feel confident in my ability to reduce medication wastage in Malta	2.3 (10)	12.6 (56)	36.7 (163)	40.5 (180)	6.1 (27)	1.8 (8)
Healthcare professionals other than me have more responsibility in advising patients on <u>use</u> of their medication	8.6 (38)	33.3 (148)	20.7 (92)	26.4 (117)	10.8 (48)	0.2 (1)
Healthcare professionals other than me have more responsibility in advising patients on <u>storage</u> of their medication	11.0 (49)	27.9 (124)	14.6 (65)	34.7 (154)	11.3 (50)	0.5 (2)
Healthcare professionals other than me have more responsibility in advising patients on <u>disposal</u> of unused medication	10.1 (45)	26.4 (117)	19.1 (85)	31.3 (139)	12.6 (56)	0.5 (2)

Patient information leaflets, available in the medication package, are a good source of information for patients on <u>use</u> of their medication	2.7 (12)	13.1 (58)	16.4 (73)	50.5 (224)	16.4 (73)	0.9 (4)
Patient information leaflets are a good source of information for patients on <u>storage</u> of their medication	2.5 (11)	12.6 (56)	16.2 (72)	52.0 (231)	16.2 (72)	0.5 (2)
Patient information leaflets are a good source of information for patients on <u>disposal</u> of unused medication	11.7 (52)	32.9 (146)	24.1 (107)	23.4 (104)	7.4 (33)	0.5 (2)
Patients put me under pressure to supply medication which I consider to be unnecessary	16.4 (73)	31.5 (140)	15.8 (70)	26.4 (117)	8.6 (38)	1.4 (6)
Family members of patients put me under pressure to supply medication which I consider unnecessary	18.9 (84)	37.2 (165)	15.3 (68)	21.4 (95)	6.1 (27)	1.1 (5)
Other HCPs put me under pressure to supply medication which I consider to be unnecessary	17.6 (78)	28.6 (127)	7.2 (32)	6.5 (29)	1.8 (8)	38.3 (170)
I am fully aware of the costs of medication I supply	3.4 (15)	13.1 (58)	19.8 (88)	40.1 (178)	22.5 (100)	1.1 (5)
I review medication for the management of chronic conditions to ensure their continued indication	4.1 (18)	10.1 (45)	16.4 (73)	52.3 (232)	14.0 (62)	3.2 (14)
Patients often bring me unwanted or unused medication	19.1 (85)	27.3 (121)	9.5 (42)	35.1 (156)	6.3 (28)	2.7 (12)

Medication supplied to patients and returned to me within their expiry dates should be reused	11.3 (50)	15.5 (69)	20.9 (93)	31.8 (141)	18.7 (83)	1.8 (8)
I have insufficient time in my daily practise to reduce the extent of medication wastage in Malta	12.2 (54)	38.7 (172)	21.4 (95)	21.4 (95)	4.3 (19)	2.0 (9)
There is little incentive for me to reduce the extent of medication wastage in Malta	14.0 (62)	32.2 (143)	15.8 (70)	26.4 (117)	10.4 (46)	1.4 (6)
Provision of medication to patients free of charge can lead to medication wastage in Malta	1.1 (5)	2.7 (12)	4.1 (18)	30.9 (137)	60.6 (269)	0.7 (3)

Table 5.27: Advice provided by HCPs on use, storage and disposal of medication (n=444)

<b>Statements</b>	<b>Never % (n)</b>	<b>Infrequently % (n)</b>	<b>Around half the time % (n)</b>	<b>Usually % (n)</b>	<b>Always % (n)</b>	<b>Unsure % (n)</b>	<b>Missing data % (n)</b>
I advise patients on <u>use</u> of their medication	1.1 (5)	4.3 (19)	4.1 (18)	20.9 (93)	68.0 (302)	0.7 (3)	0.9 (4)
I advise patients on <u>storage</u> of their medication	7.2 (32)	32.0 (142)	10.1 (45)	32.4 (144)	16.7 (74)	0.7 (3)	0.9 (4)
I advise patients on <u>disposal</u> of their medication	29.9 (132)	43.0 (190)	9.0 (40)	10.6 (47)	4.5 (20)	1.8 (8)	1.1 (5)

#### **5.4.9 Association between demographic characteristics and outcomes**

This section provides analysis of associations between a number of demographic variables and key outcome measures of: awareness of medication wastage in Malta; no interest in medication wastage; and confidence in ability to reduce medication wastage.

##### *5.4.9.1 Awareness of medication wastage*

Demographics and other variables were tested for association with the outcome of awareness of medication wastage. Awareness was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.28.

Association of data for demographic characteristics and awareness of issues of medication wastage (statement in questionnaire: "I am fully aware of the extent of medication wastage in Malta"), revealed that:

- age and awareness of medication wastage were significantly related  $\chi^2=31.555$ ,  $p<0.001$ , with the older age groups much more likely to self-report awareness of issues of medication wastage than their younger counterparts.
- number of years practising in profession and awareness of medication wastage were significantly related  $\chi^2=36.929$ ,  $p<0.001$ . The longer HCPs were in practice, the more likely they self-reported awareness of issues of medication wastage.
- Rogers' Diffusion of Innovation theory and awareness of medication wastage were significantly related  $\chi^2=20.147$ ,  $p<0.001$ . HCPs that resisted or were cautious in relation to new ways of working were more likely to self-report awareness of issues of medication wastage.

Variables identified as significant in univariate analysis ( $p\leq 0.05$ ) were entered into bivariate logistic regression. The only variable retained as significant was Rogers' Diffusion of Innovation theory, with those more venturesome being less likely to be aware, odds ratio 2.268 (95% CI 1.429-3.598).



Table 5.28: Association of data for demographic characteristics and awareness of issues of medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree /strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	42.1 (184)	57.9 (253)	0.426 (0.514)
Female	59.4 (129)	40.6 (88)	
Male	56.4 (124)	43.6 (96)	
Age (years)	42.3 (186)	57.6 (253)	<b>31.555</b>
20-29	31.3 (31)	68.7 (68)	<b>(&lt;0.001)</b>
30-39	32.0 (39)	68.0 (83)	
40-49	46.5 (46)	53.5 (53)	
50-59	48.6 (34)	51.4 (36)	
> 59	73.5 (36)	26.5 (13)	
Profession	42.4 (187)	57.6 (254)	5.916 (0.052)
Dentist	35.6 (16)	64.4 (29)	
Doctor	38.3 (85)	61.7 (137)	
Pharmacist	49.4 (86)	50.6 (88)	
Main place of work	42.0 (184)	58.0 (254)	7.734 (0.052)
Government services/public sector	38.1 (86)	61.9 (140)	
Private sector	40.3 (48)	59.7 (71)	
Self-employed	55.4 (46)	44.6 (37)	
Other	40.0 (4)	60.0 (6)	

Years in profession	42.5 (187)	57.5 (253)	<b>36.929</b>
≤ 5	32.1 (26)	67.9 (55)	<b>(&lt;0.001)</b>
6-10	27.6 (21)	72.4 (55)	
11-15	36.4 (24)	63.6 (42)	
16-20	48.9 (22)	51.1 (23)	
21-25	45.6 (26)	54.4 (31)	
26-30	42.0 (21)	58.0 (29)	
31-35	62.5 (10)	37.5 (6)	
> 35	75.5 (37)	24.5 (12)	
Rogers' Diffusion of Innovation theory	(185)	(252)	<b>20.147</b>
I resist new ways of working	100.0 (1)	0.0 (0)	<b>(&lt;0.001)</b>
I am cautious in relation to new ways of working; I tend to change once most peers have done so	69.0 (20)	31.0 (9)	
I deliberate for some time before adopting new ways of working	34.2 (82)	65.8 (158)	
I serve as a role model for others in relation to new ways of working	43.2 (16)	56.8 (21)	
I am venturesome and willing to be innovative with new ways of working	50.8 (66)	49.2 (64)	

#### 5.4.9.2 *No interest in medication wastage*

Demographics and other variables were tested for association with the outcome of no interest in medication wastage (statement in questionnaire: "I have no interest in the extent of medication wastage in Malta"). Interest was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.29. No statistically significant associations were identified.

Table 5.29: Association of data for demographic characteristics and no interest in issues of medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree /strongly disagree % (n)</b>	<b>Test value (p)</b>
Gender	3.2 (14)	96.8 (424)	0.314 (0.575)
Female	3.7 (8)	96.3 (210)	
Male	2.7 (6)	97.3 (214)	
Age (years)	3.0 (13)	97.0 (427)	2.936 (0.569)
20-29	3.0 (3)	97.0 (97)	
30-39	0.8 (1)	99.2 (120)	
40-49	4.0 (4)	96.0 (95)	
50-59	4.2 (3)	95.8 (68)	
> 59	4.1 (2)	95.9 (47)	
Profession	3.2 (14)	96.8 (428)	2.772 (0.250)
Dentist	4.4 (2)	95.6 (43)	
Doctor	1.8 (4)	98.2 (219)	
Pharmacist	4.6 (8)	95.4 (166)	
Main place of work	3.0 (13)	97.0 (426)	7.064 (0.070)
Government services/public sector	1.8 (4)	98.2 (222)	
Private sector	5.8 (7)	94.2 (114)	
Self-employed	1.2 (1)	98.8 (81)	
Other	10.0 (1)	90.0 (9)	

Years in profession	3.2 (14)	96.8 (427)	4.494 (0.721)
≤ 5	3.7 (3)	96.3 (79)	
6-10	2.7 (2)	97.3 (73)	
11-15	0.0 (0)	100.0 (66)	
16-20	4.4 (2)	95.6 (43)	
21-25	3.4 (2)	96.6 (56)	
26-30	6.0 (3)	94.0 (47)	
31-35	0.0 (0)	100.0 (16)	
> 35	4.1 (2)	95.9 (47)	
Rogers' Diffusion of Innovation theory	3.2 (14)	96.8 (424)	0.755 (0.944)
I resist new ways of working	0.0 (0)	100.0 (1)	
I am cautious in relation to new ways of working; I tend to change once most peers have done so	3.3 (1)	96.7 (29)	
I deliberate for some time before adopting new ways of working	2.9 (7)	97.1 (234)	
I serve as a role model for others in relation to new ways of working	5.6 (2)	94.4 (34)	
I am venturesome and willing to be innovative with new ways of working	3.1 (4)	96.9 (126)	

#### *5.4.9.3 Confidence in ability to reduce medication wastage*

Demographics and other variables were tested for association with the outcome of confidence in ability to reduce medication wastage (statement in questionnaire: "I feel confident in my ability to reduce medication wastage in Malta"). Confidence was collapsed into those agreeing/strongly agreeing, and those uncertain/disagreeing/strongly disagreeing as given in Table 5.30. No statistically significant associations were identified.

Table 5.30: Association of data for demographic characteristics and confidence in ability to reduce medication wastage

<b>Variable</b>	<b>Strongly agree/agree % (n)</b>	<b>Uncertain/disagree /strongly disagree % (n)</b>	<b>Test value (<i>p</i>)</b>
Gender	47.0 (203)	53.0 (229)	3.072 (0.080)
Female	42.7 (91)	57.3 (122)	
Male	51.1 (112)	48.9 (107)	
Age (years)	47.5 (206)	52.5 (228)	3.873 (0.423)
20-29	42.4 (42)	57.6 (57)	
30-39	45.5 (55)	54.5 (66)	
40-49	50.5 (49)	49.5 (48)	
50-59	50.0 (37)	50.0 (37)	
> 59	50.0 (20)	50.0 (20)	
Profession	47.5 (207)	52.5 (229)	4.479 (0.107)
Dentist	54.5(24)	45.5 (20)	
Doctor	42.5 (94)	57.5 (127)	
Pharmacist	52.0 (89)	48.0 (82)	
Main place of work	47.8 (207)	52.2 (226)	7.470 (0.058)
Government services/public sector	46.0 (104)	54.0 (122)	
Private sector	42.2 (49)	57.8 (67)	
Self-employed	61.0 (50)	39.0 (32)	
Other	44.4 (4)	55.6 (5)	

Years in profession	47.5 (207)	52.5 (229)	5.100 (0.648)
≤ 5	44.4 (36)	55.6 (45)	
6-10	41.3 (31)	58.7 (44)	
11-15	48.5 (32)	51.5 (34)	
16-20	47.7 (21)	52.3 (23)	
21-25	45.6 (26)	54.4 (31)	
26-30	51.0 (25)	49.0 (24)	
31-35	43.7 (7)	56.3 (9)	
> 35	60.4 (29)	39.6 (19)	
Rogers' Diffusion of Innovation theory	47.5 (205)	52.5 (227)	2.926 (0.570)
I resist new ways of working	0.0 (0)	100.0 (1)	
I am cautious in relation to new ways of working; I tend to change once most peers have done so	41.4 (12)	58.6 (17)	
I deliberate for some time before adopting new ways of working	46.4 (110)	53.6 (127)	
I serve as a role model for others in relation to new ways of working	43.2 (16)	44.7 (21)	
I am venturesome and willing to be innovative with new ways of working	52.3 (67)	47.7 (61)	



#### **5.4.10 Therapeutic areas, patient groups and other areas**

Analysis of responses to the open question on the therapeutic areas, patient groups or other areas which, in the respondents' opinion, should be considered as priority for targeting strategies to reduce medication wastage identified three key themes. The most frequently reported was the 'patient group' receiving free medication, mentioned by 21.0% (n=93) of respondents. This was followed by elderly patients (17.8%, n=79) and patients on chronic medication (13.1%, n=58).

Respondents also listed the classes of drugs that should be considered as priority for targeting strategies to reduce medication wastage. The most common classes of drugs to be targeted were the cardiovascular (13.5%, n=60) and antibiotics (12.6%, n=56).

The classes of medication were:

- Cardiovascular medication (n=60)
  - Antihypertensives (n=31)
  - Cardiovascular medication in general (n=15)
  - Statins (n=8)
  - Medication for ischaemic heart disease (n=4)
  - Medication for congestive heart failure (n=2)
- Antibiotics (n=56)
- Medication for diabetes (n=35)
- Respiratory (n=29)
  - Medication for asthma (n=15)
  - Respiratory in general (n=10)
  - Medication for chronic obstructive pulmonary disease (n=4)
- Analgesics (n=24)
- Antidepressants/anxiolytics (psychiatric treatment) (n=19)
- Oncology medication (n=10)
- Gastrointestinal tract medication (n=6)
- Vitamins and minerals (n=5)
- OTC medication and ophthalmic/ear nose throat medication (n=3 each)
- Warfarin/aspirin and rheumatoid arthritis/orthopaedics (n=2 each)

- Auto-immune disease medication, medication for osteoporosis, medication for menopause, and vaccines (n=1 each)

The type of medication that should be targeted to reduce wastage included:

- High cost medication (n=15)
- Cheap medication and medication used in large volumes (n=7 each)
- Medication with short expiry date (n=4)
- Medication hazardous to the environment (n=3)
- Ointments and creams (n=3)
- Medication rare or hard to source (n=2)
- New medication, tablet and liquid formulations, dressings, and emergency medication (n=1 each)

Other areas or groups that should be targeted were:

- HCPs (n=15)
  - GPs (n=11)
  - HCPs in general (n=2)
  - Pharmacists and community nurses (n=1 each)
- Health centres (n=5)
- Medication shortages (n=3)
- Storage/disposal (n=3)
- Prevention of illnesses (n=2)
- The general public (n=2)
- Medication returns (n=2)
- Political interference, coherence between primary and secondary care, medication pack size, and higher level of education of patients and carers (n=1 each)

#### **5.4.11 Education and training**

Table 5.31 indicates that although 71.0% (n=315) of HCPs had never thought about undertaking further education and training in relation to medication wastage, 79.3% (n=352) felt that they required more education and training. Table 5.31 also indicates clearly that respondents did not view that current undergraduate and postgraduate training has sufficient coverage of medication wastage.

Table 5.31: Responses to issues of education and training (n=444)

<b>Statements</b>	<b>Strongly disagree % (n)</b>	<b>Disagree % (n)</b>	<b>Unsure % (n)</b>	<b>Agree % (n)</b>	<b>Strongly agree % (n)</b>	<b>Missing data % (n)</b>
I have never thought about undertaking further education and training relating to medication wastage	1.6 (7)	14.4 (64)	12.6 (56)	55.9 (248)	15.1 (67)	0.5 (2)
My undergraduate education and training had sufficient emphasis on medication wastage	33.1 (147)	45.0 (200)	9.5 (42)	7.9 (35)	3.6 (16)	0.9 (4)
Current HCP undergraduate education and training in Malta has sufficient emphasis on medication wastage	21.6 (96)	36.5 (162)	33.8 (150)	5.9 (26)	1.1 (5)	1.1 (5)
Current HCP postgraduate education and training in Malta has sufficient emphasis on medication wastage	16.2 (72)	32.4 (144)	43.0 (191)	5.9 (26)	0.7 (3)	1.8 (8)
I require more education and training to further reduce medication wastage in Malta	2.5 (11)	6.1 (27)	11.3 (50)	59.0 (262)	20.3 (90)	0.9 (4)

Figure 5.8 illustrates the form of education and training that respondents were mostly interested in.

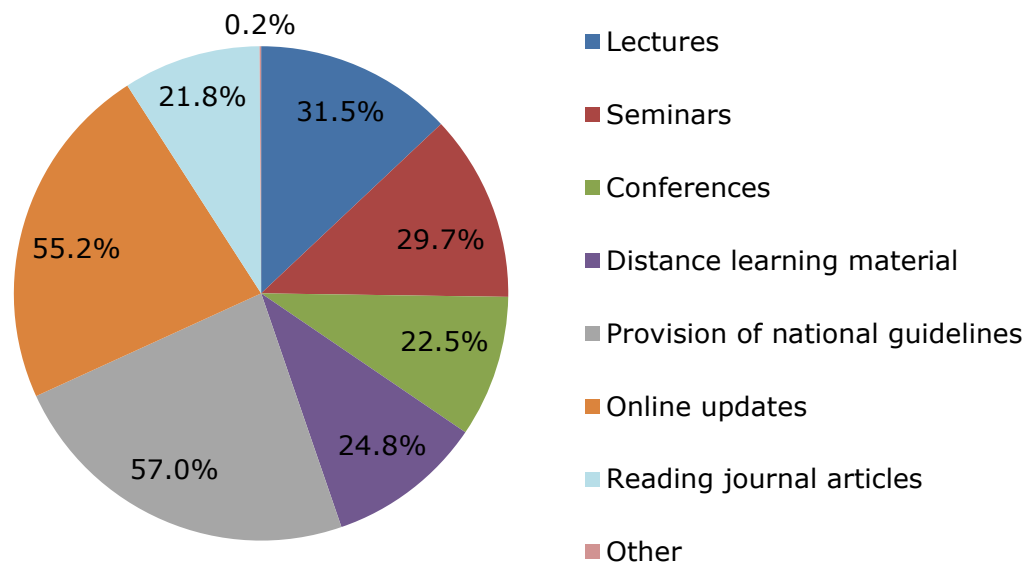


Figure 5.8: Form of education and training of most interest

The 'other' option (0.2%, n=1) was the use of social media. Some recommended multidisciplinary education.

#### **5.4.12 Additional comments on medication wastage**

Respondents were given the option to add any additional comments. Some re-emphasised causes and consequences of medication wastage. Analysis identified two key themes:

- Need for education and information for HCPs and patients (n=19)
- Introduction of payment in the free healthcare system (n=12)

## 5.5 Results: Student questionnaire

### 5.5.1 Response rate

The response rate following the first mailing was 11.5% (50 responses), which increased to 15.4% (67/434 responses) following one reminder (this is lower than the response rate of the pilot study which was 43.0%). Figure 5.9 illustrates the number of daily responses that were obtained over a 30-day collection period.

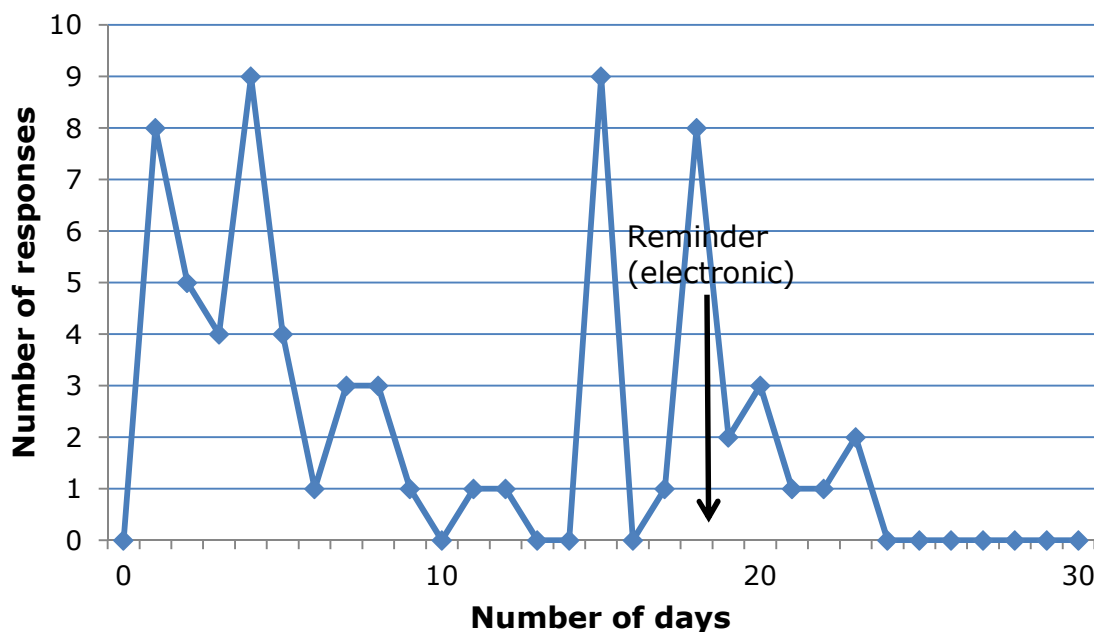


Figure 5.9: Number of student questionnaire responses during 30-day data collection

### 5.5.2 Demographic characteristics

Table 5.32 presents the demographic characteristics of student respondents. Twenty-one percent ( $n=14$ ) stated that they were taking regular medication at the time of the study. Eleven of these bought their medication, two students got them free of charge on entitlement cards (yellow or pink card) through the Maltese NHS, and one student obtained regular medication both against payment and free of charge. In the six months prior to completion of the questionnaire, 80.6% of respondents ( $n=54$ ) had a prescribed or OTC medication.

Table 5.32: Demographic characteristics of HCP students (n=67)

<b>Demographics</b>	<b>Frequency % (n)</b>
<b>Gender</b>	
Male	26.9 (18)
Female	73.1 (49)
<b>Age (years)</b>	
18-21	64.2(43)
22-25	32.8 (22)
26-29	1.5 (1)
30-33	0.0 (0)
> 33	1.5 (1)
<b>Course of study</b>	
Dentistry	3.0 (2)
Medicine	41.8 (28)
Nursing	38.8 (26)
Pharmacy	16.4 (11)
<b>Year of study</b>	
Second	35.8 (24)
Third	7.5 (5)
Fourth	37.3 (25)
Fifth	17.9 (12)
Missing data	1.5 (1)
<b>Nationality</b>	
Maltese	94.0 (63)
Other	3.0 (2)
• Kuwaiti	
Missing data	3.0 (2)

### ***5.5.3 Rogers' Diffusion of Innovation theory***

Table 5.33 shows the perceived innovativeness of respondents, with over half (59.7%, n=40) stating that they deliberated for some time before adopting change.

Table 5.33: Willingness of HCP students to adopt change

<b>Rogers' Diffusion of Innovation theory</b>	<b>Percentage (%)</b>	<b>Number of respondents (n)</b>
I resist any change	0.0	0
I am cautious in relation to change; I tend to change once most peers have done so	14.9	10
I deliberate for some time before adopting change	59.7	40
I serve as a role model for others in relation to change	3.0	2
I am venturesome and willing to be innovative with change	20.9	14
Missing data	1.5	1

#### **5.5.4 Definition of medication wastage**

All four statements relating to the definition of medication wastage developed in the previous stage of the research (chapter 4) exceeded the consensus level of 75.0% (Table 5.34). One respondent commented that medication wastage should encompass medication produced but is too expensive to be accessible to the target population.

Table 5.34: Responses by HCP students to the definition of medication wastage (n=67)

<b>Statements</b>	<b>Strongly disagree</b> <b>% (n)</b>	<b>Disagree</b> <b>% (n)</b>	<b>Unsure</b> <b>% (n)</b>	<b>Agree</b> <b>% (n)</b>	<b>Strongly agree</b> <b>% (n)</b>	<b>Missing data</b> <b>% (n)</b>
Medication wastage encompasses any medication which expires or remains unused throughout the medication supply chain (manufacturing, storage, transport and handling of medication until these reach the consumer) and during use by the patient	3.0 (2)	6.0 (4)	7.5 (5)	37.3 (25)	46.3 (31)	0.0 (0)
Medication wastage encompasses unnecessary or inappropriate consumption of medication by patients	3.0 (2)	4.5 (3)	6.0 (4)	40.3 (27)	46.3 (31)	0.0 (0)
Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals	1.5 (1)	4.5 (3)	16.4 (11)	41.8 (28)	35.8 (24)	0.0 (0)
Medication wastage poses a financial burden on patients themselves, the state's economy and requires adequate education of all people concerned	1.5 (1)	0.0 (0)	1.5 (1)	19.4 (13)	73.1 (49)	4.5 (3)



### **5.5.5 Awareness of issues related to medication wastage**

Table 5.35 gives the extent of awareness of issues related to medication wastage. Only one fifth of students (20.9%, n=14) stated that they were fully aware of the extent of medication wastage in Malta.

Slightly more than half of respondents (59.7%, n=40) strongly agreed/agreed that they were fully aware of the consequences of medication wastage on the economy. Less than half were fully aware of the consequences on society (47.8%, n=32), patients (38.8%, n=26), the environment (38.8%, n=26) and HCPs (28.4%, n=19). Respondents also stated that they were aware of other consequences of medication wastage including:

- future generations, industry, natural resources, patient comprehension, unequal resource sharing, and water purity (n=1 each).

A little more than one third of respondents (35.8%, n=24) were fully aware of factors potentially leading to medication wastage and only 10.4% (n=7) agreed/strongly agreed that they were fully aware of laws, procedures and policies relating to medication wastage in Malta.

Table 5.35: Awareness of the extent of medication wastage in Malta (n=67)

Statements	Strongly disagree % (n)	Disagree % (n)	Unsure % (n)	Agree % (n)	Strongly agree % (n)	Missing data % (n)
I am <u>fully aware</u> of the <u>extent</u> of medication wastage in Malta	11.9 (8)	26.9 (18)	40.3 (27)	14.9 (10)	6.0 (4)	0.0 (0)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	6.0 (4)	17.9 (12)	34.3 (23)	34.3 (23)	4.5 (3)	3.0 (2)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	9.0 (6)	23.9 (16)	37.3 (25)	25.4 (17)	3.0 (2)	1.5 (1)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>society</u>	7.5 (5)	13.4 (9)	29.9 (20)	38.8 (26)	9.0 (6)	1.5 (1)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	4.5 (3)	14.9 (10)	19.4 (13)	41.8 (28)	17.9 (12)	1.5 (1)
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	7.5 (5)	20.9 (14)	31.3 (21)	28.4 (19)	10.4 (7)	1.5 (1)
I am <u>fully aware</u> of <u>factors</u> potentially leading to medication wastage in Malta	9.0 (6)	14.9 (10)	40.3 (27)	35.8 (24)	0.0 (0)	0.0 (0)
I am <u>fully aware</u> of <u>laws, procedures and policies</u> relating to medication wastage in Malta	22.4 (15)	34.3 (23)	32.8 (22)	10.4 (7)	0.0 (0)	0.0 (0)

### **5.5.6 Interest in issues related to medication wastage**

Table 5.36 gives the extent of interest in issues related to medication wastage. Only 4.5% (n=3) stated that they had no interest in the extent of medication wastage in Malta.

The majority strongly disagreed/disagreed that they had no interest in the consequences of medication wastage on patients (98.5%, n=66), HCPs (98.5%, n=66), society (98.5%, n=66), the economy (94.0%, n=63) and the environment (94.0%, n=63).

None stated that they agreed/strongly agreed that they had no interest in factors potentially leading to medication wastage and only 1.5% (n=1) had no interest in laws, procedures and policies relating to medication wastage in Malta.

Table 5.36: Interest in extent of medication wastage in Malta (n=67)

Statements	Strongly disagree % (n)	Disagree % (n)	Unsure % (n)	Agree % (n)	Strongly agree % (n)	Missing data % (n)
I have <u>no interest</u> in the <u>extent</u> of medication wastage in Malta	38.8 (26)	52.2 (35)	4.5 (3)	3.0 (2)	1.5 (1)	0.0 (0)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	68.7 (46)	29.8 (20)	1.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	67.2 (45)	31.3 (21)	0.0 (0)	1.5 (1)	0.0 (0)	0.0 (0)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>society</u>	59.7 (40)	38.8 (26)	1.5 (1)	0.0 (0)	0.0 (0)	0.0 (0)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	61.2 (41)	32.8 (22)	4.5 (3)	0.0 (0)	0.0 (0)	1.5 (1)
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	62.7 (42)	31.3 (21)	3.0 (2)	0.0 (0)	0.0 (0)	3.0 (2)
I have <u>no interest</u> in the <u>factors</u> potentially leading to medication wastage in Malta	56.7 (38)	37.3 (25)	4.5 (3)	0.0 (0)	0.0 (0)	1.5 (1)
I have <u>no interest</u> in laws, <u>procedures and policies</u> relating to medication wastage in Malta	37.3 (25)	46.3 (31)	9.0 (6)	1.5 (1)	0.0 (0)	6.0 (4)

### **5.5.7 Factors potentially leading to medication wastage**

Table 5.37 shows responses to statements on factors which potentially lead to medication wastage. Respondents attributed the lack of patient education/ knowledge about medication in general (83.6%, n=56) and the overstocking of medication by patients due to previous or potential out of stock situation (80.6%, n=54) as the two major contributing factors. The factor which was considered to be contributing the least towards medication wastage was 'patient's death' (23.8%, n=16).

Table 5.37: Factors which potentially lead to medication wastage (1=No contribution at all; 5=Major contribution) (n=67)

<b>Statements</b>	<b>1 % (n)</b>	<b>2 % (n)</b>	<b>3 % (n)</b>	<b>4 % (n)</b>	<b>5 % (n)</b>	<b>Missing data % (n)</b>
Short medication expiry dates	3.0 (2)	11.9 (8)	29.9 (20)	37.3 (25)	17.9 (12)	0.0 (0)
Large pack sizes when patients need smaller quantities of medication, particularly when starting new medication	1.5 (1)	6.0 (4)	13.4 (9)	34.3 (23)	44.8 (30)	0.0 (0)
Inadequate audit of medication prescribing	0.0 (0)	10.4 (7)	25.4 (17)	44.8 (30)	16.4 (11)	3.0 (2)
Medication that remain unused within their expiry dates are not accepted for reuse by healthcare professionals	9.0 (6)	11.9 (8)	29.9 (20)	26.9 (18)	19.4 (13)	3.0 (2)
Inappropriate storage of medication	3.0 (2)	10.4 (7)	22.4 (15)	28.4 (19)	34.3 (23)	1.5 (1)
Patients' expectations to receive a prescription for medication	6.0 (4)	13.4 (9)	25.4 (17)	26.9 (18)	26.9 (18)	1.5 (1)
Lack of patient education/knowledge about medication in general	0.0 (0)	4.5 (3)	9.0 (6)	34.3 (23)	49.3 (33)	3.0 (2)
Lack of patient education/knowledge about monetary cost of medication	0.0 (0)	1.5 (1)	22.4 (15)	32.8 (22)	40.3 (27)	3.0 (2)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Overstocking of medication by patients due to previous or potential out of stock situation	1.5 (1)	3.0 (2)	13.4 (9)	35.8 (24)	44.8 (30)	1.5 (1)
Overstocking of medication by patients due to dependency on others to collect medication supply	1.5 (1)	7.5 (5)	11.9 (8)	55.2 (37)	22.4 (15)	1.5 (1)
Overstocking by patients due to fear of refusal of medication supply due to entitlement problems	1.5 (1)	4.5 (3)	23.9 (16)	44.8 (30)	23.9 (16)	1.5 (1)
Other family members or carers obtaining medication on behalf of patient unaware of stock at home	1.5 (1)	3.0 (2)	26.9 (18)	43.3 (29)	23.9 (16)	1.5 (1)
Patients getting advice from more than one HCP, family and friends regarding use of medication	1.5 (1)	3.0 (2)	32.8 (22)	29.9 (20)	29.9 (20)	3.0 (2)
Non-adherence to medication regimens by patients	1.5 (1)	1.5 (1)	19.4 (13)	32.8 (22)	43.3 (29)	1.5 (1)
Medication stopped by patient due to perceived ineffectiveness	0.0 (0)	3.0 (2)	19.4 (13)	41.8 (28)	32.8 (22)	3.0 (2)
Medication stopped by patient due to perceived adverse events	1.5 (1)	9.0 (6)	20.9 (14)	40.3 (27)	26.9 (18)	1.5 (1)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Medications stopped by patient due to perceived resolution of their symptoms/medical condition	0.0 (0)	10.4 (7)	16.4 (11)	34.3 (23)	37.3 (25)	1.5 (1)
Patient's death	13.4 (9)	32.8 (22)	28.4 (19)	11.9 (8)	11.9 (8)	1.5 (1)
Lack of education and training of HCP students about medication wastage	0.0 (0)	4.5 (3)	22.4 (15)	34.3 (23)	34.3 (23)	4.5 (3)
Lack of education and training of HCP students about monetary cost of medication	0.0 (0)	9.0 (6)	25.4 (17)	37.3 (25)	25.4 (17)	3.0 (2)
Lack of CPD of healthcare professionals about medication wastage	0.0 (0)	9.0 (6)	28.4 (19)	38.8 (26)	20.9 (14)	3.0 (2)
Lack of CPD of healthcare professionals about monetary cost of medication	1.5 (1)	7.5 (5)	40.3 (27)	29.9 (20)	17.9 (12)	3.0 (2)
Healthcare professionals' lack of awareness of monetary cost of medication	4.5 (3)	16.4 (11)	23.9 (16)	32.8 (22)	20.9 (14)	1.5 (1)
Lack of communication about medication between primary and secondary healthcare	1.5 (1)	9.0 (6)	19.4 (13)	41.8 (28)	26.9 (18)	1.5 (1)



<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Lack of communication about medication between healthcare providers and patients	0.0 (0)	10.4 (7)	16.4 (11)	40.3 (27)	31.3 (21)	1.5 (1)
Medication stopped by HCP due to ineffectiveness of the medication	3.0 (2)	32.8 (22)	38.8 (26)	14.9 (10)	7.5 (5)	3.0 (2)
Medication stopped by HCP due to adverse events of the medication	10.4 (7)	25.4 (17)	38.8 (26)	16.4 (11)	7.5 (5)	1.5 (1)
Medication stopped by HCP due to resolution of patients' symptoms/conditions	11.9 (8)	26.9 (18)	35.8 (24)	17.9 (12)	4.5 (3)	3.0 (2)
Over-prescribing by HCP	1.5 (1)	11.9 (8)	14.9 (10)	37.3 (25)	32.8 (22)	1.5 (1)
Extra medication supply dispensed to patients	1.5 (1)	11.9 (8)	22.4 (15)	29.9 (20)	32.8 (22)	1.5 (1)
Medication prescribed for no indication	3.0 (2)	13.4 (9)	16.4 (11)	22.4 (15)	43.3 (29)	1.5 (1)
Healthcare professionals' perceptions that patients expect to receive a medication	0.0 (0)	10.4 (7)	25.4 (17)	37.3 (25)	23.9 (16)	3.0 (2)
Inadequate medication reviews by healthcare professionals	1.5 (1)	10.4 (7)	46.3 (31)	20.9 (14)	19.4 (13)	1.5 (1)

<b>Statements</b>	<b>1</b> <b>% (n)</b>	<b>2</b> <b>% (n)</b>	<b>3</b> <b>% (n)</b>	<b>4</b> <b>% (n)</b>	<b>5</b> <b>% (n)</b>	<b>Missing</b> <b>data</b> <b>% (n)</b>
Free healthcare system	6.0 (4)	13.4 (9)	14.9 (10)	9.0 (6)	55.2 (37)	1.5 (1)
Medication obtained free through the National Health System are regularly out of stock in the pharmacy	4.5 (3)	9.0 (6)	35.8 (24)	20.9 (14)	26.9 (18)	3.0 (2)
Medication that legally require a prescription are easily purchased from pharmacies without the need for a valid prescription	3.0 (2)	25.4 (17)	35.8 (24)	11.9 (8)	22.4 (15)	1.5 (1)

### **5.5.8 Current practices, views, experiences**

Table 5.38 shows the current views of HCP students regarding the role of HCPs in reducing medication wastage in Malta. In the students' opinions, doctors (91.0%, n=61), pharmacists (88.0%, n=59) and nurses (77.7%, n=52) play an important part in reducing medication wastage. The majority also strongly agreed/agreed that doctors (94.0%, n=63), pharmacists (85.1%, n=57) and nurses (85.1%, n=57) could play a more active role in reducing medication wastage.

A little more than one third of respondents (38.8%, n=26) strongly agreed/agreed that they felt confident in their abilities to reduce medication wastage.

Table 5.38: Current views regarding the role of HCPs in reducing medication wastage in Malta (n=67)

<b>Statements</b>	<b>Strongly disagree % (n)</b>	<b>Disagree % (n)</b>	<b>Unsure % (n)</b>	<b>Agree % (n)</b>	<b>Strongly agree % (n)</b>	<b>Missing data % (n)</b>
<u>Dentists</u> play an important part in reducing medication wastage in Malta	6.0 (4)	22.4 (15)	56.7 (38)	6.0 (4)	7.5 (5)	1.5 (1)
<u>Doctors</u> play an important part in reducing medication wastage in Malta	0.0 (0)	1.5 (1)	6.0 (4)	31.3 (21)	59.7 (40)	1.5 (1)
<u>Nurses</u> play an important part in reducing medication wastage in Malta	3.0 (2)	3.0 (2)	13.4 (9)	47.8 (32)	29.9 (20)	3.0 (2)
<u>Pharmacists</u> play an important part in reducing medication wastage in Malta	1.5 (1)	0.0 (0)	6.0 (4)	17.9 (12)	70.1 (47)	4.5 (3)
<u>Dentists</u> could play a more active role in reducing medication wastage in Malta	1.5 (1)	0.0 (0)	49.3 (33)	31.3 (21)	11.9 (8)	6.0 (4)
<u>Doctors</u> could play a more active role in reducing medication wastage in Malta	0.0 (0)	0.0 (0)	1.5 (1)	31.3 (21)	62.7 (42)	4.5 (3)
<u>Nurses</u> could play a more active role in reducing medication wastage in Malta	0.0 (0)	0.0 (0)	10.4 (7)	38.8 (26)	46.3 (31)	4.5 (3)
<u>Pharmacists</u> could play a more active role in reducing medication wastage in Malta	0.0 (0)	0.0 (0)	9.0 (6)	28.4 (19)	56.7 (38)	6.0 (4)
There is little scope for <u>dentists</u> to further reduce medication wastage in Malta	13.4 (9)	37.3 (25)	41.8 (28)	4.5 (3)	1.5 (1)	1.5 (1)

There is little scope for <u>doctors</u> to further reduce medication wastage in Malta	47.8 (32)	38.8 (26)	7.5 (5)	1.5 (1)	1.5 (1)	3.0 (2)
There is little scope for <u>nurses</u> to further reduce medication wastage in Malta	38.8 (26)	44.8 (30)	10.4 (7)	3.0 (2)	0.0 (0)	3.0 (2)
There is little scope for <u>pharmacists</u> to further reduce medication wastage in Malta	46.3 (31)	35.8 (24)	11.9 (8)	0.0 (0)	1.5 (1)	4.5 (3)
I feel confident in <u>my ability</u> to reduce medication wastage in Malta	7.5 (5)	10.4 (7)	41.8 (28)	31.3 (21)	7.5 (5)	1.5 (1)

Table 5.39 shows the current views of HCP students regarding the provision of advice to patients on use, storage and disposal of medication. Respondents reported that doctors routinely advise patients on use of their medication (85.1%, n=57), followed by pharmacists (80.6%, n=54). Pharmacists were considered the most appropriate profession to give advice on storage (73.1%, n=49) and disposal (43.2%, n=29) of medication.

