

Seamless care with regard to medications between hospital and home

KCE reports 131C

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Federaal Kenniscentrum voor de gezondheidszorg - Centre fédéral d'expertise des soins de santé – Belgian Health Care Knowledge Centre.

Centre Administratif Botanique, Doorbuilding (10th floor)

Boulevard du Jardin Botanique 55

B-1000 Brussels

Belgium

Tel: +32 [0]2 287 33 88

Fax: +32 [0]2 287 33 85

Email : info@kce.fgov.be

Web : <http://www.kce.fgov.be>

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ANNE SPINEWINE, VEERLE FOULON, CORALINE CLAEYS, JAN DE LEPELEIRE,
PIERRE CHEVALIER, FRANCISKA DESPLENTER, SABRINA DE WINTER,
CHRISTOPHE DUMONT, VALÉRIE LACOUR, STEVEN SIMOENS,
CÉCILE DUBOIS, DOMINIQUE PAULUS

KCE reports I3IC

Title:	Seamless care with regard to medications between hospital and home
Authors:	Anne Spinewine (Université catholique de Louvain, Cliniques Universitaires de Mont-Godinne et Centre de Pharmacie Clinique), Veerle Foulon (Katholieke Universiteit Leuven, Research Centre for Pharmaceutical Care and Pharmaco-economics), Coraline Claeys (Université Libre de Bruxelles, Faculté de Pharmacie), Jan De Lepeleire (Katholieke Universiteit Leuven, Academisch Centrum Huisartsgeneeskunde), Pierre Chevalier (Université Catholique de Louvain, Centre Académique de Médecine Générale), Franciska Desplenter (Katholieke Universiteit Leuven, Research Centre for Pharmaceutical Care and Pharmaco-economics), Sabrina De Winter (Universitaire Ziekenhuizen Leuven, ziekenhuisapotheek), Christophe Dumont (Grand Hôpital de Charleroi, Service de Gériatrie), Valérie Lacour (pharmacien), Steven Simoens (Katholieke Universiteit Leuven, Research Centre for Pharmaceutical Care and Pharmaco-economics), Cécile Dubois (KCE), Dominique Paulus (KCE)
External experts:	Corinne Bouüaert (Département de Médecine Générale, ULG), Marie-Thérèse Celis (Association belge des praticiens de l'art infirmier), Alain Chaspierre (Société Scientifique des Pharmaciens), Evelyne Delmée (pharmacien, Hôpitaux Iris Sud), Martine Generêt (pharmacien, CHU Charleroi), Francis Heller (Médecine interne, Centre Hospitalier de Jolimont), M. Lombard (Fédération Nationale des Infirmiers de Belgique), Frie Niesten (Alliance Nationale des Mutualités Chrétiennes, Bruxelles), Alice Peters (Laboratoire d'Anthropologie des Mondes Contemporains, ULB), Mirko Petrovic (Gériatrie, UZGent), Dominique Putseys (CHR La Citadelle, Liège), Jan Saevels (Centre de Développement Scientifique des Pharmaciens, Association Pharmaceutique Belge), Stephane Steurbaut (pharmacien, UZ Brussel), Frank Van Beeck (pharmacien, UZ Antwerpen), Irène Vanden Bremt (FOD Volksgezondheid)
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External validators:	Christine Bond (Head of Centre of Academic Primary Care, University of Aberdeen), Thierry Pepersack (Gériatrie, Hôpital Erasme, Bruxelles), Hugo Robays (Vakgroep Farmaceutische analyse, UGent)
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FOREWORD

Thousands of patients are hospitalised every year in Belgium, raising the question of the continuity of their pharmaceutical treatment at the time of hospital admission and discharge. The list of medications can be long, complex or even not available at the time of admission, while problems arise at discharge if the treatment is not communicated clearly or properly interpreted by the patient and carers. The risks of these transitions across settings of care are known since long time ago as for example unintentional treatment discontinuation, drug interactions, overdoses or unidentified contraindications. It is estimated that at least one in four patients experiences drug-related problems related to suboptimal continuity in medication management when moving from one care site to another.

This research subject was proposed by the Belgian Pharmaceutical Association's "Task Force Seamless Care", a scientific group that is interested in this problem and the solutions to be provided. The Federal Public Health Service also demonstrated an interest by financing dozens of initiatives relating to the transition across sites of care, however without any specific focus on medications.

Miracle solutions have not been found but by combining a variety of research methods this project highlights solutions to be considered to optimise seamless care with regard to medications.

This research benefited from remarkable cooperation between pharmacists and physicians at the UCL and K.U.Leuven. We would like to thank them for their professionalism and excellent scientific cooperation.

Jean Pierre CLOSON
Vice Director general

Raf MERTENS
Director general

Executive summary

INTRODUCTION

Seamless care with regard to medications is extremely important when a patient transfers from one setting of care to another, in particular between hospital and home. The problems identified at the time of this transition can be categorised as follows (in accordance with the results of the qualitative study described later):

- Problems on hospital admission: for example an incomplete list of medications, the absence of information in case of emergency admission;
- Problems at hospital discharge: for example a patient not (sufficiently) informed, lack of communication with general practitioner (GP), insufficient supplies of medications for the weekend;
- Problems linked to health care professionals (HCPs): for example GP's opinion different to that of the specialist, lack of assistance to the patient with regard to medications management;
- Problems linked to patients and families: for example failure to understand treatment, non-compliance;
- Problems linked to the process: illegible documents, substitutions by HCPs.

Depending on the studies, these problems affect between 20% and 60% of patients after hospital discharge.

OBJECTIVES

This project aims at proposing a system to improve continuity of care with regard to medications, on admission as well as at discharge from the hospital.

The term “seamless care” (or “continuity of care”) used in this project refers solely to the continuity in medication therapy in case of transition between different health care providers or settings. Specifically, the care environments considered in this project are the ambulatory setting (home and residential care) and the hospital setting.

The specific objectives of this project are to perform:

- A systematic review of the international literature on the impact and cost effectiveness of initiatives aimed at improving continuity of care between settings with regard to medications;
- An analysis of seamless care initiatives that have been implemented at national or regional levels in seven selected countries;
- A summary of Belgian data on problems related to discontinuity of care, as well as initiatives to improve continuity of care focusing on medications;
- A quantification of the medication changes that are made following a hospital stay in Belgium, changes potentially bringing risks in terms of seamless care;
- A qualitative analysis of the perception of HCPs in Belgium on approaches to improve seamless care with regard to medications.

LITERATURE REVIEW

The systematic review of the indexed literature identified no meta-analysis or systematic review concerning actions to improve seamless pharmaceutical care. Twenty-eight (28) studies with a control group were identified and 15 of them were selected on the basis of quality. However, the heterogeneity of the populations, of the interventions and the quality of these studies do not allow final conclusions to be drawn regarding the effectiveness of the actions proposed.

CLINICAL IMPACT OF THE ACTIONS

Most of the interventions focused on hospital discharge. Some studies examined the communication with the GP and pharmacist (sending the treatment schedule for example). Other studies analyzed patient information by a HCP before and/or after discharge (mostly by a clinical pharmacist). The patient populations vary (4 studies in geriatrics) but generally exclude the most vulnerable patients (e.g. psychiatric, dementia, illiterate patients). In most studies, the intervention was provided by clinical pharmacists, in the context of multidisciplinary team working. Only one study of sufficient quality analyzed the impact of computer-based support on the process of care.

Most studies focused on process measures (e.g. medication discrepancy). Some studies also evaluated the impact on measures such as hospital readmissions. The interventions for which there is evidence of a positive impact on process measures and/or clinical outcome measures were provided both at and after discharge. They included: patient education and counselling, interventions focusing on both patients and primary care providers. However, the studies reviewed do not allow drawing definite conclusions on the clinical or humanistic impact of interventions. The transferability to the Belgian health care system is hampered by differences between the Belgian situation and that of the studies analyzed (US, Australia, Canada).

IMPACT OF ACTIONS ON COST-EFFECTIVENESS

The economic evaluation analyzed six cost-effectiveness studies and one cost-utility study. The data on effectiveness are generally based on questionnaires completed by patients, combined with other information sources (patient records, etc.). The costs taken into account vary widely depending on the studies. Most of these studies conclude that there is a positive effect in terms of compliance and readmission rates. However, the heterogeneity of the interventions, populations and parameters considered do not permit an appraisal of the cost-effectiveness of the interventions proposed.

ANALYSIS OF INITIATIVES ABROAD

The analysis of national and regional initiatives was performed for the following countries: Australia, Canada, Denmark, the United States, France, the Netherlands and the United Kingdom. The principal actions include:

- the development and implementation of guidelines for HCPs,
- national information campaigns,
- education of HCPs,
- the development of information technologies as to share patient and prescription data between settings of care.

The participation and responsibility assuming of the different HCPs in the ambulatory as well as in the hospital setting are necessary in all these initiatives. Although the described initiatives have existed for a decade or more, they are evolving continuously. According to the literature and the experts involved, the success factors are the existence of incentives for implementation (accreditation system, financial penalties), the adaptation of initiatives to the local context, the commitment of the participants, leadership to convey national and local forces and IT support. On the other hand, the lack of human and financial resources, carers who do not take responsibility, are poorly trained, or lack interest, and difficulties in agreeing on solutions to guarantee data security and confidentiality are obstacles to initiatives.

There are scarce data on the impact of these initiatives – apart from a description of their intake in practice - except at local level. Even if these initiatives cannot be implemented as such in Belgium they provide interesting data for the future development of a Belgian system to optimize seamless care with regard to medications.

SITUATION IN BELGIUM

The analysis of the situation in Belgium consists of three sections: a synthesis of documents that describe Belgian initiatives, an analysis of prescription data and a qualitative study that analyzes the opinions of health care professionals, patients and stakeholders of the Belgian health care system.

LITERATURE CONCERNING BELGIAN INITIATIVES

A total of 66 initiatives were analysed: 43 were research projects (with published results) and 23 were other initiatives.

Most are local projects of limited size. Nine projects analyzed the added value of medication history taking by a clinical pharmacist at the time of admission. Six projects studied the impact of patient counselling at the time of discharge, either by a clinical pharmacist or a nurse. Other interventions studied the impact of procedures in improving the quality of care at admission or discharge (for example, the effect of a letter to the community pharmacist). A number of projects investigated the opinions and experiences of HCPs and patients.

The high number and variety of projects show the interest for this topic as well as the involvement of care providers from different settings in the development of solutions. The evaluation of the projects shows a positive effect on several process measures (patient knowledge, match between treatment prescribed and treatment followed). As in the case of the international literature, the clinical and economic impact is not shown. These projects do not therefore, at present, provide quality scientific data relating to the effectiveness of these interventions in Belgium. However, they do provide information on the obstacles and facilitating elements to be considered when putting in place this type of interventions.

ANALYSIS OF PRESCRIPTION DATA

Prescription data were analysed for possible changes in chronic medication after hospitalisation. The literature shows that these changes are a frequent source of discontinuity of treatment. The analyses focused on statins and proton pump inhibitors (PPI), and were limited to medications issued for a same patient in the 3 months preceding hospitalisation and in the 3 months following hospitalisation (data from the Inter-mutualistic Agency). Any changes within the same chemical group (ATC level 4) were investigated, for example: change from a generic to the originator (or vice versa); change from one chemical substance to another (e.g. Simvastatine EG[®] to Lipitor[®]) or change in name of speciality (e.g. Cholemed[®] to Docsimvastatine[®]), or change in tablet dosage.

Changes in chronic medication have been identified in 17% of the patients treated with statins and in 29% of the patients using proton pump inhibitors. However, these data do not allow identifying the reasons for change and the risks for the patient.

QUALITATIVE STUDY

A qualitative study concluded this research. This aimed mainly to identify potential solutions, their level of priority and their feasibility in Belgium. Eleven focus groups were organised: 9 groups with health care professionals (and patients) and 2 groups with stakeholders. At the start of the meetings, the participants drew up a long list of problems. These were grouped into five categories (see introduction).

The many possible solutions proposed by the participants included:

- increasing awareness among patients and HCPs in relation to problems linked with transition between settings of care and the shared responsibility of all actors to improve quality e.g. national campaign;
- standardisation of procedures: e.g. standardised discharge letter, availability of an updated medication list of the patient, in electronic or paper form;
- development of IT solutions: e.g. electronic prescription, electronic medical and pharmaceutical file accessible by different care providers at various care settings with the patient's consent;
- new billing codes to help definite out-patient groups in medication management;
- an improvement of the transition process: assistance of a clinical pharmacist, contact with primary care HCPs before discharge.

An important factor mentioned in most groups is the need for responsibility on the part of the various care providers involved. When a coordination is required, the GP is often mentioned as the most appropriate HCP.

The participants to the focus groups also agreed on the necessity of seamless care with regard to medications for every patient. However, certain vulnerable groups require special attention as for example geriatric patients, patients with a psychiatric profile, patients on poly-medication.

BUILDING BLOCKS OF A SYSTEM TO IMPROVE SEAMLESS CARE FOCUSING ON MEDICATIONS

The aim of this last section was to identify building blocks for the development of a quality improvement system to optimize seamless care focusing on medications. The main findings of the research were combined with interviews of experts involved in sharing electronic data in Belgium. The elements identified in this analysis are as follows:

At policy level

- National guidelines for HCPs, guidelines that have to be adapted to the local level;
- A coordination structure at regional level to implement the guidelines at local level;
- A national campaign directed at HCPs and patients to increase awareness of the problem and to insist on everyone's responsibility;
- The introduction of financial incentives or regulations (such as accreditation systems) to support the implementation of the guidelines;
- An adequate financing of the time invested to improve seamless care, especially before and after hospital discharge;
- An electronic infrastructure that facilitates continuity care, especially at the moment of transitions;
- A better knowledge and consideration of the different rules in force at the various settings of care (for example, the stimuli to prescribe generics in general practice);
- Special attention to vulnerable patient groups, the definition of which may depend on the local context;
- Research to evaluate the clinical, humanistic and economic impact of the current initiatives;

At the health care professional level

- Enhancing the involvement and commitment of HCPs (doctors and pharmacists, in hospital and ambulatory setting);
- A structure for local concertation (between hospital and ambulatory care) to improve the collaboration between HCPs of the different settings of care;

At the patient level

- On admission to hospital: use of different sources of information and standardized procedures to perform medication history and medication reconciliation;
- At discharge from hospital: timely, structured, and comprehensive information for patients and primary care professionals;
- At discharge from hospital: appropriate medication supply for patients to cover the period (weekend) before it is possible to purchase medications;
- After discharge from hospital: reinforcement of information and medication reconciliation (ie a procedure to ensure a match between theoretical treatment and what the patient actually takes);
- Availability of an accurate medication plan for each patient, accessible for each HCP involved (preferably also in electronic format).

KCE RECOMMENDATIONS^a

This report did not identify any robust scientific evidence on interventions to enhance seamless care but the following suggestions could improve the situation:

- **There should be a need to compile, publish and circulate good practice guidelines on seamless care with regard to medication, this on the basis of international guidelines and on the results of this research (including the procedures described in the last chapter relating to hospital admission and discharge); these guidelines require cooperation between pharmacists, doctors and other care providers in the hospital environment and in primary care;**
- **The attention of care providers and patients should be drawn to the importance of the continuity of medications at the time of transition between care sites and to the shared responsibility of all in this matter;**
- **The sharing of patient data in electronic form should become increasingly operational so that the medical data of interest, including an updated list of medications, would be made available to the patient and to the care providers concerned while respecting the rules of safety and confidentiality;**
- **Seamless care focusing on medications at the admission and discharge from hospital should be formalized in clear procedures;**
- **The training of health professionals who work in ambulatory care or in hospitals should include aspects relating to this issue;**
- **The possible financing of initiatives relating to seamless care focusing on medications between home and hospital should be subject to a credible evaluation aimed at demonstrating subsequent clinical and possibly economic effects.**

^a The policy recommendations are under the full responsibility of the KCE

Scientific summary

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LIST OF ABBREVIATIONS

A	Admission
ADE	Adverse drug event
APB Belge	Algemene Pharmaceutische Bond/Association Pharmaceutique
AVK	Apothekers Vereniging Kortrijk
AZ	Algemeen Ziekenhuis
BOA	Brugse en Oostendse Apothekersvereniging
C	Clinical outcome measure
CDSP	Centre de Developpement Scientifique des Pharmaciens
CM	Christelijke Mutualiteit
CPRS	Computerized Patient Record System
CSR	Corporate Social Responsibility
D	Discharge
DRP	Drug Related Problem
ECHO	Economic, Clinical and Humanistic Outcomes
EHR	Electronic Health Record
FNRS	Fonds National de la Recherche Scientifique
FOD	Federale Overheidsdienst
GP	General Practitioner
H	Humanistic outcome measure
HADS	Hospital Anxiety and Depressions Scale
HCP	Health Care Professional
IBBT	Interdisciplinair instituut voor BreedBand Technologie
IPSA	Instituut voor Permanente Studie voor Apothekers
IT	Information Technology
IWT	Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen
KMEHR	Kind Messages for Electronic Health Record
LMWH	Low Molecular Weight Heparin
MDT	Medication Discrepancy Tool
NA	Not Applicable
OTC	Over-The-Counter
P	Process measure
SCL	Symptom Checklist
SCR	Summary Care Record
SEL	Samenwerking Eerste Lijn
SIT	Samenwerkingsinitiatieven Inzake Thuisverzorging
SPF	Service Public Fédéral

SSMG	Société Scientifique de Médecine Générale
SSPF	Société Scientifique des Pharmaciens Francophones
SUMEHR	Summarised Electronic Health Record
UZ	Universitair Ziekenhuis
WGK	Wit Gele Kruis

I INTRODUCTION

I.1 DEFINITION OF SEAMLESS CARE

Several definitions of seamless care (or continuity of care between settings) have been published in the literature. In 2000, a review of continuity of care across all medical disciplines concluded that the concept of continuity of care was broad and frequently led to misunderstanding. This review proposed a multi-element definition¹:

1. The experience of a co-ordinated and smooth progression of care from the patients' point of view (experienced continuity);
2. Excellent information transfer following the patient (continuity of information; continuity and coherence of medical record);
3. Effective communication between professionals and services and with patients (cross-boundary and team continuity);
4. To be flexible and adjust to the needs of the individual over time (flexible continuity);
5. Care from as few professionals as possible, consistent with other needs (longitudinal continuity);
6. To provide one or more named professionals with whom the patient can develop a therapeutic and interpersonal relationship (relational or interpersonal continuity).

This work focuses on seamless care with regard to medications and the authors searched for a more specific definition: they found three definitions of seamless care or continuity of care that included the medication component.

In 1998, the Canadian Society of Hospital Pharmacists and the Canadian Pharmacists Association defined seamless care as “the desirable continuity of care delivered to patient in the health care system across the spectrum of caregivers and environments”². “Spectrum of caregivers” refers to multidisciplinary care and how members of different health care professions interact to provide total patient care. “Environments” refer to different health care settings and transition between them³.

The same year, the Australian Pharmaceutical Advisory Council developed continuity of care guidelines focusing on medication management. They defined seven principles to ensure continuity of care in medication management: (1) identifying a person to coordinate the medication discharge plan, (2) obtaining an accurate medication history, (3) evaluating the complete medication list for appropriateness, (4) developing a treatment plan that is part of the overall care plan, (5) dispensing an adequate amount of medication at discharge, (6) ensuring the patient has been educated about the discharge treatment plan, and (7) communicating to follow-up health care⁴.

In 2003, the American Society of Health-System Pharmacists⁵ developed a definition of continuity of care in medication management based on a consensus-building approach using a modified Delphi process: “Continuity of care is a longitudinal process that is coordinated and provided among practitioners and organizations over time, consistent with the ongoing needs of the individual patient. Medication management is an essential component of continuity of care. All entities responsible for an individual’s health care, including practitioners from multiple professions, health care organizations, and the individuals themselves, should strive for cohesive care across a continuum of sites (from intensive care to self-care) that is responsive to changes in needs over time”.

For the purpose of this work, the authors combined the 'general' Canadian definition with the 'specific' medication component of the Australian definition. For the latter they made a few modifications in order to increase sensitivity and specificity and also specified a transition between the hospital setting and another non-hospital setting. This choice was made for homogeneity purposes and because this is a frequent transition, which has been the most researched, and has been shown to be a high-risk situation. Therefore the authors define continuity of care or seamless care (used synonymously in this report) with regard to medications as:

"The desirable continuity of care delivered to patient in the health care system across the spectrum of caregivers and environments². "Spectrum of caregivers" refers to multidisciplinary care and how members of different health care professions interact to provide total patient care. "Environments" refer to different health care settings (one of them being the hospital, the other being community care [home, rehabilitation care facilities and long term care facilities]), and transition between them³. The most important principles to ensure continuity of care in medication management include: (1) having well-defined processes of care and responsibilities across the spectrum of caregivers, (2) obtaining an accurate medication history, (3) developing a treatment plan on admission as well as at discharge that is part of the overall care plan, (4) dispensing an adequate amount of medication at discharge, (5) ensuring the patient has been educated about the discharge treatment plan, and (6) communicating to follow-up health care⁴.

This report focuses on the bidirectional transition between hospital and community.

It is important to highlight that optimising seamless care is just one component of quality improvement focusing on the use of medicines. Other important quality improvement measures, such as assessing the quality of prescriptions, are not the focus of this research.

1.2 PROBLEMS ASSOCIATED WITH DISCONTINUITY OF CARE IN RELATION TO MEDICATIONS

Medication management is an essential component of continuity of care⁵. Despite the desirability of such continuity, patients often experience drug-related problems (DRPs) as a result of discontinuity of care. DRPs are events or circumstances involving drug therapy that potentially or actually interfere with the patient achieving an optimal outcome⁶. The risk for DRPs increases in case of transfer of the patient from a setting of care to another one. On admission to hospital, a recent literature review outlined that there was at least one error in medication history for 27%–54% of patients and that 19%–75% of the discrepancies were unintentional⁷. International research estimated that about 63,7% of the patients discharged from the hospital experience drug related problems⁸. Two prospective^{9, 10} studies in North America (Canada and US) found that 19 to 23% general medicine patients experienced adverse events after discharge from hospital. Adverse drug events (ADEs) were the most common type of adverse events: more than half of them could be prevented and were improvable (duration or severity could have been decreased). More specifically, about 60 % of unplanned re-admissions of elderly people could be avoided by a more efficient intervention at discharge from the hospital¹¹.

2 OBJECTIVES AND RESEARCH QUESTIONS

Several initiatives to improve continuity of care have already been developed, in Belgium or abroad, as for example transmission of discharge plan to primary care providers, medication reconciliation process on admission and at discharge, patient medication counselling at discharge, nationwide on-line prescription records and post discharge telephone follow-up.

This project aims at proposing a system to improve continuity of care with regard to medications, on admission as well as at discharge from the hospital. Since several countries have expertise in this matter, the existing know-how and information will be drawn-up, compared, evaluated and tested for usefulness in Belgium.

More specifically, the objectives of this project are:

1. to systematically review the international literature on the impact of initiatives aiming at improving continuity of care between settings with regard to medications ; in a separate chapter, to review the international literature on the cost-effectiveness of initiatives aiming at improving continuity of care between settings with regard to the use of medications;
2. to review the grey literature on seamless care initiatives or recommendations that have been developed in 6 selected countries;
3. to summarise Belgian data on drug related problems related to discontinuity of care, as well as initiatives to improve continuity of care focusing on medications;
4. to quantify the extent of drug substitution as a result of a hospital stay in Belgium (as one cause of changes in medication therapy and a potential source of drug-related problems);
5. based on data from the first three objectives, to conduct focus groups with Belgian healthcare professionals, patients and stakeholders to evaluate the usefulness and feasibility of systems to improve continuity of care in Belgium.
6. based on Belgian and international findings, to highlight lessons learned for a quality improvement system and to discuss practical considerations for their implementation in Belgium.

3 EFFECT OF INTERVENTIONS TO IMPROVE CONTINUITY OF CARE WITH REGARD TO MEDICATION: SYSTEMATIC REVIEW OF THE INTERNATIONAL LITERATURE

3.1 RESEARCH QUESTIONS

The objective of this chapter is to systematically review the international literature on the impact of initiatives aiming at improving continuity of care between settings with regard to medications. The research questions are as follows:

- Setting: Transition between ambulatory care (including nursing homes) and hospital care worldwide;
- Perspective: patients admitted and/or discharged from hospital; health care professionals caring for these patients in the outpatient and inpatient settings;
- Intervention: Seamless care interventions with a focus on medications;
- Comparison: usual care;
- Evaluation: Process measures (eg medication discrepancies, medication related problems); clinical and humanistic outcome measures (economic outcome measures are reported separately in the next chapter).

3.2 METHODOLOGY

3.2.1 Search strategy

3.2.1.1 Databases

The indexed literature search was conducted within the following databases: Medline (OVID), EMBASE, the Cochrane Database of Systematic Reviews, Cumulative Index of Nursing and Allied Health Literature (CINAHL), International Pharmaceutical Abstracts (IPA). The different databases were searched in June and July 2009. All details are provided in appendix I. The search strategy relative to economic studies is detailed in the next chapter.

3.2.1.2 Selection criteria

The following inclusion criteria were applied:

- Date of publication: from 1995 onwards;
- Language: English or French or Dutch;
- Sample: Patients admitted to hospital and/or patients discharged from hospital (no age or other limitations regarding the patients); health care professionals caring for these patients in the outpatient and inpatient settings;
- Intervention: Seamless care interventions focusing on medications;
- Study design: Experimental and quasi-experimental studies (parallel group studies), systematic reviews and meta-analyses.

The exclusion criteria are detailed in appendix I.

3.2.2 Critical appraisal of the evidence selected

All studies were appraised using a grid including 14 different items¹² used in another KCE project. The tool and procedure are detailed in appendix I.

Systematic reviews and meta-analysis were appraised using the Dutch Cochrane grid also displayed in appendix I.

3.2.3 Data extraction

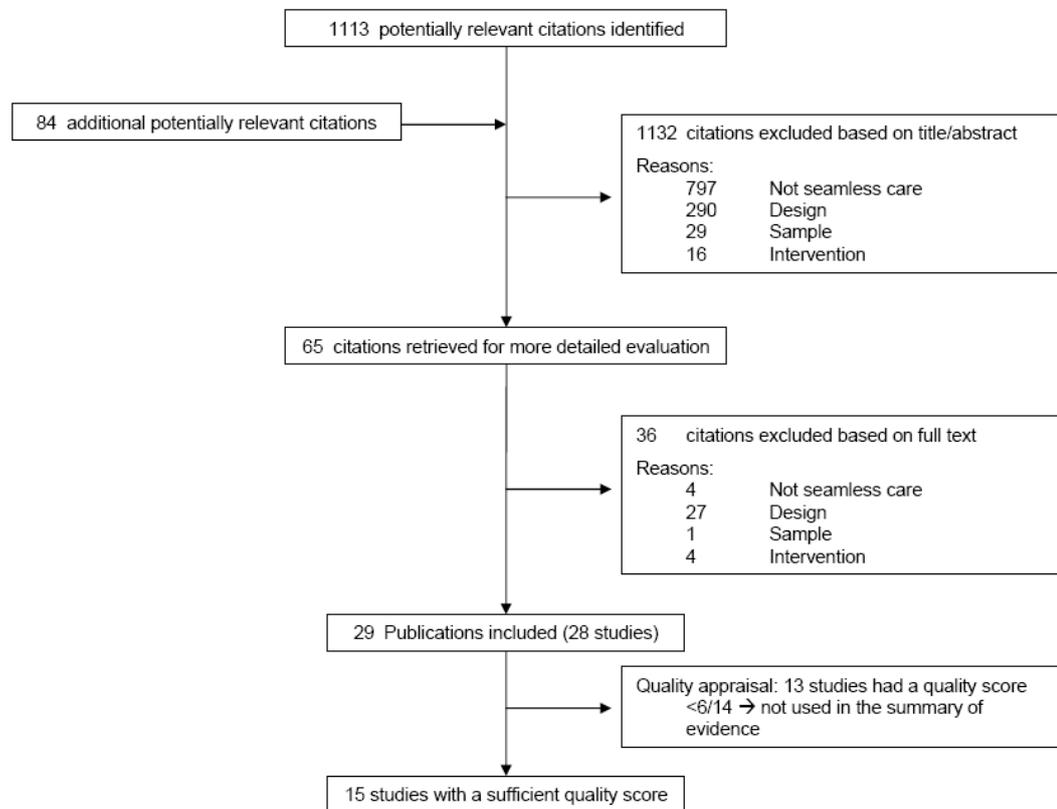
A data extraction form was developed and pilot tested on a small number of studies before the final form was decided upon. This form was also used for the extraction of data from the projects conducted in Belgium (see chapter 6). This form summarized specific information i.e. the research setting, study population, focus of transition, study design, objectives of the study, type and characteristics of intervention, outcome measures, main findings, comments. Data extraction was performed by one member of the research team (PC) and checked by a second member (AS). Disagreements were resolved by consensus.

3.3 RESULTS

3.3.1 Search results

The detailed search results are provided in appendix I and summarized in the figure below.

Figure I: Selection process for the inclusion of the studies



No systematic review/meta-analysis exclusively focused on seamless care in relation with medications. However, several of them had included individual studies that possibly fitted the inclusion criteria and were consulted for this purpose ^{13, 14, 15, 16, 17, 18, 19}.

3.3.2 Characteristics of the included studies

Two studies focused on the admission component only, and investigated the impact of a structured and comprehensive medication history done by a pharmacist on admission. In contrast, the vast majority of studies (n=21) focused on the discharge component. These interventions were delivered before discharge, shortly after discharge, or before and after discharge. Finally, in five studies, the interventions were delivered both on admission and at discharge: three of them involved computer-based interventions. The interventions often targeted the patients, sometimes the primary care providers (GPs and/or community pharmacists), or both.

The studies were conducted in the United States of America (n=9), the United Kingdom (n=7), Canada (n=4), Australia (n=3), The Netherlands (n=2), Germany, Spain, and Northern Ireland (1 for each).

The majority of studies were randomised controlled studies, several of them at a cluster level. When the intervention was provided by a health care professional, pharmacists were mostly involved, followed by nurses. The characteristics and main results of these 28 studies are summarised in the table below. Their full details are in a separate document available upon request.

Table I: characteristics of studies included in the review: quality appraisal score and summary of the main results

IA. Studies focusing on admission

Ref	Sample	Design	Intervention	Control	Effect of the intervention	QS
Nester 2002 ²⁰	100 patients admitted to a tertiary-care referral hospital USA	CT	Structured pharmacist medication history (if needed, the pharmacist contacted the patient's community pharmacy to clarify the medication regimen)	Standard care: nurse-conducted medication histories	P: more clinical interventions performed by pharmacists (p<0.05); more patients identified as taking herbal preparations, non prescription medications (p<0.001)	6*
Kwan 2007 ²¹	464 patients with preadmission clinic appointment before surgical procedures in one tertiary-care teaching hospital Canada	RCT	Structured pharmacist medication history interview (if needed contact with community pharmacy or GP) and generation of a postoperative medication order form	Standard care: nurse-conducted medication histories and surgeon-generated medication orders	P: less patients with at least 1 postoperative medication discrepancy related to home medications (p<0.001), including for discrepancies with the potential to cause possible or probable harm (p<0.001)	9*

Abbreviations: *: publication selected for the synthesis of evidence (QS \geq 6); CT: controlled trial; GP: general practitioner; P: process measure; QS: quality score (/14); RCT: randomised controlled trial.

IB Studies focusing on discharge

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Communication of discharge information to primary care providers							
Kunz 2007 ²²	178 primary care practices, patients prescribed new medications at discharge Germany	Cluster RCT	One-sentence evidence summaries appended to discharge letters for GPs	Discharge letter without evidence summary	≥100 days	P: decrease in non adherence to discharge medication (p=0.039) H: most GPs enthusiastic but few felt the summary provided new information	5
Duggan 1998 ²³	501 general medical patients in one teaching hospital UK	CT	Copy of the discharge drug information given to the patient for the community pharmacist	Usual care (no letter for the community pharmacist)	10 weeks	P: lower rate of unintentional drug discrepancies (p<0.001), including discrepancies judged to have a definite adverse effect (p<0.01)	0
Gutschi 1998 ²⁴	135 postcardiac surgery patients at a University Institute Canada	RCT	(a) Discharge letter given to the patient for the community pharmacist (b) Discharge letter given to the patient for the community pharmacist and the GP	Hospital pharmacist counselling	3 months	P: no statistically significant difference in pneumococcal or influenza vaccination rates 3 months after discharge	1
Lalonde 2008 ²⁵	83 patients discharged from a geriatric, family medicine, or psychiatric ward (urban hospital) with ≥ 2 pharmacotherapeutic changes Canada	RCT	Medication discharge plan (MDP) sent to community pharmacist and GP	Usual care (routine pharmaceutical care): MDP completed but not sent and not given to patients	1 week	P: no difference in the rate of medication discrepancies	9*
Patient education and counselling							
Provided before discharge							
Hayes 1998 ²⁶	60 elderly (≥ 60 yrs) patients discharged home from 3 rural ED USA	RCT	Individualized computer-generated discharge instructions designed within a geragogy framework	Usual preprinted discharge instructions with handwritten medication information	2-3 days	P: greater knowledge of medication (p=0.016)	12*

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Al Rashed 2002 ²⁷	83 elderly patients on 2 care of the elderly wards and discharged home on ≥4 drugs, with medication problems, UK	Cluster RCT	Predischarge pharmaceutical counselling	Usual care: medication and information discharge summary given at discharge, and explanations by a nurse	3 months	P: better medication knowledge (p<0.01) and compliance (p<0.001) C: fewer unplanned visits to GP and hospital readmissions (p<0.05)	2
Voirol 2004 ²⁸	291 patients admitted to a general academic pediatric ward and discharged on ≥1 new medication USA	RCT	Proactive program of discharge planning by the pharmacy team	Usual care (assistance from the pharmacy team only upon request)	Median 12 days	P: increased caregivers' probability to obtain prescribed medications within 24 hours (p=0.027; but not significance in the final MV model); no difference in caregivers' knowledge of how to correctly administer medications	9*
Manning 2007 ²⁹	337 patients discharged from 4 medical units in one teaching hospital with > 3 discharge medications and returning to self-care at home USA	RCT	3D: durable display at discharge	Medication list and schedule generated electronically by the nurse and given to the patient	7-14 days	P: greater understanding of prescribed medication (p<0.05); C: no significant difference in self-reported medication errors H: no significant difference in patient satisfaction	7*
Lowe 1995 ³⁰	88 patients discharged home from 2 pairs of medical wards at a general hospital UK	Cluster RCT	Hospital self medication program in which patients are educated about their medicines and given increasing responsibility for taking them in hospital	Discharge information given by a nurse	10 days	P: better compliance score (p<0.02) and knowledge of the purpose of their medicines (p<0.001)	5
Perelles 1996 ³¹	107 patients admitted to geriatric assessment and rehabilitation program in 2 geriatric units and discharged home Canada	RCT	Three-stage self-medication program	Standard care: medications administered by the nursing staff	40 days	P: no significant difference in ability to self-medicate and medication knowledge, better medication compliance 1 month after discharge (p<0.001) H: no significant difference in morale	9*
Provided after discharge							
Dunn 1995 ³²	204 patients discharged from a geriatric hospital to their homes UK	RCT	Home visit by a health visitor 72 hours after discharge to evaluate and improve medication management	Normal post-discharge care (no visit)	28 days	P: less tendency to start drugs C: More of the study subjects than the control subjects were back in the hospital or had moved into a nursing or residential home; no difference in survival, cognitive	5

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Dudas 2001 ³³	221 medical inpatients discharged home with pharmacy-facilitated discharge (one service, one teaching hospital) USA	RCT	Follow-up phone call by a pharmacist 2 days after discharge	Usual care (=pharmacy-facilitated discharge) – no phone call	30 days	and physical function, services requested and supplied at 28 days post-discharge H: more patients satisfied with medication discharge instructions 15 days after discharge (p=0.007) C: decreased rate of visits to ED (p=0.005) and hospital readmission (p=0.07) 30 days after discharge E: total cost savings \$11,910 P: resolution of medication-related problems	1
Vuong 2008 ³⁴	316 patients ≥55 yrs discharged home from 2 acute-care tertiary teaching hospitals at risk of drug-related problems Australia	RCT	Community liaison service: home visit from a community liaison pharmacist within 5 days after discharge (+ report to GP and community pharmacist)	Standard care (discharge counselling, provision of compliance aids and communication with primary healthcare providers when necessary)	8-12 weeks	P: no significant difference in number of medications taken; improvement in self-perceived medication understanding in intervention patients (p<0.001); significant improvements in adherence in both groups	6*
Provided before and after discharge Cabezas 2006 ³⁵	134 patients admitted for heart failure in two hospitals and discharged home Spain	RCT	Pharmaceutical care program: discharge counselling + post-discharge telephone calls (monthly for 6 months, then ev 2 months for 6 additional months)	Usual care	1 year	C: fewer hospital readmissions and days in hospital (significant at 2 and 6 months, non significant at 12 months), fewer deaths (p<0.05) P: better patient compliance E: saving in hospital costs 578€/patient H: no difference in quality of life, higher patient satisfaction (p<0.05)	10*
Schnipper 2006 ³⁶	178 patients discharged home from the general medicine service at a large teaching hospital USA	RCT	Pharmacist: medication review, patient counselling at discharge, and follow-up telephone call 3 to 5 days later (+ communication to GP)	Usual care: routine review of medication orders by a ward-based pharmacist and medication counselling by a nurse at the time of discharge	30 days	C: lower rate of preventable ADEs (p=0.01); lower rate of preventable, medication-related ED visits or hospital readmission (p=0.03); no difference in total ADEs, health care utilization P: no difference in medication adherence H: no difference in patient satisfaction	9*

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Complex interventions focusing on both patients and primary care providers							
Provided before discharge							
Smith 1997 ³⁷	66 elderly patients discharged from one hospital to their own home, likely to experience difficulties with their medication UK	RCT	Normal discharge information + verbal counselling by a pharmacist + written information about their pharmaceutical care plan. Copies of the plan given to the patients + instruction to show to their doctor and pharmacist.	Normal discharge information (usual pharmaceutical care, medicine record card, copy of discharge prescriptions)	7-10 days	P: better compliance ($p < 0.01$); less patients with therapeutic management not maintained after discharge (75% vs 96%)	1
Shaw 2000 ³⁸	97 patients from 2 adult and 1 care of the elderly acute admission wards at one psychiatric hospital UK	RCT	Pharmacy discharge planning, patient education, discharge plan sent to community pharmacist	Usual care	12 weeks	C: not significant decrease in hospital readmission ($p = 0.065$); P: no significant difference in medication knowledge; fewer medication problems and non-compliance	5
Provided after discharge							
Hugtenburg 2009 ³⁹	715 patients registered in 37 community pharmacies, discharged from hospital to the community, and using ≥ 5 prescribed medicines The Netherlands	Cluster CT	Comprehensive pharmaceutical care by community pharmacists at discharge (medication review and reconciliation, home visit, medication scheme, GP informed)	Usual care	9 months	P: more changes in drug therapy C: no difference in mortality E: reduced medication costs H: increased patient satisfaction about drug counselling ($p < 0.001$)	3
Provided before and after discharge							
Nazareth 2001 ⁴⁰	362 patients ≥ 75 years discharged from 3 acute general and 1 long-stay hospital on ≥ 4 medicines UK	RCT	Pharmaceutical discharge plan by a hospital pharmacist, given to the patient, carers and professionals; home visit by a community pharmacist 1-2 weeks after discharge	Usual care: discharge letter to the general practitioner listing current medications	6 months	C: no significant difference in hospital readmission 3 and 6 months after discharge, mortality, care utilization P: no difference in medication knowledge and adherence H: no difference in patient general well-being and satisfaction	8*

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Crotty 2004 ⁴¹	110 older inpatients (3 metropolitan hospitals) awaiting transfer to a long-term care facility Australia	RCT	Pharmacist transition coordinator: medication management transfer summary for GP and community pharmacist, medication review by community pharmacist and multidisciplinary case conferences	Usual care: standard hospital discharge summary	8 weeks	P: Lower scores of inappropriate prescribing (MAI) at follow-up (p=0.006); C: Better pain control (p=0.023) and lower hospital use (p=0.035); no significant difference in adverse drug events, falls/mobility, behavior/cognition	9*
Jack 2009 ⁴²	749 medical patients admitted to a medical teaching service and discharged to the community USA	RCT	Reengineered Hospital Discharge = patient education and comprehensive discharge planning by a discharge nurse, summaries faxed to primary care provider, postdischarge telephone reinforcement 2-4days after discharge by a clinical pharmacist (+ communication to primary care providers)	Usual care	30 days	C: lower rate of hospital utilization 30 days after discharge (p 0.009) and higher rate of primary care follow-up visits (p<0.001) P: better self-reported preparedness for discharge (p=0.013) E: 33.9% lower observed cost	8*

Abbreviations: *: publication selected for the synthesis of evidence (QS \geq 6); ADE: adverse drug event; C: clinical outcome measure; CT: controlled trial; E: economic outcome measure; ED: emergency department; GP: general practitioner; H: humanistic outcome measure; MAI: medication appropriateness index; MV: multivariate; P: process outcome measure; QS: quality score (/14); RCT: randomised controlled trial.

