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ORIGINAL ARTICLE

Implementing pharmacist-led home medicines reviews within fracture liaison services for better post-fracture care: a qualitative study of patient and practitioner experience

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Abstract

Summary Home medicines reviews present a novel intervention supporting continuity of care between fracture liaison services and primary care. Home medicines review pharmacists deliver multifaceted, collaborative interventions that can bridge gaps in care, promote patient empowerment, facilitate a GP-patient discussion about bone health, and improve coordination of care.

Purpose Medication review has potential to reduce the risk of falls and fractures and improve transition of care from a specialist fracture liaison service to primary care. This study was designed to examine and evaluate the implementation of a home medicines review into fracture liaison services in Australia. Study objectives were to (1) explore how home medicines reviews might facilitate the healthcare transition from fracture liaison service to primary care and (2) identify factors required to achieve this.

Methods This was a qualitative descriptive study nested within a randomised trial (reported elsewhere). Semi-structured interviews were conducted with patients and healthcare practitioners responsible for providing osteoporosis services. Formative and early-stage data collection occurred September 2022 to January 2024. Thematic analysis was employed inductively (data-driven) and directed content analysis was applied deductively (theory-driven) using the consolidated framework for implementation research (CFIR) domains to frame factors affecting home medicines review implementation.

Results Fifty-six interviews were performed: 25 with pharmacists, 14 with fracture liaison service clinicians, seven with GPs, and ten with patients. Participants perceived home medicines review pharmacists to be uniquely positioned to favourably influence the transition to primary care by (1) identifying gaps in care, (2) promoting patient empowerment, (3) facilitating a GP-patient discussion about bone health, and (4) improving coordination of care. Factors affecting home medicines review implementation related to CFIR domains of the individuals (patient and GP engagement and willingness to accept advice, patient preparedness, GP confidence deprescribing), the innovation (hospital endorsement of home medicines review reports, perception of intervention value, embedded administrative assistants, pharmacist expertise), the inner setting (role clarity, multidisciplinary teamwork culture, and patient-centred focus, scheduling practices, and communication systems), and outer setting (access to telehealth services, a network of mobile pharmacists, and appropriate remuneration systems).

Conclusion Home medicines review pharmacists delivering multifaceted, collaborative, and patient-centred interventions can support effective transition of care between fracture liaison services and primary care. Further work should test their integration into fracture liaison service models within routine care environments.

Keywords Fracture liaison service · Healthcare transitions · Home medicines review · Models of care · Osteoporosis

Introduction

In people aged over 50 years, a fracture sustained following a fall from standing height or less (termed fragility fracture) is often indicative of osteoporosis [1]. Osteoporosis is a common chronic condition of compromised bone quality and increased fracture risk, and an estimated 1 in 3 women

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and 1 in 5 men aged over 50 years experience fragility fractures [2].

Despite the availability of treatments that significantly reduce fracture risk, most people presenting with a fragility fracture are never diagnosed or treated for osteoporosis [3]. To address this treatment gap, secondary fracture prevention services, commonly termed fracture liaison services (FLS), have been implemented in over 900 centres in 56 countries [4]. These services systematically identify patients with fragility fractures, investigate their bone health, and initiate timely evidence-based treatments. FLS are the most effective model for secondary fracture prevention and, compared with "usual care", have been shown to improve treatment initiation, medication adherence, refractures, and mortality [5]. However, therapy must be sustained to achieve patient benefits and integrating FLS with primary care for ongoing management has proven challenging [6].

Medication management is an essential component of both fracture and falls prevention. Many medications are recognised as falls risk increasing drugs (FRIDs) and are associated with an increased risk of fracture, particularly among older people and those taking multiple FRIDs [7]. International guidelines recommend structured medication review that incorporates deprescribing FRIDs for older people following an injurious fall [8], but studies comparing FRID use before and after fall-related hospital presentations have shown no change, or even increased FRID use [9]. As a discrete intervention, medication review (or deprescribing) has not been shown to significantly reduce the incidence of falls [10] or improve fall outcomes [11, 12] but as a component of a multifactorial falls risk assessment, FRID deprescribing may help reduce the rate of falls [13] although not the number of people who fall [14].

Since 2001, the Australian Government has funded general practitioner (GP)–referred, pharmacist-conducted home medicines reviews (HMRs). A referral to an accredited pharmacist (HMR pharmacist) requests conduct of a comprehensive medication review in patients' homes. HMRs can entail interventions (education, motivational interviewing, deprescribing/prescribing recommendations, adherence coaching) tailored to patients' individual needs [15]. In 2021, a new pathway was introduced whereby specialist physicians can refer patients for an HMR, with the report and follow-up intended to be conducted by the patient's GP. Thus, this novel pathway represents a model of care with potential to improve transition of care between acute and primary care. No study has tested whether incorporating an HMR into an FLS can improve coordination of care between acute and primary care.

The safer medicines to reduce falls and refractures for osteoporosis (#STOP) trial is a multi-site, randomised controlled trial in Australia that seeks to evaluate the effects of incorporating a pharmacist-led HMR into the FLS care pathway for patients at risk of medication-related falls [16]. Given the challenges of implementing a complex intervention into an already complex service [17], the #STOP implementation phase study (#STOP IPS) was designed to investigate how this worked during the #STOP trial. This qualitative descriptive study [18], nested within the #STOP randomised controlled trial, sought the perspectives of patients, HMR pharmacists and healthcare professionals (HCPs) providing osteoporosis services to inform planning, implementation, and evaluation of the study intervention, and to explore how an HMR might fit alongside FLS care pathways.

This paper reports the early phases of implementation of an HMR intervention on post-fracture care for patients transitioning from an FLS to primary care following a fragility fracture. Early-stage objectives were (1) to explore stakeholder perspectives of how HMRs might facilitate the healthcare transition from FLS to primary care and (2) to identify those factors anticipated or perceived to influence the ability of HMRs to facilitate the FLS-to-primary care transition.

Methods

The #STOP trial

The #STOP trial procedures have been published in detail elsewhere [16], but in brief, community-dwelling patients ≥ 50 years of age using ≥ 5 medications (including ≥ 1 FRID) and attending an FLS following a fragility fracture were randomised 1:1 to intervention or usual care (Fig. 1). The intervention comprised an HMR initiated by an FLS specialist physician with the primary goal of reviewing the use of FRIDs and optimising adherence to osteoporosis medications. HMR pharmacists performed a comprehensive patient interview before summarising medication-related issues and their recommendations in a report sent to the referring FLS specialist physician for endorsement before being transmitted to the patient's GP. Patients were provided with a lay summary and advised to see their GP to discuss the report and develop an agreed management plan. The lay summary, including an updated medicines list and discussion points for the GP follow-up written in lay terminology, was not routine practice for HMR pharmacists and was designed to support patients/caregivers to facilitate medicine management change [19]. In the #STOP intervention, HMR pharmacists provided follow-up HMR visits at 3 and 6 months after recruitment and reports to the GP to assist with implementation of the agreed management plan.

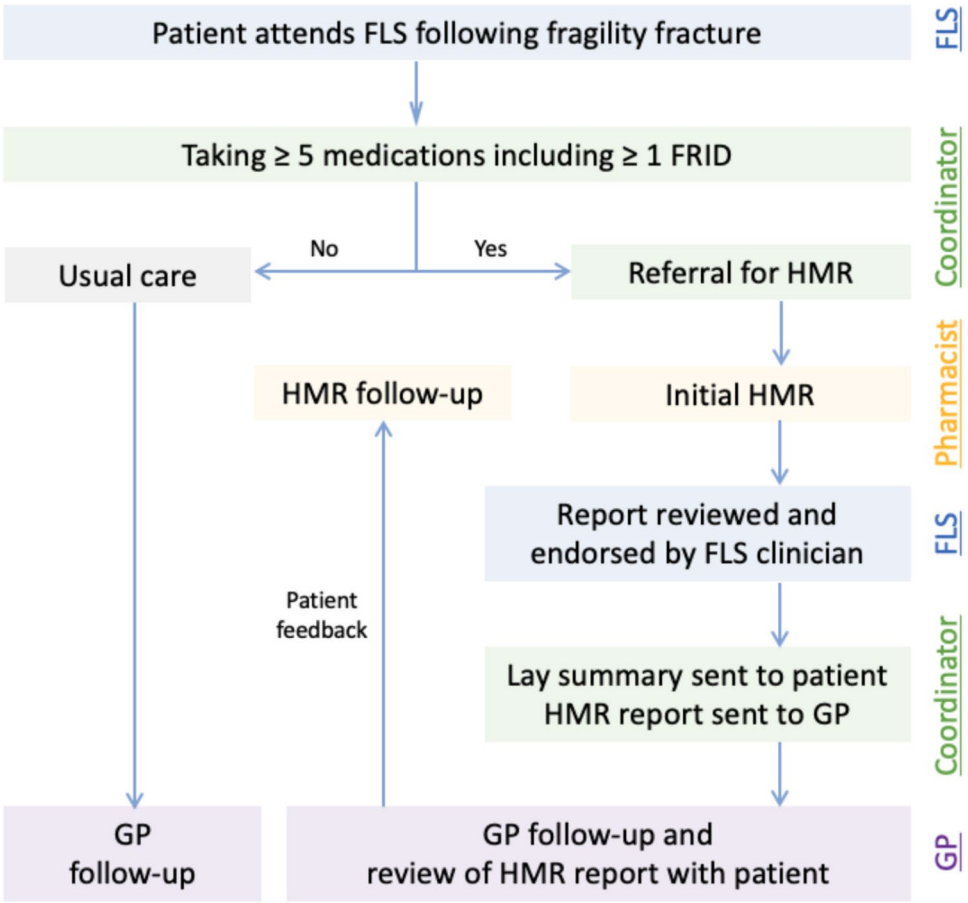

Fig. 1 Overview of the FLS pathway (incorporating a pharmacist-led HMR) applied to intervention group participants in the #STOP randomised controlled trial. FLS, fracture liaison service; FRID, falls risk increasing drug; HMR, home medicines review

