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REVIEW ARTICLE

Initiatives promoting seamless care in medication management: an international review of the grey literature

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Abstract *Background* Patients' transition between hospital and community is a high-risk period for the occurrence of medication-related problems. *Aim of the review* The objective was to review initiatives, implemented at national and regional levels in seven selected countries, aiming at improving continuity in medication management upon admission and hospital discharge. *Method* We performed a structured search of grey literature, mainly through relevant websites (scientific, professional and governmental organizations). Regional or national initiatives were selected. For each initiative data on the characteristics, impact, success factors and barriers were extracted. National experts were asked to validate the initiatives identified and the data extracted. *Results* Most initiatives have been implemented since the early 2000 and are still ongoing. The principal actions include: development and implementation of guidelines for healthcare professionals, national information campaigns, education of healthcare professionals and development of information technologies to share data across settings of care. Positive results have been partially reported in terms of intake into practice or process measures. Critical success factors identified included: leadership and commitment to convey national and local forces, tailoring to local settings, development of a regulatory framework and information technology support. Barriers identified included: lack of human and financial resources, questions relative to responsibility and accountability, lack of training and lack of agreement on privacy issues. *Conclusion* Although not all initiatives are applicable as such to a particular healthcare setting, most of them convey very interesting data that should be used when drawing recommendations and implementing approaches to optimize continuity of care.

Keywords Continuity of care · International experience · Medication therapy management · Medication errors · Quality improvement

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Impact of findings on practice

- When implementing initiatives to improve continuity of care at regional or national levels, it is sensible to start with developing guidelines for health care professionals, and in parallel to proceed with other actions such as campaigns for patients, education of professionals and IT technologies to facilitate the transfer of information.

- Leadership, commitment and interdisciplinary cooperation are essential for successfully implementing seamless care.
- Key elements in successful transition of care are medication reconciliation at each point of transition, use of patients' own medicines at hospital admission and patient education at discharge.
- Clinical pharmacists must be part of seamless care teams.
- Studies need to further evaluate the impact of seamless care initiatives on quality, safety and cost-effectiveness of the pharmacotherapy.

Introduction

Patients' transition across settings is a high-risk period for the occurrence of medication discrepancies potentially leading to adverse drug events, and the transfer across primary and secondary care is no exception [1–7]. Published studies have demonstrated that 24–91 % of patients experience unintentional medication discrepancies on admission as well as at discharge from hospital [2, 4–8].

Many local research initiatives to improve continuity in medication management between primary and secondary care have been reported in the literature. Systematic reviews of controlled studies evaluating the effect of these initiatives were recently published [9, 10]. In parallel, initiatives have been developed at national and regional levels in several countries. The lessons learned from these initiatives could be of high interest for many countries willing to improve continuity in medication management. In fact, patient safety and the capacity of an organization to deliver consistent high-quality care is both a systemic issue and one that needs to be addressed at the level of the whole care system [11].

Aim of the review

We aimed to review national and regional initiatives to improve continuity of medication management when patients transfer between primary and secondary care in seven countries.

Method

Selection of countries

Countries were selected based on (a) the existence of published literature (see the systematic review that was performed in parallel to the present work) [9] that referred to large-scale initiatives aiming at improving continuity of medication management between hospital and primary care and/or (b) personal knowledge by members of the research team of on-going national initiatives at the time of the review process. The countries selected were Australia, Canada, Denmark, France, the Netherlands, the United Kingdom (more specifically England) and the United States (US). No Asian, African, South American or Eastern/Southern Europe country was selected because we found no evidence that initiatives had been taken in these countries.

