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Experiences of key stakeholders with the implementation of medication reviews in community pharmacies: A systematic review using the Consolidated Framework for Implementation Research (CFIR)

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ABSTRACT

Background: Though medication reviews have shown positive patient outcomes, they are still not widely implemented in community pharmacies. Published reviews on their implementation often include several other pharmacy services, making them non-specific. Using the Consolidated Framework for Implementation Research (CFIR) to focus solely on the experiences of different stakeholders with the implementation of medication reviews will help to better understand relevant facilitators and barriers.
Objectives: To critically appraise, synthesise and present the available evidence on experiences of key stakeholders with the implementation of medication reviews and to identify barriers and facilitators to its implementation in community pharmacies.
Methods: A systematic literature search was conducted in four databases for studies published in English, Spanish or German. Key search terms included: implementation, pharmac*, medication review, facilitator, barrier. Study selection, quality assessment and data extraction were performed by two independent reviewers. Findings were mapped directly against the constructs of the CFIR.
Results: Out of 924 retrieved records 24 articles from 9 countries met the inclusion criteria. Key facilitators identified included pharmacists' openness to practice change and a high degree of patient satisfaction post medication review. Attracting patients to the service was stated as challenging due to an unawareness of the scope and potential benefit of a medication review. The dominant barrier was inadequate remuneration, as it impacted all additional resourcing and ultimately the viability of the service. Further barriers included difficult professional relationships with doctors and little mandate from health authorities. Most reports were from the employed pharmacists' perspective and concerned the inner setting, other perspectives were under-reported.
Conclusions: Results of this systematic review illustrate different stakeholders' experiences and add to the understanding of challenges in the implementation process. Nevertheless, findings also highlight how scarce reporting of external stakeholders' views is and that filling this gap can unveil hidden barriers and facilitators.
Registration: PROSPERO register (CRD 42019122836)

Introduction

Medication Reviews (MRs) aim to improve medication safety and optimise health outcomes in patients.[1] An MR is an intervention that allows a healthcare professional to assess a patient's entire pharmacotherapy in a structured manner taking all aspects of medication safety

Abbreviations: CFIR, Consolidated Framework for Implementation Research; CINAHL, Cumulative Index to Nursing and Allied Health Literature; CMR, Clinical Medication Review; CRD, Centre for Review and Dissemination; HMR, Home Medication Review; IPA, International Pharmaceutical Abstracts; MEDLINE, Medical Literature Analysis and Retrieval System Online; MR, Medication Review; MUR, Medicines Use Review; NMS, New Medicines Service; PCNE, Pharmaceutical Care Network Europe; PCO, Primary Care Organisation; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analysis; SFT, Seguimiento Farmacoterapéutico (MR with follow up).

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into consideration e.g. suspected adverse drug events, non-adherence, high risk-medicines and drug-drug interactions. There are different types of MRs, ranging from a review of a patient's written medication history to advanced MRs, which include a patient interview, consideration of laboratory data, medical history and the achievement of therapy goals (Table 1).[2]

Ageing populations worldwide encompass an increasing number of patients with multimorbidity.[3] Across Europe the prevalence of multimorbidity ranges from 22 to 53% between the age groups of 50–59 and 70+ years of age, respectively.[4] Multimorbidity frequently leads to the use of multiple prescribed medicines, or polypharmacy.[5] Inappropriate polypharmacy (inappropriate or too many medicines) can cause harm to the patient and lead to further health problems, which in turn is associated with an increase in healthcare utilisation and expenditure.[6,7] Thus, both individual patients and society as a whole would benefit from optimised polypharmacy and an associated increase in medication safety. Community pharmacists are highly trained in pharmacotherapy and patient counselling and are considered the most accessible health professionals in many countries across the world.[8] This means they are well placed to provide MRs in the community setting. Evidence of patients' improved health-related outcomes as a result of pharmacists' MRs is growing.[9,10] Several studies have shown that MRs conducted by community pharmacists can have positive clinical outcomes, such as improved blood pressure, improved low-density lipoprotein profile[11,12] and better diabetes control.[12–14] MRs can also improve medication appropriateness and reduce drug-related problems.[14–18] While the effect of MRs on hospitalisation remains unclear,[12,19] MRs have been shown to contribute substantially to healthcare cost savings.[14,20] Malet-Larrea et al.[21] calculated that in Spain every 1 Euro invested in an MR resulted in a healthcare cost benefit of between 3.3 and 6.2 Euros. Similarly, Ramalho de Oliveira et al. calculated a healthcare cost saving of 86 US$ per MR-conducted in the USA.[14]

MRs are available on a national scale in the USA, UK and Australia. The provision of MRs in many European countries, however, is not well established. A survey by Imfeld-Isenegger et al. showed that simple MRs were highly implemented (available in >2/3 of pharmacies) in just 4 out of 34 European countries (Finland, France, The Netherlands, Switzerland) and advanced MRs were available to this high extent only in The Netherlands.[22] There are several calls for action: The World Health Organisation urges countries to implement polypharmacy initiatives such as MRs, the Council of Europe issued a resolution on implementation of pharmaceutical care (including MRs) in European countries and another European expert consortium states, that even if the evidence for a certain intervention appears limited, countries should consider a *"bias for action"* rather than doing nothing.[23–25] Implementing community pharmacist MRs on a wider scale would be an important step towards medication safety in polypharmacy, would make better use of pharmacists' skills and support pharmacists' move towards a more clinical role[26] and finally relieve GPs' workload.[27]

Implementation research bridges the gap between research and real-world settings.[28,29] It is well understood that the process of implementation can be influenced by a range of factors, such as the characteristics of the institution itself or the wider setting to which the institution belongs, as well as the characteristics of the individuals delivering the service, who are practitioners not researchers.[30] Existing literature reviews looking at the implementation of MRs in community pharmacies have focused either on one specific national health care system,[31] compiled experiences from heterogeneous interventions (including MRs)[8,32–35] or were not systematic.[31,36] While these reviews all contribute to the understanding of implementation challenges in community pharmacies, there is a gap where a wider perspective is missing. To aid the design of a comprehensive implementation strategy for MRs in community pharmacy, it is important to gather reported experiences of all key stakeholders to date and use an underpinning theoretical framework to make reliable suggestions for practice.

Several types of implementation theories and frameworks have been published, depending on the purpose of the research.[37] Determinant frameworks focus on barriers and facilitators (independent variables) which influence the implementation outcomes (dependent variables).[37] Frameworks differ in their construct flexibility and the socioecological levels that are considered.[38] This systematic review uses the Consolidated Framework for Implementation Research (CFIR) as an underpinning theoretical framework. The CFIR offers a comprehensive taxonomy of influencing factors across several socioecological levels (community, organisation and individual level).[39] It consists of five domains, which are further subdivided into several constructs (Fig. 1). Fig. 1 includes all constructs used in the coding process. Further constructs of the CFIR which were not encountered in the studies will be discussed later.

This systematic review aims to critically appraise, synthesise, and present the available evidence on key stakeholders' experiences with, as well as barriers and facilitators for, the implementation of MRs in community pharmacies.

Table 1
Pharmaceutical Care Network Europe (PCNE) classification of MR types with details of medication information sources.[1]

Characterisation of MR		Availability of information		
Type	Level	Medication history	Patient interview	Clinical data
Type 1	Simple	✓		
Type 2a	Intermediate	✓	✓	
Type 2b		✓		✓
Type 3	Advanced	✓	✓	✓

Methods

Protocol development and registration

A systematic review protocol was developed by the research team in compliance with the Preferred Reporting Items and Meta-Analysis Protocols (PRISMA-P) 2015 statements[40] and was registered with the International Prospective Register of Systematic Reviews (PROSPERO) [PROSPERO2019:CRD42019122836].[41]

Study inclusion/exclusion criteria

Primary, peer-reviewed research items using qualitative, quantitative and mixed methods were included in the systematic review if

- the setting was community pharmacy
- participants were pharmacists, health care professionals (nurses, physicians), policy makers, patients or general public
- the intervention was a medication review in accordance with the PCNE definition[1] (including all varieties and terms used in different countries: e.g. MUR (medication use review; UK)[42]; CMR (MedsCheck or Clinical Medication Review; Australia)[16]; CMM (comprehensive medicines management; NZ); MTM (medication therapy management, MedsCheck; USA,[43] CAN); PMC (Polymedikationcheck; CH)[44]; SFT (Seguimiento Farmacoterapéutico; Spain)[45]
- reported outcomes were experiences, views, beliefs, attitudes and perceptions of the above-named stakeholders.

Studies reporting outcomes from different interventions or different settings were excluded if the outcomes could not be assigned unambiguously according to these criteria.

Search strategy

The following databases were searched in June 2019: Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE, International Pharmaceutical Abstracts (IPA) and Scopus. Key search

Fig. 1. *An adapted illustration of the Consolidated Framework of Implementation Research (CFIR)*[39] *showing the five domains with the constructs used in this systematic review.*

terms were: "implementation", "pharmac*", ["medication review" OR "medication management"], facilit*, barrier*. (See supplementary file 1 for the full search strategy). Manual screening of the reference lists of identified articles allowed the identification of additional studies. The search was limited to articles published from 2004 onward in English, German or Spanish language.

Study selection

All titles, abstracts and full papers were screened independently by two research team members to confirm the reliability of the screening process. Discrepancies were resolved through independent screening by a third reviewer.

Quality assessment

Quality assessment was performed independently by two reviewers and any discrepancies were resolved by consultation with a third reviewer. An assessment tool of the National Institute of Health and Care Excellence (NICE)[46] was used for the assessment of qualitative methods, and the BMJ[47] assessment tool "*Critical appraisal checklist for a questionnaire study*" for quantitative surveys. It was decided not to exclude any eligible studies because of their quality, as the team deemed it important to incorporate the full range of implementation experiences following the suggestion of Dixon-Woods et al.[48]

Data extraction

A template was designed to extract data of the papers including aims and objectives, methods, sampling and recruitment, participants, setting, outcome measures, key findings and key limitations. The template was piloted for face and content validity and reliability using one quantitative and one qualitative paper by all team members independently.

Synthesis of results

Extracted themes from qualitative studies were coded directly against the CFIR constructs. Outcome measures from quantitative studies (surveys) were very heterogeneous and consequently could not be pooled. Therefore, quantitative data was converted into themes, coded against the CFIR constructs, and analysed together with the extracts from qualitative studies.[35,49]

To minimise bias, data extraction was undertaken independently by two researchers and any discrepancies were resolved by discussion with a third reviewer. The completed set of coded data was again checked by two researchers independently to ensure consistency of coding.