Table 5.39: Current views regarding advice to patients on use, storage and disposal of medication (n=67)

<b>Statements</b>	<b>Strongly disagree % (n)</b>	<b>Disagree % (n)</b>	<b>Unsure % (n)</b>	<b>Agree % (n)</b>	<b>Strongly agree % (n)</b>	<b>Missing data % (n)</b>
To my knowledge, <u>dentists</u> routinely advise patients on <u>use</u> of their medication	3.0 (2)	9.0 (6)	56.7 (38)	25.4 (17)	4.5 (3)	1.5 (1)
To my knowledge, <u>dentists</u> routinely advise patients on <u>storage</u> of their medication	10.4 (7)	28.4 (19)	53.7 (36)	6.0 (4)	0.0 (0)	1.5 (1)
To my knowledge, <u>dentists</u> routinely advise patients on <u>disposal</u> of unused medication	14.9 (10)	22.4 (15)	58.2 (39)	1.5 (1)	0.0 (0)	3.0 (2)
To my knowledge, <u>doctors</u> routinely advise patients on <u>use</u> of their medication	0.0 (0)	4.5 (3)	9.0 (6)	58.2 (39)	26.9 (18)	1.5 (1)
To my knowledge, <u>doctors</u> routinely advise patients on <u>storage</u> of their medication	4.5 (3)	32.8 (22)	25.4 (17)	28.4 (19)	6.0 (4)	3.0 (2)
To my knowledge, <u>doctors</u> routinely advise patients on <u>disposal</u> of unused medication	16.4 (11)	41.8 (28)	23.9 (16)	10.4 (7)	4.5 (3)	3.0 (2)
To my knowledge, <u>nurses</u> routinely advise patients on <u>use</u> of their medication	1.5 (1)	7.5 (5)	19.4 (13)	44.8 (30)	25.4 (17)	1.5 (1)
To my knowledge, <u>nurses</u> routinely advise patients on <u>storage</u> of their medication	3.0 (2)	25.4 (17)	34.3 (23)	19.4 (13)	16.4 (11)	1.5 (1)
To my knowledge, <u>nurses</u> routinely advise patients on <u>disposal</u> of unused medication	11.9 (8)	35.8 (24)	34.3 (23)	9.0 (6)	7.5 (5)	1.5 (1)

To my knowledge, <u>pharmacists</u> routinely advise patients on <u>use</u> of their medication	0.0 (0)	1.5 (1)	14.9 (10)	37.3 (25)	43.3 (29)	3.0 (2)
To my knowledge, <u>pharmacists</u> routinely advise patients on <u>storage</u> of their medication	1.5 (1)	3.0 (2)	19.4 (13)	40.3 (27)	32.8 (22)	3.0 (2)
To my knowledge, <u>pharmacists</u> routinely advise patients <u>disposal</u> of unused medication	7.5 (5)	13.4 (9)	32.8 (22)	31.3 (21)	11.9 (8)	3.0 (2)
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>people of my same profession</u> to advise patients on <u>use</u> of their medication	17.9 (12)	35.8 (24)	25.4 (17)	13.4 (9)	4.5 (3)	3.0 (2)
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>people of my same profession</u> to advise patients on <u>storage</u> of their medication	14.9 (10)	34.3 (23)	28.4 (19)	16.4 (11)	4.5 (3)	1.5 (1)
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>people of my same profession</u> to advise patients on <u>disposal</u> of unused medication	13.4 (9)	35.8 (24)	28.4 (19)	13.4 (9)	6.0 (4)	3.0 (2)
Patient information leaflets, available in the medication package, are a good source of information for patients on <u>use</u> of their medication	1.5 (1)	6.0 (4)	10.4 (7)	44.8 (30)	34.3 (23)	3.0 (2)



Patient information leaflets are a good source of information for patients on storage of their medication	1.5 (1)	7.5 (5)	14.9 (10)	40.3 (27)	34.3 (23)	1.5 (1)
Patient information leaflets are a good source of information for patients on <u>disposal</u> of unused medication	9.0 (6)	25.4 (17)	19.4 (13)	32.8 (22)	11.9 (8)	1.5 (1)

Table 5.40 shows the current practices, views and experiences of HCP students regarding medication wastage in Malta. Almost three quarters of respondents (70.2%, n=47) felt concerned that when they graduate, patients would put them under pressure to supply medication which they consider unnecessary, 67.2% (n=45) were concerned that patients' family members would put them under pressure and 65.7% (n=44) were concerned that other HCPs would put them under pressure to supply medication which they consider unnecessary.

Only one third (35.8%, n=24) strongly agreed/agreed that medication supplied to patients and returned to the HCPs within their expiry dates should be reused. Two thirds (65.7%, n=44) strongly agreed/agreed that the provision of medication to patients free of charge could lead to medication wastage. Almost half (44.8%, n=30) strongly agreed/agreed that as a consumer of healthcare, they contributed to medication wastage. Only one tenth (10.5%, n=7) strongly agreed/agreed that current undergraduate training had sufficient emphasis on medication wastage and 86.5% (n=58) felt that they required more education and training on how to reduce medication wastage.

Table 5.40: Current practices, views and experiences regarding medication wastage in Malta (n=67)

<b>Statements</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Missing data</b>
	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>	<b>% (n)</b>
When I graduate, I intend considering medication wastage when supplying medication	0.0 (0)	0.0 (0)	6.0 (4)	65.7 (44)	26.9 (18)	1.5 (1)
When I graduate, I intend to regularly educate patients about medication wastage	1.5 (1)	1.5 (1)	6.0 (4)	56.7 (38)	31.3 (21)	3.0 (2)
Dentists can make little difference to reduce the extent of medication wastage in Malta	13.4 (9)	34.3 (23)	34.3 (23)	10.4 (7)	3.0 (2)	4.5 (3)
Doctors can make little difference to reduce the extent of medication wastage in Malta	43.3 (29)	40.3 (27)	3.0 (2)	7.5 (5)	3.0 (2)	3.0 (2)
Nurses can make little difference to reduce the extent of medication wastage in Malta	38.8 (26)	44.8 (30)	3.0 (2)	9.0 (6)	3.0 (2)	1.5 (1)
Pharmacists can make little difference to reduce the extent of medication wastage in Malta	56.7 (38)	28.4 (19)	3.0 (2)	9.0 (6)	1.5 (1)	1.5 (1)
I am concerned that when I graduate, patients will put me under pressure to supply medication which I consider unnecessary	1.5 (1)	10.4 (7)	14.9 (10)	40.3 (27)	29.9 (20)	3.0 (2)
I am concerned that when I graduate, family members of patients will put me under pressure to supply medication which I consider unnecessary	3.0 (2)	10.4 (7)	17.9 (12)	41.8 (28)	25.4 (17)	1.5 (1)

I am concerned that when I graduate, other healthcare professionals will put me under pressure to supply medication which I consider unnecessary	0.0 (0)	16.4 (11)	16.4 (11)	43.3 (29)	22.4 (15)	1.5 (1)
I am fully aware of the costs of medication commonly used in Malta	7.5 (5)	28.4 (19)	19.4 (13)	32.8 (22)	9.0 (6)	3.0 (2)
Medication supplied to patients and returned to me within their expiry dates should be reused	11.9 (8)	10.4 (7)	40.3 (27)	25.4 (17)	10.4 (7)	1.5 (1)
Dentists have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	25.4 (17)	25.4 (17)	43.3 (29)	4.5 (3)	0.0 (0)	1.5 (1)
Doctors have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	26.9 (18)	37.3 (25)	17.9 (12)	11.9 (8)	4.5 (3)	1.5 (1)
Nurses have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	29.9 (20)	40.3 (27)	14.9 (10)	10.4 (7)	1.5 (1)	3.0 (2)
Pharmacists have insufficient time in their daily practise to reduce the extent of medication wastage	34.3 (23)	41.8 (28)	14.9 (10)	4.5 (3)	3.0 (2)	1.5 (1)
Provision of medication to patients free of charge can lead to medication wastage in Malta	4.5 (3)	10.4 (7)	16.4 (11)	29.9 (20)	35.8 (24)	3.0 (2)
As a consumer of healthcare, I contribute to medication wastage in Malta	10.4 (7)	16.4 (11)	26.9 (18)	35.8 (24)	9.0 (6)	1.5 (1)
My undergraduate training has sufficient emphasis on medication wastage	23.9 (16)	50.7 (34)	11.9 (8)	9.0 (6)	1.5 (1)	3.0 (2)

I require more education and training on how to reduce medication wastage in Malta	1.5 (1)	6.0 (4)	3.0 (2)	55.2 (37)	31.3 (21)	3.0 (2)
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### **5.5.9 Therapeutic areas, patient groups and other areas**

Respondents listed the therapeutic areas, patient groups or other areas which should be considered as priority for targeting strategies to reduce medication wastage. The most commonly listed was the 'elderly patient group', mentioned by 31.3% (n=21) of respondents.

The patient groups/therapeutic areas were:

- Elderly patients (n=21)
- Patients receiving free medication (n=4)
- Polypharmacy (n=3)
- Patients on chronic medication and young adults/children (n=2 each)
- Non-adherence, patients on acute medication, patients with multiple co-morbidities, patients with chronic pain, patients dealing with their own medication independently, and middle-aged groups (n=1 each)

Respondents also listed the classes of medication that should be considered as priority for targeting. The most common class of drugs was cardiovascular (17.9%, n=12).

The classes of drugs were:

- Cardiovascular medication (n=12)
  - Antihypertensives (n=7)
  - Cardiovascular medication in general (n=4)
  - Statins (n=1)
- Antibiotics and medication for diabetes (n=4 each)
- Respiratory and analgesics (n=3 each)
- Antidepressants/anxiolytics (psychiatric treatment), warfarin/aspirin, and OTC medication (n=2 each)
- Ophthalmic, ear nose throat medication and steroids (n=1 each)

The types of medication that should be targeted were:

- Medication commonly prescribed (n=5)

- Special medication formulations, high cost medication, and ointments and creams (n=1 each)

Other areas or groups listed were:

- HCPs (n=3)
- General public, family member, and carers and parents (n=2 each)
- Medication disposal, adults, primary healthcare flu season, and immigrants (n=1 each)

## **5.6 Discussion**

### **5.6.1 Key findings in relation to the research aim and questions**

The overall aim of this phase of the research was to investigate issues of awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, HCPs and respective students.

In general, there were clear deficiencies in the awareness in relation of issues of medication wastage amongst the general population, HCPs and students, with the general public self-reporting highest level of awareness. There were also clear deficiencies in the public, as well as HCPs and students', confidence in ability to reduce medication wastage.

Awareness amongst the general public was significantly associated, in univariate analysis, with the following variables: age, type of occupation, whether the person was on regular medication, and whether the person was using medication obtained free. Bivariate logistic analysis did not yield any significant findings.

Interest amongst the general public was significantly associated, in univariate analysis, with the following variables: whether the person was using medication obtained free and whether the medication was purchased. Both variables were significant in bivariate logistic analysis.

Contribution towards medication wastage by the general public was significantly associated with the type of occupation of the participant.

Confidence in ability to reduce medication wastage by the general public was significantly associated with the presence of a HCP as a family member.

Awareness amongst HCPs was significantly associated with the following variables: age, number of years practising in profession, and Rogers' Diffusion of Innovation theory (the only variable retained in bivariate logistic analysis).

A variety of factors were suggested as contributing to medication wastage, although there were some differences in responses from the general public, HCPs and students. In general, key areas were: the free healthcare system; the overstocking of medication by patients due to previous or potential out of stock situations; the fact that patients collect free medication or purchase medication that they do not need, or more than they need; and lack of patient education/knowledge about medication.

A number of behaviours were suggested as contributing to medication wastage, namely non-adherence; and contribution towards medication wastage by other people, by doctors and by the free healthcare system. The public also felt that doctors principally could do more to reduce medication wastage, followed by pharmacists and nurses. More than half of HCPs noted that they could be more active in reducing wastage. HCP students strongly agreed/agreed that doctors could play a more active role in reducing medication wastage in Malta, followed by nurses and pharmacists. The majority of the public felt that the state could do more to reduce medication wastage in Malta.

A number of patient groups were considered as priority when targeting medication wastage. Key patient groups mostly cited by HCPs were: patients receiving free medication, elderly patients (which was the most cited group by students) and patients on chronic medication.



The most common classes of drugs that HCPs felt that needed to be targeted to reduce medication wastage were the cardiovascular (also cited by students) and antibiotics. The most common type of medication that, in HCPs' opinion, should be targeted to reduce medication wastage was high cost medication, whilst students mentioned mostly commonly prescribed medication.

In general, there were clear deficiencies in terms of advice to patients by HCPs related to storage and disposal, with the majority of HCPs and students voicing the need for more education and training in relation to this area.

### ***5.6.2 Strengths and weaknesses of questionnaires***

This is the first study to report the perspectives of the Maltese (or indeed any) general population, HCPs and students on medication wastage and associations between different variables and outcomes of awareness, interest, contribution and confidence in ability to reduce medication wastage. The questionnaires were developed from evidence generated through previous research phases of the systematic review and the Delphi technique. Furthermore, the questionnaire items were grounded in several key theoretical frameworks. The draft questionnaires underwent pre-testing in terms of face and content validity followed by piloting. The evidence base around maximising response rates was employed and the questionnaires were distributed amongst HCPs who had the greatest involvement in prescribing, dispensing or administration of medication. One further strength was the collection of data from the general public, allowing description and understanding of their perspectives.

There are, however, several weaknesses and hence the results should be interpreted with caution. Despite recruiting HCPs who had the greatest involvement in prescribing and dispensing of medication, the exclusion of nurses limited researching an important perspective. The response rates were low and hence may limit the generalizability of the results to the general public, HCPs and students in Malta and elsewhere. Regardless of the number of measures taken to enhance response rates, non-respondent bias could not be eliminated and the differences (or

similarities) between those who responded and those who did not respond to the survey could not be established. However, for the general public, the respondents were similar in terms of demographics to the general population. One further key limitation is the self-reported nature of the data which could not be validated. Moreover, relying on self-reporting meant that individuals amongst the public who were unable to read or write could not possibly participate in this study unless helped by others, thus potentially creating a selection bias. In fact, only four members of the public with no schooling completed the questionnaire. The sequence between the exposure and the outcome (i.e. any cause and effect), although a limitation of all cross-sectional surveys, could not be determined (Ho *et al.*, 2008). A core weakness of this study was the lack of internal reliability and test-retest reliability testing. All of these weaknesses and biases are potential threats to internal validity and limit the degree of generalizability of the findings (external validity). Moreover, while respondents appear to be similar to other populations, caution should be exercised in extrapolating the results beyond Malta in view of the differences in healthcare systems, practices and cultures.

### **5.6.3 Importance of findings**

The survey results highlight key issues of lack of awareness of medication wastage, levels of individual contribution to wastage and capability to reduce wastage for HCPs, students and the general public. Further understanding these issues will aid in the development of strategies to reduce wastage and hence the results are of importance to HCPs, professional bodies, organizations, policy makers, patients and the general public.

While multivariate analysis failed to identify key, consistent predictors of variables related to the outcomes studied, univariate analysis for the public questionnaire findings identified the potential importance of age, type of occupation, whether the person was on regular medication, whether the person was using medication obtained free, and the presence of a HCP as a family member. Age has been shown to be a significant factor in relation to awareness in other areas, such as awareness of and attitudes towards the avoidance of skin cancer (Butler *et al.*, 2013),

awareness of early signs and symptoms and prevention of oral cancer (Ghani *et al.*, 2013) and awareness of the patients' rights by subjects on admission to a tertiary university hospital in Poland (Krzych and Ratajczyk, 2013). Therefore, different age groups should be targeted in different ways when implementing strategies to reduce medication wastage.

Considering the significant associations observed between general public occupation and outcomes of awareness of medication wastage and individual contribution towards medication wastage, it is important for healthcare policy makers and HCPs to consider occupation when targeting medication wastage reduction. Occupation has also been shown to significantly impact areas of healthcare, such as the level of satisfaction with physicians' services in primary healthcare (Al-Doghaither *et al.*, 2000) and the level of self-medication usage (Selvaraj *et al.*, 2014). Occupation was also found to play a role in terms of awareness of existing medical conditions, such as the existence of hypertension (Davila *et al.*, 2012).

Measures to target patients on regular medication should perhaps differ to those prescribed acute medication as those on regular medication were much more likely to self-report awareness of issues of medication wastage. In contrast, Wan-kin Chan *et al.* (2013) argued that patients taking chronic medication generally lack knowledge of their medication, albeit not specifically relating to wastage. Notably, data from the public survey failed to identify any association between the level of adherence and outcomes relating to medication wastage. However, self-reported adherence levels were sub-optimal, a result which is also important in relation to medication wastage if patient health outcomes are adversely affected. It is important for HCPs to adopt models of concordance which truly engage patients, providing opportunities for informed discussion and decision-making. Bond *et al.* (2012) argued that the goals of best outcomes and reducing medication wastage can only be achieved by significant involvement of the patient and by the provision of suitable and accessible information. Study findings highlight that one quarter of patients perceived that they lacked information on how to make the most of their

medication, and one third lacked information on how to take their medication to get the least possible side-effects.

Those members of the public obtaining free medication reported a lower interest in issues of medication wastage compared to those paying for their medication. The reason for this result is unknown but could perhaps be related to paying for medication engendering a greater respect in medication in general, appropriate use and minimising wastage. This finding is important in terms of national policy development and review around medication supplies, and targeting medication wastage. Richardson *et al.* (2014), in a study on the effect of free healthcare on polypharmacy, suggested that the effects of the free healthcare system need to be fully explored and recognised before informing policy debates.

Interestingly, one quarter (25.8%) of general public respondents had a HCP as one of their close family members (dentist, doctor, nurse or pharmacist). A statistically significant association was observed between this family link and confidence in own ability to reduce medication wastage. One possible interpretation is due to the direct access to professional support, which should be extended to all.

Univariate analysis for the HCP questionnaire findings identified the potential importance of age, number of years of practise, and Rogers' Diffusion of Innovation theory (the only variable retained in bivariate logistic analysis). Number of years of practise has also been shown to statistically significantly impact other areas of healthcare. Gill *et al.* (2013) found that consultants who have been practising for longer conduct faster post-take medical ward rounds with no negative outcomes for the patients. A study by Green *et al.* (2014) on the attitudes of medical practitioners to both whole body donation to medical science and organ donation at time of death shows that attitudes change as their clinical experience grows. HCPs' age has also been shown to be an important factor in other studies. For example, Lewthwaite *et al.* (2014) found that senior doctors were more willing to be vaccinated with the seasonal influenza vaccine. This difference in attitudes indicates that future

strategies targeting HCPs to reduce wastage should consider using different approaches depending on the age and number of years in practise.

Innovation is recognised in society as a main keyword in pursuing new ideas and practices (Baek *et al.*, 2013). Rogers' Diffusion of Innovation theory was applied in this study to further our understanding of HCPs and students in relation to outcomes related to medication wastage. This study identified a statistically significant association between the Diffusion of Innovation categories and awareness of medication wastage. Interestingly, those more venturesome were less likely to be aware of medication wastage. Again, the reason for this result is not clear but could perhaps be related to 'venturesome characteristics' of risk takers not being bound by issues, such as compatibility of change with work practices, which may worry others. Moreover, based on the three types of knowledge described above that participants require to adopt the innovation, while the 'less venturesome' have the awareness knowledge, they might lack the 'how-to knowledge' required to use the innovation properly.

The public and HCP variables identified as significant in either univariate and bivariate analysis provide a framework for potentially targeting medication wastage reduction strategies and are thus important for policy makers, organizations, educators and practitioners. However, further qualitative research is required to provide more in-depth understanding to aid the development of these strategies.

Factors perceived by the general public and HCPs as contributing to medication wastage were highlighted, with the free healthcare system and previous or potential out of stock situations as two major factors. These results are consistent with those of the Delphi technique (chapter 4). Patients' fear of medication unavailability was the factor which achieved the highest level of consensus in the Delphi technique with almost all panellists (96.0%) in agreement. The issue of medication shortages is a global problem, with the Food and Drug Administration (FDA) in the US expressing concern that shortages have been increasing each year since 2006 (Haninger *et al.*, 2011). In contrast to the key findings of the systematic review, the

survey data indicate that factors of change in medication, patient's death, and resolution of patient's conditions were not considered to be major contributors to wastage. These differences may be due to the largely dated studies identified in the systematic review, most of which preceded the shortage issues.

Elderly patients were cited as an important priority group for targeting medication wastage reduction. The need for rational prescribing, particularly in the elderly, given population demographic changes and increasing prescribing patterns and volumes, has been recognised since the 1980s and is still a global priority (Duerden *et al.*, 2013). A very recent paper commissioned by the WHO Collaborating Centre for Pharmaceutical Policy and Regulation, 'Priority Medicines for Elderly' discusses inappropriate prescribing and polypharmacy in the elderly and possible interventions to improve it (Martial *et al.*, 2013). HCP respondents in this study largely considered inappropriate prescribing to be encompassed within a definition of medication wastage. Nationally a number of measures have been taken to improve awareness on issues related to medication use in the elderly. These include the establishment of the International Institute on Ageing (INIA) in Malta in 1988 under the auspices of the United Nations (International Institute on Ageing, 2001), a conference on Medication Management in Older Patients hosted by INIA and held in Malta in 2004 (Azzopardi, 2005), and a multi-disciplinary focus group held in 2012 followed by a full-day national conference for HCPs in 2013 (Office of the Commissioner for Mental Health and Older Persons, 2013). Survey results appear to suggest a maintained need to prioritise the elderly when targeting medication wastage.

Both HCPs and students agreed that cardiovascular medication should be considered as a priority when targeting medication wastage. The need to target cardiovascular medication is reflected in the findings of a number of studies identified in the systematic review (chapter 3). In a cross-sectional study of 29 pharmacies, Boivin (1997) recorded that the medication categorised as cardiovascular constituted the highest monetary value of medication wastage. Many other studies throughout the world have replicated this finding (Henderson, 1984; Longmore *et al.*, 1995; Isacson and Olofsson 1999; Grant, 2001; Langley *et al.*, 2005; Al Siyabi and Al

Riyami, 2007; Mackridge and Marriott, 2007; James *et al.*, 2009; Guirguis, 2010). There may be many reasons for this finding, including the very large volume of cardiovascular medication prescribing. However, in a cross-sectional study of 24 community pharmacies, James *et al.* (2009) found that the cardiovascular group was mainly wasted due to very frequent medication changes. There may be merit in developing guidance on prescribing quantities and monitoring response when initiating cardiovascular medication.

HCPs and students clearly indicated the need for education in the field of medication wastage, which may be considered as a key step in reducing and preventing medication wastage. Insufficient emphasis on wastage as part of HCPs' CPD was also noted as part of the Delphi technique. In addition, the fact that less than one-fifth of HCPs agreed that they were fully aware of laws, procedures and policies relating to medication wastage in Malta further supports the need for further education and CPD related to medication wastage.

## **5.7 Conclusion**

The quantitative data from these cross-sectional studies have demonstrated that more effort is warranted to raise awareness and education of the public, HCPs and students as an initial step in promoting behavioural change. This study has also presented major contributory factors which merit considerable attention (the free healthcare system; the overstocking of medication by patients due to previous or potential out of stock situations; the fact that patients collect free medication or purchase medication that they do not need, or more than they need), as well as patient groups and classes of drugs that require prioritisation when targeting medication wastage. Significant associations of data for demographic characteristics and awareness of issues and behaviours in relation to medication wastage provide an insight on important aspects that need to be considered when developing strategies to reduce wastage.

### ***5.8 Reflections and future direction***

Survey results informed the next phase of the research, which employed a qualitative methodology of interpretative phenomenology to allow in-depth description and understanding of the issues of medication wastage, again from the perspectives of the general public and HCPs. Emphasis was placed on discussing the potential for development and implementation of strategies to reduce medication wastage.



## Chapter 6

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*"Experience has shown, and a true philosophy will always show, that a vast, perhaps the larger portion of the truth arises from the seemingly irrelevant"*

Edgar Allan Poe

[Author, poet, editor, and literary critic  
1809-1849]

## ***The perspectives of the Maltese population and HCPs on medication wastage: focus groups***

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To date, no published literature has employed a qualitative approach to provide in-depth exploration of the causes and potential solutions to the issue of medication wastage. The questionnaire results presented in the previous chapter provide a quantitative perspective, with less emphasis on richness of data. This chapter describes the research aims and questions, and provides a detailed account of focus group method, findings and discussion.

### **6.1 Introduction**

#### **6.1.1 Behaviour**

This section provides a brief overview of the concept of behaviour. Attitudes are linked to some extent to their behavioural intentions and these in turn are thought to be related to some extent to actual behaviours (Bradburn *et al.*, 2004). Intention is made up of three types of things:

1. Attitude towards performing a particular behaviour
2. Perceived injunctive, the expected social pressure from important social networks regarding performing the behaviour; and perceived descriptive norm, the extent to which members of the social network perform the behaviour themselves
3. Self-efficacy, the extent to which a person regards his or her ability to successfully do something.

Targeting specific messages may not always lead to individual behaviour change as intended. Behaviour is based on four components: the action which is directed at a target which is performed in a certain context and at certain point in time (Fishbein and Ajzen, 2010). Therefore, all these aspects are important to consider when researching behaviours and are ideally aligned to qualitative modes of enquiry.

### **6.1.2 Rationale for Focus Groups**

The Delphi technique identified a number of potential factors amongst the Maltese population which give rise to medication wastage. Cross-sectional questionnaires elicited awareness, perceptions, attitudes and behaviours in relation to medication wastage. Focus groups conducted amongst samples of questionnaire respondents could provide a more in-depth examination of participants' beliefs and behaviours. Furthermore, this approach could allow exploration of possible barriers and facilitators to aid development of strategies aiming to reduce medication wastage.

### **6.1.3 Study aim and research questions**

The overall aims of this phase of the research were to describe and understand the beliefs and behaviours regarding medication wastage of the Maltese public and HCPs and to explore potential solutions to reduce medication wastage.

More specifically, this study sought to answer the following questions:

1. What are the beliefs and behaviours of participants regarding medication wastage?
2. What are the potential solutions to reducing medication wastage?
3. Which are the key facilitators and barriers?

## **6.2 Method**

### **6.2.1 Inclusion criteria**

Those individuals from the general public and HCPs who completed the questionnaire declaring interest in participating in a focus group were included.

### **6.2.2 Exclusion criteria**

Members of the general public not receiving prescription medication or not purchasing medication in the six months prior to completing the questionnaire were excluded.

HCP students were not included in this phase of the research due to the low questionnaire response.

### **6.2.3 Sample size**

There are no specific guidelines on the optimal number of focus groups to be conducted (Bowling, 2009). Focus group studies can consist of anything from a few to over fifty groups (Kitzinger, 2006). As a general rule of thumb, three to five groups per project are considered acceptable (Morgan, 1997).

Similarly, there is little evidence on the appropriate group size, with Kitzinger (2006) suggesting four to eight members whilst Bowling (2009) recommends that each group typically contains between six and twelve. Morgan (1997) states that as a general rule of thumb each focus group should have six to ten participants. However, Morgan (1997) also notes that consideration should be given to the criterion of saturation to determine whether members are reiterating what was said in earlier groups. Yzer (2012), using the integrative model of behavioural prediction, suggests a total sample size of about 30 participants to be adequate to produce an exhaustive list of prominent beliefs. Taking all of this into consideration, this phase planned to recruit five focus groups each containing six participants: three HCPs and two general public. To allow for refusals to participate, a 20% over-recruitment target was set.

### **6.2.4 Sampling**

Morgan (1997) suggests that focus groups should be homogeneous, for example participants with similar occupations, social classes, educational levels and ages, to lessen the potential for some participants feeling inhibited and hence not expressing their views. The groups were therefore homogenous in terms of being separate for HCPs (dentists, doctors and pharmacists) and the public.

Multiprofessional rather than uniprofessional focus groups were planned to enhance discussion, reflecting the multidisciplinary nature of patient care. Groups contained an equal number of males and females whenever possible. Purposive sampling was used to select participants.

Participants for the public focus groups were systematically selected in two groups according to the following criteria:

Group 1 – those who preferred to participate in the morning; age of 50 years and over (there were more in the  $\geq 50$  years who preferred morning); secondary education level or lower (in the  $\geq 50$  years group participants all happened to

have attended till primary or secondary school); gender (until five females and five males were reached).

Group 2 – those who preferred to participate in the evening; age less than 50 years (there were more amongst those less than 50 years who preferred evening); tertiary or higher level of education; gender (until five females and five males were reached).

The list of potential participants was filtered according to the exclusion criteria described and then selected according to the sequence of response (who replied first was chosen first) aiming for a group of 10 participants.

Participants for the HCP focus groups were systematically selected in three groups according to the following criteria:

Group 1 - those who preferred afternoon; mixed aged group

Group 2 - those who preferred evening; mixed aged group

Group 3 - those who preferred evening; age less than 40 years

The target was four doctors, four pharmacists and two dentists for each group (five females and five males). As none of the HCPs who specified morning were able to participate, the morning group was removed.

#### **6.2.5 Topic guide development**

A topic guide was developed to promote a consistent and systematic approach during the focus group discussions and to ensure that all study research questions were adequately covered. The focus group guide was based on:

1. the questionnaire results
2. the Theoretical Domains Framework (TDF)

The topic guides for the HCP groups (Appendix 6.1) and the general public groups (Appendix 6.2) were very similar, with the public one also translated into Maltese.

An opening ice breaker question allowed participants to introduce themselves, create a comfortable environment, while at the same time gathering demographic data. This was followed by discussions around medication wastage

and minimisation based on TDF domains of: knowledge, intentions, beliefs about capabilities, social/professional role and identity, skills, beliefs about consequences and social influences. The final section focused on beliefs of: reinforcement, environmental context and resources, emotion, optimism, behavioural regulation and goals. The guide was reviewed by members of the supervisory team to promote credibility.

#### 6.2.5.1 TDF

Theories of behaviour and behaviour change should be the first step when designing interventions, to facilitate the understanding of causal determinants, to test the theory in question and to improve theory across different contexts, populations, and behaviours (Cane *et al.*, 2012). Designing interventions solely on the basis of the researcher or participants' perceptions rather than theory prevents the understanding of behaviour change processes that underlie effective interventions and of applying the findings to inform the design of future interventions (Cane *et al.*, 2012).

The TDF was developed by 18 psychological theorists together with 16 health service researchers and 30 health psychologists to simplify and integrate a number of behaviour change theories which can then be exploited by other disciplines. The group applied a six stage consensus approach which included the identifying of theories and theoretical constructs relevant to behaviour change; simplifying the resulting constructs into overarching theoretical domains; evaluating the importance of the theoretical domains; conducting an interdisciplinary evaluation and synthesis of these domains and constructs; validating the domain list; and piloting interview questions relevant to these constructs and domains. Thirty-three theories and 128 key theoretical constructs were recognised and a 12 TDF emerged which explains implementation problems and inform implementation interventions. Following this, the framework was refined to include 14 domains and 84 component constructs. The domains are (Cane *et al.*, 2012):

1. Knowledge: *"An awareness of the existence of something"*
2. Skills: *"An ability or proficiency acquired through practice"*
3. Social/Professional Role and Identity: *"A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting"*

4. Beliefs about Capabilities: *"Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use"*
5. Optimism: *"The confidence that things will happen for the best or that desired goals will be attained"*
6. Beliefs about Consequences: *"Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation"*
7. Reinforcement: *"Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus"*
8. Intentions: *"A conscious decision to perform a behaviour or a resolve to act in a certain way"*
9. Goals: *"Mental representations of outcomes or end states that an individual wants to achieve"*
10. Memory, Attention and Decision Processes: *"The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives"*
11. Environmental Context and Resources: *"Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour"*
12. Social Influences: *"Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours"*
13. Emotion: *"A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event"*
14. Behavioural Regulation: *"Anything aimed at managing or changing objectively observed or measured actions".*

The advantages of the TDF lie within its comprehensive coverage of possible influences on behaviour, the clarity of each domain being specified by component constructs and the association between theories of behaviour change and techniques of behaviour change with the aid of the TDF to address implementation problems (Cane *et al.*, 2012). The TDF has been used in several studies to explain implementation problems and inform implementation interventions, such as the interview guide constructed by Squires *et al.* (2013) which applied the TDF to obtain a better understanding of the barriers and

enablers to physician hand hygiene compliance; the TDF based semi structured interviews by Duncan *et al.* (2012) to investigate prescribing errors in the hospital context among a sample of trainee doctors; and the focus group study by Bussi res *et al.* (2012) which used the TDF to identify chiropractors' beliefs about managing uncomplicated back pain without X-rays and to explore barriers and facilitators to implementing evidence-based recommendations on lumbar spine x-rays.

#### *6.2.5.2 Pilot testing*

A pilot focus group process was carried out to familiarise the researcher with focus group processes (e.g. topic guide content, audio-recording), and identify any logistical issues and solutions. The pilot focus group was carried out amongst HCPs following the same recruitment process as per actual study. Feedback on the topic guide and the process of the focus group was obtained. As no changes to the topic guide were necessary, data were included in the analysis.

### **6.2.6 Full study**

#### *6.2.6.1 Study information*

An 'invitation to participate letter' (Appendix 6.3) was sent with each questionnaire (chapter 5). Individuals interested in participation were asked to complete and return an 'expression of interest form' (Appendix 6.4) indicating the most preferred time of the day to attend a focus group.

#### *6.2.6.2 Sampling and recruitment*

Of those expressing interest, potential participants were sampled as described in section 6.2.4. They were contacted by telephone by the principal researcher to confirm that they were still interested in participating. Those confirming participation were assigned to a group as described above.

#### *6.2.6.3 Focus group process*

The focus group process is depicted in Figure 6.1 and described in detail below.



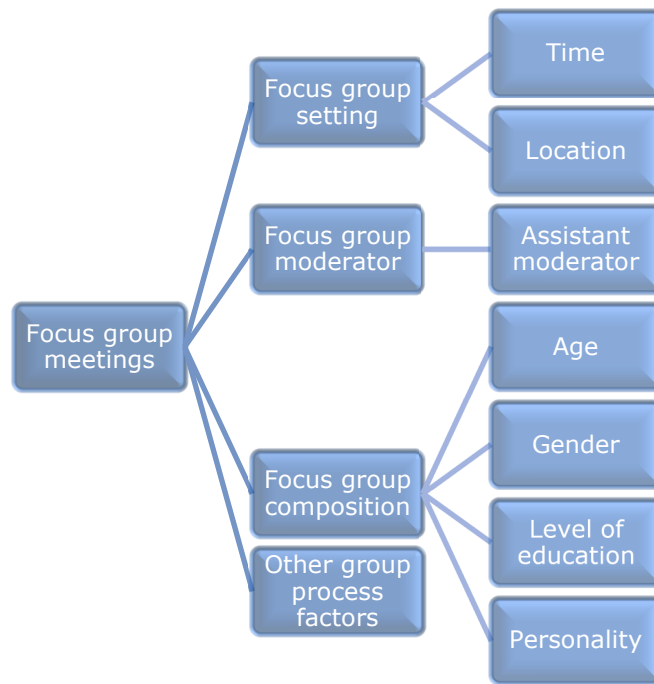


Figure 6.1: Focus group discussion process [Adapted from Fern, 2001]

#### 6.2.6.4 Focus group setting

Focus groups were carried out at three different times of the day, morning, afternoon and evening, to provide the most possible convenient time frames for participants. Groups were timed as follows:

- public focus groups between 9am and 11am; and between 7pm and 9 pm
- HCP focus groups between 3pm and 5pm; and between 7pm and 9pm (two groups)

The focus groups lasted approximately 90 minutes and were conducted in a conference room of a centrally located hotel.

#### 6.2.6.5 Moderator involvement

The funnel strategy (Morgan, 1997) of moderator involvement was applied, with minimal involvement from the outset to encourage free and open discussion, transitioning to a more structured discussion of specific issues. This approach allowed the researcher to obtain the participants' perspectives and setting their priorities (Kitzinger, 1994), as well as their responses to the researcher's specific interests.

#### *6.2.6.6 Role of assistant moderator*

The assistant moderator complemented the moderator by taking notes of discussions, including non-verbal responses, eye contact, pauses in interactions, patterns of speech and turn-taking of discussion.

#### *6.2.6.7 Focus group discussion*

Participants were asked to complete a consent form (Appendix 6.5) on the day of the focus group. Each focus group was audiorecorded using two recorders, one as back up in case of system failure. Participants were allowed to speak in Maltese or English, whichever language they felt more comfortable with, to aid better expression of experiences, ideas and opinions. Focus group discussions were held in March 2014.

### **6.2.7 Data handling and analysis**

Focus group recordings were transcribed verbatim and supplemented with non-verbal material noted by the assistant moderator. Maltese statements were translated into English by the principal researcher. Analysis was carried out using the framework approach, with the coding frame developed independently by two researchers.

#### *6.2.7.1 Framework approach*

The guidelines by Smith and Firth (2011) and Spencer *et al.* (2014) were applied as follows:

- Transcripts were read and reread to promote researcher immersion in the data.
- Preliminary codes were identified through detailed consideration of each phrase, sentence and paragraph; each code was defined.
- A coding matrix was developed in Microsoft® Excel 2010 using participants' own words ('in-vivo' codes) to stay 'true' to the data. The coding matrix contained a row for each respondent's statements and a column for a separate sub code. Data were assigned to the coding matrix.
- The coding framework was constructed independently by the principal researcher and the principal supervisor promoting confirmability.

- Preliminary codes were refined; links between codes were identified until the 'whole picture' emerged.
- Similarity in statements was identified, amongst other methods, by the use of: word repetitions, keywords, indigenous typologies, similarities and differences, metaphors and analogies (Ryan and Bernard, 2003).
- Codes were translated to final themes and subthemes.
- Themes and sub-themes were mapped to the TDF domains.
- A narrative of the themes and sub-themes was constructed, using participants' quotes.
- Interpretation of the themes and sub-themes was grounded in participants' contributions, with supporting illustrative quotes. The most representative quotes were selected. Quotes for different participants' arguments under the same theme were all included. Each quote was labelled by the participants' demographics (Anderson, 2010).

#### *6.2.7.2 Focus group 'utterances'*

The number of utterances for each participant was counted and subsequently mapped to the specific domains within the TDF framework (Bussières *et al.*, 2012). For each utterance, this was counted as to whether the utterance related directly or indirectly to 'reduce wastage' or 'increase wastage'. 'No influence' was assigned if an utterance was: unrelated to the topic of discussion; did not affect medication wastage directly or indirectly; and/or the speaker felt that whatever was being discussed had no influence on wastage. An utterance is an indicative count of what participants discussed most and should not be confused with quantifying in quantitative research.

#### **6.2.8 Promoting quality in research: trustworthiness**

A number of measures were implemented to promote trustworthiness and thus study rigour:

- The topic guide was developed from the published literature, the Delphi process and theoretical frameworks to promote credibility.
- A pilot study was carried out to ensure rigour.
- Although the study was limited in geographical location to Malta, a detailed decision trail, as suggested by Sandelowski (1986), was kept throughout all the focus group research to ensure dependability and transferability.

- Trustworthiness in interpreting the focus group data was promoted by presenting interpretations using participants' own words and concepts as much as possible (Chioncel *et al.*, 2003).

A number of measures were taken to reduce bias and thus improve trustworthiness.

- Potentially dominant or reluctant focus group participants were managed through effective moderation to prevent dominance/shyness bias. Rules of behaviour were established at the outset.
- During focus groups, attention bias was minimised by following a topic guide.
- Clear statements of the purpose of the research study were provided at the start of each focus group to reduce expectancy bias.
- Focus group moderator facilitated rather than led the discussions to prevent interviewer bias.

#### **6.2.9 Research Governance**

The study was approved by the School of Pharmacy and Life Sciences Research Ethics Committee, Robert Gordon University (Appendix 6.6) and the University of Malta Research Ethics Committee (Appendix 6.7). The focus group study and cross-sectional survey study were submitted to the ethics committees in one application. The UK DPA (The National Archives, 1998), the Maltese DPA (Information and Data Protection Commissioner, 2001) as well as the EU Data Protection Directive (The European Parliament and the Council of the European Union, 1995) were adhered to at all times by the use of password protected databases accessible only by the principal researcher. Complete confidentiality can never be guaranteed in focus group discussions and hence care was taken to minimise risk to participants. Ground rules were set at the outset and participants were instructed and reminded several times that discussions should not be shared outwith the groups. Anonymity was considered in transcribing and reporting through the use of codes rather than divulging names and identities.

## 6.3 Findings

### 6.3.1 Participant demographics

Eleven pharmacists, six doctors and six members of the general public, one of whom was a nurse, participated in the focus groups.

### 6.3.2 Focus group 'utterances'

Table 6.1 indicates the counts of utterances for each theoretical domain, as described in the analysis section.

Table 6.1: The counts of utterances for each theoretical domain, combined for focus groups

<i>Theoretical domain</i>	<i>Topic guide question number</i>	<i>Utterances</i>	<i>Reduce wastage</i>	<i>Increase wastage</i>	<i>No influence</i>
Knowledge	Introductory question	65	1	36	28
Intentions	Question 1	35	2	13	20
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	23	16	1	6
Skills	Question 4	32	7	14	11
Beliefs about consequences	Question 5	44	1	26	17
Social influences	Probe	49	0	36	13
Reinforcement	Probe	10	0	0	10
Environmental context and resources	Question 7	528	11	309	208
Emotion	Probe	38	1	15	22
Optimism	Question 8	6	4	2	0
Behavioural regulation	Questions 6 and 9	560	329	3	228
Goals	Question 10 and ending question	141	70	0	71
<b>Total</b>		<b>1,531</b>	<b>442</b>	<b>455</b>	<b>634</b>

#### 6.3.2.1 Focus group 1: HCPs

Focus group duration was 94 minutes, with five participants (one doctor and four pharmacists) and work experience ranging from 1-24 years (Table 6.2). All engaged in the discussions, with one participant (P1) slightly more dominant, and a high level of agreement throughout. Table 6.3 shows the number of utterances for each domain and participants in this group.