Given the objectives, a review of the grey literature was perceived to be the most appropriate method. Grey literature has been defined as "that which is produced on all levels of governmental, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers" [12]. Examples of grey literature include policy documents, theses, reports (e.g. state-of-the art reports, government reports), conference proceedings, fact sheets, working papers. The value of grey literature is that it provides access to information which may not be found in sources that deal largely with studies of high methodological quality. The grey literature is considered as particularly relevant when reviewing public health interventions, which was the case for the present work. In fact many public health interventions are complex and the outcomes may be influenced by any number of confounding variables. Studies of these interventions do not always lend themselves to designs associated with the traditional hierarchy of evidence [13]. Therefore, the evidence base for the effectiveness of public health interventions can be strengthened through location and appraisal of grey literature [14]. Grey literature can be timely, innovative and unique. If one fails to identify good evidence from grey sources, there is a risk of missing crucial knowledge necessary to understand a phenomenon or process [13].

Published studies linked to these national or regional strategies were used to complement the grey data. A systematic review of trials published in scientific journals was performed in parallel to the review of the grey literature, in order to evaluate the impact of specific approaches to optimize the continuity of care in medication management upon hospital admission and/or discharge. The results have been published in a separate paper [9].

Data collection and validation process

First, a structured search of relevant websites (scientific, professional and governmental organizations) was performed for each country (Appendix 1). We searched for relevant categories in the site map and also typed keywords such as "continuity of care", "seamless care", and "medication reconciliation" in the search module. Data previously gathered by members of the research team were also

used. The reference list of each relevant report was checked to identify additional data. All relevant data were included, irrespective of the period (year) of implementation.

Second, a list of the titles and sources of relevant information was shared with national experts (Appendix 2). They were asked (a) to confirm that the information represented a regional or national initiative to improve continuity of care in medication management; (b) to list additional sources of information to be considered.

Third, a structured description of each initiative was performed based on a standardized form containing the following information: title of initiative, aim, period of implementation, environment, professionals involved, initiators, description, intake in practice, impact, success factors, barriers, funding, follow-up and sources of information. The experts were asked to validate this information. The whole process started in November 2009 and ended in June 2010. An update was performed in July 2011.

Data analysis

After data extraction, research members met for discussing the results. Researchers compared and contrasted relevant features of studies as described in the standardized form and continued iterative review until consensus was reached about key messages and conclusions. The findings were classified according to the level of care at which the initiative was developed: policy-, health care professional- and patient level [15].

Results

Several initiatives were developed at the policy and health care professional (HCP) levels. Table 1 provides a summary of these initiatives and describes their success factors and barriers. Most initiatives have been implemented since the early 2000s and are still ongoing. Several have been developed by national quality and safety groups, others by professional groups. All initiatives were multidisciplinary in nature, involving different types of HCPs working in different settings. Several approaches also directly involved patients.

Key elements of actions that can be performed at patient level were identified. These are described in Table 2.

The text below describes the initiatives identified in each country together with data on their impact, when available.

Australia

Since 1998, several initiatives have been taken.

First, the Australian Pharmaceutical Advisory Council developed national guidelines to achieve quality in the continuum of medicines' use between hospital and community [16, 17].

Second, the Australian Council for Safety and Quality in Healthcare implemented a national inpatient medication chart (NIMC), as well as a standardized medication management plan, to be used to record medicines taken prior to admission and aid medication reconciliation on admission, intra-hospital transfer and discharge [18, 19]. Studies related to the NIMC initiative reported a positive impact on several quality indicators, completeness and clarity of prescriptions [19–22]. Although primarily designed for in-hospital use, the chart supports medication management at transition moments and has increased the awareness of medication safety issues [18, 19]. A thorough audit of the NIMC system was performed in Victoria, in autumn 2011. This audit showed that only 15.25 % of patients had a medication history documented on the chart [23].

Third, community pharmacists were funded to (a) perform home medicine review (HMR) for several target groups of patients, among which those recently discharged from hospital [24–26] and (b) produce a comprehensive written summary of medications taken by a patient [27]. One study showed that HMR post discharge had significant positive effects on the number of drug-related problems 90 days post discharge, unplanned readmission rates, and self-reported compliance [26].

Fourth, the Australian Government developed electronic systems to improve the sharing of medication information (MediConnect and HealthConnect), including electronic transmission of prescriptions (e-Medication Management), and the introduction of electronic discharge summary systems (EDS) [28, 29]. An evaluation of the EDS at two lead sites showed improved timeliness of receipt, legibility and consistency of content, and increased security of transmission [30].

