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## **An exploration of health professionals' experiences of medicines management in elderly, hospitalised patients in Abu Dhabi**

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### **Abstract**

#### **Background**

Given the multiplicity of issues relating to medicines in the elderly, the structures and processes of medicines management should be clearly defined and described to optimise patient outcomes. There is a paucity of research which provides an in-depth exploration of these elements of medicines management for elderly patients.

#### **Objectives**

This study explored health professionals' experiences of medicines management for elderly, hospitalised patients in Abu Dhabi.

#### **Setting**

The research was conducted in five major hospitals in Abu Dhabi, the United Arab Emirates.

#### **Method**

Responses to an online sampling questionnaire were used to purposively select nurses, pharmacists and physicians for interview. A semi-structured interview schedule was developed with reference to Normalization Process Theory (NPT) and the Theoretical Domains Framework (TDF) to explore issues of medicines management structures, processes and outcomes. Face-to-face interviews of 20-30 minutes were audio-recorded, transcribed verbatim and analysed using the Framework Approach.

## **Main Outcome Measures**

Health professionals' in-depth experiences of structures, processes and outcomes relating to medicines management.

## **Results**

Saturation of themes was deemed to occur at interview 27 (7 nurses, 13 pharmacists, 7 physicians). Six key themes and several subthemes emerged from the qualitative analysis, which pertained to the need for: appropriate polypharmacy; a systematic approach to medicines history taking; improved communication and documentation; improved patients' adherence to medicines; guidelines and policies to support medicines selection, and an educated and trained multidisciplinary team. The most dominant TDF behavioural determinants were issues around: professional role and identity; beliefs about capabilities; beliefs about consequences; environmental context and resources; knowledge, and goals. NPT construct identified little evidence of coherence, cognitive participation, collective action and reflexive monitoring.

## **Conclusion**

The key themes identified in this research indicate the need to develop a more structured approach to medicines management in elderly hospitalised patients in Abu Dhabi. The NPT constructs and the TDF behavioural determinants can be utilised as part of service development and implementing change.

## **Impact of findings on practice**

- While nurses, physicians and pharmacists are involved in medicines management in elderly, hospitalised patients it is likely that there is a lack of clarity over coherence and role definition.

- Adopting a theoretical approach to service development could lead to more effective interventions
- Theoretical domains framework of behavioural change can identify individual health professional behavioural determinants while normalization process theory can lead to more sustained interventions.

**Keywords**

Abu Dhabi, qualitative, interviews, theoretical domains framework, normalization process theory

## Introduction

Multimorbidity is defined by the World Health Organisation (WHO) as ‘the co-occurrence of two or more chronic medical conditions in one person’<sup>1</sup>, with epidemiological data indicating that it increases with age.<sup>2,3</sup>

Polypharmacy is considered to be ‘one of the greatest prescribing challenges’, increasing the likelihood of adverse drug reactions, drug interactions and contributing to non-adherence.<sup>4</sup>

Patterson et al suggest a change in emphasis from inappropriate polypharmacy (prescribing of many medicines which are either inappropriate or no longer indicated) to appropriate or optimal polypharmacy (appropriate prescribing of many medicines).<sup>5</sup>

There is a wealth of evidence of inappropriate polypharmacy in the elderly. United Kingdom (UK) data highlight that 20.8% of patients with two clinical conditions are prescribed four to nine medicines, and 1.1% prescribed ten or more; in patients with six or more comorbidities, values are 47.7% and 41.7 %, respectively.<sup>6</sup> Similar statistics have been published for elderly residents of nursing homes in the United States (US).<sup>7</sup> Furthermore, the elderly are at risk of adverse effects due to associated factors of age related physiological changes, impacting health outcomes and healthcare resources.<sup>8,9</sup>

The appropriate selection, prescribing and review of medicines in the elderly is therefore of paramount importance.<sup>10</sup> Many tools and frameworks have been developed to promote appropriate prescribing. A recent systematic review reported 46 discrete tools to identify inappropriate prescribing and high risk drugs.<sup>11</sup> The most widely used include Beers Criteria in the US and STOPP-START criteria in Europe.<sup>12,13</sup>

Multimorbidity and polypharmacy also impact medicines burden, affecting medicines adherence. Adherence, redefined as ‘the process by which patients take their medicines as prescribed, composed of initiation, implementation and discontinuation’<sup>14</sup> is a key issue. Data

suggest that between 50 and 80% of those with chronic conditions may be non-adherent, depending on the clinical condition being studied. A review of 51 systematic reviews of the determinants of adherence identified 771 individual factors, grouped into eight clusters, for non-adherence to chronic medicines.<sup>15</sup>

