Continuité du traitement médicamenteux entre l'hôpital et le domicile

KCE reports 131B

Centre fédéral d'expertise des soins de santé
Federaal Kenniscentrum voor de Gezondheidszorg
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Centre fédéral d'expertise des soins de santé (KCE).
Cité Administrative Botanique, Doorbuilding (10ème)
Boulevard du Jardin Botanique, 55
B-1000 Bruxelles
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, VALERIE LACOUR, STEVEN SIMOENS,
CECILE DUBOIS, DOMINIQUE PAULUS

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Auteurs :	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)
Experts externes :	Corinne Boüüaert (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 (Association 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), I. Vanden Bremt (FOD Volksgezondheid)
Remerciements :	Patrice Chalon (KCE), Stephan Devries (KCE), les participants à l'étude qualitative, les personnes qui ont répondu à l'enquête relative aux projets belges, les membres de la « Seamless Care Taskforce" de l'Association Pharmaceutique Belge, les experts internationaux qui ont fourni ou validé les données
Validateurs externes :	Christine Bond (Head of Centre of Academic Primary Care, University of Aberdeen), Thierry Pepersack (Gériatrie, Hôpital Erasme, Bruxelles), Hugo Robays (Vakgroep Farmaceutische analyse, UGent)
Conflits d'intérêt :	en relation avec « seamless care » : E. Delmée a reçu des budgets pour un congrès (subsides d'une firme) et un stage (subside de l'AFPHB) en pharmacie clinique ; H. Robays a déclaré avoir reçu un budget (SPF Santé Publique) pour un projet de pharmacie clinique»
Disclaimer :	Les experts externes ont été consultés sur une version (préliminaire) du rapport scientifique. Une version (finale) a ensuite été soumise aux validateurs.. La validation du rapport résulte d'un consensus ou d'un vote majoritaire entre les validateurs. Ce rapport a été approuvé à l'unanimité par le Conseil d'administration. Le KCE reste seul responsable des erreurs ou omissions qui pourraient subsister de même que des recommandations faites aux autorités publiques.
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PREFACE

Chaque année, des milliers de patients sont hospitalisés en Belgique. Se pose alors la question de la continuité de leur traitement médicamenteux lors de l'admission et à la sortie de l'hôpital. En effet, la liste des médicaments peut être longue, complexe, voire non disponible à l'admission. Et le retour à domicile pose problème si le traitement n'est pas clairement communiqué ou interprété par le patient et le prestataire de soins. Les dangers de ces transitions entre lieux de soins sont connus depuis longue date ; il s'agit par exemple d'interruptions de traitement involontaires, d'interactions médicamenteuses, de surdosages ou de contre-indications non identifiées. On estime qu'au moins un patient sur quatre serait victime d'un problème de continuité dans son traitement lors d'une transition entre lieux de soins.

Ce sujet de recherche a été proposé par la « Task Force Seamless Care » de l'Association Pharmaceutique Belge, un groupe scientifique qui s'intéresse à cette problématique et aux solutions à mettre en place. Le Service Public Fédéral de la Santé Publique a également marqué son intérêt en finançant des dizaines d'initiatives relatives à la transition entre lieux de soins mais cependant sans cibler spécifiquement l'aspect médicamenteux.

Certes, des solutions miracle ne sont pas directement disponibles mais grâce à l'articulation de méthodes de recherche variées, ce projet a mis en lumière une série de mesures à envisager pour optimaliser la continuité du traitement médicamenteux.

Cette recherche a bénéficié de la collaboration remarquable entre pharmaciens et médecins de l'UCL et de la K.U.Leuven. Nous tenons à les remercier pour leur professionnalisme et excellente collaboration scientifique.

Jean Pierre CLOSON
Directeur général adjoint

Raf MERTENS
Directeur général

Résumé

INTRODUCTION

La continuité du traitement médicamenteux est d'une importance capitale lors de la transition du patient entre milieux de soins, en particulier entre l'hôpital et le milieu ambulatoire. Les problèmes identifiés lors de cette transition peuvent être classés en cinq catégories (suivant les résultats de l'étude qualitative décrite ci-après) :

- Problèmes à l'admission, tels qu'une liste de médicaments incomplète, l'absence d'information lors d'urgence ;
- Problèmes lors de la sortie de l'hôpital, par exemple un patient peu ou non informé, un manque de communication avec le médecin généraliste (MG), des réserves insuffisantes de médicaments pour le week-end ;
- Problèmes liés aux professionnels, par exemple un avis du MG différent de celui du spécialiste, un manque d'assistance au patient pour sa prise de médicaments ;
- Problèmes liés aux patients et familles; par exemple une incompréhension du traitement, une non compliance;
- Problèmes liés au processus, par exemple des documents illisibles, une substitution par les professionnels de la santé.

Suivant les études, ces problèmes de discontinuité du traitement médicamenteux touchent de 20 à 60% des patients lors du retour à domicile.

OBJECTIFS

L'objectif de ce projet est de proposer des solutions pour optimaliser la continuité du traitement médicamenteux lors de l'admission à l'hôpital et du retour à domicile.

Le terme « seamless care » utilisé dans ce projet concerne uniquement le traitement médicamenteux et ce lors de la transition entre différents prestataires ou environnements de soins. De manière spécifique, les environnements de soins considérés dans ce projet sont le milieu ambulatoire (domicile, soins résidentiels) et l'hôpital.

Les objectifs spécifiques du projet sont de réaliser :

- Une revue systématique de la littérature internationale au sujet de l'impact et du rapport coût-efficacité d'initiatives visant à améliorer la continuité du traitement médicamenteux ;
- Une analyse des initiatives mises en place à l'échelle nationale et/ou régionale dans sept pays (Australie, Canada, Danemark, Etats-Unis, France, Pays-Bas et Royaume-Uni) ;
- Une analyse des données belges relatives aux problèmes qui se posent lors de transition de et vers l'hôpital et aux solutions mises en place pour améliorer la continuité du traitement médicamenteux ;
- Une quantification des changements de médications liés à un séjour hospitalier en Belgique, changements potentiellement porteurs de risque au niveau de la continuité du traitement ;
- Une analyse qualitative de la perception de professionnels de la santé belges vis-à-vis d'approches susceptibles d'améliorer la continuité du traitement médicamenteux.

REVUE DE LITTÉRATURE

La revue systématique de la littérature indexée n'a identifié aucune méta-analyse ou revue systématique relative à l'impact d'interventions visant à améliorer la continuité du traitement médicamenteux. Vingt-huit études avec groupe contrôle ont été relevées et quinze d'entre elles ont été sélectionnées sur la base de leur qualité. Toutefois l'hétérogénéité des populations, des interventions et de la qualité de ces études n'ont pas permis de tirer des conclusions définitives quant à l'efficacité des interventions proposées.

IMPACT CLINIQUE DES INTERVENTIONS

La majorité des interventions concerne la sortie de l'hôpital. Certaines études ont examiné la communication avec le médecin généraliste et le pharmacien (par exemple envoi du plan de traitement). D'autres ont étudié l'information du patient au moment de et/ou après la sortie, par un professionnel de la santé (le plus souvent un pharmacien clinicien). Les populations de patients ciblés varient (4 études en gériatrie) mais excluent généralement une partie des patients plus vulnérables (p.ex. les patients psychiatriques, avec troubles cognitifs, illettrés). La majorité des interventions ont été mises en place par des pharmaciens cliniciens dans un contexte multidisciplinaire. Seule une étude de qualité suffisante a évalué l'impact d'un support informatique pour les processus de soins en question.

Les conclusions se basent essentiellement sur des mesures de processus (p.ex. discordances médicamenteuses). Quelques études ont également évalué l'impact sur des mesures telles que la réhospitalisation. Les interventions qui donnent un résultat positif sont celles qui associent une intervention au moment de et après la sortie de l'hôpital, et qui ont pour cibles et le patient et les prestataires de soins de première ligne. Cependant ces études ne permettent pas de tirer de conclusions définitives de l'impact des interventions sur des critères cliniques ou de qualité de vie. Les résultats d'études réalisées à étranger (Etats-Unis, Australie, Canada) ne sont par ailleurs pas nécessairement transférables telles quelles à la situation belge.

COÛT-EFFICACITÉ DES INTERVENTIONS

Six études coût-efficacité et une étude de coût-utilité ont été analysées. Les données relatives à l'efficacité se basent généralement sur des questionnaires remplis par le patient en combinaison avec d'autres sources d'information (dossier…). Les coûts pris en considération varient fortement suivant les études. La plupart de ces études concluent à un effet positif en termes de compliance et de taux de réadmission. Cependant, l'hétérogénéité des interventions, des populations et des paramètres considérés ne permettent pas d'évaluer le rapport coût-efficacité des interventions proposées.

INITIATIVES A L'ÉTRANGER

L'analyse des initiatives nationales et régionales a porté sur les pays suivants : Australie, Canada, Danemark, Etats-Unis, France, Pays-Bas et Royaume-Uni.

Les principales initiatives identifiées comportent :

- l'élaboration de guides de pratique à l'attention des professionnels ;
- des campagnes nationales de sensibilisation ;
- la formation des prestataires de soins ;
- le développement de technologies de communication pour l'échange d'informations relatives aux dossiers des patients et aux bases de données de prescription.

Toutes ces initiatives impliquent une participation et une responsabilisation des différents prestataires de soins aussi bien dans le milieu ambulatoire qu'hospitalier. Elles ont débuté il y a une dizaine d'années mais sont en évolution constante. Suivant la littérature consultée et les experts internationaux impliqués dans ces initiatives, les facteurs de succès sont l'existence d'incitants à la mise en pratique (système d'accréditation, sanctions financières), l'adaptation au contexte local, l'engagement des acteurs, un « leadership » pour mobiliser les forces nationales et locales, le support informatique. A contrario, les initiatives sont entravées par un manque de ressources humaines et financières, par l'absence de prise de responsabilités ou de formation des prestataires, par leur manque d'intérêt, ou par des problèmes en relation avec la sécurité et la confidentialité des données.

L'impact de ces initiatives – au-delà de chiffres décrivant leur utilisation en pratique - est peu évalué, sauf à l'échelon local.

Même si ces initiatives ne sont pas applicables telles quelles à la Belgique, la plupart d'entre elles comportent des éléments d'intérêt certain pour la conception d'un système belge permettant une optimisation de la continuité des traitements médicamenteux.

SITUATION EN BELGIQUE

L'analyse de la situation en Belgique comporte trois parties : une synthèse des documents qui décrivent les initiatives belges, une analyse des données de prescription et une étude qualitative qui analyse les points de vue des professionnels de la santé, de patients et d'acteurs-clé du système belge.