I C. Studies focusing on both admission and discharge

Ref	Sample	Design	Intervention	Control	Time of f-up	Effect of the intervention	QS
Stowasser 2002 ⁴³	240 patients admitted to 8 acute wards and 1 orthopaedic pre-admission clinic at 2 major hospitals, and returning to the community following discharge Australia	RCT	Medication Liaison Service: drug history by a clinical pharmacist on admission (+ confirmation by GP and community pharmacist) + discharge plan communicated to GP and community pharmacist upon discharge	Clinical pharmacist: medication history on admission; standard discharge summary (routine clinical pharmacy service)	30 days	P: more clinical pharmacy interventions and changes in drug therapy (p<0.05) C: no significant effect on length of stay, mortality, readmission (p=0.055); fewer health care professional visits per patient (p<0.05) H: no significant difference in change of functional health status (but tendency to more improvements)	7*
Bolas 2004 ⁴⁴	243 medical inpatients ≥55 years, taking ≥3 regular drugs, discharged to the community Northern Ireland	RCT	Community liaison pharmacist: comprehensive drug history on admission, discharge counselling, and information to GP and community pharmacist	Standard clinical pharmacy service (no discharge counselling)	3 months	P: less discrepancies between discharge prescription and home medication (significant for drug names and dosage frequencies) P: better knowledge of drug therapy (p<0.001)	4
Computer-based interventions							
Smith 1996 ⁴⁵	348 inpatients of an acute medical service of a university-affiliated medical centre USA	Cluster RCT	computer-generated drug list to cancel or renew previous outpatients prescriptions, or to prescribe new medications	No cancelling outpatient drugs; writing all medications on individual prescriptions	0	P: fewer prescriptions on admission and at discharge, but no significant difference in the increase from admission to discharge (p=0.87)	3
Vanderkam 2001 ⁴⁶	139 patients admitted in one hospital and cared for by a participating GP The Netherlands	Prospective cohort	electronic communication between GP and local pharmacy to transfer data about prescriptions	Paper-based communication	10 days	P: better agreement between the GP and community pharmacist on current medication of the patient – but insufficient	0
Schnipper 2009 ⁴⁷	322 general medical inpatients (14 medical teams, 2 academic hospitals) USA	Cluster RCT	Computerized medication reconciliation tool and process redesign involving physicians, nurses, and pharmacists and supported by information technology	Usual care	30 days	P: significantly lower rate of unintentional discrepancies between preadmission medications and admission or discharge medications that had potential for harm C: non significant decrease in hospital readmission or emergency department visit	10*

Abbreviations: *: publication selected for the synthesis of evidence (QS≥6); C: clinical outcome measure; GP: general practitioner; H: humanistic outcome measure; P: process outcome measure; QS: quality score (/14); RCT: randomised controlled trial.

3.3.3 Quality of the studies

Fifteen studies had a quality score $\geq 6/14$. Five studies received a score of 5 and 8 studies had a score between 0 and 3. The items that were most often rated as negative were: sample size, blinding, and confounders addressed. The full details of the scores are in Appendix I.

3.3.4 Summary of the evidence

The summary of the impact of interventions is based on the studies (n=15) with a quality score of 6 and above. Due to heterogeneity between studies in terms of population, intervention, and measures of evaluation, a quantitative meta-analysis was not possible.

3.3.4.1 *Interventions focusing on admission*

Two studies evaluated the impact of medication histories conducted by pharmacists (including, if needed, a contact with general practitioners (GP) and community pharmacist) as compared to histories conducted by nurses^{20, 21}. The first study found that the intervention led to more interventions performed by clinical pharmacists during hospital stay, and that more patients were found to take herbal preparations and non-prescription medications²⁰. Kwan et al. found a significant decrease in postoperative medication discrepancies that had the potential to cause possible or probable harm²¹. However none of the studies evaluated the impact of history taking on clinical outcomes.

3.3.4.2 *Interventions focusing on discharge*

Communication of discharge information to GP and community pharmacist

Several studies evaluated the effect of communicating discharge information to GP and/or community pharmacists, but only one of them reached a quality score of more than 6²⁵. This study evaluated the impact of sending a medication discharge plan to the community pharmacist and GP. The authors found no difference in the rate of medication discrepancies (in this case, any discrepancy between the medication discharge plan and (i) the discharge prescription, (ii) the patient's community pharmacy dispensing records or (iii) the patient's medication self-report). However, the control group received routine pharmaceutical care as provided in Canada, including medication history on admission and discharge counselling (the latter was provided to 79% of intervention patients and 66% of control patients), and this – together with the small sample size – could have diluted the effect of the intervention.

Education and counselling of patients before discharge

Four trials evaluated the effect of educating patients before discharge from hospital^{26, 28, 29, 31}. The results are somewhat disappointing, and despite having a sufficient quality score, the studies have many weaknesses e.g., patient selection biases, insufficient power of the study.

Hayes et al reported greater knowledge of medication in patients receiving discharge instructions specifically designed for elderly people when compared to usual discharge instructions²⁶. The patients – voluntary elderly people – were taking few medications and complex regimens were not frequent. In addition, the adherence was not evaluated. This limits the value and generalisability of the results.

Voirol et al. found mixed results on the effect of a proactive discharge program for caregivers of pediatric patients²⁸. However, the baseline level of discharge management was high (86% of caregivers in the control group stated that they received information on the medications before discharge from a pharmacist, nurse or physician), and there was insufficient power to detect any significant difference.

Pereles et al evaluated the effect of a three-step self-medication program: (1) patient counselled by the pharmacist about his/her medications and the medication regimen, (2) patient given a 24-hour supply of medication to self-administer, (3) patient given several days supply of medication³¹. Patients were monitored by the nursing staff and the pharmacist. Both control and intervention patients had a 20-minute counselling session with a pharmacist 3 days before discharge and received a 40-day supply of medications from the hospital pharmacy. The medication that they had previously used at home were stored at the hospital during the trial and returned at the follow-up visit. These two interventions (i.e. 40-day supply, and storing+returning at follow-up visit) are far from what is done in the Belgian context and therefore limit the generalisability of the findings.

Manning et al. evaluated the effect of a redesigned patient education discharge tool with durable display (space in which a tablet or pill is to be affixed and displayed) in patients discharged home with at least three medications²⁹. They reported greater understanding of prescribed medication, but no significant difference in self-reported medication errors and patient satisfaction. Limitations included a high dropout rate of 48%, and a lack of data on the validity of the measures used to evaluate the impact of the intervention.

Education and counselling of patients after discharge

The only trial that evaluated the effect of a pharmacy service provided a few days after discharge is of limited interest³⁴. The authors aimed to evaluate the effect on readmission rates, but the required sample size was never reached, and the results on this primary outcome were not reported. Nevertheless the authors reported higher improvements from baseline in medication adherence in the intervention group as compared to the control group (secondary outcome measure).

Education and counselling of patients at and after discharge

The most informative studies relative to patient education are those where the intervention was provided both at and after discharge. Two randomised controlled trials were identified and they both measured an impact on outcome measures (clinical and humanistic or economic measures) in addition to process measures of evaluation^{35,36}.

Schnipper et al. evaluated the effect of pharmacists who provided patient counselling at discharge and during the follow-up (telephone calls three to five days later). The population was a general patient population discharged from a teaching hospital to the community setting (n=178, mean 58,4 years, median n medications= 8)³⁶. The pharmacists providing the intervention found at least one medication discrepancy in 49% of patients upon discharge, and in 71% of patients during telephone calls. The problems identified were communicated to the medical team or to the primary care provider. They found significant reductions in the rate of preventable adverse medication events (evaluated by blinded researchers – absolute risk reduction (ARR)=10%, unadjusted OR 0.10, 95%CI 0.013-0.86, number needed to treat (NNT) calculated by ourselves = 10) as well as in the rate of preventable medication-related visits to the emergency department or hospital readmissions (ARR 7%, no CI provided, self-calculated NNT=14). This was observed despite a high rate of discrepancies in both groups 30 days after discharge (65% of control and 61% of intervention patients). There was no difference for the other secondary outcomes such as total ADEs (this was due to a higher rate of non preventable ADEs in the intervention group), health care utilisation, medication adherence, and patient satisfaction.

A Spanish study evaluated the effect of a pharmaceutical care program involving discharge counselling and post-discharge telephone calls during 1 year in a population of patients admitted for heart failure (n=134, mean age 75 years) and discharged home³⁵. The study population had a very low educational level, and the involvement of the caregivers was therefore essential. They found significantly fewer hospital readmissions and length of stay in hospital two, six and 12 months after discharge (ARR for readmission (%) and self-calculated NNTs were: at month 2: 13.6%- 7,3; at month 6: 17.9% - 5,6; at month 12: 15.5% - 6,5), and significantly fewer deaths. In addition, significant differences in patient adherence and patient satisfaction were found, but there was no difference in quality of life. Savings in hospital costs were also calculated: the results are presented in the economic part.

Complex interventions involving patients and health care professionals

In this report, « complex » interventions are those that aim to systematically target both patients and health professionals in order to optimise continuity of care.

The three randomised controlled trials with sufficient quality all investigated the effect of an intervention that was provided before and after discharge, and all three evaluated the effect of the intervention on outcome measures (clinical, economic, and/or humanistic) in addition to process measures^{40, 41, 42}. Two of them reported positive findings^{41, 42}.

Nazareth et al. found no impact of a comprehensive and time-consuming intervention (involving pharmaceutical discharge planning, communication with carers and healthcare professionals, and home visit by a community pharmacist) on hospital readmission (primary outcome measure), mortality, care utilisation, medication knowledge and adherence, patient general well-being and satisfaction⁴⁰. The time taken by the discharge pharmacist to prepare and administer each care plan was 5.5 hours per patient, which is far superior to the time needed by pharmacists in other studies that reported positive findings. The authors provide limited explanation for the absence of impact.

The study by Crotty et al., interestingly, was the only study focusing on patients discharged to a long-term care setting⁴¹. The health care professionals providing the intervention included a pharmacist transition coordinator, the community pharmacist as well as a multidisciplinary team (for case conferences). However, case conferences took place in only 14.3% and 3.7% of intervention and control patients, respectively. Despite this low percentage, the authors found significant improvements in appropriateness of prescribing (primary outcome measure), using a validated instrument, in pain control and hospital use. The study was underpowered to detect differences in secondary outcomes. No significant differences were found in ADEs, falls and mobility, behaviour and cognition.

Jack et al. evaluated the impact of a multidisciplinary approach (called the “Reengineered Hospital Discharge”): a discharge nurse was responsible for the patient-centred education before discharge, for the discharge planning, and a clinical pharmacist did telephone reinforcement with the patient two to four days after discharge⁴². In addition, discharge summaries were faxed to primary care providers on the day of discharge. Similarly to Schnipper, the research staff was blinded to treatment allocation. The authors found significantly lower rates of hospital utilisation 30 days after discharge (incidence ratio 0.695, 95% CI 0.515-0.937, p=0.009) and of primary care follow-up visits (ARR 18%, self-calculated NNT=5.6), better self-reported preparedness for discharge, and lower costs. The intervention was the most effective in the subgroup of patients with a preceding hospital admission in the previous six months. Two thirds (65%) of the intervention patients who completed their medication review with the pharmacist after discharge had at least one medication problem and 53% needed a corrective action by the pharmacist.

3.3.4.3 *Interventions focusing on both admission and discharge*

Two out of the five studies that focused on admission and discharge were selected after quality appraisal^{43, 47}.

The first study took place in two Australian hospitals⁴³. It analysed the effect of a medication liaison service between the hospital and the GPs/ community pharmacists. Similarly to Nester et al., the study found that more interventions were made by clinical pharmacists in the intervention group, reflecting that having a comprehensive drug history on admission was important to better optimise drug therapy during hospital stay. No significant differences were found in length of stay, mortality, readmission (but trend to reduction in the intervention group) and functional health status. There were fewer health care professional visits per patient in the intervention group. The study probably lacked power to detect significant differences in clinical outcomes.

The recent study from Schnipper et al. was a cluster RCT (at the level of the medical team) in two US hospitals⁴⁷. It was the only study focusing on computer-based intervention, namely a computerised medication reconciliation tool and process redesign involving physicians, pharmacists and nurses. The NNT to prevent one unintentional discrepancy that had potential for harm (PADE) was 2.6 (adjusted relative risk of 0.72, 95%CI 0.52-0.99). Although significant, the confidence interval was wide and close to non significance. Subgroup analyses showed that the effect was greater in patients at higher risk, that the reduction in PADE was significant at discharge but not on admission, and that the intervention was effective in one hospital only. One explanation could be that hospitals differed in the extent of the integration of the medication reconciliation tool into computerized provider order entry applications at discharge. The authors also reported non-significant decreases in hospital readmission or ED visits, but the study did not have sufficient power to detect differences in health care use.

3.4 DISCUSSION

3.4.1 General findings

About half of the included studies had a sufficient quality and were included in the synthesis of evidence. Nevertheless, the quality appraisal highlighted that these fifteen studies had methodological problems and several of them were underpowered to detect any significant improvement in clinical outcomes. There is therefore insufficient evidence to draw conclusions on several types of interventions, such as patient education and counselling that is provided either before or after discharge. This conclusion is similar to the one of Coleman several years ago: "The paucity of high-quality research examining transitional care is disproportionate to the magnitude with which these care handoffs occur each day and the importance of this topic for ensuring high quality care of patients with complex care needs"⁴⁸. Previous systematic reviews relative to continuity of care in general also highlighted the low methodological quality of the studies included^{13, 17, 19, 49}.

There is recent evidence showing that patient education and counselling that are provided before discharge and reinforced after discharge (mostly by pharmacists, sometimes by nurses, in some case with involvement of primary care providers), can decrease the risk of (preventable) hospital readmission and/or preventable ADEs. However, this has to be confirmed in further multi-center randomised controlled trials with adequate power to detect significant differences in relevant clinical outcomes.

A quantitative synthesis of the evidence was impossible due to the high variability between studies in the patient populations, outcome measures, and types of interventions.

3.4.2 Settings

The studies of acceptable quality were mostly performed in the United States, Australia, and Canada. The issue of applicability of the results to the Belgian health care setting is discussed below. Less than 50% of studies were multi-center and they usually involved no more than 3 hospitals. This limits the generalisability of the findings.

This review excluded studies where the patient was not admitted to and/or discharged from the hospital. Recent trials have been published about medication reconciliation^a in outpatient care^{50, 51, 52, 53}. These studies showed that engaging the health care members and the patient improved the accuracy of medication lists^{51, 52, 53}. A recent systematic review on interventions to improve medication reconciliation in primary care concluded that there was no good quality evidence demonstrating the effectiveness of medication reconciliation in the primary care setting¹³.

3.4.3 Study design

This review excluded before-after studies^{53, 54, 55, 56, 57, 58, 59} because they convey an important risk of bias, including the possibility of non-comparable groups at baseline, and the confounding effect of secular time trends. Such studies were sometimes included in previous systematic reviews^{13, 49}.

3.4.4 Patients populations

Most studies included patients discharged from the hospital irrespective of the presence of risk factors for experiencing problems during the transition. Two studies included patients with pharmacotherapeutic changes^{25, 28}, one study targeted patients at risk of medication-related problems³⁴ and two studies included patients taking at least three or four medications^{29, 40}. Four out of 15 studies specifically targeted elderly patients^{26, 31, 40, 41} but three of them did not take into account any other risk factor for inclusion. The goal of risk identification is to ensure that the patients who will most likely benefit from these services are identified, thereby enhancing the cost effectiveness of these interventions⁴⁸. This review shows that this is not yet the case: it could have been easier to demonstrate an overall significant impact of the interventions if the individual studies had more focused on at-risk patients. A recent study published after this search selected discharged patients at high risk of medication-related problems⁶⁰. However there was no significant impact of the intervention (pharmacist-facilitated hospital discharge program) on readmission rates or emergency department visits.

The majority of studies concentrated on patients discharged from medical or surgical wards to the community setting and managing their medications at home. These studies commonly excluded vulnerable patients, including those with language difficulties, unable to communicate, cognitively impaired, or discharged from psychiatric wards. However, these patients are at high risk of suffering from adverse consequences of discontinuity of care. Future research should, for example, evaluate the impact of involving patients' caregivers (only two studies clearly reported that caregivers were involved^{28, 35}) or design interventions for individuals with cognitive impairment.

The study by Cabezas et al. included patients with a very low educational level³⁵. These patients consult more easily emergency departments (and therefore bypass the GP): the finding of decreased readmissions in the intervention group cannot be generalised to a population with a higher educational level.

There are very limited data on patients transferred to postacute care settings, while this is an increasingly frequent situation. However, these transitions carry a high risk of problems because those settings are settings where patients' usual physicians do not practice and their previous medical records are not available⁶¹. Similarly, only one study focused on patients newly transferred to long-term care⁴¹ and this is also an area for further research.

^a Medication reconciliation is a process of identifying the most accurate list of all medications a patient is taking and using this list to provide correct medications for patients any-where within the health care system. Medication reconciliation has been widely implemented in healthcare organisations as a strategy to improve patient safety, but its effectiveness has been poorly studied .

3.4.5 Health care professionals involved

The vast majority of interventions were implemented by (clinical) pharmacists. Only the two studies focusing on admission directly compared two different health care professionals (in this case, a pharmacist and a nurse)^{20, 21}, which hampers the generalisation of the results due to the limited scope of the intervention (i.e. admission to the hospital).

Pharmacists are well trained to provide many supportive function of continuity of care. The chapter 6 will show that in many pilot projects on clinical pharmacy, the scope of the activities performed by these pharmacists includes seamless care. Murray highlighted one disadvantage i.e. the pharmacists are sometimes limited by a lack of prescribing authority and comprehensive medical training compared with physicians and by their distance from the frontline of care provided by nurses⁶². Hence, the pharmacists will be most effective when working closely in collaborative arrangements with physicians, nurses, and other healthcare team members. This was the case in the studies included in this review. It is also the case in the Belgian pilot projects around clinical pharmacy.

Nothing can be concluded on the role of community pharmacists. Three studies evaluated their role but were not included in the synthesis of evidence due to low quality scores^{23, 24, 39}. In three other trials the community pharmacist played a proactive role but its effect was either not documented or non significant^{34, 40, 41}. Finally, in other trials community pharmacists played a more passive role (i.e. they received discharge information) and were not the person responsible for coordinating the continuity of care.

Nurses are well positioned to provide a continuity of care, but their expertise on medications is not similar to that of pharmacists. No trial in this review exclusively addressed the role of nurses. This might be explained by the fact that nurses who provide a continuity of care usually have a broader scope of action than only medications: trials involving nurses might have therefore been excluded. Controlled studies show evidence that management of seamless care by advanced practice nurses can reduce the readmission rates for patients with congestive heart failure and for older patients with complex care needs⁶¹.

3.4.6 Interventions

3.4.6.1 *Limited literature on information technology*

There are limited data on the effect of information technology (IT) interventions. However authors underlined the fact that the implementation of technology is central for facilitating the transfer of information across settings⁴⁸. Ideally IT should bridge the gap leading to discontinuity, but this requires that all HCPs working in different settings would use a system for coding patient information that enables sharing information across care settings. Many hospitals and GPs have access to an electronic health information system but few have a system with a connection beyond the hospital, clinic, or office⁶¹.

In Belgium, such connections are mostly used for sharing information on laboratory results or diagnostic tests, but rarely on medications. Chapter 6 describes some ongoing initiatives at local or national level to that end. Kripalani et al. did a systematic review on communication and information transfer between hospital-based and primary care physicians⁴⁹. They reported that the delivery and perhaps the quality of discharge summaries can be improved substantially through health information technology⁴⁹. In Denmark the use of nationwide on-line prescription records has shown to improve the drug history in hospitalised patients⁶³.

It is tempting to assume that a shared electronic medical record will solve the information problems inherent in transitional care but the reality shows that this is not the case. First, transitional care is more complex than the simple exchange of information. Second, although it is important for clinicians to have ready access to a patient's medical record, they also must read the information carefully and act accordingly. Third, this information must be up to date and comprehensive.

3.4.6.2 *HCP accountable for the transfer of adequate information*

The model whereby an accountable HCP “bridges” the transition with the patient and caregiver, offers a number of benefits, including the facilitation of interdisciplinary collaboration between the sending and receiving care teams. This single contact HCP will address questions or concerns of patients and caregivers before, during and immediately after transfer; and the reconciliation of potential medication errors or discrepancies before they manifest⁴⁸.

In this review, this accountable HCP was most often a clinical pharmacist with appropriate knowledge and skills to provide continuity of care. In Belgium, the number of clinical pharmacists is still limited although rapidly increasing.

How much time does it take for a pharmacist to “provide continuity of care”? Several studies included in this review provided data on the time needed to perform the intervention^{21, 28, 34, 35, 40, 42}: 20 minutes per patient to perform a structured comprehensive medication history²¹, 40 minutes per patient for education upon discharge²⁸, 50 minutes per patient for discharge counselling and postdischarge telephone calls³⁵, 30 minutes for postdischarge telephone calls⁴². This time should be balanced against the time taken by GPs to clarify medication discrepancies after discharge (in “usual care” situations). Unfortunately, this is probably difficult to measure, and has never been reported in the studies reviewed here.

The cost-effectiveness of these interventions has been evaluated in a few trials, and is discussed in the next chapter.

There is no literature to inform if the HCPs responsible for the continuity of care need to be involved in the entire process of medication reconciliation for every patient. They could focus on patients at particularly high risk or when medication regimens are most in doubt. Similarly, patient counselling and early follow-up might be reserved for patients at highest risk of ADEs³⁶.

3.4.7 Potential interest to combine interventions

The selection process excluded experimental studies focusing on seamless care where we could not distinguish the impact on the medication component. Similarly, it excluded medication-specific interventions where the seamless care component could not be evaluated separately. Several large-scale and well-conducted studies with interesting results had to be excluded on this basis^{64, 65}. Those data could be further analyzed to assess the effect of complex interventions in seamless care.

3.4.8 Outcomes under study

All studies used process measures to assess the impact of the interventions. Some of them also measured clinical or humanistic outcomes.

3.4.8.1 *Process measures*

The process measures used included the following: medication discrepancies, changes in medication therapy (which is only an indirect measure of quality), treatment knowledge and compliance, number of interventions performed by pharmacists, quality of prescribing. Process measures are particularly well suited to measuring seamless care and have the advantage that they may not require formal case-mix adjustment techniques⁶¹.

Medication discrepancy is probably the most sensitive measure to evaluate interventions on seamless care. Ideally, it should be measured using a validated instrument, and the researchers should report unintentional versus intentional discrepancies separately, the causes of these discrepancies, and their potential for patient harm. The Medication Discrepancy tool, for example, enables this assessment⁶⁶. This is essential to fully evaluate the efficacy of the intervention.

3.4.8.2 Outcome measures

Clinical and humanistic outcome measures should be evaluated in parallel to process measures, to check if the improvements in process measures lead to relevant benefits for the patients. Several authors reported a positive impact on important clinical outcome measures (e.g. ADEs, readmission, health care use). Unfortunately, many studies lacked power to detect significant differences on such outcomes. Trends in improvement were observed, but no definite conclusions can be drawn.

Among studies that reported humanistic outcome measures (mainly patient satisfaction and quality of life), very few of them found positive significant findings. These measures were never primary outcome measures (and sample size was therefore not calculated based on such measures), with many potential confounders. No conclusion can therefore be drawn on this point.

3.4.9 Are the results applicable to Belgium?

As stated in 3.4.2., the countries under study have health care systems that differ from the Belgian one. In particular most studies conducted in Europe took place in countries where patients are registered with a GP. Links between the hospital setting and the first line of care are therefore easier to organize in those countries.

In Belgium the GP has mostly the responsibility for ensuring the continuity of care at discharge from the hospital. This role has hardly been studied in the selected literature. Moreover, the collaboration of the hospital team with the GP during the follow-up is not clear from the literature analysed in this report: interventions mainly occurred in the US, where the follow-up can be ensured by the hospital team and/or the specialist. More detailed information on the specificities of several countries will be provided in chapter 5.

In most cases the control group involved usual care. However, “usual care” in the countries involved is often very different from what can be considered as “usual care” in Belgium. “Usual care” groups often received “routine clinical pharmacy services”, which is not yet considered as usual care in our country where clinical pharmacy is developing. Therefore, the impact of the interventions might be higher if they were implemented in Belgium rather than in countries as the US or the UK.

Another example of differences was the provision/supply of medications for more than the three legally-allowed days in Belgium (up to 40 days in one study). The risk of discontinuity increases if the patient does not have enough medications when coming back home which is very likely in Belgium especially since the new legislation relative to “forfaitarisation” (see chapter 8). Delays in medication administrations after hospital discharge were found to be frequent in a recent small American study⁶⁷.

The position of community pharmacists might also be different from one country to another. Only since recently, Belgian community pharmacists receive financial incentives to provide basic aspects of pharmaceutical care. However, no financial incentive to be proactively involved in continuity of care and medication reconciliation has been implied so far. This is a barrier to effective involvement of community pharmacists in continuity of care. In other countries, pharmacists can get paid for educating patients (e.g. Canada) or performing medication review (e.g. Australia). The transferability of tasks described in other countries to community pharmacists in Belgium needs to take account of this different role and payment system.

3.4.10 Limitations of this systematic review

The search strategy was extensive but might have missed some publications, because there is a lack of structured and well-recognised thesauri (MeSH and Emtree) that are specific to the problem of seamless care.

As discussed earlier, several well-conducted studies had to be excluded based on the fact that they did not specifically evaluate the impact of a seamless care intervention on the medication component. For example, Coleman et al reported that coaching chronically ill old patients and their caregivers to ensure that their needs are met during care transitions reduced the rates of subsequent rehospitalizations⁶⁴. Gillespie et al. showed that the addition of ward pharmacists to health care teams (mainly to perform medication reviews and to optimise continuity of care) led to important reductions in morbidity and health care costs for people aged 80 and over⁶⁵. The data that such studies convey must however be taken into account when designing complex and broad interventions.

Key points

- **This chapter reviews the international literature on the impact of interventions to improve seamless care focusing on medication.**
- **The selection of articles focused on medication interventions for hospitalised patients in the transition between ambulatory and hospital care. A variety of types of interventions and target populations have been assessed.**
- **Twenty-eight studies were included in the review. Fifteen of them had sufficient quality scores to be included in the synthesis of evidence. These studies still carried important methodological weaknesses, e.g. with regard to sample size, outcome measured.**
- **Several categories of high-risk patients were not included in the studies. This might have diluted the effect of interventions.**
- **In most studies, the intervention was provided by clinical pharmacists, in the context of multidisciplinary team working. No conclusion can be drawn on the impact of other health professionals given the lack of studies.**
- **Most studies focused on process measures (e.g. medication discrepancy) but there is a lack of evidence on clinical outcomes.**
- **No conclusion can be drawn on the impact of patient education and counselling that is provided at or after discharge.**
- **The interventions for which there is evidence of a positive impact on process measures (such as medication discrepancies), and/or clinical outcome measures (such as hospital readmission) were provided both at and after discharge. They included: patient education and counselling, and interventions focusing on both patients and primary care providers**
- **There is very limited information on the impact of information technology approaches.**
- **The transferability to the Belgian health care system is hampered by differences in the role of the clinical/community pharmacist and other characteristics (e.g. “forfait” for medication)**

4 COST-EFFECTIVENESS OF INTERVENTIONS TO IMPROVE SEAMLESS CARE FOCUSING ON MEDICATION

4.1 INTRODUCTION

Drug-related problems related to discontinuity of care between health care settings have an impact on patient morbidity and mortality but they also impose an economic burden on patients, on the health care system and society. The health care cost of managing drug-related morbidity and mortality for ambulatory patients was estimated to amount to \$76.6 billion per year in the USA in 1995⁶⁸. Hospitalisation costs constituted 62% of this total cost, representing 8.7 million hospital admissions. An analysis updated the costs of morbidity and mortality arising from drug-related problems to \$177.4 billion per year for ambulatory patients in the USA in 2000⁶⁹.

Research has indicated that the most common type of drug-related problems affecting patients following hospital discharge are ADEs, followed by procedure-related injuries¹⁰. A literature review of the economic impact of ADEs found that preventable ADEs made up 43.3%-80% of all adverse outcomes in the ambulatory setting leading to emergency visits and hospital admissions, thus increasing health care costs⁷⁰.

In a context of spiralling healthcare costs and limited resources, policy makers and healthcare payers are concerned about the cost-effectiveness of approaches to improve seamless care focusing on medication. The need for health economics fits within an overall trend towards evidence-based decision making in health care⁷¹.

4.2 RESEARCH QUESTIONS

The aim of this chapter is to review the international literature on the cost-effectiveness of approaches to improve seamless care focusing on medication. This chapter provides a synthesis of economic evaluations of approaches to improve seamless care focusing on medication. Methodological issues surrounding the evaluation of the cost-effectiveness of approaches to improve seamless care focusing on medication costs are also explored. The relevance of the findings is discussed and gaps in the evidence base are identified.

4.3 METHODOLOGY

4.3.1 Search strategy

Studies were identified by searching Medline (PubMed), EMBASE, Centre for Reviews and Dissemination databases (Database of Abstracts of Reviews of Effects, NHS Economic Evaluation Database, and Health Technology Assessments Database), Cochrane Database of Systematic Reviews, and EconLit (OVID) up to August 2009. The bibliography of included studies was also checked for relevant studies. Additionally, the results of the literature review of the Belgian situation (see chapter 6) and the results of the systematic literature review (see chapter 3) were searched for relevant economic evaluations. All details of the search strategy are provided in appendix 2.

4.3.2 Selecting studies

Evidence about the cost-effectiveness of approaches to improve seamless care focusing on medication was derived from economic evaluations (a study contrasting an intervention with a comparator in terms of both costs and consequences⁷²). A summary of the main inclusion criteria is presented in the table below.

Table 2: Study inclusion criteria

Population	Patients in transition between ambulatory care (including nursing homes) and hospital care, and patients admitted to and/or discharged from hospital.
Intervention	Approaches to improve seamless care focusing on medication
Comparator	Usual care
Design	Full economic evaluations: studies contrasting an intervention with a comparator in terms of both costs and consequences Trial-based economic evaluations: economic evaluations based on a randomised controlled trial, cohort study, case-control study or before-and-after analysis*. Model-based economic evaluations: economic evaluations applying a decision-analytic technique (e.g. decision tree, Markov model)

* Wider criteria were agreed upon as compared to the systematic review described in chapter 3, to increase the chance to gather a minimum of studies

4.3.3 Critical appraisal of the evidence

The quality of economic evaluations was assessed by considering the perspective, study design (trial- or model-based economic evaluation); source of clinical and economic data; cost and consequence measures; allowance for uncertainty; and incremental analysis of costs and consequences⁷².

4.3.4 Data analysis and interpretation

To compare costs between studies, costs were actualized to 2007 values using a rate of inflation based on the evolution of the Consumer Price Index. Costs were converted using purchasing power parities for Belgium, i.e. market exchange rates adjusted for differences in purchasing power between countries and Belgium. Economic evaluations are summarized in table 4.