In the context of this research the following definitions for generic terms of the CFIR were applied: the "*intervention*" is a **medication review**, the "*inner setting*" is the **community pharmacy**, and the "*individuals*" in the context of "*characteristics of individuals*" are **community pharmacists** who deliver the intervention. Although originally the CFIR was not designed to include external stakeholders' views, its domains and constructs were also used in this SR for mapping experiences of

patients, GPs and other stakeholders. These findings are clearly labelled and contrasted with pharmacists' experiences where necessary. Constructs without a self-explanatory heading are briefly described within the results section.

Reflexivity

All authors are pharmacists, three have a background in research, one is a community pharmacist, and all have experience in teaching and training pharmacists in MR-related topics.

Results

Study selection/PRISMA flow chart

The systematic search of the databases MEDLINE, IPA, CINAHL and Scopus identified a total of 1256 records as shown in the PRISMA flow chart (Fig. 2). A further 15 records were identified through manual reference list searching. Software-assisted[50] removal (n = 347 duplicates), pre-screening by the principal researcher (n = 791 papers not related to topic) and title and abstract screening by the team (n = 78 excluded) resulted in 55 records for full-text assessment. Reasons for exclusion at full-text stage were ineligibility of intervention (n = 13), outcome (n = 3), sample (n = 2) and setting (n = 13). Two articles[51,52]

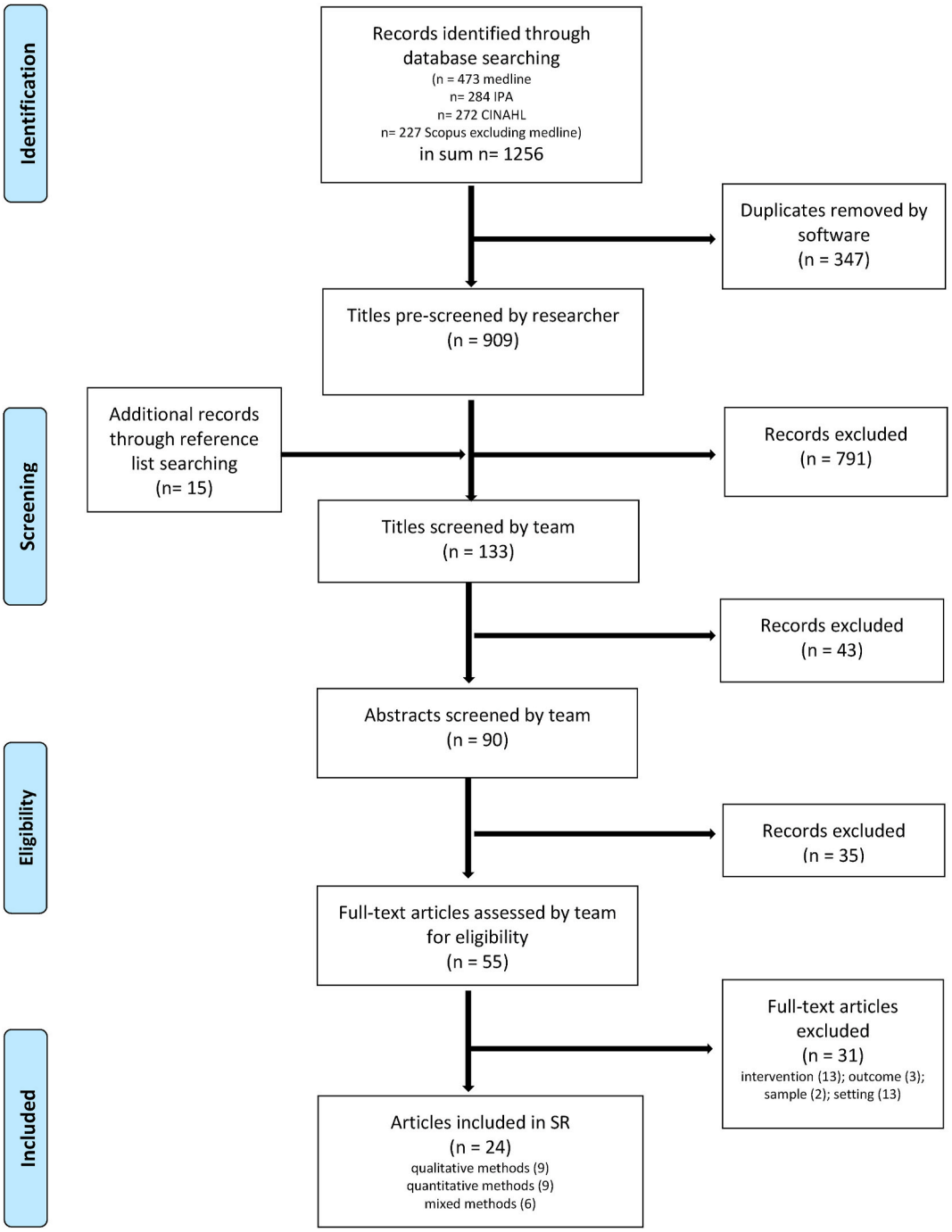

Fig. 2. *PRISMA chart showing the identification, screening, and selection of articles.*

were a series reporting outcomes from one mixed methods study. Of the 23 studies ultimately included in the synthesis: 9 were qualitative (mainly semi-structured interviews and focus-groups), 9 quantitative (cross-sectional surveys) and 5 used mixed methods.

Quality assessment of included studies

Most of the studies were deemed to be designed, conducted, and reported with moderate quality (n = 15), three were of high and five of poor quality (see supplementary files 2–4 for details). A strength was that all studies clearly stated their research aims. In addition, both qualitative and quantitative studies also clearly reported results relevant to their respective study aims. Limitations particularly with the mixed methods studies were a lack of rationale for the methodological approach and unclear robustness for the qualitative parts of methodology. In additions, the mixed methods studies often provided little detail for the quantitative parts which impeded assessment of validity, reliability, and risk of bias.

Description of studies selected for inclusion

Tables 2–4 provide an overview and details of all 23 studies included in this review. Nine studies used a qualitative methodology of mainly interviews and focus groups (see Table 2). Nine studies used a quantitative survey based methodology (see Table 3), and five studies used a mixed methods approach (see Table 4). Six studies were conducted in the UK,[53–58] five in Spain,[59–63] five in the USA[51,52,64–67] and two in New Zealand.[68,69] One study each was conducted in Belgium,[70] Germany,[71] Switzerland,[72] Slovenia[73] and Qatar.[74] Participants of these studies were mainly pharmacists (n = 12), GPs (n = 3) or patients (n = 3). The remaining studies explored either experiences from other stakeholders such as implementation tutors, representatives of health insurances or primary care organisations (PCOs) (n = 2) or included views of several of the named participant groups (n = 3). Three studies mentioned underpinning theory: García Cardenas et al.[61] used Proctor's taxonomy for implementation outcomes[75] and Fixsen's implementation framework.[76] Lelubre et al.[70] used the RE-AIM evaluation framework[77] and the FISpH model for pharmacies[78] and Castrillón et al.[59] based their study on the health needs assessment by Wright.[79] Seven of the included studies[51,52,62,64,66,67,69,72] aimed at determining barriers and facilitators and reported these accordingly. One of these studies was reported in two separate papers.[51,52] In the remaining 16 studies it was left to the judgement of this SR's authors to identify barriers and facilitators from the reported experiences.

Synthesis of findings

As the outcomes of the 9 quantitative studies were very heterogeneous it was not appropriate to perform a meta-analysis. Results were therefore included in the qualitative narrative of all studies. All outcomes were mapped against the CFIR domains and constructs. Table 5 illustrates which participant group has reported barriers and facilitators within the respective domain. (Table 5).

Intervention characteristics (= characteristics of MRs)

MRs as a process were developed externally ***(intervention source, I A)***, which led stakeholders from PCOs in England to feel *"disconnected from the service and […] unable to assess what is going on."*[53] Perceptions of ***evidence strength and quality (I B)*** of MRs varied widely. Stakeholders from PCOs and pharmacists in the UK reported a lack of transparency of achieved outcomes.[53] Patient interviews in the UK implied that formal policy aims such as improving patient knowledge about medicines had not been met,[56] whereas Spanish patients reported that their knowledge and therapeutic outcomes had improved after receiving an MR.[59] One stakeholder of a PCO stated that in the first years of MURs *"eighty five percent of [MURs] have added no value whatsoever."*[54] In contrast a representative from a US health insurer perceived there to be *"very good literature"* that pharmacists' MRs *"show[ed] dramatic improvement"* in patients' clinical outcomes.[67] Despite poor implementation and quality differences in performance of MRs,[53] the ***relative advantage (I C)*** of pharmacists' MRs compared to usual care was acknowledged across all stakeholder groups[54,59,65,67,74] and performing MRs strengthened pharmacists' role as health professionals.[62,70] While survey data from the UK revealed that not all GPs were in favour of community pharmacists' MRs, GPs in New Zealand (NZ) thought it was useful[68] *"I thought it was really invaluable because […] you are just so busy […] and you end up treating with a drug, and another drug, and you end up chasing your tail."* Room for improvement was reported regarding the way MRs are currently performed ***(adaptability, I D)***. Stakeholders from a US health insurance and GPs in NZ suggested in interviews the MR should be delivered by a pharmacist within the GP practice.[67,68] German GPs would rather select eligible patients themselves,[71] which would also increase GPs' acceptance of changes to a patient's medication regimen. Community pharmacists from several countries reported that they needed better access to medical records which would help to conduct MRs efficiently.[55,70,74] The ***complexity (I F)*** and length of documentation was perceived as a barrier by community pharmacists in several countries.[51,70] The steps of data extraction,[72] filling in new data,[53,54] transmitting data in a safe and timely manner,[67] and finally making a claim were found to be overly complicated.[51] Moreover, GPs in the UK did not appreciate receiving unnecessarily complex documentation leading them to rifle through *"pages of information and having to hunt for (unhelpful) advice."*[58] The last aspect of the first domain looks at implementation ***costs (I H)***, which were only quantified by García--Cardenas et al.[61] Others simply stated *"finances to be key"* when considering implementation of MRs.[54,69,73]

Outer setting

The second CFIR domain focuses on external influences on the implementation. The construct ***II A*** covers perceived ***patients' needs***, either from the perspective of patients' themselves or from pharmacists' and other stakeholders' point of view.[39] In general, community pharmacists from several countries believed that MRs met patient needs and that patients would find MRs valuable.[52,55,65,66,74] Although sicker patients with a more complex medication regimen are believed to benefit more from an MR,[80] less MRs were performed for this patient group.[54] One Belgian community pharmacist said *"People who need it most are the ones that are the least easy to convince",*[70] because many patients were not aware of what an MR could offer them.[70] However, other (Spanish) patients reported finding it helpful to get support with their medication and said it was a "*necessary service*", particularly if they had comorbidities.[59] GPs in Germany and England assumed that community pharmacists could make a real difference especially for patients with polypharmacy as well as for home bound or non-compliant patients.[58,71] Research findings from several countries stressed the importance of a good pharmacist-GP working relationship ***(Cosmopolitanism, II B)*** to ensure the successful implementation of MRs[58,62,68] as in many countries GPs are responsible for making the recommended changes to prescription medicines. Studies revealed that in early implementation stages pharmacists were rather apprehensive when contacting GPs,[51,70] but once a positive working relationship was established mutual respect increased and MRs could be successfully implemented.[53,68,70] Patients sometimes were concerned that a pharmacist's MR could negatively influence the patient-GP relationship.[56] One patient commented that *"I don't think they [GPs] like it, outside interference … being from […] a pharmacist or anybody else."*[56]

The construct ***external policy and incentives (II D)*** encompasses external strategies to spread the innovation and includes policies, regulations and remuneration.[39] Adequate remuneration of the service was frequently mentioned to be crucial for its successful implementation and its lack was perceived as the dominating barrier.[51,53,55,57,59,62,63,67–70,72–74] GPs stressed that they should also be

Table 2
Characteristics of included qualitative studies; Ø= average; nr= not reported; CMR= clinical medication review; MMS= medication management services; MUR= medicines use review; PG= post graduate SFT= seguimiento farmacoterapéutico (medication review with follow-up).