Given the multiplicity of issues relating to medicines in the elderly, the structures and processes of medicines management should be clearly described to optimise patient outcomes. The UK Audit Commission in 2001 stated that medicines management ‘encompasses the entire way that medicines are selected, procured, delivered, prescribed, administered and reviewed to optimise the contribution that medicines make to producing informed and desired outcomes of patient care’.<sup>16</sup> In 2002, the National Prescribing Centre in England (now part of the National Institute for Health and Care Excellence [NICE]) added that it ‘considers the systems of processes and behaviours determining how medicines are used by patients and the National Health Service (NHS)’. Medicines management has primarily been led by pharmacy teams and is the term that has been used historically in the NHS for ‘managing people’s medicines’.<sup>17</sup>

Very recently, NICE has introduced the term ‘medicines optimisation’ which ‘requires evidence-informed decision making about medicines, involving effective patient engagement and professional collaboration to provide individualised, patient-centred approach to medicines use, within available resources’.<sup>18</sup>

Whatever the definition, medicines management in the elderly is complex, requiring clarity around healthcare structures and processes in order to achieve the best possible outcomes. Donabedian proposed a conceptual model and framework for health services and quality of care, describing the elements of structures, processes and outcomes.<sup>19</sup> Structures are the characteristics of the care delivery setting, including: material resources; human resources;

and organisational structure. Processes detail what is actually carried out as part of giving care while outcomes describe the patients' resultant health status.

### **Aim of the study**

There is a paucity of research exploring these elements of medicines management for elderly patients. The aim of this research was to describe and understand health professionals' views and experiences of medicines management healthcare structures, processes and outcomes for elderly, hospitalised patients. Medicines management in this study related to the individual patient journey from the point of hospital admission to discharge.

### **Ethical approval**

The research was approved by the ethical panel of the School of Pharmacy and Life Sciences at Robert Gordon University, UK and the ethical committees of each participating hospital.

### **Methods**

#### ***Research Design***

A qualitative, interpretative phenomenological methodology of in-depth semi-structured, face-to-face interviews with a sample of health professionals most involved in medicines management.

#### ***Setting***

The research was conducted in five major hospitals of Abu Dhabi, the United Arab Emirates (UAE) providing care for 85% of the population.<sup>20</sup>

#### ***Sampling and Recruitment***

Purposive sampling was employed, with diversity in profession, countries of practice and years of experience. To identify potential participants, all physicians, nurses and pharmacists were emailed by the human resources department of each hospital. The email requested those working with elderly patients and interested in participating to complete a short online

questionnaire. Responses were collated and used to purposively select participants. Those selected were contacted by email to arrange a convenient location, date and time of interview.

### ***Sample Size***

As described by Marshall, the number of subjects required for qualitative research ‘usually becomes obvious as the study progresses, as new categories, themes or explanations stop emerging from the data (data saturation)’.<sup>21</sup> The approach to determining the point of saturation described by Francis et al was employed.<sup>22</sup> This is described as four principles: an initial analysis sample, specifying a priori the sample size at which the first round of analysis will be complete; the stopping criterion, specifying a priori how many more interviews will be conducted, without new shared themes or ideas emerging, before it can be concluded that saturation has been achieved; independent coders; and a clear audit trail of data saturation methods.<sup>22</sup>

In this study, the initial analysis sample was 15 (five each for physicians, nurses and pharmacists) and the stopping criterion was tested after each of two further consecutive interviews. Two independent researchers coded the interviews and made comparisons before confirming that data saturation had been achieved.

### ***Data Generation***

The semi-structured interview schedule was developed with reference to Normalization Process Theory (NPT) and the Theoretical Domains Framework (TDF). NPT is described as a toolkit which focuses on healthcare structures and processes to aid understanding of the dynamics of implementing, embedding, and integrating complex interventions.<sup>23</sup> The four key constructs of NPT are: coherence, the ‘sense-making work’ (e.g. shared understanding); cognitive participation, the ‘relational work’ (e.g. defining procedures); collective action, the



‘operational work’ (e.g. allocation of work), and reflexive monitoring, the ‘appraisal work’ (e.g. determining effectiveness).

TDF was used to focus on behavioural determinants of individual participants around medicines management. It includes constructs from 33 behaviour change theories (e.g. Theory of Planned Behavior, Theory of Reasoned Action, Stages of Change Model) and proposes that determinants of behaviour or practice cluster into 14 domains.<sup>24</sup> The most relevant domains (e.g. knowledge, beliefs of consequences) were used to guide the interview schedule.