PUBLICATIONS RELATIVES AUX INITIATIVES BELGES

Un ensemble de 66 initiatives ont été analysées, soit 43 projets de recherche (projets avec résultats disponibles) et 23 autres initiatives.

La majorité sont des projets locaux avec des populations de taille réduite. Neuf projets ont analysé la plus-value d'une anamnèse médicamenteuse par un pharmacien clinicien lors de l'admission. Six projets ont étudié l'impact d'un conseil du patient à la sortie, soit par un pharmacien clinicien soit par une infirmière. D'autres interventions ont étudié l'impact de procédures pour améliorer la qualité de la prise en charge à l'admission ou lors du retour à domicile (par exemple l'effet d'une lettre au pharmacien d'officine). Quelques projets ont évalué les opinions et expériences des prestataires de soins et des patients.

Le grand nombre et la variété de projets montrent l'intérêt pour le sujet de même que l'implication des différents prestataires de soins de différents secteurs pour s'investir dans le développement de solutions. Les évaluations des projets concluent à un effet positif sur les paramètres mesurés en termes de processus (connaissance du patient, adéquation entre traitement prescrit et traitement suivi). Comme dans la littérature internationale, les impacts cliniques et économiques ne sont pas démontrés. Ces projets n'offrent donc actuellement que très peu de données scientifiques de qualité relatives à l'efficacité de ces interventions en Belgique. Cependant, elles donnent des informations relatives aux barrières et éléments facilitateurs à considérer lors de la mise en place de ce type d'innovation.

ANALYSE DES DONNEES DE PRESCRIPTION

Les données de prescription relatives à un changement éventuel dans un traitement chronique suite à une hospitalisation ont été analysées. La littérature montre en effet que ces changements sont une source fréquente de discontinuité du traitement. Les analyses ont porté sur les statines et les inhibiteurs de la pompe à protons respectivement et se sont limitées aux cas où ils avaient été délivrés au même patient aussi bien dans les 3 mois avant que les 3 mois après une hospitalisation (données de l'Agence Intermutualiste). Les analyses ont évalué les changements de produit au sein du même groupe chimique (ATC niveau 4), par exemple : passage d'un générique vers l'original (ou vice versa) ; passage d'une substance chimique vers une autre (ex : Simvastatine EG® vers Lipitor®) ; changement de nom de spécialité (ex : Cholemed® vers Docsimvastatine®) ; changement de dosage des comprimés.

Ces changements dans les traitements chroniques ont été identifiés dans 17% des cas pour les statines et dans 29% des cas pour les inhibiteurs de la pompe à protons. Les données ne permettent toutefois pas d'identifier les causes de ces changements ni les conséquences en termes de risques pour le patient.

ETUDE QUALITATIVE

Une étude qualitative a clôturé cette recherche : elle visait principalement à identifier les solutions potentielles, leur niveau de priorité et leur faisabilité en Belgique. Onze *focus groups* ont été organisés dans le pays, soit 9 groupes incluant des prestataires de soins (et des patients) et 2 groupes incluant des représentants d'organisations impliquées dans la mise en place des solutions. Les participants ont identifié une longue liste de problèmes qui ont été groupés en cinq catégories (cf. introduction).

De nombreuses pistes de solutions ont été proposées par les participants, à savoir:

- une sensibilisation des patients et prestataires de soins relative aux problèmes liés à la transition et à la responsabilité partagée de chacun pour en améliorer la qualité, e.a. via une campagne nationale;
- une standardisation des procédures : e.a. une lettre de sortie standardisée ; la mise à disposition permanente - électronique ou sur papier - de la liste actualisée des médicaments du patient ;
- le développement de solutions informatiques adaptées: e.a. la prescription électronique, un dossier pharmaceutique et médical électronique accessible (moyennant accord du patient) pour les différents prestataires de soins dans les différents environnements;
- de nouveaux codes de nomenclature afin d'aider à domicile certains groupes de patients pour l'organisation de leur prise de médicaments ;
- une amélioration du processus de transition : assistance d'un pharmacien clinicien, contact avec les prestataires de la première ligne de soins avant la sortie de l'hôpital.

Un facteur important mentionné dans la plupart des groupes est la prise de responsabilité des différents prestataires impliqués. Si une coordination est souhaitable, le MG est souvent mentionné comme prestataire le mieux approprié.

Les participants des groupes s'accordaient également au sujet de la nécessité pour chaque patient d'une continuité du traitement médicamenteux. Toutefois, certains groupes vulnérables requièrent une attention particulière, comme par exemple les patients gériatriques, les patients avec un profil psychiatrique, les patients polymédiqués.

BASES D'UN SYSTÈME D'AMÉLIORATION DE LA CONTINUITÉ DU TRAITEMENT MÉDICAMENTEUX

L'objectif de cette dernière partie était de dégager les bases d'un système pour optimaliser la continuité du traitement médicamenteux. Les résultats des différentes parties de la recherche ont été analysés de manière transversale et combinés avec des interviews de personnes spécialisées dans le partage des données électroniques en Belgique. Les éléments dégagés de cette analyse sont les suivants :

Au niveau de la politique de santé

- Des "guidelines" nationaux à l'attention des prestataires de soins, directives à adapter à l'échelon local ;
- Une structure de coordination au niveau régional afin de mettre en place les "guidelines" au niveau local;
- Une campagne nationale afin de sensibiliser les prestataires de soins et patients au problème et à la responsabilité de tous;
- La mise en place d'incitants financiers ou de règlements (tels que des systèmes d'accréditation) par rapport à l'implémentation des "guidelines" ;
- Une rémunération adéquate du temps investi pour améliorer la continuité des soins, en particulier avant et après la sortie de l'hôpital ;
- Une infrastructure électronique qui facilite la continuité des soins en particulier lors de transitions ;
- Une meilleure connaissance et la prise en compte des règles et mesures en vigueur dans les différents lieux de soins (par exemple la nécessité de prescription de génériques en MG);
- Une attention particulière à des groupes de patients vulnérables, dont la définition peut dépendre du contexte local ;
- Une recherche afin d'objectiver l'impact clinique, humain et économique des initiatives en cours ;

Au niveau des professionnels de la santé

- Le renforcement de l'implication et la responsabilisation des prestataires (médecins et pharmaciens, au niveau hospitalier et première ligne) ;
- Une concertation locale (entre l'hôpital et les prestataires de première ligne) pour améliorer la coopération entre les différents lieux de soins ;

Au niveau du patient

- Lors de l'admission à l'hôpital, la combinaison de différentes sources d'information et l'utilisation de procédures standardisées pour l'anamnèse médicamenteuse ;
- A la sortie de l'hôpital, une information structurée et exhaustive, en temps utile, pour les patients et prestataires de soins de la première ligne ;
- A la sortie de l'hôpital, des réserves suffisantes de médicaments pour couvrir la période avant un achat possible de médicaments ;
- Après la sortie de l'hôpital, le renforcement de l'information et une procédure pour assurer une adéquation entre le traitement théorique et ce que le patient prend effectivement (*« reconciliation procedure »*) ;
- L'existence pour chaque patient d'une liste de médicaments (de préférence aussi sous format électronique), accessible aux professionnels de santé concernés.

RECOMMANDATIONS DU KCE[a]

Sans que de véritables évidences scientifiques ressortent du présent rapport, les points suivants paraissent susceptibles d'améliorer la situation :

- **Il serait nécessaire de rédiger, de publier et disséminer un guide de bonne pratique relatif à la continuité des soins médicamenteux et ce à partir des guides internationaux et des résultats de cette recherche (entre autres les procédures décrites dans le dernier chapitre, relatives à l'admission et à la sortie de l'hôpital) ; ce guide nécessiterait une collaboration entre pharmaciens, médecins et autres prestataires de soins tant du milieu hospitalier que de la première ligne ;**
- **Une sensibilisation des prestataires de soins et des patients devrait attirer leur attention sur l'importance de la continuité du traitement médicamenteux lors de transition entre lieux de soins et de la responsabilité de tous dans cette matière ;**
- **L'opérationnalisation du partage des données du patient sous forme électronique devrait être intensifiée afin que les données médicales d'intérêt, dont une liste de médicaments actualisée, soient disponibles pour le patient et les prestataires de soins concernés, tout en respectant les règles de sécurité et de confidentialité ;**
- **L a continuité des traitements médicamenteux lors de l'admission et à la sortie de l'hôpital devrait être formalisée dans des procédures claires ;**
- **La formation des professionnels de la santé travaillant en milieu ambulatoire et en milieu hospitalier devrait comporter un volet relatif à la continuité du traitement médicamenteux entre milieux de soins ;**
- **Le financement éventuel d'initiatives relatives à la continuité des soins entre domicile et hôpital devrait être subordonné à une évaluation crédible visant à démontrer les effets cliniques et éventuellement économiques subséquents.**

[a] Le KCE reste seul responsable des recommandations faites aux autorités publiques

Scientific summary

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LIST OF ABBREVIATIONS

A	Admission
ADE	Adverse drug event
APB	Algemene Pharmaceutische Bond/Association Pharmaceutique Belge
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

1 INTRODUCTION

1.1 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 definition[1]:

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 them [3].

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 care[4].

In 2003, the American Society of Health-System Pharmacists[5] 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 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 (one of them being the hospital, the other being community care [home, rehabilitation care facilities and long term care facilities]), and transition between them[3]. 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 care [4].

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 care[5]. 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 outcome[6]. 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 unintentional [7]. International research estimated that about 63,7% of the patients discharged from the hospital experience drug related problems[8]. 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 hospital[11].

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 1. 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 1.

3.2.2 Critical appraisal of the evidence selected

All studies were appraised using a grid including 14 different items [12] used in another KCE project. The tool and procedure are detailed in appendix 1.

Systematic reviews and meta-analysis were appraised using the Dutch Cochrane grid also displayed in appendix 1.