Setting

The #STOP IPS was a multisite study conducted across five #STOP clinical trial sites within the regions of Sydney, Newcastle, and Melbourne, Australia. The formative and early-stage data reported here were collected between September 2022 and January 2024. Formative interviews focussed on service processes and baseline experience of care delivery: FLS specialist consultations, specialist referral for HMR, and participant orientation. Early-stage interviews explored participants' early experiences of the intervention and service improvement opportunities: initial pharmacist interviews, FLS clinician reviews and endorsement of HMR reports, patient reviews of the lay summary, and GP follow-up (including reviewing and actioning the HMR report).

Participants and recruitment

Patients enrolled in the #STOP clinical trial and relevant HCPs were invited to participate in the #STOP IPS according to the following criteria:

1. Patients aged ≥ 50 years, taking ≥ 5 medications (including ≥ 1 FRID), community-dwelling (i.e., not living in a residential facility) who attended an FLS following a fragility fracture and had a diagnosis of osteoporosis. For formative interviews, both intervention and control participants were recruited. For early-stage interviews, only intervention participants were included. Patients with impaired decision-making capacity or those receiving end-of-life care were excluded.
2. HMR pharmacists contracted to the #STOP clinical trial.
3. FLS clinicians (healthcare professionals, including medical officers (specialist physicians and their trainees), nurses, allied health professionals, and clinic coordinators) working at the five study sites.
4. For formative interviews, eligible GPs were those who had received correspondence from a study site FLS clinic within the last 12 months. For early-stage interviews, GP recruitment was paired to patient recruitment, i.e., eligible GPs had provided care to patients enrolled in the intervention arm of the #STOP clinical trial.

Patient recruitment was conducted face-to-face by #STOP clinical trial research assistants at the time of recruitment to the main trial. HCP recruitment was conducted by #STOP IPS investigators (MB, LP) employing various methods; HMR pharmacists and FLS clinicians were recruited by

email invitation; GPs were recruited through telephone, post or email invitation using clinic mailing lists and personal networks to identify eligible participants. Where possible serial interviews were conducted in which formative and early-stage interviews were conducted with the same participant. However, a formative interview was not a requirement for early-stage interview.

Recruitment continued until data saturation was achieved in each interview round (formative and early-stage). Data saturation (in the form of informational redundancy [20]) was determined by two researchers agreeing when no new codes had emerged from sequential transcripts for each participant group/phase. It was anticipated that around 25 participants per phase would likely suffice, given that Romney et al. [21] calculated that, for experts from the same domain, a sample of as few as four can be adequate with high confidence, and Guest et al. [22] demonstrated similarly consistent saturation with samples of 12 lay informants.

Procedures

Interview schedules for each participant group and phase (interview round) were developed (supplement 1), bearing in mind the domains of the Consolidated Framework for Implementation Research (CFIR) [17] and input from #STOP trial investigators. The CFIR is widely used to comprehensively and systematically identify barriers and supports to implementation, with a standardised taxonomy allowing results to be compared across phases and studies. The 2022 version of the CFIR defines 67 specific and measurable elements ("constructs") arranged into five general "domains": the innovation domain (the "thing" being implemented), inner setting (the setting in which the innovation is implemented), outer setting (the setting in which the inner setting exists), individuals domain (the roles and characteristics of individuals), and implementation process domain (the activities and strategies used to implement the innovation) [17].

Interviews were intended to be conducted over three rounds, for formative, early-stage and summative phases; the first two rounds are reported here. HCP interviews were conducted prior to patient recruitment (formative) and after experiencing at least one patient intervention (early stage). Patient interviews were conducted within 1 month of their recruitment to the parent study but prior to the HMR visit (formative) and (early stage) after experiencing the first of three HMR visits (Fig. 2). While all participants were interviewed similarly, interview schedules were tailored to participant group to optimise relevance. All interviews included a focus on (a) experience of the study intervention, including components of the intervention relevant to each group (b) understanding of HCP roles and responsibilities, (c) interactions with HCPs within the study, (e) perceived benefits, barriers, and opportunities to service improvement, and (f) perceived issues relevant to future scale-up and rollout of the intervention.

In-depth, semi-structured, one-to-one interviews were conducted with one of three study investigator experienced in qualitative research by telephone or videoconference in a location and time convenient for each participant. Informed consent was obtained prior to interview, and at conclusion, participants were given the opportunity to clarify comments, provide further commentary, and ask questions of the interviewer. Baseline demographic data were collected from each participant at the time of interview.

Data analysis

Interviews were recorded as digital audio files, transcribed verbatim and imported into NVivo Pro v12 for analysis [23]. Initial inductive coding of interview transcripts was performed

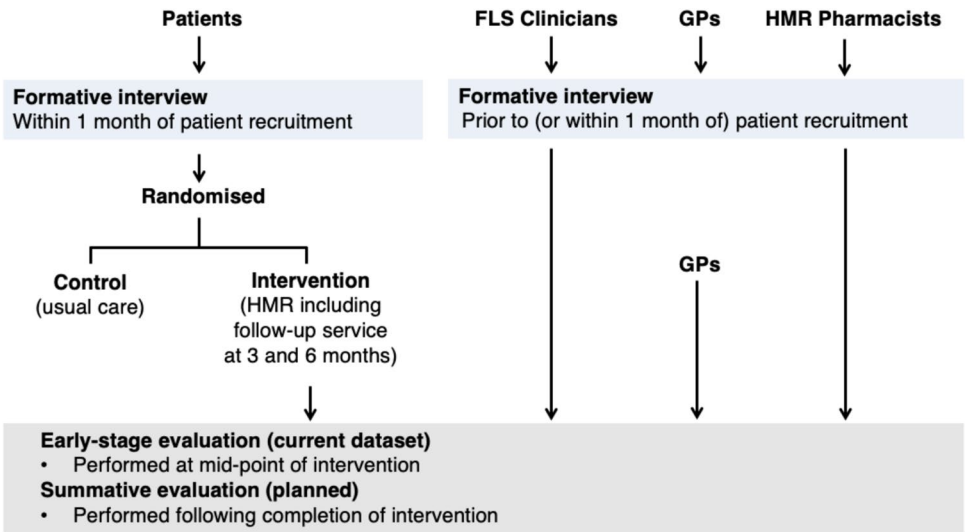

Fig. 2 Study design flowchart. FLS, facture liaison service; GPs, general practitioners; HMR, home medicines review

with concurrent data collection and analysis. A qualitative descriptive method using naturalistic theory was employed in the manner described by Sandelowski [18, 24]. To address the first objective, data-driven thematic analysis was employed, such that intermediate coding was performed to develop and link categories and subcategories, which were later grouped into themes during rounds of advanced coding [25]. To address the second study objective, a combination of inductive and deductive coding was used. Data were initially inductively coded, to generate a list of "factors" influencing the ability of HMRs to facilitate the FLS-to-primary care transition. Factors were then mapped to the CFIR constructs according to relevance, as determined by two researchers (both familiar with the dataset and CFIR construct definitions) working independently. Demographic data were summarised using Microsoft Excel for Mac version 16.78 [26].

Study rigour

The first author predominantly conducted the analysis but to promote study rigour [27], multiple data coders independently coded five transcripts and resolved differences through discussion. Data source triangulation [28] was applied to identify concordance and discordance between codes on similar topics from different participant groups.

The first author is an endocrinologist who worked as an FLS clinician at one of the study sites during the data collection period; they also hold a Bachelor of Pharmacy and have worked as a community pharmacist but not as a HMR pharmacist. At various times, they have worked alongside four of the FLS clinicians interviewed in this study. To minimise power imbalance or potential bias, they did not interview any patients where there was a current or previous clinical responsibility; their clinical role as a medical specialist was not disclosed to patient participants; and there was no prior interaction with any of the HMR pharmacist participants.

Ethics

The study was approved by South Eastern Sydney Local Health District Human Research Ethics Committee (reference: 2022/ETH00357) and study site Governance Officers. To maintain confidentiality, participants are identified by participant group and study identifier number. Reportage adhered to the standards for reporting qualitative research (SRQR) guideline [29].