Finally, fifteen Australian health services are participating in the WHO High 5 s Medication Reconciliation Program. The mission of the High 5 s project is to facilitate implementation and evaluation of standardized patient safety solutions within a global learning community. One standard operating procedure relates to medication reconciliation at patient transition, and has been developed by Canada [31].

Canada

Several initiatives have been implemented over the last 13 years.

First, the Canadian Society of Hospital Pharmacists and the Canadian Pharmacists Association have had a joint Task Force on seamless care. This Task Force studied barriers to seamless care in Canada and searched out models and tools that would enhance patient care [32, 33].

Table 1 Types of initiatives at policy and health care professional level, success factors and barriers

Initiative	Country[a]							Success factor(s)	Barrier(s)
	A	C	D	F	N	E	US		
Policy level									
National guidelines	+	+	−	+	+	+	−	Leadership and commitment to support and guide implementation	Responsibility and accountability insufficiently defined
National campaign to increase awareness of the problem, to inform on the guideline and to share tools for improvement	−	+	−	+	+	−	−	Enthusiasm of HCPs	Reluctance to change attitudes
								IT support	Lack of human resources; staff turnover
								Patient involvement and awareness	Lack of training
								Possibility to tailoring initiatives to local settings	Failure to reach agreements between settings of care on reallocation of resources
								Existence of legal or financial incentives	Insufficient collaboration between settings and HCPs
								Availability of tools and resources (enablers)	Complexity of interventions needed
								Possibility to share experiences relative to implementation	
Regulatory and financial incentives to apply recommendations, including reimbursement of specific services (e.g. medication review after discharge)	+	+	−	−	+	+	−	Earlier implementation	Slow development of new specific health care services
									Incentives covering some but not all aspects of steps of the procedure
IT support to facilitate the exchange of information on	+	+	+	+	+	+	+	Participation of key stakeholders throughout planning and implementation	Lack of agreement on security solutions
(a) medications prescribed/ delivered								Alignment of IT priorities with healthcare priorities	Difficulties to keep up with ongoing development of IT infrastructure
(b) health (including medical/ pharmaceutical data)								Establishment of national policy for investment	Reluctance to change attitudes relative to data management
								Measurement and feedback to reinforce the positive changes as they occur	Access to and use of Internet for patients
								Promotional efforts to increase patient awareness	
								Ease of use of program, availability of technical support and program education for patient and HCPs	
								Work reducing or neutral for HCPs.	
								Integration with workflow for HCPs	
								Team participation	
								Financial incentives based in patient outcomes	
								Computable data	
HCP level									
Local consultation to enhance cooperation across settings of care (e.g. development of joint medication formularies for primary and secondary care, effective shared care agreement,…)	−	+	−	−	+	+	−	Support at national level	Lack of time or lack of interest
								Financial incentives	Failure to reach agreements between settings of care on reallocation of resources
								Possibility to share experiences	
								Leadership	Responsibility and accountability insufficiently defined
									Lack of integrated processes across care providers

Table 1 continued

Initiative	Country[a]							Success factor(s)	Barrier(s)
	A	C	D	F	N	E	US		
Development and use of standard forms, including standardised medication schemes and transfer documents	+	+	+	−	+	+	+	Existence of clear guidelines, same definitions Local agreement on protocols/ standards Education Planned evaluation. IT support Consistency with outcome measures	Reluctance to change attitudes relative to data management and data transfer Lack of time; lack of human resources

A Australia, *C* Canada, *D* Denmark, *E* England, *F* France, *HCP* health care professional, *IT* information technologies, *N* The Netherlands, *US* the VA health care system in the United States

[a] The level of implementation can vary from pilot or partial to full implementation

Table 2 Key elements of interventions at patient level identified from guidelines and procedures