The schedule was reviewed for credibility by members of the research team, which included: a leading international pharmacy practice educationalist; a psychologist; a pharmacist with strategic development experience, and a leading medical consultant from the UAE. Pilot interviews were conducted with two experienced clinical pharmacy practitioners in the UAE based outwith the study settings. All interviews were audio-recorded and transcribed verbatim as soon as possible following the interview to allow further refining of the interview schedule and consideration of saturation.

### ***Data Analysis***

The first three interview transcripts were reviewed independently by a member of the research team to ensure reliability of transcribing. The Framework Approach to data analysis was employed comprising phases of: familiarisation; identifying a thematic framework; indexing; charting, and mapping and interpretation.<sup>25</sup> Data analysis was undertaken independently by another member of the research team, findings compared and consensus reached. Emerging themes and subthemes were mapped to NPT and TDF. NVivo software 10.0 was used as an aid to data management.

### **Results**

Of the 83 respondents to the online questionnaire, 32 agreed to be interviewed, as described in Table 1. Saturation of themes was deemed to occur after interviewing 7 nurses, 13 pharmacists and 7 physicians; six themes and several subthemes emerged.

***Theme 1 - Need for appropriate polypharmacy in elderly patients with multimorbidities***

One key theme was the need for appropriate polypharmacy in this patient group. During discussion, one pharmacist noted the lack of a clear definition for polypharmacy,

*“Polypharmacy does not have a clear definition...”*

(Pharmacist Z1, Clinical)

***Subtheme 1 – Consequences of polypharmacy***

Among the many consequences highlighted were issues of drug interactions, adverse effects and poor adherence,

*“...they have polypharmacy - they have a lot of medications. Sometimes the family does not know the medications. Multiple medications for same disease or different disease that will make it difficult for the patient and the family. Compliance will go down usually. Drug-drug interaction will be high. Side effects will be high.”*

(Physician M1, Internist)

***Subtheme 2 - Responsibilities for managing polypharmacy***

Some physicians were of the opinion that they dealt with the management and control of their specialist condition only, and while this may involve an element of polypharmacy in the use of several medicines, they considered polypharmacy to be the responsibility of others. As one neurologist described,

*“In my practice, when epilepsy is not controlled I use polypharmacy to kill the seizures; we try to stick to the baseline neurologic condition. Polypharmacy, usually it is the internist or general medicine physicians who figure that out.”*

(Physician A1, Neurologist)

Several physicians noted the need for specialist and multidisciplinary input,

*“If you have a lot of these issues and you have a problem we need to involve our clinical pharmacist with these kind of problems especially for multiple, polypharmacy.”*

(Physician A2, ICU)

Many of the pharmacists also considered that they had a clinical role in these patients,

*“I take care, especially the elderly patients with polypharmacy. I review their medication profiles, their labs, their vital signs, and I keep the high-risk patient at follow-up on daily basis.”*

(Pharmacist K2, Clinical)

However, some also commented that the clinical service currently provided was not always sufficient,

*“As much as we can we optimise it, but it is not up to the required standards...We are trying to avoid using sedating agents or anticholinergic agents as much as we can, but generally speaking it is not up to the required standard.”*

(Pharmacist Z2, Clinical)

***Subtheme 3 - Need for a systematic approach to a full medicines review***

Several physicians and pharmacists discussed the need for a systematic approach to medicines review,

*“These kind of patients they need analysis, meaning you need to analyse their problem like system by system, problem by problem.”*

(Physician A2, ICU)

In undertaking the review, the need to discontinue as many medicines as possible was highlighted, particularly in the context of patient safety,

*“We try to avoid unnecessary medications, like lot of patients take B complex, which has got no significant role to play, so we just cut down those unnecessary medications.”*

(Physician K1, GP)

***Subtheme 4 - Contribution of healthcare structures and processes to inappropriate polypharmacy***

Interviewees considered the UAE healthcare system to be contributing to inappropriate polypharmacy. These issues included: individual patients being treated by multiple prescribers, sometimes for the same indication; poor documentation; and a lack of inter- and intra-professional communication. These aspects were highlighted by a junior physician,

*“..... they shift from one physician to another and nobody explains to them. You know, some of the medications have the generic name and different trade names and they keep using both, they do not know about it... The problem, many times there is no documentation ....”*

(Physician Z2, Internist)

*“I think, physicians when they prescribe they are not checking each other which the physician prescribed and he will just come and prescribe and go.”*

(Pharmacist M2, Clinical)

*“Sometimes when we are talking with the patient and sometimes they will bring their medication. They have two bags of medication which — almost the same generic name but different brand name”.*

(Nurse A1)

## ***Theme 2 – Need for systematic approach to medicines history taking***

All interviewees highlighted the need to obtain an accurate, up to date, list of medicines being taken at the point of admission to hospital.