Study author; (year); country	Aims and objectives (as stated by the authors)	Method of data collection	Participants (No); Description of participants as stated	Participants' experience with MR	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
Bryant et al. N1 (2010); NZ [69]	To determine what community pharmacists perceived as inhibitors to wider implementation of clinical MRs	Face to face semi-structured interviews	**Pharmacists (20)** **role:** proprietor 35% (7) employee 45% (9) independent contractor 25% (4) **gender**: male 30% (6) age range: 27–57 years **ethnicity:** European 100% (20) **location** Town 15% (3) Peripheral city 60% (12) City 25% (5) **postgraduate study:** Completed Masters or PG diploma 30% (6) Completing Masters or PG 35% (7) no postgraduate study 35% (7)	34% of participants conducted >1 MR in last year	CMR	■ Community pharmacists perceived that they were not mandated to undertake this role. ■ Pharmacists were concerned that they lacked the skills and confidence to provide this level of input.
Bryant et al. N2 (2010); NZ [68]	To identify perceptions of GPs towards MRs undertaken by community pharmacists	Face to face semi-structured interviews	**GPs (38)** **gender**: male 80% (30) age range: 33-59 years solo practice: 21% (8) **Nationality:** NZ 71% (27) other 29% (11) **location:** town: 24% (9) peripheral city: 47% (18) city 29% (11)	yes (participation in study)	CMR	■ GPs found pharmacists' MRs useful with regard to improved patient outcomes. ■ GPS perceived additional workload and funding issues as critical.
Castrillón et al. (2010); Spain [59]	To examine patients' opinion of the pharmacotherapeutic follow-up service provided in the community pharmacy	Focus-group	**Patients (10)** **gender**: male 50% (5) **age range**: 34-75 years	yes	SFT	■ Participants were highly satisfied with a service which they felt went beyond what they expected from a pharmacist. ■ Patients acknowledged that the service helped them to better know their medication and improve health problems. ■ Doctors' opinions and responses to the intervention were not unanimous. ■ Patients felt that MR is a necessary service that should be generalised through word of mouth and should be funded by the public health service.
Latif et al. (2013); UK [56]	To describe patients' perspective of the MUR service and their understanding of the value that they derive from it.	Ethnographic observations; face to face interviews	**Patients (54)** a) Observations in 2 pharmacies (54 encounters) b) Interviews (34) **gender**: male 32% (11) **age range**: 40-89 years	yes	MUR	■ All patients reported feeling comfortable speaking with the pharmacist, who they saw as a knowledgeable expert on medicines. They appreciated the time spent with them in a private consultation. ■ The MUR provided patients with reassurance about their medicines, that they were "doing the right thing." Despite these positive views, when asked to describe the purpose of their MUR, patients provided ambivalent accounts and reported that the consultation did little to improve their knowledge of medicines or affect how they used them.
Nabergoj Macovec et al.	To understand the implementation of MUR from the perspectives of the first community pharmacists providing the service in practice.	Focus-group	**Pharmacists (7)** **Role**: 5 working in community pharmacies; 2 working in concessionary	yes	MUR	Three main thematical categories were identified: quality assurance of MUR, different stakeholders' perceptions of MUR and MURs'

(*continued on next page*)

Table 2 (*continued*)

Study author; (year); country	Aims and objectives (as stated by the authors)	Method of data collection	Participants (No); Description of participants as stated	Participants' experience with MR	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
(2018); Slovenia [73]			pharmacies The majority had 5–10 years working experiences, with the least experienced having 2 years of working experiences. 5 finished or were in the process of postgraduate training, mainly specialization to become clinical pharmacists (4) and one with a PhD			management. ■ Pharmacists' broad knowledge in pharmacotherapy was emphasized as the basis of quality provision and main advantage in performing MUR in comparison with other healthcare professions. ■ Recognition of MUR among different stakeholders should be improved with comprehensive approach in marketing of the service. ■ Positive patient feedback was reported, however persuading them to attend MUR presented a challenge.
Pérez-Escamilla et al. (2014); Spain [63]	To explore opinions and perceptions of Practice Change Facilitator[s] of their training and experiences in assisting in the implementation of Medication Reviews with follow- up in Spanish community pharmacy.	Focus-Group	**Practice change facilitators** (Pharmacists employed by the Chamber of Pharmacists) **(6)**	nr	SFT	The functions of a College Trainer should be ■ to motivate the pharmacist at the beginning and during the provision of the service, ■ to facilitate communication with patients and physicians, and ■ to provide training, especially in clinical and methodological aspects of the SFT service.
Rose et al. (2018); Germany [71]	(1) To gain information on patient selection for an MR by general practitioners (GPs). (2) To get insight into GPs perception on interprofessional collaboration with pharmacists.	Face to face semi-structured interviews	**GPs** who had participated in an MR-study, Germany **(6)** Gender: male (67%), female (33%) Average age: 58 (±3.9) years	yes	MR	■ GPs mentioned medication safety, certain diseases, polymedication, multimorbidity as selection criteria [for MR eligible patients]. ■ Increasing quality of therapy and better insight into the patient's drug regimen was appreciated by the GPs as perceived personal advantage of the MR. ■ GPs preferred to have an MR initiated by themselves, but appraised concise interprofessional collaboration with pharmacists.
Smith et al. (2017); USA [67]	1) To identify the facilitators and barriers that affect pharmacist-provided MMS at community pharmacy level, and 2) to propose strategies for pharmacist-provided MMS in value-based health plans	Semi-structured interviews; Focus-groups	a.) **Interviews (7):** Health plan executives and payers: 3 senior medical directors, 1 CEO, 1 VP of clinical services, 1 client account executive, 1 chief pharmacy officer b.) **Focus groups (9):** 2 groups (4/ 5) **pharmacists**: **gender:** male 44% (4) practice Ø 8.4 years **place of practice:** Chain pharmacy 56% (5) Independent pharmacy 33% (3) Food store pharmacy 11% (1) **dedicated MTM pharmacist** Yes 33% (3) No 56% (5) Sometimes 11% (1) **MTM Payer** Medicare Part D 89% Commercial 22%	MTM visits/ month 1–5: 67% (6) >6: 33% (3)	MMS	Health plan executives agreed conceptually that MMS could be a valuable program and recognized its potential. **Barriers:** **health plan executives** ■ funding MMS in today's fee-for-service payment models ■ lack of physician infrastructure to implement and manage MMS ■ difficulty in collecting timely, accurate data to execute and assess MMS programs. **Community pharmacists:** ■ current lack of integration of MTM with a coordinated health care team was identified as the most serious barrier to altering health outcomes through MTM. ■ MTM services are conducted as a separate program by pharmacists who do not have access to patient health records, are time-constrained, and poorly incentivized.
Urban et al. (2007); UK [57]	To explore community pharmacists' experiences of conducting medicine use reviews (MURs), including how this affects their relationship with GPs and the extent to which training and accreditation prepared them for this work.	Semi-structured interviews	**Pharmacists (21)**	2 - 35 MURs/ month 67 % (14)	MUR	Pharmacists believed that MURs enhanced their relationship with patients. Some GPs, however, were not enthusiastic of the service, a problem that varied between and sometimes within general medical practices.

remunerated for their contribution to MRs.[68,71] Community pharmacists and patients suggested the use of media campaigns to raise awareness of MRs' purpose amongst the wider public.[59,62,70,73] Professional pharmaceutical and medical organisations were perceived by pharmacists as responsible for clarifying scope and limitations of MRs within the health professional community,[63] "*to improve communication between GPs and pharmacists*"[57] as "*doctors see it as a competition, meddling in their work, which MUR is not.*"[73] External strategies to improve implementation of MRs were reported from the UK. These included interprofessional meetings, newsletters and specifying target patient groups.[53] However, in other countries a clear mandate from the government for pharmacists to perform MRs was still missing[69] and reformation of the undergraduate curriculum to teach the necessary clinical and communication skills had not begun.[62]

Inner setting (= community pharmacy)

Any internal influences on implementation are considered in the domain **inner setting.**[39] ***Structural characteristics (III A)*** as social architecture, size and actual layout of the pharmacy were found to be influential for the implementation of MRs. Bradley et al. reported significantly higher numbers of MRs performed in UK chain pharmacies than in independent pharmacies[54] and Lelubre et al. stated that a large and motivated team in a pharmacy with appropriate layout were facilitating implementation of MRs.[70] ***Networking and communication (III B)*** within the pharmacy including regular staff meetings[61] and working as a well-functioning team were reported as facilitators for implementation of MRs[62] just as the lack of these became a barrier.[63] A qualitative study in Slovenia found that the existing ***culture (III C)*** of the pharmacy could be a barrier to implementation of MRs if *"at the end of the day the pile of prescriptions is what counts most […] and that is a disaster."*[73] However, other studies showed that implementing MRs could help to change the pharmacy's orientation towards offering more patient focused care.[61,65] Community pharmacists reported challenges fitting MRs into their current workflow[57,72] ***(compatibility, III D 2)*** and performed them outside normal working-hours.[69] One pharmacist in NZ stated "*I personally find it too hard to do an interview, come back to work, be a pharmacist dispensing then go home and write up the case studies […]*".[69] But interviews in Belgium showed that many community pharmacists truly wanted to integrate MRs *"it is why we are in the pharmacy"* and thought MRs to be compatible with their daily work.[70] GPs in NZ thought that referring patients for an MR needed to become standard practice and that the current workflow within a GP-practice was not ideal for it.[68] The ***relative priority (III D 3)*** of MR implementation varied widely.[54,67,69,70,73] None of the studies reported positive ***incentives (III D 4)*** such as rise in salary or awards, rather the opposite: bonus payments were withheld if implementation targets were not met.[54] Performance targets ***(goals and feedback, III D 5)*** were set by some employers, which focused on quantity rather than quality of the MRs.[53,54,57,67]