Table 6.2: Participant demographics for focus group 1

<i>Participant</i>	<i>Age</i>	<i>Sex</i>	<i>Profession</i>	<i>Years in profession</i>	<i>Main role</i>	<i>Other experience</i>
1	47	F	Pharmacist	24	Hospital pharmacist	
2	23	M	Pharmacist	1	Hospital pharmacist	Community pharmacist
3	31	M	Pharmacist	8	Community pharmacist	
4	35	M	Pharmacist	12	Hospital pharmacist	Community pharmacist
5	28	M	Doctor	5	Hospital doctor	

Table 6.3: Number of utterances for each domain and participants, focus group 1

<i>Theoretical domain</i>	<i>Questions</i>	<i>Utterances</i>	<i>Reduce</i>	<i>Increase</i>	<i>No</i>	<i>Participants</i>				
			<i>wastage</i>	<i>wastage</i>	<i>influence</i>	1	2	3	4	5
Knowledge	Introductory question	6	1	3	2	1	1	1	0	3
Intentions	Question 1	0	0	0	0	0	0	0	0	0
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	9	5	0	4	1	3	3	1	1
Skills	Question 4	0	0	0	0	0	0	0	0	0
Beliefs about consequences	Question 5	7	1	2	4	0	0	3	0	4
Social influences	Probe	2	0	1	1	0	0	1	0	1
Reinforcement	Probe	0	0	0	0	0	0	0	0	0
Environmental context and resources	Question 7	96	0	48	48	24	24	20	11	17
Emotion	Probe	19	0	10	9	5	2	9	0	3
Optimism	Question 8	0	0	0	0	0	0	0	0	0
Behavioural regulation	Questions 6 and 9	94	50	1	43	27	14	8	26	19
Goals	Question 10 and ending question	8	8	0	0	1	2	3	1	1
<i>Total</i>		<b>241</b>	<b>65</b>	<b>65</b>	<b>111</b>	<b>59</b>	<b>46</b>	<b>48</b>	<b>39</b>	<b>49</b>

### 6.3.2.2 Focus group 2: HCPs

Focus group duration was 92 minutes, with five participants (two doctors and three pharmacists) and work experience ranging from 4-20 years (Table 6.4). All engaged in the discussions, with two participants (P4 and P5) slightly more dominant, and a high level of agreement throughout. Table 6.5 shows the number of utterances for each domain and participant in this group.

Table 6.4: Participant demographics for focus group 2

<i>Participant</i>	<i>Age</i>	<i>Sex</i>	<i>Profession</i>	<i>Years in profession</i>	<i>Main role</i>	<i>Other experience</i>
1	38	M	Pharmacist	15	Hospital pharmacist	Medical representative
2	32	M	Pharmacist	9	Responsible person/regulatory affairs pharmacist	
3	27	F	Doctor	4	Hospital doctor	
4	28	F	Pharmacist	5	Hospital pharmacist	Community pharmacist
5	43	F	Doctor	20	Hospital doctor	



Table 6.5: Number of utterances for each domain and participant in focus group 2

<i>Theoretical domain</i>	<i>Questions</i>	<i>Utterances</i>	<i>Reduce</i>	<i>Increase</i>	<i>No</i>	<i>Participants</i>				
			<i>wastage</i>	<i>wastage</i>	<i>influence</i>	1	2	3	4	5
Knowledge	Introductory question	7	0	6	1	2	0	0	2	3
Intentions	Question 1	4	0	0	4	0	1	0	1	2
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	0	0	0	0	0	0	0	0	0
Skills	Question 4	5	3	2	0	1	0	0	2	2
Beliefs about consequences	Question 5	5	0	3	2	0	1	2	1	1
Social influences	Probe	20	0	18	2	2	2	5	7	4
Reinforcement	Probe	0	0	0	0	0	0	0	0	0
Environmental context and resources	Question 7	108	0	72	36	30	16	15	28	19
Emotion	Probe	0	0	0	0	0	0	0	0	0
Optimism	Question 8	1	0	1	0	0	0	0	0	1
Behavioural regulation	Questions 6 and 9	74	60	1	13	12	5	17	16	24
Goals	Question 10 and ending question	4	4	0	0	1	1	0	1	1
<i>Total</i>		<b>228</b>	<b>67</b>	<b>103</b>	<b>58</b>	<b>48</b>	<b>26</b>	<b>39</b>	<b>58</b>	<b>57</b>

### 6.3.2.3 Focus group 3: HCPs

Focus group duration was 102 minutes, with seven participants (three doctors and four pharmacists) and work experience ranging from 3-17 years (Table 6.6). All engaged in the discussions, with one participant (P4) more dominant. Participant 7 joined after 20 minutes and participant 6 joined after 30 minutes following commencement of the focus group. A number of disagreements emerged during the course of this focus group. Since both participant 4 and 6 are male hospital doctors with 4 years' work experience, these are distinguished as hospital doctor 'A' (participant 4) and hospital doctor 'B' (participant 6) when quoting their utterances. Table 6.7 shows the number of utterances for each domain and participant in this group.

Table 6.6: Participant demographics for focus group 3

<i>Participant</i>	<i>Age</i>	<i>Sex</i>	<i>Profession</i>	<i>Years in profession</i>	<i>Main role</i>	<i>Other experience</i>
1	35	M	Pharmacist	12	Hospital pharmacist	
2	32	F	Pharmacist	9	Hospital pharmacist	Community pharmacist
3	36	F	Pharmacist	13	Hospital pharmacist	Community pharmacist
4	26	M	Doctor	4	Hospital doctor	
5	38	F	Doctor	17	Hospital doctor	
6	26	M	Doctor	4	Hospital doctor	
7	26	F	Pharmacist	3	Hospital pharmacist	Community pharmacist

Table 6.7: Number of utterances for each domain and participant in focus group 3

<i>Theoretical domain</i>	<i>Questions</i>	<i>Utterances</i>	<i>Reduce wastage</i>	<i>Increase wastage</i>	<i>No influence</i>	<i>Participants</i>						
						1	2	3	4	5	6	7
Knowledge	Introductory	12	0	11	1	0	2	4	2	1	0	3
Intentions	Question 1	1	1	0	0	0	0	0	0	1	0	0
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	4	4	0	0	1	0	0	1	1	0	1
Skills	Question 4	9	4	0	5	0	0	3	1	2	2	1
Beliefs about consequences	Question 5	11	0	11	0	4	1	1	3	2	0	0
Social influences	Probe	19	0	13	6	1	5	4	2	0	3	4
Reinforcement	Probe	0	0	0	0	0	0	0	0	0	0	0
Environmental context and resources	Question 7	73	3	57	13	8	5	8	22	9	16	5
Emotion	Probe	13	0	3	10	3	2	3	2	2	0	1
Optimism	Question 8	4	3	1	0	0	1	2	0	0	1	0
Behavioural regulation	Questions 6 and 9	121	60	0	61	7	14	19	27	33	9	12
Goals	Question 10 and ending question	6	6	0	0	1	1	1	1	0	1	1
<i>Total</i>		<b>273</b>	<b>81</b>	<b>96</b>	<b>96</b>	<b>25</b>	<b>31</b>	<b>45</b>	<b>61</b>	<b>51</b>	<b>32</b>	<b>28</b>

#### 6.3.2.4 Focus group 4: Public

Focus group duration was 100 minutes, with four participants (two males and two females) all under the age of 40 years, and with post-graduate qualifications (Table 6.8). All engaged in the discussions, with one participant (P3) more dominant, and a high level of agreement throughout. Table 6.9 shows the number of utterances for each domain and participant in this group.

Table 6.8: Participant demographics for focus group 4

<i>Participant</i>	<i>Age</i>	<i>Gender</i>	<i>Profession</i>	<i>Level of education</i>
1	34	M	PhD Nursing	Postgraduate
2	24	M	Accountant	Postgraduate
3	36	F	Director	Postgraduate
4	32	F	Assistant director	Postgraduate

Table 6.9: Number of utterances for each domain and participant in focus group 4

<i>Theoretical domain</i>	<i>Questions</i>	<i>Utterances</i>	<i>Reduce</i>	<i>Increase</i>	<i>No</i>	<i>Participants</i>			
			<i>wastage</i>	<i>wastage</i>	<i>influence</i>				
						1	2	3	4
Knowledge	Introductory question	17	0	11	6	4	2	5	6
Intentions	Question 1	0	0	0	0	0	0	0	0
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	5	4	1	0	1	1	1	2
Skills	Question 4	14	0	12	2	6	2	4	2
Beliefs about consequences	Question 5	9	0	7	2	2	3	4	0
Social influences	Probe	3	0	3	0	0	1	1	1
Reinforcement	Probe	10	0	0	10	0	2	5	3
Environmental context and resources	Question 7	48	0	36	12	10	14	14	10
Emotion	Probe	0	0	0	0	0	0	0	0
Optimism	Question 8	0	0	0	0	0	0	0	0
Behavioural regulation	Questions 6 and 9	117	84	0	33	25	29	45	18
Goals	Question 10 and ending question	4	4	0	0	1	1	1	1
<i>Total</i>		<b>227</b>	<b>92</b>	<b>70</b>	<b>65</b>	<b>49</b>	<b>55</b>	<b>80</b>	<b>43</b>

#### 6.3.2.5 Focus group 5: Public

Focus group duration was 123 minutes, with two participants (two females) both over the age of 40 years, and with a secondary level of education or less (Table 6.10). Both engaged in the discussions, with one participant (P1) more dominant, and a high level of agreement throughout. Table 6.11 shows the number of utterances for each domain and participant in this group.

Table 6.10: Participant demographics for focus group 5

<i>Participant</i>	<i>Age</i>	<i>Gender</i>	<i>Profession</i>	<i>Level of education</i>
1	63	F	Housewife	Primary
2	56	F	Housewife	Secondary

Table 6.11: Number of utterances for each domain and participant in focus group 5

<i>Theoretical domain</i>	<i>Questions</i>	<i>Utterances</i>	<i>Reduce wastage</i>	<i>Increase wastage</i>	<i>No influence</i>	<i>Participants</i>	
						1	2
Knowledge	Introductory question	23	0	5	18	17	6
Intentions	Question 1	30	1	13	16	15	15
Beliefs about capabilities and social and professional role and identity	Questions 2 and 3	5	3	0	2	2	3
Skills	Question 4	4	0	0	4	2	2
Beliefs about consequences	Question 5	12	0	3	9	7	5
Social influences	Probe	5	0	1	4	1	4
Reinforcement	Probe	0	0	0	0	0	0
Environmental context and resources	Question 7	203	8	96	99	116	87
Emotion	Probe	6	1	2	3	1	5
Optimism	Question 8	1	1	0	0	1	0
Behavioural regulation	Questions 6 and 9	154	75	1	78	85	69
Goals	Question 10 and ending question	119	48	0	71	63	56
<i>Total</i>		<b>562</b>	<b>137</b>	<b>121</b>	<b>304</b>	<b>310</b>	<b>252</b>

### **6.3.3 Key themes identified within TDF domains**

Key themes and sub-themes identified from the focus group data analysis were mapped to TDF domains as listed in Table 6.12.



Table 6.12: Key themes and sub-themes mapped to TDF domains

<i>Theoretical Domain</i>	<i>Key themes (sub-themes)</i>
Knowledge	1. Knowledge of the consequences of medication wastage (economy, staff resources)
Skills	1. Practitioner effects (ability) 2. Suboptimal use of medication by patients (non-adherence)
Beliefs about capabilities and their social/professional role and identity	1. Overstocking of medication by HCPs 2. Social influences (global force) 3. Educational influences (HCPs as educators) 4. System influences (failing system, time constraints)
Optimism	1. Psychological influences (stress, obsessed, discouraged, optimistic)
Beliefs about consequences	1. Consequences of inappropriate prescribing/dispensing (financial, consequences of medication unavailability, unawareness of consequences of unused returned medication)
Reinforcement	1. HCP incentive (uphill battle, professionalism)
Intentions	1. Sustainability of the current free healthcare system 2. Medication unavailability (fear) 3. Unclear goals within the Government health system
Environmental context and resources	1. Issues of resources and organization (lack of resources, lack of harmonisation) 2. The free healthcare system (abuse of free healthcare system) 3. Lack of review of doctors' prescribing (lack of patient review, lack of patient information, multiple prescribers, lack of patient registration, lack of treatment management guidelines) 4. Patient effects (selfish practices, confrontation, vulnerability)

	5. Lack of education (social class)
Social influences	<ol style="list-style-type: none"> <li>1. Pressure to prescribe or dispense (pressure by patients, pressure by work colleagues, pharmaceutical lobbying)</li> <li>2. Attitudes of HCPs (mentality, communication, power)</li> </ol>
Emotion	<ol style="list-style-type: none"> <li>1. Psychological effects (fear)</li> </ol>
Behavioural regulation	<ol style="list-style-type: none"> <li>1. System effects (stock management, budgeting, independent body governing free healthcare system, pharmaceutical identity card, infrastructure, incentives, medication fee, reimbursement, compulsory private insurance, medication take-back scheme with cash card, high consumption medication, disease prevention)</li> <li>2. Practitioner effects (correct prescribing and accountability, medication use reviews (MURs), improved documentation, improved communication)</li> <li>3. Patients effects (increase patient reassurance, patient empowerment)</li> <li>4. Political effects (reduce political interference)</li> <li>5. Awareness and educational effects (increase awareness, strategies and settings to deliver education)</li> </ol>
Goals	<ol style="list-style-type: none"> <li>1. Need for education (HCP and patient education)</li> </ol>

### 6.3.3.1 Domain: Knowledge

The theme which emerged in terms of knowledge regarding medication wastage was the knowledge of the consequences of medication wastage.

#### 1. Knowledge of the consequences of medication wastage

Participants demonstrated knowledge of the wide ranging consequences of medication wastage, with particular emphasis on economy and staff time. One member of the public described the high cost of expired medication within Governmental entities and stores,

*"...<sup>1</sup> 'cause there were cases where they opened out some warehouses, I don't know where, in Madliena [stores]<sup>2</sup>, just kilometres away from the hospital, and there were tens of thousands of euro worth of expired medicine, and even at Boffa [hospital] if I recall well which is quite a laughing stock".*

*(Male, accountant, 24 years, post-graduate qualifications)*

while another member of the public described the cost to an individual patient,

*"First of all if he's buying it [the medication] privately, it's an expense for him, himself, secondly it's a complete waste of resources".*

*(Female, Director, 36 years, post-graduate qualifications)*

Cost was also described by HCPs,

*"So sometimes you end up having to discard treatment that could be quite expensive that had been ordered on a named-patient basis".*

*(Female, hospital doctor, 17 years in profession)*

along with the consequences in terms of staff resources dealing with expired medication,

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<sup>1</sup> "... " at the start of a quotation indicates that the participant interrupted another participant and started speaking.

<sup>2</sup> [] indicate words that were not articulated by the participant but have been included by the researcher for clarity.

*"Human resources wasted to do that process [boarding out of expired medications for disposal]. Waste of time which could be invested in maybe more useful processes".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

#### **6.3.3.2 Domain: Skills**

Two themes emerged in terms of HCP and patient skills to reduce medication wastage.

##### **1. Practitioner effects**

When discussing issues relating to prescribing or dispensing, participants described a number of practitioner effects, notably pharmacists' skills to reduce medication wastage,

*"So even pharmacists are at a point that they can reduce this wastage. They can do it".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*

One of the doctors highlighted the need to be aware of limitations and refer to others to optimise medication use,

*"I think it is then where they should refer to a specialist, if they go outside the guidelines. Anyone can adhere to guidelines and then when the guidelines aren't simple enough, you need expert advice, you refer to expert advice".*

*(Male, hospital doctor B, 4 years in profession)*

##### **2. Suboptimal use of medication by patients**

Several issues were perceived as influencing the skills of patients which could impact medication wastage. Non-adherence leading to wastage was attributed to issues such as poor education amongst certain patients,

*"Yes because their education is low, so they won't take their medication properly".*

*(Female, hospital pharmacist, 24 years in profession)*

lack of information,

*"They just stop it, they don't care and I think lack of information is huge in Malta regarding everything, but regarding medication and their health it's incredible".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

adverse effects,

*"Yes but you can have situations where they stop the medicines and then they will remain extra in their ...<sup>3</sup> and even if you have a new patient, all right, a patient getting new medicines, this we didn't mention. I think patients get side effects from medicines and they decide to stop them because of side effects in the initial period".*

*(Female, hospital pharmacist, 24 years in profession)*

improvement in patient's condition,

*"... but I think one other reason maybe people stop before they should stop, maybe they start feeling better and they start thinking 'ok, I'm better now so I don't need to take the rest' ".*

*(Female, Assistant Director, 32 years, post-graduate qualifications)*

and issues of personality, intellect and previous experiences,

*"Very individual I think. There's varying factors depending on their level of IQ, their personality, their willingness to listen to a medical health professional, their previous experience with people".*

*(Female, Director, 36 years, post-graduate qualifications)*

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<sup>3</sup> "... " as part of a quotation indicates that in the original focus group transcript, the citations divided by the " ..." were separated by other words not recounted in this quotation.

#### *6.3.3.3 Domains: Beliefs about capabilities and their social/professional role and identity*

Several themes were apparent in term of beliefs of capabilities to reduce medication wastage, from the perspectives of the patients, HCPs and organizations.

##### *1. Overstocking of medication by HCPs*

A nurse participating in the public focus group highlighted the fact that HCPs have a tendency to stockpile medication and therefore was sceptical of his own ability to reduce wastage,

*"I would like to say that I'm confident to make wastage less. But I'm a HCP, so I tend to hoard some medication for myself but individually I will try definitely but as a HCP, every HCP that I know, they tend to stockpile some medication. I don't know why, maybe because we see a lot of things, maybe we see a lot of out of stock, but everyone has in my opinion, as a HCP, something at home, stock pile somewhere. I don't know why".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

##### *2. Social influences*

Some participants felt that their individual ability and effort to reduce medication wastage was not sufficient and required joint and co-ordinated effort by all,

*"But to reduce wastage, overall wastage, my part is not enough. It has to be done as a whole team, a global force. So everyone has to contribute to the same effect".*

*(Male, hospital pharmacist, part-time-community pharmacist, 12 years in profession)*

##### *3. Educational influences*

HCPs described confidence to educate others,

*"If I feel confident, I feel confident in addressing areas where I can affect sort of, areas where I can make a difference: patient education and maybe prescribing".*

*(Male, hospital doctor, 5 years in profession)*

A community pharmacist described asthma management educational sessions,

*"For example education. For example people were taking the salbutamol without taking the preventer. Now I am educating them to take the preventer. Maybe it's more costly. So I educate people a lot".*

*(Male, community pharmacist, 8 years in profession)*

#### **4. System influences**

When discussing capabilities, one of the doctors felt that his efforts in promoting appropriate prescribing and medication use were nullified by the failing system,

*"Personally, most of the time I try to reduce medication, especially of patients I know. The problem I find is the next time they come back they'd still be on that medication because other doctor would have prescribed it back or they would have an out-patients' appointment and be back on it as if nothing changed".*

*(Male, hospital doctor A, 4 years in profession)*

One of the hospital doctors noted time constraints which sometimes hindered efforts to reduce medication wastage,

*"Because what we can, we as prescribers, we accepted and we do prescribe randomly and like Speaker 2 said, as we are busy. And I see the previous one, one year ago, and I continue the same [medication] 'cause I don't have the time to review the patient".*

*(Female, hospital doctor, 20 years in profession)*

#### **6.3.3.4 Domain: Optimism**

There were various psychological influences which appeared to impact optimism around efforts to reduce medication wastage.

##### **1. Psychological influences**

Participants ranged from those stressed, obsessed, discouraged and optimistic,

*"I mean the prescriber, the doctor, the physician, they are too much stressed".*

*(Female, hospital doctor, 20 years in profession)*

*"Where I work we are a bit obsessed with not wasting, not wasting chemotherapy because we suffer the impact of drug shortages a lot".*

*(Female, hospital pharmacist, part-time community pharmacist, 9 years in practice)*

*"But I think sometimes I do get discouraged like most of us do probably when you work in a system where you see it failing a lot of times, you get discouraged".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

*"Perhaps I am a bit optimistic but I believe that yes I try to go through medication wastage".*

*(Male, hospital doctor B, 4 years in profession)*

#### **6.3.3.5 Domain: Beliefs about consequences**

The theme related to the consequences of inappropriate prescribing and dispensing impacting medication wastage.

##### **1. Consequences of inappropriate prescribing/dispensing**

The financial consequences of pharmacy overstocking medication was highlighted by a member of the public,

*"No I won't say it would be waste but then again striking a balance between maintaining a business, 'cause at the end of the day, pharmacies are, it's a business. So they must be sustainable, they're financed through a cycle so maintaining a balance between financial and education, I think is a very difficult task and I don't think it can be achieved".*

*(Male, accountant, 24 years, post-graduate qualifications)*

One of the hospital doctors, who also practised as a GP, felt that the beliefs of consequences of medication unavailability impacted decision making. Prescribing



patients medication at double the actual doses resulted in higher dispensed amounts thus ensuring that patients always had adequate supplies,

*"I feel that if I really know my patients, ok, and I know that she is really dependent on that medication, I mean sometimes I wrote double the dose yes".*

*(Male, hospital doctor A, 4 years in profession)*

A hospital doctor noted that patients were generally unaware of the consequences of unused returned medication, believing that these could be recycled,

*"If they have surplus stocks of medication at home, and then they stop taking them because they don't need them anymore, they think that you can just bring them back to hospital and that medication can be distributed to another patient".*

*(Female, hospital doctor, 17 years in profession)*

#### 6.3.3.6 Domain: Reinforcement

The lack of incentives to reduce medication wastage was noted by participants.

##### 1. HCP incentive

While a pharmacist described that the lack of any incentive to reduce wastage resulted to be "an uphill battle",

*"When it comes to HCPs, in order to be incentivized in reducing wastage, I think then again it's quite an uphill battle".*

*(Female, hospital pharmacist, part-time community pharmacist, 9 years in practice)*

one of the doctors suggested that professionalism should be the key incentive and hence should be continually reinforced,

*"But doctors took an oath to look after their patient, and part of that should be, in my opinion, looking after the general consensuses, to help become you know, doctors I'd like to think, because they have this sense of helping society, that's maybe my being idealistic. And even a nurse, you go into it 'cause it's more partly*

*vocational, you love what you do. Yes you need a salary, but you do it 'cause it's something that you enjoy".*

*(Female, hospital doctor, 17 years in profession)*

#### **6.3.3.7 Domain: Intentions**

The three themes which emerged in terms of impacting intentions of reducing medication wastage were sustainability of the healthcare system, medication unavailability and unclear goals.

##### **1. Sustainability of the current free healthcare system**

The need to reduce medication wastage to ensure sustainability of the current free healthcare system was highlighted by a hospital pharmacist,

*"Because it is not sustainable any more. And I think we can see it because many medications are out-of-stock and this reflects that the system is not sustainable".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*

##### **2. Medication unavailability**

Participants described the patients' fear of unavailability of medication as a major obstacle to their desire to reduce wastage. As noted by one hospital pharmacist,

*"It [unavailability of medication] is a problem, a major one".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*

In fact one of the pharmacists pointed out that patients explicitly expressed concerns about medication shortages,

*"We see it, I mean quite frequently, people you know, they just tell us outright 'because I don't really need this medication, I have at home you know. But will it be available the next time I collect my medicines?' I mean we've all heard this I think, those of us who were at the dispensing window basically".*

*(Male, hospital pharmacist, 12 years in profession)*

and one member of the public considered overstocking to be justified in the context of medication being unavailable,

*"The problem I used to see is the huge amounts patients collect. That yes, I became aware of it long time ago. And I have come across people; especially the elderly who pass away and you find full drawers packed with medicines. But then I started to notice that people take a lot and hoard, then I started thinking that they are right so that if there aren't any I will have".*

*(Female, housewife, 63 years, primary level of education)*

There were instances where fear of unavailability had led to medication sharing,

*"I know a family that even certain types of blood pressure pills, for example, let's say the mother and son take the same medicine. So when any of them runs short, one assists the other 'Give me some of yours, I will give you when I get mine' ".*

*(Female, housewife, 56 years, secondary level of education)*

and one pharmacist who encouraged overstocking,

*"... in a period when there is no doubt of stocks, people are really nice. They tell you 'Look I don't need it'. But when they see rainy days they say 'Why should I give it to him?' Sometimes I tell them 'Listen it's a bit shaky right now, it's better if you keep it because next 2 months I don't think I might have'. So I mean I do it myself. They tell me 'Don't give me this time'. I tell her 'Look I don't have' ".*

*(Male, community pharmacist, 8 years in profession)*

### *3. Unclear goals within the Government health system*

Unclear goals within the Government health system were seen to be critical in improving intentions to reduce medication wastage,

*"It's, I see a difference between, as a part-time I go to a private hospital, there's a huge difference between a private hospital mentality to a Government hospital mentality. Everything is accountable in a private hospital; everyone is working to a*

*goal. Whereas Government, there is not a clear goal. So if there is something, an independent body that gives goals, that gives, especially in this medicines wastage, and how strategies how to go around it and how to target this wastage, it would be much better".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

#### **6.3.3.8 Domain: Environmental context and resources**

While several of these sub-themes also aligned to other TDF domains, several aligned to only this theme.

##### **1. Issues of resources and organization**

The lack of adequate resources, notably an integrated computerised system was strongly emphasised,

*"That is what we're saying; the IT system is so bad that you cannot give the forecast [of medication requirements]".*

*(Male, community pharmacist, 8 years in profession)*

The lack of harmony between computerised systems of different Governmental pharmacy institutions was also critical,

*"Because sometimes I know what my stock position is but I don't know, there is no clear IT system between all the healthcare, so I don't know what Boffa [a governmental oncology and dermatology hospital] hoards, I have to ask. Where I work there is no critical level, there is no threshold, and the system does not advise, boom, you have to order".*

*(Male, hospital pharmacist, part-time-community pharmacist, 1 year in profession)*

##### **2. The free healthcare system**

The free healthcare system, particularly free medication was perceived to have a negative effect on behaviour, as described for psychiatric patients and patients in general,

*"But having said that, I am also aware that between psychiatric patients there is kind of a black market when it comes to pills. So if I get them for free because, I don't know, if I get them for free and I know someone who needs them, they sell them between themselves".*

*(Female, Assistant Director, 32 years, post-graduate qualifications)*

*"One other way of abusing entitlement, when people come with their own pink cards, and if they have children they ask for the medicines to be written on their card so that they can get them for free, for example. So they're using, the one person in the family who has a card, that card is used for everyone else".*

*(Female, hospital doctor, 4 years in profession)*

One hospital pharmacist remarked that patients perceived free medication to be comparable to their wage or pension,

*"I think a lot of people have the mentality, and this is a core issue I think, they have the mentality that once they are entitled to their free medicines, it's like they are entitled to their pension and they have to get it every month. And if something is missing or they get it late they want it back dated. Do you understand? So it's this sort of thing. They don't see it as their treatment. It's their entitlement, number of pills, that's it, it's like they're getting their wage. So that amounts to wastage. They go to the doctor every time and request whatever they need without being reviewed".*

*(Male, hospital pharmacist, part-time-community pharmacist, 12 years in profession)*

### **3. Lack of review of doctors' prescribing**

Participants cited the issue of the lack of patient reviews,

*"... patients are not being reviewed. They keep getting the repeat prescription because they have seen a doctor years ago and they keep getting the same thing for ages".*

*(Male, hospital pharmacist, part-time-community pharmacist, 12 years in profession)*

Lack of consultant review was also discussed,

*"Most of the patients are not seen by the consultant. They're seen by the junior doctors who are not able to change the medication. Sometimes you just continue the same because you'd see that there are, it's stable ok, but there could be something, say the guidelines, it could be something you need to change and you don't know what's going on and the consultant is aware. But he doesn't see everyone".*

*(Female, hospital doctor, 20 years in profession)*

The lack of review was thought to be due to several factors including lack of patient information,

*"But the problem is that if the pharmacist doesn't do any review is because of lack of information".*

*(Female, hospital pharmacist, 24 years in profession)*

multiple doctors prescribing medication for the same patient,

*"And sometimes you'll find patients shopping around where they would go first to their GP, then to another GP for prescriptions".*

*(Male, hospital doctor A, 4 years in profession)*

lack of patient registration,

*"... but I agree with all of you. But I think the biggest problem in Malta is we have no GP registration. A patient can go to a GP, prescribe, ask for a medicine, the GP can refuse, go to another GP and he can prescribe it. And he can go to another GP and prescribe another medication".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

and an absence of treatment management guidelines,

*"And we don't have first line, second line, third line".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

#### *4. Patient effects*

Participants perceived patients to have selfish practices,

*"So I am taking this sort of from the Government even if I throw it down the bin.*

*There are some people who reason with this mentality".*

*(Male, Responsible Person/Regulatory Affairs Pharmacist, 9 years in profession)*

One of the pharmacists, however, felt that a possible explanation for these selfish practices was past negative experiences,

*"I think that this problem is that big because patients are sometimes very selfish.*

*So they become very selfish and very possessive of their medications. But maybe they are that way through experience, through negative experience".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

with one of the public describing the need for confrontation with pharmacists to get the medication that one needs,

*"... yes most of the times, people have to shout and fight with them [pharmacists] sometimes. Like certain people".*

*(Female, housewife, 63 years, primary level of education)*

One of the members of the public explained that sick patients would be miserable and vulnerable,

*"Let's not forget that this woman would be miserable ... because a person is vulnerable".*

*(Female, housewife, 56 years, secondary level of education)*

### 5. Lack of education

In addition to the influence of lack of education to support medication adherence, this lack was also noted to more generally impact behaviour leading to wastage. This was thought to be a particular issue amongst those of a low socio-economic class, as highlighted by one of the pharmacists,

*"Those who are in low social class are always the ones who suffer from whatever entitlement system there is. And because they are the ones who get, don't get access to medicine because of their intellectuality, because obviously also their education, all right, their level of education, it plays an important role. Yes because their education is low, so they won't take their medication properly".*

*(Female, hospital pharmacist, 24 years in profession)*

### 6.3.3.9 Domain: Social influences

Two themes emerged in terms of social influences regarding medication wastage, the pressure to prescribe and dispense, and HCP attitudes.

#### 1. Pressure to prescribe or dispense

There was much discussion on social influences, particularly the pressure by patients on doctors to prescribe,

*"At out-patient clinics, especially at free healthcare centres, doctors, from junior doctors to consultants, they are harassed to give [prescribe to] patients free medication".*

*(Male, hospital doctor B, 4 years in profession)*

and on pharmacists to dispense,

*"It happens also between the patient and the community pharmacist because they sometimes put pressure on the community pharmacist to dispense medication".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*



These pressures were felt to be compounded by Malta being a small country,

*"So we have the pressure from the patients, 'cause it's a small country and you know each other and they want to be nice with patients".*

*(Female, hospital doctor, 20 years in profession)*

This was also reiterated by a member of the public,

*"The problem in Malta, I think, is that people develop very close relationships with their family doctors as well. Often you choose your family doctor based on the fact that it was your father's family doctor or something similar. So there is a very strong bond. And I do feel that sometimes perhaps doctors do feel that pressure sort of to acquiesce and help out the patient".*

*(Female, Director, 36 years, post-graduate qualifications)*

Pressure from work colleagues to prescribe for their relatives was discussed,

*"Pressures will not always be from patients, it might be from staff. And then you are put in a more uncomfortable situation. For example they ask you to write for their relatives and you don't know their relatives. And to say no to a staff ...<sup>4</sup>"*

*(Female, hospital doctor, 4 years in profession)*

Pressure from the pharmaceutical industry was also mentioned by one of the members of the public,

*"So easily the pharmaceutical lobbying will pressure out the doctors to dish out certain amounts of drugs, or particular drugs, through the pharmacist".*

*(Male, accountant, 24 years, post-graduate qualifications)*

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<sup>4</sup> "... " at the end of a quotation indicates that the participant has been interrupted by another participant at that point of the conversation.

## 2. Attitudes of HCPs

HCPs' attitudes were felt to regulate their behaviours, as described by a member of the public,

*"There is a category of professionals within the medical field that I think; yes they've got this mentality. It's either old-school mentality that the doctor just prescribes anything and even the pharmacies just dish out pills for the sake of ..."*

*(Male, accountant, 24 years, post-graduate qualifications)*

As noted earlier, poor communication at all levels impacted wastage and it was emphasised that this poor communication affected practice leading to wastage,

*"The patient basically there is lack of communication with the patient, all right, possibly by the consultant or between the consultant and his GP, and the patient ends up for example then taking more than, taking the medicine because he does not want to say "I do not need that medicine" for example".*

*(Female, hospital pharmacist, 24 years in profession)*

The position of 'power', mainly relating to consultants, affected behaviour of HCPs and patients,

*"But I think what has happened as well locally is that instead of the NHS setting its own rules and then implementing it across the board, the NHS asks for consultants opinion, and then they adapt the formulary according to what the consultant have said. So as Speaker 1 said, I think consultants still have a lot of power".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

### 6.3.3.10 Domain: Emotion

Different aspects of fear emerged within this domain from the perspectives of patients and HCPs.

### 1. Psychological effects

Participants spoke about patients' fear surrounding their entitlement to free medication if they do not collect these regularly, so they end up overstocking unnecessary medication,

*"Sometimes they think that if they don't actually pick up their usual medication, if they are entitled to 6 medication and they collect just 3, they won't be entitled".*

*(Male, hospital pharmacist, 12 years in profession)*

On the other hand one of the community pharmacists stated that pharmacists experience fear that they will remain with unused stock which is not sold and thus wasted,

*"But then the pharmacists have some fear that if we open the box, the agent. Now again it's stocking, we cannot give packs. The problem is there. So we are tempted to sell it just not to lose the money".*

*(Male, community pharmacist, 8 years in profession)*

One of the hospital doctors emphasised on the importance of eliminating the fear of medication unavailability by changing the patients' perspective which in turn will have an influence on the HCPs and policy makers' perspectives.

*"I think that ultimately what we need to change is the patients' perspective. Because if you change that perspective, obviously you'd change the doctors' perspective, the policy makers' perspectives. And by doing so, in the sense both media, both by increasing their confidence in the delivery system, in the sense reducing these out-of-stock."*

*(Male, hospital doctor, 5 years in profession)*

#### 6.3.3.11 Domain: Behavioural regulation

Behavioural regulation was articulated throughout the discussions of both HCPs and members of the public. The themes within this section were discussed in the context of reducing medication wastage.

### *1. System effects*

Numerous solutions to medication wastage, particularly in relation to the healthcare system in Malta, were discussed. HCPs and the public described the importance of stock management and forecasting of medication requirements,

*"Even for example between entities [different Government hospitals] they should make clear their stock positions".*

*(Male, hospital pharmacist, part-time-community pharmacist, 1 year in profession)*

*"But I'm not suggesting not maintaining any stock level at Mater Dei. What I'm suggesting is, if we can stock let's say 100 which will last us for 3 months, I'm just inventing, if that level will last us 3 months, what's the need for the Government to stock pile for 6? And then that will put the risk on the supplier, and it is the supplier's responsibility to maintain the stock in an adequate environment".*

*(Male, accountant, 24 years, post-graduate qualifications)*

*"Sure. So we need to have a simple system which is continuously updated by the HCPs and even GPs who are seeing trends coming, at the general practice and even at hospital, and this system is being updated by the doctors and even by professionals who are reading papers about upcoming medicines that are going to be launched on the market. It can, let's say, if a new drug is being developed but I don't know, and that drug can help in substituting another drug and through that drug it's going to end in less consumption, the Government can shift trends".*

*(Male, accountant, 24 years, post-graduate qualifications)*

Focusing attention around highly prevalent medical conditions and hence budgeting was suggested,

*"Exactly, I mean we are talking about every day condition. We are talking about cardiovascular; it's a huge chunk of our budget, cardiovascular medications and diabetes. I think if we are more selective in the medications we use in those two groups; the cost savings will be quite significant".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

One member of the public proposed establishing an independent body to finance healthcare, which would be subject to audit, and which would in turn be financed by the Government,

*"I would say that, would make the healthcare financed through some external body which is privately run and independent from the Government, so I would say that if I need a healthcare service, I need to get prescribed drugs from the state hospital, I would go and get it and I would need to present some sort of receipt to an independent insurance company. And then this insurance company is financed by the Government. So at the end of the day there is an independent body in between the patient and the Government ... no then again it must go down to ethics, but given that you're segregating power from the Government and giving it to an independent body, this independent body is going to be audited so on and so forth, I think".*

*(Male, accountant, 24 years, post-graduate qualifications)*

Another member of the public suggested the introduction of a patient specific pharmaceutical identity card containing all medication history for both privately purchased medication and those obtained for free to prevent redispensing,

*"I thought if they had an ID card, sort of pharmaceutical ID with, you know, you've got your history, what you've been prescribed, on a chip. Something like our ID card where the patient carries it around you know, and get plugged in ... yes, so that you can see what they've been prescribed previously as well and even for repeat prescription abuse or over, you know people, over, stock piling. Because you can see, look, they just came in and had this".*

*(Female, Director, 36 years, post-graduate qualifications)*

A number discussed the importance of a good infrastructure,

*"A computerised system would solve the thing. The same thing is with stocks, 'cause for example if you have 10% left you rebuy. So really and truly the centralised IT system should be from the Government's point, by who buys the*

*medicine and all the outlying pharmacies. So I think they should have the same or a connected IT system. Now from where they buy etc., that's up to them".*

*(Male, hospital doctor, 5 years in profession)*

with one participant adding the importance of a centralised patient medication record,

*"One thing I was going to mention is that in the community there should be an IT system where you, where if I go to a doctor and maybe next month I don't find my own doctor, and I have to go to another doctor, then there should be a record. My information, my medication record should be recorded yes".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*

Incentives for HCP to reduce wastage were suggested,

*"If not, there should be steps that are taken where if they don't want to take that responsibility, there is no incentive, they need to be incentivised somehow".*

*(Female, Director, 36 years, post-graduate qualifications)*

There was much discussion around patients paying for medication, with one pharmacist suggested implementing a payment system similar to electricity supplies,

*"People who can't afford buying the medicines or paying prescription fees, we already have a system in place. Everybody pays the electricity. Some people do not afford to pay the electricity bills and they get the voucher system. So same thing can be implemented".*

*(Male, hospital pharmacist, part-time medical representative, 15 years in profession)*

Some recommended a system of those patients eligible for free medication, initially paying, then being reimbursed and that this could reduce system abuse and hence wastage,

*"Because let me tell you, 'cause there is a system that if it happens in Malta, do you know why they do not have any extra, I do not know why it was never implemented in Malta, abroad first you buy the medicines, at the end of the year you have all the receipts, that is what they do abroad, and you would sort the whole problem. It's true not everyone could afford these medicines but that is what they do".*

*(Female, housewife, 63 years, primary level of education)*

One of the hospital doctors proposed a compulsory private insurance as a means of regulating the free healthcare system,

*"I think you have to, probably it has to be included in policy. When you start working, you should pay, you should choose your own private insurance and you should pay the insurance scheme. You know there are so many private insurances".*

*(Female, hospital doctor, 20 years in profession)*

One of the pharmacists was not in total agreement with the introduction of a compulsory private insurance if people still have to pay the full National Insurance,

*"But would the young people, if I am understanding well this argument, the younger people would be made, forced to pay for a national insurance sort of, a national insurance to cover their medicines and all health. But would the young people be charged less because nowadays everyone pays national insurance who works. And a part of it goes to the [health system] ..."*

*(Male, Responsible Person/Regulatory Affairs Pharmacist, 9 years in profession)*

Following this disagreement the hospital doctor suggested that the use of half of the National Insurance money should go to a private insurance company who will be responsible for paying health related bills,

*"Or maybe the Government I don't know, when you pay National insurance, maybe the Government half of it has to give it to a private insurance and the private insurance will be responsible for the use of it. Something similar I think".*

*(Female, hospital doctor, 20 years in profession)*

Other participants felt that having a medication take back scheme, whereby unused medication can be returned to pharmacies, was another possibility to regulate the free healthcare system,

*"By having a take back scheme".*

*(Male, hospital doctor A, 4 years in profession)*

One of the hospital pharmacists suggested the implementation of a cash card as an incentive to return unused medication to pharmacies,

*"I think a different mechanism would work; they'll give you a cash card for returning your medication. If we could test those medications and reuse them that would make sense but if we cannot".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

A hospital pharmacist mentioned the need to regulate use of high consumption, low cost medication which could result in a higher total cost compared to low consumption, high cost medication,

*"When you mention high cost medication, we tend to go see one tablet, how much that costs. But really when you have high consumption items their cost might actually be higher than the high cost".*

*(Male, hospital pharmacist, 12 years in profession)*

The aim of disease prevention with resultant decrease in the need for medication was discussed. The employment of more nutritionists in hospitals was suggested,

*"Because this is like a chain, 'cause if I am eating for my health, I will not get high cholesterol. Sometimes it could be age related; I inherited the genes from my family. Even the Government would save a lot of money".*

*(Female, housewife, 56 years, secondary level of education)*



Others suggested the employment of psychologists in schools, leading to reduced need for medication, thus indirectly reducing wastage,

*"I am in favour as well with the introduction in schools, maybe this is related or not, that we have psychologists for children so that from a young age, there are counsellors at the moment, I know that in a lot of schools there is a counsellor. But when the counsellor doesn't manage, if we have a psychologist. Because at the end of the day, this poor boy or girl, if he gets ill he will end up using medicines at a young age, tender, from a young age".*

*(Female, housewife, 56 years, secondary level of education)*

## *2. Practitioner effects*

Several noted the need to engender a culture of accountability in HCPs, particularly in relation to prescribing,

*"I think that correct prescribing in that case would be of paramount importance to do, because procurement will be linked directly to this".*

*(Male, hospital pharmacist, 12 years in profession)*

*"... so if we are going to invest in an IT system and we are not going to make anybody accountable for the cost, we are just going to spend money on an IT system".*

*(Female, hospital pharmacist, part-time community pharmacist, 9 years in practice)*

MURs were discussed as a potential for HCPs and patients to optimise medication and reduce wastage,