3.2.3 Data extraction

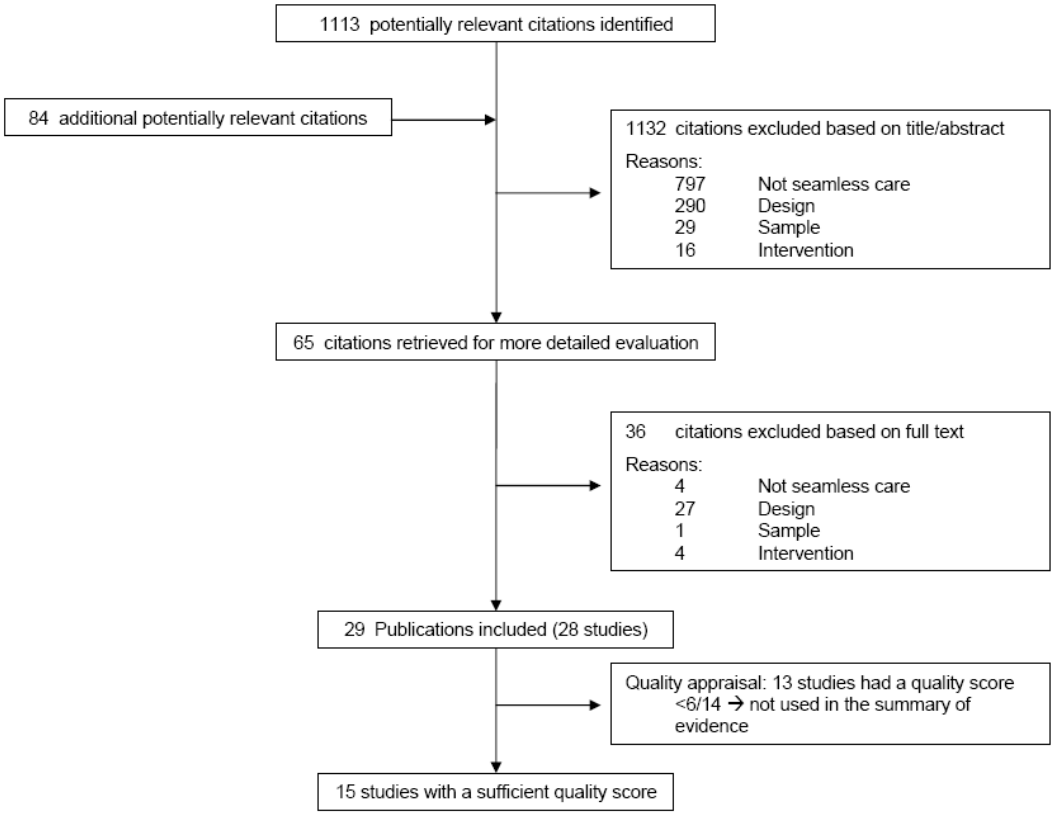
A data extraction form was developed and pilot tested on a small number of studies before the final form was decided upon. This form was also used for the extraction of data from the projects conducted in Belgium (see chapter 6). This form summarized specific information i.e. the research setting, study 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 1 and summarized in the figure below.

Figure 1: 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 1: characteristics of studies included in the review: quality appraisal score and summary of the main results

1A. 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 indentified 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≥6); CT: controlled trial; GP: general practitioner; P: process measure; QS: quality score (/14); RCT: randomised controlled trial.

1B 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
Pereles 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
						and physical function, services requested and supplied at 28 days post-discharge	
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	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	1year	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≥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.

1C. 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 ≥ 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 1.

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 medications[20]. Kwan et al. found a significant decrease in postoperative medication discrepancies that had the potential to cause possible or probable harm[21]. 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 6[25]. 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 instructions[26]. 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 patients[28]. 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 medication[31]. 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 medications[29]. 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 interest[34]. 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 home[35]. 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 satisfaction[40]. 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 setting[41]. 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 discharge[42]. 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 hospitals[43]. 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 hospitals[47]. 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 setting[13].

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 problems[34] 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 interventions[48]. 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 problems[60]. 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 level[35]. 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 available[61]. Similarly, only one study focused on patients newly transferred to long-term care[41]and this is also an area for further research.

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[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 nurses[62]. 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 needs[61].

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 settings[48]. 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 office[61].

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 physicians[49]. They reported that the delivery and perhaps the quality of discharge summaries can be improved substantially through health information technology[49]. In Denmark the use of nationwide on-line prescription records has shown to improve the drug history in hospitalised patients [63].

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 manifest [48].

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 history[21], 40 minutes per patient for education upon discharge [28], 50 minutes per patient for discharge counselling and postdischarge telephone calls[35], 30 minutes for postdischarge telephone calls[42]. 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 ADEs [36].

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 techniques [61].

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 assessment[66]. 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 study [67].

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 rehospitalizations[64]. 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 over [65]. 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 1995 [68]. 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 2000 [69].

Research has indicated that the most common type of drug-related problems affecting patients following hospital discharge are ADEs, followed by procedure-related injuries [10]. 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 costs [70].

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 care [71].

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 consequences [72]). 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 consequences [72].

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

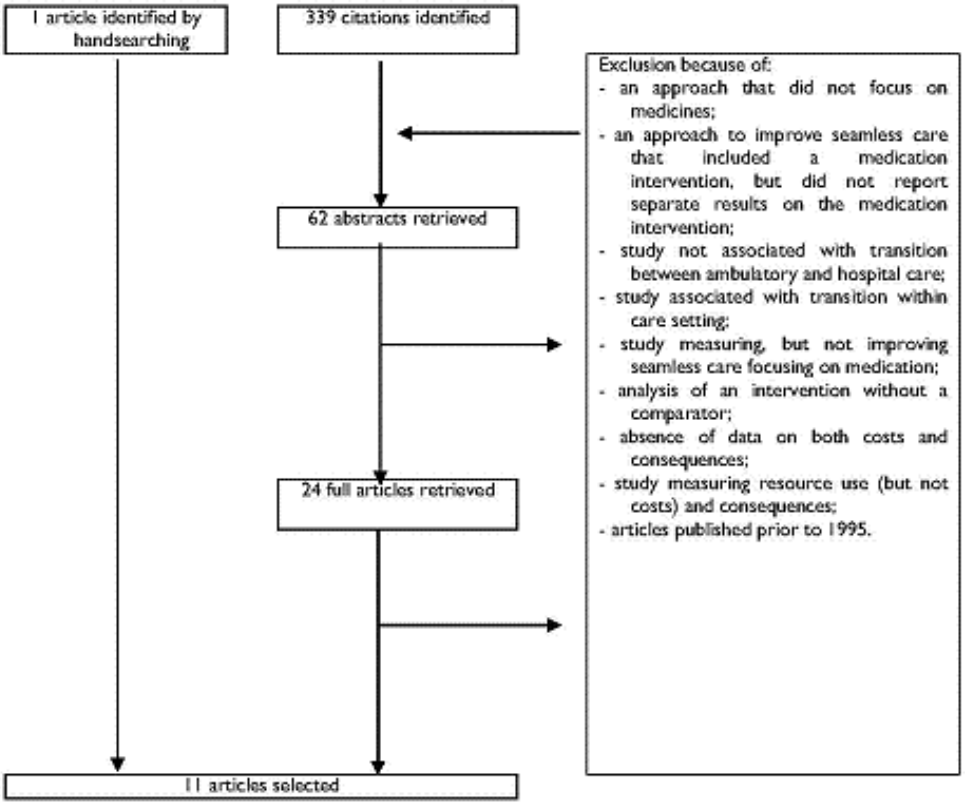
The detailed search results are summarized in the table below and in appendix 2.

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 medication [37]. 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 home [33]. 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-up [35]. 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 discharge [42]. 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 medicines [39]. 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 supply [76]. 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 patients [78].

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 perspective [77]. 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 patients [76]. 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, 199737	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 gained [77].

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 uncertainty[77]. 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 intervention[77].

None of the economic evaluations discussed the transferability of results to other settings or countries. Two economic evaluations enrolled patients who use multiple medications[39] or are likely to experience difficulties with their medication[37]. 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			not systematic					
Information relative to medications sent to community pharmacist at discharge	Rarely; pilot programs	No	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

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

[1]Unless in the case of some emergency admissions, or referral by community treatment team (e.g. mental health team); [2]Pharmacists 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; [3]Clinical 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].

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b The HMR service can only be provided be 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 details [85].

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 states [86].

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 implementation [87].

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 issues [3]. 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 admissions [96]. 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.

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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 eHeatlh 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 Programme [104]. 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 years [106].

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 management [107].

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 admission [109]. The other looks at patient involvement in decisions about prescribed medicines [110]. 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 hospital [115]. 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 2001 [111] 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 2005/2006 [114]. 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 drown from them [114].

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 organizations [114].

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 this [116].

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 healthcare [117]. 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 failure [117]. 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 needed [115].

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 accessed [118]. 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 SCR [119], 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 pharmacy [121]. 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 home [122]. 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 summaries [122]. 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 list [126]. 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 weekly [127]) and print out their medication profile from their health journal that they manage in their "My HeatlheVet" session [126]. Currently, patients are invited to keep an updated medication list handy – at home and wherever they go [128] – 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 CPRS [129].

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:

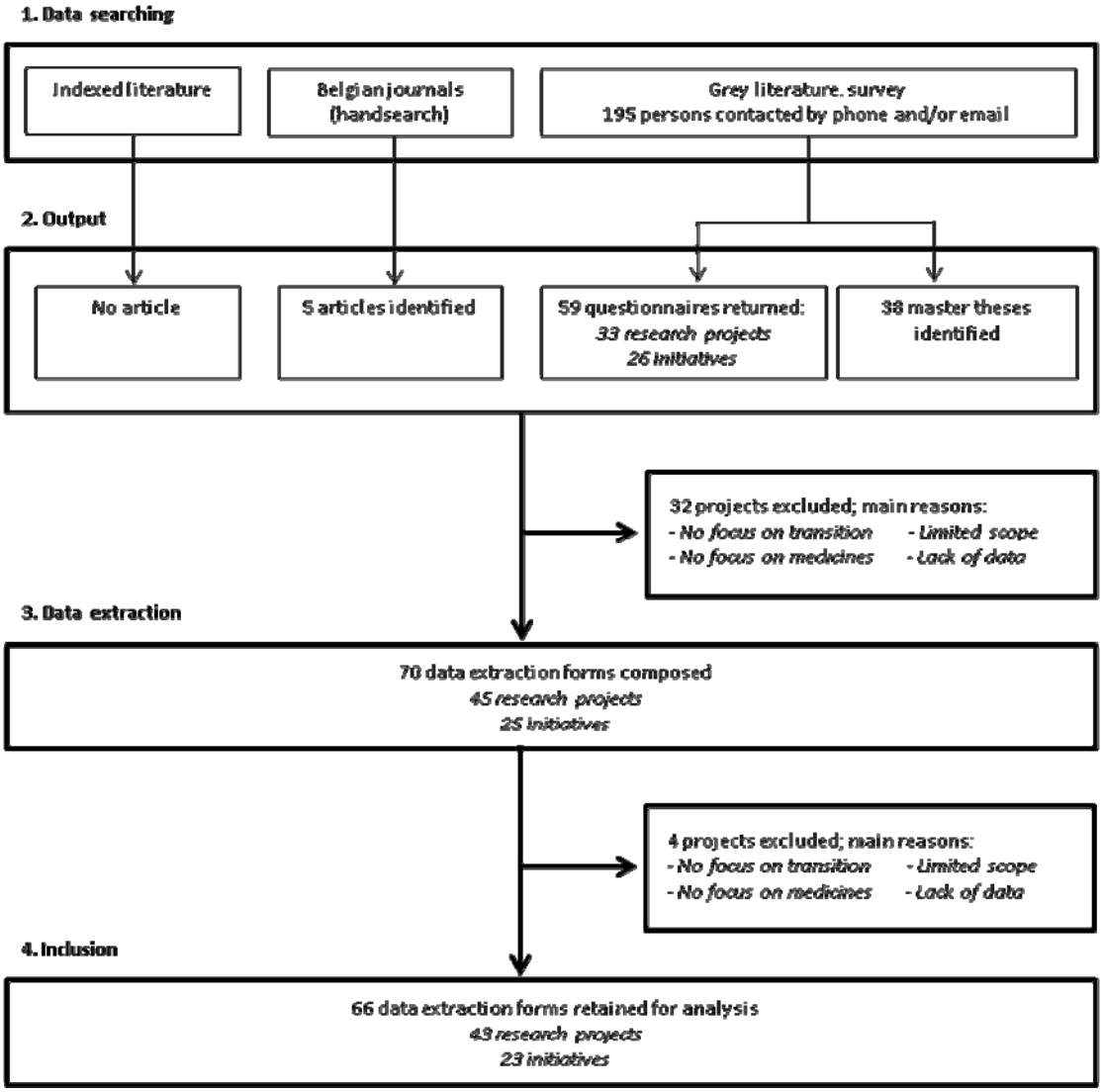
- Research projects describing drug related problems associated with transition between settings of care
- Research projects evaluating interventions to improve seamless care
- Research projects evaluating opinions or experiences of stakeholders on themes related to seamless care
- Ongoing research projects
- 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/AD	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 Middelares 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 Middelares 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

