A systematic review of the role of community pharmacies in improving the transition from secondary to primary care

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Summary

Aim

We set out to determine the potential contribution of community pharmacists to improve the transfer of care of patients from secondary to primary care settings.

Method

We systematically reviewed the literature on interventions that involved community pharmacy at the post discharge stage. We considered all relevant studies, including both randomised and non-randomised controlled trials, irrespective of patient population. Our primary outcome was any impact on patient and medication outcomes, while the secondary outcome was to identify intervention characteristics that influenced all reported outcomes.

Results

We retrieved 14 studies that met our inclusion criteria. Those studies reporting outcomes relating to the identification and rectification of medication errors were significantly improved with community pharmacy involvement. Other patient outcomes such as medication adherence and clinical control were not unanimously positively or negatively influenced via the inclusion of community pharmacy in a transfer of care post discharge intervention. Some inconsistencies in implementation and process evaluation of interventions were found across the reviewed studies; this limited the accuracy with which true impact could be considered.

Conclusions

The evidence of community pharmacy involvement in interventions aimed at improving the continuity of care (other than those relating to medication errors) is not consistent. Further studies are required which include process evaluations to fully describe the context of the intervention so as to better determine any influencing factors. Also applying more stringent controls and closer adherence to protocols in both intervention and control groups would allow clearer correlations to be made between the intervention and the outcomes.

Introduction

The transition of patients from primary to secondary care settings (and vice versa) is historically acknowledged as risky. Twenty percent of patients have been reported to experience adverse events within three weeks of discharge, 60% of which could have been ameliorated or avoided [1]. Patients are exposed to errors, which can have a detrimental effect on their health, recovery and overall satisfaction with the healthcare system [2,3].

Patients are often departing from a confusing and hectic discharge environment, supplied with messages about medicines management, follow-up appointments and other post-discharge information. The process is vulnerable to misunderstanding and miscommunication, often leaving the patient, carers and families ill-prepared to appropriately manage their care during the transition home [3,4]. Only 10% of elderly patients will be discharged on the same medication that they were admitted to hospital on [5]. Sixty percent of patients will have three or more medicines changed during their hospital stay [6]; 28-40% of medications are stopped within hospital, and 45% of medicines prescribed at discharge are new [7].

Pharmacists can potentially play a key role in patient care, especially at these transitions [8]. Indeed, the Royal Pharmaceutical Society of Great Britain (RPSGB) in 1992 advocated that hospital pharmacists should produce documentation for patients on discharge so as to assist with communication when they leave one healthcare setting and enter another [9]. The restructuring of the NHS in England, with the introduction of Clinical Commissioning Groups (CCGs) and their support and encouragement for new health care providers, has re-emphasised the important role the pharmacist can play in these transitions [10]. The working party responsible for the RPSGB report recommends fostering links within the community between pharmacists, clinicians, nurse, etc., so as to ensure patient needs are met when they move between healthcare settings [11]. Community pharmacists can offer accessibility, expertise in therapeutics, face-to-face contact and skills in drug problems and adherence [10,12]. A recent report from the Royal Pharmaceutical Society (RPS) (previously RPSGB), 'Keeping patients safe when they transfer between care providers – getting the medicines right' (June 2012), provides guidance on the medicine information that should accompany a patient from one care setting another [13]. Early adopter sites of this guidance piloted and trailed various interventions and services, many of which involved a role for community pharmacy. The adopting hospitals recognised the contribution of community pharmacies and begun referring patients for a Medicines Use Review (MUR) or New Medicines Service (NMS) consultation post-discharge [14]. Urban et al. [15] summarise that poor communication to community pharmacists at discharge can cause unintended medication discrepancies and hinder continuity. They further promote the provision of consistent and timely communication to community pharmacy post discharge to ensure seamless transition and reduction in adverse issues.

Although much literature has been published on the positive input of hospital pharmacists on admission and during discharge [4, 16, 17], less is known about their community counterparts and the effects of their interventions on patient outcomes. The RPS report [13] which recommended the improvement of communication during patient transfer and the increasing recognition and evidence of the clinical skills of community pharmacists, should lead to an increase in more clinical services being provided and commissioned within the community.

Some studies have restricted the interventions of interest to medicines reconciliation or medication review, and have limited the population to, for example, those suffering from heart failure [18].

Others have investigated the potential of post-discharge (PD) community pharmacy interventions to improve continuity of care [2, 8, 19-22].