4.4 RESULTS

4.4.1 Search results

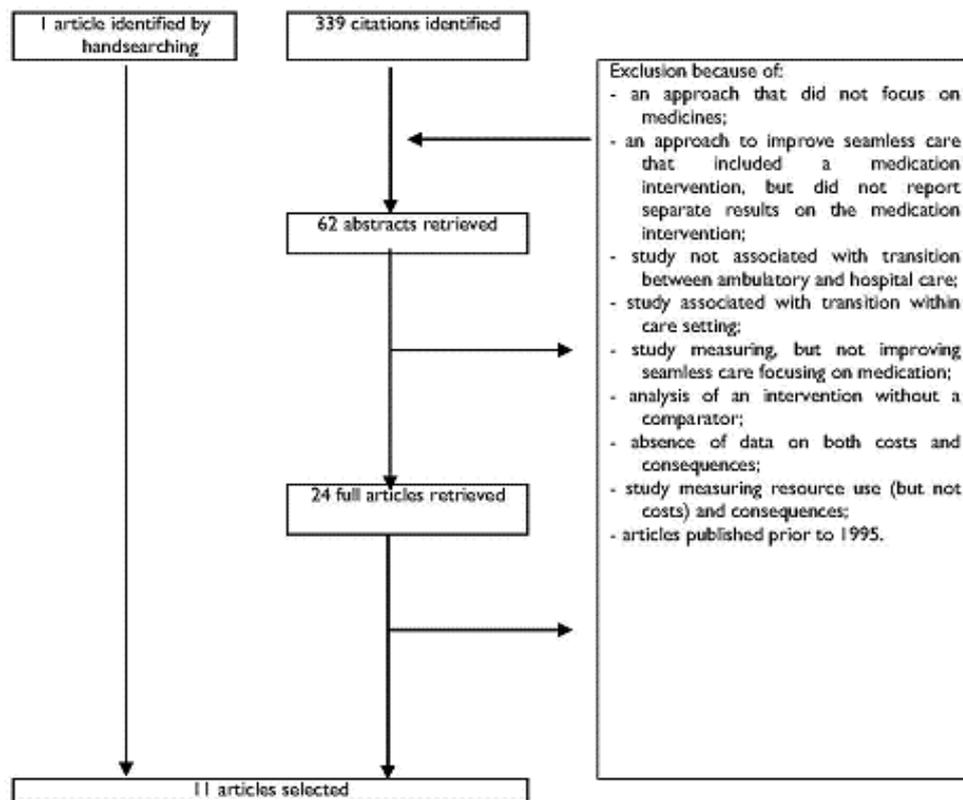
The detailed search results are summarized in the table below and in appendix 2.

Table 3: Search for cost-effectiveness studies: summary

Database	References identified
Medline	82
EMBASE	37
Centre for Reviews and Dissemination	
Database of Abstracts of Reviews of Effects	28
NHS Economic Evaluation Database	163
Health Technology Assessments	16
Cochrane Database of Systematic Reviews	22
EconLit	65
Total references identified	413
Duplicates	74
Total	339

Few studies have investigated the cost-effectiveness of approaches to improve seamless care focusing on medication. Of the 339 papers identified, 11 articles were included in the review (see Figure 2). Seven articles specifically explored approaches to improve seamless care focusing on medication. In addition, there is a literature on general integrated health care. Four of these articles related to initiatives that, amongst other things, included medication management.

Figure 2: Flow chart of literature search for economic studies



4.4.2 Evidence

This search identified four articles on general integrated health care, including medication management. These articles showed that general integrated health care including medication management generated better compliance, fewer hospital re-admissions, shorter length of stay, lower costs and similar clinical status than usual care^{64, 73, 74, 75}. However, as general integrated health care interventions consist of multiple components, these studies did not attribute results to individual components such as medication management. Therefore, these articles are not discussed further.

The characteristics of included economic evaluations of approaches to improve seamless care focusing on medication are displayed in table 4 (6 cost-effectiveness analyses and one cost-utility analysis). No cost-benefit analyses were identified. A variety of intervention types and target populations have been assessed, but the body of evidence is limited to one economic evaluation for each particular intervention type and each specific target population.

Table 4: Characteristics of economic evaluations to improve seamless care focusing on medication

Reference	Type	Sample	Intervention	Comparator	Costs and consequences
Smith 1997 37	Cost-effectiveness analysis	53 geriatric patients likely to experience difficulties with their medication UK	Patient counseling about their medicines and information about their pharmaceutical care plan. Patients received domiciliary visit 7-10 days after discharge.	Normal discharge information. Patients received domiciliary visit 7-10 days after discharge	Analysis demonstrated better compliance levels and less counseling required for the study group. A pharmaceutical domiciliary visit was necessary for 75% and 96% of study and control patients, respectively. The domiciliary visit prevented hospital admission in 3 study patients (saving 250 € per patient) and in 4 control patients (saving 374 € per patient).
Dudas 2001 33	Cost-effectiveness analysis	221 patients discharged from hospital to home USA	Pharmacist phone call 2 days after discharge asking patients about medications, such as whether they obtained and understood how to take them.	Usual care	More patients in the phone call than the no phone call group were satisfied with medication instructions (86% vs. 61%). Fewer patients in the phone call group returned to the emergency department within 30 days (10% vs. 24%). Total savings of the phone call intervention amounted to 11,992 €.
Cabezas 2006 35	Cost-effectiveness analysis	134 patients with heart failure Spain	Information about disease, diet and medication at discharge and telephone follow-up by pharmacist	Usual care	Patients in the intervention group had higher level of treatment compliance (85% vs. 73.9%), fewer hospital re-admissions (0.56 vs. 1.13), fewer days of hospital stay (5.9 vs. 9.6), higher satisfaction score (9.0 vs. 8.2), similar quality of life, lower costs (1,206 € vs. 1,905 €).
Jack 2009 42	Cost-effectiveness analysis	749 English-speaking adults admitted to a general medical service USA	Patient education and discharge planning in hospital by a nurse and post-discharge reinforcement by a pharmacist	Usual care	Patients in the intervention group had fewer hospital visits than patients receiving usual care (0.314 vs. 0.451 visit per person per month), a higher primary care follow-up visit rate (62% vs. 44%), were more prepared for discharge, and had lower hospital and outpatient costs (-348 € per person).
Hugtenburgh 2009 39	Cost-effectiveness analysis	715 patients using at least five prescribed medicines The Netherlands	An extensive medication review and drug counselling at the patient's home	Usual care	More patients in the intervention group indicated that they were (very) satisfied with drug counselling by the community pharmacist upon delivery of discharge medication (87% vs. 50%). The intervention did not influence discontinuation of drugs prescribed at discharge or mortality. Medication costs were reduced by 20.7 € per patient.
Desplenter 2009 76	Cost-effectiveness analysis	99 patients with major depressive episode Belgium	Medication information (un)differentiated according to patient information desire	Usual care	No differences were found between study groups in terms of compliance, anxiety symptoms, depressive symptoms, somatic symptoms, the number of side-effects, or patient satisfaction. Control patients had higher costs of hospital medicines and more hospital readmissions than patients in the undifferentiated group. Control patients had higher costs of primary care consultations and higher productivity loss than patients in the differentiated group.

Table 4: Characteristics of economic evaluations to improve seamless care focusing on medication

Reference	Type	Sample	Intervention	Comparator	Costs and consequences
Karnon 2009 77	Cost-utility analysis	Patients admitted to hospital UK	Pharmacist-led reconciliation; standardised forms, pharmacy technicians, hospital policy; nurses taking histories with standardised form; computerised assessment and feedback by pharmacist; current medication faxed from the general practice.	Usual care	The five interventions were extremely cost-effective when compared with the baseline scenario. Three interventions dominated the baseline scenario. Pharmacist-led reconciliation intervention has the highest expected net benefits, with a probability of being cost-effective of over 60% at a value of 13,000 € per quality-adjusted life year.

A British cost-effectiveness analysis investigated the impact of hospital-generated pharmaceutical care for geriatric patients who are likely to experience difficulties with their medication³⁷. Intervention and control patients received the normal discharge information. In addition to this, intervention patients were counselled by a pharmacist on why their medication had been prescribed, when to take their medicines, the correct use of their medication, side effects, the importance of compliance, and how to arrange a new supply. This information was written in a pharmaceutical care plan and provided to the patient. The patient in the intervention group was also asked to show this plan to their physician and pharmacist. The economic evaluation had a small sample size, enrolling 28 patients in the intervention group and 25 patients in the comparator group. Effectiveness data on compliance and the need for counselling were derived from patient questionnaires and expert opinion. The scope of costs was limited to savings arising from the prevention of hospital admissions, but did not include costs of medicines or consultations with primary care physicians.

The analysis demonstrated better compliance levels ($p < 0.01$) and less counselling ($p < 0.01$) required for the intervention group. A pharmaceutical domiciliary visit was necessary for 75% and 96% of intervention and control patients, respectively. The domiciliary visit prevented hospital admission in three intervention patients (saving 250 € per patient) and in four comparator patients (saving 374 € per patient). The authors concluded that a medication and discharge summary needs to be sent to the patient's primary care physician in advance of the normal discharge letter.

A US cost-effectiveness analysis examined the impact of providing telephone follow-up to patients who are discharged from hospital to home³³. Patients were randomly assigned to the control or to the intervention group. Pharmacists called patients two days following discharge with a view to counsel them on discharge medications and to assist them in obtaining medications (e.g. telephoning discharge prescriptions to the pharmacy and completing third-party insurance forms). Although the structure of the telephone calls was standardised, there was some variability in the actual phone call discussions, thus introducing the potential for performance bias. In general, the 110 patients in the phone call group had similar characteristics to the 111 patients in the control group (who did not get telephone follow-up), but some differences in discharge diagnosis were noted between groups.

The findings indicated that more patients in the phone call than the control group were satisfied with discharge medication instructions (86% vs. 61%; $p = 0.007$). Fewer patients in the phone call group returned to the emergency department within 30 days (10% vs. 24%; $p = 0.005$). Comparing the costs of the pharmacist intervention with the savings arising from the prevention of emergency department visits, the total savings of the phone call intervention amounted to 11,992 € (or 109 € per patient). Other health care costs (e.g. costs of medication, physician consultations) were not considered.

A Spanish cost-effectiveness analysis assessed the impact of providing information about the disease, medication therapy and diet education to patients with heart failure at hospital discharge and of carrying out a telephone follow-up³⁵. Pharmacists responsible for providing information were aware of patient allocation to intervention and control group. Data on treatment compliance, hospital admissions, length of hospital stay, quality of life and patient satisfaction were collected during follow-up visits by a cardiologist at 2, 6 and 12 months following discharge. It could be argued that these follow-up visits may have had an effect on effectiveness results (e.g. treatment compliance). Cost data were derived from the hospital perspective. Although 134 patients were enrolled in the study, the sample size may have been too small to detect significant differences at 12 months due to drop-out over time. Patients in the intervention and control groups had similar characteristics, except for the fact that patients in the intervention group had a higher ejection fraction. It should be noted that patients tended to have a low educational level, thus making it difficult to administer instruments that measure effectiveness.

The analysis showed that patients in the intervention group had a higher level of treatment compliance (85% vs. 73.9%), fewer hospital re-admissions (0.56 vs. 1.13), fewer days of hospital stay (5.9 vs. 9.6), a higher satisfaction score (9.0 vs. 8.2), and similar quality of life than patients in the control group. Comparing intervention costs with the costs of hospital stay during one year following hospital discharge, the intervention generated savings of 699 € per patient.

A US cost-effectiveness analysis enrolled 749 adults admitted to a general medical service to examine the impact of an intervention designed to minimise hospital utilisation within 30 days after discharge⁴². The intervention involved patient education and discharge planning in hospital by a nurse and post-discharge reinforcement by a pharmacist. In this analysis based on a randomised controlled trial, patients and providers were not blinded to treatment assignment. Some effectiveness and cost data were derived from patient questionnaires, thus raising the potential for recall and other biases.

Patients in the intervention group had fewer hospital visits than patients receiving usual care (0.314 vs. 0.451 visit per person per month; $p = 0.009$), a higher primary care follow-up visit rate (62% vs. 44%; $p < 0.001$), and were more prepared for discharge at 30 days. With respect to costs of hospital and outpatient visits, the intervention saved an average of 348 € per person. The authors did not consider the costs of outpatient medication.

A Dutch cost-effectiveness analysis evaluated an intervention targeted at patients using at least five prescribed medicines³⁹. The intervention consisted of an extensive medication review and drug counselling at the patient's home. Data were derived from a cohort study involving 37 community pharmacies and 715 patients. As pharmacies were able to choose their assignment to intervention or control group, there is a risk of selection bias. Also, intervention and control groups were not comparable: patients in the intervention group were younger and had a higher number of prescribed medicines. The authors measured changes in medication, mortality and medication costs. Hospital re-admission costs were not taken into account.

More patients in the intervention group indicated that they were (very) satisfied with drug counselling by the community pharmacist upon delivery of discharge medication (87% vs. 50%; $p < 0.001$). This was evaluated by sending a questionnaire to patients 6 to 9 months after discharge. The intervention did not influence discontinuation of drugs prescribed at discharge or mortality. Medication costs were reduced by 20.7 € per patient. The authors attributed the small impact of the intervention to the unstructured character of the medication review (for which pharmacists had not received any specific training) and to the fact that the intervention consisted of only one home visit.

A Belgian cost-effectiveness analysis explored whether the provision of differentiated medication information depending on the extent of patient information desire is more beneficial for the success of pharmacotherapy, the cost of medical care and the patient's wellbeing in comparison with undifferentiated information supply⁷⁶. This hypothesis was studied specifically for patients with a major depressive episode at hospital discharge. Three interventions were compared: a) undifferentiated information, with patients receiving a counselling session with the pharmacist on anti-depressants; b) differentiated information, with patients with a high information desire receiving a counselling session with the pharmacist on anti-depressants and patients with a low information desire receiving usual care; and c) usual care. The study examined the impact of medication information on economic parameters (costs of medication consumption, doctor visits, productivity loss and hospital readmission), clinical parameters (symptoms and side-effects), and humanistic parameters (quality of life and patient satisfaction). Some of these parameters were repeatedly measured post-intervention; at one month, three months and one year following hospital discharge.

The analysis failed to demonstrate any impact of medication information on clinical and humanistic parameters following hospital discharge. Patients receiving usual care tended to have higher costs for some parameters as compared to patients receiving (un)differentiated information. The authors acknowledged that the medication information intervention may have been too weak to measure changes in clinical and humanistic parameters. Also, as researchers contacted patients by telephone to collect data on parameters, the researchers in fact carried out an additional intervention, which may have influenced results. Finally, the authors stated that their results were in line with those of a literature review on the impact of educational interventions about medicines for psychiatric patients⁷⁸.

A British cost-utility analysis conducted a model-based economic evaluation of five interventions aimed at preventing medication errors at hospital admission from the health care system perspective⁷⁷. The five interventions were: a) pharmacist-led reconciliation; b) standardised forms, pharmacy technicians, hospital policy; c) nurses taking histories with standardised form; d) computerised assessment and feedback by pharmacist; and e) current medication faxed from the general practice. Each intervention was compared with usual care. Data on probabilities, costs and consequences were derived from a variety of sources from different countries. Data on the reduction in medication errors occurring with an intervention were derived from a literature review of non-randomised studies and, thus, can be questioned. In order to calculate quality-adjusted life years, the authors made assumptions about utility values and expected duration of adverse drug events.

The results indicated that the five interventions were very cost-effective when compared with the baseline scenario: the intervention based on the standardised forms and the intervention of nurses taking histories had additional costs of 241 € and 181 € per quality-adjusted life year gained, respectively. The three other interventions dominated the baseline scenario. The pharmacist-led reconciliation intervention had the highest expected net benefits, with a probability of being cost-effective of over 60% at a value of 13,000 € per quality-adjusted life year.

4.4.3 Methodological quality

Economic evaluations of approaches to improve seamless care focusing on medication suffered from a number of methodological limitations (see table 5).

4.4.3.1 *Perspective*

All but one economic evaluation were conducted from the hospital perspective or (part of) the health care system perspective. On the one hand, the hospital perspective is acceptable as interest in approaches to improve seamless care focusing on medication for patients admitted to hospital or patients discharged from hospital tends to focus on the impact of interventions on hospital readmissions and costs. On the other hand, the hospital perspective is too restrictive as approaches to improve seamless care focusing on medication have wider implications on other parts of the health care system, such as ambulatory care.

One study employed a societal perspective and measured indirect costs of productivity loss incurred by patients⁷⁶. For studies enrolling geriatric patients, the omission of costs of productivity loss may not be relevant. However, even in this case, the productivity loss of informal caregivers, such as family and friends, needs to be considered.

Who will pay for the intervention should determine the choice of the study perspective: a societal perspective may not be appropriate if an intervention is to be funded by a public health care system.

Table 5: Methodological quality of economic evaluations to improve seamless care focusing on medication

Reference	Perspective	Design	Source of data	Cost measures	Consequence measures	Allowance for uncertainty	Incremental analysis
Smith, 1997 ³⁷	Health care system	Evaluation based on prospective randomised controlled trial	Effectiveness data were derived from patient questionnaires and expert opinion. Cost data were derived from local hospital	Costs of prevented hospital admission	Compliance, counseling required, need for pharmaceutical domiciliary visit	No	No
Dudas, 2001 ³³	Hospital	Evaluation based on prospective randomised controlled trial	Effectiveness data were derived from patient questionnaires. Cost data were derived from hospital records	Costs of pharmacist time and prevented emergency department visits	Patient satisfaction	No	No
Cabezas, 2006 ³⁵	Hospital	Evaluation based on prospective randomised controlled trial	Effectiveness data were derived from follow-up visits by a cardiologist at 2, 6 and 12 months after discharge. Cost data were derived from hospital records	Costs of intervention and costs of hospital stay during one year after discharge	Treatment compliance, hospital admissions, length of hospital stay, quality of life (EuroQol), patient satisfaction	No	No
Jack, 2009 ⁴²	Health care system	Evaluation based on prospective randomised controlled trial	Effectiveness and cost data were derived from patient questionnaires and hospital records.	Costs of hospital and outpatient visits during 30 days following discharge	Number of hospital visits, self-reported preparedness for discharge, rate of primary care follow-up visits	No	No
Hugtenburg, 2009 ³⁹	Outpatient setting	Evaluation based on prospective cohort study	Effectiveness and cost data were derived from pharmacy information systems and patient questionnaires	Medication costs	Medication changes, patient satisfaction	No	No
Desplenter, 2009 ⁷⁶	Society	Evaluation based on cohort study	Hospital and patient self-report	Hospital and ambulatory care costs, costs of productivity loss	Compliance, anxiety symptoms, depressive symptoms, somatic symptoms, the number of side-effects, quality of life, patient satisfaction	No	No
Karnon, 2009 ⁷⁷	Health care system	Evaluation based on decision-analytic model	Effectiveness data were derived from systematic literature review. Error detection rates and cost data were derived from various sources from various countries.	Costs of pharmacist time, nursing time, forms, computerised assessment, dissemination of forms.	Medication errors prevented, quality-adjusted life years	Yes	Yes

4.4.3.2 Study design

All but one study evaluating the cost-effectiveness of approaches to improve seamless care focusing on medication carried out an economic evaluation based on a randomised controlled trial^{33, 35, 37, 42} or a cohort study^{39, 76}. Investigating the cost-effectiveness of treatment alternatives in a trial setting provides a degree of internal validity. However, it is challenging to carry out a randomised controlled trial in this domain, and blinding of patients and health care professionals is difficult to achieve. Moreover, the sample size of the trial included in some economic evaluations was not large enough to be able to find statistically significant differences in costs^{35, 37}. Economic evaluations based on cohort studies were designed to reflect real-world practices, but may be subject to a number of biases.

One study used a modelling approach to assess the cost-effectiveness of approaches to improve seamless care focusing on medication (i.e. a model-based economic evaluation)⁷⁷. However, due to the lack of published data, this economic evaluation had to derive model inputs from a variety of sources from different countries and had to make a number of assumptions. To address uncertainty surrounding model inputs, the authors conducted extensive sensitivity analyses.

4.4.3.3 Costs and consequences

Economic evaluations were limited in the scope of costs considered. Studies generally measured health care costs associated with approaches to improve seamless care focusing on medication^{37, 42, 76, 77}, although some analyses were restricted to hospital costs only^{33, 35}. A number of studies did not take account of the costs of the intervention itself when calculating overall costs (or savings) arising from approaches to improve seamless care focusing on medication^{37, 39, 42, 76}.

A variety of consequence measures were used in cost-effectiveness analyses. Some measures were related to intermediate consequences (e.g. appropriateness of medicine regimens, patient treatment compliance) rather than final consequences (e.g. mortality rate). As studies employed multiple consequence measures but did not combine them into a single index, it was not possible to get an idea of the overall cost-effectiveness of approaches to improve seamless care focusing on medication. Therefore, it is impossible to compare the cost-effectiveness of approaches to improve seamless care focusing on medication with the cost-effectiveness of interventions for other diseases that are expressed in terms of generic measures such as the cost per life-year gained. The exception was the cost-utility analysis which expressed results using the generic measure of the cost per quality-adjusted life year gained⁷⁷.

In general, economic evaluations measured costs and consequences over a limited time horizon, with a maximum follow-up period of one year.

4.4.3.4 Allowance for uncertainty and incremental analysis

Only one economic evaluation of approaches to improve seamless care focusing on medication allowed for uncertainty⁷⁷. Studies need to conduct a sensitivity analysis to account for uncertainty around key estimates and assumptions made during the identification, measurement and valuation of costs and consequences. Only one study presented results in terms of an incremental cost-effectiveness ratio of patients participating in an approach to improve seamless care focusing on medication as compared with patients who do not receive such an intervention⁷⁷.

None of the economic evaluations discussed the transferability of results to other settings or countries. Two economic evaluations enrolled patients who use multiple medications³⁹ or are likely to experience difficulties with their medication³⁷. Therefore, the transferability of their results to other populations is limited because these studies enrolled those patients who are most likely to benefit from an approach to improve seamless care focusing on medication. In multiple economic evaluations, cost estimates originated from a single centre^{33, 37, 42}.

As these costs are specific to a centre, results are unlikely to be transferable to other centres or countries. Similarly, results may depend on whether hospital costs are derived from an academic versus acute hospital or from an inner-city versus rural hospital.

4.5 DISCUSSION

This literature review has summarized the evidence about economic evaluations of approaches to improve seamless care focusing on medication. Three studies have detected higher or similar treatment compliance among intervention patients after hospital discharge. All but one study concluded that the intervention reduced hospital re-admissions. In general, patients in the intervention group were more satisfied than patients in the control group. In studies that analysed an effect on clinical status, no impact of the intervention was recorded on depressive symptoms, whereas results on the impact on quality of life were conflicting. Studies indicated that approaches to improve seamless care focusing on medication were associated with cost savings, although the scope of cost analyses tended to be limited.

The international literature on the cost-effectiveness of approaches to improve seamless care focusing on medication was made up of studies conducted in Europe and the USA. The results of these studies should be interpreted with care when assessing their relevance to Belgium. This is because the patient population, the range of medicines and medicine problems are not necessarily the same in these countries. Moreover, the funding, organisation, regulation and content of approaches to improve seamless care focusing on medication vary widely between countries.

Economic evaluations of approaches to improve seamless care focusing on medication suffered from a number of methodological limitations relating to the narrow perspective; focus on health care costs only; exclusion of costs of the intervention; use of intermediate consequence measures; no allowance for uncertainty; and absence of incremental analysis. As these limitations are not inherent to the techniques of economic evaluation, but arise from the sub-optimal design of existing studies, more attention needs to be paid by researchers to the design of their studies. Therefore, a number of avenues are proposed for designing future economic evaluations of approaches to improve seamless care focusing on medication:

- There is a need for more, better-designed and comprehensive trial-based economic evaluations. Studies need to be carried out that collect primary data on cost-effectiveness. Additionally, this review has underlined the importance of considering all relevant consequences in a single index. A case can be made in favour of cost-utility analyses that count the number of years of survival and adjust life expectancy for the impact of the intervention on quality of life. There is a need to carry out research and collect data on quality adjustments in the domain of approaches to improve seamless care focusing on medication. Alternatively, researchers may opt to conduct a cost-benefit analysis, although assigning monetary values to health benefits is controversial and further work on methods that value health benefits needs to be carried out.
- Studies need to provide sufficient details of the approach to improve seamless care focusing on medication. There is scope to improve the description of the intervention by reporting in more detail information about the recipients of the intervention, the settings in which the intervention is delivered, the various activities that make up the intervention, and the person(s) who administer the intervention. Uniform education and training of health care professionals who carry out the intervention on the content of the care to be provided may also contribute to delivering a standardized intervention. Researchers also need to consider the impact of programme factors (e.g. level of expertise of the health care professionals delivering the intervention) on the cost-effectiveness of the intervention.

- Studies need to select their perspective in terms of who will pay for the approach to improve seamless care focusing on medication and identify, measure and value relevant costs and consequences according to this perspective. Also, the cost of the intervention needs to be subtracted from any cost savings with a view to assessing the net cost impact of the approach to improve seamless care focusing on medication.
- Studies need to account for uncertainty surrounding key estimates and assumptions relating to costs and consequences. Economic evaluations drawing on patient-level data can account for uncertainty by carrying out a sensitivity analysis. Alternatively, the non-parametric approach of bootstrapping can be considered to incorporate uncertainty around the point estimate of the incremental cost-effectiveness ratio. Bootstrapping is a method that is used to obtain the empirical sampling distribution of the incremental cost-effectiveness ratio and construct a confidence interval around this ratio.
- Studies need to discuss the transferability of their findings to other settings and to other countries.

Key points

- **This chapter reviews the international literature on the cost-effectiveness of approaches to improve seamless care focusing on medication.**
- **The selection of articles focused on medication interventions for hospitalised patients in the transition between ambulatory and hospital care. A variety of types of medication interventions and target populations have been assessed, but the evidence is limited to one economic evaluation for each particular intervention type and each specific target population.**
- **Most studies demonstrated an impact of interventions on compliance and (re)hospitalisation rates and costs.**
- **Economic evaluations suffered from methodological limitations relating to the narrow perspective; focus on health care costs only; exclusion of costs of the intervention; use of intermediate consequence measures; no allowance for uncertainty; and absence of incremental analysis.**
- **In light of the small number of economic evaluations and their methodological limitations, it is not possible to recommend a specific approach to improve seamless care focusing on medication on health economic grounds.**

5 GREY LITERATURE: FOREIGN COUNTRIES

5.1 RESEARCH QUESTIONS

The aim of this part is to describe and analyze seamless care initiatives that have been implemented in 7 selected countries (Australia, Canada, Denmark, France, The Netherlands, UK, US) at regional or national levels. The final outputs are:

- an overview of implemented initiatives (at national or regional levels) that aim at improving continuity of care focusing on medications;
- a synthesis of the factors contributing to the success and failure of these systems (critical success factors);
- a discussion of their applicability to the Belgian setting.

The interested reader will find a detailed description of all initiatives in appendix 3.

5.2 METHODOLOGY

5.2.1 Selection of countries

The 7 countries were selected for the following reasons:

- the systematic review of the international literature gave information on previous or current regional or national initiatives on seamless care;
- and/or the authors or experts reviewing report had personal knowledge of one or several national initiatives;
- and/or close location to Belgium.

5.2.2 Data sources and methodology

For each country the authors performed a structured search of relevant websites (scientific, professional and political organizations) and other sources of information found during the systematic literature review.

In a first round, a list of the titles and sources of relevant information were shared with experts identified in each country (health care professionals or researchers involved in seamless care projects, see list in appendix 3). These experts were asked (a) to confirm that the information represented a regional or national initiative to improve seamless care in their country; (b) to list additional sources of information (internet or paper-based) to be considered given the objectives of the project.

In a second round, a structured description of the initiatives implemented in each country was performed based on a standardized collection form (see appendix 3). The native experts were asked to validate the information that had been extracted. The characteristics of the healthcare systems in the respective countries were first summarised using the respective Health System Profiles (accessible at <http://www.euro.who.int/observatory/Hits/TopPage>), except for the US VA system (<http://www4.va.gov> was used) and completed with information from the experts.

5.3 RESULTS

The full list of websites as well as the general descriptions of the healthcare systems of the countries selected can be found in appendix 3.

For the US, many initiatives were identified, but an important proportion was similar to those implemented in other countries whose health care system was closer to the Belgian system. Therefore for the US, the authors describe only two initiatives relevant to the purpose of the study and not described in the other countries selected.

Table 6 gives an overview of the characteristics of the health care systems of the countries in relation to seamless care.

5.3.1 Overview of the healthcare systems, in relation with seamless care focusing on medications

Table 6: Overview of the healthcare systems, relative to seamless care focusing on medications

Characteristics	Australia	Belgium	Canada	Denmark	France	Netherlands	UK (England)	US (VA system)
Ambulatory care								
Patients bound to one GP practice	No	No	No obligation	Yes		Yes	Yes	Yes
GP acts as gatekeeper for access to hospital care ¹	Yes	Partially	Yes	Yes		Yes	Yes	Yes
Patients bound to one community pharmacy	No	No	No	No		No	No	No
Fee for community pharmacists to provide patient counselling	Yes ²	Partially ⁶ ?	Yes (province-dependant)	No		Yes ⁴	Yes ⁴	No
Acute care								
Home medicines brought to hospital	No obligation	No obligation	Yes	Not routine		No obligation	Yes	No
Home medicines used in hospital	No	No (forbidden)	No	Not routine		No	Yes	No
Clinical pharmacy: standard care	Yes ³	No	Yes	No	No	Yes	Yes	Yes
Drug history taking on admission: who	Pharmacist or doctor or nurse sometimes pharmacy technicians	Doctors or nurses; clinical pharmacists in pilot projects	Pharmacist or doctor (student) or nurse; sometimes pharmacy technicians	Doctor or nurse; no pharmacy technicians	Doctors or nurses	Community pharmacist, pharmacy technician	Pharmacist or doctor (student) or nurse; ; sometimes pharmacy technicians	hospital staff (medical, nursing and pharmacy)
Providing information to patients on medications upon discharge: who	Pharmacist or doctor or nurse	Doctors or nurses; clinical pharmacists in pilot projects	Pharmacist	Doctor or nurse	Doctor or nurse	Depends on local situation	Hospital staff (included pharmacist)	Providers, nurses, pharmacists, and pharmacy technicians
Information relative to medications sent to GP at	Yes	Yes	Sometimes but	Yes	Yes	Yes	Yes	Yes

discharge								
Information relative to medications sent to community pharmacist at discharge	Rarely; pilot programs	No	not systematic Sometimes but not systematic	No	No	Yes	Yes	No
Medication supply at discharge	Short supply	Supply allowed for a maximum of 3 days	No	Not always		No, a prescription is sent to the community pharmacist	Yes ⁵	Yes
Miscellaneous								
IT platform to exchange data on medications between settings of care	No	No	Yes in some provinces	Yes	No (in development)	In development	In development	Yes

Abbreviations: GP : general practitioner; IT: information technology; UK: United Kingdom; US: United States; VA: Veterans Affairs.

¹Unless in the case of some emergency admissions, or referral by community treatment team (e.g. mental health team); ²Pharmacists are paid a dispensing fee for each prescription they dispense. This dispensing fee is paid to cover the professional duties of a pharmacist, including providing counselling; ³Clinical pharmacy is standard care in large tertiary referral public hospitals, but may be limited in private and smaller hospitals; ⁴ only for medication usage review, ⁵ original pack dispensing (mostly for 1 month), unless duration specifically stated; ⁶ Since April 1, 2010 pharmacists' fee per drug dispensed is partially based on basic pharmaceutical care activities

5.3.2 Australia

Since 1998, Australia developed several national and regional initiatives to optimize the continuity of care focusing on medications.

5.3.2.1 *Guidelines of national pharmacist associations for continuity of care focusing on medications*

In 1998, the Australian Pharmaceutical Advisory Council developed national guidelines to achieve quality in the continuum of medicines' use between hospital and community (1). These guiding principles, adapted in 2005 ⁷⁹, offer a system approach to medication management i.e. they advocate a consistent and standard approach across all health care settings and health care providers. Ten guiding principles were identified:

1. Leadership for medication management;
2. Responsibility for medication management;
3. Accountability for medication management;
4. Accurate medication history;
5. Assessment of current medication management;
6. Medication Action Plan;
7. Supply of medicines information to consumers;
8. Ongoing access to medicines;
9. Communicating medicines information;
10. Evaluation of medication management.

There is an expectation that all stakeholders involved in the continuity of medication management should implement those principles by aligning standard operating procedures and assigning responsibilities according to ability, skills and competence. However, the implementation of the Guiding Principles is a challenge, in particular to define who has the responsibility to initiate, follow up and maintain the implementation. To our knowledge, a comprehensive analysis of the uptake of the guiding principles has not been performed, and recent data on their impact are missing.

5.3.2.2 *National standardized inpatient medication chart to enhance the completeness of information on medications*

In a system-based approach to minimize the risk of adverse drug events, the Australian Health Ministers stated in 2003 that all public hospitals would use a common medication chart by June 2006. This means that the same chart is used for a given patient, by doctors and nurses, in any hospital. In the same reform agenda, the recommendation for a process of pharmaceutical review of prescribing, dispensing, administration and documentation processes for medication use was also formulated for Australian public hospitals by December 2006 ⁸⁰.

Following these statements, the National Inpatient Medication Chart (NIMC) was developed by a national working party of the Australian Council for Safety and Quality in Healthcare. The form was pilot tested in 31 hospitals, and is now implemented in almost all hospitals throughout the country (see Appendix 3). Although primarily designed for in-hospital use, the chart supports medication management at transition moments and has increased the awareness of medication safety issues.

Future steps will include the development of a paperless system.

5.3.2.3 *Transition care programs with limited focus on medications*

Currently, there seems to be a blurring of boundaries between hospital care and community care in Australia. Programmes as “hospital in the home” and other early hospital discharge strategies (e.g. having a discharge nurse) are now implemented. One of these programmes, the “transition care program”, is a form of flexible care provided to older persons at the end of an inpatient hospital episode, in order to complete the care recipients’ restorative process, optimize their functional capacity, and assist them and their families to make long term arrangements for care. Although medication management is one of the elements mentioned in the transition care program, there is limited evidence from the evaluation that medication review or medical assessment was part of the care program ⁸¹.

5.3.2.4 *Home Medicine Review and Patient Medication Profile: two initiatives for outpatients involving community pharmacists*

Home Medicine Review by community pharmacists

Within the framework of ‘Home Medicines Review’ (HMR), GPs can refer their patients to their nominated community pharmacy to have an HMR performed within four weeks post discharge. HMR is a patient-focused, structured and collaborative health care service provided in the community setting, to optimise quality use of medicines and patients’ understanding. It involves the patient, his/her GP, his/her community pharmacist, and other relevant members of the health care team. Target groups of patients are (among others): 1) patients with at least five regular medications; 2) patients taking more than twelve doses of medication per day; 3) patients recently admitted to a facility/hospital (in the last four weeks); 4) patients with significant changes made to medication treatment regimen in the last three months; 5) patients on medication with a narrow therapeutic index or requiring therapeutic monitoring; 6) patients suspected of non-compliance or not managing medication-related therapeutic devices.

An HMR consists of a home visit of an accredited^b pharmacist (who can be different from the community pharmacist) to the patient, in order to identify any medication related problems, including underuse, overuse, adverse events, compliance and knowledge problems, or hoarding. Upon analysis, the pharmacist writes a report which is discussed with the physician. It is therefore much more comprehensive than making a medication profile (see below). The physician is finally responsible for developing the medication management plan, communicating this to the patient and for follow-up ⁸². Australia has funded HMR services since 2001 and so far more than 230.000 collaborative medication reviews have been provided across the country, with approximately 12.000 medication reviews provided per quarter ⁸³. Unfortunately, there are no specific data on the number of HMRs that have been performed post discharge. Considering the impact of HMR post discharge, one study showed that the review significantly reduced the number of drug-related problems 90 days post discharge. Unplanned readmission rates within 90 days post-discharge were also significantly lower for the intervention group versus the control patients and self-reported compliance was significantly better in intervention patients ⁸⁴.

^b The HMR service can only be provided by a pharmacist who is accredited. The accreditation process assesses competence in clinical pharmacy, therapeutics, pharmaceutical care and medication review. Pharmacists must be reaccredited every three years.

Patient Medication Profile

Since 2005, pharmacists in Australia also get funding when producing a Patient Medication Profile (PMP), a comprehensive written summary of all medications taken by a patient. The purpose is to help patients to manage their medications at home, and to ensure that all HCPs can have access to an accurate medication history. A request for a PMP may be made by the patient or by another member of the health care team, usually upon consent of the patient. When producing the PMP the community pharmacist makes an appointment for an interview with the patient and requests the patient to bring all his medications with him to the pharmacy. Apart from the medication details, information recorded in a PMP includes medication allergies and adverse drug reactions as well as patient, prescriber and pharmacy details⁸⁵.