Results

Participant response rates were 25/31 (80.6%) for HMR pharmacists, 14/16 (87.5%) for FLS clinicians, 7/84 (8.3%) for GPs, and 10/83 (12.0%) for patients. Formative interviews were conducted with 33 participants (13 HMR pharmacists, nine FLS clinicians, six GPs, and five patients); early-stage interviews were conducted with 23 participants (12 HMR pharmacists, five FLS clinicians, one GP, and five patients) (see Table 1 for participants' characteristics). Eleven participants completed both formative and early-stage interviews and two FLS clinicians were interviewed jointly during the formative phase. Data saturation was not achieved for the GP participant group in the early-stage interview round. However, data saturation was achieved among all participant groups when formative, and early-stage interviews were combined.

Objective 1: how HMRs might facilitate transition from FLS to primary care

All stakeholder groups identified a potential role for HMRs in the post-acute care of patients with osteoporosis, with pharmacist interventions deemed to address many of the challenges arising at the FLS to primary care transition. The role of HMRs in this context fell within four themes: (1) problem identification, (2) patient empowerment, (3) facilitating a GP-patient discussion, and (4) coordination of care. Each theme arose from one or more components of the HMR intervention (see Fig. 3) and themes 1–3 interacted synergistically to improve coordination of care (theme 4).

Problem identification

Pharmacists principally sought to identify medication-related problems leading to an increased risk of falls and fractures. This was achieved through a process of information gathering and holistic assessment, which included components of medication reconciliation, adherence assessment, and home environment assessment.

Pharmacists perceived themselves as "vacuum cleaners for information" (HMR pharmacist 2, formative interview), gathering information across the healthcare transition and directly observing patients in their home in order to provide a holistic patient assessment. The home was considered to be an especially valuable setting for information gathering as patients were generally well, had recovered following their fracture, and were comfortable discussing their health in their own surroundings. HMRs were seen to be the most accurate and efficient means to obtain information about patient medication use and adherence as pharmacists could directly observe patients and their medications. FLS clinicians and GPs valued having access to this information, which was usually inaccessible to them.

> Obtaining information would probably be a lot faster and more accurate. I mean, a lot of patients don't really divulge what they're taking unless the pharma-

Table 1 Participant characteristics

Variable	Formative phase	Early-stage phase	Total
All participants[1], *n* (%)	33 (58.9)	23 (41.1)	56
HMR pharmacists, *n* (%)	13	12	25
Age in years, mean (SD) range	48.0 (16.9) 26–77	47.6 (14.5) 29–77	47.8 (15.4) 26–77
Female, *n* (% of HMR pharmacists)	8 (61.5)	9 (75.0)	17 (68.0)
Primary language English, *n* (%)	13 (100.0)	11 (91.7)	24 (96.0)
Years in current role, mean (SD) range	11 (9.1) 0.5–26	11 (9.1) 1.5–26	11 (8.9) 0.5–26
Interview duration minutes[2], mean (SD) range	24 (8) 9–37	34 (8) 21–48	29 (10) 9–48
FLS clinicians, *n* (%)	9	5	14
Age in years, mean (SD) range	50.4 (16.3) 29–78	47.4 (20.9) 29–78	49.4 (17.3) 29–78
Female, *n* (% of FLS clinicians)	4 (44.4)	1 (20.0)	5 (35.7)
Primary language English, *n* (%)	8 (88.9)	5 (100.0)	13 (92.9)
Years in current role, mean (SD) range	11.1 (13.2) 0.5–40	10.4 (16.6) 0.5–40	10.9 (13.9) 0.5–40
Interview duration minutes[2], mean (SD) range	20 (9) 9–38	14 (11) 2–28	10 (10) 2–38
GPs, *n* (%)	6	1	7
Age in years, mean (SD) range	53.8 (14.5) 36–68	59 (0.0) 59–59	54.6 (13.4) 36–68
Female, *n* (% of GPs)	4 (66.7)	0 (0.0)	4 (57.1)
Primary language English, *n* (%)	6 (100.0)	1 (100.0)	7 (100.0)
Years in current role, mean (SD) range	26 (14.7) 6–40	32 (0.0) 32–32	26.9 (13.6) 6–40
Interview duration minutes[2], mean (SD) range	31 (16) 14–55	26 (0) 26–26	30 (15) 15–55
Patients, *n* (%)	5	5	10
Age in years, mean (SD) range	76.4 (5.7) 68–81	63.2 (5.8) 53–67	69.8 (8.8) 53–81
Female, *n* (% of patients)	4 (80.0)	3 (60.0)	7 (70.0)
Primary language English, *n* (%)	5 (100.0)	5 (100.0)	10 (100.0)
Education: year 12 or below, *n* (%)	3 (60.0)	4 (80.0)	7 (70.0)
History of prior fragility fracture, *n* (%)	2 (40.0)	2 (40.0)	4 (40.0)
Duration relationship with GP in months, *n* (%)			
0–12 months	1 (20.0)	4 (80.0)	5 (50.0)
> 12 months	4 (80.0)	1 (20.0)	5 (50.0)
Interview duration minutes[2], mean (SD) range	15 (7) 7–24	27 (10) 16–41	21 (10) 7–41

[1]Eleven participants completed both formative and early-stage phase interviews. Two FLS clinicians were interviewed jointly during the formative phase

[2]Interview duration rounded to nearest minute

N Number, *HMR* Home medicines review, *SD* Standard deviation, *GP* General practitioner

cist goes into the home and finds, you know, like ten extra other medications that they take. So, I think in terms of medication reconciliation [it] will probably be a better thing for us to know what the patient is exactly on. So, I think in terms of information gathering, and medication reconciliation, [it] is highly beneficial for me to have a pharmacist on board. (GP 4, formative interview).

I think it's shown me the value of it… pharmacists have picked up that patients either have run out of a script or [are] forgetting to take tablets or there's unnecessary medicines being prescribed and the pharmacist has the advantage because they're actually in the patient's house, so they can verify everything (FLS Clinician 3, early-stage interview).

Both HCPs and patients appreciated the holistic element of the intervention. Pharmacists were perceived to be under less time pressure than other HCPs, which enabled them to more deeply explore individual patient concerns and the factors affecting their health.

Being at home they can take into account a whole range of factors that I can't take into account with my

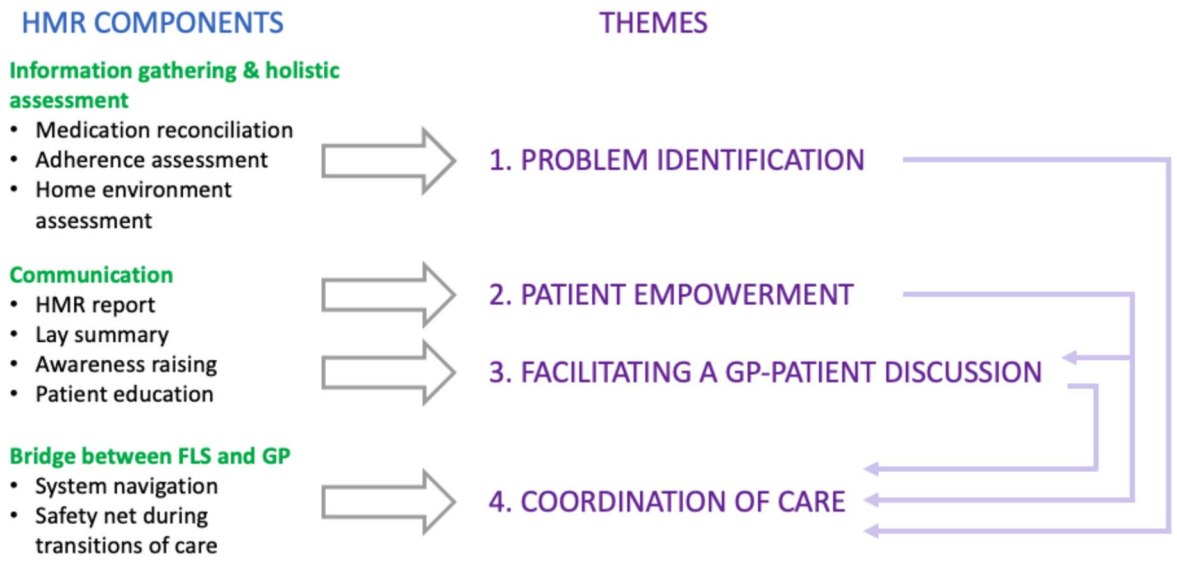

Fig. 3 The role of HMRs in supporting osteoporosis care across the FLS-to-primary care transition, showing pharmacist functions, themes, and their interaction. HMR, home medicines review; GP, general practitioner

patients sitting in the room (GP 6, formative interview).