Moment in patient transition	Description of intervention[a]
Before elective admission	Medication review and/or patient medication profile
Hospital admission	Medication bag brought by patients
	Medication reconciliation[b]
Hospital stay	Use of patients' own medicines
	Self-administration by patients or carers
	Self-management plan developed for and agreed by patient or carer
Hospital discharge	Medication reconciliation[b]
	Patient education
	Informing HCPs about medication plan
	Original pack dispensing by hospital pharmacy[c]
After discharge	Medication reconciliation[b]
	Hospital helpline for patients and other HCPs
	Medication review and adherence support after discharge
Independent of setting or context	Availability of accurate list of medications, supported by (IT) tools

HCP health care professionals, *IT* information technologies

[a] There can be some overlap between several types of intervention, e.g. 'informing HCPs about medication plan' is part of medication reconciliation; [b] Formal process of (a) obtaining a complete and accurate list of each patient's current home medications, (b) using that list when writing admission, transfer and/or discharge medication orders, and (c) comparing the list against the patient's admission, transfer, and/or discharge orders, identifying and bringing any discrepancies to the attention of the prescriber and, if appropriate, making changes to the orders. Any changes in orders are documented [36]; [c] Medicine packs mostly for 1 month and which include patient information leaflet, product's batch number and expiry date

Then in 2003 the Canadian Pharmacists Association published a pharmacist's guide on continuous care programs, which is a comprehensive source of information on the development and evaluation of seamless care initiatives [34].

Second, an important national initiative that was part of the Safer Health Care Now! Campaign was launched in 2005 [35, 36]. It aims to implement medication reconciliation at national level in all settings of care. The initiative focuses on sharing Canadian experiences on the use of medication reconciliation with the goal of reducing potential adverse outcomes. More than 300 acute care teams are currently enrolled in the campaign. The results show a substantial decrease in the number of medication discrepancies on admission [37–40]. In early 2011 a Summit was held to accelerate a system-wide strategy to implement medication reconciliation. Recommendations will form the basis of a new national strategy to ensure the advancement of medication reconciliation across the healthcare system.

Third, a province-wide initiative between hospitals and community pharmacists in Ontario aimed to improve the medication reconciliation process for elective surgery patients by asking patients to obtain a medication history (called MedsCheck) from community pharmacists prior to their pre-admission clinic appointment [41–43]. Initial results were somewhat disappointing, as the MedsCheck quality was not consistent and did not meet professional standards [41].

Finally, Canada Health Infoway has been created by the federal government to accelerate the use of electronic health records in Canada. The core elements of an electronic health record are now in place for about half of the

Canadian population, but several challenges remain to accelerate their adoption [44]. Health Infoway includes one specific program [the Drug Information Systems (DIS) program] that enables authorized HCPs to access, manage, share and safeguard patients' medication histories [45]. By early 2010, about one in three community pharmacists in Canada used DIS, as well as half of hospital emergency departments.

Denmark

The Ministry of Health and Prevention has launched two initiatives of interest, through a national strategy plan for digitalization of the Health sector.

First, the Electronic Medicine Profile is an electronic overview of prescription medications dispensed by all Danish community pharmacists over the past 2 years. Each individual profile can be accessed by the patient, by physicians and community pharmacists [46–48]. Improvement of the completeness of medication history on admission has been shown [47, 49–52].

Second, the Common Medication Card is an updated list of patients' medications that can be accessed and used by hospital doctors upon admission and at discharge [53]. National implementation started in 2010 and should ideally be finished at the end of 2011. There is currently no intake or impact data available.

England

Several types of national initiatives have been found.

First, guidelines were published by national pharmacy organizations [54], professional organizations [55, 56], as well as by the National Institute for Health and the Clinical Excellence and the National Patient Safety Agency [57, 58]. The guidance on medication reconciliation on admission was subsequently supported by an implementation guide produced by the National Prescribing Center [59]. In parallel, patient campaigns were launched by professional organisations and patient associations [55, 56, 60, 61].