### ***Subtheme 1 – Sources of information***

Interviewees described one particular issue of obtaining information from elderly patients and the need to use as many sources of information as possible,

*“I try to gather whatever from the online record or record whatever, but still I will ask the family to bring it. Because this is very important to know what the patient is on, what to continue, what to hold, and later on after discharge ... This is again a big issue of elderly patients... Sometimes the family does not know the medications.”*

(Physician M1, Internist)

Some of the pharmacists noted that it was not always clear who was responsible for medicines history taking,

*“Before admission, we have no relation with the patient, but upon admission if we receive calls to come to reconcile patients’ medications, we and we reconcile the patient’s medications.”*

(Pharmacist Z2, Clinical)

### ***Theme 3 – Need to improve communication and documentation***

Generally, all highlighted the need for more effective and efficient multidisciplinary team working, describing issues relating to poor intra- and inter-disciplinary communication and documentation.

#### ***Subtheme 1 - Lack of communication***

Several physicians stressed the need to improve communication at all levels,

*“... if different specialties have to be involved in dealing with same patient, we have a little bit difficulty in coordinating them.”*

(Physician A2, ICU)

Pharmacists also noted issues related to the processes of communicating with physicians. As described by one respondent, different modes of communication had been tried and none were particularly met their expectations,

*“We are trying verbal communication, also electronic communications, sometimes we will put notes on patient’s profile, so the physician can look at it, but we are not meeting our expectations with communication.”*

(Pharmacist K3, Inpatient)

Communication at ward level with the pharmacists was noted to be infrequent,

*“...When it comes to the pharmacists, really we are not dealing with them, except if there is something that really needs to be addressed, we will call the pharmacy”*

(Nurse K1)

### ***Subtheme 2 - Lack of documentation***

There were mixed views on the quality and extent of documentation of medicines in patient records, with some physicians repeating the work of others,

*“I look at the medication compared to the system we have in the chart. The problem, many times there is no documentation about the medication. Most people write documentation. Some don’t write it. Some write incoherent handwriting.”*

(Physician Z2, Internist)

While most of the pharmacists described a systematic approach to review of patients’ medicines and documentation of issues,

*“I go through their medication charts and the labs, and vital signs and if there is some feedback, I always give the feedback in verbal and in addition I give my medication review also in the patient chart documentation.”*

(Pharmacist K2, Clinical)

several admitted that they did not always record any identified issues,

*“...be honest, sometimes I forget to document like, I forget to document on daily basis, so sometimes there are something that I forget to document.”*

(Pharmacist T1, Clinical)

***Theme 4 – Need to improve patients’ adherence to medicines***

The issues of non-adherence of elderly patients were discussed at length.

***Subtheme 1 – Non-adherence as a consequence of multimorbidities and polypharmacy***

Several shared similar views of the links between multimorbidities, polypharmacy and adherence,

*“The poor adherence is more frequent compared to overdosing or extra doses taken and the poor adherence I think, the polypharmacy is number one factor for this.”*

(Pharmacist K1, Clinical)

***Subtheme 2 – Patients’ lack of knowledge***

Physicians, nurses and pharmacists described issues related to patients’ knowledge leading to non-adherence,

*“Many patients who have been given medication, after about few months they feel comfortable and normally they think why do I am taking this medication. So they start reducing their own and sometimes they stop also. Once we crosscheck, patient says nobody told me that this medication I have to take lifelong.”*

(Physician K1, GP)

***Subtheme 3 – Need for patient/carer/family counselling***



While all described at length the need for and importance of counselling elderly patients and their carers/family, it appeared that this tended to take place only at the point of discharge from hospital. A range of professionals were involved as described by one pharmacist,

*“First of all, it is the responsibilities for the physician to tell the patient that he is upon discharge and he will tell him what kind of medications he will take. On our part as pharmacists, we do the patient counselling and when we dispense medications, give the patient counselling.”*

(Pharmacist K3, Inpatient)

In some instances, the input of pharmacist was targeted at patients prescribed high risk medicines,

*“There is a program for counselling the patient on select drugs, which have been identified as either high-alert high-risk medications.”*

(Pharmacist M1, Clinical)

None of the interviewees described the need to educate and counsel patients at several points during stay, or the need to focus on aspects other than impacting knowledge.