I think the potential benefit is that the patient gets the time they need, from a professional to kind of go through everything holistically, which may not happen when they see their GP or the FLS service (FLS clinician 3, formative interview)

While the HMR intervention principally focussed on optimising osteoporosis treatment and deprescribing FRIDs, pharmacists were encouraged by the trial investigators to adopt a patient-centred focus where patient concerns could inform their consultation agenda, allowing for holistic assessment. In many instances, issues beyond deprescribing FRIDs were identified, prompting medication changes that positively impacted patients' quality of life.

I've suffered with chronic bowel problems and diarrhoea for many years, and she's [pharmacist] told me that [medication], that's probably my problem. And you know what, since I've been off it, I've been fine (Patient 13, early-stage interview).

I met a lady who stopped taking her apixaban, because she was convinced that her pulmonary clots were from the COVID vaccine. So, you know, I had to get her back in to see a haematologist to look at if she could at least reduce the dose…. the haematologist said 'you could probably could go down to the 2.5 [mg] twice a day' and she's started to take them again (HMR Pharmacist 6, early-stage interview).

Gathering information from diverse healthcare sources (hospitals, community pharmacy, general practice, national digital health records) as well as the patient, HMR pharmacists summarised information regarding medication use and the home environment and communicated management recommendations to HCPs through a patient-centred and holistic lens.

Patient empowerment

For pharmacists, patient empowerment was perceived to be an important goal of the HMR intervention and was supported through several communication strategies: the HMR report, lay summary, general awareness raising, and patient education. These strategies also facilitated the GP-patient discussion (see below).

In addition to enhancing the flow of clinical information to primary care, HMR pharmacists leverage their communication skills and rapport with patients to deliver education interventions with the goal of empowering patients to be leaders in their own healthcare. HCPs identified education as necessary for patients to appreciate the significance of their condition, which was considered a prerequisite to adopting treatment recommendations. Pharmacist-led strategies to support this included reinforcing key treatment messages over time and across providers, explaining in detail the rationale for treatment recommendations. They supplemented discussions with written patient-friendly information (lay summary), affording patients sufficient time for them to

feel heard and unrushed. A need for improved patient education was recognised by all groups of HCPs.

> One of the unfortunate things is that we need more time to educate patients. They don't absorb the information in one clinic visit of 30 minutes… it requires multiple visits or interventions or interactions with that patient. And it doesn't always have to be from the nurse coordinator. And a pharmacist is an excellent resource for that (FLS clinician 7, early-stage interview).
>
> Some people don't really understand why they're on Prolia. They think it's a calcium injection, ah you wouldn't believe how many people think that's vitamin D and they really don't understand (FLS clinician 8, formative interview).

Pharmacists were considered to be uniquely positioned to provide patient education. By offering patients longer consultations than GPs and FLS clinicians (in addition to two follow-up consultations), pharmacists were able to spend more time discussing disease and treatment-related information, exploring patient concerns in greater depth, and developing a trusting therapeutic partnership. Regardless of whether the pharmacists' recommendations were ultimately adopted, patients reported satisfaction with the educational and interpersonal aspects of the HMR.

> The best thing was she discussed why I am on these for, what am I taking that for, and she just said like 'this can happen to you'… she gave me a really big insight to all my medications. (Patient 13, early-stage interview).
>
> We talked about my calcium and vitamin D [intake] and why it was important to take your vitamin D to utilise your calcium, which I hadn't thought about it [even though] the doctors are always saying 'take vitamin D and calcium' (Patient 12, early-stage interview).

A unique aspect of the HMR intervention was the incorporation of a lay summary that was provided to patients shortly after their initial HMR appointment. Pharmacists perceived the lay summary a critical enabler of success of the HMR intervention as it provided patients with a written record of the consultation, reinforced discussion points, and served as a tool for communicating their healthcare needs to other members of their healthcare team.

> It's also useful in terms of just opening the conversation… so that it's like, 'okay, I know exactly what I'm going to talk about when I go to the GP' (HMR pharmacist 15, early-stage interview).
>
> In plain English, it's an explanation of what's going on. I like to know what's [going on]. I don't want to be ignorant of what's happening (Patient 11, early-stage interview).

While FLS clinicians responded positively to the use of lay summaries, patient responses varied. Some found it to be "affirming" and "validating" while others found it unhelpful or were indifferent to receiving it; both content and format clearly had scope for improvement. All interviewed GPs were in favour of the lay summary as a communication tool to support patient engagement and informed decision making, and it also served as a back-up channel of communication between the pharmacist and GP.

> I got a report in the mail, which was also sent to the doctor. But he actually said he hadn't received it. I don't know what happened there… but he took a copy of the one I had (Patient 11, early-stage interview).
>
> I think that's good because I think the more you educate a patient, the better they are at understanding why they need to take their meds and what for. Yeah, so I think that [providing a lay summary] just makes sense (GP 4, formative interview).
>
> The patient then feels like they're included in what's happening to them, rather than just a report going to the doctor, and the doctor, then I guess, telling them what to do. They've got more of an understanding of what's going on (HMR pharmacist 11, formative interview).

HCPs saw the HMR intervention as valuable for addressing educational gaps across the FLS-to-primary care transition and promoting patient empowerment. Empowered patients were perceived to be more likely to take an active role in their care and be better equipped to navigate treatment pathways that span across different settings and providers. In this way, with some further work on tailoring the lay summaries to individual patients' needs, HMRs may be an effective way of supporting the post-FLS care transition.

Facilitating a GP-patient discussion about bone health

The HMR intervention sought to improve the primary care follow-up of patients who had attended a FLS by promoting a GP-patient discussion about bone health. Separate communication and education components of the intervention targeted GPs and patients; pharmacist-led patient education, supported by a lay summary, was perceived to empower patients to raise health issues with their GP, while pharmacist-led GP education through the HMR report was perceived to increase GP awareness of bone-related health issues, prompting GPs to initiate a discussion with their patients.

All interviewed GPs described workflow systems for reviewing and actioning written correspondence. After

receiving the HMR report, GPs would review and triage its contents. If patients had an upcoming appointment, GPs would "flag" the report for discussion at their next appointment. If, however, the patient did not have an upcoming appointment or the issues were deemed urgent, GPs would often use active patient recall systems to request the patient attend the practice to discuss the HMR report.

> I might tick a box and say 'discuss next visit' and put a month recall on it so if I haven't seen them in a month to talk about it then we'd make an appointment at that point (GP 1, formative interview).
> They said they needed to see [me] non-urgently. So, I made an appointment as soon as I could and I just went in. And I said to her, 'I don't know what I'm here for but I think it might be to do with my visit from the pharmacist' and she said 'let's have a look' and then she said 'yes, it is, we need to discuss some things' (Patient 13, early-stage interview).

Pharmacist-led education (contained within the recommendations of the HMR report) also served to increase GP awareness of medication-related issues in osteoporosis management. GPs generally welcomed the educational component of the HMR, viewing it as an opportunity for reflection and professional development, despite not always agreeing with individual recommendations. Other HCPs viewed HMRs as a tool for achieving broader GP awareness of osteoporosis and falls risk, implying the intervention may offer benefits to patients who have not had an HMR.

> 'Pantoprazole increases risk of bone fracture', that's a common comment by the pharmacists and I understand it's a good opportunity to actively consider a reduction in dose to a maintenance level and that will probably be undertaken… and it's an opportunity to ponder this issue of the PPIs and bone density (GP 7, early-stage interview).
> Speaking for general practice, in general, we probably don't put enough emphasis on looking at medications which may increase falls risks, I don't think we're very good at it (GP 6, formative interview).
> At present, they [GPs] don't see osteoporosis as a priority and I need to get it up their radar (FLS clinician 2, formative interview).

HMRs incorporate communication and education strategies to bring patients and GPs together to discuss their bone health. This promotes primary care awareness after patients are discharged from a FLS and ensures osteoporosis management remains on patients' healthcare agenda as they transition between acute and primary care.

Coordination of care

HMRs were perceived to support improved coordination of care for patients by providing a bridge between FLS and primary care. HMR pharmacists directly contributed to more effective transition of care for FLS patients by acting as patient navigators, encouraging appropriate referrals, and identifying and closing communication and management gaps. They also indirectly contributed to this goal by empowering patients to engage in chronic disease self-management. In these ways, the HMR intervention provided a safety net for coordination of care across the healthcare transition.

These HMR pharmacists possessed in-depth knowledge of the healthcare system and understood the roles of the various members of patients' multidisciplinary teams. The majority of interviewed pharmacists had experience working in both tertiary/hospital and primary/community settings, and many had worked as part of multidisciplinary outreach teams. By visiting patients in their homes shortly after discharge from hospital, pharmacists witnessed the many challenges patients face during healthcare transitions. This problem awareness and system knowledge made pharmacists ideally skilled to help patients navigate the healthcare system and promote appropriate referrals.