Second, the Care Quality Commission (CQC) performed national audits in primary and secondary care to identify opportunities for improvement in medication management including during transitions. The data show that progress has been made in several areas, but many opportunities for improvement remain [62–66]. This contributed to the development of legal requirements for primary and secondary care settings to meet a set of minimum standards relative to the effective management of medicines [67]. In parallel, legal and financial incentives to improve continuity of care were implemented [66, 68, 69].

Third, a national initiative was developed in order to implement shared records between HCPs anywhere in England and electronic patient records [70–72].

Finally, the Department of Health set up a framework of future actions that promote a wider role for pharmacy. This includes access to summary care records and a reform for the training of pharmacy technicians to extend their contribution at ward level (i.e. medication history, discharge planning,…) [73]. In the future, the medicine use review service currently provided by funded accredited community pharmacist will also be available for patients recently discharged from hospital [74].

France

Two national initiatives were identified. The first initiative, the pharmaceutical file, is a shared electronic file. Patient consent is required for allowing pharmacists to record and check information on (non)-prescribed medications delivered over the last 4 months [75, 66]. This initiative was developed by the French Pharmacy Guild. It has been implemented in the primary care setting since the end of 2008, together with educational support to maximise intake in practice. In June 2011, about 20 % of the French population had a pharmaceutical file [76]. Extension to the hospital setting is being piloted, but currently no data are available on the use and impact [77]. Second, at the end of 2009, the French National Authority for Health has engaged ten French hospitals in the WHO High5's Medication Reconciliation Program [31, 78].

The Netherlands

The health care inspection has stimulated all professional organizations to develop one national guideline on information transfer regarding medications, and to engage in the implementation of this guideline by 2011. Campaigns were organized to sensitize all stakeholders, professionals as well as patients, on the necessity and benefits of safe medication transfer [79]. As an example, elements from the guideline on safe medication transfer have been incorporated in the law on pharmaceutical care. An overview of the status of implementation in the hospital setting can be found at www.nvza.nl/fpzlandkaart/fpzlandkaart.asp.

The creation of a national electronic patient file shared by all HCPs was a cornerstone of the guideline, but has been rejected by the Dutch parliament for privacy issues. However, a uniform format to transfer patients' medication profile between HCPs, as well as protocols for each situation of transfer, have been developed and are gradually implemented in the information systems of all community pharmacies and hospitals. Since 1st January 2013, the

exchange of information concerning medication is only possible with the consent of the patient, which is organized through an online platform.

At the local level, hospital pharmacists, pharmacy technicians and pharmaceutical consultants were the main driving forces of projects to implement the guideline. As an example, transmural pharmacies, coordinating the transmission of information about medications between HCPs on admission and at discharge, have been developed within hospitals. There have also been projects on pharmacist-led medication reconciliation at admission with evidence of significant reductions in medication errors [80].

At regional level, working groups have been created to stimulate the implementation of good practices related to safe medication transfer.

Moreover, eleven hospitals are participating in the WHO High 5 s Medication Reconciliation Program [31]. This is in line with the Dutch 'VMS', a safety management system around ten themes, including medication reconciliation that had to be implemented by all hospitals in 2012.

United States

For the US, many initiatives were identified, but an important proportion was similar to those implemented in the other countries. Therefore, only two initiatives implemented in the Veteran Affairs health care system were described, as we felt they brought additional valuable data.

VistA is a global initiative developed to improve the coordination of patient care for veterans, so that seamless care is delivered across all settings [81]. It has two components that aim to improve continuity in medication management.

Firstly, the computerized Patient Records System (CPRS) allows clinicians to order diagnostic tests and medications, to request and track consultations, to enter progress notes, treatments and discharge summaries [81]. These electronic records are available everywhere in the Veteran Affairs healthcare system for HCPs involved in the care of the patient [82, 83].

The second component is My HealtheVet. It gives Veterans the opportunity to manage their personalized health records online, including their medication regimen, and to search for validated information on medication [81, 84–87]. Patients are invited to keep an updated medication list handy [88]. They can also download information from their account to then share this information with their HCPs [87]. In the future, information managed by patients could be electronically shared (after patients' permission) with their HCP and patients will be able to request key portions of their CPRS [89]. As of September 2011, almost 1.5 million people had registered with My HealtheVet. Research to assess My HealtheVet is progressing [85, 90].