*"In the UK patients are even reviewed by the pharmacist, the MURs. And that has reduced a great deal of costs for the NHS. Reviews are then every year for example".*

*(Male, hospital pharmacist, part-time-community pharmacist, 12 years in profession)*

Others suggested involving different HCPs,

*"Or they should have a consultant review, yearly consultant review for chronic conditions".*

*(Female, hospital doctor, 20 years in profession)*

*"I think a GP can do the work [MURs] effectively".*

*(Female, hospital doctor, 4 years in profession)*

A standardised patient review template was suggested, which would be mandatory and updated regularly following patient assessment prior to prescribing,

*"What if they have to like you said a reassessment? So together with the prescription, every 6 months they have to show something given to the, by the doctor, of what the examination found. Maybe the blood pressure, the treatment they are on. Maybe every 6 months something is filled in as proof that the patient was examined. It's an idea".*

*(Female, hospital doctor, 4 years in profession)*

The nurse within the public focus group discussed prescribing guidelines,

*"More guidelines. Guidelines, if for example a patient is on certain medication, you can prescribe for certain amount, for certain time. Yes, not for the patient, but for the GP and the system, protocol system, not for the patients".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

while others stressed the need for better communication between the private and public health sector,

*"There is no contact between the private sector and the NHS, that is all the problem".*

*(Female, hospital pharmacist, part-time-community pharmacist, 3 years in profession)*

and at all levels of the medication supply chain,

*"I, the way I see it, it is like a chain, right? From the manufacturer, to the agent, to the wholesaler, to the pharmacy and eventually to the patient. And between the pharmacy and the patient there is the doctor prescribing. Now if there is more communication between each level, maybe on consumptions, prescribing trends, etc., I think that wastage could be reduced at each level, which means between the manufacturer and the agent, the agent and the wholesaler".*

*(Male, hospital pharmacist, part-time-community pharmacist, 12 years in profession)*

### **3. Patients effects**

A hospital pharmacist suggested that patient groups and organizations could support, encourage and reassure patients around appropriate medication ordering and use,

*"And the coeliac association had created a system whereby every patient collects his stock, whatever he is entitled to but then if you feel you have excess stock of something, maybe you can share this, you know, they had like a support group, they could meet or there was a liaising person and you know that you could go there and maybe they could spare you a packet of gluten free flour. And I used to feel that that system was a bit of like a reassurance to those patients".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

The need for reassurance was reiterated by a member of the public,

*"Basically I think what you first need is peace of mind, that if I become anxious, I went to a pharmacy and I was assisted. Now if it's close by in the village or wherever you are all the better, but if there is no alternative, you have to go to hospital, you don't have a choice, as long as your mind is at rest that you will find help".*

*(Female, housewife, 56 years, secondary level of education)*

Patient empowerment was also noted,

*"I think we go too often to the doctor so that he doesn't give you a plan ... for example, not now 'cause now they're grown-ups, when I used to take my son, he used to tell me 'look these two days leave him on this only, if you see that the symptoms have increased buy him this antibiotic' ".*

*(Female, housewife, 56 years, secondary level of education)*

#### *4. Political effects*

The need to reduce political interference in the organization and delivery of health services, leaving strategy and decision making to HCPs, was discussed at length especially amongst HCPs,

*"The politicians need to relinquish power and willingly".*

*(Male, hospital pharmacist, part-time medical representative, 15 years in profession)*

*"They [politicians] have to stop being scared of what the public thinks ... the only way it will work if both [political] parties or 3 or whatever agree, and state that they agree and sign a document that they agree that this is the way it's going to be. So it's not this party or that party, it's the way it has to be. That's the only way it will work".*

*(Female, hospital doctor, 4 years in profession)*

As a member of the public commented,

*"Yes I agree. Health I think, health is a sector that needs to be separated from politics. The administrative side of it is one thing, the medical side of it is another thing, the regulating is another thing. So I think the health sector needs to be separate. I don't know how it can be done; it needs to be separated from the Government. If we need to get anywhere I mean".*

*(Female, Assistant Director, 32 years, post-graduate qualifications)*

### 5. Awareness and educational effects

Making patients more aware of the cost of medication, particularly those supplied at no cost, was highlighted as a positive move in reducing wastage,

*"...when some get free medication, even if they're getting it free, there should be a price to make a person aware how much they are spending. Some medicines are extremely expensive. And the patient has no idea how much they are wasting. I think it would be very valuable if prices are present".*

*(Female, hospital doctor, 4 years in profession)*

A hospital pharmacist working in oncology, stated that patients who were aware of the high cost of treatment were less selfish,

*"We, for chemotherapy, not specifically to a support group but many patients know about the cost of treatment and usually it's a smaller group and discuss things between them, especially in-patients. So they understand that some drugs are difficult to procure, some drugs are bought for them on a named-patient basis. But they are not usually very selfish because they understand about the high cost of treatment and they understand that if I'm taking all this drug for myself, I'm not leaving enough drug for another person with the same condition".*

*(Female, hospital pharmacist, part-time community pharmacist, 9 years in practice)*

This was also suggested as being important for HCPs,

*"I think we need to increase awareness amongst the physicians as well. Tell them there is wastage. Because we know there is wastage but we don't know by how much".*

*(Female, hospital doctor, 20 years in profession)*

One of the members of the public felt that everyone, especially politicians, should be made aware of the extent of medication wastage to be able to regulate behaviour,

*"Malta, I don't know how much it is in Malta, but I think if we make people aware, especially politicians and doctors, how much it is, I think there will be much more awareness, as money, as pills. I don't know the exact amount ... yes but especially politicians, I think they don't know the extent so they do not know if it is a problem. They know there is a problem, like in a hospital, a big problem with beds. It's been like that ages but now because it's a critical issue on the news and everything, they will target it. I think the politicians do not know the extent of the problem".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

One of the hospital doctors thought that the cost of medication wastage should be more apparent,

*"Because when you present patients with a figure, they become more aware of wastage. Because for them being prescribed this packet of paracetamol which maybe the Government buys for one euro, for the individual patient he is only wasting one euro. But if they have an idea of what is being wasted nationally, even if it's a fraction, sometimes you know it's a reality".*

*(Female, hospital doctor, 17 years in profession)*

which was reiterated by one of the members of the public, who also added that these costs could be translated to finance further research,

*"... because if it [medication wastage] can be costed, then it can be linked maybe to targets and this target can maybe finance more research. 'Cause it is a well-known fact when it comes to research, there is never enough finance for research, we finance everything but research, in every area. So maybe that can be linked. Costing, targets ..."*

*(Female, Assistant Director, 32 years, post-graduate qualifications)*

Another hospital doctor suggested the awareness of the humane aspect of wastage,

*"Maybe not just tell them how much it costs. Maybe they get the point that if they're using more and wasting, they're taking from other patients, sort of the humane point. Em you try to focus on this".*

*(Male, hospital doctor, 5 years in profession)*

Several suggested more education on appropriate medication use, starting with the very young,

*"Maybe target young children in school even education wise. Why you take medication, how you take medication, how to store medication, how to get rid of excess medication. Ehe, I think maybe from 9 years, 10 years old. I mean they start sexual education, why don't they start about ..."*

*(Female, Assistant Director, 32 years, post-graduate qualifications)*

and using different targeting strategies,

*"But I think, it's very good to educate, but it depends which target, which people we need to target. For example if you need the youngsters, there is the social media, Facebook, Twitter, everything, computer, Facebook. If you need elderly people, it's useless. But it depends who you want to target because elderly people you will do educational session during for example news. Something like that. It depends, it depends which age you want to go".*

*(Male, Nurse, 34 years, post-graduate qualifications)*

and settings such as the workplace,

*"And with all due respect even at workplaces, during this time of year we have lent talks ... like a retreat. So why shouldn't we educate people at the workplace? If nowadays women are working outside the house and maybe she is in a hotel. You would tell me maybe not all workers can attend. No, but we should try to do it even in their breaks, get someone who is competent".*

*(Female, housewife, 56 years, secondary level of education)*

The local council was also considered to be an important setting when delivering educational sessions,

*"I will mention the same thing, I think you will agree with me, housewives, and there should be meetings like the meetings held in local councils".*

*(Female, housewife, 63 years, primary level of education)*

A medication education campaign amongst patients was also proposed as a measure to regulate behaviours,

*"Launch a medication education campaign. You have to tell the patient that if they stop wasting the medication, to tell the patient, you have to tell the patient that if they stop wasting medication, that money can go somewhere else which can end up helping them".*

*(Female, hospital doctor, 17 years in profession)*

This suggestion evoked some disagreement with one of the participants about whether a campaign would help to reduce medication wastage. Some participants also suggested that education campaigns amongst both doctors and pharmacists can help regulate behaviours to minimise wastage,

*"And not just a patient education campaign, it has to be a doctor education campaign as well. Because I don't think we are blaming all of this on, we are not saying the patient is to blame".*

*(Female, hospital doctor, 17 years in profession)*

*"Campaigns are you train the pharmacists so that then they can educate the patients because then when it's one to one it sinks in more".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*



#### 6.3.3.12 Domain: Goals

At the end of the focus groups, participants reiterated behavioural regulation which they felt was important to reduce wastage and suggested their main goal to support appropriate use of medication and reduce medication wastage.

##### 1. Need for education

Behavioural change around education and communication in general was seen as the main goal to moving forward and for maintaining long term change,

*"I think what is really important is that we should move forward towards, patients should have, should be more understanding and maybe more respectful of doctors, pharmacists when they dispense the medication. And they should understand their decisions, of the doctors and of the pharmacists. And maybe in that way, education, it boils down to education I think at the end of the day".*

*(Female, hospital pharmacist, part-time-community pharmacist, 5 years in profession)*

*"I think with medication wastage you have to go to the individual, not just the patient but also the HCP. So I think it should be a system where, as Speaker 2 said, everyone is involved but it should target the individuals, not just throw something at the general population like that".*

*(Female, hospital pharmacist, part-time-community pharmacist, 13 years in profession)*

## 6.4 Discussion

### 6.4.1 Key findings

The aims of this phase of the research were to describe and understand the beliefs and behaviours regarding medication wastage of the Maltese public and HCPs and to explore potential solutions to reduce medication wastage.

The TDF was used to guide the topic guide content and coding during data analysis. Key themes were identified around behavioural domains of:

1. knowledge (knowledge of the consequences of medication wastage)
2. skills (practitioner effects, suboptimal use of medication by patients)

3. beliefs about capabilities and their social/professional role and identity (overstocking of medication by HCPs; social influences, educational influences, system influences)
4. optimism (psychological influences)
5. beliefs about consequences (consequences of inappropriate prescribing/dispensing)
6. reinforcement (HCP incentive)
7. intentions (sustainability of the current free healthcare system, medication unavailability, unclear goals within the Government health system)
8. environmental context and resources (issues of resources and organization, the free healthcare system, lack of review of doctors' prescribing, patient effects, lack of education)
9. social influences (pressure to prescribe or dispense, attitudes of HCPs)
10. emotion (psychological effects)
11. goals (need for education)

In terms of potential solutions to reduce wastage, these were described under the domain of behavioural regulation in terms of facilitators to alter behaviour. The key emerging themes were: 1) system effects (stock management, budgeting, independent body governing free healthcare system, pharmaceutical identity card, infrastructure, incentives, medication fee, reimbursement, compulsory private insurance, medication take-back scheme with cash card, high consumption medication, disease prevention); 2) practitioner effects (correct prescribing and accountability, MURs, improved documentation, improved communication); 3) patients effects (increase patient reassurance, patient empowerment); 4) political effects (reduce political interference); 5) awareness and educational effects (increase awareness, strategies and settings to deliver education).

#### **6.4.2 Strengths and weaknesses of focus groups**

To the researcher's knowledge this is the first interpretivist phenomenological study providing a detailed description of behaviours around medication wastage and particularly on solutions and facilitators of behavioural change. The focus group

guide method was designed according to best practice. The use of a theoretical basis, the TDF and associated domains to aid the construction of the topic guide and coding framework, ensured that the research and outputs were grounded in behavioural theories which also focus on change. Furthermore, this approach provided a very systematic approach to data generation and analysis. Importantly, focus group participants were not aware of the theoretical assumptions.

The focus groups were part of a mixed methods sequential explanatory design which provided triangulation of data from the cross-sectional questionnaires and also the opportunity to explore areas in greater depth (Morgan, 1997). Perspectives of HCPs and the general public were researched through homogenous focus groups to allow broad consideration of issues and potential solutions. Attention was paid to the issue of data trustworthiness at all stages.

However, there are limitations to the research and the data generated and hence the findings should be interpreted with caution. Despite employing purposive sampling, a wider range of participants, such as unemployed or less educated members of the general public, dentists, pharmacists from the pharmaceutical industry or more GPs, may have impacted the findings. The inability to capture the views of nurses or HCP students is a key limitation, given their roles or future roles in patient care. While it is possible that data saturation was not achieved, a number of important themes and potential solutions were identified. While not attempting to be generalizable, it is possible that the research findings have limited transferability outwith the study population.

#### **6.4.3 Interpretation of findings**

Study findings confirm the usefulness of the TDF to guide the research and comprehensively describe behaviours and generate ideas. A better understanding of behaviours of HCPs and the public in relation to medication wastage will provide a greater probability of developing successful interventions to reduce wastage compared to researching without a comprehensive theoretical framework (Squires *et al.*, 2013). It is worth noting that whilst this study employed the 14 domains TDF,

the domain 'memory, attention and decision porcesses' was not retained as it was not relevant to this study.

This study has provided valuable in-depth description and understanding of a number of behaviours which may lead to medication wastage and in doing so act as barriers or hindrances to all stakeholders striving to reduce wastage. Key issues such as the lack of resources and organization factors should not be overlooked and are fundamental to the development of strategies for change. Adequate resources are essential for the management of any system. Maltese Government policies are based on quality, affordability and sustainability (Superintendence of Public Health, 2012) and hence the need to optimise limited resources is imperative. The perspectives of participants in this study on disease prevention should also be considered as a means of saving on limited resources, including HCPs' time and healthcare expenditures. Notably, the EU Commission staff working document 'Investing in Health' very recently reported that only approximately three percent of the current health expenditure is earmarked for public health and prevention programmes amongst Member States (European Commission, 2013).

The fact that the Maltese free healthcare system as a possible major barrier to medication wastage reduction was identified in the focus groups discussions triangulates this key finding of all previous phases of this research (Delphi technique and cross-sectional survey). Politicians, healthcare organizations and HCPs have the responsibility and a societal duty in providing healthcare services to everyone, regardless of the patients' ability to pay (Department of Health, 2010). The free healthcare system is provided by the Maltese state Government and therefore the state is duty-bound to ensure the sustainable and just provision of health services. Yet, the Maltese Ministry for Resources and Rural Affairs (2009, p.37-38) states that *"all actors need to respect public funds as if they were their own and hence contribute towards their effective management"*. There is therefore an urgent need to fully explore the healthcare system.

There is some evidence (albeit limited) that those patients entitled to free medication are more likely to receive polypharmacy, traditionally defined as "*the concurrent use of five or more medications*" (Richardson *et al.*, 2014, p.656). Whilst providing free medication could be viewed as a positive step in terms of patient equality of care, there is a need to research the impact of no charge on patient request for and use of prescribed medication. It could be hypothesised that patients receiving free medication are more prone to wastage. The findings of the questionnaire in the previous phase of this study also drew attention to the significant difference between respondents who were obtaining their medication for free and those who were buying the medication. Those who were obtaining their medication for free were more likely to self-report no interest of issue of medication wastage. Hence the effects of the free healthcare system need to be fully explored and recognised to fully inform policy debates (Richardson *et al.*, 2014).

Sub-optimal use (misuse, underuse and overuse) of medication amongst the Maltese population was investigated in the previous phase of the research using the MMAS-8-Item and found that three quarters self-reported not being fully adherent. Medication non-adherence was also discussed at length during the focus groups and was considered to be one of the key barriers hindering resolution of medication wastage. Notable, the WHO, in its report on the world's medicines situation, states that globally it is estimated that half of all patients fail to take medication correctly (World Health Organization, 2004b). Identifying factors which contribute to medication non-adherence is fundamental in obtaining satisfactory clinical patient outcomes (Al-Dabbagh and Aswad, 2010), as well as humanistic and economic patient outcomes. A very recent review of 51 systematic reviews of the determinants of adherence identified 771 individual factors for non-adherence to medicines for chronic conditions. These factors were grouped into eight clusters, two of which were the patients (key issue in the elderly) and the medicine (key issue with polypharmacy) (Kardas *et al.*, 2013).

While this research does not focus exclusively on non-adherence, paying attention to these factors could positively impact medication wastage. Furthermore,

medication non-adherence can lead to leftover unused medication in households which can be later used for an inappropriate indication or may expire and hence pose a public health issue, including environmental implications through improper disposal. Despite advice provided by the FDA on medication disposal with only a short-list of medications recommended for disposal by flushing down the toilet or sink (US Food and Drug Administration, 2014), participants also felt that there is inadequate knowledge and practices with regards to medication disposal. Lack of legal framework and local policies are likely to be impacting medication disposal behaviour (Vogler *et al.*, 2014) and could be the reason for lack of advice by HCPs.

The lack of awareness and the existence of knowledge gaps in relation to medication wastage both amongst the public and HCPs emerged in focus group discussions. Participants felt that the main goal to reduce medication wastage in the long term revolves around education and communication to bring about behavioural change. Overcoming the knowledge-behaviour gap through different programs designed to educate were discussed at length by participants. However, this knowledge-behaviour gap cannot be seen as a standalone barrier in the issue of medication wastage but has to be seen in the context of all the other factors elicited by participants, such as psychological factors in terms of fear of medication unavailability.

Political interference contributing to wastage and as a potential barrier to implementing wastage reduction strategies was discussed in all groups and by almost all participants. Undermining of HCPs and scientific experts by political influence has been described elsewhere (Check, 2003; Mckee and Novotny, 2003; Baum *et al.*, 2009; Roth-Deubel and Molina-Marín, 2013). In a commentary, Rest and Halpern (2007) argue that public policy decisions need to be informed by independent scientists rather than through political interference if one wants to ensure a good government and a functioning democracy. Pham *et al.* (2009) describe the importance of segregating 'macro-level decisions' generated at a political debate level from 'micro-level decisions'. This is in line with participants' suggestions around the need to redefine political will. Consistent with the

arguments by Post *et al.* (2010), that political will should be a group-level concept rather than stemming from an individual, participants emphasised that the healthcare system should be at health department level and not the individual Minister level.

While the issue of medication shortages was clearly demonstrated during the Delphi technique and the surveys, it was discussed in depth during the focus groups as a key cause of unnecessary hoarding and stocking by patients and also recommended to patients at times by HCPs. As discussed in chapter 5, medication shortages are a global problem with all medication classes being affected (European Association of Hospital Pharmacists, 2013; Dill and Ahn, 2014) and have been described for more than a decade (Charatan, 2001). This issue has also been recognised as causing great distress to patients, their carers and families (European Association of Hospital Pharmacists, 2013). There are many and complex reasons for medication shortages including manufacturing quality problems, the increased demand of medication and changes in regulatory standards of manufacturing plants, amongst others (Gray and Manasse, 2012). Following a reflection paper on the issue of medication shortages by the European Medicines Agency, the European Association of Hospital Pharmacists (2013) issued a number of recommendations. One key recommendation is the collaborative involvement of patients' organizations, using their expertise to issue guidelines for patients and HCPs to promote rational medication use. Interestingly focus group participants were in accord with this recommendation, proposing one solution involving collaborating with patient groups to provide guidance, support and reassurance.

A comprehensive description of strategies to potentially reduce wastage was elicited. These will require intervention at macro-contextual levels (e.g. the need to implement public policies and to reduce political interference), meso-transactional level (e.g. the need discussed to purchase medication according to supply and demand) and at the micro-organizational level (e.g. the resources and services discussed). Implementation of any of these strategies is likely to be an iterative process, especially since each and every strategy merits further consideration which

will generate its own multifaceted challenges. Nonetheless, implementation of some strategies might not be as simple or straightforward as one might think. In a qualitative study employing photo-elicitation to identify different types of wastage, Goff *et al.* (2013) discuss the need to re-engineer systems to target all different types of wastage, and this requires the involvement of multiple stakeholders. Moreover, Goff *et al.* (2013) added that whilst attempting to reduce medication wastage one needs to be careful so as not to generate other forms of wastage, such as the time and money invested in implementing a specific intervention which may not always outweigh the benefits of introducing the intervention.

The literature indicates that success of implementation depends on a number of inter-related factors, with some factors more prominent than others. Key success factors include the need of adequate human and financial resources available for implementation and desirable implementation factors defined as “*effective planning; project management; communication; collaboration; useful tools; clear implementation strategy; teamwork; champions; monitoring, evaluation and feedback; incentives; flexibility; autonomy; standardization; tailoring implementations to the local context*” and the actual preparation for change (Braithwaite *et al.*, 2014, p.324). Behavioural change theories that promote uptake and optimal use of strategies are discussed further in chapter 7.

Some of the strategies suggested by participants have been used elsewhere with positive outcomes. Health education campaigns have reduced the level of antibiotic prescribing both in Malta (The Malta Independent, 2013) and elsewhere (Chahwakilian *et al.*, 2011; Formoso *et al.*, 2013; National Institute for Health and Care Excellence, 2014). Patient education delivered through health promotion leaflets, patient medication reviews and attention to prescribing, have also been discussed (Jesson *et al.*, 2005). Some of the solutions from the current study are also in line with recommendations formulated during workshops throughout a Maltese conference on improving medication use in older persons (Office of the Commissioner for Mental Health and Older Persons, 2013). Overlap in recommendations emerging from this conference include: the need to increase



education and awareness amongst patients and HCPs; to use various forms of media education including social media; the need for a holistic and integrated IT system between different sectors; the need to empower different HCPs and patients; the need for clear management pathways; the importance of communication and adequate documentation; interdisciplinary teams conducting regular medication reviews; encouraging evidence-based prescribing; and patient registration with GPs. The similarity in these findings strengthens the evidence towards the need to utilise these solutions to target appropriate medication use and thus prevent wastage. The importance of some of these solutions, such as communication and documentation, has already been recognised at a national level (Superintendence of Public Health, 2012). However, it is clear that there remains a need for further action to implement and sustain change.

Novel suggestions from focus group participants include: the introduction of a patient specific pharmaceutical identity card containing all medication history for both privately purchased medication and those obtained for free to prevent redispensing; and the establishment of a healthcare intermediary independent body for Government subsidised medication. Maltese health authorities should consider each solution in turn and determine the societal and economic ramifications of each and subsequently underpin those strategies which can have a national impact.

## **6.5 Conclusion**

To date there is paucity of studies employing a theoretical framework to identify key underlying medication wastage related behaviours. This study has employed the 14 domain TDF to provide new insight into beliefs and behaviours in relation to medication wastage (such as system, practitioner and patient effects) which require attention (e.g. lack of education and information, and political interference) as part of strategic development. Relevant TDF domains which generated strong beliefs and lengthy discussions included 'behavioural regulation', 'environmental context and resources' and 'goals'. Findings may also assist health authorities when designing tailored interventions to minimise medication wastage.

## Chapter 7

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*"The improvement of understanding is for two ends: first, our own increase of knowledge; secondly, to enable us to deliver that knowledge to others"*

John Locke  
[Philosopher, physician  
1632-1704]

## Discussion

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This chapter reiterates the research aims, design and key findings, emphasising the novel contribution to knowledge. Potential impact on policy and practice is discussed in the context of Malta and beyond. Further research aims, methodologies and outcome measures are articulated.

### 7.1 Aims and key findings

The need for the implementation of a generic waste management strategy was recognised by the Maltese Government who stated that *"the success of the waste management strategy is not solely dependent on Government's commitment and resourcing. It depends also on the contribution and commitment of each and every one of us, being in our capacity as entrepreneurs, administrators, politicians and above all citizens of the Maltese islands"* (Ministry for Resources and Rural Affairs, 2009, p.7). The need to undertake a systematic, research focused development of strategy to reduce medication wastage was therefore highly topical.

#### 7.1.1 Flow of ideas

The overall aim of this research was:

- *To investigate aspects of medication wastage in Malta by applying mixed methods research*

The following aims for each phase of this research emerged:



- *Chapter 3: To appraise critically, synthesize and present the available evidence on the possible causative factors associated with medication wastage in all populations and settings and the effectiveness of any interventions focusing on wastage reduction as an outcome measure*

Key findings: The systematic review identified 42 published papers, only one of which reported a definition of medication wastage. The main factors contributing to wastage were 'change in medication', 'patient's death', 'resolution of patient's condition' and 'passed expiry date'. Very few studies reported medication wastage as an outcome measure.



- *Chapter 4: To apply the Delphi technique to define 'medication wastage' and its contributory factors in the context of the Maltese population*

Key findings: The Delphi technique generated the following definition for medication wastage, with 86% of panellists agreeing/totally agreeing (exceeding the predefined consensus value of 75%).

*'Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned'.*

Sixty-one possible factors leading to wastage were identified by the panellists, categorised as: 'physical and environmental factors'; 'social and psychological patient factors'; 'cultural factors'; and 'practitioner factors'. A total of 38 out of 61 (62%) statements of factors leading to wastage met consensus following the three Delphi rounds.



- *Chapter 5: To investigate issues of awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, HCPs and respective students*

Key findings: Surveys of HCPs, students and the general public identified key factors contributing to wastage being: lack of patient education/knowledge; the free healthcare system; the overstocking of medication by patients due to

previous or potential out of stock situations; and the fact that patients collected free medication or purchased medication not needed, or more than they needed. There were clear deficiencies in the awareness of medication wastage amongst the general population, HCPs and students.



- *Chapter 6: To describe and understand the beliefs and behaviours regarding medication wastage of the Maltese public and HCPs and to explore potential solutions to reduce medication wastage*

Key findings: Focus groups conducted with HCPs and the general public identified the following five key themes which were proposed as solutions to minimise medication wastage: 1) system effects (stock management, budgeting, independent body governing free healthcare system, pharmaceutical identity card, infrastructure, incentives, medication fee, reimbursement, compulsory private insurance, medication take-back scheme with cash card, high consumption medication, disease prevention); 2) practitioner effects (correct prescribing and accountability, MURs, improved documentation, improved communication); 3) patients effects (increase patient reassurance, patient empowerment); 4) political effects (reduce political interference); 5) awareness and educational effects (increase awareness, strategies and settings to deliver education).

## **7.2 Use of theory in research**

One of the strengths of this research is the use of theory of behaviours in the development of data collection and generation tools, analysis and interpretation. Theory, as defined by Meleis (2012, p.29) is:

*"an organized, coherent, and systematic articulation of a set of statements related to significant questions in a discipline and communicated in a meaningful whole. It is a symbolic depiction of those aspects of reality that are discovered or invented for describing, explaining, predicting, or prescribing responses, events, situations, conditions, or relationships. Theories have concepts that are related to*

*the discipline's phenomena. These concepts are related to each other to form theoretical statements."*

In essence, the importance of theory in research lies within the systematic framework it provides for analysis and in its efficiency in incorporating literature into a single, integrated consistent body of knowledge (Wacker, 1998). Furthermore, theory provides both explanations and predictions in a deductive approach (Gilbert, 2007). Theories of behaviours and behavioural change employed in this research will aid the systematic development of complex interventions to support medication wastage reduction. Such an approach is in line with the recommendations of the UK MRC (Research Councils UK, 2011).

### ***7.3 Promoting quality in research***

This research was conducted according to highest of ethical and scientific principles and standards of conduct as described in chapter 2. Studies were designed so as to promote research robustness and rigour hence maximising the quality of evidence while minimising the potential for systematic error. Strengths and limitations of the research data obtained from each phase have been highlighted throughout.

### ***7.4 Contribution to knowledge***

This body of research is an original contribution to scholarly knowledge, providing results and generating findings which will aid the development of strategies and solutions to reduce medication wastage. Reducing medication wastage is a complex task and will require interventions at the macro-contextual, meso-transactional and micro-organizational levels, as has been described in chapter 6.

The pragmatic approach adopted in this research captured a broad range of behaviours. The development and subsequent implementation of interventions are based on theories of behavioural change. Michie *et al.* (2011, p.1) defined behaviour change interventions as "*coordinated sets of activities designed to change specified behaviour patterns*". This research has applied systematic review, consensus study and sequential explanatory mixed methods approach of

surveys followed by focus groups. The latter research phases allowed an understanding of the nature of behaviours around the issue of medication wastage.

Recommended interventions and policies to change behaviour within this research fit well with the 'Behaviour Change Wheel' (BCW), which promotes uptake and optimal use of strategies. As depicted by Figure 7.1, at the centre of the BCW lies the foundation of the framework of capability, opportunity and motivation. The intervention functions and ultimately policy categories are built on this foundation (Michie *et al.*, 2011).

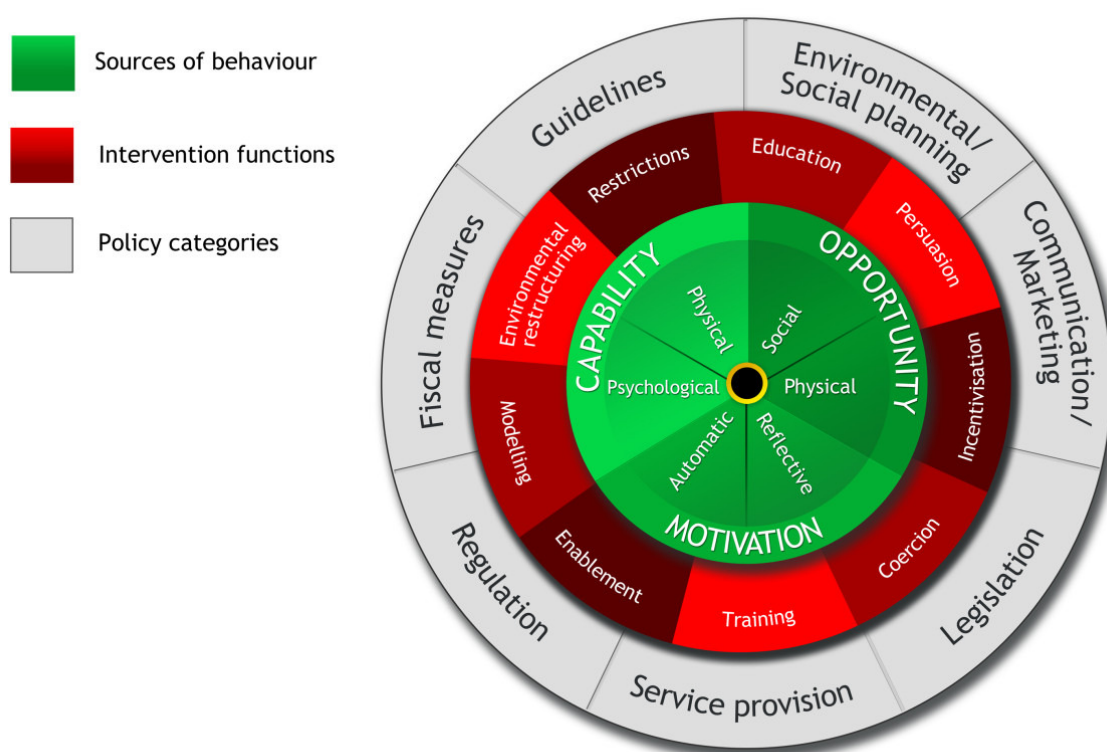


Figure 7.1: The BCW [Source: Michie *et al.*, 2011]

The TDF domains have provided an accepted theoretical approach to identifying the behavioural determinants in relation to medication wastage. The different elements of the BCW relate to the different solutions proposed throughout the research, especially in terms of 'education' and 'training' (Michie *et al.*, 2011). Education as a means of imparting knowledge and developing understanding of

the factors leading to medication wastage, as well as training to develop skills to minimise and prevent wastage were both strongly highlighted in this research under different TDF domains. If seen as a complex adaptive system, healthcare organizations have diverse parties that learn, including patients, HCPs and other stakeholders (McDaniel *et al.*, 2009). Therefore, educational effect interventions need to be targeted at the organizational, professional and individual (HCP, patient) levels.

The need to improve communication, highlighted under many domains and particularly 'social influences', maps to the BCW 'persuasion', defined as the "*communication to induce positive or negative feelings or stimulate action*" (Michie *et al.*, 2011, p.7). The free healthcare system, which was highlighted repeatedly throughout the survey and focus group phases as a contributory factor to wastage should be recognised by the government/organization as an embedded barrier within the social and cultural context of Malta. This also relates to the need for 'environmental restructuring' in the BCW, defined as "*changing the physical or social context*" (Michie *et al.*, 2011, p.7). This is in line with the NHS strategy issued by the Government, describing objectives relating to ensuring a sustainable healthcare system (Ministry for Health, 2014b).

A change in attitudes of HCPs is also crucial, evidenced by some HCPs unnecessarily stockpiling medication, rather than leading by example. This highlights the importance of 'modelling' as described in the BCW, and defined as the provision of an example "*for people to aspire or to imitate*" (Michie *et al.*, 2011, p.7). This also has relevance to reinforcing professionalism, which can be encouraged through 'incentives' as well as 'restrictions' by using rules to minimize the opportunity of creating wastage (Michie *et al.*, 2011). This research highlights the need for the Maltese healthcare system to be seen as a complex adaptive system where the managerial positions should practice influence rather than power, with command and control being replaced with incentives and inhibitions (Rouse, 2008).

Many of the solutions proposed in this research align to the BCW 'enablement' aspect of increasing means and minimising barriers to increase both capabilities and opportunities. 'Coercion', defined as the "*expectation of punishment or cost*"



(Michie *et al.*, 2011, p.7), was proposed by some focus group participants through introducing a medication fee to replace the current free of charge medication system. The need for the healthcare system and organization to provide clear goals relating to medication use and wastage, aligning to the 'Intentions' was discussed.

When discussing the BCW, Michie *et al.* (2011) distinguish between the interventional solutions aimed at changing behaviour discussed above and the actions taken by authorities in the form of policies to support those interventions. This study clearly highlights the fact that policy makers need to address not only the legislative aspects described within this study but also the social, economic and environmental factors that affect people's aptitude to change their behaviour (National Institute for Health and Care Excellence, 2007).

The BCW aims to change behaviour. However, interventions need to become accepted and integrated into routine practices. Therefore, novel explanatory frameworks, such as the Normalisation Process Theory (NPT), can aid in the understanding of the barriers and facilitators described within this research and inform future implementation, and thus should be used with the BCW to bring about the desired change. The NPT is a theory of action (May and Finch, 2009) which targets social processes and work that individuals carry out alone and in conjunction with others to make an intervention work (Bamford *et al.*, 2012). Therefore it targets implementation of an intervention to bring a practice into action through four generative mechanisms: coherence; cognitive participation; collective action; and reflexive monitoring. NPT is concerned with embedding practice in the everyday work of individuals and groups and with the integration of practice which is sustained within an organization or institution, as shown in Figure 7.2 (May and Finch, 2009). This requires continuous investment in terms of commitment, effort, meaning and appraisal (Finch *et al.*, 2013).

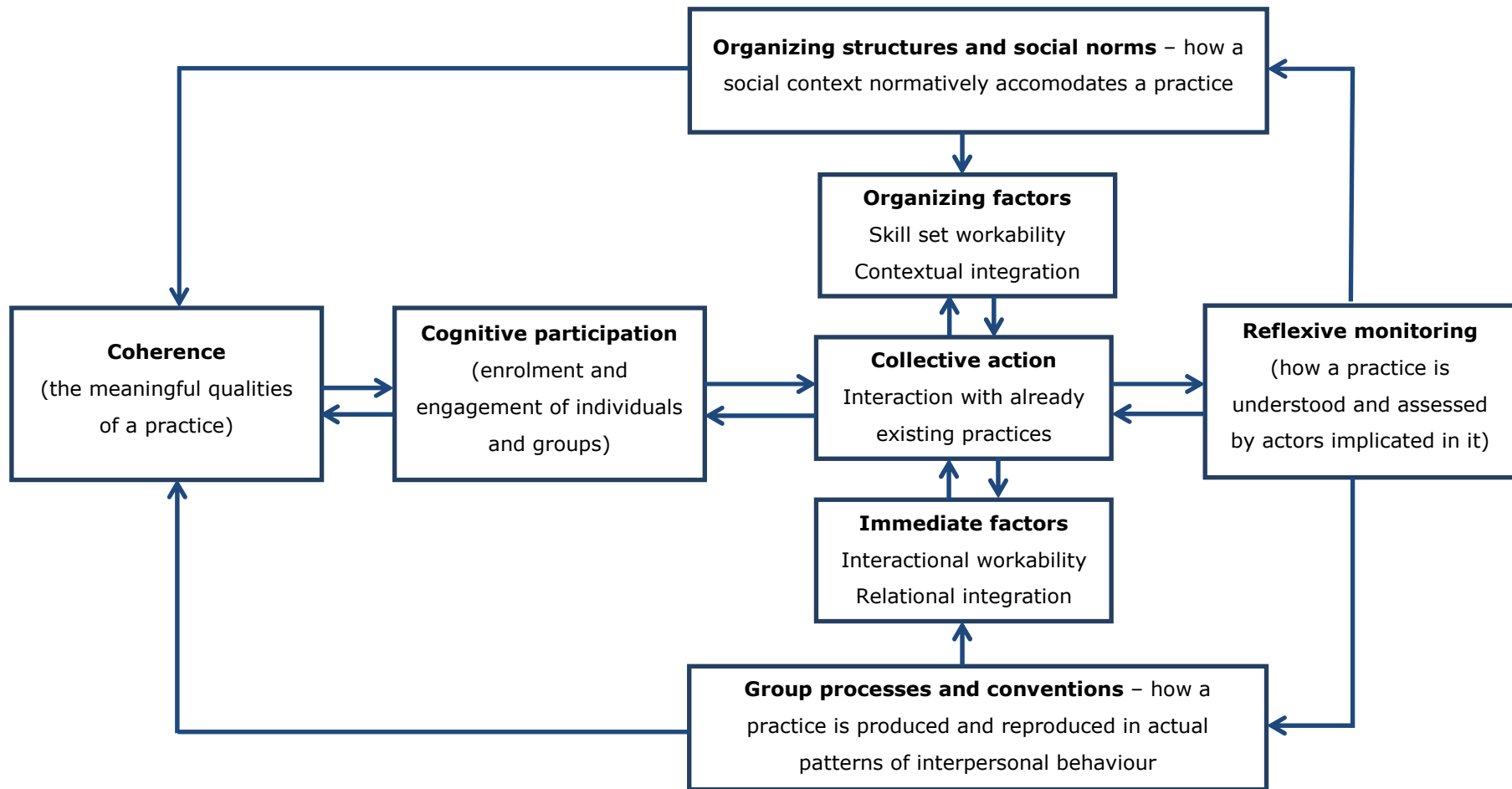


Figure 7.2: Components of NPT [Source: May and Finch, 2009]

## ***7.5 Implications of research***

The results and findings of this research are of direct relevance and have potential to impact a range of key stakeholders with the overall goals of achieving wastage minimisation and compliance with EU regulations as per strategic objectives of the Maltese Government (Ministry for Resources and Rural Affairs, 2009). Complex and multimodal interventions are required to promote behavioural change at individual, population and organizational levels. These interventions have implications for members of the public, patients, HCPs, students, educators, policy makers and many others.

Policy makers, service providers, practitioners and patients need to be partners in this mission to bring about the necessary change. As one of the participating doctors in the focus group discussed, altering patients' perspectives will have an influence on the HCPs and policy makers' perspectives.

## ***7.6 Recommendations to policy makers and other stakeholders and suggested future research***

### ***7.6.1 Need for policy and guidelines***

Findings generated from the mixed methods studies in this PhD emphasise strongly the need for policy and guidelines in a number of areas related to medication wastage. Evidence generated and collated from all the four studies within this research present contributory factors of wastage and call for urgent assessment of these factors and implementation of policies and guidelines to overcome them. As discussed in the paper by Dingfelder and Mandell (2011), contextual factors are critical variables when adopting and sustaining new strategies, interventions or practices.

Areas requiring prioritisation when developing policies in line with the BCW are:

- promoting awareness of medication wastage and information-sharing through communication (such as mass media campaigns)

- implementing educational measures regarding medication waste minimisation for all HCPs

Other areas that need to be addressed when developing policies are:

- issues of environmental and social planning (such as controlling the physical and social environment through the proposed solutions within this research)
- service provision (such as policies on the return of unused medication by patients and disposal of unused medication)
- establishing rules of behaviour of practice to regulate the current health system, including guidelines for HCPs with clear procedures on the prescribing of medication which are supplied free of charge, with links to the GFL
- guidelines for the public around storage of medication

Development of policies should follow the policy cycle depicted in Figure 7.3 (World Health Organization, 2014) in relation to the NPT described above which will aid to review and evaluate the implementation process. Participants in this research, representing key stakeholders in the Maltese healthcare system, have played a crucial role in the policy process by portraying an understanding of the present issues and establishing a vision to reduce medication wastage (Step 1 in Figure 7.3).