We therefore aim to systematically evaluate and quantify the effects of community pharmacy interventions on all potential outcomes of patients of all demographics and conditions discharged from hospital and considered to be at a point of transition.

Methods

Searching

The Cochrane Collaboration glossary of terms and the University of York guidelines for the conduct of systematic reviews and search strategies were consulted to frame the search. The included key points of research reporting, as specific in the Consolidated Standards of Reporting Trials (CONSORT) guidelines [23] for the publication of research describing RCTs, was utilised to assess the clarity of reporting in the included studies. Our search strategy identified research on interventions made or contributed by community pharmacies after hospital discharge. The following electronic databases were searched to identify evidence: MEDLINE, EMBASE, CINAHL, NHS EED, Cochrane Controlled Trials Register, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects (DARE) and Web of Science. Trial registers and websites of funding organisations were searched for ongoing studies. On-line search of The Pharmaceutical Journal as well as hand searches of relevant conference abstracts (such as the RPS conferences) were conducted. Hand searches through reference lists of key articles was also undertaken and relevant information on unpublished and in-progress research from key-experts in the field was requested and included.

Key words and synonyms used in the electronic search to frame the setting or aim of healthcare provision included: continuity of care, continuous care, continuum of care, seamless care, barriers to care, and ongoing care. Word derivatives for interventionists included: pharmacist, pharmacy, pharmacies, community pharmacy, pharmacy services and pharmacy practice. The search filters used were: randomised controlled trials; controlled clinical trials, random allocation, single-blind method, clinical trials, crossover trials and placebos.

Study selection

All titles retrieved via literature search were reviewed by one of the authors (HN) for relevance. Two of the authors (HN and ZN) then independently assessed the abstracts of these papers against the inclusion criteria. The studies were delineated by their reported population/patient, intervention, control, and outcomes and included: (i) the population of patients which were identified as post-discharge; (ii) intervention involved a community pharmacist or member of the community pharmacy team; (iii) intervention focussed on continuity of care, transfer of care or follow-up care; (iv) intervention occurred post-discharge from a hospital setting; (v) controlled trials that were randomised or non-randomised; (v) all reported outcomes were of interest. Papers were not excluded on the basis of language, country of origin or publication date. Full papers from those abstracts that were considered relevant were requested and assessed independently by the two authors for their suitability for inclusion and differences resolved by discussion with reference to a third reviewer (AT) if necessary.

Validity assessment

Validity assessment was guided by criteria recommended by Cochrane for assessing methodological quality [24]. Blinding of the assessors was not considered specifically relevant to the end-points of the studies; we therefore critiqued studies for potential influence of bias or confounding factors impacting on reported outcomes. We compared baseline characteristics of groups, and reported whether the studies described the clear and transparent flow of patients and why, if any, losses or drop-outs occurred. We also clearly defined primary and secondary outcomes, and provided a sample size calculation. We reported whether >80% of patients were retained in the trial, as well as any training that the pharmacists received or resources they required for the intervention. Two authors (HN and ZN) independently carried out this analysis and any discrepancies were resolved through discussion with the third author (AT). The appraisal will be used for descriptive purposes and will also highlight variations between studies.

Data abstraction

Data were extracted on a piloted data extraction form adapted from an established Cochrane version. Two authors (HN and ZN) extracted data independently and checked for agreement or discrepancies. The third author (AT) was consulted for additional review where appropriate. Data included type of participants, intervention details, outcomes and trial quality characteristics.

Study characteristics

Classification of interventions: Interventions had to be delivered by a community pharmacist or member of the community pharmacy team. Singular or multiple interventions made by other healthcare professionals only (excluding community pharmacies post-discharge) were excluded. All forms of intervention made PD from a hospital setting were considered. All populations of patients were considered irrespective of their age, clinical condition or diagnosis, etc. All subsequent outcomes from interventions were considered including 'soft', e.g., patient satisfaction, medication adherence, and 'hard', e.g., clinical test results, mortality. Studies were categorised by: type of patient population; intervention components; funding/resources required for intervention; intervention preference compared to control.

Outcomes: Due to heterogeneity in outcomes measured, all outcomes have been considered and reported. Outcome data were extracted at the study's pre-specified last follow-up point. Formal pooling for meta-analysis was not possible due to the diversity of outcomes and scales employed, but informal pooling highlights were studies showed a significant positive, non-significant positive, negative or no effect.