5.3.2.5 *MediConnect and HealthConnect: e-Health initiatives to improve communication on medications*

Systems to improve the sharing of medication information between patients and various healthcare providers through a shared electronic medical record have been developed and funded by the Australian Government since 2002. One of these initiatives, the MediConnect program, aims to allow consumers to give their consent to different HCPs for the access and, when necessary, record of information in a shared medication record. A secure national electronic system was pilot tested successfully in two sites in Victoria and Tasmania in 2003. In 2004 the MediConnect program was incorporated within the wider HealthConnect program. HealthConnect is an ongoing partnership between the Commonwealth and State and Territory governments to facilitate sharing of health information electronically. HealthConnect implementation aims to leverage existing eHealth projects and infrastructure, and progress towards compliance with National e-Health Transition Authority (NEHTA) and other nationally agreed standards to improve the availability of information in the health sector. Systems for electronic sharing of patient health information, including medication information, between different settings are currently under development and evaluation in various states⁸⁶.

The National eHealth Strategy (December 2008) outlines a national approach to electronic prescription transfers and medication management. By 2012 every Australian should be able to have a personal electronic health record that he/she will at all time own and control. When implemented, a person's individual electronic health record will include a list of the current medications. This information may help to reduce adverse events, improve service delivery and ensure that consumers do not have to remember or repeat information as they navigate across the health care system. The system will also enable a full-scale national electronic prescribing and dispensing implementation⁸⁷.

5.3.3 Canada

Several national and regional initiatives around seamless care focusing on medications have been implemented over the last 10 years in Canada.

5.3.3.1 *Workshops and guidelines on continuous care programs by national pharmacists associations*

At the national level, the Canadian Society of Hospital Pharmacists and the Canadian Pharmacists Association have had a joint Task Force on seamless care for several years. This Task Force studied barriers to seamless care in Canada and searched out models and tools that would enhance patient care^{88, 89, 90}.

In 2003 the Canadian Pharmacists Association published a pharmacist's guide on continuous care programs. This is a comprehensive and practical source of information on (a) how to develop and evaluate seamless care initiatives, (b) how to overcome barriers to seamless care, (c) documentation and technology requirements, (d) patient privacy and confidentiality issues³. It seems that this guide has been widely used, but its effect on practice has, to our knowledge, not been documented.

5.3.3.2 *Safer Health Care Now! Implementation of medication reconciliation at national level*

The most important and comprehensive national initiative is the Safer Health Care Now! (SHN!) Campaign launched in April 2005. Mirrored after the Institute for Healthcare Improvement's 100,000 Lives campaign in the U.S., SHN! is an ambitious pan-Canadian patient safety campaign to implement six targeted interventions in health care organizations that have been proven to prevent avoidable adverse events (<http://www.saferhealthcarenow.ca>). One of these interventions focuses on medication reconciliation^c.

Medication reconciliation will not be achieved using a single specific model. It must be tailored to fit the organisation or system, considering human resources, patient population, current admission process, culture of staff, etc. Therefore, the campaign focuses on sharing Canadian experiences on the use of medication reconciliation with the goal of reducing potential adverse outcomes of patient care related to medication therapy. More than 300 acute care teams are currently enrolled in the campaign, and the majority of them actively report data to the Central Measurement Team (using a set of core measures). The results of the national data compounded by the Central Measurement Team show a substantial decrease in the number of medication discrepancies on admission to hospital^{91, 92, 93, 94, 95}.

Critical success factors include national leadership and support, for example by connecting and sharing the work of local teams, by running teleconference national calls, workshops and conferences to educate teams. Also the fact that Accreditation Canada requires all Canadian hospitals to do medication reconciliation has boosted the implementation of medication reconciliation. Many teams have moved toward sustaining medication reconciliation on admission and are now earnestly focused on transfer within the hospital and hospital discharge. The Campaign is now being extended to medication reconciliation in ambulatory care, homecare and long-term care.

5.3.3.3 *MedsCheck and SHN!: province-wide initiative involving community pharmacists in medication reconciliation*

In 2008, ISMP Canada developed and delivered a pilot program in Ontario to link the community-based MedsCheck^d program with the SHN!-led medication reconciliation programs in hospitals to streamline the medication reconciliation process in the pre-admission clinic for planned surgical admissions⁹⁶. The goal of this collaborative initiative between hospitals and community pharmacists was to improve the medication reconciliation process for elective surgery patients by asking patients to obtain a MedsCheck from community pharmacists prior to their pre-admission clinic appointment. Leadership and support were present, similarly to the SHN! Campaign. However, the initial results were somewhat disappointing, as the MedsCheck quality was not consistent and at a professional standard. An important next step for moving this initiative forward consists therefore of teaching community pharmacists a systematic process for completing MedsCheck at the highest possible level.

^c Medication reconciliation is a formal process of:
 (1) obtaining a complete and accurate list of each patient's current home medications – including name, dosage, frequency and route,
 (2) using that list when writing admission, transfer and/or discharge medication orders, and
 (3) 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.

^d The MedsCheck is a one-to-one pharmacist consultation with patients taking three or more prescription medications for approximately 30 minutes once a year, to help them comply with their prescription medications and better understand how the medications interact with each other and other over-the-counter medication they may be taking

5.3.3.4 *Canada Health Infoway: national workforce to accelerate the use of electronic health records*

Canada Health Infoway is an independent, not-for-profit organization funded to accelerate the use of Electronic Health Records in Canada ⁹⁷. It has been created by the federal government, in collaboration with the provinces and territories, health care providers and technology solution providers.

Among ten investment programs, the Drug Information Systems (DIS) investment program supports jurisdictional projects that will result in interoperable systems to enable authorized health care providers to access, manage, share and safeguard patients' medication histories. Implementation and evaluation is ongoing ⁹⁷.

5.3.4 Denmark

5.3.4.1 *National infrastructure for electronic medication profiles*

Since 2004, the Electronic Medicine Profile (EMP) has been implemented in the Danish health care system ⁹⁸. The EMP is an electronic overview of the dispensation of prescription medications from community pharmacies (OTC medicines are not registered) ⁹⁹. All items dispensed are automatically registered and gathered in an individual, personal medical profile for every citizen ⁹⁹. The Danish Medicine Agency (DMA) is responsible for this secure system. Citizens can access the EMP via a common health public electronic portal (the National eHealth portal) or via the website of DMA ¹⁰⁰. Physicians and community pharmacists can also access the EMP, without and with patient consent respectively ¹⁰⁰. EMP has been shown to improve the completeness of medication history at admission, but also its weaknesses as a unique source of information. Indeed, one study showed that on average 27% of prescribed medication registered in EMP during the month preceding hospital admission was not reported by the patient and/or in hospital files. This may be due to patient recall bias, but can also point towards non-adherence or discontinuation of therapy, which should be taken into account when designing a medication plan ⁶³. Another weakness of the EMP is the non registration of medications prescribed in the hospital setting (i.e.: medication delivered by the hospital pharmacy for inpatients as well as outpatients, such as chemotherapy).

A new initiative, called "*The Common Medication Card*" (FMK in Danish) is therefore being nationally implemented since the beginning of 2010 ¹⁰¹. It aims to provide to patient and healthcare professionals an accurate and updated current patient medication list (including information e.g. on dose, time of intake) at hospital admission and at hospital discharge. The objective is to share the medication information between the hospitals' medication systems, GP systems and personal medication profile ¹⁰¹.

5.3.5 France

Two national initiatives, still in a pilot phase, were selected.

5.3.5.1 *The pharmaceutical file*

The pharmaceutical file ("*dossier pharmaceutique*") is a shared electronic file which allows pharmacists – after patient consent – to record and check information on prescribed and non-prescribed medications delivered over the last fourth months ¹⁰². This initiative was developed and promoted by l'Ordre des Pharmaciens Français. It has been nationally implemented in the primary care setting since the end of 2008. Perspectives are currently to extend the use of the pharmaceutical file to the hospital setting. The results of the first pilot phase should be available in February 2011 ¹⁰³.

5.3.5.2 *High 5s project*

At the end of 2009, the French National Authority for Health, an independent public body, decided to engage French hospitals in the international High 5s project initiated by the WHO. The Mission of the High 5s Project is to facilitate implementation and evaluation of standardized patient safety solutions within a global learning community to achieve measurable, significant and sustainable reductions in challenging patient safety problems. It is a patient safety collaboration among a group of countries and the WHO Collaborating Centre for Patient Safety in support of the WHO Patient Safety Programme¹⁰⁴. Several standard operating procedures (SOP) are being developed by these countries and one of them relates to medication reconciliation at patient transition developed by Canada (via the Canadian Patient Safety Institute)¹⁰⁵. A national project related to this SOP was launched in France at the end of 2009. Educational support will be provided at national and regional level. Ten hospitals have been recruited to implement this SOP over the next five years¹⁰⁶.

5.3.6 The Netherlands

One national project aims at an overall implementation of medication management initiatives. This project started from guidelines developed by the inspection of health, and is coordinated through different working groups and parties. A description of the different key elements and characteristics of this project is given below.

5.3.6.1 *A guideline on transfer of medication*

In the Netherlands, a national guideline about transfer of medication was developed by the inspection of health care in 2005. This guideline states that by 2011 a list of the current medications will have to be available any time at each point of prescribing. The medication list will have to be completed within 24 hours of admission to the emergency department and upon transfer between settings of care. The implementation of this guideline will be controlled by the inspection of healthcare from 2011 onwards.

5.3.6.2 *Management of a large national project to implement the guideline*

At the national level the implementation of the guideline is led and managed by a steering committee. This steering committee includes representatives of business organizations, professional organizations (pharmacists, hospital pharmacists, nurses, hospitals, nursing homes, general practitioners, specialists, home nurse care, IT specialists), patient organizations, and the government. Specific groups are responsible e.g. for the legal framework, the development of tools for medication management.

5.3.6.3 *Local projects*

Health care professionals work on specific subprojects in order to implement the guideline at local and regional levels. Hospital pharmacists and pharmacy technicians are the main driving forces of these projects. They work in collaboration with specialized physicians, general practitioners, dentists, community pharmacists, hospital nurses and home nurses, as a broad range of transitions is concerned. One example is the implementation of pharmacotherapeutic consultations by the inpatient pharmacy department at an orthopaedic ward, where a pharmacy technician collects a list of the outpatient medication from the community pharmacy and discusses this with the patient. Having shown, in a pilot project, error rates of 72% in medication lists obtained in common practice, the procedure for pharmacotherapeutic consultations was standardized and implemented.

5.3.6.4 *Electronic patient file enhances the implementation of the national guideline*

In 2009, the government voted in a law that regulates the obligatory use of an electronic patient file by health care professionals (general practitioners, pharmacists and specialists). If the patient consents, the aforementioned health care professionals will have access to the complete list of medication, including medications prescribed in the hospital, contra-indications, intolerances, allergies, reasons for prescribing, clinical status and lab results. On this moment, a limited number of hospitals are working with a computerized system and the transition of medication between community pharmacy and hospital pharmacies is organised by an electronic system. It is expected that the availability of a nationwide electronic patient file will facilitate the implementation of the guideline.

5.3.6.5 *Sensitisation and education*

In line with the implementation of the guideline, campaigns are organized to inform all stakeholders, professionals as well as patients, on the necessity and benefits of safe medication transfer. Specific for HCPs, there is a book published about transition of medication; one part of this book consists of a checklist that can be used to guide the implementation process. For pharmacy practitioners, e-learning modules on admission and discharge conversations, including video fragments, are available.

The process of implementation is further supported through a specific website, www.medicatieoverdracht.nl, where all developments, successes and failures are discussed. More details on this large implementation project can be found in the tables in appendix 3.

5.3.6.6 *Results*

National data on the impact of these initiatives has not been found. A lot has been published, however, on local initiatives, either in internal reports or local papers. Overall, the results show that there is a significant reduction in errors in medication histories on admission by the implementation of a standardized medication reconciliation procedure (17-96%). The reports mention that medication management initiatives lead to more quality, efficiency and patient satisfaction. The most important barriers for implementation are the lack of manpower and the changes needed in the current working procedures. IT support is mentioned as a necessary tool, and the lack of effective systems limits the development of medication management¹⁰⁷.

5.3.7 *United Kingdom*

5.3.7.1 *National guidelines relative to continuity of care focusing on medications*

In 2006 a group of national pharmacy organizations published the guidance “*moving patient, moving medicines, moving safely*”¹⁰⁸. It aimed to review medication problems during transfer of patients between different healthcare settings, to develop strategies and standards based on best practice and available evidence, and to make recommendations to reduce the risks of incidents with medicines for patients moving between different settings of care, in particular patients being discharged from acute hospitals.

The National Institute of Clinical Excellence (NICE) also published two guidelines to improve seamless care in medication management in 2007 and 2009^{109, 110}. The 2009 guideline was on medication adherence but also addressed communication between HCPs. All healthcare professionals working in the NHS must apply these guidelines. One focuses on recommendations to develop medication reconciliation at hospital admission¹⁰⁹. The other looks at patient involvement in decisions about prescribed medicines¹¹⁰. One section of this guidance relates to information for patients and healthcare professionals (HCP) when patients are transferred between services and settings of care.

For example, it is stated that, when patients are transferred between settings of care, there should be for all patients and subsequent HCPs a written report containing the patient's diagnosis and a list of all medications, clear identification of medicines that were started/stopped and reasons for this, clear information on which medicines should be continued and for how long, any known adverse reactions and allergies the patient has experienced, any potential difficulties with adherence. Other recommendations are more innovative and relate, for example, to patient involvement in decisions and establishment of the most effective way to communicate with each patient.

5.3.7.2 *National audits to identify opportunities for improvement*

The Care Quality Commission (CQC) conducts independent inspection to ensure quality of different aspects of the National Health Service in England/Wales, on medicines management in hospitals^{111, 112, 113, 114} and on the management of patients' medicines after discharge from hospital¹¹⁵. From 2001 onwards, several reports identified key initiatives required to modernise medication management, of which several were part of the NICE guidelines. In addition, various indicators for high quality medicines management were developed, including some indicators that relate to seamless care. Examples include: the existence of joint formularies between primary and secondary care, use of patients' own medicines and self-administration by patients or carers during hospital stay, medication review on admission by hospital staff, patient information on their medicines prior to discharge, quality of information received at discharge by GPs and community pharmacists, GPs processes for medicine reconciliation and medication review after discharge, availability of other processes than GP medication review to support patient medication adherence (ie. commissioned pharmacist or nurse in primary care trusts –PCTs- or medication review by an accredited community pharmacy) and monitoring of processes by PCTs.

The first report – “*A spoonful of sugar*” - reviewed medication management in hospitals in 2001¹¹¹. The audit was conducted in 197 out of 199 NHS acute trusts in England and Wales. Another report – “*The best medicine – management of medicines in acute and specialist trusts*” – was released in 2005/2006¹¹⁴. It addressed the same topic and reported national findings, including a description of progresses made since 2002. All acute trusts received a personalized feedback from the CQC on their performance in the implementation of initiatives to modernise medication management, a guide to explain indicators and how conclusions about performance should be drawn from them¹¹⁴.

Based on this report, CQC made a set of specific recommendations, and also recommended that many background activities such as writing shared care agreements and developing information for patients are applicable across trusts and are made more efficient and effective through national initiatives developed by national organizations¹¹⁴.

The last CQC report was published in 2009 and addressed the assessment of the management of patients' medicine after discharge by Primary Care Trust (PCT)¹¹⁵. Twelve PCTs were followed up for this project. The CQC saw some evidence of good practice to ensure seamless care through the medication reviews for high risk patients following hospital discharge by GPs, but also identified some problem areas (for example poor completeness and effectiveness of information shared between primary and secondary care, lack of routine review of new medications by GPs with patients after discharge, ...) ¹¹⁵.

From April 2010, all PCTs and acute trusts will be required by law to register with CQC and must meet a new set of standards (different for both groups). Effective management of medicines will be a requirement of registration, and CQC will take action where trusts fall short of meeting this¹¹⁶.

5.3.7.3 *The Standard Contract: legal national incentives to improve continuity of care*

Finally, the existence of a legal national incentive to improve continuity of care in England/Wales is an interesting initiative. Since April 2008, PCTs and other NHS healthcare providers (i.e. acute NHS trusts) must sign a contract that aims to improve the performance of healthcare¹¹⁷. The Standard Contract supports the achievement of key standards and targets. Processes for identifying and seeking to remedy performance problems should be clearly defined in the Contract. Initial failures are not penalized, but financial sanctions are applied for failing to remedy a performance failure¹¹⁷. With regard to seamless care, the new standard contract for NHS-funded hospital care sets out specific mandatory obligations to share discharge summaries with a patient's GP within 72 hours of discharge, and to include a summary of diagnosis and details of any medication prescribed at the time of the patient's discharge. PCTs can implement financial incentives within their local discharge protocol to stimulate the implementation of these obligations, and can fall back upon penalties if needed¹¹⁵.

5.3.7.4 *NHS connecting for health initiative*

NHS Connecting for Health is an initiative developed to support the NHS in providing better, safer care, by delivering computer systems and services that improve how patient information is stored and accessed¹¹⁸. Interesting parts of this initiative that could improve continuity of care in medication management are the progressive implementation of the Summary Care Records (SCR) and a personal health record called Healthspace. NHS is gradually introducing SCRs across England. It will be available to people providing patient with care anywhere in England. Patients' SCR will contain important information about their health, such as details of any allergies, current prescriptions and whether they have had any bad reactions to medicines. Data could be updated by HCPs each time patients use any NHS health service. HCPs will ask patient permission each time they need to look at information in their SCR¹¹⁹, and patients can discuss what is being added and how sensitive information is handled. Patients will also be able to view their SCR online once their GP has created it using a secure website called [HealthSpace](#)¹²⁰. Healthspace also enables patient to view information on medicine and record information on dosage, frequency, start dates etc. They are advised to print out their overall health summary to take with them or show to a healthcare professional.

5.3.7.5 *Actions in the future*

In 2008, a White Paper called "Pharmacy in England: Building on strengths – delivering the future" outlined a framework of future actions, consultations and policy development to promote a wider role of pharmacy¹²¹. For example, the paper proposes to give an access to community pharmacists to NHS summary care records that will contain details of any allergies, current patient prescriptions and history of bad reactions to medicines and that will be available to people providing care to patient anywhere in England. It is also suggested to reform the training of pharmacy technicians in order to extend their contribution to patient care at ward-level in close liaison with clinical pharmacists (ie medication history at admission, medication reconciliation, discharge planning),...¹²¹

5.3.8 United States

5.3.8.1 *VistA: using information technology to improve coordination of patient care across all settings of care*

The Veterans Health Information Systems and Technology Architecture (VistA) is a global initiative developed to improve the coordination of patient care for veterans, so that seamless care is delivered across all settings, from hospital to home¹²². VistA includes the following components: Computerized Patient Records System (CPRS); VistA Imaging (to see radiography and other imagery results); Bar Code Medication Administration, a system for inpatient medication administration; and My HealtheVet (or personal health records). The CPRS and My HealtheVet are the two components of VistA that aim to improve continuity of care in medication management.

First, the CPRS allows clinicians to order lab tests, medications, diets, radiology tests, and procedures; to record a patient's allergies or adverse reactions to medications; to request and track consultations; and to enter progress notes, diagnoses, treatments for each encounter, and discharge summaries¹²². These electronic records are available everywhere in the Veteran Affairs (VA) healthcare system for healthcare providers involved in the care of the patient^{123, 124}.

Second, Veterans have the opportunity to manage their personalized health records through 'My HealtheVet' which is accessible online^{122, 125}. A section called "pharmacy" allows patients to refill their prescriptions, to view their prescriptions history, to record their non VA medications, OTC, Herbals, Supplements (name, dosage, frequency, date of introduction and stop) and to see their complete medication list¹²⁶. Patients can also search validated information on medications, using the Healthwise knowledge base (database with drug information developed by doctors and pharmacists, based on the literature or product labelling, and updated weekly¹²⁷) and print out their medication profile from their health journal that they manage in their "My HealtheVet" session¹²⁶. Currently, patients are invited to keep an updated medication list handy – at home and wherever they go¹²⁸ – that can be used in case of hospital admission. In the future, information managed by patients could be shared (after patients' permission) with their healthcare provider and patients will be able to request key portions of their CPRS¹²⁹.

5.3.8.2 *The Geisinger health care system*

The Geisinger health care system is an integrated provider network located in 31 counties in Pennsylvania. Several initiatives improving seamless care in medication management were developed^{130, 131}.

First, patient involvement during hospital stay is encouraged. With regard to continuity of medication management, they are encouraged to (1) make sure that doctors have a complete list of all medications they are currently taking and are informed on any medication allergy or previous ADEs; (2) ask information on medication indication to HCP during inpatient stay; (3) ask written information at discharge on dosage, duration, side effects, interactions, activities to avoid while taking medication; (4) check when picking up their medication at the pharmacy if that is exactly the type their doctor prescribed and (5) ask the pharmacist any questions about the directions on medication labels.

Second, electronic health records are implemented in the entire Geisinger health care system.

Third, a medical home model was implemented to closely monitor patients with chronic conditions. High risk patients are assigned to a nurse case manager. With regard to continuity of care after hospital stay, case managers telephone high-risk patients 24 to 48 hours after hospital discharge to assess their status, review their care plan and medications, and confirm or make follow-up appointments including a primary care visit four to seven days after discharge.

5.4 DISCUSSION: MAIN RESULTS AND APPLICABILITY TO THE BELGIAN SETTING

5.4.1 Common features of seamless care initiatives

In summary, national initiatives to improve continuity of care with regard to medications have been identified in all selected countries .

These initiatives were mainly developed since the early 2000, and most of them are still ongoing. Several of them have been developed by national quality and safety groups, others by professional groups (mainly pharmacists). In all initiatives, the approach involved different types of HCPs working in different settings of care, and targeted all patients (i.e. no selection criteria relative to the types of patients were applied). The initiatives included national campaigns, national guidelines and recommendations on how to improve continuity of care with regard to medications in local settings, education of health care professionals, IT technologies relative to electronic health records and databases to share medication data between settings of care. Most initiatives initially focused on the hospital admission and/or discharge components, and several of these are being extended to other types of transitions (eg between hospital units, in long-term care).

5.4.1.1 *National guidelines or recommendations*

The publication of national guidelines or recommendations was often the first initiative (or among the first ones) at national level and was the trigger for further actions in the countries studied. For example, in Canada, the UK and the Netherlands, national recommendations were further used for national campaigns, support and education of healthcare professionals, development of performance indicators and implementation of local projects. The data suggest that these national recommendations/guidelines are an initial and important step. The content of the guidelines/recommendations shows that the problems to solve and the solutions proposed are very similar between countries and that there is international consensus on the priorities for implementation. In all cases, the recommendations clearly highlight that the different HCPs in different settings have to work together to optimise medication management.

5.4.1.2 *Importance of Information Technology (IT)*

Another important set of initiatives refer to the development and implementation of IT. IT initiatives are complementary and developed in parallel with other initiatives in most countries. In Canada and the US, IT initiatives relative to medications were part of the development of national strategies for digitalisation of the health sector. The VistA system in the US is a very good example of successful integration and exchange of health data, including data on medications, across different settings. Another interesting particularity of the US VA system is the role that patients can play, by accessing one part of the system, to improve the validity of the data on medications. Also in Australia, patients will have ownership and control over their electronic health record.

In Denmark and Australia, stand-alone systems that were designed for the exchange of information on medication will now be integrated in larger e-health projects.

5.4.2 Measure of impact

Data on the impact of the initiatives at the national level are often not available. However, data at local or regional level have been published for some of initiatives, documenting the efficacy or effectiveness of the programs implemented.

The impact and progress following the implementation of national guidelines on medication management in the aforementioned countries has only been thoroughly studied in the UK. Data show positive outcomes that can be linked with the implementation of key elements described in the guidelines, but also indicate that many opportunities for improvement remain.

The Canadian SHN! Campaign (the most comprehensive national initiative together with the Dutch one) is probably the national initiative that has been best evaluated, as local teams actively report data to the Central Measurement Team, using a set of predefined core measures relative to medication reconciliation. The results clearly show that implementing medication reconciliation according to the SHN! Standards results in a substantial decrease in the number of discrepancies in medication histories on hospital admission. Similar positive results have been reported for the Dutch initiative “medicatie overdracht” (regional data).

In Australia as well as in Canada, community pharmacy based initiatives to enhance medication management were identified. Data on the Australian HMR service post discharge showed a significant reduction in the number of drug-related problems 90 days post discharge, as well as a reduction in hospital admissions and an increase in compliance. Results for the Canadian MedsCheck program were somewhat disappointing, as the evaluation showed that quality was not consistent and didn't meet professional standards.

Results relative to the impact of IT initiatives are very scarce. When available, they are limited to results of intake in practice, but do not give information on the impact on clinical or economic outcomes.

Many initiatives need more evaluation to further quantify – if possible - their impact on the quality, safety and cost-effectiveness of continuity of care.

5.4.3 Critical success factors

5.4.3.1 *Leadership and commitment*

Implementing medication reconciliation at national level requires leadership and commitment. The Canadian and Dutch experiences are – in that respect – very similar, and illustrative. Both countries have had a very comprehensive and unique approach to quality improvement, by gathering national and local workforces, to educate health care professionals, to share local experiences, and to test, implement, and evaluate the intake of recommendations on quality of care.

5.4.3.2 *Initiatives adapted to local settings*

Another success factor in the Canadian experience was the fact that initiatives are tailored according to the local setting. The HCPs have flexibility to design initiatives that are adapted to their setting, but with the opportunity to be educated and supported by the national workforce. The same idea of tailoring national standards to local needs is also one of the key elements of the Dutch program “medicatie-overdracht”.

5.4.3.3 *Regulatory framework*

Additional measures that have been shown to improve the intake of recommendations into practice are the anchoring of recommendations in a legal and/or regulatory framework such as accreditation systems, and/or defining financial restrictions when recommendations are not applied. This was the case in Canada, the Netherlands and the UK, and such measures were described by the experts as important success factors.

5.4.3.4 *IT support*

The fact that in most countries IT systems were developed along the other initiatives further shows that IT support is a crucial factor for improving medication management.

5.4.4 Disadvantages and factors contributing to failure

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.

It is challenging to implement guiding principles. 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 (UK, original pack dispensing). 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 Denmark.

5.4.5 Transferability of the results to Belgium

5.4.5.1 *Characteristics of the health care systems*

The implementation of similar initiatives to the Belgian health care system needs to take account of the characteristics of the health care systems of the selected countries (Table 6). Several characteristics are concordant with the Belgian situation (e.g. patients not bound to one community pharmacy). However, other factors that are different might have implications in terms of generalisation of the findings to the Belgian system. One major difference is that clinical pharmacy is part of standard care in all selected countries, except 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 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 standardised procedures to improve continuity of care. Belgian clinical pharmacists are already involved in local initiatives around seamless care (see chapter 6), and international data call for further development of clinical pharmacy in Belgium, with the aim that it becomes part of standard care.

Another difference is that in two countries (Canada and UK), patients bring their home medicines to hospital, which facilitates medication history taking on admission. This is not common practice in Belgium, although it has been described in some Belgian initiatives (see chapter 6).

5.4.5.2 *Adaptation and implementation of guidelines/recommendations*

As already mentioned, most national guidelines / recommendations have common grounds on problems and solutions. These guidelines could be applicable to the Belgian setting with only minor modifications. As an illustration, a Belgian guideline could include the following topics (found in the Canadian and English guidelines): how to develop seamless care initiatives, how to overcome barriers, documentation and technology requirements, performance indicators, patient privacy and confidentiality issues. Most of the practical tools that have been developed at national and regional levels to help implementing medication reconciliation are also usable in Belgium.

An important additional point is that leadership and commitment, together with time and resources, are important for the effective implementation of the guidelines. This could be done, similarly to experiences abroad, through national existing structures working on quality in health care.

The Canadian and Dutch experiences show that the implementation of guidelines, e.g. on medication reconciliation, will not be achieved using a single specific model. It must be tailored to fit the organisation or system, considering human resources, patient population, current processes, culture of staff, etc.

5.4.5.3 *Regulatory framework and/or incentives*

In addition, 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. Other countries already have those structures i.e. hospital accreditation (Canada), measurement of indicators (UK). Such structure does not exist currently in Belgium.

5.4.5.4 *Questions around IT development*

IT initiatives in the selected countries showed that many questions encountered are similar to the questions in Belgium i.e. identification of patient and HCP, privacy, responsibility. The solutions that have been found abroad could to some extent be used within the Belgian eHealth platform. This will be further discussed in the last chapter of this report. Interesting observations are: the responsibility that is given to the patient in some IT systems (eg US, Australia), sharing of medication dispensing information among HCPs (Denmark, Canada, France).

5.4.5.5 *Medication chart, medication review, medication profile*

Many local or regional initiatives have focused on the design and implementation of a medication chart. A medication chart was even developed at the national level in Australia (so far for the hospital setting only). The experience that one national form could be created for such a large country as Australia, with its complex mix of private and public funders and providers, should take away some of the barriers for the design and implementation of a national chart in Belgium.

So far, community pharmacy based initiatives such as medication review (HMR in Australia and England, MedsCheck in Canada) do not exist in Belgium, although pilot projects are underway. This type of services could be developed within the new remuneration system for pharmacy services applied since April 2010 but, as the Canadian experience shows, community pharmacists might require additional training (eg by clinical pharmacists and/or academics experienced in drug history taking) and a clear definition of standards.

Developing a patient medication profile is much more structured and formalized in the Australian example than it is now in Belgium. As for medication review, this could be another service that could be developed within the new remuneration system for pharmaceutical care.

5.4.5.6 *Other interesting initiatives*

The attempt to use joint forms between hospitals and ambulatory practice in the UK and Netherlands is interesting. In Belgium also this could decrease the number of problems encountered at transition moments, when switches between specialties have to be done to fit the hospital's formulary and/or GP and patients' habits.

Several initiatives are currently not applicable to the Belgian setting for legal reasons. Firstly, dispensing medicines in original packs at discharge (see UK experience) is not possible in Belgium because in most cases this would exceed the 3-day dispensing that is currently allowed and because hospitals do not always have the commercial preparation that the patient is used to. In addition, there is currently no or limited evidence showing a positive impact of such initiatives. Secondly, using patients' own medicines during hospital stay (see UK experience) is forbidden in Belgium, and once again, there are no convincing data suggesting that it has an important impact on continuity of care. However, the examples abroad suggest that it could be valuable to encourage patients to bring their home medicines to the hospital, to facilitate medication history and medication reconciliation on admission.

Key points

- **This chapter reviews national and regional initiatives that have been implemented in Australia, Canada, Denmark, France, The Netherlands, the UK and the US, in order to optimise continuity of care focusing on medications.**
- **Initiatives have been identified in all selected countries. Most initiatives have been implemented since the early 2000 and are still ongoing.**
- **Various kind of initiatives were reported: national guidelines and recommendations, national campaigns, education of healthcare professionals, IT technologies relative to electronic health records and databases to share medication data between settings of care.**
- **All approaches involved different healthcare professionals from different settings of care.**
- **Positive results have been reported in terms, for example, of intake into practice, or number of medication discrepancies. However, additional data are needed to confirm their impact on relevant clinical, economic and humanistic outcome measures.**
- **Critical success factors identified are: requirement of leadership and commitment, the adaptation of initiatives to local settings, the development of a regulatory framework, and IT support.**
- **Contributing failure factors identified are: lack of human and financial resources, questions relative to responsibility and accountability, lack of training of HCPs, lack of agreement for security solutions.**
- **Although not all initiatives are applicable as such to the Belgian setting, most of them convey very interesting data that should be used when drawing recommendations for optimising continuity of care in Belgium.**

6 REVIEW OF THE SITUATION IN BELGIUM

6.1 RESEARCH QUESTIONS

The aim of this part is to summarise Belgian data on drug related problems related to discontinuity of care, as well as initiatives to improve continuity of care focusing on medications.

The research questions addressed in this part of the study are:

- What are the most frequent drug related problems on admission and at/after discharge and are specifically related to transition?
- What are the potential causes of these drug related problems?
- Which initiatives have been tested in Belgium to avoid these errors and what is their impact?

Setting	Transition between ambulatory care (including nursing homes) and hospital care in Belgium
Perspective	Patients admitted and/or discharged from hospital Health care professionals caring for these patients in the outpatient and inpatient settings
Intervention*	Seamless care initiatives
Comparison*	Usual care
Evaluation	Drug-related problems: characteristics, causes Impact of initiatives: process measures, and/or economic, clinical and humanistic outcome measures (ECHO)

* Not applicable for the first two review questions.

6.2 METHODOLOGY

6.2.1 Search strategy

A combination of three approaches was used:

1. Indexed literature search,
2. Handsearch of specific Belgian medical and pharmaceutical journals AND abstract books of national conferences
3. Grey literature search through a questionnaire survey sent to “experts” in the field.

The details of the search strategy for these three data sources are provided in the appendix related to chapter 6.

6.2.2 Selection of the studies

Studies needed to comply with the following criteria to be included:

Date of project	1995 till present
Language	English OR Dutch OR French OR German
Setting	Transition between ambulatory care (including nursing homes) and hospital care. Only studies performed in Belgium
Sample	Patients admitted to hospital AND/OR patients discharged from hospital (no age or other limitations regarding the patients) Health care professionals caring for these patients in the outpatient and inpatient settings
Intervention	No intervention in case of descriptive studies on drug related problems OR Seamless care interventions to avoid drug related problems, e.g. admission or discharge management
Outcome measures	Drug related problems due to the transfer of patients between ambulatory care and hospital care OR Causes of these drug related problems OR Costs of drug related problems OR Characteristics of seamless care interventions aiming to avoid drug related problems and impact of these interventions

The following exclusion criteria were applied:

Sample	Transition between settings of care, not in the context of admission /discharge from the hospital (e.g. transition between ambulatory care and nursing home, between an intensive care ward and a cardiology ward,...)
Intervention	Seamless care interventions not focusing on medicines
Outcome measures	Drug related problems not associated with transition between settings of care

Details on the inclusion process are in the appendix that relates to chapter 6.

6.2.3 Data extraction

The description of the data extraction is in appendix 4 with the items of the data extraction forms developed for that purpose.

A project was called a 'research project' when clear measures of evaluation were described and results were presented. A project was called 'initiative' when it was not a research and no results (other than data on the level of implementation of the initiative like number of interventions done) were presented.

6.2.4 Data analysis and interpretation

The characteristics and the results of the included studies and initiatives are summarized in the tables 7 to 10. The textual narrative synthesis of the results is organized around the following themes:

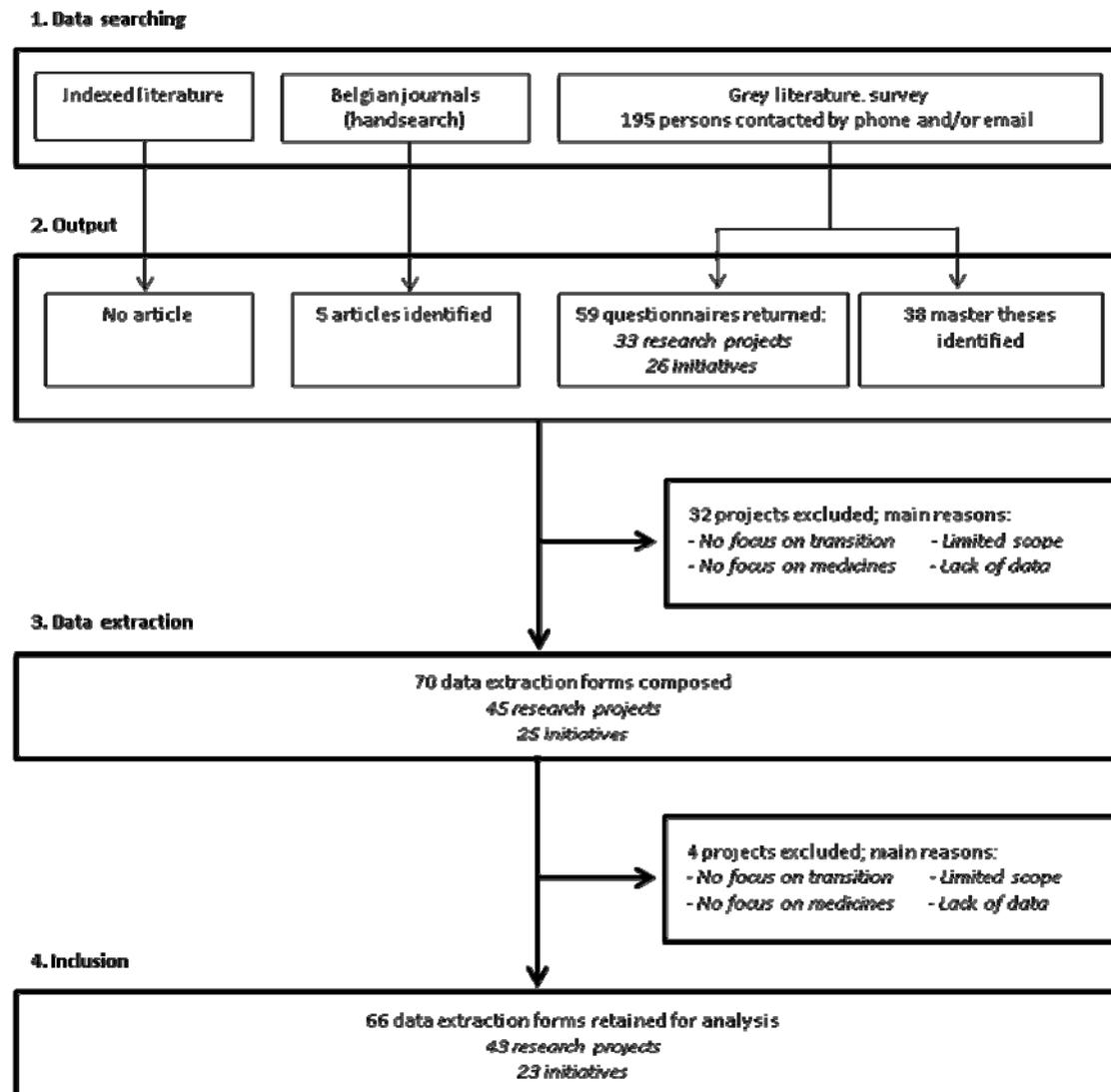
- Research projects describing drug related problems associated with transition between settings of care
- Research projects evaluating interventions to improve seamless care
- Research projects evaluating opinions or experiences of stakeholders on themes related to seamless care
- Ongoing research projects
- Initiatives taken to improve continuity of care with regard to medications

6.3 RESULTS

6.3.1 Search results: number of projects identified by source

The number of projects identified by source is in appendix 4 and summarised in the figure below.