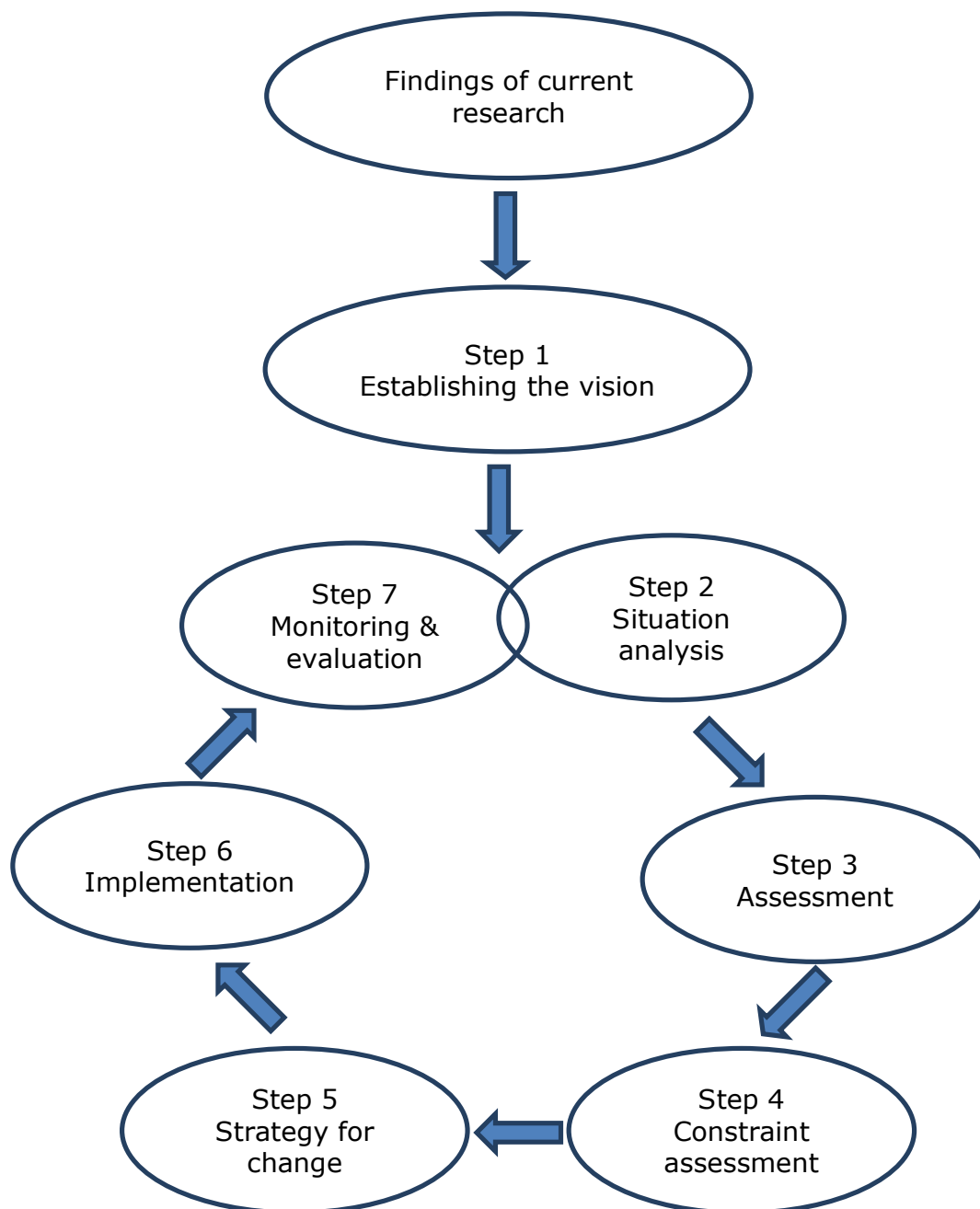


Figure 7.3: The policy cycle [Adapted from World Health Organization, 2014]

To promote uptake and sustainability, all stakeholders and stakeholder groups need to be involved in policy development, planning and implementation. This may help to ensure that the policy is not rejected at implementation stage and, once implemented, it is not opposed due to misunderstandings or lack of communication (Schmeer, 1999). Current literature lacks clarity on how to identify stakeholders

and establish their importance to policy decision and policy making (Jepsen and Eskerod, 2009).

The Maltese Government currently aims to apply a people-centred concept which recognizes four major groups of stakeholders of 1) individuals, families and communities; 2) health practitioners; 3) healthcare organizations; and 4) health authorities (Ministry for Health, 2014b). In a healthcare system, which can be considered as a complex adaptive system with strong tendencies to learn, adapt, and self-organize (Rouse, 2008), change depends on each individual being empowered to act autonomously and in an informed way (Innes and Booher, 1999). Schiller *et al.* (2013) provide a broader framework as depicted in Figure 7.4.

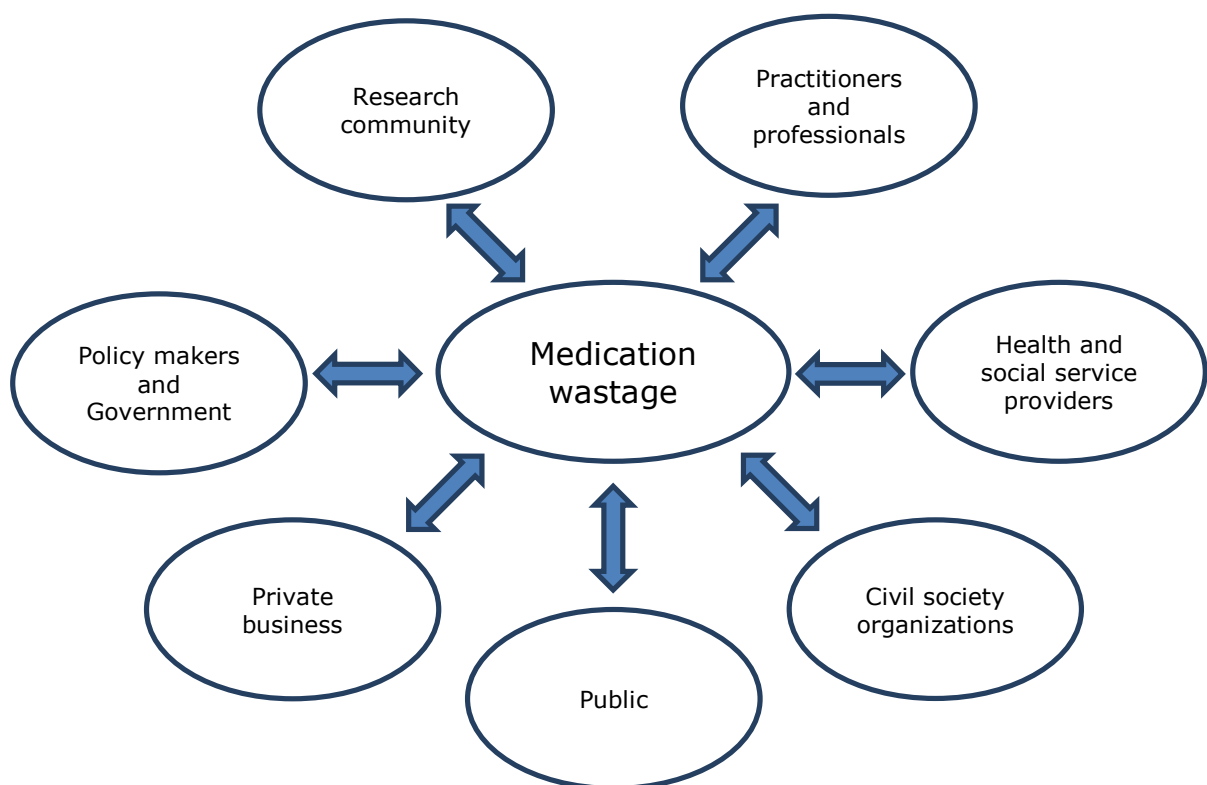


Figure 7.4: Framework of stakeholder categories [Adapted from Schiller *et al.*, 2013]

### 7.6.2 Need for education and training

Attention needs to be given to aspects of medication wastage within undergraduate healthcare student educational programmes and CPD for professionals. Recognising the factors giving rise to wastage, evidenced throughout this research, will help to define the learning outcomes for both students and HCPs. Quality improvement measures such as lean thinking could be deployed as educational and interventional measures which can result in wastage minimisation. Lean thinking, which adapts from the five principles of Lean (Figure 7.5), is a quality improvement philosophy originally formulated for manufacturing by Ohno Taichi of Toyota, and attempts to improve value and remove wastage. The concept of Lean has been applied into different healthcare settings, with the resultant delivery of excellent and efficient care in a safe environment which benefits patients, employees and tax-payer (Rexhepi and Shrestha, 2011; McDermott *et al.*, 2013).

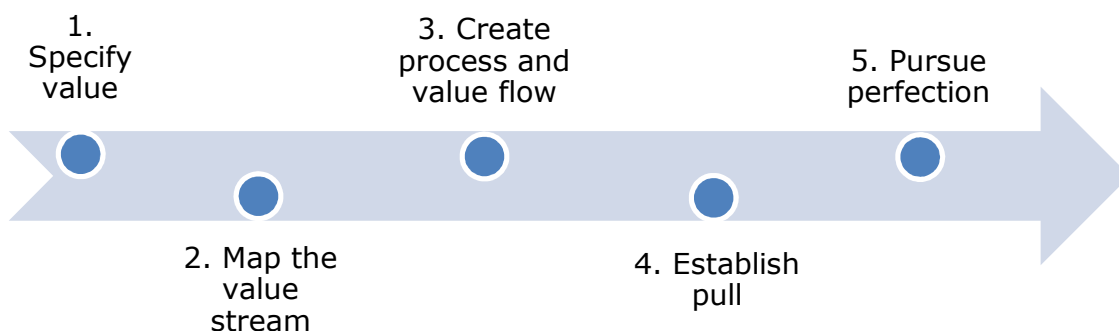


Figure 7.5: The five principles of Lean [Adapted from Lean Enterprise Institute, 2009]

A goal arising from the current research is to plan and deliver appropriate education and training for HCPs and students with the aim of knowledge and skills development around effective and efficient medication usage hence minimising wastage. The need to implement different educational measures, such as education on appropriate medication use for the general public and patients in different settings, has also been recognised within this research.

### **7.6.3 Future research**

One of the benefits of this research is the linkage to practice developments. While there are many future research areas and questions which emerge from this research, this section focuses on key priority areas. It is also recommended that the views of stakeholders are sought in further developing these suggestions.

#### *7.6.3.1 The effect of policy implementation on practice from the HCP perspective*

As discussed above, implementing policies requires the engagement of a wide range of stakeholders and relies on various disciplines in order to address complex implementation challenges (Peters *et al.*, 2013). Policies can modify the role of different stakeholders, including HCPs, change the relationships among them, and change the resources available to them.

Research question: What are the effects of policy implementation on practice from HCP perspectives?

Research philosophy: This study adapts with the interpretivist paradigm in that it explores in-depth effects from the perspectives of HCPs.

Methodology and methods: A phenomenological methodology of focus group studies with different HCPs (dentists, doctors, nurses and pharmacists) identified through purposive sampling to explore the policy implementation and impact.

Outcome measures around policy implementation and impact are complex and will include perspectives and experiences of: acceptability, adoption, appropriateness, feasibility, practice impact, and sustainability.

#### *7.6.3.2 Effects of education*

The European Commission recognises the importance of education for the achievement of a sustainable future and proposes education as one of the measurable targets for 2020 (European Commission, 2010). Therefore, measuring the effects of education is imperative to determine its success.



Research question: What are the effects of education on the public, patients, HCPs, students and educators in relation to medication waste minimisation?

Research philosophy: This study takes a pragmatic approach in that it both measures as well as explores the effects of education on different stakeholders.

Methodology and methods: Survey and phenomenological methodologies to determine the effects of education, using a mixed methods approach with samples of the public, patients, HCPs, students and educators. An explanatory sequential approach could be adopted with a quantitative design followed by qualitative methods. The quantitative element, pre and post intervention questionnaires, would be distributed to random samples to determine their self-reported perspectives. Results could be further explored through qualitative interviews or focus groups with purposive samples.

Outcome measures around policy implementation:

Quantitative: self-reported skills pre and post the educational intervention.

Qualitative: experiences of their adoption of educational interventions and the facilitators and barriers encountered to adopting such interventions.

#### *7.6.3.3 Overall impact of the interventions on medication wastage*

Determining the impact of interventions will establish the success or otherwise of these interventions and hence is the most important area of research.

Research question: What is the overall impact of the interventions on medication wastage? This will apply the definition of medication wastage and outcome measures derived through this doctoral research.

Research philosophy: This study takes a positivist approach in that it determines impact of interventions and attempts to quantify waste reduction.

Methodology and methods: Quantitative tools will be developed, validated and piloted to quantify amount of expired and unused medication and its cost, to determine patient medication adherence and medication appropriateness before and after the intervention.

Outcome measures relate to each element of the definition:

*Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain:* amount of expired and unused medication before and after the intervention.

*Medication wastage also refers to the unnecessary or inappropriate consumption of medication by patients:* patient medication adherence (measured using MMAS-8-Item) before and after the intervention in a sufficiently powered sample of patients.

*Medication wastage also refers to the unjustified non-adherence to treatment guidelines by HCPs:* clinical audit of HCP adherence to clinical guidelines in therapeutic target areas highlighted by stakeholder group; medication appropriateness, measured using a scale such as the Medication Appropriateness Index (Hanlon *et al.*, 1992), before and after the intervention in a sufficiently powered sample of patients.

*Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned:* medication costs, acknowledging that a pharmacoeconomic assessment is likely to be complex requiring health economic modelling (and thus health economist input to research design) from many perspectives.

## **7.7 Conclusion**

This body of work has identified a paucity of published literature on medication wastage, particularly around interventions using wastage as an outcome measure. A consensus based definition of medication wastage was derived and used in later research phases.

The cross-sectional questionnaires, based on selected theoretical frameworks, namely Rogers' Diffusion of Innovation theory, the HBM and the TTM, have

demonstrated that more effort is warranted to raise awareness and educate the public, HCPs and students as initial steps in promoting behavioural change. The TDF was applied to design the focus group guide and to systematically interpret findings of the focus group discussions and to identify key underlying medication wastage related behaviours which required attention (e.g. lack of education and information, and political interference) as part of strategic development. This research has highlighted the areas requiring prioritisation when developing and implementing policies and strategies.

While the research was conducted within Malta and notwithstanding limitations such as low response rates, it is likely that results and findings are generalizable and transferrable to other countries and settings.

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## ***Appendix 3.1: Search strategy***

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### Box 1: Search terms and search strings

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Medic\* wast\* or unwanted medic\* or unwanted pharm\* or unwanted drug\* or unused medic\* or unused pharm\* or unused drug\* or drug wast\* or pharm\* wast\* or prescription\* wast\* or unnecessary medic\* or unnecessary drug\* or unnecessary pharm\* or extra medic\* or extra drug\* or extra pharm\* or surplus medic\* or surplus drug\* or surplus pharm\* or untouched medic\* or untouched drug\* or untouched pharm\* or remaining medic\* or remaining drug\* or remaining pharm\* or returned medic\* or returned drug or returned pharm\* COMBINED with (1) Patient\* or pharmacist\* or doctor\* or prescriber\* or student\* (2) Perception\* or opinion\* or belief\* or awareness or attitude\* or concept\* or knowledge (3) Solution\* or reduc\* (4) Medic\* appropriate\* or medic\* manage\* or appropriate\* or medic\* review\* or drug review\*

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## Search terms for Medline and CINAHL

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### Search Combination 1:

- S1. medic\* wast\*
- S2. unwanted medic\* OR unwanted pharm\* OR unwanted drug\*
- S3. unused N1 medic\* OR unused N1 pharm\* OR unused N1 drug\*
- S4. pharm\* wast\*
- S5. prescription\* wast\*
- S6. unnecessary N1 medic\* OR unnecessary N1 pharm\* OR unnecessary N1 drug\*
- S7. extra N1 medic\* OR extra N1 pharm\* OR extra N1 drug\*
- S8. surplus N1 medic\* OR surplus N1 pharm\* OR surplus N1 drug\*
- S9. untouched N1 medic\* OR untouched N1 pharm\* OR untouched N1 drug\*
- S10. remaining medic\* OR remaining pharm\* OR remaining drug\*
- S11. returned medic\* OR returned pharm\* OR returned drug\*
- S12. S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11
- S13. S12 AND patient\*
- S14. S12 AND pharmacist\*
- S15. S12 AND doctor\*
- S16. S12 AND prescriber\*
- S17. S12 AND nurse\*
- S18. S12 AND student\*
- S19. S13 OR S14 OR S15 OR S16 OR S17 OR S18

### Search Combination 2:

- S20. S12 AND perception\*
- S21. S12 AND opinion\*
- S22. S12 AND belief\*
- S23. S12 AND awareness
- S24. S12 AND attitude\*
- S25. S12 AND concept\*
- S26. S12 AND knowledge
- S27. S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26

### Search Combination 3:

- S28. S12 AND solution\*
  - S29. S12 AND reduction
-

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S30. S28 OR S29

**Search Combination 4:**

S31. S12 AND medic\* appropriate\*

S32. S12 AND medic\* manage\*

S33. S12 AND appropriate\*

S34. S12 AND medic\* review\*

S35. S12 AND drug review\*

S36. S31 OR S32 OR S33 OR S34 OR S35

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**Search terms for the Cochrane Library**

**Search Combination 1:**

#1. medic\* wast\*

#2. unwanted medic\* OR unwanted pharm\* OR unwanted drug\*

#3. unused NEXT medic\* OR unused NEXT pharm\* OR unused NEXT drug\*

#4. pharm\* wast\*

#5. prescription\* wast\*

#6. unnecessary NEXT medic\* OR unnecessary NEXT pharm\* OR unnecessary NEXT drug\*

#7. extra NEXT medic\* OR extra NEXT pharm\* OR extra NEXT drug\*

#8. surplus NEXT medic\* OR surplus NEXT pharm\* OR surplus NEXT drug\*

#9. untouched NEXT medic\* OR untouched NEXT pharm\* OR untouched NEXT drug\*

#10. remaining medic\* OR remaining pharm\* OR remaining drug\*

#11. returned medic\* OR returned pharm\* OR returned drug\*

#12. #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11

#13. #12 AND patient\*

#14. #12 AND pharmacist\*

#15. #12 AND doctor\*

#16. #12 AND prescriber\*

#17. #12 AND nurse\*

#18. #12 AND student\*

#19. #13 OR #14 OR #15 OR #16 OR #17 OR #18

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**Search Combination 2:**

#20. #12 AND perception\*  
#21. #12 AND opinion\*  
#22. #12 AND belief\*  
#23. #12 AND awareness  
#24. #12 AND attitude\*  
#25. #12 AND concept\*  
#26. #12 AND knowledge  
#27. #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26

**Search Combination 3:**

#28. #12 AND solution\*  
#29. #12 AND reduction  
#30. #28 OR #29

**Search Combination 4:**

#31. #12 AND medic\* NEAR/5 appropriate\*  
#32. #12 AND medic\* NEAR/5 manage\*  
#33. #12 AND appropriate\*  
#34. #12 AND medic\* NEAR/5 review\*  
#35. #12 AND drug NEAR/5 review\*  
#36. #31 OR #32 OR #33 OR #34 OR #35

**Search terms for Embase**

**Search Combination 1:**

#1. medic\* wast\*  
#2. unwanted medic\* OR unwanted pharm\* OR unwanted drug\*  
#3. unused adj medic\* OR unused adj pharm\* OR unused adj drug\*  
#4. pharm\* wast\*  
#5. prescription\* wast\*  
#6. unnecessary adj medic\* OR unnecessary adj pharm\* OR unnecessary adj drug\*  
#7. extra adj medic\* OR extra adj pharm\* OR extra adj drug\*  
#8. surplus adj medic\* OR surplus adj pharm\* OR surplus adj drug\*  
#9. untouched adj medic\* OR untouched adj pharm\* OR untouched adj drug\*  
#10. remaining medic\* OR remaining pharm\* OR remaining drug\*  
#11. returned medic\* OR returned pharm\* OR returned drug\*

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#12. #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11

#13. #12 AND patient\*

#14. #12 AND pharmacist\*

#15. #12 AND doctor\*

#16. #12 AND prescriber\*

#17. #12 AND nurse\*

#18. #12 AND student\*

#19. #13 OR #14 OR #15 OR #16 OR #17 OR #18

#### **Search Combination 2:**

#20. #12 AND perception\*

#21. #12 AND opinion\*

#22. #12 AND belief\*

#23. #12 AND awareness

#24. #12 AND attitude\*

#25. #12 AND concept\*

#26. #12 AND knowledge

#27. #20 OR #21 OR #22 OR #23 OR #24 OR #25

#### **Search Combination 3:**

#28. #12 AND solution\*

#29. #12 AND reduction

#30. #28 OR #29

#### **Search Combination 4:**

#31. #12 AND medic\* adj5 appropriate\*

#32. #12 AND medic\* adj5 manage\*

#33. #12 AND appropriate\*

#34. #12 AND medic\* adj5 review\*

#35. #12 AND drug adj5 review\*

#36. #31 OR #32 OR #33 OR #34 OR #35

### **Search terms for PubMed**

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#### **Search Combination 1:**

#1. medic\* wast\*

#2. unwanted medic\* OR unwanted pharm\* OR unwanted drug\*

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- 
- #3. unused medic\* OR unused pharm\* OR unused drug\*
  - #4. pharm\* wast\*
  - #5. prescription\* wast\*
  - #6. unnecessary medic\* OR unnecessary pharm\* OR unnecessary drug\*
  - #7. extra medic\* OR extra pharm\* OR extra drug\*
  - #8. surplus medic\* OR surplus pharm\* OR surplus drug\*
  - #9. untouched medic\* OR untouched pharm\* OR untouched drug\*
  - #10. remaining medic\* OR remaining pharm\* OR remaining drug\*
  - #11. returned medic\* OR returned pharm\* OR returned drug\*
  - #12. #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11
  - #13. #12 AND patient\*
  - #14. #12 AND pharmacist\*
  - #15. #12 AND doctor\*
  - #16. #12 AND prescriber\*
  - #17. #12 AND nurse\*
  - #18. #12 AND student\*
  - #19. #13 OR #14 OR #15 OR #16 OR #17 OR #18

---

**Search Combination 2:**

- #20. #12 AND perception\*
- #21. #12 AND opinion\*
- #22. #12 AND belief\*
- #23. #12 AND awareness
- #24. #12 AND attitude\*
- #25. #12 AND concept\*
- #26. #12 AND knowledge
- #27. #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26

**Search Combination 3:**

- #28. #12 AND solution\*
- #29. #12 AND reduction
- #30. #28 OR #29

**Search Combination 4:**

- #31. #12 AND medic\* appropriate\*
  - #32. #12 AND medic\* manage\*
-



#33. #12 AND appropriate\*  
#34. #12 AND medic\* review\*  
#35. #12 AND drug review\*  
#36. #31 OR #32 OR #33 OR #34 OR #35

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## Search terms for SCI Expanded - Web of Science

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### Search Combination 1:

#1. TS=(medic\* SAME wast\*)  
#2. TS=(unwanted SAME medic\* OR unwanted SAME pharm\* OR unwanted SAME drug\*)  
#3. TS=(unused SAME medic\* OR unused SAME pharm\* OR unused SAME drug\*)  
#4. TS=(pharm\* SAME wast\*)  
#5. TS=(prescription\* SAME wast\*)  
#6. TS=(unnecessary SAME medic\* OR unnecessary SAME pharm\* OR unnecessary SAME drug\*)  
#7. TS=(extra SAME medic\* OR extra SAME pharm\* OR extra SAME drug\*)  
#8. TS=(surplus SAME medic\* OR surplus SAME pharm\* OR surplus SAME drug\*)  
#9. TS=(untouched SAME medic\* OR untouched SAME pharm\* OR untouched SAME drug\*)  
#10. TS=(remaining SAME medic\* OR remaining SAME pharm\* OR remaining SAME drug\*)  
#11. TS=(returned SAME medic\* OR returned SAME pharm\* OR returned SAME drug\*)  
#12. #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11  
#13. TS=(#12 AND patient\*)  
#14. TS=(#12 AND pharmacist\*)  
#15. TS=(#12 AND doctor\*)  
#16. TS=(#12 AND prescriber\*)  
#17. TS=(#12 AND nurse\*)  
#18. TS=(#12 AND student\*)  
#19. #13 OR #14 OR #15 OR #16 OR #17 OR #18

---

**Search Combination 2:**

#20. TS=(#12 AND perception\*)

#21. TS=(#12 AND opinion\*)

#22. TS=(#12 AND belief\*)

#23. TS=(#12 AND awareness)

#24. TS=(#12 AND attitude\*)

#25. TS=(#12 AND concept\*)

#26. TS=(#12 AND knowledge)

#27. #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26

**Search Combination 3:**

#28. TS=(#12 AND solution\*)

#29. TS=(#12 AND reduction)

#30. #28 OR #29

**Search Combination 4:**

#31. TS=(#12 AND medic\* SAME appropriate\*)

#32. TS=(#12 AND medic\* SAME manage\*)

#33. TS=(#12 AND appropriate\*)

#34. TS=(#12 AND medic\* SAME review\*)

#35. TS=(#12 AND drug SAME review\*)

#36. #31 OR #32 OR #33 OR #34 OR #35

## Appendix 3.2: Quality assessment tools

### Quality Assessment Tool for Quantitative Research

Question	Yes	No	Partial	Unclear	Not applicable
1. Did the study ask a clearly-focused and relevant question(s) (aims, objectives)?					
2. Was a definition of waste described?					
3. Was the definition of waste for this study clearly explained?					
4. Was ethics approval reported?					
5. Was the study design/method justified and appropriate for the research question(s)?					
6. Were limitations of study design/method considered?					
7. Was the sampling population and strategy clear and justified?					
8. Was the sample size justified?					
9. Were participant recruitment strategies clearly described?					
10. Were the data collection tools described, piloted and validated?					
11. Were analysis strategies (quantitative and any open comments) clear and justified?					
12. Were participant characteristics sufficiently described?					

- 13. Is the loss of any of the participants explained?
  - 14. Are the results of the study clearly explained and do the results address the original research question?
  - 15. Were limitations (bias, confounders, generalizability etc.) of findings considered?
  - 16. Were all important outcomes considered so the results can be applied?
  - 17. Are the conclusions supported by the findings?
  - 18. Is conflict of interest reported?
-

### Quality Assessment Tool for Systematic Reviews

Question	Yes	No	Partial	Unclear	Not applicable
1. Did the review ask a clearly-focused question?					
2. Was a definition of waste described?					
3. Was the definition of waste for this study clearly explained?					
4. Did the review include the right type of study?					
5. Did the reviewers try to identify all relevant studies?					
6. Did the reviewers assess the quality of the included studies?					
7. If the results of the studies have been combined, was it reasonable to do so? Are the results of each individual study clearly displayed?					
8. Do the results address the original research question?					
9. How precise are these results?					
10. Can the results be applied to the local population?					
11. Were all important outcomes considered?					
12. Should policy or practice change as a result of the evidence contained in this review?					
13. Is conflict of interest reported?					

### ***Appendix 3.3: Data extraction tool***

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#### **Publication Details**

**Author**

**Year**

**Stated Aims/Objectives**

#### **Participants**

Total number of participants recruited

Age

Gender

Ethnicity

Education

Any other socioeconomic or cultural data

How were the participants recruited

Were there any inclusion or exclusion criteria

#### **The Intervention**

Study design

Country

Setting

Description of intervention

Delivered by

Length of study

#### **Outcomes**

Description of outcomes

#### **Results**

Number of participant loss

Reasons for dropping out

Details of statistical analysis

Key findings

*Results:*

---

Definition of medication wastage

Total wasted medication

Quantity: Tablets and Capsules

Quantity: Syrups (oral liquids)

Quantity: Creams/ ointments

Quantity: Inhalers

Quantity: Injections

Quantity: Other

Type: Prescribed

Type: Pharmacy medicine

Type: Over-the-counter or General Sales List medicine

Type: Other including samples and unclear origin

Pharmacological characteristics: Drugs

Pharmacological characteristics: Drug classes

Expiration date

Cost of medication wastage

Causes of medication wastage

Awareness of issues relating to medication wastage amongst patients

Awareness of issues relating to medication wastage amongst HCPs

Awareness of issues relating to medication wastage amongst healthcare students

Approaches to reduce medication wastage

Storage

Disposal

**Author's Conclusion**

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### **Appendix 3.4: References of included studies**

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### **Appendix 3.5: References of excluded papers and reason for exclusion**

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- Cameron, S. (1996) Study by Alberta pharmacists indicates drug wastage a "mammoth" problem. *Canadian Medical Association Journal*, 155(11), 1596-1598. - **It is not primary research.**
- Coker, A., Sangodoyin, A., Sridhar, M., Booth, C., Olomolaiye, P. and Hammond, F. (2009) Medical waste management in Ibadan, Nigeria: obstacles and prospects. *Waste Management*, 29(2), 804-811. - **It is not primary research.**
- Daughton, C.G. and Ruhoy, I.S. (2008) The afterlife of drugs and the role of pharmEcovigilance. *Drug Safety*, 31(12), 1069-1082. - **It is not primary research.**
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*Management*, 28(2), 435-441. - **Refers mainly to general wastage - medication wastage mentioned briefly but not according to protocol.**

## ***Appendix 4.1: Invitation to Participate Letter***

---

Dear Government Official/ Professional Organization/ Practitioner,

### **Re: Definition of medication wastage amongst the Maltese population**

I am a senior clinical pharmacist currently pursuing a PhD at the Robert Gordon University, Aberdeen, Scotland, about medication wastage in Malta. This study will seek to determine the influential factors which have the potential to create medication wastage in Malta, and is being financially supported, and considered as high priority by the Malta Government Scholarship Scheme. A systematic review identified a lack of standard definition for medication wastage. It is therefore the aim of the next phase of the study to formulate a standard definition for medication wastage with the help of a panel of "experts."

I would therefore like to invite you to form part of this panel and participate in a Delphi questionnaire. The expert panel is composed of a combination of Government officials, professional organizations, academics, practitioners, and patients. The Delphi questionnaire involves a number of questionnaire rounds. The first round consists of a questionnaire with open-ended questions where your expertise will be sought. Subsequent rounds will consist of questionnaires containing statements from previous rounds and you will be asked to rate these statements on a Likert scale. There are no right or wrong answers in these questionnaires. Consensus between panellists for the rating of these statements will be sought. It is estimated that consensus will be reached with 3 rounds.

Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member. However, the provided feedback will not disclose names of members who made the attributed response. The study has obtained approval from the Robert Gordon University Ethics Committee and the Maltese Government Research Ethics Committee and is in conformity with the UK Data Protection Act (1998) and the Maltese Data Protection Act (2001) as well as European Union Data Protection Directive (1995).



Questionnaire compilation takes approximately 20 minutes and each round takes place approximately 3 weeks apart. Participation requires an element of commitment as drop out during the study compromises the final results. Medication wastage has been identified to be a major problem amongst many countries. Therefore, completion of this study is the first step towards identifying the root cause of this problem and your expertise would be of great help in achieving this. Findings of this study will inform the next phase of my PhD study which will involve questionnaires amongst healthcare professionals and respective students and case studies with patients.

Whilst I understand your various commitments and busy schedule, I would greatly appreciate your participation. However, this letter carries no obligation on your part to participate and once you enrol in the study you can withdraw whenever you want. If you do accept to participate in the Delphi questionnaire please endorse the attached consent form and kindly email back the scanned copy. As part of the expert panel I would also like you to recommend and provide contact details (as per hereunder) of an individual to participate as well as part of the expert panel. The nominee must be a person working within your organization and who is considered to be most suitable due to him/her working directly with medication wastage or indirectly through experience with medications.

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk. Whilst hoping for a favourable reply, I would like to thank you in advance for your time. Kindly accept or decline participation by not later than \_\_\_\_\_.

Yours sincerely,

Lorna Marie West  
Senior Clinical Pharmacist  
B. Pharm (Hons) MSc (Aberdeen)

Name of Nominee: \_\_\_\_\_

Position: \_\_\_\_\_

Contact details: \_\_\_\_\_

Dear Voluntary Patient Association,

**Re: Definition of medication wastage amongst the Maltese population**

I am a senior clinical pharmacist currently pursuing a PhD at the Robert Gordon University, Aberdeen, Scotland, about medication wastage in Malta. This study will seek to determine the influential factors which have the potential to create medication wastage in Malta, and is being financially supported, and considered as high priority by the Malta Government Scholarship Scheme. A systematic review identified a lack of standard definition for medication wastage. It is therefore the aim of the next phase of the study to formulate a standard definition for medication wastage with the help of a panel of "experts."

I would therefore like you to recommend and provide contact details below of a patient to form part of the expert panel and participate in a Delphi questionnaire. The nominee must be a person with good English language writing skills, must be suffering from a chronic condition for at least the past two years which requires medication treatment, and should be of male/female gender and must be part of \_\_\_\_\_ association. Since the 2012 estimated gender ratio in Malta for the total population is 0.99 male/ female an equal amount of male is to female patients will be recruited. This explains why a specific gender is being requested.

The expert panel is composed of a combination of Government officials, professional organizations, academics, practitioners, and patients. The Delphi questionnaire involves a number of questionnaire rounds. The first round consists of a questionnaire with open-ended questions where the patient's expertise will be sought. Subsequent rounds will consist of questionnaires containing statements from previous rounds and the panellist will be asked to rate these statements on a Likert scale. There are no right or wrong answers in these questionnaires. Consensus between panellists for the rating of these statements will be sought. It is estimated that consensus will be reached with 3 rounds.

Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member. However, the provided feedback will not disclose names of members who made the attributed response. The study has obtained approval from the Robert Gordon University Ethics Committee and the Maltese Government Research Ethics Committee and is in

conformity with the UK Data Protection Act (1998) and the Maltese Data Protection Act (2001) as well as European Union Data Protection Directive (1995).

Questionnaire compilation takes approximately 20 minutes and each round takes place approximately 3 weeks apart. Participation requires an element of commitment as drop out during the study compromises the final results. Medication wastage has been identified to be a major problem amongst many countries. Therefore, completion of this study is the first step towards identifying the root cause of this problem and your expertise would be of great help in achieving this. Findings of this study will inform the next phase of my PhD study which will involve questionnaires amongst healthcare professionals and respective students and case studies with patients.

Whilst I understand your various commitments and busy schedule, I would greatly appreciate your help in selecting a suitable patient for participation. Moreover, once enrolled in the study the participant can withdraw whenever he/she wants.

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk

Whilst hoping for a favourable reply, I would like to thank you in advance for your time. Kindly accept or decline the nomination of a patient by not later than \_\_\_\_\_.

Yours sincerely

Lorna Marie West  
Senior Clinical Pharmacist  
B. Pharm (Hons) MSc (Aberdeen)

Name of Nominee: \_\_\_\_\_

Contact details: \_\_\_\_\_

Dear Academic,

**Re: Definition of medication wastage amongst the Maltese population**

I am a senior clinical pharmacist currently pursuing a PhD at the Robert Gordon University, Aberdeen, Scotland, about medication wastage in Malta. This study will seek to determine the influential factors which have the potential to create medication wastage in Malta, and is being financially supported, and considered as high priority by the Malta Government Scholarship Scheme. A systematic review identified a lack of standard definition for medication wastage. It is therefore the aim of the next phase of the study to formulate a standard definition for medication wastage with the help of a panel of "experts."

From the list of included references in the systematic review you were one of the main authors that published most in the area of medication wastage. I would therefore like to invite you to form part of this panel and participate in a Delphi questionnaire. The expert panel is composed of a combination of Government officials, professional organizations, academics, practitioners, and patients. The Delphi questionnaire involves a number of questionnaire rounds. The first round consists of a questionnaire with open-ended questions where your expertise will be sought. Subsequent rounds will consist of questionnaires containing statements from previous rounds and you will be asked to rate these statements on a Likert scale. There are no right or wrong answers in these questionnaires. Consensus between participants for the rating of these statements will be sought. It is estimated that consensus will be reached with 3 rounds.

Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member. However, the provided feedback will not disclose names of members who made the attributed response. The study has obtained approval from the Robert Gordon University Ethics Committee and the Maltese Government Research Ethics Committee and is in conformity with the UK Data Protection Act (1998) and the Maltese Data Protection Act (2001) as well as European Union Data Protection Directive (1995).

Questionnaire compilation takes approximately 20 minutes and each round takes place approximately 3 weeks apart. Participation requires an element of commitment as drop out during the study compromises the final results. Medication wastage has been

identified to be a major problem amongst many countries. Therefore, completion of this study is the first step towards identifying the root cause of this problem and your expertise would be of great help in achieving this. Findings of this study will inform the next phase of my PhD study which will involve questionnaires amongst healthcare professionals and respective students and case studies with patients.

Whilst I understand your various commitments and busy schedule, I would greatly appreciate your participation. However, this letter carries no obligation on your part to participate and once you enrol in the study you can withdraw whenever you want. If you do accept to participate in the Delphi questionnaire please endorse the attached consent form and kindly email back the scanned copy.

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk

Whilst hoping for a favourable reply, I would like to thank you in advance for your time. Kindly accept or decline the nomination of a patient by not later than \_\_\_\_\_.

Yours sincerely

Lorna Marie West  
Senior Clinical Pharmacist  
B. Pharm (Hons) MSc (Aberdeen)

## ***Appendix 4.2: Consent Form***

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### **Consent Form**

#### **Definition of medication wastage amongst the Maltese population**

I, the undersigned, confirm that I have read and understood the Invitation to Participate letter and that I have had a chance to have my questions answered.

I agree to participate as part of the panel of experts in all the rounds of the Delphi questionnaire regarding medication wastage.

I also agree that the findings of this Delphi technique will be utilized for research purposes only and that anonymity to attributed responses will be kept at all times, except from the principal researcher.

I am also aware that my participation is voluntary and that I can withdraw from the study whenever I would like to.

For any queries or clarifications, the principal researcher can be contacted on 00356 99893001 or an email can be sent to l.m.west@rgu.ac.uk

Name of participant: \_\_\_\_\_

Date: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_

Principal Researcher's Signature: \_\_\_\_\_

## ***Appendix 4.3: Covering Letters: Covering letter round 1***

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Dear ,

I would like to take this opportunity to thank you for accepting to participate as part of the expert panel in the Delphi technique. This is the first questionnaire which consists of open-ended questions where your expertise will be sought. Questionnaire compilation takes approximately 20 minutes. Subsequent questionnaires will contain statements from previous rounds and you will be asked to rate these statements on a Likert scale. Consensus between participants for the rating of these statements will be sought. It is estimated that consensus will be reached with 3 rounds. Completion of this study is the first step towards identifying the root cause of medication wastage and your expertise would be of great help in achieving this.

Here is a link to the survey:

[SurveyLink]

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member.

Should you wish to withdraw your participation from this research study, please click the link below:

[RemoveLink]

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk

I would like to thank you once again for your support and contribution towards this research study. Kindly complete the questionnaire by not later than 17<sup>th</sup> August 2012.

Yours sincerely,

Lorna Marie West

Senior Clinical Pharmacist

B.Pharm (Hons.) MSc Clin Pharm (Aberdeen)

## ***Covering letter Round 2***

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Dear ,

I would like to take this opportunity to thank you for participating as part of the expert panel in the Round 1 Delphi questionnaire. Generated opinions during the first questionnaire were used to develop Round 2 Delphi questionnaire regarding medication wastage.

Compilation of this second questionnaire takes approximately 20 minutes, during which you will be asked to rank or rate statements on a Likert scale. Consensus between participants for the rating of these statements will be sought. It is estimated that consensus will be reached with 3 rounds of questionnaires. Completion of this study is the first step towards identifying the root cause of medication wastage and your expertise would be of great help in achieving this.

Here is a link to the survey:

[SurveyLink]

This link is uniquely tied to this survey and your email address. Please do not forward this message. Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member.

Should you wish to withdraw your participation from this research study, please click the link below:

[RemoveLink]

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk. I would like to thank you once again for your constant support and contribution towards this research study. Kindly complete the questionnaire by not later than 21<sup>st</sup> September 2012.

Yours sincerely,

Lorna Marie West

Senior Clinical Pharmacist

B.Pharm (Hons.) MSc Clin Pharm (Aberdeen)



## ***Covering letter Round 3***

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Dear ,

I would like to take this opportunity to thank you for participating as part of the expert panel in the Round 2 Delphi questionnaire. The results you have provided have been analysed and assessed for degree of consensus. The consensus level chosen for this Delphi technique is 75%. You are now invited to complete the third Delphi round. This third questionnaire will include only statements which have not achieved consensus in Round 2.

Compilation of this third questionnaire takes approximately 20 minutes, during which you will be asked to reconsider your original response in view of the group response. However, you do not have to change your original response if you do not wish to. Next to each statement, you will also find the percentage of participants who marked "Totally disagree", "Disagree", "Neither disagree nor agree", "Agree" and "Totally agree" in round 2, your response to the statement in Round 2 and the comments given by all the participants in Round 2. The abbreviations used next to each statement in this Delphi questionnaire refer to the following: "TD" = Totally Disagree, "D" = Disagree, "N" = Neither disagree nor agree, "A" = Agree, "TA" = Totally agree, "P" = Participant's (your) response from Round 2. Completion of this study is the first step towards identifying the root cause of medication wastage and your expertise would be of great help in achieving this.

Here is a link to the survey:

[SurveyLink]

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Anonymity and confidentiality between members of the panel will be maintained throughout. The undersigned researcher will be the only person who has access to the individual members and their respective responses, as feedback of the individual and the overall group responses from previous rounds will have to be provided to each member.

Should you wish to withdraw your participation from this research study, please click the link below:

[RemoveLink]

For further clarifications, please do not hesitate to contact me on 99893001 or send me an email on l.m.west@rgu.ac.uk

I would like to thank you once again for your constant support and contribution towards this research study. Kindly complete the questionnaire by not later than 19<sup>th</sup> October 2012.