Results

Search results and study characteristics

A total of 1,528 titles were identified from our literature search, which yielded 144 potentially relevant studies. Further assessment of the abstracts of these studies and hand searches led to a total of 14 controlled trials identified that fit the inclusion criteria for the review. Figure 1 describes the steps involved in the search and selection process.
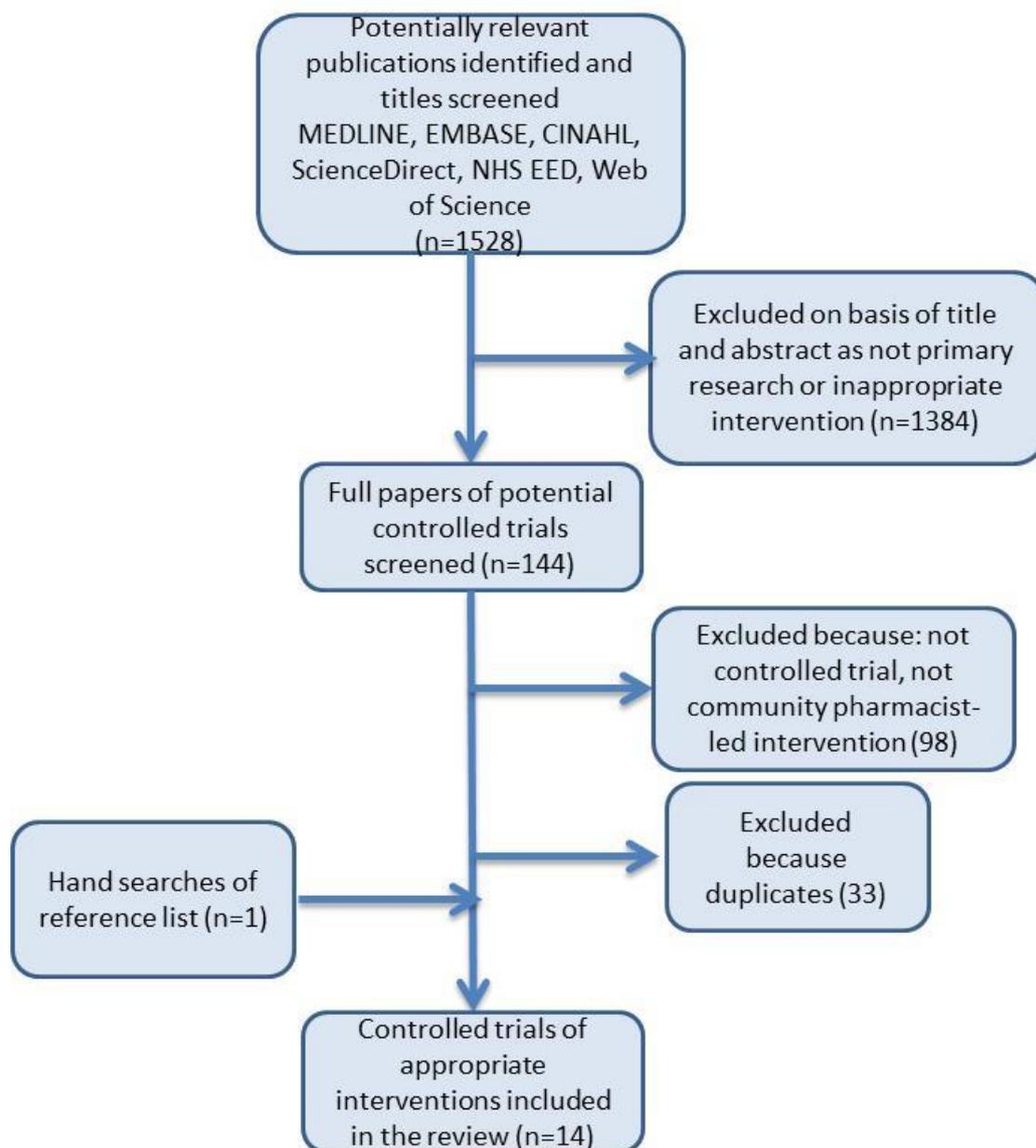
Figure 1. Flowchart describing study selection and excluded studies