Discussion

The main purpose of this study was to analyze national and regional initiatives to improve the continuity of medication management in seven selected countries. Different initiatives have been implemented, such as guidelines, campaigns, education of HCPs and development of information technologies (ITs). Positive results have been reported in terms of intake into practice or process measures. Various success factors and barriers were identified, ranging from local organizational factors to national regulatory issues.

Initiatives at national and regional levels convey important data for quality improvement approaches, but they are often overlooked in systematic reviews that mostly report on local initiatives. The results of the present review will therefore benefit different types of stakeholders, including pharmacists being involved in medium- or large-scale initiatives around medication reconciliation.

The development of national guidelines was often the first initiative developed at the national level and was the trigger for further actions. It would be sensible for other countries to follow a similar approach. For example, in Canada and England, national recommendations were used to design and implement national campaigns, education of HCPs, implementation of new local projects and evaluation through performance indicators. Medication reconciliation is commonly described as a critical procedure for improving continuity in medication management.

In parallel, the development of electronic software to enable the sharing of data on medications prescribed/delivered/taken is ongoing in all countries. Many challenges remain for the future, and one of these will be to further address the patients' role in improving the validity of data on medications [91].

Data on impact

Data on the clinical, economic and humanistic impact of initiatives at the national level are often not available. The Canadian SHN! Campaign is the only national initiative where local teams actively report data to a Central Measurement Team, using predefined measures relative to medication reconciliation. The results clearly show a substantial decrease in medication discrepancies. We could not identify data relative to the impact of guidelines as a whole, and of IT initiatives (apart from scarce data on implementation in practice). In contrast, data at local or regional levels have been published for several initiatives, documenting their intake in practice, efficacy and/or effectiveness [26, 47, 49, 80, 92, 93]. Positive outcomes have been reported, but many opportunities for improvement remain.

Barriers and critical success factors

Unsurprisingly, the data show that implementing medication reconciliation at national—but also at local—levels is complex and requires human and financial resources. The substantial time and money needed were mentioned in most countries as potential barriers. In addition, the requested involvement of many different HCPs and of patients further complicates the task. A big part of the challenge is whose responsibility it is to initiate, follow up and maintain the implementation. In the UK and Australia, clinicians' resistance and scepticism have been described, together with failure to reach agreements between settings of care on reallocation of resources. The time required to get things done has resulted in disappointment of HCPs in several projects. Insufficient education of HCPs was also described as a factor contributing to failure in the Dutch and Canadian experiences. With regard to IT solutions, difficulties to establish common security solutions were reported in some countries.

When looking at critical success factors, national leadership and commitment seem essential. In Canada, The Netherlands and England, national workforces have played a major role, for example with regard to education of HCPs, experience sharing, evaluation and feedback. However, it seems important to leave some flexibility to HCPs and local institutions, so that they can design initiatives adapted to their setting. The anchoring of recommendations in a legal and/or regulatory framework has also been shown to improve the adoption of recommendations into practice.

Transferability to other countries

Several (pieces of) recommendations and initiatives can be transferred across countries pending that they fit within the legal framework and particularities of the healthcare system, considering human resources, patient population, current processes and culture of staff.

Guidelines, tools and processes developed in one country can be used to some extent by other countries to design their own initiatives. Upon analysis of the content of national guidelines, we found that the problems and main solutions—when analysed at a high level of abstraction—are very similar across countries. National and international experiences on medication reconciliation procedure and tools are worth sharing. The Canadian expertise is being valued by the WHO High5's project and several other countries worldwide are implementing this project. This shows that the experience and expertise gained in one country (e.g. Canada) is valuable for other countries. But it is obvious that the implementation of different initiatives, e.g. on medication reconciliation, will not be achieved using a single specific model. Adaptations to national, regional or local factors will always be needed.