### ***Theme 5 - Need for guidelines and policies to support medicines selection***

Several raised aspects such as a standardised approach of policies and guidance to support medicines selection in this population of patients.

#### ***Subtheme 1 - Awareness of and adherence to guidelines and policies***

There were diverse views on organisational and clinician approaches to medicines selection. Two pharmacists gave detailed accounts of the organisational level approaches in their hospitals, comprising Pharmacy and Therapeutic Committees which aimed to provide recommendations on preferred medicines to medical staff,

*“Physicians in our hospital they cannot prescribe whatever they want to prescribe.*

*We have here what is called ‘pharmacy & therapeutic committee’, generates a list for our hospital and this pharmacy and therapeutic committee is a multidisciplinary team.”*

(Pharmacist A2, Clinical)

One pharmacist, however, noted that the process of medicines selection was less controlled at the individual physician level,

*“Most of our physicians are basically free to prescribe whatever they want.”*

(Pharmacist T1, Clinical)

One physician expressed his frustration in the lack of freedom to prescribe any medicine,

*“The problem is a lot of times we do not get the drugs that we want. If I give them this antibiotic and they have to jump through a lot of hoops to get the medication, are they really going to end up getting it?”*

(Physician Z1, Internist)

There was also a notable lack of use of guidelines and policies to support medicines choice and that selection was normally at the discretion of the physician, but acknowledging that specific clinical guidelines may be referred to,

*“It is like physician discretion rather than based on any guideline, but we rely on like international guidelines such as for epilepsy, American Heart Association in Stroke and then we have other guidelines for so many other things.”*

(Physician A1, Neurologist)

Some physicians were of the view that there was a need for the development and implementation of guidelines for elderly patients,

*“Elderly – we try to establish guidelines. I think we are a little bit behind. We should do even better. There are some policies in the hospital where we follow, but I think we should do better, definitely.”*

(Physician M1, Internist)

When asked specifically about their awareness and use of any lists of drugs potentially inappropriate in the elderly or drugs commonly omitted in the elderly, only one pharmacist was aware of Beers Criteria and admitted not using routinely,

*“Yes, sometimes. Yeah. It is not always the case, but sometimes I use this list and first I got through the idea of this list in 2011 when I was doing research from my pharmacotherapy, so I found this article in annual of pharmacotherapy, the Beers Criteria, and I shared with other colleagues for some patients it is useful and helpful.”*

(Pharmacist K2, Clinical)

Notably, none of the nurses gave detailed responses in relation to questions on medicines selection.

***Theme 6 - Need for an educated and trained multidisciplinary team***

Another key theme was the need for a focused education and training programme for health professionals to optimise all aspect of medicines management.

***Subtheme 1 - Need for specialised education and training***

Physicians, nurses and pharmacists proposed that there was an inherent need for specialised education and training in medicines management for elderly patients, highlighting several issues including medicines selection.

Several physicians stated that they need specific training on elderly medication.

*“You need to have training, because like paediatrics, geriatric population needs specific involvement. Even the pharmacokinetics is different like the paediatrics.”*

(Physician A2, ICU)

*“Their doses are different and we cannot give someone adult the same dose like young or whatever. They have different way of approaching things and drug interaction in the elderly is a little bit different.”*

(Physician Z2, Internist)

*“It is better you have to have a special geriatric nurse for geriatric patients. It is better.”*

(Nurse K1)

Table 2 provides a summary of the themes and subthemes. These are mapped to TDF domains (Table 3) and NPT constructs (Table 4).

## **Discussion**

This research highlights health professionals' perceptions of the need for: appropriate polypharmacy; a systematic approach to medicines history taking; improved communication and documentation; improved patients' adherence to medicines; guidelines and policies to support medicines selection; and an educated and trained multidisciplinary team. Findings are underpinned by two theoretical frameworks. The TDF was used in relation to domains of determinants of behaviour at the individual practitioner level. The domains which were most dominant were: professional role and identity; beliefs about capabilities; beliefs about consequences; environmental context and resources; knowledge, and goals. NPT was used at the organisational level with little evidence of coherence, cognitive participation, collective action and reflexive monitoring.

There are a number of strengths to this study. To date, while several studies have used a qualitative approach to research aspects of medicines management (e.g. medicines selection and prescribing)<sup>26-28</sup> there is an absence of published qualitative studies relating to the full spectrum of medicines management activities as described in this paper. Throughout this qualitative study, attention was paid to aspects of research trustworthiness with consideration of credibility, transferability and dependability.