Two of the studies which focussed on "warfarinised" patients were controlled but with no randomisation [25, 26], one further study was non-randomised [27], and another was an economic evaluation of a particular randomised control trial [28] with the trial itself also included [29]. Four of the studies were carried out in Australia [25, 26, 30, 31], five in the UK [19, 28, 29, 32, 33], two in Amsterdam [27, 34], two in USA [35, 36] and one in Canada [37]. All but one study limited inclusion to specific diagnoses or cohorts of patients: "warfarinised" [25, 26]; older age and/or polypharmacy [27, 28, 30, 33, 34, 35]; cardiological related conditions [29, 31, 32, 36] and respiratory disorders [37]. One study recruited patients from a general ward of a wide age range, 16-79 years old, and excluding only based on presence of psychotic illness or alcohol abuse [19].

Study validity

Six of the studies reported some statistical differences in baseline characteristics between their intervention and control groups [25-27, 30, 35]. The majority (n=10) of studies clearly described the

patient flow, and where and why losses or drop-out occurred [19, 25, 26, 29-33, 36, 37]. In most of these studies, the retention rate was $\geq$ 80%. However, one study did not include a flow diagram [28], but made reference to the previously reported trial [29], and another trial was reported as an abstract so lacked much of the required information for quality assessment [34]. Sample size calculations were reported in 64% of studies (n=9/14) [25, 26, 28, 30, 31, 33, 35-37], but only half achieved their required quota [25, 26, 28, 31]. All studies clearly defined their primary and/or secondary outcomes, and stipulated as and when specific resources or funding was utilised in the implementation of the interventions.

Interventions

Table 1 outlines the key characteristics of the individual interventions. This includes the year the study was published, the healthcare professional involved (e.g., hospital pharmacist), and the classification of the intervention (e.g., information, coordination, communication). Two of the Australian studies reported on interventions delivered by a pharmacist belonging to the Home Medicine Review (HMR) programme [25, 26]. This Programme provided governmental remuneration for appropriately accredited pharmacists, who are generally based in community pharmacies, to carry out home visits to review medication and provide education and counselling. In these studies, the pharmacists had to undertake additional training in the area of warfarin therapeutics and patient education. In another group of related studies, pharmacists with a postgraduate qualification or recent continued professional development in therapeutics also had to receive additional training in heart failure, drugs used, exercise, diet, smoking cessation and communication skills [28, 29, 32]. Two studies ensured pharmacists received training on the use of the intervention protocol [33,36], and two studies involved reimbursement for pharmacists participating in the trial [31,36]. One study in USA only considered pharmacists providing services within CommUnity Care health centres, which specifically provide services to the medically underserved [30]. The remaining Australian study made use of a transition pharmacist (TP) who coordinated the medication communication transfer to primary care, community pharmacy and GP [30]. Only four trials reported utilising existing pharmacist roles, with no further training or funding deemed necessary [19, 27, 34, 37]. The majority of the interventions (n=9) involved the community pharmacist making a home visit [25-30, 32, 33, 35], one involved telephonic communication [36], one was face-to-face interaction in the community pharmacy [31], and three were unclear to the authors as they were not described in detail [19, 34, 37]. These different forms of communication and interaction were performed in order to carry out a follow-up interview to provide education, counselling, check adherence and medication issues, remove inappropriate/excess medications and provide information on laboratory monitoring. Both primary and secondary outcomes measured were diverse, often with different measuring scales and in the majority of cases showing little agreement amongst studies (Table 2). Of the ten studies whose interventions involved increased information sharing between providers; improved coordination of care and improved communication, seven showed some statistically significantly positive outcomes.

Outcomes

Our review has identified some interventions that demonstrate outcomes that are significantly more preferable to those receiving standard care (n=5) (two studies reported on the different outcomes of the same intervention), others that have negative effects (n=3) (two studies reported on the different outcomes of the same intervention) and some that have no impact (n=2). Table 2 provides

further details on the outcomes reported for each study and the positive, negative and lack of statistically significant results. Only the outcomes that resulted from identification and rectification of drug reported problems received unanimous statistically significant positive effects with the intervention(s). Of the key primary outcomes, such as hospital readmissions, mortality, patient medication adherence and the wider outcomes of quality of life and patient satisfaction, there was either no significant difference awarded with the intervention or little agreement between trials. The factor of reimbursement or additional pharmacist support (either via a liaison pharmacist or specialist training in the intervention) did not contribute to improved trial outcomes across the studies. We found no population group characteristic was associated with significantly improved trial outcomes. However, six of the nine interventions that incorporated the three recognised characteristics of information sharing, coordination of care and communication did demonstrate some outcomes classified as statistically significant, which suggests the importance of these particular factors in the design and delivery of interventions to improve transfer of care.