In contrast, other initiatives might not be transferred as such to other countries, for legal reasons. If we take the Belgian situation, several initiatives that have been developed in the UK are not transferable. First, using patients' own medicines during hospital stay is forbidden in Belgium. Second, dispensing medicines in original packs at discharge is also not possible because in most cases this would exceed the three-day dispensing that is currently allowed.

Transferability can also be limited for other reasons. Lessons from abroad learnt the importance of regulatory and/or financial incentives to apply the recommendations. However, the development of incentives has to be coupled with a pre-existing structure to measure indicators linked with the implementation of the recommendations, as it exists in Canada (hospital accreditation) and UK (measurement of indicators). Such a structure is not yet available in other countries, where straightforward application is therefore not possible. However, it might encourage decision-makers to develop these structures.

Finally, what is considered as "usual care" in one country might be different in another country, and this consideration is important to take into account when interpreting the results of this review. The implementation of clinical pharmacy is a good example. Clinical pharmacy is part of standard care in five out of the seven countries selected (the two countries with no routine clinical pharmacy are Denmark and France). Although the exact meaning of "clinical pharmacy" might differ between countries, clinical pharmacists are often responsible for performing medication reconciliation on admission and at discharge. In the results section of the present paper no specific "clinical pharmacy" initiative was presented, probably because this is now standard care, but these pharmacists—for example in Canada—often played a major role in the development of guidelines and/or standardized procedures to improve continuity of care.

Limitations

The present study has several limitations. First, the use of grey literature, despite its added value, has limitations. A structured identification, extraction and analysis of data remains challenging, due to heterogeneity in indexing and reporting. It is therefore possible that some relevant information was not identified through our search strategy, although validation by national experts should have limited this risk. In addition we might have missed initiatives performed in other countries. Furthermore, it was sometimes difficult to precisely characterise the level of

implementation due to lack of data. Second, generalisation to other countries is not straightforward. Nevertheless we found that several initiatives are transferable.

Conclusion

Through an analysis of grey literature from a selection of countries, we identified a range of initiatives that were taken at national and regional levels to improve continuity in medication management: national guidelines and campaign, IT support development to exchange information, local consultation and use of standardized forms. All initiatives have in common that they are built up of a number of interacting components and require interdisciplinary collaboration. Success factors include leadership and commitment, as well as tailoring to local needs and IT support. Although not all initiatives are directly transferable to other countries, we believe the key elements of the interventions, including their success and failure factors, can be used when designing a system to optimise continuity of care in a specific healthcare system. Importantly, many initiatives need more evaluation to further quantify their impact on quality, safety and cost-effectiveness.

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Conflicts of interest None.

Appendix 1: Websites browsed

Australia

Australian Commission on Safety and Quality in Healthcare (www.safetyandquality.gov.au), Commonwealth Department of Health and Ageing (www.health.gov.au), Australian Pharmacy Council (http://pharmacycouncil.org.au/content/), Australian Pharmaceutical Advisory Council (for http://australia.gov.au/search), The Pharmacy Guild of Australia (www.guild.org.au/the_guild), Pharmaceutical Society of Australia (www.psa.org.au), eHealth (www.health.gov.au/internet/main/publishing.nsf/Content/eHealth), and (www.nehta.gov.au/).

Canada

Canadian Patient Safety Institute (www.patientsafetyinstitute.ca), Safer Health Care Now (www.saferhealthcarenow.ca), Canadian Council on health services accreditation (www.accreditation.ca), Quality Healthcare Network (www.qhn.ca), Canadian Pharmacist Association (www.pharmacists.ca/), Ordre des Pharmaciens du Québec (www.opq.org/), Canadian Institute for Health information (www.cihi.ca), Canada Health Infoway (www.infoway-inforoute.ca).