> A patient might go… 'Do I speak to you? Do I speak to my GP? Do I speak to my specialists? Who do I go to'? So, I think [by] us coordinating their care, we can empower them and say, 'This is the person that you need to go speak to', and we can help coordinate that care as well (HMR pharmacist 15, early-stage interview).
> She [HMR Pharmacist] also asked me about whether or not I had a My Aged Care Package and I said 'you know, I think before I left [hospital] in March, I signed a form, but I never heard anything about it'... so, she gave me all the information to ring up and I did ring and found out that 'you've been approved for that'. And I said 'how was I supposed to find this out'… I wouldn't have known… if I hadn't spoken to [HMR pharmacist] (Patient 11, early-stage interview).

HMR pharmacists were perceived to have an important role identifying gaps in treatment and reconciling discrepancies arising from poor communication between acute and primary care. Many pharmacists recalled instances where they had identified unintentionally omitted, discontinued, or duplicate treatments, guideline-discordant care, or other unresolved issues with patient care, which they were able address, thereby functioning as a "safety net".

> There was one patient that we saw that the hospital clinician had recommended the Prolia injection, yet

nowhere in the paperwork could we see where it had actually been prescribed… I'm following up on that (HMR pharmacist 11, early-stage interview).

I've found things in discharge summaries that the GPs have just completely missed, or because they haven't necessarily had access to the [discharge] summary at the time of the visit (HMR pharmacist 3, early-stage interview).

We're looking back at sort of clinical practice guidelines and things like that and we're looking back and going, 'okay, have we met the guideline? Why or why not?', 'Is there a particular reason why this patient can't be treated exactly to that guideline, have we forgotten therapy? (HMR pharmacist 15, early-stage interview).

While some FLS clinicians and pharmacists were concerned that GPs may not welcome unsolicited advice from pharmacists, this was not the case. GPs indicated broad support for the intervention and valued pharmacist input, viewing it as an opportunity to optimise patient care rather than a critique of their management.

Working in patients' homes, HMR pharmacists occupied a space between FLS and primary care that enabled them to influence the quality of care across the healthcare transition. Many of these HMR pharmacists had diverse sets of clinical skills and possessed a unique knowledge of the health system, which allowed them to be effective system navigators. Where these HMR pharmacists had the capacity and capability, they were able to identify communication and management gaps between care settings and could act as a safety net, supporting safer and higher quality transitions of care.

Objective 2: factors anticipated or perceived to influence the ability of HMRs to facilitate the transition of care from FLS to primary care

Data analysis identified a range of factors anticipated or perceived to affect the ability of HMRs to facilitate the FLS-to-primary care transition (Table 2). These factors were mapped to CFIR domains (individuals, innovation, inner setting, outer setting) and constructs [17], which are presented below.

"Individuals" domain

Individuals were considered to be stakeholders involved in delivering or receiving the intervention. FLS clinicians and pharmacists were considered "innovation deliverers", whereas patients were considered "innovation recipients". GPs were considered both "innovation recipients" (by receiving HMRs reports), and "innovation deliverers" (by discussing the content of HMR reports with patients and actioning pharmacist recommendations).

Opportunity—patient preparedness and understanding of the HMR process During formative phase interviews, pharmacists identified patient understanding of the pharmacist's role and purpose of the HMR as key elements to success. This view was informed by previous negative experiences conducting GP-initiated HMRs where patients had not been adequately informed about the nature, purpose, and process of the home visit by the referrer. Early-stage data indicated that HMR pharmacists were satisfied the patients had been oriented and prepared for their HMR by trial research assistants.

Capability—GP confidence deprescribing For deprescribing recommendations to be adopted in primary care, GPs needed to feel confident deprescribing, appreciate a benefit for their patients, and be proactive in discussing recommendations with patients. Formative data revealed most GPs had experienced challenges in deprescribing, and many cited examples where their attempts had been met with patient reluctance or opposition. For GPs, there were three factors influencing their confidence in deprescribing: patient resistance, GP hesitation to change specialist-initiated medications, and fear of exacerbating well-controlled medical conditions. HMRs sought to address these issues by preparing patients for a deprescribing discussion with their GP, providing independent and tailored advice to support GPs in deprescribing FRIDs, offering follow-up reviews to monitor patient response to medication change, and suggesting specialist consultation where deprescribing of specialised drugs was indicated.

Motivation—patient and GP engagement, and willingness to accept advice Patients and GPs needed to be engaged and willing to receive advice. GP engagement meant reviewing reports, considering the pharmacists' recommendations, proactively recalling patients, and leading a discussion with the patient. During the formative phase interviews, many pharmacists and FLS clinicians cited variability in GP engagement as a potential barrier to the success of the intervention. This concern stemmed from the perception that GPs were (a) time poor and less likely to prioritise low paid work (the HMR report did not attract reimbursement beyond standard consultation fees) in a time-based remuneration system, and (b) less willing to accept advice they did not solicit. Neither of these issues appeared to be concerns for the GPs interviewed.

All interviewed GPs belonged to small group and academic medical practices, and levels of GP engagement may vary between primary care settings. In particular, GPs highlighted the different model of care employed by large "walk

Table 2 CFIR domains and constructs associated with factors influencing the outcome of HMRs on the healthcare transition

CFIR domain	CFIR construct	Factor	Illustrative data
Individuals	Opportunity	Patient preparedness and understanding of the HMR process	*The patient was expecting, had an idea about the process and what our role is and understands the benefit and the goals from behind the pharmacist's visit so, really a good experience* (Pharmacist 18, early-stage interview)
			I think the patients had been well informed. So, I think it was easy to talk to [patients], they are more willing to accept suggestions (HMR Pharmacist 14, early-stage interview)
			They had an idea of what was going to happen, rather than me calling a patient and them not knowing and having to explain what a HMR is, and then declining (HMR Pharmacist 16, early-stage interview)
	Capability	Confidence deprescribing	*I tend not to[deprescribe] if it is prescribed by the specialist and the patient has been quite stable for a long period. So, I tend not to follow that instruction. I review it but I tend not to take the patient off the medication until they see their specialist and talk about it* (GP 3, formative interview)
			I think deprescribing any medication is hard, regardless of why you're doing it. People seem very happy to add in medications but really struggle to let go of them… I think there's a fear from GPs that if we take away a medication then something happens then the question will then be well, 'why did you stop that medication'? (GP 6, formative interview)
	Motivation	Patient engagement	Patient engagement and perception of value each followed a concordant gradient; e.g., Patient 13 (early-stage interview) highly valued the HMR as it connected her with additional home services. She also held the Australian healthcare system in high regard and had faith in the medical model. She had strong engagement detailing her relationship with the HMR pharmacists in familiar terms, anticipating her next consultation, and making appointments with her may specialists to discuss the results of the HMR report:
			And then she [GP] said 'well, do you know what's going on'? I said 'well, yes, I do'. I said, 'I've seen my rheumatologist, my bowel specialist and my cardiologist all in a week'. So, I said 'I've had a chance to discuss all my medications that they want to take me off and what they want to do'. I said, 'so this is what they've decided' (Patient 13, early-stage interview)
			Conversely, Patient 10 (early-stage interview) did not perceive the intervention held much value to them and only participated as they felt "all research is good". They were not willing to adopt the recommendations of the pharmacist

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
			Quotes from HMR pharmacists supported patient engaging as a key factor influencing the outcome of the intervention on the healthcare transition: *If the patient is on board, there is a much higher chance of changes being made, particularly in deprescribing* (HMR Pharmacist 6, early-stage interview) *I think they were quite engaged with the review in general. Like, asking questions if needed or like happy to share their information about how they in general [they] take their medicines* (HMR Pharmacist 18, early-stage interview)
		GP engagement	*It's certainly worthwhile having a conversation about it [the HMR report]. I guess, it depends on how long you've been doing general practice and how idealistic [you are], because many [of the] things you recommend you [are] beating your head against a brick wall* (GP 1, formative interview)
			Challenges, I guess, is all about, I guess this is common through all, but just getting the buy in from GPs, that that would be the biggest thing. Especially given that, you know, they're not getting reimbursed for it (HMR Pharmacist 12, formative interview)
			I have certain GPs that I expect to have little to no feedback from. And that's just standard. And then I have other GPs who are very receptive to the advice (HMR Pharmacist 3, formative interview)
			I've had some brilliant doctors [GPs], but I've also had some shockers (Patient 10, early-stage interview)
		Willingness to accept advice	*My GP disagreed with [HMR Pharmacist] and said 'no, no, the only thing that is going to fix you when you have these bad attacks [of back pain] is massive amounts of pain killers'* (Patient 10 early-stage interview)
			I guess there will always be doctors out there who are resistant to being given advice that didn't solicit. You can't change human nature (GP 1, formative interview)
			'Does not take enough calcium in her diet and should be supplemented', that's a good recommendation (GP 7, early-stage interview)
			I get pushback from patients, resistance from patients, and you get the conflict of trying to manage their incontinence and their falls risk. It's very difficult to do (GP 2, formative interview)
Innovation	Source	Hospital endorsement of HMR report	Interviewer: *How do you think the GPs will respond when they receive those reports after you've endorsed them? It's going to have your name on there and the pharmacist's name* FLS Clinician 2 (formative interview): *Better than if it was just the pharmacist*