						respectively knew which one(s).	
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)	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	Indevuyst 136	UZ Leuven 24 patients discharged from pediatric wards (oncology and infectious diseases)	D	Prospective observational study	(P) Quantitative and qualitative evaluation of discharge medicationb (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

						1 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 medicationb, 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 seams 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 Middelares 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, geriatry, gastro-enterology 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-Dympna 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/AD	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/AD	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 an 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/AD	Study design	Measures	Main results	Financial support
30	Sterckx 148	Algemeen ziekenhuis Sint-Dympna 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	Algmeen ziekenhuis Maria Middelares 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	Provincie-bestuur 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/AD	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) Usablility	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) Usablility	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/AD	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 Middelares Gent – gatro-enterology 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/AD	Type of initiative	Brief description	HCP involved	Comments	Financial support
				outreach				CSR Johnson & Johnson, Janssen - Cilag
54	APPI 164	UZ Antwerpen – policlinic surgery	D	Treament 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 geneesmid-delen	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/AD	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	Samen-werking 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 elektronsiche 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 – geriatry, 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 – thoracal 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.

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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 overweigh 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 countries [175]. In Belgium, the market for generic drugs is relatively under-developed as compared to other countries [176]. 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 2008[177]. 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 System [179]; the number of packages and the number of defined daily doses[6] (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.

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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):

Table12: 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				
Weighted Frequency Row percent	Change of ATC level 5	Change only in dosage	Change only in specialty name	Both change (specialty name & dosage)	No change
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	Type of change after the Hospitalization				
Estimated Frequency Row Percent	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 SEAMESS 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.trentrdsu.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	Ieper	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 drugs[7] 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.

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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 al 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 nomenclature[9] 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.'

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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,...	- Risk of loss by patient - Transfer delay - Patient privacy	- Standardization	- 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)	- 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)	- Adapted rules - Electronic prescription - Peer review - Project based implementation - Ownership - Mass distribution - Quick access to information - Card readers do exist	- 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	- Cost - Limited sharing (pharmacists) - Patient information remains needed - No emails allowed	- Existing SIS or ID card	- 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	- Patient refusal	- Legal issues (2009) - Communication prescribers	- 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	- 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	- Feasibility - Technical progress - High participation of health care workers in dialogue - It is readable - 'Subvention' of hospital informatisation - Frustrated professionals	- 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	- Authorisation (reading, writing) - ICT mindedness - Cost	- Financial incentives - Databases with good links - Standardisation as far as possible	- e health - Willingness for cooperation - availability of staff

		- Divergence of programs - Overkill of information - Sis card needs readers everywhere	- expertise	- 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	- Treating pharmacist not known - Resistance of physicians	- Existing file at community pharmacy - Digital progress	- Informed consent of patient - Pharmacists all need to use IT
D	**REIMBURSEMENT OF HEALTHCARE SERVICES**	**BARRIERS**	**FACILITATORS**	**PREREQUISITES**
D3	Therapeutic education for patients	- Competition between hospital and community care - Lack of time - Short hospital stays - Corporatism of professionals (nurse, occupational therapists) - Cognitive problems - Motivation - Cost	- Decrease readmission - Decrease accidental falls - Personal motivation	
E	**TRANSITION PROCESS**	**BARRIERS**	**FACILITATORS**	**PREREQUISITES**
E1	Clinical pharmacy, e.g. standardised medication history taking on admission	- Lack availability - Recruitment - Cost - implementation process - Acceptation by physicians	- Expertise - Time available - Is done everywhere	- 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)	- Availability of pharmacists - Time - Anonymity - Accessibility	- Videoconferencing, - Financial support - Clinical benefits: avoiding medication errors - Time gain	- 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	- Fragmentation is dangerous	- New honorary system for pharmacists - Financial incentives in – and extra-mural	- 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):

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 polypathology, 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] (chapter3)	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 *Nr 41, 27*	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 optimization[3]. (http://www.saferhealthcarenow.ca). www.medicatieoverdracht.nl[108].

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, Share4Healh, electronic prescribing in hospitals, the pharmaceutical record, facilitation tools for the prescription and approval of chapter IV drugs). The conclusions are that:

- their operationality 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 1 and 11 to 14).
- 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.

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j 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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Seamless care with regard to medications between hospital and home - Supplement

KCE reports 131S

Belgian Health Care Knowledge Centre
Federaal Kenniscentrum voor de Gezondheidszorg
Centre fédéral d'expertise des soins de santé
2010

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Introduction: The Belgian Health Care Knowledge Centre (KCE) is an organization of public interest, created on the 24th of December 2002 under the supervision of the Minister of Public Health and Social Affairs.
KCE is in charge of conducting studies that support the political decision making on health care and health insurance.

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

Seamless care with regard to medications between hospital and home - Supplement

KCE reports 131S

ANNE SPINEWINE, VEERLE FOULON, CORALINE CLAEYS, JAN DE LEPELEIRE,
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Belgian Health Care Knowledge Centre
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KCE reports 131 S

Title: Seamless care with regard to medications between hospital and home - Supplement

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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Seamless care – appendices

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1 APPENDIX CHAPTER 3: SYSTEMATIC LITERATURE REVIEW

1.1 SEARCH STRATEGY

1.1.1 Indexed literature search

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. The search strategy relative to economic studies is detailed in the next chapter.

1.1.1.1 Medline (by OVID)

Two search strategies were run in parallel by two members of the research team, and their results were combined thereafter.

The first search strategy provided below combined two groups of terms. The first group included MESHs (and free terms) that relate to the transition between settings. The second group of terms described the scope of interventions that relate to medications. All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English).

The second search strategy provided below was conducted simultaneously to the first strategy by another member of the research team, and combined three groups of terms. The first group included MeSHs (and free terms) that relate to the transition between settings. The second group of terms described the scope of interventions that relate to medications. The MeSH and free terms used in these two groups partially differed from those used in the first search strategy. The third group of terms included terms that relate to outcome of interventions. All terms from group one were combined with terms from the second and third groups. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English).

In addition, all terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards), languages (Dutch, Flemish, French and English), article type (reviews or meta analyses or clinical trials or controlled clinical trials or randomized controlled trials).

Details of the search strategy in Medline/OVID (by DP, 9th June 2009)

The search strategy combined two groups of terms.

The first group included MESHs (and free terms) that relate to the transition between settings: Patient admission, patient discharge, patient readmission, patient transfer, continuity of care, seamless, delivery of care/integrated, interprofessional relations, transmural care. Also a combination of settings (using the Boolean "AND") has been used to include papers that refer to different settings: MESHs terms "hospitalization", "emergency service" and terms that describe residential or home care settings.

The second group of terms described the scope of interventions that relate to medications: community pharmacy services, medication therapy/management, pharmacy service/hospital, prescriptions, medication interactions (focus), medication therapy/computer assisted, medication errors, medication systems, medication reconciliation.

All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English).

Search History D. Paulus saved as "Seamless care - final", Medline OVID, 9June

	Searches	Results
1	pharmaceutical services/ or community pharmacy services/ or medication therapy management/ or pharmacy service, hospital/ or prescriptions/ or drug prescriptions/ or electronic prescribing/	31761
2	Drug Interactions/	66716
3	drug therapy, computer-assisted/ or medication errors/	8425
4	medication systems/ or medication systems, hospital/	3336
6	patient admission/ or patient discharge/ or patient readmission/ or patient transfer/	34984
7	"Continuity of Patient Care"/	10308
8	"Delivery of Health Care, Integrated"/	5765
9	Interprofessional Relations/	36085
10	seamless.mp.	951
14	transmural care.mp.	20
15	medication reconciliation.mp.	124
16	4 or 1 or 3 or 2 or 15	105743
17	8 or 6 or 7 or 10 or 9 or 14	85045
18	16 and 17	1366
19	limit 18 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans)	808
25	Hospitalization/	54710
26	residential facilities/ or homes for the aged/ or nursing homes/	31103
27	home care services/ or home care services, hospital-based/	24800
28	primary health care/ or "continuity of patient care"/	48760
29	Emergency Service, Hospital/	29970
30	25 or 29	83118
31	27 or 28 or 26	102214
32	30 and 31	3778
33	32 and 16	61
34	33 or 19	851
35	limit 34 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans)	834
36	limit 35 to (meta analysis or "review")	68
37	limit 35 to (clinical trial, all or controlled clinical trial or randomized controlled trial)	60

Details of the search in Medline/Ovid (by AS,19th June 2009)

The second search strategy combined three groups of terms.

The first group included MESHs (and free terms) that relate to the transition between settings: Patient admission, patient discharge, patient readmission, patient transfer, continuity of care, seamless, delivery of care/integrated, interprofessional relations, transmural care.

The second group of terms described the scope of interventions that relate to medications: pharmaceutical services, community pharmacy services, medication therapy/management, pharmacy service/hospital, prescriptions, medication prescriptions, medication therapy/computer assisted, medication errors, electronic prescribing, computer communication networks, computerized medical records systems, clinical pharmacy information systems, medication systems, medication reconciliation, pharmaceutical preparations, medication therapy, combination medication therapy.

The third group of terms included terms that relate to outcome of interventions: Intervention studies, outcome assessment (health care), process assessment (health care).