Leadership engagement (III E 1) was considered fundamental by stakeholders in several countries, as without support of the owner or store manager implementation of MRs would not succeed.[51,52,59,70] Even one patient stated *"If this fails, nothing will help. If the boss says, no I am not investing … he is the driving factor."*[59] Almost all studies mentioned lack of resources ***(available resources, III E 2)***, especially lack of time[55,57,58,64,65,67–70,72,73] and lack of staff as main barriers for implementation.[51,55,64,70,73] An appropriate pharmacy layout with a suitable consultation room facilitated implementation of MRs as would the necessary software, which should preferably be connected with the dispensing software.[51,61,62,64,70] ***Access to knowledge and information (III E 3)*** includes statements related to training and educational needs, as well as access to clinical databases.[39] To upskill, a range of programmes were deemed to be useful,[66,70,73] some pharmacists preferred academic programmes offered by universities,[61,64,74] others favoured practical workshops with role playing,[70] simple training on the job[52] or having mentors to consult with.[57,60,63,73]

Characteristics of individuals

The domain **characteristics of individuals** comprises attitudes and attributes of the individuals engaged with implementation. The construct ***knowledge and beliefs about the intervention (IV A)*** reflects individuals' attitudes toward and value placed on the intervention.[39] Overall, community pharmacists' attitudes towards provision of MRs were positive and they were willing to take up a new task.[60,69,70,72,74] Pharmacists valued the time they spent with patients to discuss the medication,[57] since providing MRs was believed to build better rapport with patients,[69] improve quality of customer care[52] and thus ultimately benefit patient outcomes.[65,70,74] Patients were reported to appreciate *"private time"* with the pharmacist,[59] even if they were unclear of the purpose of an MR.[56] In the first years of MURs some confusion among UK pharmacists and GPs was reported about what constituted an MUR,[53] whereas almost all (97%) responding pharmacists participating in a pre-implementation survey in Qatar knew the general definition and scope of an MUR.[74] GPs in NZ valued pharmacist's MRs and one said "*… it should be useful […] especially for the older people and to make sure that they [patients] have got everything straight because they get so muddled*".[68] According to a German interview study GPs stated that a community pharmacist's MR was much more useful than any MR-software,[70] while GPs in the UK would not necessarily implement suggested changes of medication regimens with high priority.[58]

Many pharmacists reported ***self-efficacy (IV B)*** related issues. Lack of self-confidence was frequently mentioned as a barrier.[54,69,70,72] Some pharmacists felt ill prepared to conduct MRs[52] and a US survey found that only few believed their knowledge of MR service, disease states, billing and computer systems was sufficient to provide MRs.[64] On the other hand, once having acquired profound clinical and communication skills, pharmacists believed in their own capabilities to provide better MRs than other health professionals[65,70,73,74] as they were progressing towards a new, more clinical role ***(individual stage of change, IV C).***[55,62,70,74] ***Other personal attributes (IV E)*** such as intrinsic motivation,[54] willingness to take risks and to serve as role model[74] were reported by pharmacists as facilitators to MR implementation, while pharmacists' gender, practice experience or title did not significantly influence the number of MRs performed.[55]

Process

Implementation ***planning (V A)*** was reported in only few studies[61,69,70] and overall was not explored in depth. Without implementation plans reports of ***executing according to plan (V C)*** were equally rare. ***Engaging (V B1-6)*** specifies how different stakeholder groups were attracted and involved in the implementation process.[39] Two Spanish studies reported appointing ***implementation leaders (V B 2)*** within the pharmacy, who were responsible to create a conducive organisational culture for implementation.[61,62] Another Spanish study described external pharmaceutical ***change agents (V B 4)***, whose role was to motivate, tutor and support pharmacists to implement and perform MRs.[63] GPs were frequently reported to have a role as change agents as they were in some settings responsible for patient referral to the service or for implementing suggested medication changes. Engaging GPs was challenging from a pharmacist's perspective *"Communication with doctors is a problem… and it is transferred to the patients as they trust the doctor above all and they fear what the doctor will say."*[73] Several studies reported both positive and negative experiences of pharmacists when trying to engage GPs.[57,59,67,69,70,73] GPs' willingness depended on whether they thought it was valuable for the patient[55,71] or whether they were paid for their supporting role in implementation.[53]

Patient engaging strategies ***(V B 6)*** at the community pharmacy level included highlighting patient benefit before inviting the patient to the MR.[70] Spontaneous performance of MRs was reported to work better than appointment schemes.[56,57] Pharmacists preferably invited patients they knew,[70] patients with conditions the pharmacists had profound knowledge of, or patients actively seeking advice.[57] On the other hand,

Table 3
Characteristics of included quantitative studies; nr= not reported; CMR= clinical medication review; GP= general practitioner; MUR= medicines use review; MR= medication review; MTM= medication therapy management; SFT= seguimiento farmacoterapéutico (Spanish medication review with follow-up).

Study [author; year; country]	Aims and objectives (as stated by the authors)	Method of data collection	Sample size (n) / response rate	Description of participants as stated	Participants' experience with MRs	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
Babiker et al. (2014); Qatar [74]	(1) [To] assess the availability of facilities to support MUR implementation in community pharmacies in Qatar; (2) [to] evaluate the pharmacist's knowledge and self-perceived competence in providing the MUR service; (3) [to] explore their attitude and perceptions towards implementation of MUR; and (4) [to] assess the practices of the community pharmacists pertaining to MUR	Paper questionnaire (self-administered)	n= 123/ 220 (56%)	**Pharmacists gender:** male 64% (74) **age:** 25-34 years (60%) 35-44 years (33%) 45-54 years (7%) **years of experience** <10 y: 58.4 % 11+y: 41.6%	none	MUR	The participants generally reported concerns about time, dedicated consultation area, and support staff as significant barriers towards MUR implementation.
Bright et al. (2009); USA [64]	To identify pharmacists' perceptions of barriers to the implementation of medication therapy management (MTM)	Paper questionnaire (self-administered)	n= 121/ 415 (29.2%)	**Pharmacists years of practice:** 30.2% < 5 years 22.9% >20 years **title** BS Pharm (68%), PharmD (28.9%) residency training after obtaining a PharmD (3.1%)	16.2% had provided MRs; Ø 1.4 MRs in last 6 months	MTM	Pharmacists reported a desire for additional training in disease states, MTM systems, and MTM service elements, but 50.5% felt comfortable as a provider of MTM without additional training.
Cremades et al. (2015); Spain [60]	1) To measure the level of implementation of pharmaceutical services 2) to assess the documentation, registration, and evaluation of results (of pharmaceutical services) 3) to analyse the services to be implemented/ improved and adequate tools to do so	Online questionnaire	n= 306/ 1543 (19.9%)	**Pharmacists** 205 owners, 96 employed pharmacists, 3 locums, 2 long-term locums	23% had performed MRs; 63% of these had more than 5 patients	SFT	Preferred documentation format was electronical; 29% pharmacists evaluated MR results; Facilitators were an external (clinical) help service, followed by implementation support.
Gil et al. (2013); Spain [62]	To prioritize previously identified facilitators for the implementation of new pharmaceutical services that allow designing strategies for the implementation of MRs.	Researcher administered questionnaire (via phone)	n= 549/ 1271 (36%)	**Pharmacists gender**: male 30% (165) **job title:** 75,5% owners 22% employed pharmacists 2,5% locums	nr	SFT	4 factors defined as «Incentives», «External campaigns», «Expert in MR» and «Professionalism of the pharmacist» were main influences to implementation of MRs.
Latif and Boardman (2008); UK [55]	1) To investigate factors that influence the number of MURs performed by community pharmacists 2) to explore community pharmacists' attitudes towards the service	Postal questionnaire	n= 167/ 280 (60%)	**Pharmacists** Pharmacy chain, UK ***gender:*** male 32% (54) ***job title***: 46% (67) store based 16% (26) locum 34% (56) manager 5% (9) other ***years of practice***: < 9 yrs: 34% (57) 10 -19 yrs: 28% (47) >20 yrs : 37% (62)	***No. of MUR performed*** None = 44 (27%) 1- 14 = 71 (43%) >15 =51 (31%)	MUR	Most respondents reported that MURs were an opportunity for pharmacists to use their professional skills in an extended role and patients would benefit from the service.
Mc Intosh et al. (2009); USA [65]	To assess the attitudes of community pharmacy managers who were and were not contracted with [one specific] provider to provide Medicare Part D MTM services in 2006	Telephone administered survey	n=1033 / (19,4%)	**Pharmacists** (Independent pharmacy managers only)	nr	MTM	Pharmacists who contracted with the [specific] provider to provide MTM services in 2006 were more familiar with Medicare Part D MTM (80% vs. 59%, P = 0.001). Significantly more pharmacists contracted with the [specific] provider to provide MTM services agreed that they were qualified to provide MTM services (96% vs. 88%, P = 0.01) and strongly agreed that an annual personal medication review would benefit patient outcomes (59% vs. 45%,

(*continued on next page*)

Table 3 (*continued*)