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
			GPs are often a little bit more open with recommendations coming from a specialist, especially ones that are part of a specialist team, whether it's a heart failure clinic or an osteoporosis clinic (HMR Pharmacist 13, early-stage interview)
			I had to follow up after one of my colleagues sent a report and the doctor instituted all the changes without really reviewing them… the doctor was like 'oh, well, it came from the hospital, so we thought we had to do that'. So yeah, sometimes it can be like really strong engagement because it's coming from that hospital (HMR Pharmacist 9, formative interview)
	Relative advantage	Perception that the intervention has value	*If the patient thinks that it's helpful to the doctor, then they're much more agreeable* (Pharmacist 1, early-stage interview)
			I would absolutely [recommend the intervention to a friend]. And more to an elderly person, probably because they're not technical with computers and so they can't do a Google search or anything. So, the insights to them about their medications would be amazing (Patient 13, early-stage interview)
			All he [GP] said was 'how did this [HMR] happen' and I said 'well, all I know is that it's a hospital thing that happened' and he said 'don't you think it's a waste of your time', and I said 'well, no' (Patient 14, early-stage interview)
			I find it very useful to have pharmaceutical HMRs. And I find their input can be really useful in sort of giving me pithy ways to do it [deprescribe]… Sometimes, the reports come in and I've already attended to what is needed and started the treatment and done the necessary blood tests and all of that stuff… duplication is an issue here (GP 2, formative interview)
			I think pharmacists are good in identifying gaps in medications, and also many key interactions, drug-drug interactions. So, I think it's just a good adjunct to have. Yeah, so an additional toolkit to help us manage patients appropriately (GP 4, formative interview)
			[HMR pharmacists assist by] improving patient understanding of treatments, particularly prescribed medication, assessing compliance, detection of adverse effects (GP 7, early-stage interview)
	Design	Embedded administrative assistant	*Having a nurse do a lot of preparation work [in this trial] has been quite helpful and did streamline all the things* (HMR Pharmacist 13, early-stage interview)
			Having that one person that I can go back to, and sort of say, you know, 'are there any pathology results, are there any comments from the specialist?'… that's been really useful (HMR Pharmacist 15, early-stage interview)
	Adaptability	Pharmacist expertise	*I haven't really counselled a lot of osteoporosis patients* (HMR Pharmacist 4, formative interview)

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
			I would never normally do a lay summary (HMR Pharmacist 1, early-stage interview)
			There's been some really special cases within the study that I sort of didn't, you know, they're very, very specialist care. And so they're outside of my scope, really… I think it's also knowing when to refer on (HMR Pharmacist 15, early-stage interview)
			I wasn't deprescribing this medication before, because not many people I saw before had osteoporosis. But now I'm focusing on it. So, I knew it but I never practiced it [before this trial] (HMR Pharmacist 17, early-stage interview)
			I feel that I'm rather comfortable with at least being able to make a lot of the reasonable deprescribing recommendations (HMR Pharmacist 13, early-stage interview)
			I've had to look over how to reduce some medications. So, for me, it's been quite a learning experience as well. Like, looking at guidelines, so that's been very good for my knowledge (HMR Pharmacist 11, early-stage interview)
Inner setting	Relational connections	Understanding of roles and responsibilities	*The project was new, and I didn't understand, you know, who's doing what roles* (HMR Pharmacist 14, early-stage interview)
			We're the medication experts and we look at the medication. But if you just look at that, by itself, you're never going to address the patient. And so, I think our role is a lot bigger than that (HMR Pharmacist 15, early-stage interview)
			I think the GP role is very strong because they will be the profession that's going to care for the patient ongoing and see them on a quite frequent basis (HMR Pharmacist 18, early-stage interview)
			There needs to be clarity between who needs to review and act on the pharmacist's findings. Where is that finding directed to and who is the recipient that is expected to respond to it (FLS Clinician 6, early-stage interview)
			I believe that they [patients] are informed of the role of the GP, their own community pharmacist, what the HMR pharmacist's role will be, what my role is at that moment and what [FLS specialist's role] will be, but I'm not sure they actually walk away with a clear understanding (FLS Clinician 7, early-stage interview)
	Culture	Multidisciplinary teamwork culture and a focus on patient-centred care	*I'm quite happy for anybody who is involved with patient care giving me suggestions, because you're the doctor, you will coordinate all the treatment for the patient. So, the specialists, physio, occupational therapists, that nurse, district nurse involved, I will take it all into account and I'm quite happy to accept all the recommendation* (GP3, formative interview)

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
			I used to work out West, where there was a lot of chronic opioid use. And that was useful to have a pharmacist on board, I suppose, as part of a multidisciplinary team just to enable the conversation to get started (GP4, formative interview)
			It's a collaborative process and the best way to achieve change with both the doctor and the patient is to get them on board. I think a collaborative model, especially with occupational therapists, physiotherapists, exercise physiologists, we're all here to help each other. I can't do their job. Sometimes we really do need to collect information together and collaborate together (HMR Pharmacist 3, formative interview)
			She was positive about it, you know, as I said, because we were discussing me coming off doxepin and I discussed it with [the pharmacist] and discussed it with my GP and we all sort of come to the same agreement (Patient 12, early-stage interview)
	Work and information technology infrastructure	Scheduling and ensuring adequate consultation time	*We have to be very specific with our instructions to the patient and say [their appointment with their GP] 'has to be half an hour and it has to be only for this reason', because GPs get really annoyed when the patient comes with their laundry list plus the HMR because they can't get paid for both* (HMR Pharmacist 3, formative interview)
			Ten to 30 min would be what's required to go over it and make sure they understand (GP 2, formative interview)
			It's just a matter of time, of having adequate time. Because everyone expects us to do everything these days (GP 5, formative interview)
	Communication	Communication systems that are comprehensive, consistent, succinct, timely, appropriately toned, and feedback enabled	*We can computerise files, so it would be nice if it came in electronic format and just could be put straight in* (GP 1, formative interview)
			I felt that the referrals were very concise in terms of what I'm used to (HMR Pharmacist 11, early-stage interview)
			There's a section called 'clinic notes/management plan', which I found is often very helpful… that's probably one of the most valuable parts of the referral because it gives you a bit of context in terms of why they're here, what the imminent plan is for their management and if there was anything awry that we needed to follow up on or was a little bit unclear (HMR Pharmacist 13, early-stage interview)
			I'm not sure about the language [in the example HMR report] 'I am concerned' and 'I encourage'. It's sort of like saying, I know better than your doctor (GP 5, formative interview)
			It'd be nice to be able to get some more information back to see, you know, if they're happy with the interventions that we've made (HMR Pharmacist 13, early-stage interview)

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
			It's concise. It's not excessive. It's been managed on two pages, and I think the actual clinical recommendations are on one page, which is always a good indication. The first page is introductory and so, the issues are pertinent. I think that I have no recommendations for change or adjustment at this stage (GP 7, early-stage interview)
			I do receive the reports, but I always allow for about a six-to-eight-week lag (GP 7, early-stage interview)
			The pharmacist was careful [by] saying 'I can only suggest this, I'm not saying you must do it', or whatever. And I have a wonderful GP, and she was really good, we talked about it in, so that was really good. I think she thought it was a good thing (Patient 12, early-stage interview)
Outer setting	Local conditions, partnerships and connections	Access to a network of mobile pharmacists willing to perform HMRs	*When I contacted AAPC [Australian Association of Accredited Pharmacists] about Mildura they said, 'there's 25 accredited pharmacists in Mildura'. And I said 'well, that's interesting because zero of them are willing to do these reports'. So, just because on paper there are HMR pharmacists in a regional town does not mean that those reviews are going to get picked up. So, barriers are pharmacists willing to do it because the amount of time to drive to the location* (HMR Pharmacist 3, formative interview)
			I'm getting offered patients that are a long way from my working area. Now, I got one today from [research assistant], and it's about an hour and a half drive away. And I said 'really'? … I think 20 min, even up to half an hour at a pinch, I don't mind, but not much further than that (HMR Pharmacist 1, early-stage interview)
			You need to get a scattering of pharmacists and where they live (HMR Pharmacist 8, early-stage interview)
	Local conditions, policies and law, and financing	Access to telehealth	*There will be a difference between the trial versus reality in that majority of follow up reviews get done* via *telehealth… if you're only paying us half the amount of money [to conduct a follow-up review] and we still need to drive the same amount of distance, which is actually most use of our time unless we have another patient in that specific area* (HMR Pharmacist 3, formative interview)
			I generally do a follow-up after the first HMR, so just to make sure you get that feedback from the GP, if there's something to touch upon … a lot of the time if it's just basic, it might just be a check-in through telehealth, just make sure that it's still compliant or if they've had a change the medication, they're tolerating that fine (HMR Pharmacist 5, early-stage interview)
			I usually ring them or do telehealth. Some don't want telehealth (HMR Pharmacist 8, formative interview)

Table 2 (continued)

CFIR domain	CFIR construct	Factor	Illustrative data
	Available resources and structural characteristics	Appropriate remuneration systems	*As the practice principle who has to make the books balance, would we get paid Medicare the Medicare item number for going through that report with the patient?* (GP 2, formative interview) *I have never claimed [Medicare Benefits Scheme] item 900 for the medication review because I find it part of your job to look at the patient medication every time you see the patient* (GP 3, formative interview) *General practice is a time-based remuneration system anyway, so if it's [scheduled as] a long appointment, I don't see there being an issue* (GP 4, formative interview) *Everything is increasing [in price], at least, so CPI, but our payment is still the same for the reports since 2019* (HMR Pharmacist 17, early-stage interview) *I did one HMR recently near [Hospital] and it cost me $40 in parking, so that was not good* (HMR Pharmacist 10, formative interview)

CFIR Consolidated Framework for Implementation Research, *GP* General Practitioners, *HMR* Home medicines review, *FLS* Fracture Liaison Service

in" medical centres offering affordable and accessible rather than comprehensive and continuous care. One GP felt that those working in such practices may be less inclined to take ownership of a patient or see it as their responsibility to recall patients to discuss an HMR report.