All terms from group one were combined with terms from the second and third groups. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English) and humans.

All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards), languages (Dutch, Flemish, French and English), article type (reviews or meta analyses or clinical trials or controlled clinical trials or randomized controlled trials) and humans.

Searches		Results
1	Pharmaceutical Services/	3177
2	Community Pharmacy Services/	1747
3	Medication Therapy Management/ or Pharmacy Service, Hospital/	8744
4	Prescriptions/ or Drug Prescriptions/	19492
5	Medication Errors/ or Drug Therapy, Computer-Assisted/ or Electronic Prescribing/ or Computer Communication Networks/ or Medical Records Systems, Computerized/ or Clinical Pharmacy Information Systems/	33709
6	Medication Systems/	586
7	medication reconciliation.mp.	124
8	6 or 4 or 1 or 3 or 7 or 2 or 5	63584
9	Pharmaceutical Preparations/	37188
10	Drug Therapy/	28151
11	Drug Therapy, Combination/	113209
12	11 or 10 or 9	176218
13	8 or 12	235097
14	Patient Readmission/	5067
15	Patient Admission/	14532
16	Patient Discharge/	13866
17	Patient Transfer/	4143
18	"Continuity of Patient Care"/	10328
19	"Delivery of Health Care, Integrated"/	5776
20	Interprofessional Relations/	36116
21	seamless.mp.	953
22	transmural care.mp.	20
23	21 or 7 or 17 or 20 or 15 or 14 or 22 or 18 or 16 or 19	85226
24	8 and 23	2658
25	23 and 13	3259
26	Intervention Studies/	4089
27	"Outcome Assessment (Health Care)"/	32905
28	"Process Assessment (Health Care)"/	2265
29	27 or 28 or 26	38927
30	24 and 29	88
31	25 and 29	105
32	limit 24 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans and (meta analysis or "review"))	106
33	limit 25 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans and (clinical trial or controlled clinical trial or randomized controlled trial))	81
34	limit 24 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans and (clinical trial or controlled clinical trial or randomized controlled trial))	40
35	limit 25 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans and (meta analysis or "review"))	144
36	33 or 31	176
37	limit 31 to (yr="1995 -Current" and (meta analysis or "review"))	9
38	limit 31 to (yr="1995 -Current" and (dutch or english or flemish or french) and humans)	87
39	38 or 33	158

1.1.1.2 Embase

The strategy used was identical to that used in Medline. MeSHs and free terms from Medline were translated in Emtree terms.

The first group included Emtree (and free terms) that relate to the transition between settings: hospital admission, hospital discharge, hospital readmission, patient transport, patient transfer, continuity of patient care, continuity of care, integrated health care system, public relations, interprofessional relations, seamless, transmural care. Also a combination of settings (using the Boolean "AND") has been used to include papers that refer to different settings: Emtree terms "Hospitalization", "Residential home", "Homes for the aged", "Nursing home", "Home care", "Primary health care", "Emergency health service".

The second group of terms described the scope of interventions that relate to medications: pharmacy, hospital pharmacy, medication therapy management, prescription, electronic prescribing, medication interactions, computer assisted medication therapy, medication error, medication systems, hospital medication systems, medication reconciliation.

All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards), type of article (reviews or meta-analyses or clinical trials), and language (Dutch, Flemish, French and English).

The second search strategy combined three groups of terms.

The first group included MESHs (and free terms) that relate to the transition between settings: Hospital admission, Hospital discharge, Hospital readmission, Patient transport, Patient transfer, Continuity of patient care, Continuity of care, Integrated health care system, Public relations, Interprofessional relations, Seamless, Transmural care.

The second group of terms described the scope of interventions that relate to medications: pharmacy, medication therapy management, hospital pharmacy, prescription, medication error, computer assisted medication therapy, electronic prescribing, computer network, electronic medical records, clinical pharmacy AND medical information systems, medication systems, medication reconciliation, medication (explode, focus), medication therapy (explode, focus), medication combination (explode, focus).

The third group of terms included terms that relate to outcome of interventions: Intervention study, outcome assessment. No appropriate translation was found for the Mesh Term "process assessment (health care)".

All terms from group one were combined with terms from the second and third groups. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English) and humans.

All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards), type of article (reviews or meta-analyses or clinical trials or controlled clinical trials or randomized controlled trials) and languages (Dutch, Flemish, French and English) and humans.

1.1.1.3 International Pharmaceutical Abstracts (IPA)

The Medline search was translated into IPA (23/07/2009). No distinction could be made between original studies and systematic reviews or meta-analysis.

Les termes ont été prétestés dans l'index afin de trouver le « subject headings » permettant de référencer l'article dans la base de données IPA. Pour choisir les synonymes utilisés, tous les termes des recherches embase et medline ont été testés au singulier et au pluriel dans IPA. Ensuite, les termes au singulier et au pluriel donnant le plus de hits ont été utilisés.

Au vu des hits données lors de l'utilisation unique des mots de l'index, nous avons étendus la recherche aux mots clés (titre, abstract, mot clé, etc… .mp). Le tableau complet relative à la correspondance des termes peut être communiqué sur demande.

A noter que la fin de la stratégie de recherche dans la base de données IPA diffère de la stratégie dans la base de données Ovid et Embase. En effet, il n'est pas possible de limiter la recherche aux essais cliniques. En effet, le choix possible de limites possible est le suivant : Abstracts of meeting presentations, Communications, Editorials, Journal articles, Letters, Notes, Reprints, Reviews. Remarque : les « reviews » sont contenues dans les références limitées aux « journal articles ».

1 pharmaceutical services.mp. (1142)
2 Medication therapy management.mp. (139)
3 Hospital pharmacy service.mp. (123)
4 community pharmacy services.mp. [mp=title, subject heading word, registry word, abstract, trade name/generic name] (170)
5 electronic prescribing.mp. (117)
6 Medication error.mp. (832)
7 medication errors.mp. (2475)
8 electronic medical record.mp. (180)
9 drug therapy.mp. (7118)
10 medication reconciliation.mp. (155)
11 drug related problems.mp. (629)
12 medication related problems.mp. (162)
13 medication discrepancies.mp. (40)
14 Medication systems.mp. (67)
15 Clinical pharmacy information system.mp. (2)
16 prescription.mp. (11418)
17 prescriptions.mp. (10475)
18 computer communication network.mp. [mp=title, subject heading word, registry word, abstract, trade name/generic name] (0)
19 computer assisted drug therapy.mp. [mp=title, subject heading word, registry word, abstract, trade name/generic name] (2)
20 11 or 7 or 17 or 2 or 1 or 18 or 16 or 13 or 6 or 3 or 9 or 12 or 14 or 15 or 8 or 4 or 19 or 10 or 5 (26459)
21 hospital admissions.mp. (559)
22 hospitals admissions.mp. (1234)
23 patient discharge.mp. (117)
24 hospitals discharge.mp. (583)
25 continuity of patient care.mp. (29)
26 continuity of care.mp. (251)
27 seamless.mp. (94)
28 medication reconciliation.mp. (155)
29 hospital readmission.mp. (43)
30 integrated health care system.mp. (69)
31 interprofessional relations.mp. (12)
32 transmural care.mp. (1)
33 patient transfer.mp. (6)
34 27 or 25 or 33 or 32 or 28 or 21 or 26 or 22 or 30 or 24 or 23 or 31 or 29 (2745)
35 34 and 20 (789)
36 limit 35 to (human and (dutch or english or flemish or french) and journal articles and yr="1995 -Current") (311)

Searches in Medline and Embase

Database	Ref-Date	Hits	Total
1. "Clinical trials"			
Medline/Ovid	DP-09-06-2009	60	
	AS-19-06-2009	158	
Embase	DP-01-07-2009	145	
	AS-01-07-2009	339	
Total after removing duplicates			534
2. "Reviews"			
Medline/Ovid	DP-09-06-2009	68	
	AS-19-06-2009	144	
Embase	DP-01-07-2009	35	
	AS-01-07-2009	52	
Total after removing duplicates			217

1.1.1.4 CINAHL

The Medline search was translated into CINAHL using free terms.

Free terms were used for this search.

The first group of terms included the following: pharmaceutical services, community pharmacy services, medication therapy/management, pharmacy service/hospital, prescription, medication prescriptions, medication therapy/computer assisted, medication errors, electronic prescribing, computer communication networks, computerised medical records systems, clinical pharmacy information systems, medication systems, medication reconciliation, pharmaceutical preparations, medication therapy, combination medication therapy.

The second group of terms included the following: patient admission, patient discharge, patient readmission, patient transfer, continuity of care, seamless care, delivery of care, integrated or interprofessional relation, transmural care. The third group of terms included the following: intervention studies, outcome assessment, process assessment.

All terms from group one were combined with terms from the second group. Limits were dates (from 1995 onwards) and languages (Dutch, Flemish, French and English) and type of publication (clinical trials or experimental studies).

1.1.1.5 Cochrane

The Cochrane Database of Systematic Reviews was searched using the following key MeSH terms: continuity of patient care, patient discharge, patient admission, patient transfer, patient compliance, patient readmission.

1.1.2 Handsearch in the literature

Handsearching of journals was performed for the European Journal of Hospital Pharmacy Science (from 1995 onwards), because this was a peer-reviewed journal of relevance to the research topic and which is not included in the above databases.

1.1.3 Personal databases

Databases compounded by members of the research group before the beginning of the project were searched to check if there were relevant papers that had not been identified through the indexed literature search.

1.2 SELECTING STUDIES

Studies needed to comply with the following study selection criteria for inclusion in the literature review:

- 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 following exclusion criteria were applied:

- Intervention:
  - studies where the intervention was broader than "seamless care with a focus on medications" and that had no specific outcome measure to evaluate the effect of the intervention on the medications component;
  - studies where the intervention focused on medications but was broader than seamless care (e.g. clinical pharmacists doing admission histories and discharge counselling but also interventions to improve prescribing during the hospital stay) and that had no specific outcome measure to evaluate the effect of the intervention on the seamless care component, ie the effect could not be analysed separately.
- Study design:
  - studies without a comparison or control group, including before-after studies with no control group (i.e. in which the control group is the historical group).
- Sample size: less than 30 patients per group.

Systematic reviews and meta-analyses were included as such if they exclusively focused on seamless care with regard to medications. Systematic reviews and meta-analyses with a broader perspective (e.g. looking at seamless care but not specifically at the medication component, looking at the impact of health care professionals (HCPs) providing continuity of care but also other interventions) were not included as such, but the list of articles included in the review were checked. The individual studies that were eligible for the present review were then added to the database of individual studies (if this was not already the case).