Study [author; year; country]	Aims and objectives (as stated by the authors)	Method of data collection	Sample size (n) / response rate	Description of participants as stated	Participants' experience with MRs	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
							P = 0.04). No significant difference was found between groups with regard to other variables addressed in the survey.
Murray et al. (2018); USA [66]	1) To determine whether implementing a systematic approach to providing MTM as part of the pharmacy workflow has an impact on MTM completion rates, 2) to assess pharmacists' perceptions regarding the feasibility of and barriers to the process	Paper survey (self-administered)	n=4/6 (67%)	**Pharmacists** from 4 pharmacies within a large grocery store-based pharmacy in Texas, USA	yes	MTM	Training several sites within a community pharmacy chain on a singular, standardized MTM process may lead to improved MTM completion rates. After implementing this process, CMR […] completion rates improved at each individual site, and the mean change in CMR completion rates across the 4 sites showed significant improvement.
Niquille et al. (2010); Switzerland [72]	To identify barriers and facilitators [to implementation of advanced MRs]	Survey	n=27/ 78 (35%)	**Pharmacists** (Head pharmacists Members of a virtual pharmacy chain in French-speaking Switzerland)	40% had performed MRs	CMR	Barriers: Time and training issues, insufficient remuneration, difficult collaboration with physicians
Wilcock et al. (2007); UK [58]	To explore their [GPs] perceptions of MURs	Self-administered questionnaire	n= 52/ 58 (90%)	**GPs** from practices in Cornwall and Isles of Scilly, UK **gender:** 80% male approx. 50 % in dispensing practices	96% were aware of MURs 56%>10 forms 33%<10 forms 6% had not received forms	MUR	A **useful MUR** consists of ■ Succinct documentation with brief relevant action points ■ Information on patients with compliance problems, adverse effects, or interactions ■ Ensuring patients' understanding about their medicines ■ Targeting of MURs to patients on polypharmacy, complex regimens, or homebound patients A **useless MUR** consists of: ■ Confusing extensive documentation ■ Doubling monitoring of clinical parameters or the review itself ■ Known, unsolvable problems ■ Discussing inevitable adverse effects

patients with language barriers, psychiatric disorders, or cases where a third party would be involved were more difficult to engage.[70] Patients who were satisfied with the MR service they had received were found to be best promoters of the service in several countries.[59,61,62,73]

When stakeholders were ***reflecting and evaluating (V D),*** it became clear that implementation of MRs had not occurred as expected,[53] sometimes due to communication issues with GPs[68] or with patients,[70] or misunderstanding about targets.[53,54,57] Recommendations resulting from MRs had to be feasible and clear, text-book like advice was not appreciated,[68] but in general outcomes were seen as positive by GPs in Germany *"things have been detected by the MR, which haven't been clear that they went wrong before."*[71]

A summary of facilitators and barriers which were identified in the studies is provided in Table 5. The table follows the CFIR structure of domains and constructs.

Discussion

Unlike existing reviews,[8,31–33,35] this SR focused specifically on MRs and encompassed the different perspectives of community pharmacists, GPs, patients, and further stakeholders. Most studies included in this SR reported experiences from the pharmacist's perspective, whereas other stakeholder perspectives appear less well documented. Key findings included a high degree of patient satisfaction with MRs, and pharmacists' openness to practice change as the main facilitators. The dominant barrier highlighted in nearly all studies was inadequate remuneration, as it impacts additional resourcing such as MR-software, consultation room, staff, and time availability. Further barriers included difficult professional relationships with GPs and little mandate from health authorities.

A number of the barriers and facilitators identified in this SR have been described in the context of pharmacy services in general.[8,31–33,35] However, an exclusive focus on MRs is important as MRs differ in complexity from other pharmacy services such as vaccination or generic drug substitution and thus might face different challenges in implementation.[32] Every service must meet societal and individual health needs, and stakeholders might have a positive perception of MRs, even though they may be sceptical about other pharmacy services.[79,81,82] Furthermore, it is important to consider all stakeholders' views on MR delivery. Only if everyone involved recognises the advantage, sustainable implementation of MRs in community pharmacies will be facilitated.

Pharmacists showed positive attitudes towards MRs *(knowledge and beliefs, IVA)* and tried to fit MRs into their daily workflow although

Table 4
Characteristics of included mixed methods studies; nr= not reported; PCO= Primary Care Organisation; PCT= Primary Care Trust; SHA= Strategic Health Authority; LPC= Local Pharmaceutical Committee.

Study [author; year; country]	Aims and objectives (as stated by the authors)	Method of data collection	a) Qualitative part: Description and number of participants as stated b) Quantitative part: Description of participants/ sample size (n)/ response rate (%)	Participants experience with MRs	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
Blenkinsopp et al. (2007); UK [53]	1) To determine the numbers of MURs provided by individual pharmacies in a sample of PCOs in England and Wales 2) to explore the association between pharmacy ownership and levels of provision 3) to identify the actions taken by PCTs to support local implementation 4) to explore the perspectives of NHS stakeholders at PCT and SHA level on progress in implementation of the MUR service	a) Structured telephone interview b) Postal questionnaire	a) Pharmacy leads from SHAs responsible for performance management of PCT functions n=25/ 29 (84%) b) Pharmacy leads from PCOs responsible for implementation and monitoring of the new [MUR] contract n=29/ 31 (94%)	a) Experience with monitoring implementation of MURs b) yes	MUR	■ There are wide variations in provision of MURs in different parts of England and Wales ■ Independent pharmacies were under-represented in the MUR service in its first year ■ NHS stakeholders identified a number of barriers to provision and asked for an audit of value for money from MURs: poor acceptance by GPs, unclear scope of the service, lack of performance monitoring, lack of pharmacists' confidence to perform MURs, extensive paperwork
Bradley et al. (2008); UK [54]	To explore and elucidate stakeholders' views on the approach to and experience of the commissioning and provision of community pharmacy services, with a particular focus on MURs	a) In-depth interviews b) Paper and online questionnaires	a) PCO representatives (Pharmaceutical Advisor, Head of Medicines Management) (10); LPC representatives (Chair or Secretary) (10); community pharmacists (23) - hereof 10 independent contractors b) PCO representatives n= 216/ 303 (74%)	yes	MUR	■ Ownership category of the pharmacy determined rates of MUR uptake; multiples performed twice as many MURs as independent pharmacies. ■ Organisational pressure within multiple pharmacies led to these high numbers. ■ Interviewees reported a lack of communication between GPs and pharmacists. ■ Lacking support from GPs was perceived as the major barrier.
Fyke et al. (2008); USA [51,52]	To determine pharmacists' attitudes and practices surrounding medication therapy management services. To identify a number of barriers to MTM implementation and to provide concrete suggestions for overcoming each barrier.	a) In-depth interviews b) Questionnaire	a) Pharmacists (6) b) Pharmacists; n= 81/nr (nr%)	yes	MTM	**Barriers:** ■ Lack of management support ■ Lack of training ■ Inadequate patient education and awareness ■ Lack of time ■ Lack of private space ■ Complexity of required documentation ■ Difficulty interacting with physicians ■ Lack of access to information ■ Inadequate reimbursement
García-Cardenas et al. (2017); Spain [61]	[To] describe the implementation process of an MR [with follow-up] service in a community pharmacy setting and [to] evaluate its implementation outcomes	a) Semi-structured interviews b) Questionnaire	a) GPs, representatives of professional bodies, pharmacy practitioners, strategists (n=nr) b) Patients, who had received the service n= 61/nr (nr %)	yes	SFT	■ Penetration rate was 62.5% (out of 211 eligible patients 132 received the service) ■ Implementation costs were 57,36 Euro ■ High retention-participation rate of patients, monthly increase of service request compared to active service offers ■ Time spent on service provision was 171.7 min per patient. ■ Average patient satisfaction with the service was 4.82 (SD: 0.39, scale 1–5; 1= lowest; 5=highest satisfaction) ■ Acceptance rate of care plans by patients (97%;128/132), by GPs (96%; 127/132)
Lelubre et al. (2018); Belgium [70]	1) To describe the implementation process of the MR service 2) To present the implementation evaluation of the pilot study (testing stage)	a) Focus-groups (FG), telephone interviews b) Web-platform; online-	a1) **Focus-groups**: pharmacists (5 groups with a total of 22 pharmacists) **gender:** male 27% (6), **years of practice**: median	yes	MR	■ Patient recruitment successful in 51,5% of cases ■ Pharmacists perceived the service as professionally satisfying

(*continued on next page*)

Table 4 (*continued*)

Study [author; year; country]	Aims and objectives (as stated by the authors)	Method of data collection	a) Qualitative part: Description and number of participants as stated b) Quantitative part: Description of participants/ sample size (n)/ response rate (%)	Participants experience with MRs	Type of MR	Key findings relevant to this SR's first objective: experiences with the implementation of MRs in community pharmacies
		questionnaire; online-survey	16 [IQR 6-27] a2) **Interviews**: drop-out pharmacists 22/ 25 (88%) b1) platform pharmacies 55/55 (100%) b2) questionnaire: pharmacists (58/nr) b3) web-survey: pharmacists (67/nr) **gender:** male 25,4% (17) **years of practice:** median 14 [IQR 7-20] **job title:** associated pharmacists 38,8% (26) manager pharmacists 61,2% (41)			■ 62/67 (92.5%) of pharmacists found this service feasible in practice ■ Suggested changes were reducing internal workload; media campaigns to increase awareness; and modified software

implementing such a complex service posed challenges, a finding that concurred with a review by Shoemaker et al.[32] Similarly, pharmacists' positive attitudes were reported by Luetsch, who pointed out that pharmacists *"expressed necessity, willingness or enthusiasm to extend their roles"* despite perceived barriers in their environment.[83] None of the research reports included in this SR expressed anything like necessity to engage in delivery of MRs and none of the findings could be mapped to the constructs *"peer pressure"* and *"tension for change"*. This could be due to the fact that MRs are not widespread enough to put pressure on pharmacists who are comfortable with simply fulfilling traditional tasks.[22]

As for organisational influences, pharmacists from different countries reported similar experiences from within the pharmacy *(inner setting, III)*, indicating that pharmacy as an organisation appears to function in rather universal ways regardless of the health system or country where it is situated. This SR identified a lack of accounts from pharmacy managers and owners. This, despite the fact that a managers' support is believed to be an indispensable prerequisite for successful implementation *(leadership engagement, IIIE1)*,[84] as they shape the pharmacy's workflow and resourcing, which can ultimately shift the pharmacy's culture to a focus on patient care.[85]

An official mandate from health authorities to conduct MRs was considered to be crucial *(external policy and incentives, IID)* and in countries where clear instructions and a defined protocol for MR-delivery are in place, MRs were implemented in more pharmacies.[2,8,32] Lack of funding can result in MRs being rushed and superficial and has been shown to contribute to access inequality in the community.[86]

GPs expressed heterogeneous viewpoints on collaboration with pharmacists around MRs. Yet plenty of literature reports show that collaboration between all health care professionals involved in the care of an individual patient is of utmost importance to avoid fragmentation of care.[87,88] Fragmentation of healthcare has been shown to increase costs and lead to poorer health outcomes.[87,88] Our findings align with the literature in that interprofessional rapport has to be built step by step, on both an interpersonal and organisational level.[8,89]

Patients reported very positive experiences with MRs, provided that the MR was flexible enough *(adaptability, ID)* to focus on individual *patients' needs (IIA)* a finding congruent with reports by Hossain et al. and Stewart et al.[8,33] Patients' satisfaction with MRs shows their interest in information about their medication, which can be a first step towards shared decision making.[90,91] However, this SR showed that *engaging patients (VB6)* could be challenging, if patients were not aware of the purpose of an MR. National engaging strategies which included information of aims, nature and benefits of the promoted intervention were suggested in another SR by Weir et al.[35] Some pharmacists in the studies of this SR suggested similarly to use nationwide promotion to raise awareness for MRs.[62,70,73] This appears to be a logical step as implementation starts with the discovery of an intervention[78] and to aid discovery, information for all stakeholders, including patients and the public, is necessary.