Figure 3: Overview of search strategy



6.3.2 Results: description of the projects

An overview hereafter describes all projects and initiatives that were identified. The numbers used in the text refer to the ID numbers in the summary tables. Financial support was considered to be 'none' when projects were carried out by students. Projects were labelled 'hospital' when financed through normal payment of staff (nurses, pharmacists,...).

6.3.2.1 *Projects describing drug-related problems associated with transition between settings of care.*

Thirteen projects were identified that attempted to describe the type, number and characteristics of drug-related problems associated with transition between settings of care (1-13). Most of these projects focused on discharge from the hospital.

Drug-related problems measured at discharge

In two projects (1,2), a quantitative and qualitative analysis was made of the communication about the discharge treatment in the discharge letter. Both found a lot of missing information, either about the treatment that was initiated during hospital stay or about the (dis-)continuation of home medication.

In five projects (3-7) a clinical pharmacist evaluated the content of the discharge package (discharge medication, medication scheme, substitution form,...) or the discharge medication as such. All found high numbers of packages to be incomplete or containing errors. Furthermore, the majority of discharge packages contained more medication than is legally allowed, i.e. medication for three consecutive days.

The study of Leemans (8) investigated the number and type of problems related to discharge medication, as evaluated by the community pharmacist. In 33% of cases, pharmacists notified at least one problem concerning medications prescribed at hospital discharge. Furthermore, 30.9% of patients who consulted a pharmacist with the medication scheme received from the hospital, admitted not to have fully understood.

In a parallel study (9), the number and type of problems related to discharge medication was evaluated by GPs. In 35.6% of cases at least one DRP was noticed. About 90% of those were system- or HCP-related (e.g. discrepancies between information in the medication scheme and the actual discharge medication; lack of information on discharge medication,...). Out of 20 GP's who noticed at least one DRP, 12 evaluated the most severe DRP as potentially dangerous for the patient.

Only one study (10) analysed the follow-up of the discharge process i.e., after return at home. The researchers compared the actual drugs taken by the patient 7-17 days post discharge with the drug regimen at discharge. A mean of 6 discrepancies per patient was reported, with 95% of those system-related and due to incomplete registration of drug therapy at admission (68%) or erroneous instruction at discharge (25%).

Drug-related problems measured at admission

One study (11) from Leuven found a lot of information missing in drug histories taken at admission, with medication records complete for patients being transferred from nursing homes only. According to this study, the lack of adequate information in the medication record leads to errors in dosage or frequency of administration, or even omission of drugs, in 25-44% of cases.

Another study from Ghent found that there seems to be no major difference in the quality of the medication history in the medical files of a university hospital and a regional hospital, but patients on geriatric wards seem to be better off than patients on surgery wards, for whom the medication history is notified in the medical file in a minority of cases only (12).

Checking referral letters for the information on medication learned that data on chronic medication are present in 71% of cases, whereas only 33% of referral letters have information on the actual medication profile (13). A typed referral letter seemed to enhance the chance of having information on chronic medication and allergies / intolerances ($p=0.04$; $p=0.03$).

Conclusion: drug-related problems associated with transition between settings of care

In conclusion, most projects describing drug-related problems associated with transition between settings of care focus on discharge from the hospital. All but one did not include any follow-up at home. Several projects have shown large numbers of missing or erroneous information in the information and medication at discharge, related or not with missing information in the medication record of the patient upon admission. More data on the latter type of problems were identified through intervention studies described in the following paragraph.

Table 7: Research projects describing drug-related problems associated with transition between settings of care

ID	Reference	Setting / Study population	A/D/A/D	Study design	Measures	Main results	Financial support
1	Delmée	Cliniques Universitaires Saint-Luc 50 patients discharged from the orthopedic surgery ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge treatment communicated in the discharge letter (done by a clinical pharmacist)	Pain treatment (added in 46/50 cases): names and dosages mentioned in 33% of cases only LMWH (added in 29/50 cases): treatment duration not mentioned in 17% of cases Other medication (added in 21/50 cases): not mentioned in 67% of cases Overall, lack of information on therapeutic modifications in 54%; imprecise or erroneous information in 80%.	Hospital
2	Deryckere 132	University Hospital Gent 62 patients > 60 years discharged from surgery ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge treatment communicated in the discharge letter (done by a clinical pharmacist)	In 6.5% of discharge letters, no discharge medication was mentioned In 83.9% of discharge letters, discharge medication was mentioned but no home medication	FOD projects clinical pharmacy
3	Bouchier 133	Algemeen ziekenhuis Maria Middelaes Gent 14 patients discharged from gastro-enterology ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge packagea (done by a clinical pharmacist)	71% of discharge packages were complete. In 75% of cases where a drug had been substituted in the hospital, no written information on this substitution was present. Only 36% of medication schemes were complete and correct. Correct information on drug dose was present in 71% of cases. In 37% of cases the packages contained more medication than legally allowed.	None
4	Maenhaut 134	Algemeen ziekenhuis Maria Middelaes Gent 32 patients discharged from geriatric ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge packagea (done by a clinical pharmacist) (P) Patient knowledge about discharge medication after discharge counseling by ward nurse (done by clinical pharmacist)	75% of discharge packages were complete. In 53% of cases where a drug had been substituted, no written information on this substitution was present. 72% of medication schemes were complete and correct. In 95% of cases, the packages contained more medication than legally allowed. This percentage decreased to 23% after reporting to the head nurses. 33% of patients had good knowledge about their medicines; in 24% knowledge was moderate. 24% of patients had bad knowledge; 19% had no knowledge at all. Of the patients who had one or more drugs stopped or substituted, 56% and 38%	None

5	Lazeure 135	UZ Leuven 42 patients discharged from traumatology ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge medication, i.e. errors in drugs given at discharge as compared to the discharge prescription (done by a clinical pharmacist)	respectively knew which one(s). One or more errors in 54.8% of cases; mean 3.9 errors/patient. 67% of errors related to home medication. 64% of packages contained more medication than legally allowed; > 50% of packages contained medication for at least 8 days. Double medication (brand and generic) was present in 25% of packages. 11% of packages contained 'extra' medication (drugs given during hospital stay but already stopped or drugs never meant to be used by the patient)	None
6	Indevuyt 136	UZ Leuven 24 patients discharged from pediatric wards (oncology and infectious diseases)	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge medication (done by clinical pharmacist) (P) Patient knowledge about discharge medication after discharge counseling by ward nurse (done by clinical pharmacist)	One or more discrepancies between the discharge medication and the intended medication scheme in 54.2% of cases. Most frequent discrepancies: missing drug (4.8%), incorrect dose (4%); incorrect frequency (1.6%); erroneous advice related to intake with or without food (3.2%) Overall, patient knowledge about discharge medication was satisfactory. Two items required extra information from the clinical pharmacist: the indication of the drug (3.2 / 10.3% of respective cases) and whether or not to take the drug with food (4.8 / 5.6% of cases respectively).	None
7	Bink 137	Virga Jesse Ziekenhuis Hasselt 785 patients on an oncology, hematology or abdominal ward	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge management (done by a clinical pharmacist) (P) Acceptance of the medical staff of proposed interventions	The clinical pharmacist has to change the discharge management in 63% of cases. Correction of discharge medication in 71% for oncology, in 22% for hematology and in 6 % for abdominal surgery Advice by the clinical pharmacist about discharge medication is done in 76% for oncology, in 20% for hematology and in 4% for abdominal surgery. 90% of interventions accepted by staff	FOD projects clinical pharmacy
8	Leemans 138	82 Community pharmacies in Flanders 261 Patients discharged from hospital	D	Prospective, observational study	(P) Number and type of problems related to discharge medication, evaluated by the community pharmacist	69% of patients had received a medication scheme upon discharge 30.9% of patients who presented in the pharmacy with the medication scheme received from the hospital, admit not to have fully understood this scheme In 33% of cases the pharmacist noticed at least	CDSP CM Focus Farmaceutische Zorg vzw

						I problem concerning medications prescribed at hospital discharge.	
9	Daenen 139	28 Flemish GP's 87 Patients discharged from hospital	D	Prospective observational study	(P) Number and type of problems related to discharge medication, evaluated by the GP	84/87 patients had to take medicines post discharge. 22 of those did receive neither discharge medication, nor prescriptions from the hospital. 6/22 waited more than 2 days (mean = 6 days) to contact the GP. Medication was changed due to hospitalization in 90% of cases; most frequent change was addition of a new drug. In 35.6% of cases the GP noticed at least one DRP. In 90.3% of cases the DRP was system- or HCP-related. 12/20 GP's who noticed at least one DRP evaluated the most severe DRP as potentially dangerous for the patient. Admission on a surgical ward seems to raise the chance that neither the GP nor the patient receives information on discharge medication (p=0.001).	None
10	Hens 140	6 French-speaking hospitals 25 patients discharged from internal medicine or surgery wards	D	Prospective observational study	(P) Number, characteristics and causes of discrepancies between discharge medication and medication taken by patients 7-17 days post discharge (home visits by a nurse)	151 discrepancies; mean 6 / patient. Most frequent discrepancies: addition (65%), difference in frequency (13%) or dosage (10%). 95% of discrepancies are system-related, and due to incomplete registration of drug therapy on admission (68%) or erroneous instruction at discharge (25%).	None
11	Vermeulen 141	UZ Leuven 220 patients admitted to traumatology ward	A	Prospective observational study	(P) % of complete drug histories for different sources (P) Prescribing errors due to incomplete drug histories	% complete drug histories for different sources: nursing homes, 100%; emergency ward, 70%; ward nurse, 63%; anesthesiology, 53% Errors in prescribed home medication: dosage errors (44%); omission (38%); frequency of administration (25%)	None
12	De Sloovere 142	Regional Hospital Maria Middelaes Gent and university Hospital Gent 1 x 15 medical records on orthopedic surgery, abdominal surgery and geriatric surgery	A	Prospective observational study	(P) Registration of medication history in medical records	Not many differences in registration of medication history in medical records between regional and university hospital. The medication history is almost always present in the medical file of patients on geriatric wards; for patients on surgery wards medication history is often missing. During hospital stay, home medication is prescribed for all patients on geriatric wards; for patient on surgery wards prescribing of home medication is forgotten in the majority of	None

						cases. Only 11% of the referral letters can be used as information source for medication history taking. In 54% of cases the GP agrees with the medication history as told by the patient.	
13	Lybaert 143	Sint-Jan Brugge 98 patients admitted to emergency ward	A	Retrospective observational study	(P) Qualitative and quantitative analysis of referral letter	74/98 referral letters were composed during a home visit; 68/74 were hand-written. 70/98 of referral letters contain information on chronic medication; 32/98 have information on the actual medication. Only 8/98 have data on allergies or intolerances. Information on chronic medication and allergies/intolerances is more present in typed letters than in hand-written letters ($p=0.04$; $p=0.03$).	None

Abbreviations: A: admission; CDSP: Centre de Developpement Scientifique des Pharmaciens; CM: Christelijke Mutualiteit; D: discharge; DRP: Drug Related Problem; FOD: Federale Overheidsdienst; GP: General Practitioner; HCP: Health Care Professional; LMWH: Low Molecular Weight Heparin; P: Process measure; UZ: University Hospital

adischarge package = a bag, containing the discharge medication + a medication scheme for the patient, information forms about substituted drugs for the patient and a discharge letter for the GP;

bdischarge medication = the medication given at the patient on discharge; meant to take home.

6.3.2.2 *Projects evaluating interventions to improve seamless care*

Added value of a clinical pharmacist for medication history taking

Sixteen projects (14-29) were identified that evaluated interventions to improve seamless care. Nine projects (14-22) focused on admission, and investigated whether a clinical pharmacist is of added value in medication history taking. All studies found high numbers of discrepancies between a medication history taken by the clinical pharmacist and a medication history done by the nurse or medical doctor. The proportion of discrepancies (one or more) varied between 42% to 67.7% of cases, with mean numbers of about 2 discrepancies per patient. The most frequently reported discrepancies were drug omissions, wrong drugs and dose and frequency errors. In one of these projects (18) it was further shown that there is a difference between a medication history performed by the clinical pharmacist in collaboration with the patient, and a medication history performed through a phone call of the clinical pharmacist with the GP or community pharmacist (mean numbers of 2.01 and 1.72 discrepancies per patient respectively – data paired for the same patients).

Impact of patient counselling at discharge

About 6 projects (22-27) investigated the impact of patient counselling upon discharge, either by the ward nurse or by a clinical pharmacist, on different types of outcomes such as patient knowledge and satisfaction about the counselling. One study (23) found significant impact of discharge counselling by the clinical pharmacist on the number of discrepancies between the intended discharge medication and the actual medication taken by the patient 2-3 weeks post discharge (0.17 versus 0.32 discrepancies per patient). Another study (26) checked whether the recommendations that were made by the clinical pharmacist at discharge were followed by the GP or the patient one month post-discharge. The results for the patients were encouraging, with 89% of patients following lifestyle and dietary advice and even 95% reporting to be fully adherent (respecting dosing times and intervals). However, 65% of GP's did not follow recommendations. In two projects (24,25), information leaflets were used to support the counselling session. The study by Deryckere (25) was performed on a traumatology ward and showed a positive impact of patient counselling on patient knowledge ($p=0.002$) and satisfaction with information ($p=0.006$). The study by Desplenter (24), also mentioned in chapter 4, was performed in different psychiatric hospitals. Although no impact of the counselling could be found on clinical or humanistic outcomes, neither on compliance, the counselling had a significant effect on loss of productivity ($p=0.022$) as well as on costs for medical consultations ($p=0.036$).

Added value of discharge letter

A pilot program evaluated the usability of a discharge letter, written by the clinical pharmacist, for the community pharmacist (27). 10 out of 12 community pharmacists who received the discharge letter through the patient thought it facilitated patient care; 5 of them used the document to counsel their patient.

Procedures to improve admission / discharge management

Two before-after studies were identified that evaluated procedural aspects of either admission or discharge. The study by Amant (28) found a positive impact of the use of a template for referral letters on the experienced quality of this referral letter. The study in the General Hospital 'Zusters van Barmhartigheid' in Ronse (29) showed an improvement in the quality of the discharge package after optimization of the discharge procedure and communication of this new procedure towards the people involved.

Conclusion: interventions to improve admission and discharge management

In conclusion, many interventions to improve seamless care focused on admission, and involved medication history taking by a clinical pharmacist. Some of the interventions involved patient counselling at discharge either by a nurse or by a clinical pharmacist. For all interventions tested, a positive impact on one or more outcome parameters was reported. According to several authors, there is an added value of medication history taking by a clinical pharmacist. Discharge counselling was shown to have a positive impact on patient knowledge and satisfaction, but the impact on clinical outcomes could not be demonstrated. Only one of the projects evaluated the impact on economic outcomes.

Table 8: Research projects evaluating interventions to improve seamless care

ID	Reference	Setting / Study population	A/D/A D	Study design	Intervention (+ control)	Measures	Main results	Financial support
14	Quennery 144	Cliniques Universitaires Saint-Luc 50 patients admitted on orthopedic surgery ward	A	Prospective controlled study	Medication history on admission performed by a clinical pharmacist vs by the admitting nurse	(P) Number and characteristics of discrepancies	107 discrepancies, mean 2.1/patient Most frequent discrepancies: omission (40%), dosage (36%), frequency of administration (11%) 27% of errors concerned OTC drugs	Hospital
15	Leysen and De Baere 145	UZ Brussel 110 patients admitted to geriatric ward	A	Prospective controlled study	Medication history on admission performed by a clinical pharmacist vs by the admitting physician / nurse	(P) Number and characteristics of discrepancies	6.6±3.5 drugs/patient registered by admitting physician / nurse vs 7.8±3.8 by clinical pharmacist 53% of discrepancies clinically relevant Most frequent discrepancies: 36% incorrect dosage; 35% wrong drug; 11% incorrect formulation	FOD projects clinical pharmacy
16	Deryckere 132	University hospital Gent 175 patients admitted on surgery and emergency ward	A	Prospective controlled study	Medication history on admission performed by a clinical pharmacist vs by the admitting physician / nurse	(P) Number and characteristics of discrepancies	1007 drugs reported by clinical pharmacist vs 792 by admitting physician / nurse Most frequent discrepancies: 15.9% wrong drug; 14.9% incorrect dosage; 7.8% frequency missing; 4.8% incorrect frequency	FOD projects clinical pharmacy
17	De Winter 146	UZ Leuven 2656 patients admitted on emergency ward	A	Prospective controlled study	Medication history on admission performed by a clinical pharmacist / pharmacy technician vs by the admitting physician / nurse	(P) Number and characteristics of discrepancies	One or more discrepancies in 61% of cases. Most frequent discrepancies: 36% omission; 11% dose missing; 6% frequency missing Mean time needed to fill the document: 16 minutes. In 53.1% information obtained from different sources; in 39% GP or community pharmacist contacted	FOD projects clinical pharmacy
18	Deliens – Vandegaar 147	Cliniques Universitaires Saint-Luc 65 patients admitted to internal medicine, geriatrics, gastroenterology and cardiac surgery wards	A	Prospective controlled trial	Medication history on admission performed by clinical pharmacist in collaboration with the patients vs with GP and community pharmacist (though a phone call by the clinical pharmacist)	(P) Number and characteristics of discrepancies	Comparison patient – GP: mean of 2.01 discrepancies / patient Comparison patient – pharmacy: mean of 1.72 discrepancies / patient 11 % of discrepancies are class 3 (causing clinical deterioration or severe discomfort).	None
19	Sterckx 148	Algemeen Ziekenhuis Sint-Dymphna Geel 78 patients admitted to cardiology, orthopedic surgery or neurosurgery ward	A	Prospective controlled trial	Medication history on admission performed by a clinical pharmacist vs by the nurse	(P) Number and characteristics of discrepancies	One or more discrepancies in 67.7% of cases. Most frequent discrepancies: omission (20.5%); time error (12.8%); dose error (7.7%).	None
20	Mertens 149	UZ Leuven 55 patients admitted to	A	Prospective controlled trial	Medication history on admission performed by a clinical pharmacist	(P) Number and characteristics of discrepancies	One or more discrepancies in 52% of cases. Most frequent discrepancies: omission (12.2%); dose error (4.1%); frequency error	None

ID	Reference	Setting / Study population	A/D/A D	Study design	Intervention (+ control)	Measures	Main results	Financial support
		pediatric wards (oncology and infectious diseases)			vs by the nurse		(1.7%).	
21	ASL150	AZ Damiaan Oostende 273 geriatric patients under polymedication	AD	Prospective controlled study	Medication history on admission performed by a clinical pharmacist vs by the nurse	(P) Number and characteristics of discrepancies (P) Acceptance of medical staff of proposed interventions	One or more discrepancies in 42% of cases at admission; in 66.7% of cases at discharge. Most frequent discrepancies at admission : omission(67.29%); addition (16.82%); incorrect frequency (7.48%); incorrect dose (7.48%). 67% and 98 % of interventions accepted by medical staff at admission and at discharge respectively	FOD projects clinical pharmacy
22	Muylkens151	Imeldaziekenhuis Bonheiden Part 1: 15 patients admitted to orthopedic ward Part 2: 27 patients discharged from orthopedic ward	AD	Part 1: prospective controlled trial Part 2: prospective uncontrolled trial	Part 1: Medication history on admission performed by a clinical pharmacist vs by the nurse Part 2: Discharge counseling by ward nurse	(P) Number and characteristics of discrepancies (P) Patient knowledge on discharge counseling (H) Patient satisfaction on discharge counseling	Most frequent discrepancies: omission (53%); incorrect dosage (73%); time of administration (26%) Indication of home medication known by 83% of patients; indication of new medication by 51%. 74% of patients confirmed they had ample opportunity to ask questions about their medication; 37% had additional questions. All patients (100%) were satisfied with the discharge form and with the extra information.	FOD projects clinical pharmacy
23	Remy 152	Cliniques Universitaires Saint-Luc 37 patients discharged from internal medicine and orthopedic surgery wards	D	Prospective controlled trial	Information on medicines provided to patient upon discharge by the clinical pharmacist vs usual care	(P) inter-rater reliability of the MDT to evaluate medication discrepancies (P) Number, characteristics and causes of discrepancies between discharge medication and medication taken by patients 2-3 weeks post discharge (phone call by a blinded clinical pharmacist)	Inter-rater reliability satisfactory (0.96; 0.79 and 0.97) Mean number of 0.32 discrepancies in the control group vs 0.17 in the intervention group Reasons for discrepancies: Intervention group: 40% intentional non-compliance, 33.3% non-intentional non-compliance, 20% and 16.7% incomplete or contradictory information respectively Control group: 47.4% intentional non-compliance; 21% automedication	None
24	Desplenter 76	11 Flemish psychiatric hospitals 99 patients admitted with major depression (DSM IV)	D	Prospective controlled trial	Control group: usual care Undifferentiated group: discharge counseling for all patients, using information leaflet on relevant antidepressant Differentiated group:	(P) Compliance (C) HADS, SCL, adverse effects (H) satisfaction and quality of life (E) productivity, costs, readmissions (see also chapter 4)	No effect on compliance No effect on HADS, SCL or adverse reactions No difference between groups on satisfaction or quality of life Differentiated approach resulted in a lower decrease of productivity (p=0.022), and lower costs for medical consultations	IWT Vlaanderen

ID	Reference	Setting / Study population	A/D/A D	Study design	Intervention (+ control)	Measures	Main results	Financial support
					discharge counseling for patients with high extent of information desire only		(p=0,036). Undifferentiated approach decreased the number of re-admissions within 12 months post discharge (p = 0.031).	
25	Deryckere 153	UZ Leuven 29 patients discharged from traumatology ward	D	Prospective controlled trial	Intervention group patients received information leaflets (3) on low molecular weight heparine, pain medication and antibiotics; control patients received only verbal information	(P) Knowledge about discharge medication (H) Satisfaction with information on discharge medication; readability of leaflets	Increase in patient knowledge about discharge medication significantly higher in intervention group than in control group (p=0.002) Satisfaction with information 8.78/10 in intervention group vs 7.83 in control group (p=0.006) Majority of patients scored leaflets as well-structured, readable and understandable.	None
26	Jullion 154	Hopital Erasme Bruxelles 78 patients discharged from cardiology ward	(A)D	Prospective uncontrolled trial	Medication history on admission performed by clinical pharmacist, analysis of pharmacotherapy during hospital stay, discharge counseling	(P) Follow-up of recommendations by patients and GP one month after discharge	89% of patients followed lifestyle and dietary advice; 95% respected dosing times and intervals. 65% of GP's did not follow recommendations of clinical pharmacist.	SPF – clinical pharmacy projects
27	Cavrenne 155	Cliniques Universitaires Saint-Luc and Mont-Godinne 18 patients discharged with treatment changes	D	Prospective uncontrolled pilot study	Discharge form written by the clinical pharmacist and given to the community pharmacist by the patient	(P) Usefulness and quality of the discharge form (telephone call to community pharmacist 2 weeks after discharge) (P) time required for the clinical pharmacist	12 pharmacists received the discharge plan. 10 pharmacists thought the document facilitated continuity of patient care; 5 used it to counsel their patients. Mean time needed to fill the document: 25 minutes.	None
28	Amant 156	1 hospital (not specified) 10 specialised medical doctors	A	Before – after study	Classic referral letter vs referral letter composed by using template	(P) Quality of the referral letter (layout, brevity, content, professionalism, usability)	Overall quality score before intervention: 8/10; overall quality score after intervention: 8.78/10 Improvement on brevity (p=0.028), professionalism (p=0.045) and quality in relation to ideal referral letter (p=0.008).	None
29	Medicatie project	Algemeen Ziekenhuis Zusters van Barmhartigheid, Ronse	D	Before – after study	Optimization of discharge procedure related to medication	(P) Quantitative and qualitative evaluation of discharge management	Less discrepancies between hospital file and discharge form / discharge letter after intervention Discharge medication conform legal rules Improvement in readability of medication scheme	Hospital

Abbreviations: A: Admission; AZ: Algemeen Ziekenhuis; C: Clinical outcome measure; D: Discharge; FOD: Federale Overheidsdienst; GP: General Practitioner; H: Humanistic outcome measure; HADS = Hospital Anxiety and Depressions Scale; IWT: Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen; MDT: Medication Discrepancy Tool; OTC: Over-The-Counter; P: Process measure; SCL: Symptom Checklist; UZ: Universitair Ziekenhuis

6.3.2.3 *Research projects evaluating opinions or experiences of stakeholders on themes related to seamless care*

Ten projects (30-40) surveyed the experience of different stakeholders on themes related to seamless care.

Experiences of nurses

In three studies (30-32) ward nurses were asked about current practice in medication history taking. These studies showed that any nurse is allowed to perform a medication history taking, and that there is no standard procedure as to obtain information on the medication record of the patient. The study by Sterckx (30) further showed that next to the patient, the patients' family is the most important source of information, and that only in a minority of cases (6%) the GP or the community pharmacist is contacted.

The CASOC project (33) (CASuïstic rond Ontslag Coordinatie) shows that there are many discrepancies between the ward nurse's statement and the patient's experience concerning admission and discharge management. Nurses claimed in more than 70% of cases that they gave written instructions for the GP to the patient, and that they explained these instructions in 90% of cases. However, only 52.9% of patients confirmed they had received these instructions, with not yet 25% agreeing that these instructions were explained.

Collaboration between hospital and home care setting

As part of a large, three-year project on admission and discharge, OVOSIT (Oost Vlaams Overleg Samenwerkings Initiatieven Thuiszorg) organized a questionnaire survey as well as focus groups to identify the current practice in collaboration between health care providers of hospital and home care settings, and showed that there is 1) a need for an electronic database to facilitate communication between all partners; 2) a need for a clear definition on the roles and responsibilities of all different partners, and 3) no consensus as to the ideal person / function to coordinate transition between settings of care (34).

The experience of patients

In the study by Desplenter (35) semi-structured interviews with patients and health care professionals were performed to investigate current practice in information provision about antidepressant drugs throughout hospital stay. As for medication history taking, information provision is not structured or standardized, is mostly done by the psychiatrist or the nurse, and is more usual when starting or changing pharmacotherapy than at discharge.

Patient experience and satisfaction about the discharge process was also questioned in a survey performed at Gezondheidszorg Oostkust (36), where a vast majority of patients confirmed that they received a medication scheme upon discharge, as well as information about this scheme and on the drugs themselves.

Opinion of patients and health professionals on the information process

Three studies were identified that asked the opinion of patients and/or health care professionals on information processes.

The patient forum 'Vlaams patiëntenplatform' found that 53% of chronically ill patients who participated in the survey find it's the task of the GP to inform the hospital about his/her medication record. 67% are opposed to direct exchange of information on discharge medication between the hospital and the community pharmacy, while 91% agree with direct information between hospital and GP (37).

Clinical pharmacists would favour a secured on-line system to exchange data between community pharmacy and hospital (38). Also GP's and medical doctors working on emergency wards are in favour of an electronic health record, to be used in acute situations, given that it minimally contains information on all the medication chronically used by a patient, including dose and frequency of administration, allergies, the medical history of the patient and the vaccination status (39).

In a project aiming to improve seamless care for oncology patients, the community pharmacist would first contact the GP (39.1%) then the oncologist (33.8%) in case of need for information (40). Only a minority of pharmacists would contact the clinical pharmacist. This might change however, as a meeting between clinical pharmacists and community pharmacists, and leaflets written by the clinical pharmacists were evaluated very positively.

Conclusion: perception of stakeholders

In conclusion, medication history taking, information provision and discharge counselling are in most hospitals not structured or standardized. Many health care professionals are involved in these processes, without any clear definition on the roles and responsibilities of all different partners. Patients usually remind and appreciate the information they received although their perception differs from the perception of the caregiver who gave it. Clinical pharmacists, GP's and other specialists involved in projects are in favour of an electronic health record to enhance the performance of medication history taking, the medical decision making and the communication between health care professionals.

Table 9: Research projects evaluating opinions or experiences of stakeholders on themes related to seamless care

ID	Reference	Setting / Study population	A/D/A D	Study design	Measures	Main results	Financial support
30	Sterckx 148	Algemeen ziekenhuis Sint-Dimpna Geel 48 ward nurses (8 different wards)	A	Questionnaire survey	(P) Admission procedure with regard to medication history taking	Sources of information: 35.4% patient; 18.8% previous admission; 16.7% patient; 8.3% other hospital; 6.3% nursing home; 4.2% GP In case of unclear or missing information, family (59%), GP (6%), community pharmacist (6%) or nursing home (6%) is contacted. In 23% of cases, the specialist is informed. All nurses are allowed to perform medication history taking and to transfer the data into the electronic medication record of the patient.	None
31	De Sloovere 142	Algemeen ziekenhuis Maria Middelaers Gent and UZ Gent 6 head nurses	A	Questionnaire survey	(P) Admission procedure with regard to medication history taking	On an abdominal, orthopedic and geriatric wards of both hospitals medication history is taken by a nurse. Exception is the emergency department of university hospital Gent, where medication history is only taken on demand of the doctor. Patients on a geriatric wards do often bring their home medication, including pill boxes, to the hospital. However, there is no general rule as to bring home medication upon admission.	None
32	Saelen 157	4 Flemish hospitals (600-1000 beds each) 300 ward nurses	A	Questionnaire survey	(P) Medication history taking	According to 84.4% of the respondents, medication history taking is a task for the nurse. Their opinions on background in pharmacotherapy are divided, but all confirm that they have no standardized procedure to perform a medication history. Information on home medication is written in the nursing file in 95.9% of cases, and in the medical file in 52.1% of cases.	None
33	CASOC	Ziekenhuis Overleg Gent (4 hospitals) Patients > 65 discharged from hospital and followed-up by SIT + ward nurses	AD	Questionnaire survey	(P) Admission and discharge procedure according to the ward nurse (P) Admission and discharge procedure experienced by the patient	In 10.8% of cases, ward nurses claimed that they actively informed the GP about the admission of their patient; patients thought in 68.4% of cases that their GP was informed about their admission. In 13.2% of cases, GP's were actively informed about discharge of their patients; patients thought this was done in 26.8% of cases. Nurses claimed in 88.2% of cases that prescriptions for discharge medication were given to the patients or their family; 67.9% of patients said they received prescriptions. In 80.90% of cases, nurses said they	None

						provided medicines for the first days; 70.6% of patients said they received medication. In 70.6% of cases, written instructions for the GP were given to the patient; only 52.9% of patients said they received this type of instructions. Nurses said they explained these instructions in 89.78% of cases; only 24.5% of patients agreed this was done.	
34	OVOSIT 158	Ziekenhuizen en thuiszorg Oost-Vlaanderen 320 health care professionals for the questionnaire survey Health care professionals and policy makers for the focus groups	AD	Questionnaire survey Focus groups	(P) Communication between different partners about admission and discharge (who? when? how?) (P) Optimization of transfer documents? (P) Optimization of collaboration between all partners? (P) How to answer the need for a seamless care coordinator settings?	On the long term, an electronic database is required. On the short term, the written home care file is preferred as transfer document. There is a need for a clear definition of the roles and responsibilities of the different partners in order to optimize collaboration. No conclusions could be made as to the ideal person to coordinate transition between settings	Provinciebestuur Oost-Vlaanderen
35	Desplenter 159	11 Flemish psychiatric hospitals 17 patients; 48 health care providers	AD	Semi-structured interviews	(P) Information provision about antidepressant drugs throughout hospital stay	Information is mostly given by the psychiatrist and the nurse. Information provision is not structured or standardized. While information provision when starting or changing pharmacotherapy is usual, interventions at discharge are very limited.	IWT Vlaanderen
36	Ontslag medicatie	Gezondheidszorg Oostkust 113 patients discharged from D, C and Sp wards	D	Questionnaire	(H) Patient experience and satisfaction about discharge process	97% of patients received a medication scheme upon discharge; 96% received information about this scheme, while 91% received information about the drugs. 97% of patients claim to have understood the information.	None
37	Vlaams Patiënten Platform 160	Chronically ill patients, member of patient association	AD	Questionnaire survey	(H) Role and responsibility of different HCP in sharing information on medication record upon admission and discharge	53% of respondents find it the task of the GP to inform the hospital about his/her medication record upon admission. 17% think it is the task of someone else (patient, family or specialist). 45% agree that the name of the pharmacist should be kept in the hospital file; 38% disagrees. 67% are opposed to direct exchange of information on discharge medication between the hospital and the community pharmacy. 91% agree with direct information between the hospital and the GP. 58% of patients prefer to inform the community pharmacy themselves.	None
38	Leemans 161	All Flemish hospitals with FOD project clinical pharmacy (Clinical) pharmacists, responsible for admission and	AD	Questionnaire survey, focus groups and semi-structured	(P) Problems related to transfer of information between community pharmacy and hospital (P) Essential elements of a shared	Respondents confirmed that information on home medication of patients upon admission is often unclear Identification of family pharmacy and availability of	APB

		discharge + software developers		interviews	pharmaceutical record? (P) Current status of development of pharmacy software related to these issues?	complete drug history are of major importance for clinical pharmacist. Respondents would favor a secured on-line system to exchange data between community pharmacy and hospital.	
39	De Nys 162	404 GP's (82% Dutch-speaking; 17% French-speaking) 21 medical doctors working at emergency wards (80% Dutch-speaking; 19% French-speaking)	A	Questionnaire survey (electronic)	(P) Essential elements of an Electronic Health Record (EHR) for use in acute situations (P) Attitude towards and confidence in an EHR	According to the respondents, the EHR should at least contain information on 1) allergies; 2) all medication chronically used by the patient, including information on dose and frequency of administration; 3) medical history of the patient, including information on surgeries; 4) vaccination status and 5) reanimation code The survey shows that respondents have some doubts about the safety of an EHR, but think that using an EHR is efficient and is beneficial in making a correct diagnosis.	None
40	Duvivier	Centre Hospitalier Peltzer la Tourelle (oncology) Clinical pharmacist + community pharmacists	D	Questionnaire Survey Meetings for information	(P) Information needed by the community pharmacists for counselling oncologic patients discharged from hospital (H) Satisfaction vs meetings and leaflet given (and written) by the clinical pharmacist	(P) 45% of respondents reported that patients often ask questions over their oncologic treatment: side effects (15,5%), pain (14,2%), associated treatments (12,5%), medicines (11,2%), interactions (10,5%), treatment length (10,3%), intervention of the mutual insurance company (9,8%), home care services (8,8%) (P) the first person contacted by the pharmacist in case of need of information is: the GP (39,1%), the oncologist (33,8%), the service of oncology (17,7%), the clinical pharmacist (9,4%) (H) Evaluation of the meeting: 87,5% satisfaction , evaluation of the leaflet written by the clinical pharmacist for the community pharmacists: 100% satisfaction	FOD Clinical Pharmacy projects

Abbreviations: A: Admission; APB = Algemene Pharmaceutische Bond / Association Pharmaceutique Belge; D: Discharge; EHR: Electronic Health Record; FOD: Federale Overheidsdienst; GP: General Practitioner; HCP: Health Care Professional; IWT: Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen; P: Process measure; UZ : Universitair Ziekenhuis

6.3.2.4 *Ongoing research projects*

A few ongoing research projects were identified, that aim to encompass the gaps in the existing evidence, or that aim to investigate the impact of interventions on a larger scale.