There are, however, several limitations hence the findings should be interpreted with caution. The research was limited to five major hospitals; although qualitative findings do not seek to be generalizable, the research was conducted within Abu Dhabi only and hence the research findings may not be transferrable to other hospitals in Abu Dhabi, the other six Emirates within the UAE, the Middle East and beyond.

Interviewees described the need for guidelines to support medicines selection and review.

While there is an array of international clinical guidelines which could be adapted for the

Middle East, the failure of single disease state guidelines to account for patients with multimorbidities has been highlighted by others.<sup>29,30</sup>

Several other qualitative studies have focused on elements of medicines management processes. Vogelsmeier et al identified the need for more efficient deployment of staff in processes of medicines reconciliation while Skoglund et al highlighted that prescribing practice was pragmatic rather than evidence-based medicine.<sup>26,27</sup> Cullinan et al stressed the lack of emphasis on geriatric clinical pharmacotherapy in physicians' undergraduate courses and the need to consider social influences on prescribing decision making.<sup>28</sup> Our findings are similar in relation to the need for: a systematic approach to medicines history taking; appropriate polypharmacy; improved communication and documentation; and guidelines and policies to support medicines selection.

Our NPT findings highlight a perceived lack of coherence with little shared beliefs around the aims of medicines management, defining appropriate polypharmacy, and approaches to promote appropriate polypharmacy. However, there was clear knowledge of the implications and consequences of inappropriate polypharmacy. In terms of the other NPT constructs, there was little evidence of cognitive participation and collective action with no clear allocation of the processes of medicines reconciliation, history taking and counselling. While medicines selection was clearly the remit of the physicians, there was confusion relating to multiple prescribers prescribing for the same indication, and responsibility for medicines review.

There is a need for considering task allocation with clearly defined roles and responsibilities, requiring improved standards for documentation and inter- and intra-professional communication. There is opportunity to promote reflexive monitoring to evaluate the outcomes of the processes, which will require agreeing clear service aims and objectives, all of which must centre on optimising patient outcomes.

There is a consensus in the literature that behaviour change is key to increasing the uptake of evidence into healthcare practice.<sup>31</sup> Implementing behaviour-change interventions commences with problem analysis, which is informed by theory. The NPT constructs and the TDF behavioural determinants have provided a theoretical approach to identifying the behaviour determinants in relation to medicines management. Further research is required using consensus based approaches and expert panels to define practice norms of structures, processes and desired outcomes.

### **Conclusion**

Health professionals perceived deficiencies in structures and processes of medicines management in elderly hospitalized patients. These issues were at both an individual and organisational levels. Key areas of behavioural theories were identified for targeting of interventions.

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### **Conflicts of Interest**

The authors have no conflicts of interest to declare.

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## Tables

Table 1 Demographics of those agreeing to be interviewed (n=32)

| <b>Profession</b>            | <b>% (n)</b> |
|------------------------------|--------------|
| Physician                    | 28.1 (9)     |
| Nurse                        | 25.0 (8)     |
| Pharmacist                   | 46.9 (15)    |
| <b>Years of experience</b>   |              |
| 1-5                          | 18.8 (6)     |
| 6-10                         | 32.3 (10)    |
| 11-15                        | 9.4 (3)      |
| 16-20                        | 21.9 (7)     |
| 21-25                        | 9.4 (3)      |
| 26-30                        | 6.3 (2)      |
| >30                          | 3.1 (1)      |
| <b>Countries of training</b> |              |
| UAE                          | 25.0 (8)     |
| Other Middle East            | 43.8 (6)     |
| Asia                         | 21.9 (7)     |
| USA                          | 15.6 (5)     |
| Europe                       | 12.5 (4)     |
| Africa                       | 6.3 (2)      |

Table 2 A summary of key themes and subthemes

| Key Themes   | Subthemes   |
|--|---|
| <p><b><u>Theme 1</u></b></p> <p><b>Need for appropriate polypharmacy in elderly patients with multimorbidities</b></p> | <p><u>Subtheme 1</u> - Consequences of polypharmacy</p> <p><u>Subtheme 2</u> - Responsibilities for managing polypharmacy</p> <p><u>Subtheme 3</u> - Need for a systematic approach to a full medicines review</p> <p><u>Subtheme 4</u> - Contribution of healthcare structures and processes to inappropriate polypharmacy</p> |
| <p><b><u>Theme 2</u></b></p> <p><b>Need for systematic approach to medicines history taking</b></p>                    | <p><u>Subtheme 1</u> - Sources of information</p>   |
| <p><b><u>Theme 3</u></b></p> <p><b>Need to improve communication and documentation</b></p>                             | <p><u>Subtheme 1</u> - Lack of communication</p> <p><u>Subtheme 2</u> - Lack of documentation</p>   |
| <p><b><u>Theme 4</u></b></p> <p><b>Need to improve patients' adherence to medicines</b></p>                            | <p><u>Subtheme 1</u> - Non-adherence as a consequence of multimorbidities and polypharmacy</p> <p><u>Subtheme 2</u> - patients' lack of knowledge</p> <p><u>Subtheme 3</u> - Need for patient/carer/family counselling</p>  |