Yours sincerely,

Lorna Marie West  
Senior Clinical Pharmacist  
B.Pharm (Hons.) MSc Clin Pharm (Aberdeen)

## Appendix 4.4: Round 1 Delphi Questionnaire

### Definition of medication wastage amongst the Maltese population

Please complete the following questions:

**1. How would you define medication wastage?**

**2. Do you consider medications which are commonly found in households and intended to be used only if required or in case of an emergency, as wastage? Examples of such medications are paracetamol to be used in cases of pain or fever, salbutamol inhaler to be used as a rescue medication for asthma patients in case of an acute asthma attack and antacids to be used in case of indigestion. State reasons for your answer.**

☐ Yes

☐ No

Reasons (please specify)

**3. Based on regular consumption, how many maximum number of weeks of medication supply do you consider to be acceptable to have in a household? State reasons for your answer.**

**4. In your opinion, what are the possible causes that give rise to medication wastage?**

## Appendix 4.5: Round 2 Delphi Questionnaire

### Definition of Medication Wastage

**1. During round 1 Delphi questionnaire, the question "How would you define medication wastage?" generated a number of definitions which are listed below. Rank the four (4) definitions that you prefer most in order of preference. Choose the definition that you prefer most as number 1 and so on. You can only choose 4 statements.**

	1	2	3	4
1. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medications by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medications by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Medication wastage refers to any medication which remains unused or partly used by patients and that needs to be disposed of, either because it is no longer needed or because it has passed its expiry date. Medication wastage also refers to the unnecessary or inappropriate consumption of medications by patients or incorrect prescribing and dispensing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Medication wastage refers to the financial burden on patients themselves and the state's economy due to bad use of medication resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Medication wastage refers to any medication that does not end up fulfilling its intended and scientifically justified scope before its expiry date or which is inappropriately prescribed or dispensed due to unjustified non-adherence to guidelines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Medication wastage refers to the excessive collection of any medication which is provided free of charge by the state on a periodical basis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Medication wastage refers to prescribed or over-the-counter medication which is purchased or obtained free of charge which expires or remains unused.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

	↑
	↓

**2. In the definitions given above, rather than using the term "any medication" in the first round Delphi questionnaire, some of the respondents used the following terms:**

**Option 1: "prescribed or over-the-counter medication"**

**Option 2: "medication intended for licensed or off-licensed purposes"**

**Option 3: "medication intended for use in the diagnosis, cure, treatment, or prevention of disease"**

**Kindly indicate for the definitions that you chose in question 1, whether you prefer to keep the term "any medication" or whether you prefer to replace it by one of the three options.**

- ☐ I prefer to keep the term "any medication"
- ☐ I prefer to choose option 1: "prescribed or over-the-counter medication"
- ☐ I prefer to choose option 2: "medication intended for licensed or off-licensed purposes"
- ☐ I prefer to choose option 3: "medication intended for use in the diagnosis, cure, treatment, or prevention of disease"

Please include any comments you would like to make in the table below:

--

## Reasons for Keeping Emergency or PRN Medications

During round 1 Delphi questionnaire, consensus has been reached for Question 2: "Do you consider medications which are commonly found in households and intended to be used only if required or in case of an emergency, as wastage? Examples of such medications are paracetamol to be used in cases of pain or fever, salbutamol inhaler to be used as a rescue medication for asthma patients in case of an acute asthma attack and antacids to be used in case of indigestion." 21 out of 23 respondents are in agreement. Please proceed to the next question.

### Number of Weeks of Chronic Medications

**3. Question 3 from Round 1 Delphi questionnaire: "Based on regular consumption, how many maximum number of weeks of medication supply do you consider to be acceptable to have in a household?" generated a number of responses. Reasons given by the panel are provided in the bottom part of the page. Considering the reasons provided by participants, choose the maximum number of weeks of medications which are taken on a regular basis which you consider to be acceptable to have in a household and state the reason why.**

- ☐ Less than 2 weeks
- ☐ 2-4 weeks
- ☐ 5-8 weeks
- ☐ 9-12 weeks
- ☐ More than 13 weeks

Please state the reason for choosing your answer:

The following reasons were given during the first Delphi round by the panel of experts for choosing the specific number of weeks:

2-4 weeks:

"2-4 weeks. minimises probability of wastage. Takes into account possible changes in prescription."

4 weeks:

"I think a maximum of 4 weeks (28 day) medication supply would be acceptable. This would help to maximise patient safety, reflects good medical practice and ensures patient convenience when obtaining medicines."

4-8 weeks:

"1-2 months should be adequate since older patients often have their medications placed in containers which can hold up to 1 months supply and people travel for up to 4 weeks at a time."

8 weeks:

"It depends on how easy it is to get these medicines. If one can be sure that after a month, he can go to the pharmacy and restock, I would say a couple of months supply is OK."

"When treatment is taken on a regular basis it can be supplied for quite a number of weeks such as 8 weeks but in my opinion more than that is wastage."

"In case of medicines for chronic use, 8 weeks is a good supply. Treatment might change so as to better manage a condition, or in situations where patients encounter side effects; and patients, especially those in their 80's might die. In both cases, treatment changes and death, there is wastage of medicines if one dispenses a large supply at one go. On the other hand, it is difficult to dispense for a short period, for example 4 weeks, as one has to take into consideration the costs of the service rendered by pharmacists, and the available resources (pharmacists and support staff). In cases of drugs of dependence, a 30 day supply is good to prevent misuse and abuse of these medications."

"Eight weeks. This allows ample time for the next batch to be prescribed, delivered to your choice of pharmacy, collected and replaced without giving the chance to run out of medication."

12 weeks:

"Provided patients are regularly monitored by their treating professionals, I consider a 3 month [12 weeks] supply to be adequate."

13 weeks:

"13 weeks (except for dangerous drugs or in psychiatric patients)."

12-24 weeks:

"Somewhere between 3-6 months. It would be acceptable to have more of "essential" medications "in case of emergency". i.e. following a recent earthquake, medications were in short supply in some areas. This has led to people having "emergency kits" including a supply of their regular medications."

16 weeks:

"Regular consumption in my case should be of 16 weeks. Less queuing and less labour cost for the government."

"For chronic intake of medication, one should have at least 16 weeks supply. This is based in order to avoid problems when dealing with Out of stock situations and any other scenarios which may end up delaying the patient from buying/procuring medication."

16-24 weeks:

"Two sides - larger to decrease administrative burden (2) to avoid hoarding. Compromise - (4-6 months for chronic medication)."

26 weeks:

"26 [weeks] Less hassle for patient. Less pressure on health care system."

Till your next entitlement date:

"Enough medication till your next entitlement date."

Time would vary depending on factors:

"Enough medicine that would last a patient who has difficulty in obtaining medicine for several reasons until the necessary assistance is available to the patient."

"However, having a back-up supply of basic medication is not necessarily a terrible thing, especially if you suffer from a chronic illness which is almost surely going to plague you for the rest of your life. As long as you're not stupid enough to take medicine which has far outlived its expiry date, then you're perfectly entitled to additional supplies of any medicine you are required to take on a daily basis."

"This depends on the amount and the necessity of taking certain medications."

"There should not be any hoarding of medicines in household beyond what is to be consumed according to what is prescribed."



## Physical and Environmental Causes

**4. The following physical and environmental causes have been attributed to give rise to medication wastage during round 1 Delphi questionnaire. For each reason listed below, rate your level of agreement.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Medications which should be refrigerated and are left out of refrigeration are considered as wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Lack of medication rotation on pharmacy shelves leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Medications are dispensed with short expiry dates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Government medical stores overstock with medications which subsequently expire.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Medications which are no longer in use are not accepted back by pharmacies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Inadequate computerised audits and medication consumption trends lead to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. There is an inadequate information technology implementation and interoperability across interfaces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Large pack sizes when patients require only a short course of these medications leads to wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

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## Social and Psychological Causes

**5. The following social and psychological causes have been attributed to give rise to medication wastage during round 1 Delphi questionnaire. For each reason listed below, rate your level of agreement.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Patients get an oversupply of medications through the Pharmacy of Your Choice even though they do not need it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Inadequate training of healthcare professional students in prescribing, dispensing and administration of medications subsequently leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Inadequate continuing professional development of healthcare professionals in prescribing, dispensing and administration of medications leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Due to patients' expectation that medications will solve every problem, patients take medications when they could have modified their lifestyle behaviour instead.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The prevalence of ignorance is a primary cause of almost everything, so it is also the cause of medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Patients tend to throw away medications which are not expired to refill with "fresh" stock from the pharmacy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Inadequate stock management training of pharmacists and their assistants leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Health care professionals and the health care system does not offer the knowledge, education, support and advice regarding medications to patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Patients lack the knowledge about their medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Irresponsibility and carelessness of patients leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Patients are not educated about the cost of medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Some doctors are not aware of the monetary costs of medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Patients regularly receive medications for pain, or other minor ailments, notwithstanding they still have a good supply at home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Persons of a certain mature age may depend on others to supply them with their necessities. So, they stock medications to a certain excess, to have their minds at rest that they can always be comfortably self sufficient.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. The health care system fails to support medication taking by vulnerable individuals who cannot independently adhere to their treatment regimens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Patients are afraid that their medications will be unavailable when they need them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Patients continue to receive the same amount of medications notwithstanding that their dose has been decreased, due to fear that it will be out of stock in the near future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Many people believe that once they do not collect all of their periodical medication they will automatically be refused the same medication in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Due to lack of communication between hospital and community care, patients continue to receive medications even if these have been stopped.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Different family members handle the collection of medications without taking any notice if the medications are being consumed or not.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Patients should ask their family doctor to prescribe the medications that they consume only and not the whole list that is listed on their yellow entitlement card.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. When prescribing, doctors should ask the patients the quantity of medications they have left at home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. When a person passes away, all his/her medication gets wasted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

## Cultural Causes

**6. The following cultural causes have been attributed to give rise to medication wastage during round 1 Delphi questionnaire. For each reason listed below, rate your level of agreement.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Medications which are provided freely by the state and not paid directly from patients' pockets leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. There should be co-payment of medications (that is patients must pay a fixed fee for their use of specific medications).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When entitled for free medications, patients believe that the medication has no value.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. When entitled for free medications, patients reason that since the medication is "free" it is good to have lots of different medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Medications are regularly out of stock.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Patients hoard medications as they are afraid that the item will be out of stock and then they will be forced to buy the medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. There is lack of stock from the importers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Some patients believe that once they are entitled for a medication, it is theirs by right even in those cases when they do not need it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Medications can be easily purchased without the pharmacist questioning the need of such medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Greed and hording situations by patients, on the welfare system, is a mentality which is difficult to overcome.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

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## Treatment and Counselling Causes

**7. The following treatment and counselling causes have been attributed to give rise to medication wastage during round 1 Delphi questionnaire. For each reason listed below, rate your level of agreement.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Medications have to be changed due to the unexpected development of side-effects, allergies, contra-indications or medication interactions during medication therapy which consequently leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Prescribing antibiotics for acute bronchitis or mild coughs or asthma attacks is considered as wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Overprescribing is one of the causes of medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. A large volume of medication is dispensed during the treatment initiation phase (that is when the patient has just started the medication).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Excessive volumes of medications are supplied to patients during repeat prescribing and dispensing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Doctors stop or change medications when patients have already collected their medication supply.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. If symptoms resolve when patients have already collected their medication supply, these medications go wasted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Men with low pain thresholds taking unnecessary medications lead to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Overbearing mothers who mistake their child's mild bout of the common cold for Yellow fever leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Patients read about illnesses on the internet and they subsequently take medications which they do not require.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. General practitioners do not always have time to review all their patients' medications and so new medications get added to the patients' list.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. General practitioners do not always have time to review all their patients' medications and often those medications that are not required anymore continue to be prescribed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Inadequate medication reviews at the point of dispensing leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. The fact that pharmacists have to spend their time carrying out bureaucratic and administrative chores leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Pharmacists should have the time to concentrate on the patient and their medication usage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Pharmacists should be supported by state of the art information technology to reduce medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Pharmacists should be supported by well trained assistants to reduce medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Patients fail to take the whole course of antibiotics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Non adherence (when patients do not take their medications as intended) to treatment leads to medication wastage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Patients purchase different medications, especially non-prescription medications, upon the advice of different persons, both health care professionals and family/friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

## Appendix 4.6: Round 3 Delphi Questionnaire

### Definition of medication wastage amongst the Maltese population Round

#### Definition of Medication Wastage

**1. During Round 2 Delphi questionnaire, for the question "How would you define medication wastage?" you were asked to rank the four (4) definitions that you prefer most in order of preference. The following definition was the one that was chosen most. Kindly rate your level of agreement to this definition. Key: Percentage (%) in bracket = the percentage of the total number of times the definition was chosen as first preference.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
Medication wastage refers to any medication which expires or remains unused throughout the whole medicines supply chain. Medication wastage also refers to the unnecessary or inappropriate consumption of medications by patients, or the unjustified non-adherence to treatment guidelines by healthcare professionals. Medication wastage poses a financial burden on patients themselves and the state's economy and requires adequate education of all people concerned. (43.5%)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The definition provided above was generated from participants' responses and, therefore, could not be modified by the researcher. In the systematic review the term "medication" and the term "medicine" retrieved the same amount of primary research studies targeting medication wastage. It was decided to use the term "medication" rather than "medicine" for this study to prevent the misunderstanding of the term medicine as pharmaceutical with medicine in terms of the clinical practice of medicine. Please include any comments or modifications you would like to make to the above definition in the table below:

The following comments were provided by 4 participants:

1. "In order to avoid medication wastage, it's a must that patients should and must adhere and obey the medical instructions given to them by their medical carers."
2. "Would refer also to bad storage and purchasing practices by government pharmaceutical services and other cases of ordering supplies over and above what is actually needed."
3. "With respect to definition 6: I would add "or consumed" after "prescribed or dispensed" to include medicines inappropriately consumed by patients in the absence of a prescription. I prefer definition 6 to 2,4 & 1 as the latter three wrongly assume that the only valid scope of a medicinal is in its consumption. However this is not invariably true for medicinals that should be made available (irrespective of consumption) for the sake of maintaining a suitable level of preparedness such as in an Emergency trolley/crash cart or preventing a potential pandemic."
4. "The researcher has to set the boundaries/the scope for the project. Are you going to consider the medicines from prescribing onwards or even the other steps of the supply chain? At the level of the supply chain up to the pharmacy there are certain factors which differ from the perspectives of the step concerning patients directly. It is important that the scope defines the boundaries. Also what do you mean by medication? Is it a prescribed medicine? I can define medicines and medicinal products - but not medication. You need to define medication. Also you will need to define wastage. Is something not used in line with its intended use wasted? Although I prefer alternative 4 I would still reword it. It needs to be more balanced. The last sentence looks like an addendum. I was forced to choose 4 options, but in reality I do not agree with 4 options."

## Definition of medication wastage amongst the Maltese population Round

During Round 2 Delphi questionnaire, consensus has been reached for Question 2:

"In the definitions given above, rather than using the term "any medication" in the first round Delphi questionnaire, some of the respondents used the following terms:

Option 1: "prescribed or over-the-counter medication"

Option 2: "medication intended for licensed or off-licensed purposes"

Option 3: "medication intended for use in the diagnosis, cure, treatment, or prevention of disease"

Kindly indicate for the definitions that you chose in question 1, whether you prefer to keep the term "any medication" or whether you prefer to replace it by one of the three options."

18 out of 23 respondents are in agreement. Please proceed to the next question.

## Definition of medication wastage amongst the Maltese population Round

### Number of Weeks of Chronic Medications

**2. Question 3 from Round 2 Delphi questionnaire: "Based on regular consumption, how many maximum number of weeks of medication supply do you consider to be acceptable to have in a household?" did not achieve consensus. Considering the reasons provided by participants, kindly reconsider your original response in view of the group response. Please note that you do not have to change your original response if you do not wish to. Key: Percentage (%) in bracket = percentage of the total number of times the timeframe was chosen; "P" = Participant's (your) response from Round 2.**

- ☐ Less than 2 weeks (4.3%)
- ☐ 2-4 weeks (13.0%)
- ☐ 5-8 weeks (39.1%) P
- ☐ 9-12 weeks (39.1%)
- ☐ More than 13 weeks (4.3%)

Please state the reason for choosing your answer:

The following comments were provided by 21 participants:

1. "This depends sometimes on the illness severity one may encounter off and on. One likes to keep one's mind at rest especially if one needs to go abroad for a certain period of time long or short, not knowing what availability of finding the medicines needed, while in another country."
2. "The possibility of change of treatment in chronic patients is minimal."
3. "Based on regular consumption & assuming that the prescription is appropriate and correct, wastage should be minimal in these cases. 8 weeks is a sufficiently long & convenient interval - this should also be coupled with the physician reviewing the patient and the prescription regularly."
4. "To allocate time for the patient to retrieve the prescription."
5. "From the answers given by the panel, it appears that most refer to the Government distribution system or the POYC in the private sector; few answers refer to a more general situation. At present there is a discrepancy between the Government Health centres distribution system which is for 12 weeks supply whereas POYC is of 8 weeks; Major objective of adequate supply period should be optimal management of patient outcomes and safety; together with curbing wastage. Other factors may be logistical in nature depending on the scenario of prescribing/dispensing. My choice would be 8-12 weeks but since there is not such a choice in the question I opt for the 9-12 weeks one."
6. "In case of medicines for chronic use, 8 weeks is a good supply. Treatment might change so as to better manage a condition, or in situations where patients encounter side effects; and patients, especially those in their 80's might die. In both cases, treatment changes and death, there is wastage of medicines if one dispenses a large supply at one go. On the other hand, it is difficult to dispense for a short period, for example 4 weeks, as one has to take into consideration the costs of the service rendered by pharmacists, and the available resources (pharmacists and support staff). In cases of drugs of dependence, a 30 day supply is good to prevent misuse and abuse of these medications."
7. "9 - 12 weeks is, in my opinion ideal, as this would give some rest of mind that if there is an occasion when the use of this medicine is required by more than one person on a weekend, it is handy without having to go to the chemist for more supply.. IT HAPPENED TO US WHEN WE WERE TRAVELLING BY CAR FROM DUSSELDORF TO MALTA, STOPPING FOR A FEW DAYS IN DIFFERENT COUNTRIES, WITH DIFFERENT LANGUAGES."



## Definition of medication wastage amongst the Maltese population Round

8. "However this depends on the type of medication, whether for chronic use (and in this case if the medicines are obtained through the NHS, then the schedule has to be followed) or acute use whereby considering the large number of pharmacies in Malta one can obtain medicines very easily. The only problem would be those who are house-bound and rely on other people to get their supplies."
9. "There would be ample time for an appointment for review and for raising the prescription, since if not 4 weeks would suffice."
10. "As the Professional Medical Doctors do not see you very often, I think that an average of 12 weeks for the regular consumption is enough to be economical and less waste of time."
11. "5-8 weeks is a balance between: - patient convenience (getting the prescription and going to the pharmacy) - pharmacist/prescriber labour and costs - good time frame for medications to take effect - good time frame for review of patient by prescriber - avoids excessive stocks from being stored in a household."
12. "That should be enough stock [2-4 weeks]. More than that will not be able to be consumed even if taken regularly."
13. "Changes in therapy may result in wastage of meds dispensed."
14. "It is a reasonable time to have a good stock, without having too much and running the risk of wastage in case the Pt dies or prescription changes. On the other hand it is also reasonable in order not to tax the dispensing services and the patients themselves by going to restock very often."
15. "Safety, cost-effectiveness. In chronic conditions/elderly patients, this period would be ideal and allows for minimal wastage of medications."
16. "If a medicine is taken regularly, one can have stock in the house so that he doesn't have to go and buy/get medicines often."
17. "3 month supply should be enough, but I can see value of having more if 'hard to source'."
18. "Compromise between convenience and possibility of waste."
19. "Patients need to get on with their lives. They shouldn't waste time queuing for prescriptions and medicines."
20. "Enough medicine to last for the patient in case of illness and cannot go out or have nobody to help so frequently; change of prescription; out of stock and to last until the entitlement date."
21. "A balance between patient convenience and staff deployment in prescribing and dispensing versus an effort to prevent wastage."

## Definition of medication wastage amongst the Maltese population Round

### Physical and Environmental Causes

**3. The following are the physical and environmental causes that have been attributed to give rise to medication wastage during Round 1 Delphi questionnaire, which have not achieved consensus in Round 2. 2 out of 8 statements achieved consensus. Kindly reconsider your original response in view of the group response. Please note that you do not have to change your original response if you do not wish to. Key: "TD" = Totally Disagree, "D" = Disagree, "N" = Neither disagree nor agree, "A" = Agree, "TA" = Totally agree, "P" = Participant's (your) response from Round 2.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Lack of medication rotation on pharmacy shelves leads to medication wastage. (TD = 0.0%; D = 4.3%; N = 26.1%; A = 43.5%; TA = 26.1%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Medications are dispensed with short expiry dates. (TD = 0.0%; D = 26.1%; N = 34.8%; A = 30.4%; TA = 8.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Government medical stores overstock with medications which subsequently expire. (TD = 8.7%; D = 4.3%; N = 26.1%; A = 43.5%; TA = 17.4%; P = TA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Medications which are no longer in use are not accepted back by pharmacies. (TD = 4.3%; D = 4.3%; N = 34.8%; A = 47.8%; TA = 8.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Inadequate computerised audits and medication consumption trends lead to medication wastage. (TD = 0.0%; D = 4.3%; N = 30.4%; A = 26.1%; TA = 39.1%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. There is an inadequate information technology implementation and interoperability across interfaces. (TD = 0.0%; D = 4.3%; N = 47.8%; A = 17.4%; TA = 30.4%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

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The following comments were provided by 7 participants:

1. "Regarding wastage no. 8 [Medications which should be refrigerated and are left out of refrigeration are considered as wastage], can be avoided easily, because its utterly unfeasible to supply unnecessary amounts of medicines if these are needed for a short term."
2. "Bad storage practices. Simple example...newer batch supply placed in front of older ones."
3. "I don't know what government medical stores and pharmacies do & hence lack the knowledge and factual information to provide an educated opinion about some of these statements."
4. "Currently the department is focusing on the IT system and networking so that the necessary trends can be identified and thereby the current necessary actions to minimise wastage will be ameliorated."
5. "The IT networking is the main issue but also the physical stock management within the different pharmacies and wards needs a standardised procedure."
6. "Re no 5 [Medications which are no longer in use are not accepted back by pharmacies] whilst one should have systems in place to ensure that medicines dispensed are of good quality, safe and efficient, in practice there are situations: whereby patients die, thus medicines they have sometimes an 8 week supply is wasted, also there are changes in treatment to enable better control of the patient's condition. The question is whether these medicines are of good quality, safe and efficient. if they are then they should be accepted back to reduce the issue of wastage."
7. "Large pack sizes can be broken down You refer to the local scenarion only? Are you going to limit your dissertation to the local model or will you do something more general? The local model is very specific."

## Definition of medication wastage amongst the Maltese population Round

### Social and Psychological Causes

**4. The following are the social and psychological causes that have been attributed to give rise to medication wastage during Round 1 Delphi questionnaire, which have not achieved consensus in Round 2. 9 out of 23 statements achieved consensus. Kindly reconsider your original response in view of the group response. Please note that you do not have to change your original response if you do not wish to. Key: "TD" = Totally Disagree, "D" = Disagree, "N" = Neither disagree nor agree, "A" = Agree, "TA" = Totally agree, "P" = Participant's (your) response from Round 2.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Patients get an oversupply of medications through the Pharmacy of Your Choice even though they do not need it. (TD = 0.0%; D = 21.7%; N = 21.7%; A = 34.8%; TA = 21.7%; P = TA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Inadequate training of healthcare professional students in prescribing, dispensing and administration of medications subsequently leads to medication wastage. (TD = 0.0%; D = 13.0%; N = 30.4%; A = 43.5%; TA = 13.0%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Inadequate continuing professional development of healthcare professionals in prescribing, dispensing and administration of medications leads to medication wastage. (TD = 0.0%; D = 8.7%; N = 21.7%; A = 47.8%; TA = 21.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Due to patients' expectation that medications will solve every problem, patients take medications when they could have modified their lifestyle behaviour instead. (TD = 0.0%; D = 8.7%; N = 26.1%; A = 34.8%; TA = 30.4%; P = TA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The prevalence of ignorance is a primary cause of almost everything, so it is also the cause of medication wastage. (TD = 0.0%; D = 17.4%; N = 26.1%; A = 39.1%; TA = 17.4%; P = TA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Patients tend to throw away medications which are not expired to refill with "fresh" stock from the pharmacy. (TD = 0.0%; D = 17.4%; N = 52.2%; A = 21.7%; TA = 8.7%; P = TA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Inadequate stock management training of pharmacists and their assistants leads to medication wastage. (TD = 0.0%; D = 8.7%; N = 30.4%; A = 34.8%; TA = 26.1%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Health care professionals and the health care system does not offer the knowledge, education, support and advice regarding medications to patients. (TD = 0.0%; D = 26.1%; N = 30.4%; A = 30.4%; TA = 13.0%; P = D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Irresponsibility and carelessness of patients leads to medication wastage. (TD = 4.3%; D = 8.7%; N = 34.8%; A = 43.5%; TA = 8.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Some doctors are not aware of the monetary costs of medications. (TD = 0.0%; D = 8.7%; N = 21.7%; A = 34.8%; TA = 34.8%; P = D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. The health care system fails to support medication taking by vulnerable individuals who cannot independently adhere to their treatment regimens. (TD = 4.3%; D = 4.3%; N = 21.7%; A = 43.5%; TA = 26.1%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Many people believe that once they do not collect all of their periodical medication they will automatically be refused the same medication in the future. (TD = 0.0%; D = 8.7%; N = 17.4%; A =	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Definition of medication wastage amongst the Maltese population Round

43.5%; TA = 30.4%; P = A)

13. Due to lack of communication between hospital and community care, patients continue to receive medications even if these have been stopped. (TD = 0.0%; D = 4.3%; N = 34.8%; A = 39.1%; TA = 21.7%; P = A)

☐ ☐ ☐ ☐ ☐

14. When a person passes away, all his/her medication gets wasted. (TD = 0.0%; D = 13.0%; N = 30.4%; A = 26.1%; TA = 30.4%; P = D)

☐ ☐ ☐ ☐ ☐

Please include any comments you would like to make in the table below:

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The following comments were provided by 4 participants:

1. "Regarding 1 [Patients get an oversupply of medications through the Pharmacy of Your Choice even though they do not need it], this can be avoided if patients refuse to accept the medications they do not need. Re 23 [When a person passes away, all his/her medication gets wasted] the family of the deceased should inform those responsible for medication supply, so that the medicines would be stopped at once. Thus wastage is surely avoided."
2. "Wastage needs to be attributed to the prescriber and the dispenser and the system rather than the patient. We are all aware that the latter exert certain pressures however the prescriber has the responsibility to review and raise the prescription using the correct dosing, and the dispenser should be able to pinpoint certain issues. Since the advent of POYC there is a link with the community and hospital system, however wastage has still not been minimised."
3. "No 6 [Patients tend to throw away medications which are not expired to refill with "fresh" stock from the pharmacy] I am not aware of such practice unless they have an abundant quantity that has been there for years and thereby they think it is expired w/o referring to the date; No 21 [Patients should ask their family doctor to prescribe the medications that they consume only and not the whole list that is listed on their yellow entitlement card] the prescribers should have PMRs and follow-up patients accordingly, the prescriber should raise prescriptions on needs assessment and not just copy the Schedule V card list and No 23 [When a person passes away, all his/her medication gets wasted], if a person dies and only his 4-8 weeks treatment is wasted the problem won't be an issue, but the fact is that sometimes the patient may have a year stock if not more at his end."
4. "Regarding point 23 [When a person passes away, all his/her medication gets wasted], although true is unavoidable. Excessive hoarding leads to wastage even when the patient is alive, but often gets discovered when he passes away."

## Definition of medication wastage amongst the Maltese population Round

### Cultural Causes

**5. The following are the cultural causes that have been attributed to give rise to medication wastage during Round 1 Delphi questionnaire, which have not achieved consensus in Round 2. 3 out of 10 statements achieved consensus. Kindly reconsider your original response in view of the group response. Please note that you do not have to change your original response if you do not wish to. Key: "TD" = Totally Disagree, "D" = Disagree, "N" = Neither disagree nor agree, "A" = Agree, "TA" = Totally agree, "P" = Participant's (your) response from Round 2.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. There should be co-payment of medications (that is patients must pay a fixed fee for their use of specific medications). (TD = 0.0%; D = 17.4%; N = 17.4%; A = 30.4%; TA = 34.8%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. When entitled for free medications, patients believe that the medication has no value. (TD = 0.0%; D = 17.4%; N = 34.8%; A = 17.4%; TA = 30.4%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. When entitled for free medications, patients reason that since the medication is "free" it is good to have lots of different medications. (TD = 0.0%; D = 8.7%; N = 39.1%; A = 26.1%; TA = 26.1%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Medications are regularly out of stock. (TD = 0.0%; D = 26.1%; N = 21.7%; A = 30.4%; TA = 21.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. There is lack of stock from the importers. (TD = 0.0%; D = 21.7%; N = 69.6%; A = 8.7%; TA = 0.0%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Medications can be easily purchased without the pharmacist questioning the need of such medications. (TD = 0.0%; D = 13.0%; N = 47.8%; A = 34.8%; TA = 4.3%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Greed and hoarding situations by patients, on the welfare system, is a mentality which is difficult to overcome. (TD = 4.3%; D = 4.3%; N = 26.1%; A = 43.5%; TA = 21.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

	<input type="button" value="↑"/> <input type="button" value="↓"/>
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The following comments were provided by 4 participants:

1. "A limited storage of emergency or PRN medicines is necessary to keep one's mind at rest, in case of an emergency. Never over do it. It's waste of money and resources. What is really extra for certain patients, may be of the utmost need to other patients who need it. We're not to be selfish, but think of the needs of others too. The problem sometimes of 'out of stock' medicines arising, may lead to extra hoarding of medicines."
2. "Government policy is to provide free medicines to the entitled patients Q7 [There is lack of stock from the importers] ?? Q10 [Greed and hoarding situations by patients, on the welfare system, is a mentality which is difficult to overcome] It is difficult but not impossible if all the NHS colleagues work hand in hand to defeat such a practice."
3. "Q5 [Medications are regularly out of stock] This is a vicious cycle, hoarding results in shortages besides the exceptional international shortages, Malta in fact has one of the highest consumptions of most of the medicines; Q7 [There is lack of stock from the importers] is not that clear; Q9 [Medications can be easily purchased without the pharmacist questioning the need of such medications] I don't believe that, since a pharmacist can question out everything still, she can also interrupt treatment and/or reduce dosing through the proper channels."
4. "2 [There should be co-payment of medications (that is patients must pay a fixed fee for their use of specific medications)] co-payment can be a fixed fee or a variable fee 3 [When entitled for free medications, patients believe that the medication has no value] not clear - they do not appreciate the cost of the medicine or they believe that the medicine supply is cheap (inferior quality)? 10 [Greed and hoarding situations by patients, on the welfare system, is a mentality which is difficult to overcome] introduction of a fee will reduce hoarding."



## Definition of medication wastage amongst the Maltese population Round

### Treatment and Counselling Causes

**6. The following are the treatment and counselling causes that have been attributed to give rise to medication wastage during Round 1 Delphi questionnaire, which have not achieved consensus in Round 2. 8 out of 20 statements achieved consensus. Kindly reconsider your original response in view of the group response. Please note that you do not have to change your original response if you do not wish to. Key: "TD" = Totally Disagree, "D" = Disagree, "N" = Neither disagree nor agree, "A" = Agree, "TA" = Totally agree, "P" = Participant's (your) response from Round 2.**

	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
1. Medications have to be changed due to the unexpected development of side-effects, allergies, contra-indications or medication interactions during medication therapy which consequently leads to medication wastage. (TD = 0.0%; D = 13.6%; N = 27.3%; A = 45.5%; TA = 13.6%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Prescribing antibiotics for acute bronchitis or mild coughs or asthma attacks is considered as wastage. (TD = 0.0%; D = 18.2%; N = 13.6%; A = 50.0%; TA = 18.2%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. A large volume of medication is dispensed during the treatment initiation phase (that is when the patient has just started the medication). (TD = 4.5%; D = 13.6%; N = 31.8%; A = 36.4%; TA = 13.6%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Excessive volumes of medications are supplied to patients during repeat prescribing and dispensing. (TD = 0.0%; D = 13.6%; N = 36.4%; A = 40.9%; TA = 9.1%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Doctors stop or change medications when patients have already collected their medication supply. (TD = 0.0%; D = 9.1%; N = 27.3%; A = 59.1%; TA = 4.5%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. If symptoms resolve when patients have already collected their medication supply, these medications go wasted. (TD = 0.0%; D = 4.5%; N = 27.3%; A = 63.6%; TA = 4.5%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Men with low pain thresholds taking unnecessary medications lead to medication wastage. (TD = 4.5%; D = 31.8%; N = 45.5%; A = 18.2%; TA = 0.0%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Overbearing mothers who mistake their child's mild bout of the common cold for Yellow fever leads to medication wastage. (TD = 4.5%; D = 13.6%; N = 36.4%; A = 31.8%; TA = 13.6%; P = N)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Patients read about illnesses on the internet and they subsequently take medications which they do not require. (TD = 0.0%; D = 9.1%; N = 22.7%; A = 45.5%; TA = 22.7%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Inadequate medication reviews at the point of dispensing leads to medication wastage. (TD = 4.5%; D = 4.5%; N = 18.2%; A = 45.5%; TA = 27.3%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. The fact that pharmacists have to spend their time carrying out bureaucratic and administrative chores leads to medication wastage. (TD = 4.5%; D = 22.7%; N = 18.2%; A = 36.4%; TA = 18.2%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Pharmacists should be supported by well trained assistants to reduce medication wastage. (TD = 0.0%; D = 0.0%; N = 31.8%; A = 40.9%; TA = 27.3%; P = A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any comments you would like to make in the table below:

## Definition of medication wastage amongst the Maltese population Round

The following comments were provided by 6 participants:

1. "Some statements (ex 18 [Patients fail to take the whole course of antibiotics]) give the impression that all patients fail to take full course of treatment. would have given different reply if wording is different (ex Some patients fail....antibiotics)."
2. "Q1 [Medications have to be changed due to the unexpected development of side-effects, allergies, contra-indications or medication interactions during medication therapy which consequently leads to medication wastage] & 6 [Doctors stop or change medications when patients have already collected their medication supply] If dispensed in the appropriate amounts it should not be an issue of concern; Q2 [Prescribing antibiotics for acute bronchitis or mild coughs or asthma attacks is considered as wastage] Inappropriate prescribing yes... and dispensers not stopping such practice when obviously such inappropriateness is clear leads to wastage!"
3. "The main problem is monitoring; if a patient has his treatment interrupted or is not adhering, these issues would be pinpointed during treatment review, the prescriptions amended accordingly and the necessary advice given for treatment continuity. Also the bureaucratic procedures allow the pharmacist to dispense the appropriate medication since if only the prescription is followed, more medicines will be dispensed not acc to government policies."
4. "Pharmacists should be encouraged to do patient medication reviews. this will enhance adherence and eliminate unnecessary medicines and reduce wastage."
5. "Linked to point 20 [Patients purchase different medications, especially non-prescription medications, upon the advice of different persons, both health care professionals and family/friends] is the ease to be dispensed antibiotics and other prescription medicines without a prescription."
6. "I would clearly distinguish between wastage due to factors like hoarding etc, wastage due to irrational prescribing and wastage due to improper use by patients. 12 [General practitioners do not always have time to review all their patients' medications and often those medications that are not required anymore continue to be prescribed] the problem is that there is improper follow up between GP, consultant and private and public practice. 13 [Inadequate medication reviews at the point of dispensing leads to medication wastage] Is it the dispenser who should do the medication review?"

## **Appendix 4.7: Robert Gordon University Ethics Approval**

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**ROBERT GORDON  
UNIVERSITY•ABERDEEN**

30<sup>th</sup> April 2012

Dear Lorna

We have reviewed your ethics application for your project '*Definition of medication wastage amongst the Maltese population*' and it has been approved with no changes. The panel recommends that it is of sufficient standard for you to proceed to your local ethical review process.

I attach a copy of our completed review for your files but we do not need you to comment formally on any of them but just to consider any of the committee's comments.

If there are any questions on our response to the ethics submission please do not hesitate to get in touch.

Regards

A handwritten signature in black ink, appearing to read 'Lesley Diack'.

Dr Lesley Diack\*  
Chair of the School Ethics Review Panel

\*In view of potential conflict of interest Prof Diack did not participate in discussions for the approval of this research but acted only as endorser and signatory as Chair of the School Ethics Review Panel



## **Appendix 4.8: Maltese University Research Ethics Committee Approval**

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**L-UNIVERSITÀ TA' MALTA**

Msida – Malta  
Skola Medika  
Sptar Mater Dei



**UNIVERSITY OF MALTA**

Msida – Malta  
Medical School  
Mater Dei Hospital

Ref No: 29/2012

5<sup>th</sup> July 2012

Dear Ms. West,

Please refer to your application submitted to the Research Ethics Committee in connection with your research entitled:

**Definition of medication wastage amongst the Maltese population**

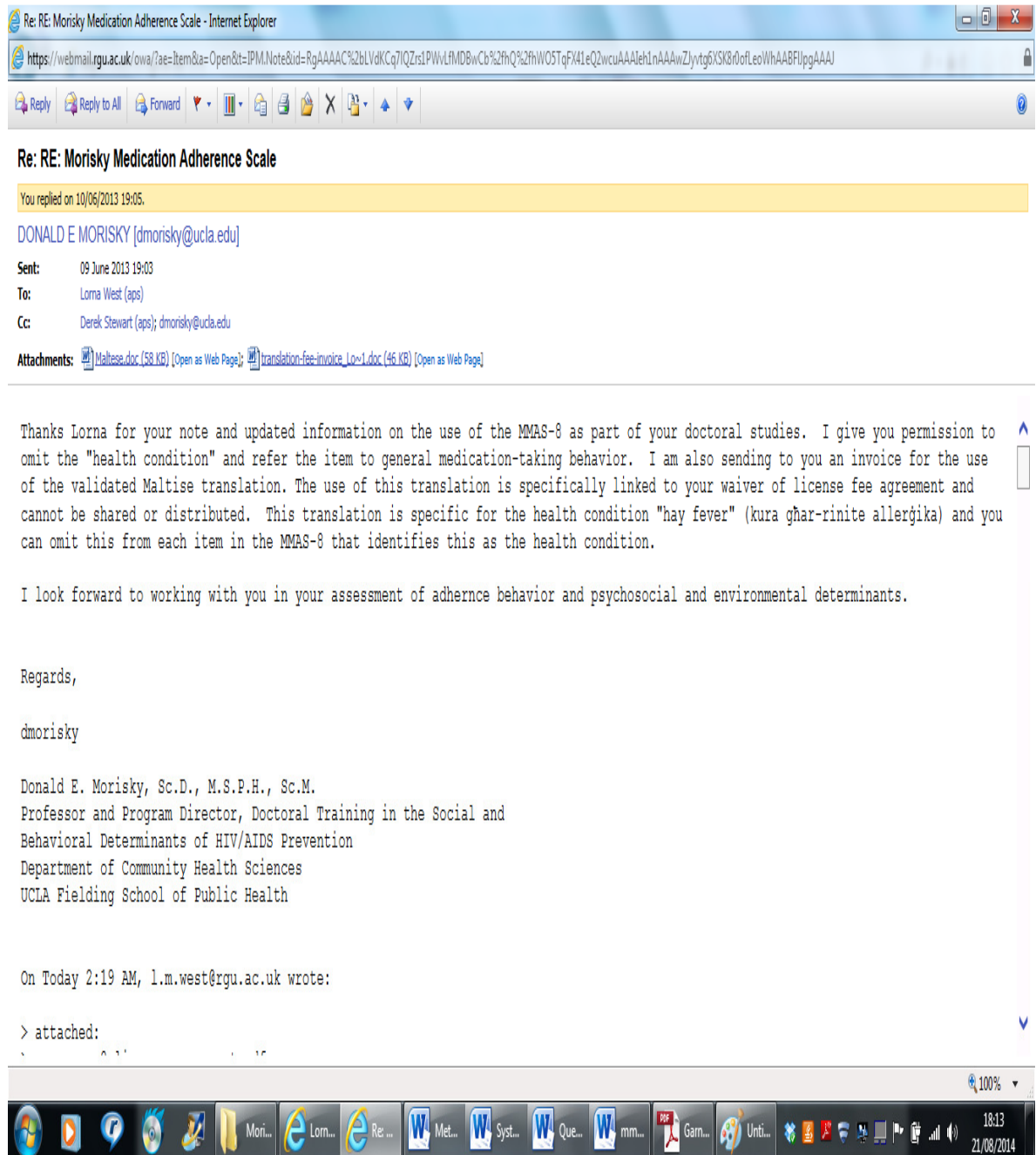
The University Research Ethics Committee granted ethical approval for the above mentioned protocol.

Yours sincerely,

Dr. Mario Vassallo  
Chairman  
Research Ethics Committee

Email: [umms@um.edu.mt](mailto:umms@um.edu.mt) • Web: <http://www.um.edu.mt/ms>

## Appendix 5.1: Approval letter MMAS-8-Item



## Appendix 5.2: Content Validity of Questionnaires

### Content validity overall comments

1. Content validators' comments in black
2. Lorna West's comments in red
3. Derek Stewart's comments in purple. No comment means that he agrees with Lorna's comments
4. Lesley Diack's comments in green

My comment: Medication samples are not mentioned anywhere in the questionnaires. We might want to consider them too and other issues within the scope of medication wastage.