One research project will evaluate, in a cluster controlled trial, the impact of discharge medication scheme and information (composed by the clinical pharmacist) for the patient, the GP and the community pharmacist versus usual care (41). Outcome measures are 1) the number and characteristics of discrepancies between discharge medication and medication taken by the patient 2 weeks post-discharge (through phone call with patient/carer and GP), using the validated MDT (Medication Discrepancy Tool); 2) satisfaction of patients, GP's and community pharmacists and 3) readmission and care consumption 1 month after discharge. The results are expected by the end of 2010.

The aim of two other research projects, one in Flanders and one in Wallonia, is to develop an electronic platform to share health-care related data between health care professionals (42,43). Both projects should result in a proof of concept, tested and evaluated by different stakeholders. As part of the Share4Health project (42), a pre-study was performed to investigate the legal as well as practical possibilities of this type of platform, and the expectations and opinions of different stakeholders (results expected in 2010). Two other projects (44,45) focus on the use of existing medication schemes, and aim at developing a uniform document. The project of Leemans (45) will use qualitative interviews, while the study of the SIT Brugge-Oostkust (44) starts from document analysis. The results from these projects might inform others, as the developers of electronic platforms, on the expectations and usability of tools to enhance seamless care.

Table 10: Ongoing research projects

ID	Reference	Setting / Study population	A/D/A D	Study design	Intervention (+ control)	Measures	Financial support
41	Claeys	Cliniques Universitaires Mont Godinne, Centre Hospitalier de Jolimont-Lobbes Geriatric and orthopedic wards	(A)D	Cluster controlled trial	Discharge medication scheme and information (composed by the clinical pharmacist) for the patient, the GP and the community pharmacist vs usual care	(P) Number and characteristics of discrepancies between discharge medication and medication taken by the patient 2 weeks post-discharge (through phone call with patient/carer and GP), using the validated MDT (H): Satisfaction of patients, GP's and community pharmacists (C-E): readmission and care consumption 1 month after discharge	FNRS
42	Share4 Health	Virga Jesse Ziekenhuis Hasselt / AZ Groeninge Kortrijk GP's and community pharmacists from both regions	AD	Proof of concept	Development of an inter-professional patient-centered IT platform that enables sharing of health-related data. WP4 focuses on the exchange of the medication record between hospital, GP and community pharmacy	(H) Usability	IBBT
43	Réseau santé Wallon	38 French speaking hospitals	AD	Proof of concept	Development of an electronic platform to share patient information between doctors (i.c. the specialist and the GP)	(H) Usability	SPF Santé Publique, Région Wallonne, DELL
44	SIT Brugge – Oostkust	Different hospitals in the region of Brugge - Oostkust SIT Brugge – SIT Oostkust	AD	Document analysis Development of a universal medication scheme, to be used in the different settings	NA	(H) Layout, readability and use of existing medication schemes	None
45	Leemans	UZ Brussel Patients and nurses on different wards	AD	Qualitative interviews	NA	(H) Layout, readability and use of existing medication schemes	None

Abbreviations: A: admission; AZ: algemeen ziekenhuis; C: Clinical outcome measure; D: discharge; E: Economic outcome measure; FNRS: Fonds National de la Recherche Scientifique; IBBT: Interdisciplinair instituut voor BreedBand Technologie; IT: Information Technology; MDT: medication discrepancy tool; NA: not applicable; P: Process measure; SIT: Samenwerkingsinitiatieven Inzake Thuisverzorging; UZ: Universitair Ziekenhuis

6.3.2.5 *Initiatives to improve the continuity of care with regard to medications, without any outcome measurement*

Searching for evidence through contacts with experts in the field resulted in a list of initiatives aimed to improve continuity of care with regard to medications, but without measurement of the impact on any outcome parameter (46-62). Many initiatives are clinical pharmacy based, either oriented on the admission process or on the admission and discharge processes. Some initiatives have an IT focus, while in others the use of a medication scheme or treatment plan was implemented. Two initiatives were identified that focused on the active follow-up of patients. In three hospitals, a brown bag was introduced. This kind of bag is to be used by patients upon admission, and should contain all the medication a patient is currently taking. In two other settings, transfer documents are developed that should enable transition between settings of care.

Table 11: Initiatives to improve seamless care, without outcome measurement

ID	Reference	Setting	A/D/A D	Type of initiative	Brief description	HCP involved	Comments	Financial support
46	Mediweb	AZ Groeninge, Kortrijk	D	IT	Creation of a 'mediweb', which enables electronic access for GP's to the medical files of their patients in the hospital	For general practitioners	One-way system. Information on medicines might be limited and distributed over different files and reports.	AZ Groeninge
47	Verhelle	AZ Groeninge	AD	IT Information and standardiza- tion	Analysis of current admission and discharge procedures; standardization; participation in Share4Health.	For general practitioners, hospital and community pharmacists		AZ Groeninge AVK IBBT
48	My UZ	UZ Leuven	A	IT	Personal and medical data, needed for anesthesiology, can be filled in by patients at home in an on-line application. Information is stored in a patient-specific file accessible for anesthesiologists.	For specialists	Not exclusively focusing on medicines	UZ Leuven
49	GLS	Services et soins à domicile, Liège	AD	Medication scheme + Information and coordination between stakeholders	Development of a patient-specific medication scheme to be used upon transfer of patients between settings of care Development of a coordination book for stakeholders	By nurses, in collaboration with pharmacists and GPs For GP's, pharmacists, nurses, physiotherapists, patients		SPF Santé Publique
50	Medicatie schema BOA	Community pharmacies, region of Brugge – Oostende	AD	Medication scheme	Development of a medication scheme to be filled in by the community pharmacist in order to clarify the established drug regimen after discharge and/or to be used upon transfer between settings of care	By community pharmacists		BOA
51	Meert 163	Algemeen Ziekenhuis Maria Middelaes Gent – gastroenterology ward	D	Medication scheme	Development of a simplified medication scheme, to be used upon discharge	By clinical pharmacist	Follow-up of project by Bouchier (49)	None
52	Ziekenhuis project WGK Limburg	Hospitals and Wit-Geel Kruis, Limburg	D	Treatment plan, including medication scheme	Preparation of discharge of patients previously cared for by WGK and organization of care by 'continuity' nurse	By nurses	Not exclusively focusing on medicines	WGK Limburg
53	Project Puente	43 psychiatric hospitals Vzw Remissie	D	Patient follow- up Assertive	Follow-up of patients with schizophrenia, with focus on compliance to drug regimen and with attention for communication between HCP's.	By nurses	Not exclusively focusing on medicines	Koning Boudewijn stichting

ID	Reference	Setting	A/D/A D	Type of initiative	Brief description	HCP involved	Comments	Financial support
				outreach				CSR Johnson & Johnson, Janssen - Cilag
54	APPI 164	UZ Antwerpen – policlinic surgery	D	Treatment plan + patient follow-up	Elaboration of a patient-specific pain treatment plan + telephonic follow-up of patients post discharge	By clinical pharmacist		FOD projects clinical pharmacy
55	Van Hove 165	Algemeen Ziekenhuis Sint-Nikolaas	AD	Medication scheme + Information and coordination between stakeholders	Development of a uniform medication scheme, to be used upon discharge Implementation of brown bag	By clinical pharmacist, in collaboration with nurses and GP's		FOD projects clinical pharmacy
56	Verhaeghe 166	AZ Groeninge – emergency ward	A	Clinical pharmacy	Drug history taking, including drug-disease and drug-drug interaction checking	By clinical pharmacist		FOD projects clinical pharmacy
57	Clinical pharmacy admission and discharge 167, 168, 169, 170, 171, 172, 173 174;;	Different hospitals (see list below)a	AD	Clinical pharmacy	Drug history on admission, and informing patient/GP/community pharmacist upon discharge	By clinical pharmacist, in collaboration with other HCP	Not all wards covered at the same time; dependent on availability of clinical pharmacists.	FOD projects clinical pharmacy + hospital (in limited cases only) + external (in limited cases only)
58	Inventarisatie thuis-medicatie	Algemeen Ziekenhuis Sint-Jozef Turnhout	A	Brown bag	Patients receive a 'brown bag' upon pre-operative consultation or when admitted to the emergency ward. Patients are asked to bring all the medicines they use at home in the brown bag upon admission. The ward nurse discusses the content of the brown bag with the patient and uses this information to build the drug history. Upon discharge, the brown bag is given back to the patient, and any change or discontinuation is explained.	By ward nurses		Hospital + Vlaams Ziekenhuis netwerk
59	Zakje voor persoonlijke geneesmiddelen	Algemeen ziekenhuis Sint-Blasius Dendermonde	A	Brown bag	Patients receive a 'brown bag' upon pre-hospitalization consultation. Patients are asked to bring all the medicines they use at home in the brown bag upon admission.	By ward nurses	Pilot phase	Hospital
60	Medicatie-zakje	UZ Leuven	A	Brown bag	Patients receive a 'brown bag' + information leaflet upon pre-hospitalization consultation or when admitted to one of the participating	By ward nurses, specialized doctors (e.g.	Started in November 2008 as part of the 'Week van de patiëntveiligheid'.	UZ Leuven Vlaams Ziekenhuis

ID	Reference	Setting	A/D/A D	Type of initiative	Brief description	HCP involved	Comments	Financial support
					wards. Patients are asked to bring all the medicines they use at home in the brown bag.	anesthesiology) and clinical pharmacists		Netwerk
61	Samenwerking MZNL WGK Limburg	Maria Ziekenhuis Noord Limburg WGK Peer, Bree, Neerpelt, Lommel	AD	Discharge protocol Transfer document, including medication scheme	Development of a uniform discharge protocol and discharge document for patients cared for by WGK.	Ward nurses WGK nurses	Not exclusively focusing on medicines	
62	TransFert Document	AZ Sint-Maarten Duffel	D	Transfer document	Development of a standardized drug therapy chart, to be used upon discharge of patients		Concept phase	
63	Van farmac. anamnese tot elektronische ontslagbrief	AZ Groeninge Kortrijk	AD	Clinical pharmacy + IT	Drug history taking, including drug-disease and drug-drug interaction checking. Storage of data in electronic record. Electronic discharge letter, composed of information in the electronic record.	By clinical pharmacists		None

Abbreviations: A: Admission; AVK: Apothekers Vereniging Kortrijk; AZ: Algemeen Ziekenhuis; BOA: Brugse en Oostendse Apothekersvereniging; CSR: Corporate Social Responsibility; D: Discharge; FOD: Federale Overheidsdienst; GP: General Practitioner; HCP: Health Care Professional; IBBT: Interdisciplinair Instituut voor Breedband Technologie; IT: information technology; SPF: Service Public Fédéral; UZ: Universitair Ziekenhuis; WGK: Wit-Gele Kruis

a Hospitals with clinical pharmacy initiatives on seamless care (admission and discharge):

AZ Damiaan Oostende – geriatric ward (42); AZ Groeninge Kortrijk – emergency department (22); AZ Sint-Blasius Dendermonde – geriatric ward (44); AZ Sint-Lucas Gent – geriatric ward (23); AZ Sint-Lucas Gent – geriatric ward (23); AZ Sint-Nikolaas Sint-Niklaas – geriatric ward (43); CH du Bois de l'Abbaye et de Hesbaye – geriatric ward (10D); CH Peltzer La Tourelle – Oncology (59); CHU Liège – geriatric ward (10E); CHU Tivoli – geriatric ward (10B); CHU Tubize Nivelles – geriatric ward (10E); Clinique du Sud du Luxembourg – Orthopedic ward (10E); Cliniques Universitaires Saint-Luc Bruxelles – internal medicine, revalidation, dialysis, intensive care, pediatrics, orthopedics* (10C)(38)(36)(37); Erasme – cardiology (19); Hôpital Vésale CHU de Charleroi – geriatric ward (10E); Imelda ziekenhuis Bonheiden – orthopedic surgery (6); Intercommunale CHP de Liège – psychiatric ward (10E); Onze-Lieve-Vrouw ziekenhuis Aalst – oncology (7); UCL Mont-Godinne – geriatrics, orthopedic surgery, digestive surgery, internal medicine, cardiology, pneumology* (10A)(35)(32); UZ Antwerp – surgery day-hospital; UZ Brussel – geriatric ward (30); UZ Gent – surgery (27); UZ Leuven – emergency department (28); Virga Jesse Ziekenhuis Hasselt – oncology ward, hematology ward, abdominal surgery (29); Ziekenhuis Oost-Limburg Genk – cardiology – gastro-enterology – abdominal surgery – urology – oncology – pneumology – neurology- geriatric ward – thoracic surgery – orthopedics surgery – neurosurgery

6.3.3 Results: Barriers and difficulties reported by the experts

Some of the barriers identified by the experts who filled the questionnaires are patient-related, while other are linked with the health-care professional performing the intervention. However, most barriers, are system-related.

6.3.3.1 *Patient-related barriers*

- Patients don't always know the name of the community pharmacist or do not have a fixed pharmacy where they collect their medicines. This has an impact on the possibility to perform medication history taking in collaboration with the community pharmacist (18).
- Patients often have difficulties to use an on-line tool as developed to inventory personal and medical data needed for anaesthesiology (48). Some patients don't know how the e-ID reader works, don't know the codes or don't fill in the files properly.
- Patients might need help to complete the medication scheme provided on the brown bag and need to be counselled to take the bag with them upon admission and discharge (58-60).
- Patients may not want the direct exchange of information between the hospital and the community pharmacy (37)
- Language and health literacy may be barriers when counselling patients upon discharge (26).
- Leaving the patient with a transfer document for the community pharmacist might weaken the power of this type of intervention. Some patients might forget or not give the information letter to the pharmacist (27).

6.3.3.2 *Barriers related to the health care professional performing the intervention*

- Specific education and training is needed to perform clinical pharmacy (21).
- Nurses and discharge managers often lack adequate knowledge on medication (36).
- Community pharmacists might feel uncomfortable to contact clinical pharmacists (40)

6.3.3.3 *System related barriers*

- Access to patient files is often difficult and electronic data insufficient (7,56,57).
- It is often difficult to reach the GP or community pharmacist when attempting to get into contact when performing medication history (18).
- Discharge planning is often very variable, which makes it difficult to plan interventions by clinical pharmacists (24).
- Many of the interventions are time consuming. Health care professionals struggle with a lack of economic and human resources (7,21,53,54,56,57).
- The "Forfaitarisation"⁵ of medication in hospitals makes it difficult to find a balance between adequate service and budget (36).
- In some settings, there is a lack of interest of doctors and other HCP's for the medication problem and more specifically for the development of clinical pharmacy.

⁵ Forfaitarisation means that the hospital receives a fixed amount of money per patient and per indication that should be sufficient to pay all costs, including drug expenditure. In order to reduce costs, hospitals may limit the amount of discharge medication.

6.3.4 Results: Driving forces reported by the experts

The experts also identified facilitators, i.e. elements that sustain or even stimulate the development of new services. Quite a lot of experts reported that the most motivating factor is that patients as well as other health care professionals welcome the initiative, and that they confirm the added value of the intervention. Also the positive results or improvements following initiatives seem to be motivating for further development of interventions. An overview of specific facilitators mentioned by experts involved in the inventoried projects, is given below.

6.3.4.1 *Patient-related facilitators*

- When visiting patients at home (10), or when counselling patients at discharge (24), health care professionals experience the appreciation of patients for having a meeting with someone who is really interested in their difficulties, without judgement.
- Patients report to find added value in being counselled by a clinical pharmacist upon discharge (24,26), and appreciate the personalized approach (26).
- Patients seem to appreciate receiving an appropriate medication scheme as it meets their need for more information about their treatment (49,50,51,52,61,62).

6.3.4.2 *Facilitators related to the interaction with other health care professionals*

- GP's and community pharmacists do react in a positive way when contacted by the clinical pharmacist to collaborate in medication history taking (18).
- Community pharmacists express their appreciation for receiving an information document, written by the clinical pharmacist upon discharge (27).
- Medical doctors and nurses confirm the added value of services such as the Apotheek Service Loket (21).
- Nurses express their satisfaction with the fact that composing a medication scheme is taken over by the pharmacist, because they lack time and knowledge to perform this task (49,50,51,52,61,62).
- Doctors and other health care professionals are enthusiastic about clinical pharmacy initiatives (7,56,57), and confirm that these initiatives result in time saving. Nurses do find the presence of a clinical pharmacist supportive, and report gaining knowledge about drugs.

6.3.4.3 *Results or improvements perceived by health care professionals*

- Discrepancies observed when comparing drug histories taken by medical doctors / nurses and clinical pharmacists, are often clinically relevant and have an impact on clinical judgement (17).
- Electronic access for GP's and specialists to medical files of patients does improve the communication between health care professionals (43,46).
- Personal and medical data filled in by patients at home (on-line) is comfortable for patients, decreases the rate of medication errors at admission and saves time for doctor and patient (48).
- Clinical pharmacy initiatives upon discharge result in an improved follow-up of therapy, e.g. notification of drug interactions, and in a decreased number of phone calls from GP's to specialists after discharge (7,56,57).
- Patient counselling upon discharge results in better compliance and understanding of the therapy by the patient (7,56,57).
- Implementation of a brown bag decreases the number of phone calls from GP's to specialists after discharge (58,59).

- Projects do result in integration of the clinical pharmacist in the health care team (26) (21) an enhance the appreciation for the clinical pharmacist as a reference person to be contacted for all questions related to medication (7,56,57).

6.4 DISCUSSION

This work gives an extensive overview of initiatives on seamless care for medication in Belgium. There is a growing awareness of the problems around seamless care as most projects or initiatives identified started over the last three years.

6.4.1 Setting: outnumber of hospital based initiatives

Most projects were initiated by health care professionals working in the hospital setting. Very few studies were set up as collaboration between primary and secondary care.

The majority of projects were single-centre, with only a few multi-centre studies.

Projects were developed in both teaching and non teaching environments. There does not seem to be any clear-cut difference in the problems encountered or other results found, which enhances generalisation of the results.

6.4.2 Sources of funding

From the list of projects, it is clear that the pilot projects in clinical pharmacy, sponsored by the Ministry of Health, have 'boosted' this research domain. Without this support, half of the projects reported in this study would not have been performed. The yearly budget for these projects, started in 2007, was estimated to be 1.248.983 €.

Other projects have been funded by the hospital, through employment of the people involved, or didn't require extra funding because they were performed by students as part of their master thesis. For PhD projects, funding was searched at organisations as IWT or FWO/FNRS.

Some projects, initiated by health care professionals in ambulatory care, were supported by home care organisations as Wit-Gele Kruis. One project was sponsored by the province of Oost-Vlaanderen, another by IBBT.

6.4.3 Design: controlled interventions with small sample sizes

Studies that evaluated DRP were all, except one, prospective in nature. This enhances the validity of the data collected.

When looking at the design of intervention studies, there was no randomised controlled trial, but most studies were controlled. Three studies evaluating the impact of discharge counselling were uncontrolled (22,26,27), and therefore their validity and usefulness is questionable.

An important weakness of the evidence collected refers to the sample size. About half of the studies included less than 50 patients, and only one-third of them included more than 100 patients. This has important consequences in terms of generalisation and power. If future studies are designed, they should include enough patients to be able to show an impact on important patient outcomes, and preferably be multicentre.

Most projects that investigated drug-related problems at discharge yielded information on the numbers of problems only, not on the causes of these problems. Only one study (10) investigated possible factors contributing to these problems.

6.4.4 Stakeholders involved

The initiatives reported were taken by different stakeholders (e.g., pharmacists, GPs, nurses, SIT (Samenwerkings Initiatieven Thuiszorg)) with an important proportion of initiatives taken by clinical pharmacists. Overall, there is a need for interdisciplinary projects, with a focus on the community setting and what can be done there.

Despite the heterogeneity in outcome measures, the results show discrepancies between drug histories performed by a doctor/nurse versus by a clinical pharmacist. This concurs with results from studies performed in other countries^{20, 21} and with the international consensus that medication history taking by a clinical pharmacist should be considered as 'golden standard', under the condition that it is performed in a structured and comprehensive way, combining different sources of information.

So far, the evaluation of the role of the community pharmacists is limited, but interesting. The fact that only a small number of answers were received from discharge managers might show the limited attention paid to medication in the process of case management or when developing discharge procedures.

6.4.5 Population of interest: at risk for DRP

The patients mostly targeted were patients admitted on surgery and geriatric wards as well as on the emergency department. This is not surprising as these patients are at high risk of adverse drug events. Consequently, many seamless care studies conducted in other countries have targeted the same groups of patients^{21, 27, 40, 41}. One could expect that the impact of the interventions tested may be different when performed at different wards or when focusing on different patient groups.

Studies evaluating DRPs upon discharge evaluated both the perspective of GPs (by looking at missing or erroneous information in the discharge letter) and of patients (by looking at the information they received, as well as errors in the drugs given at discharge). In contrast, in the majority of intervention studies focusing on discharge, the focus was on the patient (by measuring knowledge of medications, for example) and not on the GP or the community pharmacist. This is an area for further research.

6.4.6 Type of intervention

Most projects that analyzed the problems at the transition between settings focused on the errors at discharge. The interventions that aimed to improve seamless care mostly focused on admission. Many initiatives focused on changing the role of HCP's, and more specifically on the role of the clinical pharmacist. This was also the case in the international literature review.

Several projects and initiatives on clinical pharmacy were repeated in different settings (hospital or ward). The amount of 'new' or 'original' research projects is rather limited. However, the fact that some of the results were shown in different settings and at different wards, enhances the generalisation of the main findings.

Development of IT tools is still in concept phase. In the projects or initiatives reporting on electronic access to data, this access is limited to doctors (GP's, specialists). So far, there is no involvement of pharmacists or home care nurses, except for the Share4Health project (42) where the electronic exchange of information between hospital, GP and community pharmacy will be tested. However, there is a real interest from pharmacists, as could be seen in the studies by Leemans (38). Furthermore, the impact of the proposed IT tools has not yet been evaluated. Also in other countries there is a lack of studies reporting the impact of IT initiatives.

6.4.7 Evaluation: heterogeneous outcome measures and limited data

6.4.7.1 *Lack of clinical and economical outcome measures*

An important weakness of the studies is that none but one of them evaluated the impact on clinical outcome measures (such as adverse drug events or readmission) or on economic outcome measures. The vast majority of research studies used process measures as primary and secondary endpoint.

6.4.7.2 *Short term effects*

Most interventions focused on short term effects at discharge. One study planned a home visit post discharge to evaluate discrepancies between the intended medication and the medication actually taken by the patient. Only one other study looked at ADEs or readmissions that could occur in consequence. Therefore, future studies should be designed in order to collect follow-up data and to focus on long-term effects of the interventions.

6.4.7.3 *Heterogeneous outcome measures*

Another weakness in the identified projects is that there is a lack of homogeneity in the measures used and that only a few studies used or reported using validated process measures. In studies comparing drug histories performed by a doctor/nurse vs by a clinical pharmacist (10 studies in total), the categories used to report discrepancies varied from one study to another, which makes comparison of the results more difficult. There is therefore a need to develop and validate a national form (similarly to the form to report clinical pharmacy interventions), or to use a validated form from the literature. Despite these differences, the results clearly show that discrepancies between drug histories performed by a doctor/nurse vs by a clinical pharmacist are extremely frequent. This concurs with results from studies performed in other countries^{20, 21} and with the international consensus that medication history taking by a clinical pharmacist should be considered as 'golden standard', under the condition that it is performed in a structured and comprehensive way, combining different sources of information.

A few studies evaluated humanistic outcome measures, mainly satisfaction of patients on the counselling process. For projects evaluating opinions or experiences of stakeholders, the transferability of the results is questionable. The information conveyed by these studies is limited and the data obtained might be valid in specific settings only. However, most of these projects confirm the existence of the problems identified by other studies, and point towards the need to improve the continuity of care with regard to medicines.

6.4.7.4 *Limited data on causes of drug related problems*

One of the objectives of this study was to identify the possible causes of drug related problems related to transition of care. Although many studies investigated the frequency and nature of DRP's on admission as well as discharge, data on the causes of these problems were not identified as such and can only be extrapolated from the studies. Determining factors in the hospital setting seem to be: 1) the fact that medication history taking, information provision and discharge counselling is in most cases not structured or standardized, and 2) the fact that many health care professionals are involved in these processes, without any clear definition on the roles and responsibilities of all different partners. This lack of standardisation also seems to apply to ambulatory care, as was shown in studies investigating referral letters of GP's.

6.4.8 Barriers and facilitators: multilevel data

The barriers and facilitators for developing seamless care interventions, as reported by experts in the field, could be categorized at three levels: the patient level, the health care professional level, and the system level. This is in full agreement with the findings of Coleman ⁴⁸, describing barriers to effective care transition for persons with continuous complex care needs. The lack of formal relationships between care settings, hence influencing the communication and collaboration between health care professionals, is probably the most important barrier to target.

A frequently reported motivating factor to improve seamless care is the fact that patients as well as health care professionals welcome this kind of initiatives and that they confirm the added value of the interventions. Moreover, the health care professionals involved, seem to perceive a positive impact of the interventions tested. From these reports, we feel that facilitators outweigh barriers and that there is, at least at an individual or local level, enthusiasm for the development of new services. Whether this enthusiasm is also present at other levels (e.g. health care professionals who have not been involved yet in projects; policy makers), will be explored in the qualitative study (see chapter 8).

6.5 SUMMARY

The main objective of this review was to obtain an exhaustive overview of the past and ongoing seamless care projects in Belgium. The results show a high number of recently initiated heterogeneous projects, mostly initiated in the hospital setting. Many interventions focus on admission, and involve medication history taking by a clinical pharmacist. Patient counselling at discharge, either by a nurse or a clinical pharmacist, is part of many other projects. All interventions with record of outcome measures reported a positive impact on one or more outcome parameters (process measures; economic or humanistic outcomes). However, we cannot discount the fact that there is enthusiasm with any new initiative which gives better results regardless of intervention. The impact on clinical outcomes could not be demonstrated.

Overall, the quality of the evidence obtained is low. The weaknesses observed apply to sample size, design (including lack of randomisation and blinding), evaluation measures used, and generalisation. One cause for this might be that many initiatives were only recently set up, mainly as part of pilot programs. Other projects were part of students' master theses. This situation might explain the limited scope of projects, with small numbers of included patients, in only one ward and over a short period of time.

Ongoing research projects hold great interest, because they will fill gaps in existing research (through evaluation of the impact of IT initiatives (42,43), and evaluation of the impact of discharge management from the perspective of three different HCPs, within a multicenter design, and with clinical outcome measures in addition to process measures (41).

In spite of efforts to inventory all possible initiatives, it is still possible that this review missed some interesting projects. However, this inventory gives a good overview of the current situation in Belgium and can be used to further analyze possibilities or strategies to enhance seamless care.

Key points

- This chapter reviews the initiatives taken in Belgium to improve seamless care. Data were retrieved using a combination of strategies: indexed literature search, handsearch of Belgian journals, and a questionnaire survey.
- A variety of types of interventions has been found, mostly in the hospital setting, with an important proportion of initiatives taken by clinical pharmacists.
- For most studies a positive impact was reported on one or more process measures. The impact on clinical outcomes was evaluated in a few cases only, and could not be demonstrated.
- Overall, the quality of the evidence is low.
- Ongoing research projects hold great interest, because they will fill gaps in existing research.

7 PILOT STUDY: DRUG SUBSTITUTION ASSOCIATED WITH A HOSPITAL STAY

7.1 INTRODUCTION

Transitions between settings of care are often accompanied by changes in medication. Many types of changes may occur i.e. changes of specialty name for the same chemical substance as defined by the Anatomical Therapeutic Chemical Classification System (ATC) level 5 (for example Simvafour versus Simvastatin EG), changes of dosages (for example 20 mg once daily versus 10 mg twice daily), changes within the same chemical subgroup (ATC level 4) (for example atorvastatin versus simvastatin),...

One particular type of change associated with transition between settings of care is the change between generic and originator drugs due to different prescription rules in hospital and in ambulatory care (cf. qualitative study, chapter 8).

Pressure to sustain health care provision whilst curtailing pharmaceutical expenditure and price competition among pharmaceutical manufacturers are fuelling the development of generic drug markets in European countries¹⁷⁵. In Belgium, the market for generic drugs is relatively under-developed as compared to other countries¹⁷⁶. As compared with other European countries, Belgian physicians face few incentives to prescribe generic drugs and existing incentives tend to be weak. The size of generic drug markets therefore varies within Belgium according to the settings. On the one hand, generic drugs are increasingly being prescribed and dispensed in ambulatory care. For instance, the market share of generic drugs by volume (as measured by the number of defined daily dosages) in the Belgian retail market rose from 0.6% in 1997 to 24.0% in 2008¹⁷⁷. On the other hand, the use of generic drugs in hospitals is restricted due to, amongst other things, the existence of hospital-specific drug formularies that list one commercial preparation of a specific chemical substance/dosage available for prescription. The limited availability of generic drugs with a suitable pharmaceutical form (e.g. for intravenous injection or perfusion, for intramuscular injection, etc.) might explain why so few generic drugs are on drug formularies, and hence why generic drugs are prescribed to a lesser extent in hospitals. Differences in the amount of generic drug use between hospital and ambulatory care may lead to drug substitution associated with a hospital stay: a generic drug prior to hospitalisation may be replaced by an originator drug during (and potentially following), hospitalisation, or vice versa.

Finally, financial aspects associated with drug substitution need to be considered: several studies have demonstrated that substantial savings could be gained from substituting generic drugs for originator drugs in Belgium^{175, 178}.

7.2 RESEARCH QUESTIONS

The aim of this chapter is to conduct a pilot study on drug substitution associated with a hospital stay in Belgium. The research question is the following: To what extent does drug substitution associated with a hospital stay take place in Belgium?

7.3 METHODOLOGY

7.3.1 Study setting

The study focused on drug use in ambulatory care of patients who have been admitted and discharged from Belgian acute hospitals.

7.3.2 Data source

Data were extracted from the 2006-2007 permanent sample dataset of IMA/AIM, the Belgian Agency of Health Insurance Funds. The permanent sample dataset is an anonymous sample of the Belgian population that includes data on demographic characteristics and health care claims. The permanent sample consists of a 1:40 sample of patients aged below 65 years and a 1/20 sample of patients aged 65 years or older. As older patients are over-represented in the permanent sample, the analysis weighted data so that the results presented in this section becomes representative of the Belgian population. [Data cleaning conventions and rules applied to the data are described in the appendix 5 that relates to chapter 7.](#)

No ethical approval was needed for this study.

7.3.3 Data

The study database extracted information about demographic characteristics, drug claims and hospitalisations from the IMA/AIM permanent sample dataset.

The demographic characteristics of patients related to gender; age of birth; and time of death, if applicable.

Data on reimbursed drugs dispensed in ambulatory care were extracted for the three-month period prior to hospitalisation and for the three-month period following hospitalisation. For each three-month period, variables included the drug code according to the Anatomical Therapeutic Chemical Classification System¹⁷⁹; the number of packages and the number of defined daily doses⁶ (DDD) of generic drugs; the reimbursement tariff, patient co-payment and supplement of generic drugs; the number of packages and the number of defined daily doses of originator drugs; the reimbursement tariff, patient co-payment and supplement of originator drugs; and dispensing dates. Two additional variables allowed identification of generic drugs and cheap drugs (i.e. generic drugs and originator drugs that have dropped their price to the level of the reference price or a lower level). The label 'generic drug' referred to generic drugs and copies, while the label 'originator drug' related to originator drugs, parallel imported drugs, reference specialities, and orphan drugs. Cases where a patient took more than 25 packages of a specific drug during a three-month period were considered to be outliers and, hence, excluded from the dataset.

Also, data were gathered on start and end dates of patient hospitalisations. The study focused on hospitalisations in an acute hospital: day hospitalisation, palliative care and stays in a psychiatric hospital were not considered. As only those hospitalisations could be included that had a three-month period prior to and following the hospital stay during 2006-2007, hospitalisations needed to start on 1st April 2006 at the earliest and needed to end on 30th September 2007 at the latest. Patients may have experienced multiple hospitalisations during 2006-2007. Two hospital stays, for which there was a gap of three days at the most between two stays, were considered as one hospitalisation. In order to have data on drug use in ambulatory care during a three-month time period, no other hospitalisation could occur in the three months prior to or following a hospitalisation.

⁶ The defined daily dose refers to the assumed average daily dose of a drug needed to treat its main indication in an adult person weighing 70 kg.

7.3.4 Medications under study

7.3.4.1 Selection of medications

The study was limited to all compounds in drug classes that answered to different criteria, i.e.:

- With the highest public expenditure in 2008 ¹⁸⁰;
- That were included in the physician-health insurance convention;
- That may lead to transition-related problems between ambulatory care and hospital ¹⁸¹;
- That are administered for chronic indications;
- That included generic drugs.

The project team agreed to include the following drug classes in the analysis (see Table 12):

Table 12: Medications under study

ATC code	Description
A02B	Drugs for peptic ulcer and gastro-oesophageal reflux disease
A10B	Blood glucose lowering drugs, excl. insulins
C03B	Low-ceiling diuretics, excl. thiazides
C03C	High-ceiling diuretics
C03D	Potassium-sparing agents
C07A	Beta blocking agents
C08C	Selective calcium channel blockers with mainly vascular effects
C09A	Ace inhibitors, plain
C10A	Lipid modifying agents, plain
M01A	Anti-inflammatory and anti-rheumatic products, non-steroids
M05B	Drugs affecting bone structure and mineralization
N02A	Opioids
N05A	Antipsychotics
N06A	Antidepressants

Note: ATC = Anatomical Therapeutic Chemical Classification System.

7.3.4.2 Drug substitution

Substitution between generic and originator drugs

In the first analyses drug substitution was identified as a switch from a generic drug to an originator drug or vice versa between pre- and post-hospitalization periods. A switch had to involve the same active substance as defined at level 5 of the Anatomical Therapeutic Chemical Classification System (for example Simvastatine EG[®] versus Cholemed[®]). When the same active substance was used prior to and following hospitalisation, a descriptive analysis quantified the extent of drug substitution by calculating the percentage of generic drug – originator drug switches, the percentage of originator drug – generic drug switches, the percentage of generic drug – generic drug cases, and the percentage of originator drug – originator drug cases between pre- and post-hospitalization periods.

Substitution within the same chemical subgroup or with the same chemical substance

Given the low substitution rate between generic and originator drugs it has been decided in a further step to analyse more in depth all changes in therapy that could be the cause of medication errors after hospitalisation. Drug substitution was defined much larger i.e. as any change that occurred within the same chemical subgroup (at level ATC 4) or any changes in dosage or names of the specialty within the same chemical substance subgroup (at level ATC 5), i.e.:

1. Changes between chemical substances within the same chemical subgroup (as defined at the level 4 of the ATC system) (e.g. switch from simvastatin to atorvastatin); cases of patients who had several drugs within the same chemical subgroup before and/or after hospitalization were added to this category of change (for example Simvastatine EG® switched to Simvastatine EG® and Crestor®);
2. Changes in specialty name of the product with the same composition (e.g. switch from Cholemed® to Docsimvastatine®) including the changes already analysed above (same chemical substance with a generic or originator label)
3. Changes of tablet dosage but no change in the specialty name of the product (e.g. switch from a tablet of 20mg to a tablet of 40mg of simvastatin)
4. Both changes (specialty name and tablet dosage for the same chemical substance)

The initial database had no separate fields for specialty name and dosages. All marketed drugs had, therefore, first to be manually coded according to specialty names and dosages separately to identify any possible change for the patient. There were 87 possibilities for the statins group and 117 different possibilities for the proton pump inhibitors group. The analyses were therefore restricted those two medications.

5. ATC level 4 = C10AA: HMG CoA Reductase Inhibitors (Statins)
6. ATC level 4 = A02BC: Proton Pump Inhibitors (IPP group)

7.3.5 Data analysis

A descriptive analysis was carried out of the demographic characteristics of the patient sample. Characteristics were reported as relative frequencies for categorical data; mean and standard deviation for continuous data. The age was calculated as the difference between the year in which the most recent hospitalisation took place and the year of birth.