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| <p><b><u>Theme 5</u></b></p> <p><b>Need for guidelines and policies to support medicines selection</b></p> | <p><u>Subtheme 1</u> - Awareness of and adherence to guidelines and policies</p> |
| <p><b><u>Theme 6</u></b></p> <p><b>Need for an educated and trained multidisciplinary team</b></p>         | <p><u>Subtheme 1</u> - Need for specialised education and training</p>           |

Table 3 Themes and subthemes mapped to TDF domains

| <b>Theoretical Domains Framework</b>   |   |
|--|---|
| <b>Domains</b>   | <b>Themes &amp; Subthemes</b>   |
| <p><b>Professional role &amp; identity</b><br/>(Coherent set of behaviors and displayed personal qualities of an individual in a social or work setting)</p> | <p>Several subthemes mapped to the domain of professional role and identity. Most notably, interviewees expressed diverse views around roles and responsibilities in managing polypharmacy from those physicians who viewed that their remit was solely around managing the conditions within the specialist field of practice to those more concerned with polypharmacy (<u>Theme 1, Subtheme 2</u>). Other similar themes were around less clearly defined roles and responsibilities in medicines history taking (<u>Theme 2, Subtheme 1</u>), patient/carer/family counselling (<u>Theme 4, Subtheme 3</u>), medicines selection (<u>Theme 5, Subtheme 1</u>) and optimising medicine management for elderly patients (<u>Theme 6, Subtheme 1</u>).</p> |

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| <p><b>Beliefs about capabilities</b></p> <p>(Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put into constructive use)</p> | <p>While not explicitly discussing beliefs about their individual capabilities regarding the different aspects of medicines management, the interviewees emphasised the need for specialised education and training in medicines management for elderly patients, highlighting particularly the complexities of medicines selection (<u>Theme 6, Subtheme 1</u>).</p>  |
| <p><b>Beliefs about consequences</b></p> <p>(Acceptance of the truth, reality, or validity about the outcomes of a behavior in a given situation)</p>                             | <p>Several respondents highlighted the consequences of polypharmacy in terms of drug interactions, the occurrence of adverse effects and poor patient medicines adherence (<u>Theme 1, Subtheme 1</u>).</p> <p>Awareness of these consequences appeared to influence behaviors of some interviewees in relation to their practices of conducting full medicines reviews in elderly patients (<u>Theme 1, Subtheme 3</u>).</p> <p>Several interviewees described that the consequences of their experiences of cognitive impairment and confusion in elderly patients resulted in them using several sources of information (including family members and carers) to ensure as complete a</p> |

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|   | <p>medicines history as possible (<u>Theme 2, Subtheme 1</u>)</p> <p>All interviews demonstrated their awareness of the heightened issue of non-adherence in elderly patients due to inappropriate polypharmacy (<u>Theme 4, Subtheme 1</u>), patients' lack of medicines knowledge (<u>Theme 4, Subtheme 2</u>) all of which impacted their behaviors relating to medicines counselling (<u>Theme 4, Subtheme 3</u>).</p>  |
| <p><b>Environmental context and resources</b><br/>(Circumstances of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive</p> | <p>Several themes and subthemes mapped to domain of environmental context and resources and how these affected behaviors of individuals. Many interviewees commented on the issue of individual patients being treated by multiple prescribers, sometimes for the same indication, and the problem of poor documentation (<u>Theme 3, Subtheme 2</u>); and a general lack of inter- and intra-professional communication (<u>Theme 3, Subtheme 1</u>). As a result physicians, nurses and pharmacists considered the healthcare system to be contributing to inappropriate polypharmacy (<u>Theme 1, Subtheme 4</u>).</p> <p>Several physicians and pharmacists were of the view that more standardised approach to the development and use of policies and guidance to support medicines selection would be of benefit (<u>Theme 5, Subtheme 1</u>).</p> |