In a preliminary sift, papers that did not meet the inclusion criteria were eliminated based on their title and/or abstract. All titles and abstracts identified as being potentially relevant were provisionally included. The final inclusion or exclusion was decided after retrieving all full texts. This selection process was done independently by two members of the research team (PC and AS). Disagreements were resolved by discussion and a consensus was reached.

1.3 CRITICAL APPRAISAL OF THE EVIDENCE SELECTED

1.3.1 Critical appraisal of controlled studies

Every selected study was appraised using a grid including 14 different items [1] used in another KCE project. The tool consists of ten generic items (namely research question, patient population and setting, intervention, comparison, outcome, design, sample size, statistics, generalisability, confounders) and four design specific items (randomisation, blinding, clustering effect, number of data point). For each study, a score was given for each of the 14 items, ranging from -1 (lower quality) to +1 (higher quality). This scoring system was piloted by two members of the research team (PC and AS) on six studies that had been included in the review.

It appeared that it was necessary to define better several items as well as the scoring given for each item. The final scoring grid used to score all studies is in Appendix 1, as well as the instructions for use. The quality appraisal was performed independently by those two researchers (PC and AS). Disagreements were resolved by consensus. A cut-off score of six and above was used for final inclusion in the synthesis of evidence. The choice of this rather low cut-off point was decided after the review of all scores that were generally low.

Item		Score	Instruction
1	Research question	+1	Précisément mentionné
		-1	Non précisément mentionné
2	Patient population and setting	+1	Précisément mentionné
		-1	Non précisément mentionné
3	Intervention	+1	Précisément mentionné
		-1	Non précisément mentionné
4	Comparison	+1	Groupe comparaison en parallèle
		-1	Pas de groupe comparaison en parallèle
5	Outcome	+1	Précisément mentionné
		-1	Non précisément mentionné
6	Design	+1	Précisément mentionné
		-1	Non précisément mentionné
7	Sample size	+1	Calculée, au moins 30 par groupe, et chiffre atteint
		-1	Non calculée et/ou < 30 par groupe et/ou chiffre non atteint
8	Statistics	+1	Précisément mentionné et méthodes adéquates, entre
			Autres IC pour les résultats
		-1	Non précisément mentionné et/ou méthodes inadéquates
9	Generalisability	+1	Généralisable population moyenne belge
		0	Applicable dans un contexte belge particulier
		-1	Non généralisable population belge
10	Confounders addressed	+1	Discuté et corrigé
		0	Mentionné mais pas de correction
		-1	Pas discuté
11	Randomisation	+1	Présent et correct
		0	Non pertinent
		-1	Présent et incorrect
12	Blinding	+1	Présent (au moins évaluateur aveugle)
		0	Non pertinent
		-1	Pas en aveugle et évaluation non aveugle
13	Clustering effect	+1	RCT cluster avec corrections pour clustering
		0	Non pertinent
		-1	RCT cluster sans correction pour clustering
14	Nr datapoints	+1	Au moins 3 mesures avant et après intervention
			Au moins 30 observations par mesure si ANOVA ou t-test multiplle
		0	Non pertinent

1.3.2 Critical appraisal of systematic reviews and meta-analyses

Systematic reviews and meta-analysis were appraised using the Dutch Cochrane grid:

1. Research question PICOD: clear, unclear
2. Search strategy
   a. Databases: broad,…
   b. Entry terms: broad, unclear,…
   c. Period
3. relevance selection: clear, unclear
4. Quality appraisal (Jadad, other): clear, unclear
5. Data extraction: clear, unclear
6. Studies description: clear, unclear
7. Heterogeneity and pooling: clear, unclear
8. Validity rating: sufficient, insufficient

1.4 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.

1.5 RESULTS

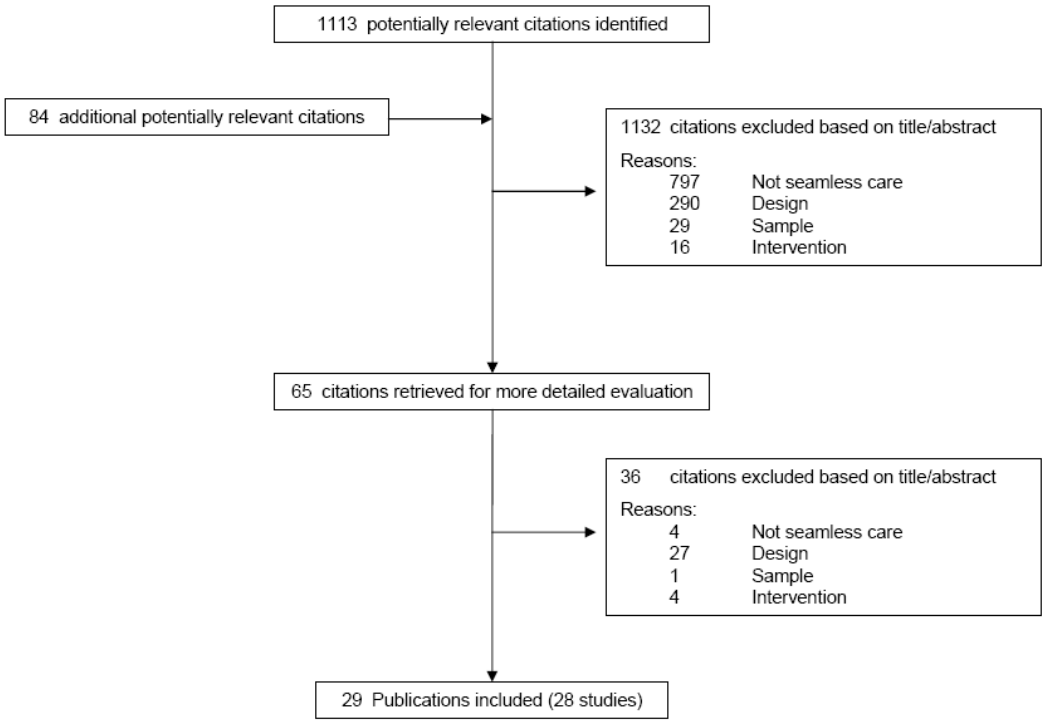
1.5.1 Search results

After removing duplicates, the search strategy run in Medline and Embase yielded 751 hits. The strategy run in IPA yielded 311 citations after removing duplicates. The search in the Cochrane and CINAHL databases generated 49 and 33 hits respectively (49 and 29 after removing duplicate citations found in Medline, Embase, IPA).

The researchers identified a total of 1113 potentially relevant citations (after removing duplicates), all databases confounded. Eighty-four additional references were added after checking the personal databases (n=79) as well as original studies found in systematic reviews or meta-analysis, as explained in the methods section. No paper was found upon handsearch in the European Journal of Hospital Pharmacy Science.

The figure below summarises the selection process for inclusion. At the end of this selection process, 29 publications were selected, representing 28 different studies.

Selection process for the inclusion of the studies



Comment by C Bond: add 1 box explaining the qualitative appraisal → 15 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 [2,3,4,5,6,7,8].

1.5.2 quality scores for clinical trials

Reference	Research question	Patient population and setting	Intervention	Comparison	Outcome	Design	Sample size	Statistics	generalisability	Counfounders addressed	Randomization	Blinding	Clustering effect	Nr. datapoints	Total score
AL-RASHED 2002	+1	+1	+1	+1	+1	+1	-1	-1	0	-1	1	-1	-1	0	2
BOLAS 2004	+1	+1	+1	+1	+1	+1	-1	-1	+1	-1	+1	-1	0	0	4
CABEZAS 2006	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	-1	0	0	10
CROTTY 2004	+1	+1	+1	+1	+1	+1	-1	+1	+1	0	+1	+1	0	0	9
DUDAS 2001	+1	-1	+1	+1	+1	+1	-1	-1	0	0	0	-1	0	0	1
DUGGAN 1998	+1	+1	+1	+1	+1	-1	-1	-1	0	-1	0	-1	0	0	0
DUNN 1995	+1	+1	+1	+1	+1	+1	+1	-1	+1	-1	0	-1	0	0	5
GUTSCHI 1998	+1	+1	+1	+1	+1	+1	-1	-1	-1	-1	0	-1	0	0	1
HAYES 1998	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	0	0	12
HUGTENBURG 2009	+1	+1	+1	+1	+1	-1	-1	+1	+1	-1	-1	0	0	0	3
JACK 2009	+1	+1	+1	+1	+1	+1	-1	+1	0	0	+1	+1	0	0	8
KUNZ 2007	+1	-1	+1	+1	+1	+1	-1	-1	+1	+1	+1	-1	+1	0	5
KWAM 2007	+1	+1	+1	+1	+1	+1	+1	+1	0	+1	+1	-1	0	0	9
LALONDE 2008	+1	+1	+1	+1	+1	+1	+1	+1	+1	0	+1	-1	0	0	9
LOWE 1995	+1	+1	+1	+1	+1	+1	-1	+1	+1	-1	+1	-1	-1	0	5
MANNING 2007	+1	+1	+1	+1	+1	+1	-1	+1	0	-1	+1	+1	0	0	7
NAZARETH 2001	+1	+1	+1	+1	+1	+1	-1	+1	+1	-1	+1	+1	0	0	8
NESTER 2002	+1	+1	+1	+1	+1	+1	-1	+1	0	0	+1	-1	0	0	6
PERELES 1996	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	0	-1	0	0	9
SCHNIPPER 2006	+1	+1	+1	+1	+1	+1	-1	+1	+1	0	+1	+1	0	0	9
SCHNIPPER 2009	+1	+1	+1	+1	+1	+1	-1	+1	00	+1	+1	+1	+1	0	10
SHAW 2000	+1	+1	+1	+1	+1	+1	-1	+1	0	-1	+1	-1	0	0	5
SMITH 1997	+1	+1	+1	+1	+1	-1	-1	-1	-1	-1	0	+1	0	0	1
SMITH 1996	+1	+1	+1	+1	+1	+1	-1	+1	-1	-1	+1	-1	-1	0	3
STOWASSER 2002	+1	+1	+1	+1	+1	+1	-1	+1	+1	-1	+1	0	0	0	7
VANDERKAM 2001	+1	-1	+1	+1	+1	+1	-1	-1	-1	-1	0	-1	-1	0	0
VOIROL 2004	+1	+1	+1	+1	+1	+1	-1	+1	0	+1	+1	+1	0	0	9
VUONG 2008	+1	+1	+1	+1	+1	+1	-1	+1	0	0	+1	-1	0	0	6

2 APPENDIX CHAPTER 4: SYSTEMATIC REVIEW ON COST-EFFECTIVENESS

2.1 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 other relevant studies. Additionally, the results of the literature review of the Belgian situation (see chapter 6) and the literature review of the effectiveness of approaches to improve seamless care focusing on medication (see chapter 3) were searched for relevant economic evaluations.