The analysis focused on the use of the same active substance during the three-month period prior to hospitalisation and during the three-month period following hospitalisation. A patient may buy a medication of the same chemical subgroup or chemical substance group at multiple points in time during the pre- and post-hospitalization periods. When investigating the occurrence of drug substitution, the medication bought at the time point closest to the hospitalisation was considered. In other words, the last purchase of a drug prior to the hospitalisation was compared with the first purchase following the hospitalisation.

The reader should note that patients who died or stopped taking a drug at some point during the three months following hospitalisation were not excluded from the analysis. This is because such patients still provided relevant data about possible drug substitution for our analyses as only cases with available medication information prior and following the hospitalization were taken into account in the analyses.

All analyses were conducted in SAS Enterprise Guide 4.

7.4 RESULTS

7.4.1 General information

The database used in the analysis related to 17,764 patients: the mean age of patients was 65.9 years (standard deviation: 16.72 years) and 60% of patients were female. As a result of the data selection procedure as described above, patients had a minimum of 1 and a maximum of 4 hospitalisations during 2006 and 2007.

7.4.2 Drug substitution between generic and originator drugs

The study database included 41,633 records where the patient purchased the same active substance prior to and following a hospitalisation. As explained before (see section 7.3.2.), the data were weighted and extrapolated to the Belgian population. Table 13 reports absolute and relative frequencies of generic drugs and originator drugs purchased during the three-month periods prior to and following a hospitalisation in 2006-2007.

The extent of drug substitution was limited. In 71% of cases, an originator drug was purchased prior to and following hospitalisation. Similarly, a generic drug was purchased prior to and following hospitalisation in 25% of cases.

Some form of drug substitution occurred in 3.9% of cases: a generic drug was replaced by an originator drug in 2.4% of cases and an originator drug was replaced by a generic drug in 1.5% of cases. Focusing on those cases where a generic drug was purchased prior to hospitalisation, the generic drug was substituted with an originator drug in 8.7% of cases. Focusing on those cases where an originator drug was purchased prior to hospitalisation, the originator drug was substituted with a generic drug in 2.0% of cases.

With respect to individual drug classes, drug substitution was most likely to occur for M01A anti-inflammatory and anti-rheumatic products (11% of cases); N02A opioids (5% of cases); C03D potassium-sparing agents (6% of cases); C03B low-ceiling diuretics (5% of cases); C03C high-ceiling diuretics (5% of cases); C08C selective calcium channel blockers with mainly vascular effects (5% of cases); and N06A antidepressants (4% of cases).

Table 13: Weighted Frequencies of generic and originator drugs prior to and following hospitalisation

ATC code and name	Generic – generic drug	Generic – originator drug	Originator – generic drug	Originator – originator drug
A02B Drugs for peptic ulcer and gastro-oesophageal reflux disease	69,260 (56%)	2,160 (2%)	1,140 (1%)	51,900 (42%)
A10B Blood glucose lowering drugs, excl. insulins	7,880 (10%)	1,580 (2%)	680 (1%)	69,520 (87%)
C03B Low-ceiling diuretics, excl. thiazides	5,960 (48%)	360 (3%)	220 (2%)	5,760 (47%)
C03C High-ceiling diuretics	10,300 (23%)	1,200 (3%)	1,020 (2%)	32,420 (72%)
C03D Potassium-sparing agents	6,380 (28%)	740 (3%)	520 (2%)	15,000 (66%)
C07A Beta blocking agents	42,960 (28%)	4,700 (3%)	1,820 (1%)	101,700 (67%)
C08C Selective calcium channel blockers with mainly vascular effects	10,020 (17%)	1,680 (3%)	1,100 (2%)	46,880 (78%)
C09A Ace inhibitors, plain	15,680 (19%)	1,320 (2%)	840 (1%)	66,620 (78%)
C10A Lipid modifying agents, plain	32,960 (28%)	1,960 (2%)	920 (1%)	79,800 (69%)
M01A Anti-inflammatory and anti-rheumatic products, non-steroids	12,460 (24%)	3,200 (6%)	2,540 (5%)	34,660 (65%)
M05B Drugs affecting bone structure and mineralization	40 (0%)	0 (0%)	60 (1%)	17,820 (99%)
N02A Opioids	6,800 (12%)	1,420 (3%)	1,500 (3%)	46,920 (83%)
N05A Antipsychotics	3,280 (7%)	120 (0%)	100 (0%)	40,300 (93%)
N06A Antidepressants	34,260 (22%)	4,020 (3%)	2,440 (2%)	111,980 (73%)
Total	258,240 (25%)	24,460 (2%)	14,900 (1%)	721,280 (71%)

7.4.3 Additional analyses : any change after hospital stay

7.4.3.1 Proton Pump Inhibitor Drugs

Table 14 presents the estimated frequency and percentage of the possible changes by type (originator or generic) of the drug delivered prior the hospitalization for the Proton Pump Inhibitors drugs.

Considering all the possible changes mentioned previously:

- 71% of the cases did not change , neither of dosage of the tablets nor of name on the package within the same chemical substance group)
- 18% of the cases changed of name and/or tablet dosage with the chemical substance group
- 11% of the cases changed of chemical substance group (ATC level 5)

The results by drug type purchased prior the hospitalisation shows that:

No change group:

- 65% of the cases when a generic was purchased prior the hospitalization
- 79% of the cases when an originator was purchased prior the hospitalization.

Major Changes:

- Cases when a generic was purchased prior the hospitalization: 24% of the cases changed within the same chemical substance group (within the same ATC level 5)
- Cases when an originator was purchased prior the hospitalization: 11% of the cases changed for another chemical substance group

Table 14: Estimated frequency and percentage of Changes by type of the drug delivered before the hospitalization in Proton Pump Inhibitor Drugs class (estimated total number of cases = 105 600)

Type of the drug delivered prior the Hospitalization	Type of change after the Hospitalization				
	Change of ATC level 5	Change only in dosage	Change only in specialty name	Both change (specialty name & dosage)	No change
Weighted Frequency					
Row percent					
Generic & Copie n=62380	6720	2280	9100	3640	40640
	11%	4%	15%	6%	65%
Originator n=43220	5120	3100	480	280	34240
	12%	7%	1%	1%	79%
Total N = 105600	11840	5380	9580	3920	74880
	11%	5%	9%	4%	71%

7.4.3.2 HMG CoA Reductase Inhibitors (statins)

Table 15 presents the estimated frequency and percentage of the possible changes by type (originator or generic) of the drug delivered prior the hospitalization for the HMG CoA Reductase inhibitors (statins) drugs group

Considering all the possible changes mentioned previously:

- 83% of the cases did not change , neither of dosage of the tablets nor of name on the package within the same chemical substance group)
- 13% of the cases changed of name and/or tablet dosage with the chemical substance group
- 4% of the cases changed of chemical substance group (ATC level 5)

The results by drug type purchased prior the hospitalisation shows that:

No change group:

- 70% of the cases when a generic was purchased prior the hospitalization
- 90% of the cases when an originator was purchased prior the hospitalization.

Major Changes:

- Cases when a generic was purchased prior the hospitalization: 25% of the cases changed within the same chemical substance group (within the same ATC level 5)
- Cases when an originator was purchased prior the hospitalization:5% of the cases changed only or dosage and 4% changed for another chemical substance group

Table 15: Estimated frequency and percentage of Changes by type of the drug delivered before the hospitalization in HMG CoA Reductase inhibitors Drugs class (estimated total number of cases = 103720)

Type of the drug delivered prior the Hospitalization Estimated Frequency Row Percent	Type of change after the Hospitalization				
	Change in ATC level 5	Change only in dosage	Change only in specialty name	Both change (specialty name & dosage)	No change
Generic & Copie n=34480	1600	1080	5740	1860	24200
	5%	3%	17%	5%	70%
Originator n= 69240	2440	3760	840	180	62020
	4%	5%	1%	0%	90%
Total n = 103720	4040	4840	6580	2040	86220
	4%	5%	6%	2%	83%

7.5 DISCUSSION

This pilot study has addressed seamless care by focusing on the issue of drug substitution associated with a stay in a Belgian acute hospital during 2006 and 2007.

This study has shown that hospitalisation is not a trigger for drug substitution for the switches between generic and originator drugs. When the same active substance was purchased prior to and following hospitalisation, the extent to which drug substitution took place was limited: in around three-quarters of cases, the patient continued to use an originator drug following hospitalisation (see Table 13). Drug substitution from originator to generic drug (or vice versa) within the chemical substance (ATC level 5) occurred in 3.9% of cases only, with substitution of an originator drug for a generic drug more likely to occur than vice versa. This may reflect the limited use of generic drugs in Belgian hospitals.

More detailed analyses for statins and IPP medications show that the changes of any type (dosage, composition and/or specialty name) within a chemical subgroup (ATC level 4) was 17 % for the statins and 29% for the IPP subgroup. Unfortunately the reason for changes (medical versus other reasons) could not be retrieved from the administrative data. However, if those changes occur for one medication that belongs to a much larger patient medication list, the possibilities for medication errors following hospital discharge are a reality for many patients.

Schemes have been developed abroad to enhance seamless care with a focus on the substitution with generic drugs. For instance, the Safe Therapeutic Economic Pharmaceutical Selection method (STEPS) was implemented in Northern Ireland. This scheme reached agreement among specialist physicians, general practitioners, hospital and community pharmacists and prescribing advisers with regard to the use of seven generic drugs that had equivalent clinical efficacy as the originator drugs.

Our dataset was restricted to drugs that are reimbursed by INAMI-RIZIV. Therefore, our results apply to substitution of reimbursed drugs only. Data on substitution of for example over-the-counter drugs and non-reimbursed prescription drugs associated with a hospital stay were not available. However, the issue of substitution of generic and originator drugs is primarily relevant to reimbursed drugs, as few generic over-the-counter drugs are available in Belgium. Another limitation of this study is that it only gives information on changes between drugs purchased in ambulatory care, i.e. between the drugs prescribed before and after hospitalisation. Intramural substitutions have not been studied. Finally, this study quantified the extent of drug substitution, but was not able to explore the possible health impact of drug substitution between settings.

Key points

- **This chapter addressed seamless care by focusing on the issue of drug substitution associated with a stay in a Belgian acute hospital during 2006 and 2007.**
- **Substitutions between generic and originator drugs were limited after a stay in hospital.**
- **When medications of the same chemical subgroup was purchased prior to and following hospitalization, changes occurred (dosage, composition, specialty name) in 29% of the cases for Proton pump inhibitor subgroup and in 17% of the cases for the Statins subgroup).**

8 IDENTIFICATION OF PROBLEMS AND SOLUTIONS IN SEAMLESS CARE FOCUSING ON MEDICATION: QUALITATIVE STUDY

8.1 RESEARCH QUESTIONS

The objectives of the qualitative part of this project are to answer the following questions:

1. According to the experience of health care professionals, what are the most important drug related problems that can occur due to admission and discharge?
2. Which solutions are proposed by health care professionals to improve the safety of patients at transition across care settings?
3. Which barriers and facilitators do health care professionals identify for the implementation of the proposed strategies?
4. From a policy perspective, which actions need priority?
5. Aiming at implementation of the selected strategies, what are the prerequisites and preferred target groups?

8.2 METHODOLOGY

Given the research questions and the benefit of interactions between participants, a combination of nominal and focus techniques were selected as qualitative research method [Kitzinger, 1995, 8915 ; Flick, 2002, 6935]. This type of research stimulates interaction among participants, which has the potential for greater insights to be developed (Hancock B. Trent focus for research and development in primary health care: an introduction to qualitative research. <http://www.trentntrdsu.org.uk/cms/uploads/Health%20Needs%20Assessment.pdf> (Accessed 5 July 2009)).

8.2.1 Organisation of the groups

Between mid-December 2009 and the beginning of February 2010, eleven groups were organised: 9 with health care professionals (HCPs) and patient representatives and 2 with stakeholders. The focus groups with health care professionals were organised at different locations, geographically spread all over the country. In each selected region (see table 16), a hospital was the starting point for participant sampling for the focus groups with HCPs.

Details on the locations, sampling methods, process, topic guides of the groups are in appendix 6.

8.2.2 Data analysis

Data analysis started from the notes taken during the focus groups. *Verbatim* transcription of the focus groups and in-depth text-based analysis was not feasible. A framework analysis approach was applied. Details are in appendix 6.

8.3 RESULTS

8.3.1 Description of the groups

The table below gives an overview of the eleven focus groups (9 with health care professionals, 2 with stakeholders).

Table 16: Overview of focus groups

N°	Date	Location	Language	Participants
FG1	16/12/2009	Charleroi	French	HCPs
FG2	16/12/2009	leper	Dutch	HCPs
FG3	05/01/2010	Duffel	Dutch	HCPs
FG4	07/01/2010	Eeklo	Dutch	HCPs
FG5	08/01/2010	Ottignies	French	HCPs
FG6	14/01/2010	Liège	French	HCPs
FG7	15/01/2010	Genk	Dutch	HCPs
FG8	21/01/2010	Libramont	French	HCPs
FG9	28/01/2010	Brussels	Dutch/French	HCPs
FG10	02/02/2010	Brussels	Dutch/French	Stakeholders
FG11	04/02/2010	Brussels	Dutch/French	Stakeholders

In total 100 persons were involved in 11 groups:

- 47 women (47.0%) and 53 men (53.0%);
- 40.0% participants were French speaking, 60 (60.0%) were Dutch speaking.

For the exact composition of the focus groups with HCPs and stakeholders see the tables in appendix 6.

8.3.2 Identified Problems

When asked about the problems they experience related to (dis-)continuity of care, all HCPs mentioned a number of items. The answers on this question, mainly asked as an icebreaker, are listed in appendix 6. According to the phase in the transition process or the people involved, the problems were further clustered in five themes: problems on admission to hospital, problems at discharge, problems as to professions, problems as to patients and their carers, and problems as to processes.

8.3.2.1 *Problems on the admission to hospital*

The main issue raised by participants is the lack of a complete overview of all the medications used by a patient, including information about over the counter products and self medication. When information is present, information seems often incomplete: participants mentioned the absence of the dosage, the galenic form, the indication or the moment of intake.

Generic products cause confusion due to frequent changes from supplier (having consequences, e.g. for colour of the boxes). Information on generics is lacking.

Due to the lack of information, it requires quite some time and energy for health care professionals to collect the right information on the medications of a patient, even when they bring their (written list of) medications to the hospital.

8.3.2.2 *Problems at discharge*

Participants mentioned a lack of information at discharge for patients as well as for primary care providers. Sometimes discordance between different pieces of information is present, causing errors and inconsistencies. The process of chapter 4 drugs⁷ causes major problems due to the fact that it is often unclear for primary care providers whether or not the procedure was started or is ongoing.

Discharge on Friday afternoon is mentioned as a cause of problems related to medications, because it doesn't always leave time for a visit to/from the GP, or to get the right drugs from the pharmacy. This is especially a problem if the contact between hospital and primary care providers is absent or limited.

Problems with medications given to the patient upon discharge were also often cited (no medications given, or discrepancies between the medications given and the list of discharge medications).

⁷ Chapter 4 drugs are drugs that need a special procedure for reimbursement.

8.3.2.3 *Problems as to professions*

HCPs admit not to succeed in keeping an up to date medication list of their patients. This is especially a problem when they visit patients at home, and fail to update the information on medication in the (electronic) patient file.

The fact that assistance in medication management is not reimbursed for home care nurses, is seen as another problem related to professions.

8.3.2.4 *Problems as to patients and their carers*

The lack of knowledge and information on medications and on their correct use by patients and their families was mentioned in almost all focus groups. An hidden problem in some patients is the inability to handle medications due to cognitive dysfunction, vision problems or problems of praxis and illiteracy, which may influence patient compliance.

8.3.2.5 *Problems as to processes*

Laws and regulations seem to aggravate some of the aforementioned problems. For example, GPs are called upon to prescribe generics, while prescribing by specialists in hospital care is driven by the hospital formulary. This causes frequent changes and substitution of the medications prescribed to a patient. Home nurses and GPs asked that larger quantities of medications be supplied to patients upon discharge (e.g. a 3-day supply), but hospital pharmacists were reluctant due to the “forfait”⁸ rule.

8.3.3 Identified Solutions

An overview of all solutions highlighted by HCPs is in table 17. The solutions were clustered into 5 groups, depending on the level and type of resources needed in order to implement them: 1) Sensitisation and/or regulation; 2) Small technology and regulation; 3) Technical Support; 4) Nomenclature; 5) Transition processes and 6) Support for general processes.

8.3.3.1 *Sensitisation and /or regulation*

The need for a national campaign on the role of patients and health care professionals to improve continuity of care in medication management was mentioned in two groups. Participants referred to campaigns on antibiotics and benzodiazepines as successful examples.

Regarding regulation, participants suggested to impose the delivery of discharge medications for a period of three days. Although this is allowed by law, some hospitals do not so because they consider this as an extra cost on the fixed budget for medications delivered during hospital stay. Very few participants knew that the medications delivered at discharge, for at maximum 3 days, can be billed for separately as an outpatient bill.

8.3.3.2 *Technology and standardisation of medication lists and schemes*

Up to date medication scheme

Nearly all groups mentioned that (at least a paper based) up to date medication scheme should be available at all time and for all HCPs i.e. names of the medications, when the patient has to take it and for how long. Some proposed a kind of log book that allows indicating the changes and reason for change. In some groups, it was stressed that it should be possible to have a national standardized form.

⁸ “Forfaitarisation”: the hospital receives a fixed amount of money per patient and per indication that should be sufficient to pay all costs, including drug expenditure. In order to reduce costs, hospitals may limit the amount of discharge medication.

FG3/HN: 'At home you don't have anything. I should already be pleased when it is on paper.'

FG4/HP: 'When substitution is performed, give a clear message about conversions.'

FG7/CC: 'It would be easier if all schemes would be the same (any hospital, any department)'

Accurate list of medications across settings: role of the patient and format

An accurate list of medications, to be carried (and if possible managed) by the patient is a universal request in all groups. Discussion arises whether the list should be paper based, available through the sis-card, ID-card or other means. Most participants stressed that the patient, if capable, has to be an active partner in medication management, i.e. in dissemination of information on the medications used.

FG4/GP: 'Make the patient also responsible to bring an up-to-date medication list.'

FG4/P: 'For me it is logic to give my SIS card, it is like your bank card.'

FG9/CC: 'The patient's role in the management is underestimated. The patient as the information carrier is a pragmatic alternative while waiting for an electronic platform.'

A standardized referral letter to be used from primary to secondary care, including an adequate and up to date medication list, was proposed as a solution with major impact on the accuracy of information upon admission.

FG4/HN: 'We need up-to-date information from home to hospital, including who is involved as HCP's.'

FG6/ GP: 'GPs should use a standardized referral letter'.

Another solution is one complete discharge file with all relevant documents, on all medications and related products, as well as on care procedures: a document from specialized physician to GP, from hospital pharmacist to community pharmacist, from ward nurse to home nurse, etc. All documents should be gathered in one main file to limit the risk of discrepancies between the different files.

FG8/SP: 'So really a report from the hospital pharmacist, for the community pharmacist, documents for the patient and for the physician. The home nurse and others need access to the medical information.'

FG1/GP: 'We want that the specialized physician specifies what must be followed up, especially in oncology'

FG1/NM: "We need the dosage, when it has to be taken and when they got it the last time in the hospital"

One group proposed to use a regional drug formulary in order to limit the changes in medication therapy due to transition of care.

8.3.3.3 *Technical Support*

Suggestion of centralized electronic file

In this section, solutions on the use of digital tools and instruments are described. Most proposals point towards the implementation of centralized data files, either on medications, medical data, social information or a combination of those. 'Centralized' was used in the meaning of having the possibility to obtain all relevant data on a certain topic in one single operation. 'Centralized' did not mean the creation of one big file or document to be kept on a central server.

A centralized electronic file with information on all medications delivered to a patient was proposed in half of the focus groups. This file should be accessible by different health care professionals, upon patient consent. Participants further suggested the implementation of a centralized electronic medical file, standardized, protected, and accessible (with patient consent) by different health care professionals, whatever the setting of care.

There was also a suggestion of a larger centralized electronic patient file, including medical, pharmaceutical and social information, accessible (with patient consent) by different health care professionals, whatever the setting of care. Overall, there was a major interest for the latter solution that offers more information.

FG3/DM: 'We need an extramural electronic file so we don't need to be a detective.'

FG4/GP: 'We need good electronic systems with the use of KMEHR (Kind Message Electronic health Record).'

FG3/HP: 'Data should be collected somewhere. There are so many details, which can simply be joined together'

Electronic prescribing

In addition to the introduction of centralized electronic files, participants were also waiting for the implementation of electronic prescribing in hospitals and primary care. A distinction was made between prescriptions written with the use of software and prescriptions sent and shared between different HCPs through an electronic platform. This latter one was expected to facilitate appropriate prescribing and administration procedures.

FG5/SP: "Pending clinical pharmacists, we should have electronic prescription with tools to check for drug interactions."

Connected with it is the request in three groups for electronic procedures to facilitate the administration process for chapter IV medications.

FG4/SP: (about procedures for chapter 4 drugs) 'if we now simply could do it electronically...'

Finally, participants were waiting for a database with all contact details of involved HCPs, in order to avoid detective work when attempting to contact a colleague.

8.3.3.4 Reimbursement of healthcare services

All focus groups stressed that it is crucial that patients would be well informed on their medications, by all care professionals.

FG2/SP: 'ICT provides correctness of the information but not necessary transmission of this information to the patient.'

FG5/P: 'Information of the patient is the most important: you can automate everything you want, if you do not convince me of the relevance of the medication I do not take the medication.'

Most groups supported the introduction of a reimbursement for home care nurses to assist patients in the management of their medications at home.

FG8/SS: 'For patients, whose cognitive functions are impaired, someone has to prepare medications at home but this is not included in the nomenclature of nurses.'

FG9/HN: 'There is no nomenclature⁹ for nurses to manage medication: we have to do something else, for example wash the patient.'

There was a suggestion to a lesser extent to facilitate a GP visit directly after discharge, by taking away financial barriers (either third payer system and/or fully reimbursed).

FG5/GP: '

'I feel responsible when a patient is discharged home, that he got the information and that he has understood his condition. So, I always ask them [my patients] to call me after hospitalization. That's the responsibility of the GP.'

FG7/SP: '... That's the reason why we don't give prescriptions, but just a scheme and a short supply. That's the idea behind it, that they first see their GP. Although some people don't like this.'

⁹ 'Nomenclature' refers to a billing code that is used by HCPs to indicate which activities they have performed for a patient, and on which calculations for remuneration and reimbursement are based

8.3.3.5 *Transition process*

Participants proposed different types of processes to optimise transition, but none of them reached an agreement in all groups.

- Introduction of clinical pharmacy in the hospital to standardize medication history taking and to prepare patient discharge in relation to medication.
- FG8/SP: 'We need the expertise of a clinical pharmacist.'
- Contact between hospital and primary care HCPs before discharge (i.e. exchange of information, proposed changes and their value/usefulness).
- FG2/ GP: 'I want to discuss on beforehand with the specialist why some medications are prescribed.'
- FG4/SP: 'It should be necessary to consult with the specialist who has prescribed.'
- To send the medication discharge plan to the community pharmacist, the GP and the home care nurse.
- To discourage discharge on Friday afternoon or, if difficult to implement, to prepare discharge well in advance:
- FG8/HN: 'When patients return home on Friday or Saturday, and need medications that are not necessarily available in pharmacies, it might be difficult for these people to continue their treatment.'

8.3.3.6 *Support for general processes*

In two of the nine focus groups, it was suggested to reduce the administrative workload, to use substitution rights and to reduce the range of generic products available on the market, as to reduce frequent changes in medication therapy.

An important measure supported in nearly all groups was the local/regional concertation to enhance cooperation between settings of care and between HCPs at the micro- and the meso-level.

FG8/WN: 'ICT can regulate many things but not all: each HCP has to explain his approach (to the other HCPs).'

FG5/SP: 'We need to know the professional needs of the others.'

FG7/P: 'The GP should be a central and also an intermediary person. Much more communication is needed.'

FG4/SP: 'It would be good to involve the specialist, GP, and pharmacist to discuss what to do with incompatibilities.'

8.3.3.7 *"Extra": other solutions mentioned*

In addition to the solutions described above, some solutions were mentioned only once or twice e.g. presence in the hospital of a physician with a training focused on coordination and integration of medical problems, all generic products in the same size and colour, readable information leaflets,...

Table 17: Overview of solutions

A	SENSITISATION AND/OR REGULATION
A1	National campaign: inform the public on the problems (cfr overuse of antibiotics and sleep medication), and encourage people to take their role in order to minimize these problems
A2	Encourage patients to bring their medications on admission, in order to improve and to ease medication history taking
A3	Oblige hospitals to deliver medications at discharge and to apply existing regulations
B	TECHNOLOGY AND STANDARDISATION OF MEDICATION LISTS AND SCHEMES
B1	Up to date (paper-based or electronic) medication list / plan, including a logbook of changes and reasons for modifications, contact details of HCPs,... If possible, (national) standardised form.
B2	Accurate list of medications, to be carried and managed by the patient (paper-based or electronic, e.g. on SIS card or ID card)
B3	Standardized referral letter to be used from primary care to secondary care
B4	Discharge file with all relevant documents for patients and HCPs (from specialist to GP, from hospital pharmacist to community pharmacist, from ward nurse to home care nurse,...)
B5	Uniform regional drug formulary
C	TECHNICAL SUPPORT (IT)
C1	Centralised national electronic database with all information on all medications (+related products) delivered to patients, whatever the setting of care – if patient consents
C2	Centralised electronic medical file (standardised, protected), accessible by different HCPs, whatever the setting of care – if patient consents
C3	Centralized national electronic patient file, including medical, pharmaceutical, care and social information , whatever the setting of care – if patient consents
C4	Electronic prescribing in hospitals, facilitating appropriate prescribing and administration procedures for reimbursement of medications
C5	Database with contact details for HCPs in primary and secondary care
C6	On-line and real-time available procedures for chapter 4 drugs
D	REIMBURSEMENT OF HEALTHCARE SERVICES
D1	Assistance of patients in their medication management (e.g. for home care nurses)
D2	Fully reimbursed visit by the GP for patients post-discharge (2-3 days) in the third payer system
D3	Therapeutic education for patients
E	TRANSITION PROCESS
E1	Clinical pharmacy (e.g. standardized medication history taking).
E2	Contact between the hospital and primary care HCPs shortly before discharge to discuss relevant information
E3	Discourage discharges later than 3pm on Fridays as well as over the week-end, unless this was planned in advance and/or follow-up care is organized
E4	Medication discharge plan sent to community pharmacist, GP and home care nurse, upon discharge
F	GENERAL PROCESSES
F1	Reduction of administrative workload (e.g. attestation,...)
F2	Reduction of range of generic products on Belgian market
F3	Use substance names for drug prescribing
F4	Local consultation to enhance cooperation between settings of care and between HCPs (micro- and meso-level).
G	EXTRA
	Clinical pharmacist in general
	Readable information leaflets
	Medication review every year
	Digital information databases
	Hospital practitioners
	Obligatory visit of GP at discharge
	Perform discharge management
	Fixed 'chaperon' for patient during hospitalisation
	Coordination of care at home and in the hospital
	Taking social factors in mind
	Substitution
	Medical specialist should also prescribe generic products
	Enhance the communication processes
	Cahier de liaison

8.3.4 Barriers, facilitators and prerequisites

Table 18 gives an overview of the barriers, facilitators and prerequisites that were identified for the top-3 solutions identified in each of the focus groups. As there was a high level of concordance between the solutions mentioned as the most important ones in the different focus groups, the final list of solutions could be limited to a set of ten items. Therefore barriers, facilitators and prerequisites are only listed for this set of solutions.

Overall, the most important barriers are money, time availability, and willingness to implement and use the same system/software. IT tools are seen as an important facilitator. Prerequisites that were mentioned are patient informed consent, privacy, a good implementation plan, finances, availability and motivation of professionals, standardisation and adequate support.

Table 18: Overview of barriers, facilitators and prerequisites

B	TECHNOLOGY AND STANDARDISATION	BARRIERS	FACILITATORS	PREREQUISITES
B1	Up-to-date (paper-based or electronic) medication scheme including a logbook of changes and reasons for modifications, contact details of HCPs,...	<ul style="list-style-type: none"> - Risk of loss by patient - Transfer delay - Patient privacy 	<ul style="list-style-type: none"> - Standardization 	<ul style="list-style-type: none"> - Patient consent - Transfer should be in time
B2	Accurate list of medications, to be carried and managed by the patient (paper-based or electronic, e.g. on SIS card or ID card)	<ul style="list-style-type: none"> - No standardisation - Electronic prescription - Own routine - Cost - Lack of updating - More than one card - Perception lack of added value - Time - Willingness to do - Cost hardware - Patient privacy (e.g. psychiatric patients) 	<ul style="list-style-type: none"> - Adapted rules - Electronic prescription - Peer review - Project based implementation - Ownership - Mass distribution - Quick access to information - Card readers do exist 	<ul style="list-style-type: none"> - Integrated - Well designed - Added value for patient flexibility (acute versus chronic use) - Usable in different settings - Accountability - Adequate implementation plan (preparing in small regional groups) - Willingness
C	TECHNICAL SUPPORT (IT)	BARRIERS	FACILITATORS	PREREQUISITES
	General topics applicable to solutions C1-C4	<ul style="list-style-type: none"> - Cost - Limited sharing (pharmacists) - Patient information remains needed - No emails allowed 	<ul style="list-style-type: none"> - Existing SIS or ID card 	<ul style="list-style-type: none"> - Reserved and payed time - Protection and privacy - Need for IT support
C1	Centralised national electronic database with all information on all medications (+related products) delivered to patients, whatever the setting of care – if patient consents	<ul style="list-style-type: none"> - Patient refusal 	<ul style="list-style-type: none"> - Legal issues (2009) - Communication prescribers 	<ul style="list-style-type: none"> - Accessibility for hospital pharmacist with writing permission
C2	Centralised electronic medical file (standardised, protected), accessible by different HCPs, whatever the setting of care – if patient consents	<ul style="list-style-type: none"> - No sufficient logistic materials (PC etc.) - Individualism of health care workers - Doctors don't trust communication of data - Time - No planning at governmental level - Professionals not enough IT knowledge - Lack of knowledge patient - Securisation 	<ul style="list-style-type: none"> - Feasibility - Technical progress - High participation of health care workers in dialogue - It is readable - 'Subvention' of hospital informatisation - Frustrated professionals 	<ul style="list-style-type: none"> - Cost - Education - Concertation needed - Patient access - Need to preserve the human relationship - Planning by national working group - Securisation - System should be general (whole country, all settings)
C3	Centralized national electronic patient file, including medical, pharmaceutical, care and social information, whatever the setting of care – if patient consents	<ul style="list-style-type: none"> - Authorisation (reading, writing) - ICT mindedness - Cost 	<ul style="list-style-type: none"> - Financial incentives - Databases with good links - Standardisation as far as possible 	<ul style="list-style-type: none"> - e health - Willingness for cooperation - availability of staff

		<ul style="list-style-type: none"> - Divergence of programs - Overkill of information - Sis card needs readers everywhere 	<ul style="list-style-type: none"> - expertise 	<ul style="list-style-type: none"> - ICT mindedness - Step by step implementation - Expertise - Stability of the system - Privacy matters (patient)
C4	Electronic prescribing, facilitating appropriate prescribing and administration procedures for reimbursement of medications	<ul style="list-style-type: none"> - Treating pharmacist not known - Resistance of physicians 	<ul style="list-style-type: none"> - Existing file at community pharmacy - Digital progress 	<ul style="list-style-type: none"> - Informed consent of patient - Pharmacists all need to use IT
D	REIMBURSEMENT OF HEALTHCARE SERVICES	BARRIERS	FACILITATORS	PREREQUISITES
D3	Therapeutic education for patients	<ul style="list-style-type: none"> - Competition between hospital and community care - Lack of time - Short hospital stays - Corporatism of professionals (nurse, occupational therapists) - Cognitive problems - Motivation - Cost 	<ul style="list-style-type: none"> - Decrease readmission - Decrease accidental falls - Personal motivation 	
E	TRANSITION PROCESS	BARRIERS	FACILITATORS	PREREQUISITES
E1	Clinical pharmacy, e.g. standardised medication history taking on admission	<ul style="list-style-type: none"> - Lack availability - Recruitment - Cost - implementation process - Acceptation by physicians 	<ul style="list-style-type: none"> - Expertise - Time available - Is done everywhere 	<ul style="list-style-type: none"> - Teamwork - Formation/ education - Availability staff
F	GENERAL PROCESSES	BARRIERS	FACILITATORS	PREREQUISITES
F4	Local consultation to enhance cooperation between settings of care and HCPs (e.g. to compose a uniform regional drug formulary)	<ul style="list-style-type: none"> - Availability of pharmacists - Time - Anonymity - Accessibility 	<ul style="list-style-type: none"> - Videoconferencing, - Financial support - Clinical benefits: avoiding medication errors - Time gain 	<ul style="list-style-type: none"> - Personal availability - Willingness for cooperation - Time - Established indications - Mutual respect - Follow up of the results - Correct and complete composition of the group
G	Extra	BARRIERS	FACILITATORS	PREREQUISITES
	Coordination	<ul style="list-style-type: none"> - Fragmentation is dangerous 	<ul style="list-style-type: none"> - New honorary system for pharmacists - Financial incentives in – and extra-mural 	<ul style="list-style-type: none"> - Personal available - Willingness for cooperation - Nomenclature (nurses, clinical pharmacists)

8.3.5 Additional themes

In addition to the main research questions the participants were asked about their ideas on the Australian guiding principles for medication management, the most appropriate health care professional to coordinate medication management, and the patient groups that need priority when developing seamless care initiatives.

8.3.5.1 *Concordance with the Australian guiding principles*

All participants confirmed the importance of the six key elements in medication management, as defined in the Australian guiding principles to achieve continuity in medication management ([http://www.health.gov.au/internet/main/publishing.nsf/Content/4182D79CFCB23CA2CA25738E001B94C2/\\$File/guiding.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/4182D79CFCB23CA2CA25738E001B94C2/$File/guiding.pdf)):

accurate medication history, assessment of current medication management, medication action plan, supply of medications information to patients, ongoing access to medication and communicating medications information. It is stressed however that a good description of the items is important and that the interaction between the elements should be continuous.

8.3.5.2 *Appropriate HCP to coordinate medication management at transition moments*

Seven out of the 9 focus groups mentioned the GP as the most important person for coordination. Nurses, community pharmacists and hospital pharmacists were also thought to play an important role. However, there was a general consensus on the fact that each type of HCP has specific responsibilities in the process of ensuring continuity of care, and that approaches for optimisation MUST be multidisciplinary in nature. The participants also stressed that it is important to check if coordination is really needed and in a second step to see which professional is the most efficient in the current situation.

In nearly all groups the clinical pharmacist was mentioned as an important person in the coordination of medication management as well. The experiences with this function were variable, mainly positive. The lack of similar experiences resulted in an absence of consensus between the different focus groups regarding the introduction of this function.

8.3.5.3 *Priority patient groups*

There is a general consensus that strategies to enhance seamless care should focus on patients with a geriatric profile, psychiatric patients, patients with polymedication and the combination of polymedication (i.e. more than 5 medications) and polypathology. Other target patient groups were isolated patients, patients with anticoagulation drugs, patients with dementia and patients being cared for within care pathways (*'zorgtrajecten/trajets de soins'*). Many participants acknowledged that these groups represented an important proportion of patients.

Given this agreement on the priority groups, it was also mentioned that solutions should be designed to be applicable for every patient.

8.3.6 Additional input from stakeholders

The aim of the focus groups with stakeholders (and two additional interviews) was to get input on the proposed problems and solutions from a policy perspective. Additional ideas and comments that resulted from these focus groups and interviews are described here.

8.3.6.1 *Identified problems*

The stakeholders confirmed the listed problems and did not notice any major missing elements. One added that the problems encountered differ depending on the social situation of patients, and that the proposed solutions should take these differences into account.

8.3.6.2 Solutions

At all levels and in all disciplines projects are going on as to the issue of medication management at transitions. The most elaborate work at this moment is done by the pharmacists (hospital as well as community). Important examples are the pilot programs on clinical pharmacy in hospitals and the implementation of a pharmaceutical file in community pharmacies, which allows the storage of data on all prescribed medications, along with (a limited number of) patient data.