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| behavior)  |  |
| <b>Knowledge</b><br>(An awareness of the existence of something)                         | <p>Interviewees expressed diverse views around their awareness of polypharmacy and its association with interactions, adverse drug reactions, and impacting patient medicines adherence (<u>Theme 1, Subtheme 1</u>).</p> <p>While some interviewees were aware of the existence of international guidelines to support their prescribing in the elderly, there was a major gap in knowledge specific tools such as Beers, STOPP/START to aid appropriate prescribing and identify inappropriate prescribing in the in elderly (<u>Theme 5, Subtheme 1</u>).</p> |
| <b>Goals</b><br>(Mental representations of outcomes that an individual wants to achieve) | <p>Several of the themes and subthemes map to the domain of goals, particularly around the need for appropriate polypharmacy (<u>Theme 1</u>), need for a systematic approach to medicines history taking (<u>Theme 2</u>) and need to improve patient adherence (<u>Theme 4</u>).</p>   |

Table 4 Themes and subthemes mapped to the four constructs of NPT

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|-------------------------------------|
| <b>Normalisation Process Theory</b> |
|-------------------------------------|

| <b>Constructs</b>  | <b>Themes &amp; Subthemes</b>  |
|--|--|
| <p><b>Coherence</b></p> <p>Defines and organises the components of a practice</p>  | <p>While respondents appeared to be aware of the different processes in relation to medicines management in elderly hospitalized patients (i.e. medicines history taking, reconciliation, medicines selection, counselling etc.), there appeared to be less coherence around actually defining these processes and demonstrating consistent, shared beliefs in a structured manner. For example, all were aware of the consequences of polypharmacy (<u>Theme 1, Subtheme 1</u>) but there were varied responses to defining appropriate polypharmacy (<u>Theme 1, Subtheme 2</u>). Also there were varied responses in terms of the approach to a full medicines review (<u>Theme 1, Subtheme 3</u>). There was more coherence around the goals of patient counselling in relation to medicines adherence (<u>Theme 4, Subtheme 3</u>).</p> |
| <p><b>Cognitive participation</b></p> <p>Defined and organises the people implicated in a complex intervention and brings a practice into practice, organising ways that</p> | <p>There were diverse views around task allocation in relation to the different elements on medicines management in elderly hospitalized patients. Specific responsibilities and roles around managing polypharmacy were unclear (<u>Theme 1, Subtheme 2</u>), as were those relating to conducting medicines reviews (<u>Theme 1, Subtheme 3</u>). For example, on occasions pharmacists were involved in processes of medicines reconciliation, but this did not appear to be a</p>  |

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| <p>people join and support a practice</p>   | <p>clearly allocated task (<u>Theme 2</u>).</p> <p>It appeared that physicians, nurses and pharmacists were all involved in patient medicines counselling with no clearly defined remit assigned to each profession (<u>Theme 4, Subtheme 3</u>)</p> <p>However, all interviewees were aware of the need to undertake education and training in relation to medicines management in elderly hospitalized patients (<u>Theme 6, Subtheme 1</u>)</p>  |
| <p><b>Collective action</b></p> <p>Defines and organising the enacting of a practice through skill set and task allocation, and performance with accountability and interconnected work</p> | <p>This mechanism related to the actual work or skills involved in delivering the tasks relating to medicines management.</p> <p>The actual approach to medicines review varied amongst physicians in different specialties and between different professions such as pharmacists and nurses (<u>Theme 1, Subtheme 3</u>). All those involved in medicines history taking described the use of multiple sources in an attempt to gather as much information as possible (<u>Theme 2, Subtheme 1</u>).</p> <p>Interviewees were aware of the suboptimal inter- and intra-professional communication (<u>Theme 3, Subtheme 1</u>) and documentation (Theme 3, Subtheme 2).</p> <p>All discussed the need to counsel the family and carers in addition to (and sometimes instead of) the patient (<u>Theme 4, Subtheme 3</u>). There were diverse descriptions of the use of</p> |

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|  | <p>policies and guidelines in relation to medicines selection<br/><u>(Theme 5, Subtheme 1).</u></p>   |
| <p><b>Reflexive monitoring</b><br/>Defines and organises<br/>assessment of the<br/>outcomes of a practice<br/>in terms of effects,<br/>communal and<br/>individual appraisal</p> | <p>There was very little description or discussion of how the patient outcomes of the processes of medicines management were assessed, either at individual patient or population levels. However, many expressed the need of a multidisciplinary team approach for better medicines review <u>(Theme 1, Subtheme 3)</u> and for specialised education and to optimise patient outcomes <u>(Theme 6, Subtheme 1).</u></p> |