Search terms included the following MeSH terms: 'economics, medical', 'economics, pharmaceutical', 'costs and cost analysis', 'cost-benefit analysis', 'health care costs', 'hospital costs', 'drug costs' in combination with terms describing seamless care focusing on medication (see chapter 3). A list of search terms for each database is provided below.

Articles could be published in English, Dutch or French. The review was limited to studies published between January 1995 and July 2009. Earlier articles were considered of limited relevance because changes in the organisation and financing of health care systems over time are likely to influence cost-effectiveness estimates.

Search strategy and results for Medline (OVID)

Date	16/07/2009		
Database	Medline (OVID)		
Date covered	January 1995 to July 2009		
Search Strategy	**#**	**Search History**	**Results**
	1	Pharmaceutical Services/	3177
	2	Community Pharmacy Services/	1747
	3	Medication Therapy Management/ or Pharmacy Service, Hospital/	8744
	4	Prescriptions/ or Drug Prescriptions/	19492
	5	Medication Errors/ or Drug Therapy, Computer-Assisted/ or Electronic Prescribing/ or Computer Communication Networks/ or Medical Records Systems, Computerized/ or Clinical Pharmacy Information Systems/	33709
	6	Medication Systems/	586
	7	medication reconciliation.mp.	124
	8	6 or 4 or 1 or 3 or 7 or 2 or 5	63584
	9	Pharmaceutical Preparations/	37188
	10	Drug Therapy/	28151
	11	Drug Therapy, Combination/	113209
	12	11 or 10 or 9	176218
	13	8 or 12	235097
	14	Patient Readmission/	5067
	15	Patient Admission/	14532
	16	Patient Discharge/	13866
	17	Patient Transfer/	4143
	18	"Continuity of Patient Care"/	10328
	19	"Delivery of Health Care, Integrated"/	5776
	20	Interprofessional Relations/	36116
	21	seamless.mp.	953
	22	transmural care.mp.	20
	23	21 or 7 or 17 or 20 or 15 or 14 or 22 or 18 or 16 or 19	85226

	24	8 and 23	2658
	25	23 and 13	3259
	40	Economics, Medical/ or Economics, Pharmaceutical/	9113
	41	"Costs and Cost Analysis"/	37490
	42	Cost-Benefit Analysis/	46149
	43	Health Care Costs/	18253
	44	Hospital Costs/	5890
	45	Drug Costs/	9245
	46	42 or 40 or 45 or 43 or 44 or 41	113336
	47	25 and 46	149
	48	*limit 47 to (humans and yr="1995 -Current" and (dutch or english or flemish or french))*	*82*
Citations	82 references found		

Search strategy and results for EMBASE

Date	29/07/2009		
Database	EMBASE		
Date covered	No restrictions		
Search Strategy	**#**	**Search History**	**Results**
	3	'health economics'/exp AND [embase]/lim	241,451
	4	'pharmacoeconomics'/exp AND [embase]/lim	57,904
	6	'cost'/exp AND [embase]/lim	132,672
	7	'cost benefit analysis'/exp AND [embase]/lim	31,590
	8	'health care cost'/exp AND [embase]/lim	109,880
	9	'hospital cost'/exp AND [embase]/lim	10,525
	10	'drug cost'/exp AND [embase]/lim	36,619
	11	#3 OR #4 OR #6 OR #7 OR #8 OR #9 OR #10	261,744
	74	'pharmacy'/exp/mj AND [embase]/lim	13,359
	75	'medication therapy management'/exp/mj AND [embase]/lim	30
	76	'hospital pharmacy'/exp/mj AND [embase]/lim	2,817
	77	'prescription'/exp/mj AND [embase]/lim	12,935
	79	'medication error'/exp/mj AND [embase]/lim	1,243
	80	'electronic prescribing'	249
	81	'computer assisted drug therapy'/exp/mj AND [embase]/lim	66
	82	'computer network'/exp/mj AND [embase]/lim	790
	83	'medical information system'/exp/mj AND [embase]/lim	2,869
	85	'clinical pharmacy'/exp/mj AND [embase]/lim	1,537
	86	#83 AND #85	1
	87	'electronic medical record'/exp/mj AND [embase]/lim	1,359
	88	'medication systems'	42
	89	'medication reconciliation'	178
	91	'drug therapy'/exp/mj AND [embase]/lim	444,022
	92	'drug'/exp/mj AND [embase]/lim	58,276
	93	'drug combination'/exp/mj AND [embase]/lim	21,030
	94	'hospital admission'/exp/mj AND [embase]/lim	4,085
	95	'hospital discharge'/exp/mj AND [embase]/lim	1,931
	96	'hospital readmission'/exp/mj AND [embase]/lim	162
	97	'patient transfer'	400
	98	'patient transport'/exp/mj AND [embase]/lim	1,901
	99	'integrated health care system'/exp/mj AND [embase]/lim	140
	100	'continuity of patient care'	154
	101	'continuity of care'	2,977
	102	'interprofessional relations'	53
	103	'public relations'/exp/mj AND [embase]/lim	435
	104	seamless	1,173

	105	'transmural care'	39
	106	#74 OR #75 OR #76 OR #77 OR #79 OR #80 OR #81 OR # 82 OR #86 OR #87 OR #88 OR #89 OR #91 OR #92 OR #93	523,511
	107	#89 OR #94 OR #95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102 OR #103 OR #104 OR #105	13,247
	108	#106 AND #107	487
	119	*#11 AND #108 AND ([dutch]/lim OR [english]/lim OR [french]/lim) AND [humans]/lim AND [1995-2009]/py*	*37*
Citations	37 references found		

Search strategy and results for CRD: DARE

Date	29/07/2009
Database	CRD DARE
Date covered	January 1995 to July 2009
Search Strategy	transmural cost continuity patient care cost integrated health care cost
Citations	28 references found

Search strategy and results for CRD: NHS EED

Date	29/07/2009
Database	CRD NHS EED
Date covered	January 1995 to July 2009
Search Strategy	transmural cost continuity patient care cost integrated health care cost
Citations	163 references found

Search strategy and results for CRD: HTA

Date	29/07/2009
Database	CRD HTA
Date covered	January 1995 to July 2009
Search Strategy	transmural cost continuity patient care cost integrated health care cost
Citations	16 references found

Search strategy and results for CDSR

Date	29/07/2009		
Database	CDSR		
Date covered	No restrictions		
Search Strategy	**#**	**Search History**	**Results**
	1	Seamless care	7
	2	Integrated health care	7
	3	Continuity care	8
Citations	22 references found		

Search strategy and results for Econlit (OVID)

Date	29/07/2009		
Database	Econlit (OVID)		
Date covered	January 1995 to July 2009		
Search Strategy	**#**	**Search History**	**Results**
	1	Seamless care cost	4
	2	Integrated health care cost	54
	3	Continuity care cost	7
Citations	65 references found		

2.1.1 Selecting studies

Evidence about the cost-effectiveness of approaches to improve seamless care focusing on medication was derived from economic evaluations. An economic evaluation was defined as a study contrasting an intervention with a comparator in terms of both costs and consequences [9]. The intervention was an approach to improve seamless care focusing on medication. The comparator was usual care.

Articles were included if they focused on the transition between ambulatory care (including nursing homes) and hospital care and enrolled patients admitted to and/or discharged from hospital. The main inclusion criteria are presented in the table below.

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 evaluation: economic evaluation based on a randomised controlled trial, cohort study, case-control study or before-and-after analysis. Model-based economic evaluation: economic evaluation applying a decision-analytic technique (e.g. decision tree, Markov model)

2.1.2 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 consequences [9].

2.1.3 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 were summarized by focusing on the study country, type of economic evaluation (i.e. cost-effectiveness analysis, cost-minimisation analysis, cost-utility analysis, cost-benefit analysis), sample, intervention, comparator, cost and consequence results. Due to the heterogeneity of the primary studies, a descriptive synthesis of the extracted data was made. The characteristics and the results of the included studies were summarized via tabulation.

2.2 RESULTS

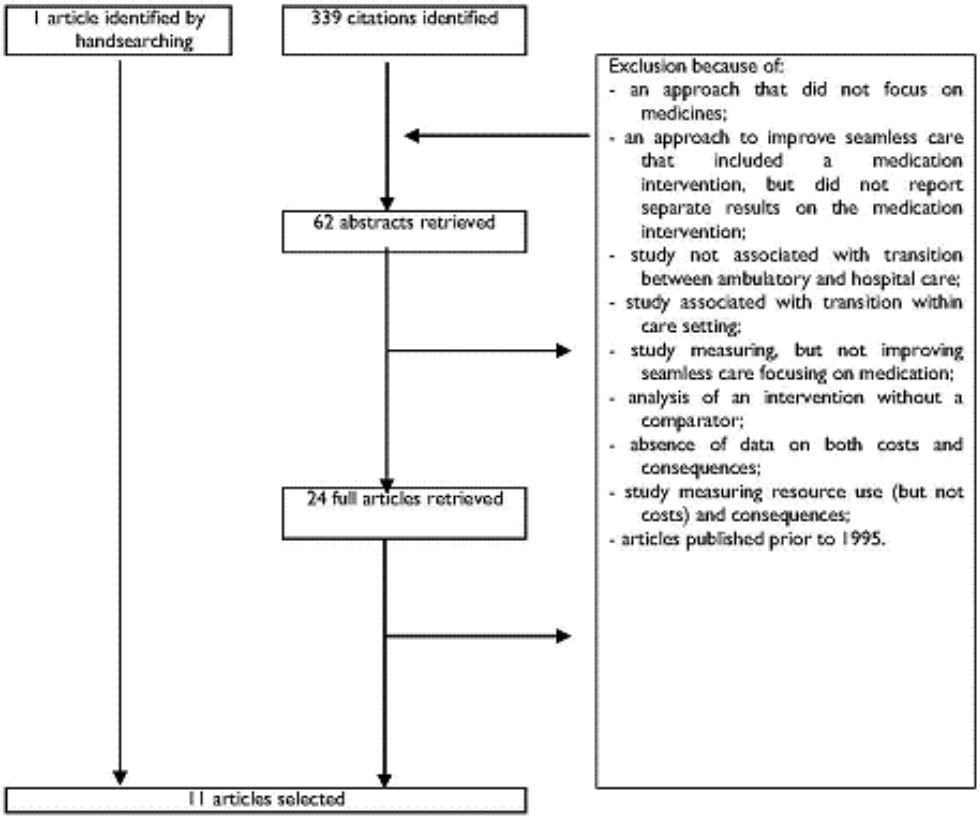
2.2.1 Search results

A total of 413 papers were identified: 82 with Medline, 37 with EMBASE, 207 with Centre for Reviews and Dissemination databases (28 with Database of Abstracts of Reviews of Effects, 163 with NHS Economic Evaluation Database, 16 with Health Technology Assessments Database, 22 with the Cochrane Database of Systematic Reviews, 65 with EconLit). The search strategy and results for each database are in Appendix 2. After removing 74 duplicates, 339 articles were left.