Discussion

Main study findings

This work has indicated there is a role to be played by community pharmacists in improving the transfer of care for post-discharged patients. However, due to the design and implementation of these studies, the full potential of these interventions may not be, as yet, fully realised. The evidence suggests a need for randomised controlled trials that have a more stringent outline for the control rather than comparison to uncontrolled 'usual care'. Caution should be heeded to regulate and account for activities that can take place in the control group that have characteristics similar to the intervention and can impact on subsequent outcomes reducing potential differences between the groups (ref). Protocol violations also need to be minimised to ensure standardised delivery of the intervention and allow for subsequent accurate evaluation of outcomes. Thompson and Schoenfeld [38] discussed how the use of usual care in a two-armed randomised controlled trial is appropriate for drug and devices and for non-pharmacological interventions that lie well outside of usual care practices. Adhering to these principles improves the investigation and deduction of findings regarding impact through the minimisation of confounding factors. The observed inconsistencies in practice in these particular studies make usual care difficult to understand and describe, therefore limiting its value as a comparator arm in the trial. Thompson and Schoenfeld suggest the use of a strict protocol and computer-aided decision support to improve both usual care and intervention group [38].

Strengths and weaknesses of the study

Our search strategy included key databases and was supplemented by reviewing the references of relevant studies, review articles and conducting a citation search of identified studies. Where insufficient information was included in studies, authors were contacted. Our inclusion criteria were wide enough to capture any intervention made by a community pharmacist at the primary-secondary care interface and did not exclude on the specifics of the populations, the interventions or outcomes reported. It became clear from our early literature search that the role of pharmacists, not specifically community pharmacists, is one that offers much potential to improve the transfer of patient care. Many studies reported on interventions solely performed by clinical pharmacists,

hospital-based pharmacists or a liaison pharmacist that was not necessarily based in community, all of which were excluded in this review. This offers another perspective to investigate the particular characteristics, location and profile of a pharmacist that is a prerequisite of a 'successful' intervention. Our main focus was to concentrate on evaluating controlled studies only; we recognise this as a rigorous method for determining whether a cause-effect relation exists between intervention and outcome. However, in our systematic review, it was clear that much research exists of a qualitative and uncontrolled nature which could highlight some valuable lessons in the design and implementation of the interventions. The Medical Research Council has described that an evaluation of a complex intervention, which these transfer of care interventions can generally be considered to be, must include the investigation of how the intervention works. A more descriptive analysis of the context would facilitate the identification of the key active ingredients of an intervention, allowing for a better understanding of the causal mechanisms [39]. Hence, a process evaluation should complement an evaluation of effectiveness of any complex intervention.

Unfortunately, due to the heterogeneous nature of the patient populations tested, the baseline risk and opportunity to impact on outcomes may have differed amongst trials, as patients may have been in receipt of varying types of care provision from other sources within the healthcare system. This was keenly referred to in the intervention evaluations reported by Stafford et al, where "warfarinised" patients, even in the control group received a contact visit with a GP eight days after discharge that could have shared components of monitoring, counselling, or medicines management information similar to that of the pharmacist intervention [25,26]. Also the variation in patient groups between studies, including age, comorbidities, etc., may have made them more or less vulnerable to poor outcomes, therefore affecting the impact potential of the evaluated intervention. Unstandardized delivery of the interventions, violations in protocols across providing pharmacies, and between individual pharmacists and even between patients from the same pharmacists, may have veiled beneficial effects in certain situations.

As reported in a previous review [1] that focussed on any interventions made by any primary care providers at hospital discharge, we found that the intensity in intervention (number of interactions with the community pharmacist) did not appear to correlate directly to the effectiveness of the intervention. This reflects upon the complexity of factors to consider in the design and implementation of a 'successful' intervention. The evaluation of the qualitative and uncontrolled studies may shed further light onto the context and the interplay of patient, pharmacist and non-pharmacist issues and in turn the design of future interventions.