The following items in the list of solutions were most frequently mentioned by stakeholders as being of major importance, although not everyone agreed with all of them: 1) a national information campaign; 2) an up to date medication scheme; 3) a centralized electronic patient file, including medical, pharmaceutical, care and social information 4) assistance for patients in the management of their medications; 5) clinical pharmacy and 6) a medication discharge plan. Three out of these six solutions (numbers 2, 3 and 5) were also selected in one or more focus groups with HCPs as top-3 initiatives.

As for an information campaign, stakeholders mentioned that the topic is far more complex than e.g. antibiotics. A campaign should therefore be tailored to the aged population with simple messages (i.e. “show medications to all consulted doctors, bring them to hospital”).

The idea of a centralized electronic patient file, triggered major reactions linked to privacy and ownership. For some stakeholders this solution is clearly going too far.

Not all stakeholders welcomed the idea of implementation of clinical pharmacy. The presence of a clinical pharmacist was considered to be useful on some wards, but redundant and even confusing on others.

A medication discharge plan was considered to be very important, but a direct transmission to the community pharmacist triggered some reluctance, as it encompasses the coordination role of the GP and the correct identification of the right pharmacist might be difficult.

8.3.6.3 How to proceed?

Stakeholders were in favour of a national policy plan in order to guide future developments in medication management and e-Health, as well as of a bottom-up approach to enhance local initiative and implementation. It is not clear however what level ‘local’ exactly is. The stakeholders stressed that we need hard endpoints to measure the effect of what is being done, sustaining the development of a structural financing system.

8.4 DISCUSSION

8.4.1 Important results and observations

8.4.1.1 *Question 1: According to the experience of health care professionals, what are the most important drug related problems that can occur due to admission and discharge?*

Problems at different levels

The focus groups provided a long list of problems that could be summarized in five different clusters, according to the phase in the transition process or the people involved:

1. problems at admission (mainly lack of information on the medication used by a patient);
2. problems at discharge (predominantly lack of information for patients as well as HCPs);
3. problems as to professions (e.g. not succeeding in keeping an up to date medication file of all patients; no reimbursement for patient assistance in medication management);
4. problems as to patients (mainly lack of knowledge and information on medication taken);
5. problems as to processes (e.g. loyalty to laws and regulations aggravating some of the aforementioned problems).

All problems were identified in more than one group, by different health care professionals and the stakeholders confirmed the existence of these problems.

Few information about the rules in other settings

It was remarkable that a lot of participants had little or no information about the rules and regulations that are applied in other health care settings. There is certainly a problem of correct perception of the real situation. For example, primary care HCPs did not know much about the “forfeit” financing system in hospitals and people working in the hospital did not realize the pressure for generic prescribing in primary care.

Perspective on problems and solutions limited to settings and professional groups

Moreover, HCPs in primary care and hospital settings expect more from other HCPs and from the government than they are able to give themselves. For example, GPs complained about the lack of information and clear documents from the hospital, while failing to write good referral letters.

Even at the stakeholders' meetings, problems were regarded from a limited perspective, i.e. from a professionals' group rather than from a system point of view. Furthermore, some representatives were not very confident as to the ideas and perceptions of their members, and in some cases representatives of the same professional group had differing views.

Importance of law and regulations

Another important observation was that problems seem to arise in consequence to adherence to existing rules and regulations. Although the main regulations are developed and supervised at the federal level, some gaps between regulations in primary care versus secondary care settings may lead to inconsistencies in practice. For example, GPs are supposed to prescribe a great proportion of generic drugs, while hospital physicians have to stick to the drugs in the local formulary for which good price-quality arrangements have been obtained.

The latter is in turns important in order not to exceed the lump sums that were agreed for each type of hospitalisation and care procedure.

8.4.1.2 *Question 2: Which solutions are proposed by health care professionals to improve the safety of patients at transition across care settings?*

There is overall agreement about the need for a comprehensive package of solutions. Most participants agreed with the different elements of this package, although there were some barriers mentioned for specific points.

Proposals of concrete solutions

Important parts for a comprehensive package of solutions, are: 1) a national information campaign; 2) an up-to-date (paper-based or electronic) medication list / plan; 3) a comprehensive discharge file (understood as a main file with all relevant documents for different HCPs, without discrepancies); 4) a centralised national electronic patient file including medical, pharmaceutical, care and social information; 5) electronic prescribing; 6) reimbursement for assisting patients in their medication management; 7) therapeutic education for patients; 8) clinical pharmacy, 9) local consultation to enhance cooperation between settings of care and HCPs, and 10) coordination of medication management. All solutions were highlighted in more than one group and by different health care professionals.

The potential role of a clinical pharmacist was systematically discussed in all focus groups (see Key Question 5.2 of the topic guide). Not all participants did agree on the necessity for implementation of clinical pharmacy, or even had firm objections to the involvement of clinical pharmacists in medication history taking or discharge counselling, which was mostly due to variable and limited experiences with this concept.

Ongoing initiatives and future implementation

So far, initiatives taken by stakeholders are limited in number and content. Most important initiatives are taken by pharmacists (hospital as well as community based), which is likely due to the “medication” focus. The federal government FOD/SPE prepares, based on the positive results of the pilot projects on clinical pharmacy, a broader implementation of this concept. The number of hospitals being funded for developing clinical pharmacy will be doubled. APB mentioned to be working on different solutions: a pharmaceutical file, which is obliged by law since 01/01/2010; a quality standard for pharmacists, describing all kinds of procedures, development of a position paper on a medication file in nursing homes; implementation of an electronic care-plan, including a medication plan; development of an information database concerning generic products; introduction of medico-pharmaceutical “concertation-overleg”; and testing pilot programs on electronic prescribing. Other professional groups invest in training, education and “concertation-overleg”.

The development and availability of IT tools generated great expectations among participants. At the same time, however, HCPs acknowledged that IT is not the only or final solution, but they rather considered it as a support tool. Taking responsibility and using and optimising the already existent systems were considered to have a major impact on seamless care.

Some solutions that were mentioned are currently worked out in ongoing projects of the Ministry of Public Health or the National Institute for Health and Disability Insurance (NIHDI-RIZIV/INAMI). For example the Chapter 4 procedure will be facilitated by on-line procedures, and the problems with electronic prescribing in hospitals should be tackled by the end of 2010. HCPs and even some stakeholders were not aware of these projects, but they indicated that these types of solutions would make a big difference and that this is the right moment to further invest in and implement these projects.

Overall, participants stressed that there is no more need for pilot projects; sustainable initiatives are terribly wanted. By stressing this, participants gave way to their frustration of not being able to continue pilot programs that were perceived as effective, although scientific evidence is often limited.

8.4.1.3 *Question 3: Which barriers and facilitators do health care professionals identify to the implementation of the proposed strategies?*

The main barriers can be summarized as issues of privacy, lack of standardization, lack of the willingness to change, lack of time to proceed with the solutions, (professional) resistance at all levels and accessibility of the solutions (standardised, supported and adequately implemented technical solutions). Ongoing projects, the fast development of IT solutions and the supposed added clinical value of the proposed interventions seem to be important facilitators. Furthermore, these solutions can be facilitated by changing some rules, and e.g. using the e-health methodology.

8.4.1.4 *Question 4: From a policy perspective, which actions need priority?*

As mentioned above, participants (both HCPs and stakeholders) stressed that not one solution on its own will solve the problem. There is a need for a multi-level, multiphase and multidisciplinary strategy. Everybody has to take up his own responsibility. This idea of shared responsibility also arose from the discussion on the most appropriate HCP to coordinate continuity in medication management. Moreover, participants stressed that coordination is not always necessary, and one should avoid designing complex interventions like useless team meetings or when feasibility is compromised.

Therefore, the priority is a balanced and long term vision on the bottlenecks and the solutions, along with the design of an implementation plan, involving all actors. Hard endpoints (e.g. the number of drug related problems following discharge; the number of hospital re-admissions) should be used to measure the effects of the actions taken. A sensitisation campaign for patients as well as HCPs, well established and prepared, could be a starting point.

8.4.1.5 *Question 5: Aiming at the implementation of the selected strategies, what are the prerequisites and preferred target groups?*

Participants stated that important prerequisites for the implementation of the selected strategies are a well balanced implementation plan, finances, staff members, accountability and ownership, and patient involvement, consent and education. Efforts for optimal seamless care should focus on every patient but some groups of patients deserve particular attention e.g. patients with a geriatric profile, psychiatric patients, patients with polymedication (n>5) and/or polyopathy, and low SES (socio economic status) groups.

8.4.2 Strengths of the study

This large qualitative study involved 100 participants, with different professional backgrounds, from all over the country. HCP's statements have been confirmed and completed by the stakeholders' ones who are more involved in decision making and implementation. The overall concordance within the groups and between the groups, as well as the concordance with the ideas of the stakeholders, favours the generalisation of the results and conclusions. A discussion of the findings, in light with the literature and international data on this topic, is part of chapter 9.

The focus groups further had a balanced input from all HCPs, who presented their opinion with respect for each others' ideas. The discussions were very constructive and solution-oriented.

The participants very often did not know the rules, regulations, problems and situations of other settings and health care providers. For example, people working in the hospital didn't realize the pressure for generic prescribing in primary care while the latter didn't know that in hospital care a formulary is obligatory. With regard to this point, the process of the focus groups created unexpected output: groups were formed and (local) interaction between participants, an important argument for local consultation, was induced following the focus groups. This underlines the importance of local concertation at the mesolevel.

The encounter with some participants in the groups pointed towards very concrete solutions for the Belgian situation. Some of them were not mentioned in previous parts of this project, and are still very relevant to the topic (cf. NIHDI-RIZIV/INAMI – Chapter 4 drugs). These additional solutions will be checked in interviews in a next part of the project.

8.4.3 Limitations of the study

Problems and solutions were identified at each level and step of the transition care process. However, little information was gathered concerning the transition process from and to the nursing home. One explanation can be that few GP-coordinators in nursing homes were present. A second reason can be that in nursing homes the problems are less prominent as medication is managed in a more structured way, and at each transition information can be obtained from the nurses.

As to the composition of the focus groups, some bias may have occurred during the sampling procedure. The recruitment was partly done by coordinators at the hospital and they may have invited HCPs that knew better or who were a priori interested in the theme. Generally, the researchers went on inviting until all predefined disciplines were present. Overall, the presence of specialists could have been more broadly divided over different disciplines. The researchers did not succeed including specialists from surgical or emergency wards, even if those specialists also received an invitation. Also the presence of specialists in internal medicine, other than geriatricians, was limited. This issue was addressed and partly resolved through two additional one-to-one interviews with internists. However, other specialists such as surgeons could still have views that are totally different from the internists' or geriatrician ones, in particular for the role of a clinical pharmacist at discharge (e.g. in counselling patients receiving a combination of anticoagulation with a treatment for other conditions).

In five out of nine focus groups a patient was present, in four of them a carer / family member. Although the patients often gave valid personal comments, carers / family members gave more specific information on problems and solutions concerning seamless care.

There seems to be some overlap between the functions of care coordinator, discharge manager and social worker although specific accents exist and the functions may be filled in differently in different settings. This caused some confusion on the background and working experience of some participants, which might have hampered the interpretation of some of the findings.

There are strong arguments in favour of the validity of the results. However, focus groups can never give certainty about the acceptability of the proposed interventions by all involved HCPs in daily practice. Enthusiasm during a meeting with participants, who have in principle an interest in the topic, does not necessarily reflect the reactions of any HCP when implementing solutions into practice. Especially the issues of privacy and informed consent of the patient, besides other legal, deontological and practical prerequisites warrants attention.

8.5 CONCLUSIONS

Important problems exist as to medications at transition moments, especially for vulnerable and at risk patients.

The involved healthcare professionals identified feasible and desirable solutions. These should be multifaceted and multileveled, incorporating the input of many professionals and organisations. Important issues have to be solved for an adequate implementation of solutions for people most at risk.

Key points

- This chapter discusses the problems and solutions that were analysed in focus group discussions with Belgian HCPs and stakeholders to optimize seamless care.
- Problems have been identified in different settings and at different points of the transition process.
- Concrete solutions, including barriers and facilitators for their implementation, were highlighted in more than one group and by different health care professionals i.e.:
 - a national information campaign;
 - an up-to-date (paper-based or electronic) medication list / plan;
 - an accurate list of medications, to be carried and (if possible) managed by the patient;
 - a comprehensive discharge file;
 - a centralised national electronic patient file including medical, pharmaceutical, care and social information;
 - electronic prescribing;
 - reimbursement schemes for assisting patients in their medication management;
 - therapeutic education for patients;
 - clinical pharmacy;
 - local consultation to enhance cooperation between HCPs and between care settings;
 - coordination of medication management.
- The development and availability of IT tools (e.g. a centralized electronic patient file containing medical, pharmaceutical, care and social information) generates great expectations.
- Participants stressed the need for shared responsibility in medication management. When coordination is needed, the GP was often mentioned as the most appropriate HCP.
- Priority patient groups were identified (e.g. geriatric profile, psychiatric patients, patients with polymedication) but there was agreement on the fact that efforts for optimal seamless care should focus on every patient.

9 SUMMARY OF FINDINGS: BUILDING BLOCKS TO OPTIMIZE SEAMLESS CARE FOCUSING ON MEDICATIONS

9.1 OBJECTIVE OF THIS PART

The aim of this part is to summarize the findings of this research in order to identify building blocks for the development of a quality improvement system to optimize seamless care focusing on medications. Some practical considerations are mentioned in relation to the implementation in Belgium.

9.2 METHODOLOGY

The main findings of the research were summarised, compared, and tabulated. Additional stakeholders were consulted to obtain up-to-date information on various initiatives with potential implications for seamless care (i.e. eHealth, Recip-e, Prorec, E-prescribe and RIZIV/INAMI – see list in appendix 7). Common findings were extracted from the summary of the international and Belgian data, and lessons to learn were subsequently discussed within the research group.

9.3 SUMMARY OF FINDINGS AND BUILDING BLOCKS

9.3.1 Summary of findings

The table below summarizes the main findings of this research project, with regard to solutions identified. For clarity and coherence with the lessons proposed in 9.3.2, the findings were classified according to the level of care at which the initiative should be taken/developed: policy, professionals, and patient levels ¹⁸²

Table 19: Overview of the main findings, obtained from international and Belgian data

Description	Evidence from international data		Evidence from Belgian data		Building block nr ^a
	Systematic review ^b (chapter 3)	Grey literature (chapter 5)	Existing projects (chapter 6)	Qualitative study (chapter 8)	
Policy level					
National guidelines	No data	Well described and developed in several countries (A, C, NL, UK)	No data	Not described or requested as such, but some participants mentioned the need for a long term vision	1
National campaign	No data	Occurred in several countries (C,NL), in combination with other initiatives	No data	Requested by several participants. Considered by stakeholders as an initiative of major importance.	2
Regulatory and/or financial incentives to apply recommendations	No data	financial penalty if recommendations not applied (recommendations linked to accreditation (C)	No data	Not addressed	3
Reimbursement of health care services	No data	Pharmacist-based activities in acute care and ambulatory care (A,C,)	No data	Requested for: post-discharge consultation with GP; patient education and medication management by home care nurse. The latter was considered by stakeholders as an initiative of major importance.	4
IT support to facilitate the exchange of information on medications	Very limited data on impact as such	Described in most countries – limited data on impact (D)	Share4Health	Seen as important by HCPs and stakeholders.	5
IT support to facilitate the exchange of information on health (including medical and pharmaceutical data)	Very limited data on impact as such	Developed as a supportive tool in all countries; local and national levels involved; very limited data on impact	Different local or regional initiatives mentioned to allow GPs to access the hospital file or to share information between prescribers	Seen as very important by HCPs and stakeholders.	5

Health care professionals level					
Local concertation to enhance cooperation between settings of care		Described in several countries (N, UK)	Pilot project on oncology	Requested several times (joint formularies, use of standard documents, GP-pharmacist concertation, concertation between hospital and home care ...)	9,10
Development and use of a standardised medication scheme	Standardised schemes used in RCTs, but effect evaluated as such in one study	Yes, either national scheme (Australia), or local/regional schemes	Described in some local projects (but no evaluation for most)	Requested, with additional details on the content	9, 11, 12, 14
Development and use of transfer documents ^c	Standardised documents used in RCTs, but effect evaluated together with patient counselling	Local/regional standardised documents available in most countries	Described in some local projects (but no evaluation for most)	Requested, with additional details on the content	9, 11, 12, 14
Patient level					
Medication reconciliation (at each transition between settings of care)	Medication history by clinical pharmacists on admission improves the quality of the medication list and decreases discrepancies	Widely developed in several countries in different settings of care	Mainly through clinical pharmacy projects	Requested by several types of HCPs, although the term "reconciliation" was not used	11,12,14
Medication bag brought by patients on admission	No data	Described in UK guidelines	Several pilot projects	Suggested	11
Patient education at and/or after discharge	10 RCTs have evaluated its impact; more likely to be effective when provided before and after discharge	Described in guidelines, standard care in some countries, mostly involving pharmacists	Mainly through clinical pharmacy projects; reinforcement after discharge nowhere implemented	Seen as very important; mentioned by different HCPs in different settings	12,14
Informing HCPs at discharge about medication plan	5 RCTs available on informing GPs and/or community pharmacists	Described in guidelines, informing GPs implemented in all 6 countries; informing community pharmacists performed but not systematically in most countries	Evaluated in pilot projects: structured and comprehensive information to the GP, and information for community pharmacist <i>Nr 41, 27</i>	Requested, with additional details on the information to be provided. Considered by stakeholders as an initiative of major importance.	12
Availability of accurate list of medications to be		Described in guidelines (UK); systems or initiatives available		Need for an accurate list of medications to be carried by	15

carried by the patient, supported by (IT) tools	(US, C, Australia)	the patient repeatedly mentioned, although need for support tools or interventions was not mentioned. Considered by stakeholders as an initiative of major importance.	
Medicine review and adherence support after discharge	Described in several countries (A, UK); some data on impact		14

[Table annotations] ^a Number of the lesson to learn made in link with this finding, see 6.3.2, ^b only controlled trials were considered for inclusion in the review, ^c This type of document can contain diverse administrative, medical and pharmaceutical data, eg reason for admission, past medical history, drug history or medication changes after discharge, biological data, clinical data,...

Abbreviations: A: Australia, C: Canada; D: Denmark; HCP: health care professional; IT: information technology; NL: The Netherlands; RCT: randomised controlled trial; UK: United Kingdom; US: United States (Vista and Geisinger systems)

9.3.2 Lessons learned to optimise continuity of care focusing on medications

The lessons learned are described as “building blocks“ that can be used to re-design a health care system that allows a more effective management of transitions between settings of care. The first group of building blocks depends upon the policy level. The second one refers to the professionals at a regional and/or local level, with a focus on communication. The last group describes initiatives that are needed at the individual patient level.

For each building block, the authors first summarise its rationale based on the results of the research and then briefly elaborate on practical considerations about implementation.

9.3.2.1 Initiatives at policy level

The Belgian findings have shown that many local projects have been (and are being) run, for example in individual hospitals, because HCPs themselves experienced the need for improvement in continuity of care focusing on medications. To move forward, initiatives taken at policy level are now essential. Their objectives will be to provide clear recommendations on the kind of interventions that should be implemented and how these interventions should be implemented, and to centralize and to share the initiatives taken at local levels.

Building block nr 1: National guidelines on optimizing continuity of care focusing on medications

The international experiences show that national guidelines are often an initial and important step to optimize the continuity of care. It gives professional groups and HCPs clear directives on what should be done and how. Participants from focus groups also called for a standardization of procedures and practices, and for a long-term vision on the best procedures and practices.

National guidelines from five countries (Australia, Canada, The Netherlands and United Kingdom)³, 91, 92, 93, 94, 95, 108-112, 113, 114, 115 have a similar content that addresses the following points:

- standards of care (see building blocks 11 to 14);
- role, responsibility and accountability of the different HCPs;
- proposal of a pre-tested standard medication scheme and transfer form;
- technology requirements;
- training for HCPs involved (at all levels i.e. undergraduate, postgraduate and continuous education);
- definition of key performance indicators;
- steps for implementing seamless care initiatives;
- clues to overcome barriers;
- patient privacy and confidentiality issues.

The guidelines in most countries were written by national working groups with e.g. representatives of health authorities, patient and professional representatives, practicing HCPs from all disciplines, academics and researchers with relevant expertise. These guidelines are designed to allow local adaptations, as seamless care cannot be achieved using a single specific model.

Building block nr 2: National campaign on continuity of care focusing on medications

The grey literature shows that, in parallel to the development of national guidelines, running a national campaign is important to increase the awareness of HCPs and patients to the problem of seamless care focusing on medications and to insist that their involvement is needed for optimization³. (<http://www.saferhealthcarenow.ca>). www.medicatieoverdracht.nl¹⁰⁸.

Foreign countries developed different types of support tools for HCPs and patients e.g. books, websites, e-learning methods in order to reinforce the message of the campaign. Quantitative data on the clinical impact of such campaigns at the national level are, however, lacking. Several participants of the focus groups (chapter 8) also mentioned the need for a national campaign (similar to the positive example of the hand washing campaign). Other participants were more skeptical due to experienced limitations of such initiatives (e.g. campaign on the use of benzodiazepines).

The set-up of a campaign on the topic of seamless care has therefore to consider success factors and barriers identified in other national campaigns. This campaign would be based on the national guidelines (see building block nr 1) but also refer to results and learning points from local pilot projects on seamless care in Belgium (see chapter 6). Target groups for such a campaign are both HCPs and patients.

Building block nr 3: Financial and/or regulatory incentives to promote optimization of continuity of care

The international experience clearly shows that financial and regulatory incentives are perceived as major success factors (see chapter 5). However, no evidence from good quality studies of the specific impact of such incentives was found.

Incentives can be linked to accreditation or registration systems, to local contracts signed by primary and secondary health care providers, or to assessment of compliance to national standards of care. The review of the grey literature also describes an accreditation procedure for taking part in local consultation teams.

The development of an incentive-based system requires different steps i.e.:

- the development of measurable validated indicators of seamless care focusing on medications,
- if available, an automatic extraction of indicators from electronic health records,
- the evaluation of the impact of such incentives on the quality of continuity of care.

Building block nr 4: Financing specific services to improve seamless care

The participants from the qualitative study (chapter 8) suggested three measures to improve seamless care i.e. (1) a fully reimbursed (thus “free”) visit by/to the GP within 3 days after discharge, (2) financing patient education on medication management, and (3) financing the assistance of ambulatory patients in their medication management.

The full reimbursement of a visit by/to the GP within 3 days after discharge could facilitate coordination and medication reconciliation by the GP and promote compliance, in particular for vulnerable groups (e.g. polymedicated elderly patients, patients discharged from surgery wards, psychiatric patients...). Many participants perceived the patient co-payment (after a stay in hospital) as a barrier to seamless care. The key elements of an early post-discharge visit by/to the GP are detailed in building block nr 14.

Patient education on medication management applies to patients who manage themselves their medication after discharge. As explained above, some form of financing was requested by the participants of the focus groups, because this education takes time and is perceived as beneficial. This is in line with the international situation. First, the systematic review concluded that patient education that is provided at and after discharge is the initiative that has shown the best evidence of impact. Second, funding is available for such services in several countries. Education can be performed by different HCPs (but most of the literature refers to pharmacists-based activities), in ambulatory as well as in hospital settings.

Assistance of ambulatory patients in their medication management applies to vulnerable patients (see block 7) who have difficulties (or who are unable) with the management of their medicines. This assistance is particularly relevant at transition moments (i.e. when the patient comes back from hospital) but might be needed on a regular basis for some patients in the home care setting. Participants of the focus groups proposed that the latter form of assistance could be performed by home care nurses (as it is already the case for psychiatric patients), or by pharmacists who could help patients in preparing dosing aids.

Building block nr 5: Electronic health care infrastructure that facilitates seamless care across settings

The grey literature showed that IT tools facilitate the sharing of information on medications across settings of care: they are an important component of the optimization procedure in foreign countries, but few solid research data are available to demonstrate their impact. The potential benefit of IT support was also raised in all focus groups, often with questions on the type of data to be shared and privacy issues.

Additional discussions were conducted with stakeholders involved in ongoing initiatives around “electronic health care” in Belgium (e.g. RECIP-e, ePrescribe, BeScript, Share4Health, electronic prescribing in hospitals, the pharmaceutical record, facilitation tools for the prescription and approval of chapter IV drugs). The conclusions are that:

- their operability and/or applicability is still very limited,
- most of them are designed and developed within one specific setting (i.e. the ambulatory setting or the hospital setting), with very limited consideration of bridging the gap with other settings of care. One exception is Share4Health, a project that focuses on the development of a healthcare platform for collaboration between GPs, pharmacists and hospitals, while designing solutions for patient consent management, federated identity management and access management.

This research highlighted some requirements to set up an IT system related to medications and seamless care:

- Processes have to be well defined and agreed upon by all HCPs as well as by patients (see building blocks nr I and II to I4).
- Privacy issues have to be targeted: exchange of information requires a secured central platform.
- Coordination and decisions relative e.g. to the processes, access rights and privacy issues must occur at the policy level, as in other countries. The need for such coordination is reinforced by the observation that most Belgian pilot projects are now developed at local level, with very limited sharing of experiences at a higher level.
- Existing tools are a basis for the development of IT systems. For example, in Flanders, there are some experiences with the ‘Electronic Home Health Record’, whose access is regulated by a token or E-health technology. Multidisciplinary collaboration is possible through protected e-mail, regulations on access rules and writing/reading permissions. This home health record has a functionality to share information on the medication scheme of the patient, although this functionality is not yet fully developed and / or used. Another example is the proof of concept of the Share4Health portal that also uses e-health technology for authentication, has an integrated patient consent management tool, and allows the sharing of KMEHR data between HCPs (KMEHR is a proposed Belgian medical data standard that enables the exchange of structured clinical information).

- HCPs and patients should agree on what kind and level of information can or must be communicated to whom and how. Research shows that the perception of GPs, pharmacists and patients actually differs when speaking about sharing medical information¹⁸³. It is out of the scope of this project to define in detail what data should be shared and how (even though a part of this has already been defined in relation to the KMEHR-bis message “pharmaceutical prescription”). Most participants from the qualitative study suggested that at least a pharmaceutical file (which could be part of a global medical file, or a separate file) should be available for access and modification by HCPs (prescribers, pharmacists, nurses) upon patient consent. The question of sharing more information than about medications (e.g. indication(s) for the prescribed medication, other issues that may have an impact on medication management capacities of the patient) is not clear from this research.
- While designing an electronic pharmaceutical file, the role of patients in updating the list of current medicines must be considered. This was requested by several participants of the focus groups and has been addressed in other countries as well.
- Electronic prescribing facilitates the generation of an accurate pharmaceutical file. Therefore, electronic prescribing (including information on dosing and duration of treatment) should be promoted not only within one setting but also across settings, e.g. at discharge from hospital, for ambulatory patients visiting a specialized physician in the hospital.

Building block nr 6: Tuned regulations that support continuity in medication management

From the focus groups it was obvious that several problems in seamless care focusing on medications arise from existing contradictions in current regulations. For example, GPs are encouraged to prescribe generic drugs while hospital doctors must prescribe drugs from the “therapeutic formulary” (where generic drugs are not the most common). This often leads to medication shifts on admission or at discharge, potential risks of double use of medications or altered efficacy. The fact that the generic and original drugs do not have the same aspect (form, colour) and carry different names, are additional barriers. Finally, the procedures for Chapter IV drugs differ between hospital and ambulatory setting: this discrepancy triggers mistakes, frustration and conflicts.

These data therefore suggests that there is a need for tuned regulations that better support the continuity of medication management.

Building block nr 7: Agreement on the categories of patients that would benefit most from optimisation procedures

National guidelines, processes of care, IT and some other initiatives that can be considered as “standard care” apply to all patients. However, the literature shows that several categories of patients or situations carry a higher risk of medication problems related to transitions^{184, 185} and would benefit most from optimization procedures. The systematic review concluded that most studies did not sufficiently focus on vulnerable patients, which might have diluted the effect of the interventions tested.

New interventions that require additional financial and human resources such as involvement of clinical pharmacists and reimbursement for patient education, for example, have to be applied in priority to these vulnerable patients in order to maximize the cost-effectiveness of the interventions. Categories of high risk patients have to be agreed upon at the national level with possible adaptation at the local level, depending on the characteristics of the population and available resources.

There is no international consensus on a specific list of risk factors but there was a good agreement within the focus groups on the patients to target i.e. frail elderly patients, psychiatric patients, polypharmacy patients, patients with cognitive impairment.

Building block nr 8: Research assessing the economic, clinical, and humanistic impact of the initiatives

The systematic review and the analysis of Belgian findings highlighted many areas for further research. The two main research questions in relation to interventions that aim to optimise seamless care can be summarised as follows:

- What is – using strong designs with large samples - their relative impact on clinical (e.g. prevalence of hospital readmissions) and humanistic measures (patient satisfaction, quality of life)?
- What is their cost-effectiveness from a societal perspective?

9.3.2.2 Initiatives in relation to health care professionals

Building block nr 9: Intermediate level of coordination

The qualitative study clearly showed that HCPs working in one specific setting do not know (a) the regulation and difficulties encountered by HCPs working in a different setting and (b) the work and difficulties of other HCPs working in the same setting. This is an important barrier to seamless care. The international experience also reveals that the implementation of national guidelines in local settings requires some level of coordination between the national and local levels.

An intermediate level of coordination creates the frame to achieve clear goals and measurable outcomes, to support and alienate clinical and administrative systems, to organize structures for communication and data handling and to provide multidisciplinary training. Recommendations provided at the national level (see building block nr 1) should be used to develop processes of care at the intermediate level. Furthermore, a framework for local concertation should be developed at the same level. In Flanders, the discussion on the organization of this intermediate level is ongoing in preparation of a conference on public health (December 2010).

Building block nr 10: Involvement, responsibility and accountability of GPs and specialist doctors, home and hospital nurses, community and hospital pharmacists

During the focus groups, the idea of shared responsibility was stressed by many HCPs. This is in line with the findings from international research projects: the majority of them involved multidisciplinary teams. Also international guidelines usually contain a section on responsibility and accountability of HCPs. In the focus groups, the GP was frequently mentioned as an appropriate HCP to coordinate medication management, when a coordination is required.

Clinical pharmacists played a key role in the implementation of initiatives described in other countries as well as in most Belgian pilot projects. The experiences and views of focus group participants on clinical pharmacy differed. Availability and funding were often cited as barriers for the implementation of clinical pharmacy on a large scale.

The focus groups also showed that community pharmacists are ready to take up new roles as defined in the new legal framework on community pharmacy issued in 2009 and that professional organisations are developing tools to support this practice change.

9.3.2.3 Initiatives to be implemented at patient level

The international experience (see chapter 5) has shown that a bottom-up approach in optimizing seamless care is a critical factor for success. The local implementation of optimization procedures is driven by the recommendations and initiatives taken at a higher level and by personal or small group initiatives taken by different HCPs.

Building blocks nr 11 to 15 are derived from international guidelines (chapter 5), were applied in most controlled trials (chapter 3), some were successfully developed in Belgian pilot projects (chapter 6) and suggested by participants of focus groups (chapter 8).

Building block nr 11: On admission to hospital: use of different sources of information and standardized procedures to perform medication history and medication reconciliation

Several elements found in different parts of the study facilitate medication history taking. A combination of these elements will enhance the quality of the information on the actual medication list of the patient at admission:

- GP referral letter with a list of medications taken by the patient, including dosages, frequency of administration, indication, recent changes and allergies. This information might be part of the electronic medical record, and be compatible with the SUMEHR structurej.
- Patients who bring their usual medications upon hospital admission. This facilitates the medication history taking and avoids duplication at discharge. This has been successfully tested in a Belgian pilot project and in the UK ¹⁰⁸.
- Standardized procedures and questionnaires to perform medication history taking and medication reconciliation at admission. This has been set up in Belgian projects and abroad with the expertise of clinical pharmacists.

There is also specific international literature on the method for conducting medication histories on admission, and on the respective roles of different HCPs (including clinical pharmacists)¹⁸⁶. One Belgian paper is also in press ¹⁸⁷. This question has however not been addressed in details in this research.

Building block nr 12: At discharge from hospital: timely, structured, and comprehensive information for patients and health care professionals

- A standardized procedure is needed to inform patients (or the person caring for the medications after discharge) and HCPs on the discharge medication plan,
- Medication reconciliation is also necessary at discharge, especially if changes to the home medication were made in hospital,
- The following elements need to be present in each discharge letter,
 - list of medications including DCI name, dosage, frequency and time of administration, other modalities of administration, day and time of last administration,
 - medication changes during hospital stay (with reasons for change),
 - recommendations for follow-up: especially for new drugs, drugs with restricted use and highly specialized drugs (e.g. chemotherapy, biological agents),
 - administrative steps taken for chapter IV drugs (e.g. results of tests),
 - summary of efficacy and side-effects of new medications prescribed during hospital stay,
 - if applicable, arrangements taken for medication management after discharge or proposals to improve compliance.
- Each discharge letter is transmitted on the day of discharge (ideally electronically) to the GP. The international literature and the qualitative study also suggested the possibility to transmit medication information to the community pharmacy and to the nurse (when applicable) with the patient's consent.
- Finally, the participants of the focus groups also mentioned that discharge on Friday afternoon triggers problems when not well prepared e.g. GP informed, planned consultation, drugs ordered by the community pharmacist.

i SUMEHR is a KMEHR message, used for the exchange of medical information. This summarizes the minimal set of data that a physician needs in order to understand the medical status of the patient in a few minutes and to ensure the continuity of care.

Building block nr 13: At discharge from hospital: appropriate medication supply for patients

Participants from the qualitative study insisted that patients should be given a sufficient amount of medication to cover the period between discharge and medication purchase (and therefore the whole week-end for patients discharged on Friday afternoon) in the community pharmacy. It seemed that this was often not the case, due to reluctance from hospitals (see building block nr 6).

Building block nr 14: After discharge from hospital: reinforcement of information and medication reconciliation

After discharge, information on medication as well as medication reconciliation and/or proactive medication review contributes to detect/prevent medication related problems. The participants to the qualitative study confirmed that the GP has an important role in that respect, but in other countries part of this is frequently performed by a hospital HCP (phone call reinforcement) or by the community pharmacist.

Building block nr 15: Availability of an accurate medication plan for each patient, accessible for each HCP involved

A medication plan carried by the patient gives each HCP the possibility to consult it when needed. The importance of the availability of this type of information was stressed by participants of the focus groups and was clear from the grey literature. The availability in an electronic record raises privacy issues (see above, building block 5). An interesting initiative mentioned in this context is the development of the Mobile Patient Support that allows the storage of the actual medication plan on the patient's Smartphone. Physicians as well as pharmacists are able to add and check medication information on this Smartphone upon patient consent. Another initiative identified in the research is "www.followweb.eu": an internet platform used to create an electronic database with the current list of medications prescribed to a patient. It is available at any point of care to the patient, to authorized doctors and (in a further step) authorized community pharmacists, through a personal account.

Building block nr 16: local consultation to enhance cooperation between HCPs within and across settings of care

The need for local consultation between HCPs and between settings of care was repeatedly worded in the focus groups. The scope of this type of consultation at the local level is a (group of) patient(s) with the aim to organize care and / or to agree on the medication plan. The way to implement this consultation depends on the local HCPs involved.

Essential elements for a quality improvement system on seamless care focusing on medications

- **National guidelines on optimizing continuity of care focusing on medications**
- **National campaign on continuity of care focusing on medications**
- **Financial and/or regulatory incentives to promote optimization of continuity of care**
- **Reimbursement of specific services to improve seamless care: consultation with GP within 3 days after discharge, assistance of patients in medication management, and patient education on medication therapy**
- **Electronic health care infrastructure that facilitates continuity of care across settings**
- **Tuned regulations that support continuity in medication management**
- **Agreement on the categories of patients that would most benefit from optimisation procedures**
- **Research assessing the economic, clinical, and humanistic impact of the initiatives**
- **Set up of an intermediate level to coordinate actions for improvement**
- **Involvement, responsibility and accountability of GPs and specialist doctors, home and hospital nurses, community and hospital pharmacists**
- **On admission to hospital: use of different sources of information and standardized procedures to perform medication history and medication reconciliation**
- **At discharge from hospital: timely, structured, and comprehensive information for patients and health care professionals**
- **At discharge from hospital: appropriate medication supply for patients**
- **After discharge from hospital: reinforcement of information and medication reconciliation**
- **Availability of an accurate medication plan for each patient, accessible for each HCP involved**
- **Involvement, responsibility and accountability of GPs and specialist doctors, home and hospital nurses, community and hospital pharmacists**

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