### Maltese population questionnaire

Section	Validator 1
A. Demographics	<p>Should this come at end. Discuss with DS but perhaps the more "engaging" questionnaires should be at start and demographic at end?</p> <p>To be discussed</p> <p>Suggest leave as is for the population survey</p> <p>I think with population better at the beginning</p> <p>Level of education: How about college, technical institute like MCAST etc?</p> <p>I agree. We can write Sixth form/College/MCAST</p> <p>Locality of residence: Is this relevant? Will it add anything else?</p> <p>We can correlate our questions to area of residence. Although in Malta measure of deprivation cannot be directly linked to locality, it would be interesting to correlate results of different areas. I would NOT change</p> <p>Occupation: Would it be appropriate to expand this further? E.g. labour work, skilled, unskilled</p> <p>We are asking for the type of employment. I am afraid that the more we add the more we have to define. What is skilled for them. Also</p> <p>Employment question was based on the Malta Demographic Review 2010. So I would NOT change</p> <p>I agree and you can justify</p> <p>Family members in household: Why only these HCPs? How about physios etc?</p> <p>These are the same healthcare professionals that we are including as participants in the questionnaires. We decided to include only professions who either prescribe, dispense or administer medicines. Therefore I would NOT include other HC professionals</p> <p>This is quite difficult – does prescribing make a difference or having an HCP in family make a difference. This is a tricky one</p> <p>Question 7: Perhaps note here if yes go to Q8 if no go to Q9?</p> <p>I agree</p> <p>Question 9: Does this need to be clarified to "privately"?</p> <p>I don't think it matters whether it was privately or not. I would NOT change</p>
B. Awareness	<p>Questions in this section are about your awareness of and <b>interest</b> in medication wastage in Malta: Not sure right word? Attitudes perhaps seeing use of Likert scales?</p> <p>To a certain extent 'interest' could be seen as a form of 'attitudes'. So guess we can change this to 'attitudes'</p>

	<p>Yes what is interest in this context – how do you quantify it. Attitude seems better</p> <p>Is statement 6 "I feel that the Government is contributing to the problem of medication wastage in Malta" related/covered by statement 5 " I feel that the free health system is contributing to the problem of medication wastage in Malta"?</p> <p>I agree. People in Malta tend to see the free health system as the Government. Therefore, I would remove the Government statement</p> <p>In bullet questions ? include 'other' category</p> <p>I agree</p> <p>Should this question "Are you aware of the approximate costs of ALL the medication that you take, including any medication that were obtained for free from the National Health Service?" be here seeing that those not on medicines have also been asked to answer Section B?</p> <p>I agree. Probably we should put it as "Are you aware of the approximate costs of ALL the medication that you buy?" in Section C and "Are you aware of the approximate costs of ALL the medication that you get for free from the National Health Service?" in Section D</p>
C. Current practice with medication that you buy	<p>"I buy medication from the pharmacy without checking if I already have a supply at home": What if a one-off medicine? Perhaps statement should be reworded to a more general one?</p> <p>I am not sure of this</p> <p>I think you should leave as is and see what we get in the pilot</p> <p>"I pass medication that I buy to other persons, such as relatives and friends": And neighbours?</p> <p>I agree. I would change statement to "I pass medication that I buy to other persons, such as relatives, neighbours and friends"</p>
D. Current practice with medication that you get for free	<p>Title "Current practice with medication that you get for free": ?involving instead of with</p> <p>I agree</p>
E. Experiences with medication	<p>"use-by" date: How about best before?</p> <p>'Best before' date is more connoted with food. I would NOT change</p> <p>"Please tell me where in a medication package that you can find the expiry date": Reword. Also what is this telling you?</p> <p>I would reword to "Please tell me where on a medication package you can find the expiry date". I think that this can potentially tell us a lot: if patients cannot reply to this then they do not even look at the package or do not know that it is there</p> <p>"In the last 6 months, did you ever check the expiry date before taking any medication?": What about medicines like antibiotic syrups, eye-drops?</p> <p>We can ask if they have any opened antibiotic syrup or eye drops which they are not using.</p> <p>I would change the wording of this to have you checked the expiry date (did you ever – is pejorative) Sorry for not picking this up earlier</p> <p>Question 4: "Throw them away": ?dispose</p> <p>Since the questionnaire is for the public I would leave as 'throw them away' as it is more easy to understand than 'dispose'. i would NOT change</p> <p>Question 12: "On person": ?reword to "carried around by individual"</p> <p>I agree to change this</p>
F. Taking your medication	<p>Does this section give you any information on wastage? What I mean is, is it worth going through all this process for the information that this will give you?</p> <p>Medication non-adherence can lead to wastage. Therefore, this can help in determining the aspect of non-adherence as an indirect link to</p>

	wastage. However, if we have to decrease the length of questionnaire we will remove then this section. For now I would NOT change
G. Your overall health	Perhaps needs more explanation of the scale? I agree. We can add 'Choose a point between 1 and 5'

Section	Validator 2
A. Demographics	<p>"Age category in years": Would 'what is your age? Be more relevant for general population? I am not sure Suggest leave as is and see what pilot gets Between 18 –and 24 years I am not sure "Gender": change to What is your Gender? I am not sure "Occupation": Include Self-employed Does it really matter for us if they are self-employed or not? I think we would complicate things further for nothing. I would NOT add I think that might be of interest "Are you, or one of your family members living in your household, any of the following?": Any other health professional We decided to include only professions who either prescribe, dispense or administer medicines. Therefore I would NOT include other HC professionals Will the general public make this distinction – will it matter to them?</p>
B. Awareness	<p>I am not sure how the general public will interpret this. To discuss Suggest leave for pilot "I am fully aware of the extent of medication wastage in Malta": Change 'extent' to 'issue' I agree "I feel that I contribute to the problem of medication wastage in Malta": Clarify I am not sure Perhaps leave "I feel that dentists are contributing to the problem of medication wastage in Malta": ??? Isn't this a complex term for the general public- may be say responsible or partly responsible??? I am not sure. To discuss Think the suggestion is good – change to responsible "I feel that doctors are contributing to the problem of medication wastage in Malta": same as above I am not sure. To discuss "I am fully aware of the consequences of medication wastage in Malta on": consequences???? I agree that these statements are probably too general and people might have different interpretations of them. What could one see as a consequence someone else might not. Shall we be more specific? Perhaps change to impact "I have no interest in the consequences as above of medication wastage in Malta on": as above I agree that these statements are probably too general and people might have different interpretations of them. What could one see as a consequence someone else might not. Shall we be more specific? What do you want to find out with these questions and then try and tailor the question accordingly "Pharmacists could do more to reduce medication wastage in Malta":</p>

	<p>May be will it be worth having some space for open ended comments boxes after these?</p> <p><b>I agree</b></p> <p>"Are you aware of the approximate costs of ALL the medication that you take, including any medication that were obtained for free from the National Health Service?": Costs ??? To whom?</p> <p><b>Probably we should put it as "Are you aware of the approximate costs of ALL the medication that you buy?" in Section C and "Are you aware of the approximate costs of ALL the medication that you get for free from the National Health Service?" in Section D</b></p>
C. Current practice with medication that you buy	
D. Current practice with medication that you get for free	
E. Experiences with medication	<p>"In the last 6 months, do you recall if there were any unused medication (medication that a person does not take any longer) in your household? Yes (if you ticked this go to question....) No (go to...) I am not sure</p> <p><b>I agree</b></p>
F. Taking your medication	<p>"Are you careless at times about taking your medication?": Add regularly</p> <p><b>This is taken from the Morisky medication adherence scale. Therefore, I would NOT change</b></p> <p><b>I really hate this Morisky question and feel that it is not a good question and actually asks the wrong question as well as being pejorative. However it would give you lots to write about!</b></p>
G. Your overall health	
Section	Validator 3
A. Demographics	
B. Awareness	
C. Current practice with medication that you buy	
D. Current practice with medication that you get for free	
E. Experiences with medication	<p>"If yes to either questions 9 or 10, where did you get the information from? Tick as many responses as you feel necessary.": Will you include magazines/ newspaper - sometimes there are these A&amp;H magazine which have some information</p> <p><b>I agree</b></p>
F. Taking your medication	
G. Your overall health	
Section	Validator 4
A. Demographics	You would need to make a short introduction to the general public of what the study is about (even for HCPs and students). Include definition

	<p>of medication in your introduction.</p> <p>Participants will receive a covering letter including details of the study. I agree that we can include a short introduction with glossary of terms.</p> <p>Question 7: If no (go to question 9)</p> <p>I agree</p> <p>"If no, in the last 6 months, have you had a medicine prescribed or have you bought any medicines?": change to "If your answer to question 7 is no, in the last 6 months, have you had a medicine prescribed or have you bought any medicines?"</p> <p>I agree</p>
B. Awareness	<p>Is it possible to use some questions the same as for healthcare professionals and then compare responses? Only as relevant of course. Depending on the number of questionnaires which you intend to send, it may be recommendable to add a few open questions to get some in depth information which supports the quantitative e.g. What are the consequences of wastage (if any)? How can wastage be reduced?</p> <p>I agree</p> <p>"Are you aware of the approximate costs of ALL the medication that you take, including any medication that were obtained for free from the National Health Service?": change 'were' to 'are'.</p> <p>I agree</p>
C. Current practice with medication that you buy	<p>I understand why you do sections C and D but make sure you guide patients clearly</p> <p>We can give a brief introduction to the section</p> <p>Possibly ask whether they buy medicines over the internet - what doctor prescribes - they decide on what they need</p> <p>I agree</p>
D. Current practice with medication that you get for free	
E. Experiences with medication	<p>"Please tell me where in a medication package <u>that</u> you can find the expiry date": Remove that ? question</p> <p>Include 'do you have problems with reading the expiry date for eye drops etc?'</p> <p>I agree</p> <p>Ask them an open question - how they dispose of medicines</p> <p>We did interviews with patients at two points in time. If you want you can use some of our questions and then compare the responses which you get with ours.</p> <p>I agree. We can adapt some questions from this questionnaire interview</p>
F. Taking your medication	<p>Storage of medicines, difficulty with taking medicines, do they read the information on patient leaflet</p> <p>This is taken from the Morisky medication adherence scale. Therefore, I would NOT change</p>
G. Your overall health	

Section	Validator 5
A. Demographics	<p>These questionnaires have been well thought out but they look intimidatingly long as they are, and when properly formatted, will probably span close to ten pages ... People may just not bother.</p> <p>I agree. Will decide after formatting of questionnaires and possibly piloting</p>
B. Awareness	



C. Current practice with medication that you buy
D. Current practice with medication that you get for free
E. Experiences with medication
F. Taking your medication
G. Your overall health

Section	Validator 6
A. Demographics	<p>Age: It would be interesting exploring what late teens (16+) think. Many countries are increasingly considering 16 year olds as adults e.g. Austria, Brazil, Argentina and Nicaragua</p> <p>Inclusion criteria state that "Participants must be adults aged 18 years and over". Also electoral list contains details of participants aged 18 years and over. Therefore, I would NOT change</p> <p>I agree but the roll will also give you some 17 year old people able to vote at next election – so you have to be careful with this. But agree do not get side-tracked into the 16+ question</p> <p>"Are you, or one of your family members living in your household, any of the following?": Can you add also 'Other Healthcare Professional'</p> <p>We decided to include only professions who either prescribe, dispense or administer medicines. Therefore I would NOT include other HC professionals</p>
B. Awareness	
C. Current practice with medication that you buy	
D. Current practice with medication that you get for free	
E. Experiences with medication	
F. Taking your medication	<p>"Do you ever forget to take your medication?": Shouldn't we make a distinction between someone who forgets on a regular basis and someone who forgets only rarely</p> <p>This is taken from the Morisky medication adherence scale. Therefore, I would NOT change</p>
G. Your overall	



## HCP questionnaire

Section	Validator 1
A. Demographics	<p>Footer: Does this need to be a footnote? Also does "drugs" need to be included too?</p> <p>Probably we can remove the term "drugs" since it's never mentioned in the questionnaire</p> <p>I think still keep drugs in case respondents think about drug wastage</p> <p>Age: Needs further break down to cover &gt;65 separately?</p> <p>I doubt there are many HC professionals &gt;65 years. Therefore I would NOT change</p> <p>Profession: How about allied healthcare professionals? Any reason why not included?</p> <p>We decided to include only professions who either prescribe, dispense or administer medicines. Therefore I would NOT include other allied HC professionals</p> <p>Number of years in profession: ? Needs further breakdown? than greater than 20 years</p> <p>Possibly right since participants in their 40s would have 20 years' experience. I agree to change</p> <p>Question 6: ?Need anything re postgraduate educations</p> <p>We could ask them whether they have postgraduate education and from where. They might have got their awareness, knowledge, etc through post-graduate. I agree to change</p> <p>If you are going to put this in – would that be enough? What do we want from the question?</p> <p>Question 8: Does this question need anything to indicate it is about change?</p> <p>We can change the statement in line with the student questionnaire to read "Please tick one of the following which best describes you in relation to how you change in your professional practice:"</p> <p>Perhaps reword 'in relation to changes to your professional practice'</p>
B. Awareness	<p>Scale: Why not have these as a number and they just rank putting no in?</p> <p>We are testing each and every statement not ranking them in order of preference. Therefore I would NOT change</p> <p>"Medication wastage encompasses any medication which expires or remains unused throughout the whole medicines supply chain (medicines supply chain refers to the manufacturing, storage, transport and handling of medicines until these reach the consumer) and during use by the patient": Why not put the definition as a footnote? Overall I think this statement is very cumbersome and needs rewording</p> <p>We are actually testing this definition which was derived from the Delphi study. So cannot put as footnote or simplify it. I would NOT change.</p> <p>"Medication wastage encompasses the unnecessary or inappropriate consumption of medication by patients": Is the patient not part of the chain? Is this part of medication wastage? By inappropriate I would understand even inappropriate dosing etc....</p> <p>Whilst I agree with the comment, we are actually testing this definition which was derived from the Delphi study. I would NOT change.</p> <p>"Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals": Reword</p> <p>We are actually testing this definition which was derived from the Delphi study. So cannot reword. I would NOT change.</p> <p>Bullet point questions: Add 'other' category</p> <p>I agree</p>
C. Perception	"Perceptions regarding factors potentially leading to medication

	<p>wastage": Or is it views and attitudes? I would associate perceptions as qualitative methods</p> <p>I am not sure about this comment</p> <p>I think that 'perceptions' is OK</p> <p>Nor am I – not sure you need to do anything?</p> <p>" For each statement listed below, rate <u>in your opinion</u> the level of contribution each factor has towards medication wastage." : Would take out – is it not their opinion you are seeking?</p> <p>I agree to remove the term 'in your opinion'</p> <p>I agree it is superfluous</p> <p>Headings: Do you need these headings?</p> <p>I think the headings give a more systematic layout to the questionnaire therefore I do NOT agree in removing them</p> <p>"Unused medication within expiry dates not accepted by for reuse": Unclear statement - reword</p> <p>We can change to "Medication that remain unused within their expiry dates are not accepted for reuse"</p> <p>"Inappropriate storage of medication": Medicines such as eye drops – "Use within----- days of opening?"</p> <p>We can ask this but I think we will complicate the questionnaire. To discuss</p> <p>I agree that this could complicate things so suggest leave</p> <p>I think this is quite an important issue but is it one that you want to address in your research?</p> <p>"Hoarding by patients due to dependency on others to collect medication supply": Reword to include "access problems?"</p> <p>I am not sure</p> <p>Perhaps there are 2 issues here. Suggest change to - hoarding by patients (there could be lots of reasons)</p> <p>I must admit I don't like the word 'hoarding' it has connotations to it – it could be seen as pejorative and even biased. Would storage be appropriate?</p> <p>How about patient's beliefs in all this?</p> <p>I am not sure</p> <p>Perhaps you could include a statement on patients' beliefs around wastage</p> <p>You can only ask Patient's beliefs in their questionnaire not the HCPs or student one? Do you want to do that in the questionnaire?</p> <p>Inadequate training of healthcare professional students about <u>monetary</u> cost of medication": Delete all</p> <p>I am not sure that we need to delete this. I believe if students knew more about costs of medication it can make a difference. I would NOT delete</p> <p>"Medication easily purchased from pharmacies": Prescription only medicines. Perhaps include without the need for a valid prescriptions</p> <p>We can add 'without the need for a valid prescription'</p>
D. Current practice, views and experiences	<p>Does attitudes come into this?</p> <p>This includes attitudes</p> <p>Is an "other" point required in all bullet point questions?</p> <p>I agree</p>
E. Education and training	<p>Scale: Why not have these as a number and they just rank putting no in?</p> <p>We are testing each and every statement not ranking them in order of preference. Therefore I would NOT change</p>

Section	Validator 2
A. Demographics	<p>Is wastage the same as waste?  <b>Yes. We can include this in the footnote too</b></p> <p>"Age category in years": change to Your Age category in years:  <b>I prefer just 'age' rather than 'Your age'. I would NOT change</b></p> <p>"Gender": change to Your gender  <b>I prefer just 'gender' rather than 'Your gender'. I would NOT change</b></p> <p>"Profession": change to Your profession  <b>I prefer just 'profession' rather than 'Your profession'. I would NOT change</b></p> <p>"Government post": change to Government post or public sector  <b>I agree</b></p> <p>"Employed privately": change to Private sector  <b>I agree</b></p>
B. Awareness	<p>"Questions in this section are about your awareness of and interest in medication wastage in Malta and your professional practice": This instruction should be reworded for clarity  <b>We could change to "Questions in this section are about your awareness of/interest in medication wastage in Malta and in relation to your professional practice"</b></p> <p>"For each statement listed below, rate your level of agreement."  State as <b>please</b> rate  <b>I agree</b></p> <p>For bullet point questions: Will they rank for individual bullet points here or for number 7 as a whole?  <b>They will rank for each bullet point</b>  <b>The reviewers have not really understood this perhaps the instructions need more clarity</b></p> <p>For bullet point questions: how is public health different to society, patients and environment?  <b>I agree with comment. Although it can be considered differently it is not clear. I would remove it</b></p> <p>"I have no interest in the factors potentially leading to medication waste in Malta": waste versus wastage <b>I agree</b>; Do you need to define medication wastage right at the beginning although you have asked to rank their agreement with your definition, some of them won't know about this.  <b>We are actually testing the definition. Therefore, cannot define medication wastage at the beginning. Therefore I would NOT change</b></p> <p>"I have no interest in laws, procedures and policies relating to medication waste in Malta": Are these same or different terms- seems quite a lot asked- procedure regarding what?  <b>These are different terms</b></p>
C. Perception	<p>In general, you could reduce the number of items, some of them could be merged- those will similar themes.  <b>I am not sure we can merge further</b>  <b>I agree with you and we can try this in the analysis of the data</b></p> <p>Titles such as "Physical and environmental factors": I don't think these titles should be there- these could bias opinions.  <b>I think the headings give a more systematic layout to the questionnaire. However, it is true these can possibly bias opinions. Shall we remove?</b>  <b>Agree with you to keep</b>  <b>I would leave these as they add structure</b></p> <p>"Unused medication within expiry dates not accepted by for reuse": by whom?  <b>Remove the word 'by'</b></p> <p>"Patients getting advice form more than one healthcare professional,</p>

	<p>family and friends": regarding what?</p> <p>Shall we add 'regarding use of medication'?</p> <p>Agree with you to add</p> <p>Happy to do this</p> <p>"Medication non-adherence to medication regimens by patients": remove first medication</p> <p>I agree</p> <p>"Medication stopped by patient due to perceived ineffectiveness": This could be difficult for patients to understand.</p> <p>This questionnaire will be completed by healthcare professionals</p> <p>"Inadequate training of healthcare professional students about medication wastage" and</p> <p>"Inadequate training of healthcare professional students about monetary cost of medication": Revise these sentences</p> <p>I am not sure</p> <p>I think they are OK</p> <p>I wonder if instead of inadequate you use lack of.</p> <p>"Healthcare professionals unaware of cost of medication": change to "Healthcare professionals lack of awareness of cost of medication"</p> <p>I agree</p> <p>"Lack of communication about medication between healthcare system and patients": healthcare system????</p> <p>I agree that it is not clear. We can change 'healthcare system' to 'healthcare provider'</p> <p>"Medication stopped by doctor due to ineffectiveness": Unclear</p> <p>We can change to "Medication stopped by doctor due to ineffectiveness of the medication"</p> <p>"Over-dispensing": I do not understand this</p> <p>Change to "extra medication supply dispensed to patients"</p> <p>"Healthcare professional perceptions of patients' expectations to receive medication": Unclear</p> <p>We can change to "Healthcare professional perceiving that patients expect to receive a medication"</p> <p>"Medication obtained for free through the National Health System are regularly out of stock": How is this different to "free healthcare system"</p> <p>The first includes only the free healthcare system, the second includes the out of stock situation of free medication</p>
D. Current practice, views and experiences	<p>Scale: How about – never, hardly ever.....mostly, always</p> <p>Although different scales are suitable, the one chosen followed a reference</p> <p>"I could be more active in reducing medication wastage in Malta": This sentences and some below do not align to the options [scale] above.</p> <p>To discuss</p> <p>"I routinely advise patients on": Again does it align to above [scale]</p> <p>To discuss</p> <p>I think these are OK</p>
E. Education and training	<p>" I have had sufficient education and training related to medication wastage": ?chances of double positive if participants choose agree option</p> <p>I agree. However, I am not sure if it makes sense separating education and training in two statements</p> <p>I would leave as these 2 are usually considered together</p> <p>I would separate as they are different but you could just ask it slightly differently</p> <p>"The next phase of the research will involve focus groups...": Will they understand this?</p> <p>Together with the questionnaire they will receive a covering letter giving details about the focus group study</p>

Section	Validator 3
A. Demographics	<p>"Government post": should it be public sector?  <b>I agree</b>            Question 8 "Please tick one of the following which best describes you in relation to your professional practice: I resist new ways of working ...": Maybe it's me but I'm not sure i understand "new ways of working" well – is it referring to changing your practice in your current post or with relation to other people and new positions?  <b>To discuss</b></p>
B. Awareness	<p>Some of the statements have full stops, others not. Also will these be spaced out a bit more in the actual questionnaire?  <b>There will be formatting of questionnaires using SNAP®</b></p>
C. Perception	<p>"Medication non-adherence to medication regimens by patients": I think I would remove the first medication and state: Non-adherence to medication regimens by patients  <b>I agree</b>            "Unnecessary sold-medication": Meaning the pharmacist sold the incorrect medication or he sold a medication that the patient didn't need?  <b>We can change to "medication sold unnecessarily without an indication to a patient "</b></p>
D. Current practice, views and experiences	<p>"Family members put me under pressure to prescribe/dispense/administer medication which I consider to be unnecessary": Family members of the patients or of the professional?  <b>I agree. I would change to 'family members of patients'</b></p>
E. Education and training	<p>Will you be putting boxes next to each response  <b>Yes</b>            "If you have responded 'Yes' to the above question, please refer to the enclosed invitation to participate letter for further details about this study": This will be separate to ensure confidentiality  <b>Yes</b></p>

Section	Validator 4
A. Demographics	<p>General comment: For most questions I would also include 'Other' at the end so that maybe they come up with other ideas rather than just being restrained by your list  <b>I agree</b>            Make footer smaller font and clearly a footer. Refer to it in text - e.g. by <sup>1</sup> superscript  <b>I agree. There will be formatting of questionnaires using SNAP®</b>            I would put footer in the front page too - possibly make a short glossary? E.g. what do you mean by healthcare professionals?            "Government post": change to Government services  <b>I agree</b>            "Other countries where you have practiced": Why do you assume that they practised in Malta?  <b>Inclusion criteria state that participants must have a license to practise in Malta</b>            "I am venturesome and willing to take risks with new ways of working": I would not use the word risk. Risk has a negative connotation. 'Be innovative' with new ways of working  <b>I agree. I would change 'risk' to 'be innovative'</b></p>
B. Awareness	<p>Comment: Medication wastage also refers to inappropriate prescribing by doctor, taking of medicines by patient  <b>Whilst I fully agree with this comment we are actually testing the definition. Therefore I would NOT change</b></p>

	<p>"Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals": What makes it justifiable - to whom?</p> <p>We are actually testing the definition. Therefore I would NOT change</p> <p>"Medication wastage poses a financial burden on patients themselves, the state's economy and requires adequate education of all people concerned": Have you defined the people concerned? Who is concerned?</p> <p>Whilst I fully agree with this comment we are actually testing the definition. Therefore I would NOT change</p> <p>" I am fully aware of the extent of medication wastage in Malta": ? knowledge of the extent?</p> <p>Different participants might have a different opinion of what extent is for them. Maybe we need to reword</p> <p>I suggest we leave as it is – we are interested in their perceptions rather than if they actually know the extent</p> <p>I agree – this is a difficult question to get the wording</p> <p>I am not sure whether these questions [5, 7 and 9] reflect the [Health Belief] model - achieve the intentions of the mode - check this</p> <p>I need to check this. To discuss</p> <p>I think it is OK – you could do an entire PhD on the health belief model</p> <p>"I have no interest in laws, procedures and policies relating to medication waste in Malta": Ask them what the laws/procedures are too - as another question and thus correlate what they belief and what they know correlate well</p> <p>I agree</p>
C. Perception	<p>"Unused medication within expiry dates not accepted by for reuse": by whom?</p> <p>I agree. To remove word 'by' or else say by whom</p> <p>"Patients' expectations to receive medication": To be prescribed? To be supplied with medication?</p> <p>We can change to "Patients' expectations to receive a prescription for medication"</p> <p>"Hoarding by patients due to fear of refusal of medication supply by healthcare professionals": ? refuse to prescribe? problems with entitlement?</p> <p>I agree. We can change to "Hoarding by patients due to fear of refusal of medication supply due to entitlement problems by healthcare professionals"</p> <p>This seems to be very long now – are there 2 statements here?</p> <p>"<u>Medication</u> non-adherence to medication regimens by patients": remove first medication</p> <p>I agree</p> <p>"Unnecessary sold-medication": ? or dispensed</p> <p>I agree. We can change to "Medication dispensed unnecessarily"</p> <p>"Medication stopped by doctor due to <u>resolution of patient's symptoms</u>": response to treatment</p> <p>I agree. We can change to "Medication stopped by doctor due to patient's response to treatment"</p>
D. Current practice, views and experiences	<p>"Patients bring me unwanted or unused medication"</p> <p>I agree</p> <p>"Medication supplied to patients and returned to me within their expiry dates should be reused": Why did you choose this rather than 'should not be reused'</p> <p>Using the word not can lead to double negatives and confusion. So I would NOT change</p> <p>"As a consumer of healthcare, I contribute to medication wastage in Malta": ? this is for healthcare professional</p>

	<p>I agree. Probably we should remove this statement</p> <p>Yes I agree unless you feel that they would have a different view as a consumer from their professional life – and are interested in capturing the dichotomy</p>
E. Education and training	<p>You should leave the scale consistent for all questions as much as possible</p> <p>I agree</p> <p>I think/ consider that training in medication wastage is useful <input type="checkbox"/> essential <input type="checkbox"/></p> <p>"Dentistry/ Medicine/ Nursing/ Pharmacy": Determine a system for order e.g. alphabetical and keep it throughout</p> <p>I agree</p>

Section	Validator 5
A. Demographics	<p>These questionnaires have been well thought out but they look intimidatingly long as they are, and when properly formatted, will probably span close to ten pages ... People may just not bother.</p> <p>I agree. Will decide after formatting of questionnaires and possibly piloting</p> <p>Snap should help with this</p>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	

Section	Validator 6
A. Demographics	<p>I find the questionnaire comprehensive and in essence excellent. I made some minor corrections</p> <p>Spelling mistakes corrected</p>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	



## HCP student questionnaire

Section	Validator 1
A. Demographics	<p>Should this come at end. Discuss with DS but perhaps the more "engaging" questionnaires should be at start and demographic at end?</p> <p>To be discussed</p> <p>Don't think really matters</p> <p>Footer: Does this need to be a footnote? Also does "drugs" need to be included too?</p> <p>Probably we can remove the term "drugs" since it's never mentioned in the questionnaire.</p> <p>Age: &gt; 33 years: Does there need to be an older categories too such as mature nursing students?</p> <p>Not sure of this</p> <p>Course of study: How about allied healthcare professionals? Any reason why not included?</p> <p>We decided to include only professions who either prescribe, dispense or administer medicines. Therefore I would NOT include other HC professionals</p> <p>Year of study: Any reason why first year omitted?</p> <p>Inclusion criteria states that "Students must be in their final or pre-final year of their undergraduate course as most of the topics in the curriculum would have been covered by then". All course have five years (therefore fourth and fifth year will be included), except nursing which has three years (therefore second year and third year will be included).</p> <p>"Are you, yourself, currently on any regular medication?": Remove 'yourself'</p> <p>I agree</p> <p>"If no, in the last 6 months, have you had a medicine prescribed or have you bought any medicines?": Do you need to include "over-the-counter from a pharmacy"?</p> <p>I agree</p> <p>"Please tick one of the following which best describes you in relation to how you change, for example ways of working or studying:": Or how do you react/adjust to change?</p> <p>I agree</p>
B. Awareness	<p>"If yes, where did you hear about 'medication wastage'?": Discussion with peers? Social media?</p> <p>I agree</p> <p>"What does 'medication wastage' mean to you?": Maybe reword to "what do you understand by the term medication wastage?"</p> <p>I agree</p> <p>Scale: Why not have these as a number and they just rank putting no in?</p> <p>We are testing each and every statement not ranking them in order of preference. Therefore I would NOT change</p> <p>"Medication wastage encompasses any medication which expires or remains unused throughout the whole medicines supply chain (medicines supply chain refers to the manufacturing, storage, transport and handling of medicines until these reach the consumer) and during use by the patient": Why not put the definition as a footnote? Overall I think this statement is very cumbersome and needs rewording</p> <p>We are actually testing this definition which was derived from the Delphi study. So cannot put as footnote or simplify it. I would NOT change.</p> <p>"Medication wastage encompasses the unnecessary or inappropriate consumption of medication by patients": Is the patient not part of the chain? Is this part of medication wastage? By inappropriate I would understand even inappropriate dosing etc....</p>



	<p>Whilst I agree with the comment, we are actually testing this definition which was derived from the Delphi study. I would NOT change.</p> <p>"Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals": Reword</p> <p>We are actually testing this definition which was derived from the Delphi study. So cannot reword. I would NOT change.</p> <p>Bullet point questions: Add 'other' category</p> <p>I agree</p>
C. Perception	<p>"Perceptions regarding factors potentially leading to medication wastage": Or is it views and attitudes? I would associate perceptions as qualitative methods</p> <p>I am not sure about this comment</p> <p>Perhaps this indicates that there needs to be discussion somewhere about why perceptions??</p> <p>"For each statement listed below, rate <u>in your opinion</u> the level of contribution each factor has towards medication wastage.": Would take out – is it not their opinion you are seeking?</p> <p>I agree to remove the term 'in your opinion'</p> <p>Headings: Do you need these headings?</p> <p>I think the headings give a more systematic layout to the questionnaire therefore I do NOT agree in removing them</p> <p>"Unused medication within expiry dates not accepted by for reuse": Unclear statement - reword</p> <p>We can change to "Medication that remain unused within their expiry dates are not accepted for reuse"</p> <p>"Inappropriate storage of medication": Medicines such as eye drops – "Use within----- days of opening?"</p> <p>We can ask this but I think we will complicate the questionnaire. To discuss</p> <p>"Hoarding by patients due to dependency on others to collect medication supply": Reword to include "access problems?"</p> <p>I am not sure</p> <p>How about patient's beliefs in all this?</p> <p>I am not sure</p> <p>Inadequate training of healthcare professional students about <u>monetary</u> cost of medication": Delete all</p> <p>I am not sure that we need to delete this. I believe if students knew more about costs of medication it can make a difference. I would NOT delete</p> <p>"Medication easily purchased from pharmacies": Prescription only medicines. Perhaps include without the need for a valid prescriptions</p> <p>We can add 'without the need for a valid prescription'</p>
D. Current practice, views and experiences	<p>I find this overall very long – will this influence questionnaire completion?</p> <p>I agree. Will decide after formatting of questionnaires and possibly piloting</p> <p>"Dentists could be more active in reducing medication wastage in Malta": Reword to: take on a more active role?</p> <p>I agree</p> <p>"In my view, dentists routinely advise patients on:": Reword to "to my knowledge</p> <p>I am not sure</p> <p>Agree that this is better</p> <p>"In my view, other health professionals have more responsibility than dentists to advise patients on:": Why specifically dentists?</p> <p>This will be specific to each profession depending on who is filling in the questionnaire</p>

	<p>"When I graduate, I intend considering medication wastage when prescribing/dispensing/administering medication": How about patient education?</p> <p>We can add another statement "When I graduate, I intend to regularly educate patients about medication wastage"</p> <p>Agree</p> <p>Check number ordering. Statements 21-24 perhaps better placed after statement 14</p> <p>To be discussed</p>
E. Education and training	<p>Scale: Why not have these as a number and they just rank putting no in?</p> <p>We are testing each and every statement not ranking them in order of preference. Therefore I would NOT change</p>

Section	Validator 2
A. Demographics	<p>"Age category in years": change to Your Age category in years (please circle/tick etc):</p> <p>I am not sure about this. I prefer 'age category in years'</p> <p>"Are you, yourself, currently on any regular medication?": I am not sure the relevance of asking this question to the health profession students.</p> <p>We can correlate the difference between responses of students who take medication versus ones who do not. However, not sure myself</p> <p>Agree with you</p> <p>Would this change an answer – perhaps could be seen in a pilot but not sure that important</p>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	

Section	Validator 3
A. Demographics	<p>Check re spelling mistakes</p> <p>Spelling mistakes corrected</p>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	

Section	Validator 4
A. Demographics	"health professional students": Is this the 'correct' term? It doesn't ring well. Check journals etc and see what terms they use <b>I need to check</b>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	Maybe you ask them whether their curriculum contains any coverage of your subject <b>I agree</b>

Section	Validator 5
A. Demographics	These questionnaires have been well thought out but they look intimidatingly long as they are, and when properly formatted, will probably span close to ten pages ... People may just not bother. <b>I agree. Will decide after formatting of questionnaires and possibly piloting</b>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	

Section	Validator 6
A. Demographics	I find the questionnaire comprehensive and in essence excellent. I made some minor corrections <b>Spelling mistakes corrected</b>
B. Awareness	
C. Perception	
D. Current practice, views and experiences	
E. Education and training	

### ***Appendix 5.3: Maltese Public Questionnaire***

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**Part 1: Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students**

*Dear Sir/Madam*

We would like to invite you to take part in a research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read this information carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

**What is the purpose of the study?**

Medication wastage is a major problem amongst many countries. The purpose is to investigate awareness, perceptions, attitudes and behaviours amongst the Maltese population, healthcare professionals and students about medication which is wasted.

**Why have I been chosen?**

You have been chosen at random from all the members of public in Malta as per the electoral list 2013.

**Do I have to take part?**

No. Participation in the study is voluntary.

**What will happen to me if I take part?**

To take part in the study, we ask that you complete the enclosed questionnaire which should take no more than about 15 minutes.

**What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify possible causes of medication wastage in our country.

**Will my taking part in this study be kept confidential?**

Yes. This study is not anonymous but information will be kept completely confidential.

**What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

**Who is organizing and funding the research?**

This project is organized by Robert Gordon University in Scotland and partially funded by the Malta Government Scholarship Scheme.

**Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To participate in this study, please complete the questionnaire within 2 weeks and send it back to us using the enclosed paid self-addressed envelope. The information in Part 2 at the end of the questionnaire is about focus groups that will take place later on this year. It is OK to return the questionnaire even if you are not interested in taking part in the focus groups.**

*Yours sincerely*  
*Lorna Marie West*  
*Contact number 99893001*

## Section A, Demographics

Questions in this section are about you. Please tick only one answer.

1. You are

☐Female

☐Male

2. Your age is

☐18-24 years

☐25-34 years

☐35-44 years

☐45-54 years

☐55-64 years

☐65-74 years

☐75-84 years

☐85 and over

3. Your level of education is

☐No schooling

☐Primary (Year 1 till Year 6)

☐Secondary (Form 1 till Form 5)

☐Post secondary (Sixth form/College/ MCAST)

☐Tertiary (University)

☐Post-graduate education

4. Your locality of residence is \_\_\_\_\_

5. Your occupation is

☐Employed, please specify the type of employment \_\_\_\_\_

☐Unemployed

☐Pensioner

☐Student

☐Other, please specify \_\_\_\_\_

6. Are you, or one of your close family members, any of the following?

☐Dentist

☐Doctor

☐Nurse

☐Pharmacist

☐No

7. Are you taking or using any regular medications (medications that you have to take or use every day)?

☐Yes (go to question 8)

☐No (go to question 9)

8. If yes, how do you obtain these medications? You may tick more than one answer.

☐Free on yellow or pink card

☐I or a family member pays for them

☐The doctor gives me free samples

☐Other, please specify \_\_\_\_\_

9. In the last 6 months, have you had a medication prescribed or have you bought any medications?

☐Yes I had a medication prescribed

☐Yes I bought medications over-the-counter

☐No

**If you replied 'No' to question 9 please complete only Section B of the questionnaire and then return the questionnaire. If you replied 'Yes' to question 9 please complete the whole questionnaire.**

## Section B, Awareness of Medication Wastage

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I am <u>fully aware</u> of the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>I contribute</u> to the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>other people</u> are contributing to the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that the <u>free health system</u> is contributing to the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>dentists</u> are responsible for the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>doctors</u> are responsible for the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>nurses</u> are responsible for the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that <u>pharmacists</u> are responsible for the <u>issue</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>impact</u> of medication wastage in Malta on <u>other</u> , please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>impact</u> of medication wastage in Malta on <u>other</u> , please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident in my ability to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
<u>Dentists</u> could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Doctors</u> could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Nurses</u> could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Pharmacists</u> could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>The state</u> could do more to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
Medications supplied to patients and returned, within their expiry dates, to healthcare professionals should be reused	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What, in your opinion, are the causes or reasons that could be leading to medication wastage in Malta?					
What, in your opinion, are the consequences (if any) of medication wastage?					
How, in your opinion, can medication wastage be reduced?					



**Section C, Current practice involving medications that you buy**

Questions in this section are ONLY about medications that you buy. This includes buying over-the-counter (e.g. paracetamol) or prescription medications from a pharmacy, health shops or the internet.

If you do not buy any medications tick the box Not Applicable ☐

For each statement listed below, tick the option which you feel mostly relates to you.

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I buy all my medications regularly whether or not I have run out of them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I buy all my medications only when I run out of them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I buy more medication than I need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I buy medications without checking if I already have a supply at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pass medications that I buy for myself to other persons, such as relatives, neighbours and friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I buy different medications for the same condition as I follow the advice of different people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I visit the dentist, doctor, pharmacist, nurse, I put them under pressure to supply me medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I buy medications depending on what I read in books, magazines, internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get medications from other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am aware of the approximate costs of the medications that I buy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section D, Current practice involving medications that you get for free**

Questions in this section are ONLY about medications that you get for free through the National Health System.

If you do not get any free medications tick the box Not Applicable ☐

For each statement listed below, tick the option which you feel mostly relates to you.

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I get all my free medications regularly whether or not I have run out of them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get all my free medications only when I run out of them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get more free medication than I need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get free medications from the pharmacy without checking if I already have a supply at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I pass medications that I get for free to other persons, such as relatives, neighbours and friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am aware of the approximate costs of the medications that I get for free from the National Health Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section E, Experiences with medications

Questions in the section are about your experiences with medications which you either buy or get for free

Are you aware that all medications have an expiry date (the "use-by" date)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I am not sure															
Please tell me where on a medication package you find the expiry date															
Do you have problems with reading the expiry date? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I am not sure															
Where do you currently store any medications that you have? Tick as many responses as you feel necessary. <input type="checkbox"/> Medication cabinets in the kitchen <input type="checkbox"/> Medication cabinets in the bedroom <input type="checkbox"/> Medication cabinets in the bathroom <input type="checkbox"/> Medication cabinets in the garage <input type="checkbox"/> Cupboard in the kitchen <input type="checkbox"/> Cupboard in the bedroom <input type="checkbox"/> Cupboard in the bathroom <input type="checkbox"/> Cupboard in the garage <input type="checkbox"/> Office <input type="checkbox"/> Car <input type="checkbox"/> Fridge <input type="checkbox"/> Carried around by individual <input type="checkbox"/> Other, please specify _____															
Do you recall who gave you the information on where to store the medications? Tick as many responses as you feel necessary. <table border="0"><tr><td><input type="checkbox"/>No one</td><td><input type="checkbox"/>Dentist</td><td><input type="checkbox"/>Doctor</td></tr><tr><td><input type="checkbox"/>Nurse</td><td><input type="checkbox"/>Pharmacist</td><td><input type="checkbox"/>Television/ Radio</td></tr><tr><td><input type="checkbox"/>Internet</td><td><input type="checkbox"/>Friend</td><td><input type="checkbox"/>Magazines/ Newspapers</td></tr><tr><td colspan="3"><input type="checkbox"/>Information leaflet supplied with medication</td></tr><tr><td colspan="3"><input type="checkbox"/>Other, please specify _____</td></tr></table>	<input type="checkbox"/> No one	<input type="checkbox"/> Dentist	<input type="checkbox"/> Doctor	<input type="checkbox"/> Nurse	<input type="checkbox"/> Pharmacist	<input type="checkbox"/> Television/ Radio	<input type="checkbox"/> Internet	<input type="checkbox"/> Friend	<input type="checkbox"/> Magazines/ Newspapers	<input type="checkbox"/> Information leaflet supplied with medication			<input type="checkbox"/> Other, please specify _____		
<input type="checkbox"/> No one	<input type="checkbox"/> Dentist	<input type="checkbox"/> Doctor													
<input type="checkbox"/> Nurse	<input type="checkbox"/> Pharmacist	<input type="checkbox"/> Television/ Radio													
<input type="checkbox"/> Internet	<input type="checkbox"/> Friend	<input type="checkbox"/> Magazines/ Newspapers													
<input type="checkbox"/> Information leaflet supplied with medication															
<input type="checkbox"/> Other, please specify _____															
In the last 6 months, do you recall if there were any unused medications in your household? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I am not sure															
If yes, do you remember the reason why these unused medications remained unused? Tick as many responses as you feel necessary. <input type="checkbox"/> Medication changed <input type="checkbox"/> Condition got better <input type="checkbox"/> Medication expired <input type="checkbox"/> There was extra stock <input type="checkbox"/> Patient passed away <input type="checkbox"/> Stopped by patient <input type="checkbox"/> I cannot remember <input type="checkbox"/> Other, please specify _____															

If you end up with unused medications which are not expired yet, what would you do with them? Tick as many responses as you feel necessary.