Findings in comparison with other studies

This is the only review we are aware of that focusses on interventions involving community pharmacists made to improve the continuity of patient care PD from hospital. Unfortunately, before now there has been little pooled evidence around community pharmacist-led interventions. The findings do agree in essence with related evaluations of interventions in the transfer of patients between primary and secondary care. A recent systematic review of patient handovers from secondary to primary care at discharge by Hesselink et al. [1] describes that most interventions focussed on the sharing of discharge information, facilitation of continuity of care, and direct and timely communication between healthcare providers. The authors also deduced that no singular intervention was evidenced to guarantee positive effects on specific outcome measures. There was an acknowledgement that their review, in common with this review, evaluates complex

interventions, including the number of interactions between components, the un-standardised delivery and receipt of interventions, the variability in targeting of the interventions, the number and diversity of outcomes and the degree of flexibility or tailoring of intervention components. It therefore becomes very problematic to isolate the fundamental role of any player or characteristic of that intervention [40]. This remains an issue despite the majority of the studies being classed as clear or very clear in their assessment for clarity of reporting against the CONSORT statement. Another review, that specifically looked at medication reviews in older patients as an intervention to reduce hospital readmissions, reported how variations in the delivery of care and patient selection hindered the ability to recommend consistent benefit from such interventions [41]. Okumura et al. [42] also concluded that the poor description of the counselling interventions evaluated in their review weakened their critique and subsequent evidence to support patient counselling as a robust intervention to improve patient outcomes. They advocated that clinical pharmacy services should adopt a systematic tool, e.g. DEPICT: Descriptive Elements of Pharmacist Interventions Characterisation Tool [40], to allow better understanding of the service and its components to ensure reproducibility and standardisation of delivery. Also, if a process evaluation is nested in a trial it can be used to assess fidelity and quality of implementation, clarify causal mechanisms and identify contextual factors associated with variation in outcomes [39].

Conclusion

This review provides evidence to support the role of community pharmacists in identifying and rectifying medication errors post discharge, as part of interventions aiming to improve the transfer of care. However, insufficient data and flawed study design and implementation mean that further impact on patient outcomes cannot be deduced. To demonstrate consistent benefit more studies are required which are stricter in their intervention and usual care arms. Clear delineation will facilitate causal relationships to be better explored. Studies should also include process evaluations as standard so that contextual factors can be accounted for. These research modifications will improve the evidence base to inform future interventions and potentially describe the facilitative accompanying environment required to successfully improve continuity of care.

Our findings are important at a time when many community pharmacies in the UK are responding to the recent RPS guidance to improve transfer of care. Until now MURs and NMS are services accessed by discharged patients, despite the lack of empirical robust data to support their potential in improving continuity of care. Although medicine related outcomes have here been evidenced, community pharmacy has yet to provide convincing verification of the impact on a range of economic, clinical and humanistic outcomes. If other interventions, excluding community pharmacy, are able to robustly demonstrate such collective effects on the continuity of care, the clinical qualities and role of community pharmacy in patient care will not be fully realised and possibly ignored. It is important that we recognise how more work needs to be done in this important area.

Competing interests

The authors have no competing interests to report.

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Table 1. Intervention characteristics