Several constructs are closely interrelated and influence each other. For example, remuneration of the service *(external policy and incentives II D)* must be balanced with the costs of its delivery *(cost I H)*. This balance is likely to be considered by pharmacy managers and owners as they are responsible for the viability of the business, and the balance can thus be a crucial influence on leadership engagement *(III E1)*. Presence or absence of leadership support, again, will shape the implementation climate *(III D and subconstructs)* and can also influence the available resources *(III E2),* such as money, physical space, time, training, and education. Training and education, in turn, can have an impact on pharmacists' *self-efficacy (IV B)* as well as on pharmacists' competence *(IV E)* and individual stage of change *(IV C)*. These personal characteristics will also shape pharmacists' external image and affect the way they engage patients and other externals *(V B4; V B6)*. However, *process (V)*-related aspects such as *planning (V A), executing (V C)* according to plan and *evaluating (V D)* were under-reported, so this reviews' findings only indicated these potential influences and their interrelationships. Yet, planning and evaluating is indispensable to ascertain the relation between cause and effect of an influencing factor.

Strengths and limitations

A strength of this systematic review was the inclusion of studies published in the English, Spanish, and German language, only 6 identified records were discarded due to the language (<1%). Including studies from nine countries with different health systems was a strength and weakness at the same time as findings from one system can not necessarily be translated to another. Our intention was to capture a broad range of experiences with implementation across all implementation stages from different perspectives. The application of the widely used CFIR-framework as theoretical underpinning was a strength of this SR as it ensured that all influences on implementation were captured in a systematic way.[39,92]

Table 5
Summary of barriers (-) and facilitators (+) found in the literature, mapped against the CFIR domains; GP= general practitioner; P= patient; Ph= pharmacist; St= other stakeholder.

	CONSTRUCT	*Blenkinsoppet al.(2007), UK.*[53]	*Bradleyet al.(2008), UK.*[54]	*Latif.Boardman(2008), UK.*[55]	*Latifet al.(2013), UK.*[56]	*Urbanet al.(2008), UK.*[57]	*Wilcock.Harding(2007), UK.*[58]	*Brightet al.(2009), USA.*[64]	*Fykeet al.(2008), USA.*[51,52]	*MacIntoshet al.(2009), USA.*[65]	*Murrayet al.(2018), USA.*[66]	*Smithet al.(2017), USA.*[67]	*Castrillónet al.(2010), Spain.*[59]	*CremadesAlcarazet al.(2015), Spain.*[60]	*García − Cardenaset al.(2016), Spain.*[61]	*Gilet al.(2013), Spain.*[62]	*Pérez − Escamillaet al.(2014), Spain.*[63]	*Bryantet al.(2010)a, NZ.*[68]	*Bryantet al.(2010)b, NZ.*[69]	*Babikeret al.(2014), Qatar.*[74]	*Lelubreet al.(2019), Belgium.*[70]	*Nabergojet al.(2018), Slovenia.*[73]	*Niquilleet al.(2010), Switzerland.*[72]	*Roseet al.(2018), Germany.*[71]
Lack of influence on accreditation and evaluation	I A	**St (-)**																						
Lack of transparency of outcomes	I B	**St (-)**																						
Evidence of positive MR outcomes	I B											**St (+)**	**P (+)**											
Strict question format	I D			**Ph (-)**																				
Length and complexity of documentation	I F	**St (-)**	**St (-)**				**GP (-)**		**Ph (-)**		**Ph (-)**										**Ph (-)**		**Ph (-)**	
Expense of monitoring suggestions	I H																	**GP (-)**						
Low awareness and acceptance in some patient groups	II A		**St (-)**						**Ph (-)**			**Ph (-)**									**Ph (-)**			
Patient satisfaction with the service	II A			**Ph (+)**	**P (+)**					**Ph (+)**			**P (+)**		**P (+)**	**Ph (+)**						**Ph (+)**		
Agreed patient eligibility criteria	II A	**St (+)**					**GP (+)**																	**GP (+)**
Difficulty contacting GPs	II B								**Ph (-)**		**Ph (-)**													
Interdisciplinary meetings GP / pharmacists	II B		**St (+)**													**Ph (+)**								
Good working relationship GP/ pharmacist	II B						**GP (+)**																	
Lack of adequate remuneration	II D	**St (-)**		**Ph (-)**		**Ph (-)**			**Ph (-)**			**St (-)**	**P (-)**			**Ph (-)**	**Ph (-)**	**Ph (-)**	**GP (-)**	**Ph (-)**	**Ph (-)**	**Ph (-)**	**Ph (-)**	**Ph (-)**
Lack of mandate from health authorities	II D																	**Ph (-)**						
National publicity to raise awareness of MRs	II D	**St (+)**				**Ph (+)**										**Ph (+)**					**Ph (+)**	**Ph (+)**		
Financial incentive	II D			**Ph (+)**																				
Pharmacy size: either large with several pharmacists or very small with few customers	III A												**P (+)**								**Ph (+)**			
Regular staff meetings	III B														**Ph (+)**									
Focus on dispensing and product selling	III C														**Ph (-)**							**Ph (-)**		
Difficulty fitting in a new task	III D2		**Ph (-)**			**Ph (-)**						**Ph (-)**						**Ph (-)**	**GP (-)**					
Perceived low priority	III D3																	**Ph (-)**			**Ph (-)**			

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Table 5 (*continued*)

	CONSTRUCT	*Blenkinsoppet al.(2007), UK.*[53]	*Bradleyet al.(2008), UK.*[54]	*Latif, Boardman(2008), UK.*[55]	*Latifet al.(2013), UK.*[56]	*Urbanet al.(2008), UK.*[57]	*Wilcock, Harding(2007), UK.*[58]	*Brightet al.(2009), USA.*[64]	*Fykeet al.(2008), USA.*[51,52]	*MacIntoshet al.(2009), USA.*[65]	*Murrayet al.(2018), USA.*[66]	*Smithet al.(2017), USA.*[67]	*Castrillónet al.(2010), Spain.*[59]	*CremadesAlcarazet al.(2015), Spain.*[60]	*García – Cardenaset al.(2016), Spain.*[61]	*Gilet al.(2013), Spain.*[62]	*Pérez – Escamillaet al.(2014), Spain.*[63]	*Bryantet al.(2010)a, NZ.*[68]	*Bryantet al.(2010)b, NZ.*[69]	*Babikeret al.(2014), Qatar.*[74]	*Lelubreet al.(2019), Belgium.*[70]	*Nabergojet al.(2018), Slovenia.*[73]	*Niquilleet al.(2010), Switzerland.*[72]	*Roseet al.(2018), Germany.*[71]
Lack of incentives	III											**Ph**												
	D4											**(-)**												
Pressure to fulfil target numbers	III	**St**	**St**									**Ph**												
	D5	**(-)**	**(-)**									**(-)**												
Lack of feedback	III											**Ph**					**Ph**							
	D5											**(-)**					**(-)**							
Lack of owner / manager support	III								**Ph**											**Ph**				
	E1								**(-)**											**(-)**				
Support from the owner / store manager	III							**Ph**				**Ph**	**P**		**Ph**									
	E1							(+)				(+)	(+)		(+)									
Lack of staff	III			**Ph**				**Ph**	**Ph**											**Ph**	**Ph**			
	E2			**(-)**				**(-)**	**(-)**											**(-)**	**(-)**			
Lack of time	III			**Ph**		**Ph**	**GP**	**Ph**		**Ph**		**Ph**						**Ph**	**GP**	**Ph**	**Ph**	**Ph**		
	E2			**(-)**		**(-)**	**(-)**	**(-)**		**(-)**		**(-)**						**(-)**	**(-)**	**(-)**	**(-)**	**(-)**		
Lack of consultation room	III			**Ph**					**Ph**															
	E2			**(-)**					**(-)**															
Lack of access to patient information	III			**Ph**					**Ph**															
	E2			**(-)**					**(-)**															
MR-software	III							**Ph**							**Ph**	**Ph**					**Ph**			
	E2							(+)							(+)	(+)					(+)			
Consultation room	III			**Ph**											**Ph**	**Ph**				**Ph**	**Ph**			
	E2			(+)											(+)	(+)				(+)	(+)			
Lack of training facilities	III											**Ph**					**Ph**							
	E3											**(-)**					**(-)**							
Lack of knowledge	III	**St**							**Ph**															
	E3	**(-)**							**(-)**															
Mentors to consult with	III					**Ph**								**Ph**			**St**					**Ph**		
	E3					(+)								(+)			(+)					(+)		
Practical workshops	III										**Ph**										**Ph**	**Ph**		
	E3										(+)										(+)	(+)		
Confusion about scope of MRs	IV A	**St**																						
		(-)																						
Useful for medication safety	IV A																						**Ph**	**GP**
																							(+)	(+)
Useful for patients' adherence	IV A						**GP**												**GP**		**Ph**			
							(+)												(+)		(+)			
High value placed on pharmacists' MRs	IV A			**P**									**P**											
				(+)									(+)											
Positive attitudes towards MRs	IV A					**Ph**								**Ph**		**Ph**		**Ph**		**Ph**	**Ph**			
						(+)								(+)		(+)		(+)		(+)	(+)			
Belief in positive patient outcomes of MRs	IV A								**Ph**	**Ph**										**Ph**	**Ph**		**Ph**	
									(+)	(+)										(+)	(+)		(+)	
Lack of confidence	IV B																							

(*continued on next page*)

Table 5 (*continued*)