☐ Throw them away with the household rubbish  
☐ Throw them down the toilet or sink  
☐ Give them to a pharmacy to give them to someone else  
☐ Give them to another person or friend  
☐ Take them to a medication disposal bring-in-site  
☐ Give them to a pharmacy to dispose of them  
☐ Keep them for possible future use  
☐ Sell these medications  
☐ Give to charity  
☐ I do not know  
☐ Other, please specify\_\_\_\_\_

If you end up with unused medications which are expired, what would you do with them? Tick as many responses as you feel necessary.

☐ Throw them away with the household rubbish  
☐ Throw them down the toilet or sink  
☐ Give them to a pharmacy to give them to someone else  
☐ Give them to another person or friend  
☐ Take them to a medication disposal bring-in-site  
☐ Give them to a pharmacy to dispose of them  
☐ Keep them for possible future use  
☐ Sell these medications  
☐ Give to charity  
☐ I do not know  
☐ Other, please specify\_\_\_\_\_

Do you remember who gave you the information on how to dispose (get rid) of unused or expired medications? Tick as many responses as you feel necessary.

<input type="checkbox"/> No one	<input type="checkbox"/> Dentist	<input type="checkbox"/> Doctor
<input type="checkbox"/> Nurse	<input type="checkbox"/> Pharmacist	<input type="checkbox"/> Television/ Radio
<input type="checkbox"/> Internet	<input type="checkbox"/> Friend	<input type="checkbox"/> Magazines/ Newspapers
<input type="checkbox"/> Information leaflet supplied with medication	<input type="checkbox"/> Other, please specify_____	

Do you feel you have enough information on how to take all of your medications to get the most benefit from them (including medications which are used only occasionally)?

☐ Yes
 ☐ No
 ☐ I am not sure

Do you feel you have enough information on how to take all of your medications to get the least side-effects from them (including medications which are used only occasionally)?

☐ Yes
 ☐ No
 ☐ I am not sure

If yes to either of the last two questions, where did you get the information from? Tick as many responses as you feel necessary.

<input type="checkbox"/> I do not know	<input type="checkbox"/> Dentist	<input type="checkbox"/> Doctor
<input type="checkbox"/> Nurse	<input type="checkbox"/> Pharmacist	<input type="checkbox"/> Television/ Radio
<input type="checkbox"/> Internet	<input type="checkbox"/> Friend	<input type="checkbox"/> Magazines/ Newspapers
<input type="checkbox"/> Information leaflet supplied with medication	<input type="checkbox"/> Other, please specify_____	

## Section F, Taking your medications

Questions in this section are about how you take your medications. Please complete this section if you take regular medications (medications that you have to take or use every day) or if you had a medication prescribed during the past two weeks.

You indicated that you are taking medication for your health. Individuals have identified several issues regarding their medication-taking behaviour and we are interested in your experiences. There is no right or wrong answer. Please answer each question based on your personal experience with your medication.

Tick the correct answer from "Yes" or "No".

Do you sometimes forget to take your pills? <input type="checkbox"/> Yes <input type="checkbox"/> No					
People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it? <input type="checkbox"/> Yes <input type="checkbox"/> No					
When you travel or leave home, do you sometimes forget to bring along your medication? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Did you take your medicine yesterday? <input type="checkbox"/> Yes <input type="checkbox"/> No					
When you feel like your health is under control, do you sometimes stop taking your medicine? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Taking medication everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan? <input type="checkbox"/> Yes <input type="checkbox"/> No					
How often do you have difficulty remembering to take all your medications?	Never/ Rarely <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Sometimes <input type="checkbox"/>	Usually <input type="checkbox"/>	All the time <input type="checkbox"/>

## Section G, Your overall health

This question is about your overall health. Choose a point between 1 and 5

1 = As bad as it could be

5 = As good as it could be

Statements	1	2	3	4	5
How would you rate your health in the past 6 months?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please give any other comments you have on medication wastage in Malta

**I would like to thank you for completing this questionnaire. Your contribution is of valuable importance to this research. Please return in the reply paid envelope.**



**Part 2: Information letter ONLY if you are interested in participating in ONE focus group**

*Dear Sir/Madam*

We would like to invite you to take part in a research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read the following letter carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

**What is the purpose of the study?**

The purpose of this part of the research is to allow for more discussion on experiences and views on medication wastage, and possible ways to reduce this in Malta.

**Do I have to take part?**

No. You do not have to take part and it is okay if you change your mind after sending back the questionnaire.

**What will happen to me if I take part?**

We ask that you complete the attached short form. We will then contact you to check that you are still interested in taking part and give you a date, time and venue for the focus group meeting. The group discussion will not last longer than 90 minutes. Refreshments will be served during the discussions.

**What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, participation in this study will help to identify possible causes of medication wastage in our country.

**Will my taking part in this study be kept confidential?**

Yes. We will audio-record the discussions. These will then be written out in full. The recording will be deleted when the study is finished. All people taking part in the discussions will be asked not to divulge the information to others.

**What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

**Who is organizing and funding the research?**

This project is organized by Robert Gordon University and partially funded by the Malta Government Scholarship Scheme.

**Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To take part in this part of the study, please complete the attached form and send it back to us together with the questionnaire using the enclosed paid self-addressed envelope.**

*Yours sincerely  
Lorna Marie West*



**ROBERT GORDON  
UNIVERSITY • ABERDEEN**

**RESEARCH TEAM**

**Ms Lorna Marie West  
Dr Lesley Diack**

**Prof Derek Stewart  
Prof Maria Cordina**

**Expression of interest form to participate in focus groups  
regarding medication wastage in Malta**

First Name & Surname

How old are you?

What is your profession?

Dentist ☐ Doctor ☐ Nurse ☐ Pharmacist ☐  
Student ☐ Other ☐

If you responded 'other', what is your current job?

If you responded 'other', in the last 6 months, have you been taking or using any regular medications or had a medicine prescribed or have you bought any medicines?

Yes ☐ No ☐

If you are a student, what course are you undertaking?

Telephone Number:

Mobile Number:

Preferred time of day when to attend the focus group:

Morning ☐ Afternoon ☐ Evening ☐ Any time ☐

*Thank you in advance*

*Yours sincerely  
Lorna Marie West*

## ***Appendix 5.4: HCP Questionnaire***

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**Part 1: Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students**

**Dear Healthcare Professional**

We would like to invite you to take part in a PhD research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read this information carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

**What is the purpose of the study?**

Medication wastage is a major problem amongst many countries. The purpose is to investigate awareness, perceptions, attitudes and behaviours amongst the Maltese population, healthcare professionals and students about medication which is wasted.

**Why have I been chosen?**

We have selected healthcare professionals (dentists, doctors, nurses and pharmacists) through random sampling from lists of healthcare professionals.

**Do I have to take part?**

No. Participation in the study is voluntary.

**What will happen to me if I take part?**

To take part in the study, we ask that you complete the enclosed questionnaire which should take no more than about 15 minutes.

**What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify your views which will be valuable in studying medication wastage in our country.

**Will my taking part in this study be kept confidential?**

Yes. This study is not anonymous but information will be kept completely confidential.

**What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

**Who is organizing and funding the research?**

This project is organized by Robert Gordon University in Scotland and partially funded by the Malta Government Scholarship Scheme.

**Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To participate in this study, please complete the questionnaire within 2 weeks and send it back to us using the enclosed paid self-addressed envelope. The information in Part 2 at the end of the questionnaire is about focus groups that will take place later on this year. It is OK to return the questionnaire even if you are not interested in taking part in the focus groups.**

*Yours sincerely*

*Lorna Marie West*

*B.Pharm (Hons) MSc Clinical Pharmacy (Aberdeen) PgCert (Research Methods)*



## Section A, Demographics

1. You are

☐Female

☐Male

2. Your age is

☐20-29 years ☐30-39 years ☐40-49 years ☐50-59 years ☐ >59 years

3. Your profession is

☐Dentist

☐Doctor

☐Nurse

☐Pharmacist

4. Your main place of work is

☐Government services/ Public sector

☐Private Sector

☐Self-employed

☐Other, please specify \_\_\_\_\_

5. You have been practising in your profession

☐5 years or less

☐6-10 years

☐11-15 years

☐16-20 years

☐21-25 years ☐26-30 years ☐31-35 years

☐ >35 years

6. You completed your undergraduate training in

☐Malta

☐Other, please specify \_\_\_\_\_

7. You have completed a postgraduate course

☐No

☐Yes, please specify the country \_\_\_\_\_

8. You have also practised as a health professional in countries other than Malta

☐No

☐Yes, please specify the country \_\_\_\_\_

9. In relation to changes to your professional practice, you would describe yourself as (tick one only)

☐I resist new ways of working

☐I am cautious in relation to new ways of working; I tend to change once most peers have done so

☐I deliberate for some time before adopting new ways of working

☐I serve as a role model for others in relation to new ways of working

☐I am venturesome and willing to be innovative with new ways of working

## Section B, Awareness of Medication Wastage

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Medication wastage encompasses any medication which expires or remains unused throughout the medication supply chain (manufacturing, storage, transport and handling of medications until these reach the consumer) and during use by the patient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage encompasses unnecessary or inappropriate consumption of medication by patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage poses a financial burden on patients themselves, the state's economy and requires adequate education of all people concerned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please describe anything else you think should be encompassed within medication wastage					
I am <u>fully aware</u> of the <u>extent</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>extent</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>other</u> , please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>no interest</u> of the <u>consequences</u> of medication wastage in Malta on <u>other</u> , please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of factors potentially leading to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>factors</u> potentially leading to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of <u>laws, procedures and policies</u> relating to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in <u>laws, procedures and policies</u> relating to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C, Your opinions of factors potentially leading to medication wastage

For each statement listed below, rate the contribution of each as potentially leading to medication wastage

1= No contribution at all

5=Major contribution

Statements	1	2	3	4	5
Short medication expiry dates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large pack sizes when patients need smaller quantities of medications, particularly when starting new medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate audit of medication prescribing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications that remain unused within their expiry dates are not accepted for reuse by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inappropriate storage of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients' expectations to receive a prescription for medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of patient education/ knowledge about medications in general	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of patient education/ knowledge about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to previous or potential out of stock situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to dependency on others to collect medication supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to fear of refusal of medication supply due to entitlement problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other family members or carers obtaining medications on behalf of patient unaware of stock at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients getting advice from more than one healthcare professional, family and friends regarding use of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-adherence to medication regimens by patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived ineffectiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived adverse events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived resolution of their symptoms/ medical condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient's death	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1= No contribution at all

5=Major contribution

Statements	1	2	3	4	5
Lack of education and training of healthcare professional students about medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of education and training of healthcare professional students about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of continuing professional development of healthcare professionals about medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of continuing professional development of healthcare professionals about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professionals' lack of awareness of monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of communication about medications between primary and secondary healthcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of communication about medications between healthcare providers and patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professional due to ineffectiveness of the medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professional due to adverse events of the medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professionals due to resolution of patients' symptoms/ conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Over-prescribing by healthcare professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra medication supply dispensed to patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication prescribed for no indication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professional's perceptions that patients expect to receive a medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate medication reviews by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free healthcare system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications which are obtained free through the National Health System are regularly out of stock in the pharmacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications that legally require a prescription are easily purchased from pharmacies without the need for a valid prescription	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section D, Current practice, views, experiences

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I currently play an important part in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could be more active in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is little scope for me to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident in my ability to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professionals other than me have more responsibility in advising patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professionals other than me have more responsibility in advising patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health professionals other than me have more responsibility in advising patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets, available in the medication package, are a good source of information for patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets are a good source of information for patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets are a good source of information for patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients put me under pressure to supply medications which I consider to be unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family members of patients put me under pressure to supply medications which I consider to be unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other health professionals put me under pressure to supply medications which I consider to be unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am fully aware of the costs of medications I supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I review medications for the management of chronic conditions to ensure their continued indication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients often bring me unwanted or unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications supplied to patients and returned to me within their expiry dates should be reused	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have insufficient time in my daily practise to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is little incentive for me to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provision of medications to patients free of charge can lead to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For each statement listed below, tick the option which you feel mostly relates to you.

Statements	Never	Infrequently	Around half the time	Usually	Always	Unsure
I advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I advise patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In your opinion, which medications, therapeutic areas or patient groups should be considered as priority for targeting strategies to reduce medication wastage in Malta?

### Section E, Education and Training

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
I have never thought about undertaking further education and training relating to medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My undergraduate education and training had sufficient emphasis on medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Current healthcare professional undergraduate education and training in Malta has sufficient emphasis on medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Current healthcare professional postgraduate education and training in Malta has sufficient emphasis on medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I require more education and training to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>If you ticked strongly agree or agree to the last statement, what form of education and training are you most interested in (tick all that apply)</p> <ul style="list-style-type: none"><li><input type="checkbox"/>lectures</li><li><input type="checkbox"/>seminars</li><li><input type="checkbox"/>conferences</li><li><input type="checkbox"/>distance learning material</li><li><input type="checkbox"/>provision of national guidelines</li><li><input type="checkbox"/>online updates</li><li><input type="checkbox"/>reading journal articles</li><li><input type="checkbox"/>other, please specify_____</li></ul>					

Please give any other comments you have on medication wastage in Malta

**I would like to thank you for completing this questionnaire. Your contribution is of valuable importance to this research.**



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**RESEARCH TEAM**

**Ms Lorna Marie West  
Dr Lesley Diack**

**Prof Derek Stewart  
Prof Maria Cordina**

**Part 2: Information letter ONLY if you are interested in participating in ONE focus group**

**Dear Healthcare Professional**

We would like to invite you to take part in a research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read the following letter carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

**What is the purpose of the study?**

The purpose of this part of the research is to allow for more discussion on experiences and views on medication wastage, and possible ways to reduce this in Malta.

**Do I have to take part?**

No. You do not have to take part and it is okay if you change your mind after sending back the questionnaire.

**What will happen to me if I take part?**

We ask that you complete the attached short form. We will then contact you to check that you are still interested in taking part and give you a date, time and venue for the meeting. The discussion will not last longer than 90 minutes. Refreshments will be served during the discussions.

**What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify possible causes of medication wastage in our country.

**Will my taking part in this study be kept confidential?**

Yes. We will audio-record the discussions. These will then be written out in full. The recording will be deleted when the study is finished. All people taking part in the discussions will be asked not to divulge the information to others.

**What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

**Who is organizing and funding the research?**

This project is organized by Robert Gordon University and partially funded by the Malta Government Scholarship Scheme.

**Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To take part in this part of the study, please complete the attached form and send it back to us together with the questionnaire using the enclosed paid self-addressed envelope.**

*Yours sincerely  
Lorna Marie West*





**ROBERT GORDON  
UNIVERSITY • ABERDEEN**

**RESEARCH TEAM**

**Ms Lorna Marie West  
Dr Lesley Diack**

**Prof Derek Stewart  
Prof Maria Cordina**

**Expression of interest form to participate in focus groups  
regarding medication wastage in Malta**

First Name & Surname

How old are you?

What is your profession?

Dentist ☐ Doctor ☐ Nurse ☐ Pharmacist ☐  
Student ☐ Other ☐

If you responded 'other', what is your current job?

If you responded 'other', in the last 6 months, have you been taking or using any regular medications or had a medicine prescribed or have you bought any medicines?

Yes ☐ No ☐

If you are a student, what course are you undertaking?

Telephone Number:

Mobile Number:

Preferred time of day when to attend the focus groups:

Morning ☐ Afternoon ☐ Evening ☐ Any time ☐

*Thank you in advance*

*Yours sincerely  
Lorna Marie West*

## ***Appendix 5.5: HCP Student Questionnaire***

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#### RESEARCH TEAM

Ms Lorna Marie West    Prof Derek Stewart  
Dr Lesley Diack        Prof Maria Cordina



### **Part 1: Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students**

#### *Dear Healthcare Professional Student*

We would like to invite you to take part in a PhD research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read this information carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

#### **What is the purpose of the study?**

Medication wastage is a major problem amongst many countries. The purpose is to investigate awareness, perceptions, attitudes and behaviours amongst the Maltese population, healthcare professionals and students about medication wastage.

#### **Why have I been chosen?**

We have selected all students who are pursuing a first degree undergraduate healthcare professional course with the University of Malta and are in their final or pre-final year.

#### **Do I have to take part?**

No. Participation in the study is voluntary.

#### **What will happen to me if I take part?**

To take part in the study, we ask that you complete the enclosed questionnaire which should take no more than about 15 minutes.

#### **What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify possible causes of medication wastage in our country.

#### **Will my taking part in this study be kept confidential?**

Yes. This study is not anonymous but information will be kept completely confidential.

#### **What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

#### **Who is organizing and funding the research?**

This project is organized by Robert Gordon University in Scotland and partially funded by the Malta Government Scholarship Scheme.

#### **Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To participate in this study, please complete the questionnaire within 2 weeks and submit. The information in Part 2 at the end of the questionnaire is about focus groups that will take place later on this year. It is OK to submit the questionnaire even if you are not interested in taking part in the focus groups.**

*Yours sincerely*

*Lorna Marie West*

*B.Pharm (Hons) MSc Clinical Pharmacy (Aberdeen) PgCert (Research Methods)*

## Section A, Demographics

1. You are

☐Female

☐Male

2. Your age is

☐18-21 years

☐22-25 years

☐26-29 years

☐30-33 years

☐ >33 years

3. Your course of study is

☐Dentistry

☐Medicine

☐Nursing

☐Pharmacy

4. Your year of study is

☐Second year

☐Third year

☐Fourth year

☐Fifth year

5. Your nationality is

☐Maltese

☐Other, please specify \_\_\_\_\_

6. Your email address is: \_\_\_\_\_

7. Are you currently on any regular medications?

☐Yes (go to question 8)

☐No (go to question 9)

8. If yes, how do you obtain these medications? You may tick more than one answer.

☐Free on yellow or pink card

☐I or a family member pays for them

☐The doctor gives me free samples

☐Other, please specify \_\_\_\_\_

9. In the last 6 months, have you had a medication prescribed or have you bought any medications over-the-counter?

☐Yes I had a medication prescribed

☐Yes I bought medications over-the-counter

☐No

10. Please tick one of the following which best describes you in relation to how you react/adjust to change, for example ways of working or studying:

☐I resist any change

☐I am cautious in relation to change; I tend to change once most peers have done so

☐I deliberate for some time before adopting change

☐I serve as a role model for others in relation to change

☐I am venturesome and willing to be innovative with change

## Section B, Awareness of Medication Wastage

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Medication wastage encompasses any medication which expires or remains unused throughout the medication supply chain (manufacturing, storage, transport and handling of medications until these reach the consumer) and during use by the patient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage encompasses unnecessary or inappropriate consumption of medications by patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication wastage poses a financial burden on patients themselves, the state's economy and requires adequate education of all people concerned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please describe anything else you think should be encompassed within medication wastage					
I am <u>fully aware</u> of the <u>extent</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>extent</u> of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of the <u>consequences</u> of medication wastage in Malta on <u>other</u> , please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>patients</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>healthcare professionals</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>society</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>economy</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on the <u>environment</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>consequences</u> of medication wastage in Malta on <u>other</u> , please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of <u>factors</u> potentially leading to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in the <u>factors</u> potentially leading to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am <u>fully aware</u> of <u>laws, procedures and policies</u> relating to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have <u>no interest</u> in <u>laws, procedures and policies</u> relating to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section C, Your opinions of factors potentially leading to medication wastage**

For each statement listed below, rate the contribution of each as potentially leading to medication wastage

1 = No contribution at all

5 = Major contribution

<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Short medication expiry dates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large pack sizes when patients need smaller quantities of medications, particularly when starting new medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate audit of medication prescribing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications that remain unused within their expiry dates are not accepted for reuse by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inappropriate storage of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients' expectations to receive a prescription for medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of patient education/ knowledge about medications in general	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of patient education/ knowledge about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to previous or potential out of stock situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to dependency on others to collect medication supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overstocking of medications by patients due to fear of refusal of medication supply due to entitlement problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other family members or carers obtaining medications on behalf of patient unaware of stock at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patients getting advice from more than one healthcare professional, family and friends regarding use of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-adherence to medication regimens by patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived ineffectiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived adverse events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by patient due to perceived resolution of their symptoms/ medical condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient's death	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 = No contribution at all

5 = Major contribution

Statements	1	2	3	4	5
Lack of education and training of healthcare professional students about medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of education and training of healthcare professional students about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of continuing professional development of healthcare professionals about medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of continuing professional development of healthcare professionals about monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professionals' lack of awareness of monetary cost of medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of communication about medications between primary and secondary healthcare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of communication about medications between healthcare providers and patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professional due to ineffectiveness of the medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professional due to adverse events of the medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications stopped by healthcare professionals due to resolution of patients' symptoms/ conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Over-prescribing by healthcare professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra medication supply dispensed to patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medication prescribed for no indication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthcare professional's perceptions that patients expect to receive a medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate medication reviews by healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free healthcare system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications which are obtained free through the National Health System are regularly out of stock in the pharmacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications that legally require a prescription are easily purchased from pharmacies without the need for a valid prescription	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section D, Current practice, views, experiences

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
<u>Dentists</u> play an important part in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Doctors</u> play an important part in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Nurses</u> play an important part in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Pharmacists</u> play an important part in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Dentists</u> could play a more active role in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Doctors</u> could play a more active role in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Nurses</u> could play a more active role in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
<u>Pharmacists</u> could play a more active role in reducing medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please provide any comments you would like to make					
There is little scope for <u>dentists</u> to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is little scope for <u>doctors</u> to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is little scope for <u>nurses</u> to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is little scope for <u>pharmacists</u> to further reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident in <u>my ability</u> to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
To my knowledge, <u>dentists</u> routinely advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>dentists</u> routinely advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>dentists</u> routinely advise patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>doctors</u> routinely advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>doctors</u> routinely advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>doctors</u> routinely advise patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>nurses</u> routinely advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>nurses</u> routinely advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>nurses</u> routinely advise patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>pharmacists</u> routinely advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>pharmacists</u> routinely advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>pharmacists</u> routinely advise patients <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>doctors</u> to advise patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>doctors</u> to advise patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To my knowledge, <u>other healthcare professionals</u> have more responsibility than <u>doctors</u> to advise patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets, available in the medication package, are a good source of information for patients on <u>use</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets are a good source of information for patients on <u>storage</u> of their medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient information leaflets are a good source of information for patients on <u>disposal</u> of unused medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rate your level of agreement or disagreement with each of the following statements

Statements	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
When I graduate, I intend considering medication wastage when supplying medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I graduate, I intend to regularly educate patients about medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentists can make little difference to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doctors can make little difference to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nurses can make little difference to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacists can make little difference to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned that when I graduate patients will put me under pressure to supply medications which I consider unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned that when I graduate family members of patients will put me under pressure to supply medications which I consider unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned that when I graduate other healthcare professionals will put me under pressure to supply medications which I consider unnecessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am fully aware of the costs of medications commonly used in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medications supplied to patients and returned to me within their expiry dates should be reused	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentists have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doctors have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nurses have insufficient time in their daily practise to reduce the extent of medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacists have insufficient time in their daily practise to reduce the extent of medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provision of medications to patients free of charge can lead to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As a consumer of healthcare, I contribute to medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My undergraduate training has sufficient emphasis on medication wastage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I require more education and training on how to reduce medication wastage in Malta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In your opinion, which medications, therapeutic areas or patient groups should be considered as priority for targeting strategies to reduce medication waste in Malta?					
Please give any other comments you have on medication wastage in Malta					

**I would like to thank you for completing this questionnaire. Your contribution is of valuable importance to this research.**



**ROBERT GORDON  
UNIVERSITY • ABERDEEN**

**RESEARCH TEAM**

**Ms Lorna Marie West  
Dr Lesley Diack**

**Prof Derek Stewart  
Prof Maria Cordina**

**Part 2: Information letter ONLY if you are interested in participating in ONE focus group**

*Dear Healthcare Professional Student*

We would like to invite you to take part in a research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read the following letter carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

**What is the purpose of the study?**

The purpose of this part of the research is to allow for more discussion on experiences and views on medication wastage, and possible ways to reduce this in Malta.

**Do I have to take part?**

No. You do not have to take part and it is okay if you change your mind after sending back the questionnaire.

**What will happen to me if I take part?**

We ask that you complete the attached short form. We will then contact you to check that you are still interested in taking part and give you a date, time and venue for the meeting. The discussion will not last longer than 90 minutes. Refreshments will be served during the discussions.

**What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify possible causes of medication wastage in our country.

**Will my taking part in this study be kept confidential?**

Yes. We will audio-record the discussions. These will then be written out in full. The recording will be deleted when the study is finished. All people taking part in the discussions will be asked not to divulge the information to others.

**What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

**Who is organizing and funding the research?**

This project is organized by Robert Gordon University and partially funded by the Malta Government Scholarship Scheme.

**Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To take part in this part of the study, please complete the attached form and submit it together with the questionnaire.**

*Yours sincerely  
Lorna Marie West*



**ROBERT GORDON  
UNIVERSITY • ABERDEEN**

**RESEARCH TEAM**

**Ms Lorna Marie West  
Dr Lesley Diack**

**Prof Derek Stewart  
Prof Maria Cordina**

**Expression of interest form to participate in focus groups  
regarding medication wastage in Malta**

First Name & Surname

How old are you?

What is your profession?

Dentist ☐ Doctor ☐ Nurse ☐ Pharmacist ☐  
Student ☐ Other ☐

If you responded 'other', what is your current job?

If you responded 'other', in the last 6 months, have you been taking or using any regular medications or had a medicine prescribed or have you bought any medicines?  
Yes ☐ No ☐

If you are a student, what course are you undertaking?

Telephone Number:

Mobile Number:

Preferred time of day when to attend the focus groups:

Morning ☐ Afternoon ☐ Evening ☐ Any time ☐

*Thank you in advance*

*Yours sincerely  
Lorna Marie West*

## **Appendix 5.6: Robert Gordon University Ethics Approval**

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### **School of Pharmacy and Life Sciences Research Ethics Committee**

**COMPLETED**

**24 April 2013**

<b>Research Student Name</b>	Lorna Marie West
<b>Study Coordinator</b>	Professor Derek Stewart
<b>Research Project Title</b>	Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students

Dear Lorna

We have reviewed your ethics applications (title above) and it has been approved with no changes. The panel recommends that it is of sufficient standard for you to proceed.

If there are any questions on our response to the ethics submission please do not hesitate to get in touch.

Regards


A handwritten signature in black ink, appearing to read 'Lesley Diack'.

Dr Lesley Diack\*

Chair of the School Ethics Review Panel

\*In view of potential conflict of interest Prof Diack did not participate in discussions for the approval of this research but acted only as endorser and signatory as Chair of the School Ethics Review Panel

## **Appendix 5.7: University of Malta Research Ethics Committee Approval**

<b>L-UNIVERSITÀ TA' MALTA</b>  Msida – Malta Skola Medika Sptar Mater Dei		<b>UNIVERSITY OF MALTA</b>  Msida – Malta Medical School Mater Dei Hospital
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**Ref No: 21/2013**

Monday, 29<sup>th</sup> April 2013

Ms Lorna Marie West  
74 'Polaris'  
St Peter Street  
Fgura FGR1084

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Dear Ms West,


Please refer to your application submitted to the Research Ethics Committee in connection with your research entitled:

**Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students.**

**The University Research Ethics Committee granted ethical approval for the above mentioned protocol.**

The University Research Ethics Committee granted ethical approval for the above mentioned protocol.

Yours sincerely,

  
\_\_\_\_\_

Dr. Mario Vassallo  
Chairman  
Research Ethics Committee

Email: [umms@um.edu.mt](mailto:umms@um.edu.mt) • Web: <http://www.um.edu.mt/ms>

## Appendix 6.1: Focus group guide: HCPs

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**[5 minutes] Opening question:** Asking participants to introduce themselves: their name/ profession/ place of work

**[5 minutes] Introductory question:** Less than half of healthcare professionals responding to the questionnaire (42.1%) stated that they were fully aware of the extent of medication wastage in Malta. Before completing the questionnaire, had you really considered medication wastage as an issue in your practice?  
[*Knowledge*]

### **[30 minutes] Key questions: Initial unstructured discussion**

1. Do you feel that there is a real need to reduce medication wastage?  
[*Intentions*]  
(**Probe:** Only 7% stated that there is little scope for them to further reduce medication wastage in Malta. Do you feel there is a scope to reduce medication wastage)
2. Less than 50% of healthcare professionals stated that they felt confident in their ability to reduce medication wastage in Malta. How confident do you feel in your ability as professionals to further reduce medication wastage? [*Beliefs about capabilities and social/professional role and identity*]
3. What is the reason for your confidence or lack of? [*Beliefs about capabilities and social/professional role and identity*]
4. Almost three fourths of respondents stated that medication wastage encompasses the unjustified non-adherence to treatment guidelines by healthcare professionals. Are there any particular issues in professionals prescribing/recommending medications according to evidence based guidelines which might contribute to wastage? [*Skills*]
5. Are there situations when professionals have prescribed/recommended inappropriate medication or more medication than is required? What could contribute to this? [*Beliefs about consequences*]  
(**Probe:** There may be a relationship between inappropriate prescribing (such as prescribing more medication than is required) and the pressure by

patients/relatives to supply medications which they consider to be unnecessary. Some of the respondents to the public questionnaire commented on healthcare professionals' contributions towards wastage. One third of the public (35.0%) stated that doctors are responsible for the issue of medication wastage. One respondent from the public questionnaire claimed that doctors "do whatever the patient tells them to do" and another respondent stated that "doctors should not succumb to patients' pressures, who take medicines that they do not need any longer". To what extent do you feel patients/family members of patients/ healthcare professionals/ the healthcare system influence prescribing? What are the reasons?) [*Social influences*]

**[40 minutes] Transitioned into a more structured discussion**

6. Which, in your opinion, are the factors or interventions that would help to reduce medication wastage? [*Behavioural regulation*]

(**Probe:** Would you give me an example of how healthcare professionals can reduce medication wastage? (eg 66.3% of healthcare professionals stated that they review medications for the management of chronic conditions to ensure their continued indication)

(**Probe:** 79.3% of healthcare professionals felt that they require more education and training to further reduce medication wastage in Malta. Do you feel this would help?)

(**Probe:** Would you give me an example of how patients can reduce medication wastage?)

(**Probe:** Half of the healthcare professionals responding to the questionnaire felt that there is little incentive for them to reduce the extent of medication wastage in Malta. What do you consider as an incentive for healthcare professionals to further reduce medication wastage in Malta?

[*Reinforcement*])

7. Which, in your opinion, are the factors that would challenge prevention of medication wastage? [*Environmental context and resources*]

(**Probe:** Potential out of stock situation was considered to be a major factor contributing to medication wastage. To what extent, in your opinion, does the



fear of out stock situation affect healthcare professionals' prescribing or recommendation to give out medications? [*Emotion*])

(**Probe:** Almost half of public (42.4%) blame the free healthcare system as a contributor towards medication wastage. In what way is the free healthcare system linked to medication wastage?)

(**Probes:** What is the relationship between competing tasks, time constraints and medication wastage?)

8. What would help to overcome these factors? [*Optimism*]
9. The following patient groups and areas were considered as high priority to target medication wastage: Patients having free medications, elderly patients and patients on chronic medications, high cost medications and healthcare professionals. What steps could be taken to help reduce medication wastage in these patient categories and areas? [*Behavioural regulation*] Do you feel there are other more important priorities?
10. What are the potential strategies for moving forward and for maintaining long term change? [*Goals*] How can these best be implemented?

**[10 minutes] Ending question:** Of all the issues that were discussed, which one is most important to you?

The moderator will undertake to summarise the key questions and ideas that emerged from the discussion.

**Ending question:** Is this an adequate summary?

## **Appendix 6.2: Focus group guide: Public**

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**[5 minutes] Opening question:** Asking participants to introduce themselves: their name/ locality

**[5 minutes] Introductory question:** The majority of public respondents (70.6%) stated that they were fully aware of the extent of medication wastage in Malta. Before completing the questionnaire, had you really considered medication wastage as an issue in your every day lives? [*Knowledge*]

### **[30 minutes] Key questions: Initial unstructured discussion**

1. Do you feel that there is a real need to reduce medication wastage?  
[*Intentions*]  
(**Probe:** Only 7% stated that there is little scope for them to further reduce medication wastage in Malta. Do you feel there is a scope to reduce medication wastage?)
2. Only a third of the public (35.6%) stated that they felt confident in their ability to reduce medication wastage in Malta. How confident do you feel in your ability as a Maltese citizen to further reduce medication wastage?  
[*Beliefs about capabilities and social/professional role and identity*]
3. What is the reason for your confidence or lack of? [*Beliefs about capabilities and social/professional role and identity*]
4. Three quarters of respondents (75.1% n=202) self-reported not being fully adherent to their medications. Are there any particular issues which might cause patients not to take their medications as they are supposed to? [*Skills*]
5. Are there situations when professionals have prescribed/recommended inappropriate medication or more medication than is required? What could contribute to this? [*Beliefs about consequences*]  
(**Probe:** There may be a relationship between inappropriate prescribing (such as prescribing more medication than is required) and the pressure by patients/relatives to supply medications which they consider to be unnecessary. Some of the respondents to the public questionnaire commented on healthcare professionals' contributions towards wastage. One

third of the public (35.0%) stated that doctors are responsible for the issue of medication wastage. One respondent from the public questionnaire claimed that doctors “do whatever the patient tells them to do” and another respondent stated that “doctors should not succumb to patients' pressures, who take medicines that they do not need any longer”. To what extent do you feel patients/family members of patients/ healthcare professionals/ the healthcare system influence prescribing? What are the reasons?) [*Social influences*]

**[40 minutes] Transitioned into a more structured discussion**

6. Which, in your opinion, are the factors or interventions that would help to reduce medication wastage? [*Behavioural regulation*]

(**Probe:** Would you give me an example of how healthcare professionals can reduce medication wastage? (eg 66.3% of healthcare professionals stated that they review medications for the management of chronic conditions to ensure their continued indication)

(**Probe:** 79.3% of healthcare professionals felt that they require more education and training to further reduce medication wastage in Malta. Do you feel this would help?)

(**Probe:** Would you give me an example of how patients can reduce medication wastage?)

(**Probe:** Half of the healthcare professionals responding to the questionnaire felt that there is little incentive for them to reduce the extent of medication wastage in Malta. What do you consider as an incentive for healthcare professionals to further reduce medication wastage in Malta?

[*Reinforcement*])

7. Which, in your opinion, are the factors that would challenge prevention of medication wastage? [*Environmental context and resources*]

(**Probe:** Potential out of stock situation was considered to be a major factor contributing to medication wastage. To what extent, in your opinion, does the fear of out stock situation affect the public to hoard medications? [*Emotion*])

(**Probe:** Almost half of public (42.4%) blame the free healthcare system as a contributor towards medication wastage. In what way is the free healthcare system linked to medication wastage?)

8. What would help to overcome these factors? [*Optimism*]
9. The following patient groups and areas were considered as high priority to target medication wastage: Patients having free medications, elderly patients and patients on chronic medications, high cost medications and healthcare professionals. What steps could be taken to help reduce medication wastage in these patient categories and areas? [*Behavioural regulation*] Do you feel there are other more important priorities?
10. What are the potential strategies for moving forward and for maintaining long term change? [*Goals*] How can these best be implemented?

**[10 minutes] Ending question:** Of all the issues that were discussed, which one is most important to you?

The moderator will undertake to summarise the key questions and ideas that emerged from the discussion.

**Ending question:** Is this an adequate summary?

## ***Appendix 6.3: Invitation to participate information letter for focus groups***

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### **Part 2: Information letter ONLY if you are interested in participating in ONE focus group**

We would like to invite you to take part in a research study. It is important that you understand why the research is being done and what it will involve. Thank you for taking the time to read the following letter carefully. Ask us if there is anything that is not clear or if you would like further information. Take time to decide whether or not you wish to participate.

#### **What is the purpose of the study?**

The purpose of this part of the research is to allow for more discussion on experiences and views on medication wastage, and possible ways to reduce this in Malta.

#### **Do I have to take part?**

No. You do not have to take part and it is okay if you change your mind after sending back the questionnaire.

#### **What will happen to me if I take part?**

We ask that you complete the attached short form. We will then contact you to check that you are still interested in taking part and give you a date, time and venue for the meeting. The discussion will not last longer than 90 minutes. Refreshments will be served during the discussions.

#### **What are the possible benefits of taking part?**

There is no direct benefit to you from taking part. However, completion of the questionnaire will help to identify possible causes of medication wastage in our country.

#### **Will my taking part in this study be kept confidential?**

Yes. We will audio-record the discussions. These will then be written out in full. The recording will be deleted when the study is finished. All people taking part in the discussions will be asked not to divulge the information to others.

#### **What will happen to the results of the research study?**

The main findings of the study will be published in a healthcare journal and on the University website. You may request a copy of the publication or report.

#### **Who is organizing and funding the research?**

This project is organized by Robert Gordon University and partially funded by the Malta Government Scholarship Scheme.

#### **Who has reviewed the study?**

This study has been approved by the Ethical Review Panel of the School of Pharmacy & Life Sciences at Robert Gordon University and the Maltese University Research Ethics Committee.

**To take part in this part of the study, please complete the attached form and send it back to us together with the questionnaire using the enclosed paid self-addressed envelope. Once we receive it, the questionnaire and this leaflet will be immediately stored separately. Therefore, the questionnaire will remain completely anonymous.**

*Yours sincerely  
Lorna Marie West*

## ***Appendix 6.4: Expression of interest form to participate in focus groups***

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Expression of interest form to participate in focus groups regarding medication wastage in Malta

First Name & Surname

How old are you?

What is your profession?

Dentist ☐

Doctor ☐

Nurse ☐

Pharmacist ☐

Student ☐

Other ☐

If you responded 'other', what is your current job?

If you responded 'other', in the last 6 months, have you been taking or using any regular medications or had a medicine prescribed or have you bought any medicines?

Yes ☐

No ☐

If you are a student, what course are you undertaking?

Telephone Number:

Mobile Number:

Preferred time of day when to attend the focus groups:

Morning ☐

Afternoon ☐

Evening ☐

Any time ☐

*Thank you in advance*

*Yours sincerely*

*Lorna Marie West*

## **Appendix 6.5: Consent form focus groups**

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Consent form focus groups: Attitudes and experiences regarding medication wastage and its reduction in Malta

Please initial the circle beside each of the following statements to confirm your consent to participate in the study. All seven parts are required.

- ☐ I confirm that I have read and understood the information provided
- ☐ I confirm that I have had a chance to have my questions answered
- ☐ I agree to participate in the discussions regarding medication wastage
- ☐ I am aware that my participation is voluntary and that I can withdraw from the study whenever I would like to
- ☐ I understand that the findings will be utilized for research purposes
- ☐ I agree not to share any information divulged during the discussions
- ☐ I hereby assign the copyright for my research contribution to Robert Gordon University

First Name & Surname

Date

Participant's Signature

Principal Researcher's Signature

Principal Researcher's Contact Details

Email: l.m.west@rgu.ac.uk

Contact Number: 99893001

## Appendix 6.6: Robert Gordon University Ethics Approval

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### School of Pharmacy and Life Sciences Research Ethics Committee

**COMPLETED**

**24 April 2013**

<b>Research Student Name</b>	Lorna Marie West
<b>Study Coordinator</b>	Professor Derek Stewart
<b>Research Project Title</b>	Awareness, perceptions, attitudes and behaviours regarding medication wastage amongst the Maltese population, healthcare professionals and healthcare professional students

Dear Lorna

We have reviewed your ethics applications (title above) and it has been approved with no changes. The panel recommends that it is of sufficient standard for you to proceed.

If there are any questions on our response to the ethics submission please do not hesitate to get in touch.

Regards

A handwritten signature in black ink, appearing to read 'Lesley Diack'.

Dr Lesley Diack\*  
Chair of the School Ethics Review Panel

\*In view of potential conflict of interest Prof Diack did not participate in discussions for the approval of this research but acted only as endorser and signatory as Chair of the School Ethics Review Panel



## **Appendix 6.7: University of Malta Research Ethics Committee Approval**