Study, Year [Ref]	Intervention characteristics	Key players	Classification of intervention		
			Information	Coordination	Communication
Duggan 1998 [19]	Patients were given a letter on discharge that documented their prescribed medication and were asked to give this to their CP. The CP would compare the discharged medication list to the medications subsequently prescribed by the GP and report any discrepancies.	Hospital pharmacy, CP, GP	√	√	√
Stafford 2011, 2012 [25, 26]	Prior to hospital discharge, the HMR referral process was initiated. At discharge all community-based healthcare providers received summary of patient's inpatient warfarin therapy in addition to usual discharge summary. 2-3 home visits by CP, the first within 8-10 days PD. Visits involved medication review, INR monitoring and targeted warfarin education, referrals to GP where necessary.	Hospital pharmacy, CP, GP	√	√	√
Nazareth 2001 [33]	Hospital pharmacist assessed medication, rationalisation of treatment, assessment of patient's ability to manage their medication, provision of drug information and liaison with carers and community professionals. Discharge plan was given to patient and CP and GP and any other relevant healthcare professional involved. CP made home visit 7-14 days PD to check discrepancies with medication being taken and those prescribed. CP assessed patient's understanding of and adherence to regimen and intervened where appropriate. CPs arranged further visits at their own discretion.	Hospital pharmacist, CP, GP, other healthcare professionals	√	√	√
Bellone 2012 [35]	A CP visit within 60 days PD that could have included a number of interventions: discontinuation/initiation of drug therapy, dosage adjustments, medication counselling, adherence counselling and laboratory monitoring.	CP			
Beachesne 2007 [37]	Medication history carried out by clinical pharmacist and communicated information with CP. On discharge clinical pharmacist counsels on discharge medication and completes a discharge plan including admission diagnosis, comorbidities, allergies/drug intolerances, medications pre-admission, changes made and contact details of hospital pharmacist. In intervention group additionally a list of 3 DRPs with proposed actions to resolve them were included and CP was phoned and faxed information.	Hospital pharmacy, CP	√	√	√
Hutenberg 2009 [27]	Usual care included fax of discharge prescription to CP, also newly prescribed drugs are accompanied with personalised letters of information, and patients receive additional oral information. The intervention added in a check by CP of drugs pre- and post-hospitalisation and differences were recorded and ay subsequent intervention made as a consequence. Other interventions included taking a medication passport, producing a daily medication scheme, sending these to patient and GP, synchronising discharge and concomitant medication on time, interviewing patient and checking home drug supplies. Interventions were not standardised.	Hospital pharmacy, CP, GP	√	√	√
Hutenberg 2012 [34]	CP performed a medication review at discharge, after 3, 6 and 9 months PD.	CP, pharmacy technicians and not clear who else			
Holland 2005 [32]	Discharge letter sent to CP. CP arranged home visits to assess patient's ability to self-medicate and drug adherence. Educated patient and proxies, removed out of date drugs, reported ADR or interactions to GP, and reported need for compliance aid to local pharmacy. One follow-up visit at 6-8 weeks PD to review and reinforce original advice.	Hospital, CP, GP	√	√	√

Study	Intervention description	Provider			
Holland 2007 [29] Pacini 2007 [28]	CP made home visit within 2 weeks PD to provide patient medication education and lifestyle advice. Patients also completed a sign and symptom monitoring diary card. Recommendations were fed back to GP. One follow-up visit at 6-8 weeks PD to review and reinforce original advice.	CP		√	√
Gurjal 2014 [31]	CP reviewed patient monthly to assess if medication was being collected and record any DRP. AT 3 and 6 months PD longer discussions were tailored to medication beliefs informed by researcher. CP funded	Researcher, CP			
Calvert 2012 [36]	At discharge standardised adherence counselling from study pharmacist and medication review. Provided a pocket medication card, a list of tips for remembering to take medications and pillbox. Fax of medication, and barriers to adherence sent to CP. Study pharmacist called patient 1-2 weeks PD to confirm collection of medication. CP verified adherence immediately and 6, 12, 18 and 24 weeks PD. When medication stopped or missed or any intervention was sent to study pharmacist and/or GP. CP funded.	Study pharmacist, CP.	√	√	√
Crotty 2004 [30]	On hospital discharge to long term facility, physician and CP faxed a medication transfer summary compiled by transition pharmacist (TP). TP organised medication review by CP within 10-14 days PD, and a case conference involving him/her, the CP, physician and nurse at the facility with 14-28 days PD.	TP, CP, physician, nurse	√	√	√

Table 2. The types of outcomes and statistical significance of effects by studied interventions.

Study, Year [Ref]	Outcome											
	Hospital use	Identification (no. and type) of DRP	Rectification (no. and type) of DRP	Medication adherence	Patient knowledge	Patient satisfaction	Death	Quality of life	Quality of prescribing	Clinical adverse effects	Condition control	Economic evaluation
Stafford 2011 [25]	√			√				√		√‡	√	
Stafford 2012 [26]					√‡							
Nazareth 2001 [33]	√			√	√	√	√	√				
Bellone 2012 [35]	√‡											
Beachesne 2007 [37]		√‡	√‡									
Hutenberg 2009 [27]		√‡	√‡			√‡	√					√
Hutenberg 2012 [37]		√‡										
Holland 2005 [34]	√−							√	√			
Holland 2007 [29]	√			√		√	√	√				
Pacini 2007 [28]												√
Gurjal 2014 [31]				√								
Calvert 2012 [36]				√‡∏								
Crotty 2004 [30]	√‡									√‡	√	√‡∏
Total	6	4	2	6	2	4	5	3	1	2	2	2

‡ Outcome with statistically significant effect in favour of the intervention.

‡∏ Outcome with statistically significant effect in a subgroup population in favour of the intervention.