Patient engagement meant actively participating in an HMR consultation and discussing the arising recommendations with their GP. Patient engagement supported but did not guarantee adoption of pharmacist recommendations. Patient willingness to adopt changes was also required, and this was affected by multiple factors, including personality factors, the perceived risks and benefit of change, acceptance of their diagnosis, appreciation of its seriousness, and trust in their HCPs.

"Innovation" domain

Factors considered relevant to the innovation domain were those concerned principally with the implementation of the HMR intervention per se.

Innovation source—hospital endorsement of HMR report Following completion by the pharmacist, HMR reports were sent to the FLS specialist physician for endorsement, adding official hospital and university letterhead before despatch to GPs. Pharmacists and several FLS clinicians felt the goodwill associated with specialist and organisational endorsement enhanced document credibility and hence the likelihood that GPs would action pharmacist recommendations; however, this incurred additional time and resource to review and endorse reports, and delayed document delivery.

Innovation relative advantage—perception of value All stakeholders considered the intervention held value in improving patient care. GPs and pharmacists spoke of the potential benefits of the intervention as a factor influencing their enthusiasm to participate. While some patients did not feel the HMR would benefit them directly, they saw it as having research merit and participated to help others. Regardless of the apparent beneficiary, HCP and patient engagement appeared deeper when the perception of value was greater.

Overall, the HMR intervention was perceived by HCPs to facilitate the FLS-to-primary care transition for patients with osteoporosis by addressing many of the challenges experienced at this healthcare interface. Pharmacists and GPs recognised transitions of care as high-risk periods where barriers to communication may lead to inadvertent treatment omission, medication errors, and patient misunderstanding or confusion. The views of many pharmacists and GPs were informed not only by their experience on the #STOP Trial

but also through pharmacists working in tertiary transitional care programs or pharmacy outreach services, and GPs referring and reviewing HMRs from primary care.

Beyond their established role as medication reconciliation/review experts, some pharmacists perceived themselves to function as a valuable "link between" the patient and other healthcare providers, taking a central role in identifying and communicating gaps in care, educating patients and providers, and raising awareness of medication-related issues across healthcare transitions. GPs broadly welcomed the addition of HMR pharmacists to post-fracture care teams, valuing their contribution to communication, education, and medication optimisation.

Innovation design—embedded administrative officers As part of the #STOP Trial, a dedicated research assistant at each study site provided administrative support and ensured quality control for trial processes. These assistants acted as important links between all stakeholders; they worked with FLS clinicians to identify patients and generate HMR referrals including documentation of the best possible medication history, identified available pharmacists to conduct the HMR, liaised with FLS clinicians to review and endorse reports, and sent reports to GPs and lay summaries to patients. Pharmacists, in particular, identified the presence of an administrative assistant as a key determinant of success for the intervention.

Innovation adaptability—pharmacist expertise The success of the intervention may depend on the ability to adequately skill HMR pharmacists to deliver the intervention. Pharmacists described a wide range of experience and exposure to patients with osteoporosis. Some had worked within a hospital outreach service and were familiar with the acute-to-primary care transition, conducting HMRs shortly after patient discharge and liaising with hospital specialists and GPs. However, few had prior experience preparing a lay summary, and appreciated resources such as templates, worked examples and training provided by the research team.

"Inner setting" domain

The inner setting was defined as the settings in which the HMR intervention was initiated, conducted, and acted upon (e.g., FLS clinic, patient's home, GP office) and the virtual spaces where key stakeholders work.

Relational connections—understanding of roles and responsibilities HCPs had a sound understanding of their roles and responsibilities and those of other stakeholders. This likely reflected high levels of previous experience working within multidisciplinary healthcare settings. An exception to this was the role of FLS clinicians, which was unfamiliar to many pharmacists at the time of formative interview. Pharmacist education and training, provided by study investigators, effectively resolved this role ambiguity, as reflected in early-stage interviews. Similarly, a sound understanding of the role of the pharmacist by patients was seen as a key element to intervention success, and achieved through education (see above: opportunity—patient preparedness and understanding of the HMR process).

Culture—multidisciplinary teamworking with a focus on patient-centredness When considering their role in the HMR-embedded FLS model, pharmacists (and to a lesser extent GPs) frequently described activities with underlying values of patient-centredness. This entailed a change from traditional medical hierarchies to focus on multidisciplinary collaboration, individualised care, shared decision-making, and respect for patient values. It is likely that this shared culture fostered patient-provider partnerships and supported patient empowerment, favourably influencing effective healthcare transition.

Work and information technology infrastructure—scheduling and consultation time Pharmacists and GPs both felt that standard GP consultations (6–20 min) provided inadequate time for GPs to review and discuss HMR reports. To address this, pharmacists encouraged patients to request a long consultation (> 20 min) with their GP, an approach supported by GPs.

Communication—communication systems For all stakeholders, communication was the most important factor affecting the outcome of the HMR on transitional care; however, each stakeholder had different communication needs. GPs sought timely and succinct communication, worded in an appropriate tone, and compatible with mail systems. They preferred electronic communication using existing secure delivery services. Receiving the report prior to the patient's primary care appointment was essential to provide time for GPs to review the report and consider the recommendations. Moreover, GPs had a preference for concise HMR reports, and dot-point formatting, facilitated by HMR report templates. Some GPs considered the language and tone of the report and lay summary, preferring a passive or neutral rather than an assertive or instructive tone. HMR pharmacists were generally cognisant of this preference.

Elements of communication important to pharmacists included receiving comprehensive referrals from FLS clinicians and feedback from GPs regarding the outcome of the HMR. Pharmacists felt more equipped to perform HMRs when provided with details of the patient's medical and medication history, recent biochemistry and radiology reports, and the outcome of their FLS consultation. Sourcing this information independently was challenging,

time consuming, and frustrating. While pharmacists did not receive direct feedback from GPs on the outcome of the GP-patient HMR discussion, they did receive valuable feedback from patients during follow-up HMR appointments. Pharmacists saw the lay summary as a valuable tool both for enhancing pharmacist-patient communication and patient-GP communication.

For patients, consistency was a principal element of effective communication across the healthcare transition. Receiving inconsistent advice from different HCPs led to confusion and frustration. In most cases, inconsistency arose due to the provision of incorrect information, potentially arising from inadequate interprofessional communication.

Available resources, structural characteristics—remuneration systems Remuneration systems for stakeholders involved in delivering the HMR intervention were split between inner and outer setting according to role. The #STOP Trial remunerated HMR pharmacists (independent contractors) and site research assistants (salaried), whereas GP remuneration was though the Australian Government Medicare Benefits Schedule (MBS; public healthcare arrangement) and FLS clinicians through public hospital funding arrangements (generally salaried). While these disparate funding schemes were considered satisfactory by stakeholders, beyond the trial environment sustainable funding will be required for model feasibility.

"Outer setting" domain

The outer setting was defined as the context in which the inner setting functions, e.g., community, broader healthcare system, government, and regulatory environment.

Local conditions, partnerships, and connections—access to a network of mobile pharmacists A geographical network of mobile pharmacists willing to perform HMRs is required to implement an HMR intervention. As pharmacists did not receive reimbursement for their travel time or travel costs, they sought to minimise these expenses. Most preferred to work within a short driving radius from their home or office, and to conduct HMRs during off-peak periods to avoid traffic congestion and parking fees. In regional or rural areas, this created particular challenges as the pool of available pharmacists was smaller and travel distances greater.

Local conditions, policies and law, and financing—remunerations systems and access to telehealth Under the Australian MBS, where an HMR is initiated by GP referral, the MBS provides a rebate for GP involvement in the service; however, GPs are ineligible for rebates when the HMR is initiated by specialist referral. In these circumstances time-based professional attendance fees apply, which provide a lower rate of reimbursement. While pharmacists identified this as a potential barrier to GP engagement in this model of care, these GPs were broadly satisfied with the available remuneration schemes. Several pharmacists routinely conducted follow-up consultations by telehealth, seeing this as an acceptable and efficient way of reviewing patient progress and an enabler of the HMR intervention.