	CONSTRUCT	Blenkinsoppet al.(2007), UK.[53]	Bradleyet al.(2008), UK.[54]	Latif.Boardman(2008), UK.[55]	Latifet al.(2013), UK.[56]	Urbanet al.(2008), UK.[57]	Wilcock.Harding(2007), UK.[58]	Brightet al.(2009), USA.[64]	Fykeet al.(2008), USA.[51,52]	MacIntoshet al.(2009), USA.[65]	Murrayet al.(2018), USA.[66]	Smithet al.(2017), USA.[67]	Castrillónet al.(2010), Spain.[59]	CremadesAlcarazet al.(2015), Spain.[60]	García − Cardenaset al.(2016), Spain.[61]	Gilet al.(2013), Spain.[62]	Pérez − Escamillaet al.(2014), Spain.[63]	Bryantet al.(2010)a, NZ.[68]	Bryantet al.(2010)b, NZ.[69]	Babikeret al.(2014), Qatar.[74]	Lelubreet al.(2019), Belgium.[70]	Nabergojet al.(2018), Slovenia.[73]	Niquilleet al.(2010), Switzerland.[72]	Roseet al.(2018), Germany.[71]
			Ph (-)															**Ph (-)**					**Ph (-)**	
Openness to practice change	IV C			**Ph (+)**	**Ph (+)**									**Ph (+)**		**Ph (+)**				**Ph (+)**	**Ph (+)**			
Lack of communication skills	IV E																**St (-)**							
Good communication skills	IV E								**Ph (+)**															
Intrinsic motivation	IV E		**Ph (+)**																					
Adapted work schedule	V A														**Ph (+)**						**Ph (+)**			
Little mandate from GPs	V B4					**Ph (-)**		**Ph (-)**										**Ph (-)**					**Ph (-)**	
Difficulties engaging GPs	V B 4	**St (-)**	**St (-)**									**Ph (-)**												
Support from external implementation tutors	V B4													**Ph (+)**			**St (+)**							
Language barriers	V B6																				**Ph (-)**			
Lack of quality monitoring	V C	**St (-)**																						
Accreditation of premises	V C		**St (-)**																					
Poor quality of MR	V D	**St (-)**																						

Further research

Important areas for future research are collaboration issues between GPs and pharmacists regarding MRs in the community setting, patients' reasons for accepting or refusing an offer to an MR and finally pharmacy managers' and owners' attitudes on MRs and how to incorporate them into a successful business model. Better understanding of these aspects can advance implementation of MRs to the benefit of all stakeholders involved.

Conclusions

Implementation of MRs in community pharmacies is a highly complex matter, perspectives of several stakeholders must be considered, and several determinants influence each other. Results of this SR illustrate different stakeholders' experiences and add to the understanding of challenges in the implementation process. Nevertheless, findings also highlight how scarce reporting of other health care professionals' and further stakeholders' views are and that filling this gap can unveil hidden barriers and facilitators with the aim to inform future strategies for implementation.

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Declaration of competing interest

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Appendix A. Supplementary data

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PRISMA-P 2015 Checklist: Experiences of key stakeholders with the implementation of medication reviews in community pharmacies

A systematic review using the Consolidated Framework for Implementation research; Michel et al.

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 **4**:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☒	☐	2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☒	n/a
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☒	☐	79
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☒	☐	
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review		☒	
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☐	☒	n/a
Support					
Sources	5a	Indicate sources of financial or other support for the review	☒	☐	479-480
Sponsor	5b	Provide name for the review funder and/or sponsor	☐	☒	no sponsor
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☐	☒	n/a
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	☒	☐	33-56
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☒	☐	71-73
METHODS					

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☒	☐	83-96 103-104
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☒	☐	99-103
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☒	☐	99-103
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☐	x☐	
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☒	☐	107-109
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☒	☐	121-124
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☒	☐	85-92
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☒	☐	93-94
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☒	☐	112-115
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	☐	☒	n/a
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☐	☒	n/a
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	☐	☒	n/a
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☒	☐	127-141
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☐	☒	n/a
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☐	☒	n/a

search strategy for SR:

DM_17.06.19

"Implementation of medication reviews in ambulatory care settings"

Hits listed below are from 17.6.19:

No.	term	field	medline	IPA	CINAHL	scopus fields	scopus
1	implement*	all	361228	8895	144380	title-abs-key	1851180
2	pharmac*	all	1996968	218615	235642	title-abs-key	816172
3	1+2	all	31080	7486	7188	title-abs-key	27338
4	"medication review"	all	1034	265	603	title-abs-key	1589
5	"medication management"	all	2607	655	2187	title-abs-key	3329
6	"medication therapy management"	all	2203	449	429	title-abs-key	
7	"home medic* review"	all	71	41	49	title-abs-key	
8	"drug utilization review"	all	2475	71	42	title-abs-key	
9	"drug utilisation review"	all	4	3	4	title-abs-key	
10	"domiciliary med* review"	all	3	2	1	title-abs-key	
11	"pharmaceutical care"	all	2640	3266	681	title-abs-key	
12	"pharmac* service"	all	4901	387	5114	title-abs-key	
13	4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12	all	14325	4707	8396	title-abs-key	38335
14	3 AND 13	all	2046	879	1079	title-abs-key	3846
15	facilitat*	all	357399	4762	70910	title-abs-key	
16	barrier*	all	209963	5274	65810	title-abs-key	
17	obstacle*	all	32885	668	8466	title-abs-key	
18	opportunit*	all	172684	3815	67364	title-abs-key	
18	implanta*	all	174638	1453	35615	title-abs-key	
20	"servic* pharmac*"	all	533	1209	106	title-abs-key	

No.	term	field	medline	IPA	CINAHL	scopus fields	scopus
21	15 OR 16 OR 17 OR 18 OR 19 OR 20	all	894716	15773	234179	title-abs-key	
22	3 AND 13 AND 21	all	541	316	300	title-abs-key	991
23	hospital	title	110936	3887	59639	title	
24	22 AND NOT 23		473	284	272		901
						AND NOT (index medline	227

Qualitative Studies	Bryant et al. N1 2010	Bryant et al. N2 2010	Castrillón et al. 2010	Latif et al. 2013	Nabergoj Macovec et al. 2018	Pérez-Escamilla et al. 2014	Rose et al. 2018	Smith et al. 2016	Urban et al. 2007
1. Appropriateness of a qualitative approach	yes	yes	yes	yes	yes	yes	yes	yes	yes
2. Clear aims and objectives	yes	yes	yes	mixed	yes	yes	yes	yes	yes
3. Rigour of research design/methodology	cd	cd	cd	yes	yes	cd	yes	yes	cd
4. Appropriateness of data collection	cd	cd	cd	cd	yes	cd	yes	yes	cd
5. Description of researcher's role	no	cd	no	cd	yes	no	yes	no	no
6. Clarity of context description	no	yes	no	cd	yes	cd	cd	yes	cd
7. Reliability of methods	yes	yes	yes	yes	yes	yes	yes	yes	cd
8. Rigour of data analysis	nr	nr	nr	cd	yes	nr	cd	yes	cd
9. Richness of data	yes	yes	cd	yes	yes	cd	yes	yes	cd
10. Reliability of data analysis	cd	cd	cd	cd	yes	nr	cd	yes	cd
11. Convincing findings	yes	yes	yes	yes	yes	cd	yes	yes	yes
12. Relevance of findings regarding study aims	yes	yes	yes	partially	yes	yes	yes	yes	yes
13. Adequate conclusions	yes	yes	yes	yes	yes	yes	yes	yes	yes
14. Clear ethic reporting	yes	yes	cd	cd	yes	cd	yes	yes	cd
Overall assessment	**+**	**+**	**+**	**+**	**++**	**-**	**+**	**++**	**-**

Supplementary file 2: Quality assessment: using NICE, Appendix H, Quality appraisal checklist for qualitative studies[1] *++ indicates that the study was designed or conducted in such a way as to minimise the risk of bias; + indicates that the study was partly designed to minimise the risk of bias or it was not clear from the way it was reported; - indicates that the study had significant sources of bias across all aspects of study design or was reported in a way that risk of bias remained unclear; cd= cannot determine; nr= not reported*

1. National Institue of Health and Care Excellence. Appendix H Quality appraisal checklist – qualitative studies | Methods for the development of NICE public health guidance (third edition) | Guidance | NICE. https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-qualitative-studies#checklist-2. Accessed April 23, 2020.

Quantitative studies	Babiker et al. 2014	Bright et al. 2009	Cremades et al. 2015	Gil et al. 2013	Latif Boardman 2008	Mc Intosh et al. 2009	Murray et al. 2018	Niquille et al. 2010	Wilcock et al. 2007
Research question and study design									
Clear aims and objectives	yes	yes	yes	yes	yes	yes	yes	yes	yes
Appropriateness of method	yes	yes	yes	yes	yes	yes	yes	no	yes
Existing measures (questionnaires)	no	no	no	yes (used)	no	no	no	nr	no
Consideration of consumers' views of study method	yes	na	nr	na	nr	nr	nr	nr	nr
Validity and reliability									
Validity of the questionnaire	yes	yes	yes	yes	yes	yes	na	nr	nr
Reliability of the questionnaire	no	yes	nr	yes	nr	nr	na	nr	nr
Format									
Appropriateness of questionnaire's title	nr	yes	nr	yes	nr	yes	yes	nr	nr
Appropriate format of questionnaire	yes	yes	yes	yes	nr	yes	yes	nr	yes
Adequate order of questions	na	na	yes	na	na	na	na	nr	na
Adequate length of questionnaire	nr	yes	yes	yes	nr	yes	yes	nr	nr
Adequate wording of questions	nr	yes	no	yes	nr	yes	yes	nr	nr
Instructions									
Adequate instructions how to complete the questionnaire	nr	yes	yes	na	nr	na	yes	nr	nr
Adequate instructions how to return the questionnaire	nr	nr	yes	na	nr	na	nr	nr	nr
Adequate explanation of research aim	yes	nr	nr	yes	nr	yes	nr	nr	nr
Piloting									
Adequate piloting	yes	yes	no	no	yes	cd	na	nr	no
Details of piloting	yes	yes	na	na	yes	nr	na	nr	na
Results of piloting	nr	nr	na	na	nr	nr	na	nr	na
Sampling									

Appropriate size and representativeness of sampling frame	yes	yes	yes	yes	nr	cd	na	no	yes
Suitability of the questionnaire for all participants	yes	yes	yes	yes	yes	yes	yes	yes	nr
Distribution, administration and response									
Distribution of questionnaire	paper	internal mail	email	phone call	internal mail	fax	nr	e-mail	in person
Administration of questionnaire	self-admin.	self-admin.	web-based	by researcher via phone	self-admin.	by researcher via phone	self-admin.	self-admin.	self-admin.
Complete reporting of responses	yes	yes	yes	cd	yes	cd	no	nr	yes
Discussion of response bias	yes	no	yes	no	no	no	na	no	yes
Coding and analysis									
Appropriateness of data analysis	yes	descriptive analysis only	yes	yes	yes	yes	yes	nr	nr
Adequate data management	nr	nr	nr	nr	nr	cd	nr	nr	nr
Data dredging	no	cd	no	no	no	no	no	no	no
Results									
Clear reporting of all relevant data	yes	yes	yes	cd	yes	yes	yes	cd	yes
Reporting of relevant non-significant results	yes	yes	cd	yes	yes	yes	yes	no	no
Adequate interpretation of qualitative results	na	na	na	na	na	na	na	na	nr
Conclusions and discussion									
Adequate conclusion	yes	yes	yes	yes	yes	yes	yes	cd	yes
Adequate discussion	yes	yes	yes	yes	yes	yes	yes	limited	yes
Overall assessment (++ / + / -)	**+**	**+**	**+**	**+**	**+**	**+**	**++**	**-**	**+**

Supplementary file 1: Quality assessment: using BMJ's Critical appraisal checklist for a questionnaire study[1] ++ indicates that the study was designed or conducted in such a way as to minimise the risk of bias; + indicates that the study was partly designed to minimise the risk of bias or it was not clear from the way it was reported; - indicates that the study had significant sources of bias across all aspects of study design or was reported in a way that risk of bias remained unclear; cd= cannot determine; na= not applicable; nr= not reported

1. References, further examples and checklists | The BMJ. https://www.bmj.com/content/suppl/2004/05/27/328.7451.1312.DC1. Accessed April 23, 2020.