Denmark

The European Observatory on health systems and Policies—Denmark 2007 (www.euro.who.int/en/who-we-are/partners/observatory), The Danish Medicine Agency (www.dkma.dk), The Danish Medicine Agency—Medicine Profile (www.laegemiddelstyrelsen.dk), The Danish Pharmaceutical Association (www.apotekerforeningen.dk), Ministry of Health and Prevention (www.sum.dk/English.aspx), Sundhedsstyrelsen—Danish National Board of Health (www.sst.dk/English.aspx), Medcom (www.medcom.dk/wm109991), Sundhed—The Danish eHealth Portal (www.sundhed.dk/service/english/), Digital Sundhed—Connected Digital Health in Denmark (www.sdsd.dk/), National Board of e-health (www.nsi.dk).

England

National Health Service (NHS; www.nhs.uk), Department of Health (www.dh.gov.uk), National Institute for Clinical Excellence (NICE; www.nice.org.uk), The Royal Pharmaceutical Society of Great Britain (www.rpsgb.org.uk/), National Prescribing Center (www.npci.org.uk), The Care Quality Commission (www.cqc.org.uk), Healthspace (www.healthspace.nhs.uk), The NHS Institute (www.institute.nhs.uk).

France

Haute Autorité de Santé (www.has-sante.fr), Agence Française de Sécurité Sanitaire des Produits de Santé (www.afssaps.fr/), Ordre National des Pharmaciens (www.ordre.pharmacien.fr/), Société Française de Pharmacie Clinique (www.sfpc.eu/fr/).

The Netherlands

Koninklijke Nederlandse Maatschappij (www.knmp.nl); Project: Overdracht van medicatiegegevens in de keten (www.medicatieoverdracht.nl).

US

Joint Commission on the Accreditation of Healthcare Organizations (www.jointcommission.org), Institute for Healthcare Improvement (www.ihi.org/), Agency for healthcare research and quality in US (www.ahrq.gov/), United States Department of Veteran Affairs (www.va.gov/health/), NHS connecting for health—newsroom—"world view" reports (http://webarchive.nationalarchives.gov.uk/*/http://www.connectingforhealth.nhs.uk/archive), My Healthevet (www.myhealth.va.gov), Veteran Affairs Resource Center—VIRec (www.virec.research.va.gov).

Appendix 2: Experts consulted

Australia

Experts: Dr. Simon Bell, Associate Professor, Project Director Veterans' MATES, Quality Use of Medicines and Pharmacy Research Centre, Sansom Institute, University of South Australia, Australia; Dr. Timothy Chen, Assistant Professor, Faculty of Pharmacy, University of Sydney, Australia; Ms. Glena Ellitt, Faculty of Pharmacy, University of Sydney, Australia; Dr. Rebekah Moles, pharmacy lecturer, Faculty of Pharmacy, University of Sydney, Australia.

Canada

Dr Margaret Colquhoun, project leader ISMP Canada; Pr Louise Mallet, clinical pharmacist at the University of Montreal.

Denmark

Tina Eriksson PhD GP, President of European Association for Quality in General Practice (EQuiP) Consultant of DAK-E, Danish Quality Unit of GP; Henrik Schroll, Senior researcher, PhD, head of the National Quality Unit—IT department University of Southern Denmark; Simon Schytte-Hansen, hospital pharmacist, orthopedic surgery department, Amager Hospital, Copenhagen.

England

Saskia Vercaeren, Specialist Pharmacist Cardiac Services, Barts and the London NHS Trust, Catherine Picton BSc, MBA, MRPharmS. Author of "Keeping patients safe when they transfer between care providers—getting the medicines right".

France

Benoît Allenet, hospital pharmacist, PhD, Université Joseph Fourier et Centre Hospitalier Universitaire de Grenoble.

The Netherlands

J. F. Schüsler, KNMP; Nicolette van Horssen, KNMP; Fatma Karapinar, hospital pharmacist in training and researcher, Department of hospital pharmacy, Sint Lucas Andreas Ziekenhuis, Amsterdam and Division of Pharmacoepidemiology and Pharmacotherapy, Faculty of Science, Utrecht Institute for Pharmaceutical Sciences, Utrecht University.

US

Maureen layden, md, mph, veterans health administration, director, va medication reconciliation initiative, va central office: pharmacy benefits management.

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