Discussion

This study has unpacked the potential role for HMRs in facilitating osteoporosis care across the FLS-to-primary care transition and detailed the requirements for successful implementation of this from the perspectives of key stakeholders, including patients, GPs, FLS clinicians, and pharmacists. The results confirm that participants' views were generally that an HMR intervention can address multiple barriers to seamless post-fracture care and improve patient and practitioner experience of the FLS-to-primary care transition. HMR pharmacists were perceived to occupy a space between FLS and primary care where they are uniquely positioned to favourably affect the quality of the healthcare transition. Pharmacists could identify gaps in care (through medication reconciliation and holistic patient assessment), promote patient empowerment, and bring patients and GPs together to discuss bone health issues. Furthermore, many pharmacists expanded their scope of practice beyond medication review to function as system navigators and provide a safety net during transitions of care, supporting improved coordination of post-FLS care. We considered "navigation" to be distinct from "coordination" in the sense that coordination involves changing the healthcare system to reduce fragmentation, while navigation involves helping patients move through a fragmented system.

Many pharmacists cited patient empowerment and self-advocacy as primary outcomes of their education interventions. Pharmacists recognised poor patient understanding of the rationale for their treatment as a leading contributor to non-adherence. Doctors were perceived to be working in a time-pressured setting where making treatment decisions was prioritised over patient education, leaving patients with unmet information needs. By explaining the reasons for treatment recommendations and exploring individual patient concerns, pharmacists helped patients develop deeper and more personally resonant understanding of healthcare issues. Pharmacists in particular felt that deeper understanding promoted adherence and allowed patients to more fully participate in informed decision-making and

confidently drive their own healthcare agenda with their GP.

Using the CFIR [17], numerous factors emerged as influential to the success of these HMRs. Within the individuals domain this included: patient and GP engagement and willingness to accept advice, patient preparedness, and GP confidence deprescribing. Within the innovation domain, this included obtaining hospital endorsement of the HMR report, perception of intervention value, access to administrative support, and pharmacist expertise. Within the inner setting domain, key drivers included understanding of roles and responsibilities, multidisciplinary teamwork culture and focus on patient-centred care, scheduling practices to ensure adequate consultation time, and appropriate communication systems. Within the outer setting, access to telehealth services and a geographical network of mobile pharmacists were important. Finally, access to appropriate remuneration systems was a critical issue that spanned both inner and outer domains.

Access to funding has important implications for the scalability and sustainability of an HMR-FLS model beyond a clinical trial environment. In particular, #STOP Trial research assistants were HCPs (pharmacists or nurses) who received training to perform medication history taking in addition to providing trial and intervention administrative support. While the #STOP trial necessitated this role be filled by HCPs (to review medication histories in order to determine trial eligibility and calculate the drug burden index [30], a key study variable), outside of a clinical trial setting, administrative support could be provided by non-HCPs, likely improving cost-effectiveness. These research assistants played a critical role in the implementation of the HMR-FLS model, and their administrative activities would require funding if not absorbed by FLS team members. Conversely, HMR pharmacists could access payment for their services through the MBS, and funding for other stakeholders (GPs and FLS clinicians) could remain unchanged in a real-world setting.

Internationally, patient care transitions between healthcare settings or providers have been characterised by fragmentation, discontinuity, and increased risk of adverse events [31]. During the transition from hospital to home, 19% of patients experience an adverse event (most commonly an adverse drug event) [32], and 19% are readmitted shortly after discharge [33] with more than a quarter of readmissions considered potentially preventable [34]. Such events occur across a range of healthcare interfaces (primary, secondary, tertiary, community, home) [35] and predominantly arise due to system failures [36–38]. Achieving quality healthcare transitions is challenging but possible. In their conceptual model, Burke et al. define ten key components required to achieve an ideal healthcare transition [39]. Many have been identified where an HMR pharmacist works within a multidisciplinary team, including medication safety, educating patients, enlisting the help of community supports, coordinating multidisciplinary care, monitoring symptoms after discharge, and outpatient follow-up. Similarly, Baxter et al. explored how high-performing primary care and hospital teams overcome challenges to deliver safe transitions of care, identifying three key themes of knowing the patient (by building trust and rapport and gathering a holistic understanding of their care needs), knowing each other (by developing relationships, feeling valued, and building trust among non-hierarchical teams), and bridging gaps (by enhancing communication, adjusting patient expectations, and adapting to competing priorities) [35]. All of these qualities can be demonstrated by HMR pharmacists operating in the FLS-to-primary care setting.

Aligning with a recent meta-synthesis of the views of healthcare providers treating osteoporosis [40], study findings recommended improving interdisciplinary communication and collaboration through multidisciplinary models of care. Novel, multifaceted, collaborative interventions that span settings are needed to address the challenges that emerge at healthcare transitions [39, 41]. Currently, neither clinical practice guidelines nor a national standard for FLS include clinical pharmacists as members of the multidisciplinary FLS team [42]; however, Janjua et al. identified eleven areas where a two-way referral pathway between FLS and pharmacists could support patient management [43]. Our findings demonstrate that HMR pharmacists can present a valuable addition to the FLS team, supporting the optimal use of medicines and facilitating patient care transitions. The addition of pharmacists in this way was received positively by all stakeholder groups.

Previous studies have shown pharmacists successfully integrated into many models of care at various time points within the patient care continuum; in hospital, the outpatient FLS clinic, community settings, primary care, or patient home. They have been shown to be helpful in a wide range of innovative roles and may have an emerging role as system navigators [44, 45]. While reviews have highlighted the positive impacts of pharmacist-led interventions on transitions of care [46–48], these studies have largely been restricted to medication reconciliation (particularly when combined with education and counselling) performed by hospital pharmacists at the time of admission or discharge. Limited research has explored the role of pharmacists within the FLS setting. Billups et al. reported the addition of a clinical pharmacist within the outpatient environment improved treatment initiation rates and GP attendance where the FLS did not initiate anti-osteoporosis treatment [49], and Lööf et al. reported improved treatment initiation rates with an FLS coordinated by a clinical pharmacist [50]. To our knowledge, no published studies have explored the impact of incorporating HMR pharmacists into the FLS model although the findings of the #STOP trial are expected in 2025–2026.

While the primary role of HMR pharmacists is to review the use of medications to reduce medication-related problems, many of the pharmacists interviewed perceived they could deliver a broader role in supporting safe healthcare transitions. This entailed acting as system navigators, identifying and bridging communication gaps, empowering patients to be leaders in their care, promoting primary care awareness, and monitoring progress through follow-up reviews. Several pharmacists felt willing and capable of performing these roles and did so proactively. The degree to which these sentiments reflect those of the broader HMR pharmacist community are unknown and the subject of further research.

Limitations

This study was conducted as a sub-study of the #STOP trial, and recruitment was dependent on recruitment to the parent trial, reflecting its restricted participant diversity and response rate. Extensive efforts to recruit GPs thorough phone contacts, written invitations, and professional networks netted frustratingly low responses. Such challenges recruiting GPs have been shared by other investigators [51]. Similarly, stronger patient input would have been preferable and was sought but, as recruitment for these interviews was scheduled to occur following recruitment for a lengthy interview for the parent study, we experienced ongoing problems with recruitment.

Recruiting in an enriched clinical trial context makes it difficult to gauge the intervention's transferability to real world settings. Patient selection criteria were designed to align with Medicare access rules for HMRs and recruited participants may be sicker than those of the general FLS population. Pharmacists were hand selected by trial investigators, and many FLS clinicians were jointly employed by tertiary academic centres. The patients and GPs recruited may have higher levels of healthcare and professional engagement than those of the wider populations. Trial coordinators provided education to HMR pharmacists to prepare them for their role, which may have influenced their practice or opinions. Research assistants facilitated patient understanding of the HMR process, gathered referral information including the best possible medication history, and oversaw document handling processes. Nonetheless, study findings provide a rationale for further research to explore the role of HMRs in a real-world post-FLS setting and to assess the impact on quantifiable outcomes (e.g., medication persistence, primary care attendance, incidence of falls and secondary fractures, healthcare costs) and the cost effectiveness of this model.

Conclusion

The primary care transition is an intrinsic feature of the FLS model, during which treatment discontinuity and adverse events may, and commonly do, occur. Many HMR pharmacists have a well-developed understanding of the challenges patients face moving between fragmented systems and, by occupying a space between FLS and primary care, are uniquely positioned to assess and influence the quality of this healthcare transition. Novel, collaborative, and multifaceted interventions are needed to address transitional care challenges; HMR pharmacists, with their diverse skillsets and experience as members of multidisciplinary teams, represent an untapped resource and HMRs one way to engage this.

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Declarations

Ethics approval This study has been approved by the South Eastern Sydney Local Health District HREC (Reference: 2022/ETH00357), and all procedures performed in studies involving human participants were in accordance with the ethical standards of the institution and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Conflicts of interest None.

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