QUANTITATIVE PART	Blenkinsopp et al. 2007	Bradley et al. 2008	Fyke et al. 2008	García-Cardenas et al. 2017	Lelubre et al. 2018
Research question and study design					
Clear aims and objectives	yes	yes	yes	no	yes
Appropriateness of method	yes	yes	yes	ok	yes
Existing measures (questionnaires)	yes	no	no	no	yes (used)
Consideration of consumers' views of study method	no	nr	nr	nr	nr
Validity and reliability					
Validity of the questionnaire	nr	nr	nr	nr	yes
Reliability of the questionnaire	nr	nr	nr	nr	cd
Format					
Appropriateness of questionnaire's title	nr	nr	nr	nr	nr
Appropriate format of questionnaire	yes	yes	yes	nr	yes
Adequate order of questions	na	na	na	nr	na
Adequate length of questionnaire	nr	yes	nr	nr	cd
Adequate wording of questions	nr	yes	nr	nr	cd
Instructions					
Adequate instructions how to complete the questionnaire	nr	nr	nr	nr	nr
Adequate instructions how to return the questionnaire	nr	nr	nr	nr	nr
Adequate explanation of research aim	nr	nr	nr	nr	nr
Piloting					
Adequate piloting	yes	yes	nr	nr	nr
Details of piloting	nr	yes	nr	nr	nr
Results of piloting	yes	yes	nr	nr	nr
Sampling					
Appropriate size and representativeness of sampling frame	yes	yes	no	nr	yes
Suitability of the questionnaire for all participants	na	na	na	nr	na
Distribution, administration and response					
Distribution of questionnaire	paper mail	paper and online versions	e-mail	nr	e-mail
Administration of questionnaire	self-administered	self-administered	self-administered	nr	self-administered
Complete reporting of responses	yes	yes	nr	nr	yes
Discussion of response bias	yes	no	no	no	no
Coding and analysis					
Appropriateness of data analysis	yes	yes	yes	yes	yes

Adequate data management	nr	nr	nr	nr	nr
Data dredging	no	no	cd	nr	no
Results					
Clear reporting of all relevant data	yes	yes	cd	cd	cd
Reporting of relevant non-significant results	yes	yes	cd	yes	no
Adequate interpretation of qualitative results	yes	na	nr	yes, but not contextualised	cd
Conclusions and discussion					
Adequate conclusion	yes	yes	cd	yes	yes
Adequate discussion	yes	yes	no	yes	yes
Overall assessment (++ / + / -)	-	-	**- (too little detail)**	**- (too little detail)**	-

QUALITATIVE PART	Blenkinsopp et al. 2007	Bradley et al. 2008	Fyke et al. 2008	García-Cardenas et al. 2017	Lelubre et al. 2018
1. Appropriateness of a qualitative approach	yes	yes	cd	yes	yes
2. Clear aims and objectives	yes	yes	no	no	cd
3. Rigour of research design/methodology	cd	cd	cd	cd	cd
4. Appropriateness of data collection	yes	cd	cd	cd	cd
5. Description of researcher's role	no	no	no	cd	no
6. Clarity of context description	no	cd	no	no	no
7. Reliability of methods	yes	cd	cd	cd	cd
8. Rigour of data analysis	cd	yes	nr	cd	partly (focus groups: rigorous; phone interviews not rigorous)
9. Richness of data	cd	cd	cd	no	yes
10. Reliability of data analysis	cd	cd	cd	cd	cd
11. Convincing findings	yes	yes	cd	cd	yes
12. Relevance of findings regarding study aims	yes	yes	cd	yes	yes
13. Adequate conclusions	yes	yes	cd	cd	yes
14. Clear ethic reporting	yes	cd	cd	yes	yes
Overall assessment	**+**	**+**	**-**	**-**	**+**

Supplementary file 3 Quality assessment using NICE, Appendix H, Quality appraisal checklist for qualitative studies[1] *and using BMJ's Critical appraisal checklist for a questionnaire study*[2] *++ indicates that the study was designed or conducted in such a way*

as to minimise the risk of bias; + indicates that the study was partly designed to minimise the risk of bias or it was not clear from the way it was reported; - indicates that the study had significant sources of bias across all aspects of study design or was reported in a way that risk of bias remained unclear; cd= cannot determine; na= not applicable; nr= not reported

1. National Institue of Health and Care Excellence. Appendix H Quality appraisal checklist – qualitative studies | Methods for the development of NICE public health guidance (third edition) | Guidance | NICE. https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-qualitative-studies#checklist-2. Accessed April 23, 2020.
2. References, further examples and checklists | The BMJ. https://www.bmj.com/content/suppl/2004/05/27/328.7451.1312.DC1. Accessed April 23, 2020.

CFIR Constructs[1]		Pharmacists	Patients	GPs	Other Stakeholders*
Intervention characteristics					
I A	Intervention Source		✓		✓
I B	Evidence Strength & Quality	✓	✓		✓
I C	Relative Advantage	✓	✓	✓	✓
I D	Adaptability	✓	✓	✓	✓
I E	Trialability				
I F	Complexity	✓		✓	✓
I G	Design Quality & Packaging				
I H	Cost	✓		✓	
Outer Setting					
II A	Patient Needs & Resources	✓	✓	✓	
II B	Cosmopolitanism	✓	✓	✓	✓
II C	Peer Pressure				
II D	External Policy & Incentives	✓	✓	✓	✓
Inner Setting					
III A	Structural characteristics	✓	✓		
III B	Network & communication	✓			
III C	Culture	✓			
III D	Implementation climate	✓			✓
III D 1	Tension for change				
III D 2	Compatibility	✓		✓	✓
III D 3	Relative priority	✓			✓
III D 4	Organisational Incentives & Rewards	✓			
III D 5	Goals & Feedback	✓			✓
III D 6	Learning climate				
III E	Readiness for implementation				
III E 1	Leadership engagement	✓	✓		
III E 2	Available resources	✓		✓	
III E 3	Access to knowledge & information	✓			✓
Characteristics of individuals					
IV A	Knowledge & Beliefs about the Intervention	✓	✓	✓	✓
IV B	Self-efficacy	✓			
IV C	Individual Stage of Change	✓			
IV D	Individual Identification with Organisation				
IV E	Other Personal Attributes	✓			
Process					
V A	Planning	✓			
V B	Engaging				
V B1	Engaging Opinion Leaders				
V B2	Engaging formally appointed internal Implementation Leaders	✓			
V B3	Engaging Champions				

CFIR Constructs[1]		Pharmacists	Patients	GPs	Other Stakeholders*
V B4	**Engaging External Change Agents**	✓	✓	✓	✓
V B5	**Engaging Key Stakeholders (within the organisation)**				
V B6	**Engaging Innovation Participants**	✓	✓		✓
V C	**Executing**	✓		✓	
V D	**Reflecting & Evaluating**	✓		✓	✓

*Supplementary table 5: Ticked boxes indicate that the named participant groups have contributed information to the respective constructs, whereas blank boxes indicate that no experiences were reported in any of the included studies; *Other stakeholders: representatives of health insurances, of primary care organisation or implementation tutors.*

1. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. Implement Sci. 2009;4(1):1–15.

	Included	Excluded
Method	primary, peer-reviewed research items with qualitative, quantitative, mixed methods	guidelines, opinion articles, comments, editorials, narrative reports, reviews
Setting	community pharmacy	care home, nursing home, sheltered housing, community clinics, hospital, academia, general practices, clinics with non-medical prescribing team-members; non-high income countries according to World bank list[1]
Sample	pharmacists, health care professionals (nurses, physicians), policy makers, patients, general public	students, academics, pharmacy technicians, other pharmacy supporting staff
Aim/ Intervention	implementation of medication review in accordance with the PCNE definition[2] (including all varieties and terms used in different countries: e.g. MUR (medication use review; UK)[3] CMR (MedsCheck or Clinical Medication Review; Australia)[4] CMM (comprehensive medicines management; NZ) MTM (medication therapy management, MedsCheck; USA,[5] CAN) PMC (Polymedikationcheck; CH)[6] SFT (Seguimiento Farmacoterapéutico; Spain)[7]	statistical analysis, curriculum design; pharmacy practice, medication reconciliation; MRs targeted at specific conditions or focusing on specific therapeutics
Outcome	experiences, views, beliefs, attitudes, perceptions of stakeholders (named in "sample")	other forms of data output

Inclusion and exclusion criteria for studies included in the systematic review.

1. World Bank Country and Lending Groups – World Bank Data Help Desk [Internet]. [cited 2019 Jun 22]. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

2. Pharmaceutical Care Network Europe. Position paper on the PCNE definition of medication review. 2016;(April):3.

3. HM Government. The National Health Service Act 2006: The Pharmaceutical and Local Pharmaceutical Services (Prescriptions , Payments and Listings) Directions 2013. 2013;134(349):6.

4. Jokanovic N, Tan E, van den Bosch D, Kirkpatrick C, Bell J, Al; E. Clinical medication review in Australia: A systematic review. Res Soc Adm Pharm. 2016;12(3):384–418.

5. Centers for Medicare & Medicaid Services. MTM [Internet]. 2019 [cited 2019 Jun 29]. Available from: https://www.cms.gov/medicare/prescription-drug-coverage/prescriptiondrugcovcontra/mtm.html

6. Messerli M, Blozik E, Vriends N, Hersberger KE. Impact of a community pharmacist-led medication review on medicines use in patients on polypharmacy- A prospective

randomised controlled trial. BMC Health Serv Res. 2016;16:145.

7. Consejo General de Colegios Oficiales de Farmacéuticos. Servicio de Seguimiento Farmacoterapéutico en Farmacia Comunitaria. Spain; 2014.