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**

Flow chart of literature search for economic studies



3 APPENDIX CHAPTER 5: GREY LITERATURE

3.1 WEBSITES AND EXPERTS CONSULTED

3.1.1 Australia

- Websites: Australian Commission on Safety and Quality in Healthcare (http://www.safetyandquality.gov.au), Commonwealth Department of Health and Ageing (http://www.health.gov.au), Australian Pharmacy Council (http://www.apec.asn.au/), Australian Pharmaceutical Advisory Council (http://agencysearch.australia.gov.au/search/), The Pharmacy Guild of Australia (http://www.guild.org.au/), Pharmaceutical Society of Australia (www.psa.org.au), eHealth (http://www.health.gov.au/internet/main/publishing.nsf/Content/eHealth), and http://www.nehta.gov.au/).
- Experts: Dr. Simon Bell, Research Director, Kuopio Research Centre of Geriatric Care and Clinical Pharmacology & Geriatric Pharmacotherapy Unit, School of Pharmacy, University of Eastern Finland, Kuopio, Finland; Dr. Timothy Chen, Senior Lecturer, Faculty of Pharmacy, University of Sydney, Australia; Ms. Glena Ellitt, Faculty of Pharmacy, University of Sydney, Australia; Dr. Rebekah Moles, pharmacy lecturer, Faculty of Pharmacy, University of Sydney, Australia

3.1.2 Canada

- Websites: Canadian Patient Safety Institute (http://www.patientsafetyinstitute.ca), Safer Health Care Now (http://www.saferhealthcarenow.ca/fr/Pages/default.aspx), Canadian Council on health services accredication (http://www.accreditation.ca), Quality Healthcare Network (http://www.qhn.ca), Canadian Pharmacist Association (http://www.pharmacists.ca/), Ordre des Pharmaciens du Québec (http://www.opq.org/), Canadian Institute for Health information (http://secure.cihi.ca), Canada Health Infoway (http://www.infoway-inforoute.ca).
- Experts: Dr Margaret Colquhoun, project leader ISMP Canada; Pr Louise Mallet, clinical pharmacist at the University of Montreal.

3.1.3 Denmark

- Websites: The European Observatory on health systems and Policies – Denmark 2007 (http://www.euro.who.int/observatory/Hits/TopPage), The Danish Medicine Agency (www.dkma.dk), The Danish Medicine Agency - Medicine Profile (www.laegemiddelstyrelsen.dk), The Danish Pharmaceutical Association (www.apotekerforeningen.dk), Ministry of Health and Prevention (http://www.sum.dk/English.aspx), Sundhedsstyrelsen - Danish National Board of Health (http://www.sst.dk/English.aspx), Medcom (http://www.medcom.dk/wm109991), Sundhed – The Danish eHealth Portal (https://www.sundhed.dk/profil.aspx?id=11062.105), Digital Sundhed – Connected Digital Health in Denmark (http://www.sdsd.dk/).
- Experts: Tina Eriksson PhD GP, President of European Association for Quality in General Practice (EQuiP) Consultant of DAK-E, Danish Quality Unit of GP; Henrik Schroll, Senior researcher, PhD, head of the National Quality Unit – IT department University of Southern Denmark

3.1.4 France

- **Websites** : Haute Autorité de Santé (http://www.has-sante.fr), Agence Française de Sécurité Sanitaire des Produits de Santé (http://www.afssaps.fr/), Ordre National des Pharmaciens (http://www.ordre.pharmacien.fr/), Société Française de Pharmacie Clinique (http://adiph.org/sfpc/).
- Experts : Benoît Allenet, Université Joseph Fourier et CHU de Grenoble

3.1.5 The Netherlands

- **Websites**: KNMP (http://www.knmp.nl); www.medicatieoverdracht.nl
- **Experts**: J.F. Schüsler, KNMP; Nicolette van Horssen, KNMP

3.1.6 UK

- Websites: National Health Service (NHS; http://www.nhs.uk), National Institute for Clinical Excellence (NICE; http://www.nice.org.uk), Scottish Intercollegiate Guideline Network (SIGN; http://www.sign.ac.uk), The Royal Pharmaceutical Society of Great Britain (http://www.rpsgb.org.uk/)
- **Experts:** Saskia Vercaeren, Specialist Pharmacist Cardiac Services, Barts and the London NHS Trust

3.1.7 US

- **Websites**: Joint Commission on the Accreditation of Healthcare Organizations (http://www.jointcommission.org), Institute for Healthcare Improvement (http://www.ihi.org/), Agency for healthcare research and quality in US (http://www.ahrq.gov/), United States Department of Veteran Affairs (www1.va.gov/health/), NHS connecting for health – newsroom – "world view" reports (www.connectingforhealth.nhs.uk/newsroom/worldview/protti4), Geisinger Health System (www.geisinger.org)
- **Experts**: Maureen Layden, MD, MPH, Veterans Health Administration, Director, VA Medication Reconciliation Initiative, VA Central Office: Pharmacy Benefits Management

3.2 DESCRIPTION OF THE HEALTH CARE SYSTEMS OF THE COUNTRIES SELECTED

3.2.1 Australia

Australia has a complex health system, with both public and private funders and providers. With 2.6 acute beds per 1000 population, Australia is below the European Union average, reflecting shorter stays and quicker throughput of patients, more same-day procedures, and more health care provided in the community. There is a blurring of boundaries between hospital and community, and there are now programmes such as « hospital in the home » and other early hospital discharge strategies (eg having a discharge nurse).

Given the division of powers within the federal form of government and the many stakeholders, the ability of any one actor to plan or regulate is limited. The main changes over the last decade, relative to seamless care, are: national government funding for coordinated care programs, more e-health initiatives and greater attention to the quality and safety of patient care.

3.2.2 Canada

Canada has a predominantly publicly financed health system with services provided through private (for-profit and not-for-profit) and public (arm's-length or state-run) bodies. Canada's publicly funded health care system is an interlocking set of ten provincial and three territorial health insurance plans. Provincial and territorial governments are responsible for the management, the organisation and the delivery of health services for their residents.

Accreditation Canada requires all Canadian hospitals to do medication reconciliation (*Required Organisational Practices*).

3.2.3 Denmark

The Danish healthcare sector has a taxed-based system and has 3 political and administrative levels: the state, the regions and the municipalities.

The Danish health system can be described as a tripartite health care delivery system consisting of hospitals, primarily managed and financed by the regions (except private hospitals), private (self-employed) practitioners (GPs, specialists, pharmacists, …) who are financed by the regions trough capitation and fee-for-service payment, and municipal health services (nursing homes, …), that are mainly managed and financed by municipalities. Primary health care is provided by private practitioners and municipal health services.

At the end of the nineties, a National Strategy Group has been established for the development of an IT strategy in health that probably marked an important step relative to seamless care. The major priority is to provide a common framework for the full computerization of the Danish health care sector to share data among systems that are already in use through integrated information systems and electronic health records and using common standards.

3.2.4 The Netherlands

Medical care in the Netherlands is largely funded by a system of public and private insurance schemes. In the Netherlands, three parallel compartments of insurance coexist, which is different from other European health care systems: the first compartment is a national health insurance scheme for exceptional medical expenses; the second compartment consists of different regulatory regimes – one for compulsory health insurance through sickness funds for those under a certain income, and another for private health insurance, mostly voluntary; and the third compartment is voluntary supplementary health insurance. These different compartments and the systems that constitute them are steered and supervised by different ministries and have (at least) partly different relationships to the insured on the one side and the providers on the other side.

Public health services, primary care and secondary care are separate modalities. Secondary and tertiary care in hospitals is largely provided in private not-for-profit institutions.

Transmural care – care given "across the walls" of the existing system – was introduced in the early 1990s and has been growing rapidly since then. Despite certain successes in improving quality and efficiency in care delivery, incorporation of the concept of transmural care as a new modality in the Dutch health care structure has faced some difficulties. The problems concern cooperation, capacity management, and financing. Here, the inflexibility of the financial structure of the Dutch health care system is considered to be a major implementation barrier.

3.2.5 United Kingdom

The UK has a tax-based health care system managed by the National Health Service (NHS) (http://www.euro.who.int/document/e68283.pdf, 1999). With the exception of charges for some prescriptions and optical and dental services, the NHS remains free at the point of use for anyone who is resident in the UK. The UK is made up of four constituent countries: England, Wales, Scotland and Northern Ireland and each of them have their NHS managed separately. We will focus on England in this report.

The National Health Service (NHS) is divided in two sections: the primary and the secondary care. Primary care is the first point of contact for most people and is delivered by a wide range of independent contractors, including GPs, dentists, pharmacists and optometrists. All of these services are managed for patients by a local primary care trust (PCT). PCTs work with local authorities and other agencies that provide health and social care to make sure that the local community's needs are being met. PCTs control 80% of the NHS budget. Secondary care is known as acute healthcare and can be either elective care or emergency care. Hospitals are managed by acute trusts. Acute trusts make sure that hospitals provide high-quality healthcare and that they spend their money efficiently. They also decide how a hospital will develop, so that services improve (http://www.nhs.uk/NHSEngland/thenhs/about/Pages/nhsstructure.aspx , 27/12/09)

In the NHS, guidance on ways of promoting good health (public health guidance) and treating ill health (technology appraisal, interventional procedures, clinical guidelines) are published by the National Institute of Clinical Excellence (NICE). The current Care Quality Commission (CQC) (previously called Commission for Health Improvement) ensures that good quality services are provided based on independent inspection (HIT, 1999).

3.2.6 United States: Veteran Healthcare System

The Veteran Healthcare System (VHS) is one of the publicly-funded (tax-based) healthcare systems in the United States. VHS provides healthcare services to veterans and their families. In 1995, VH administration (VHA) established 22 regional networks (now 21) and charged each one with conducting daily operations and decisions affecting hospitals, clinics, nursing homes and Vet centres located within their regions. These regional networks (called Veterans Integrated Service Networks, or VISNs) remain the VA fundamental units for managing funding and ensuring accountability. Since 1995, VHS has moved from an inpatient model of care, characterized by a limited number of specialized facilities that often were far from a veteran's home, to an outpatient model in which more than 1,400 sites provide care in communities throughout the United States. The main strategy developed by VHA to improve seamless care is the implementation of the Veterans Health Information Systems and Technology Architecture (VistA). It is a single, integrated system for health care providers serving all VA hospitals, nursing homes, outpatient clinics and Vet centers. Another focus is to support patients' ability to successfully age and manage disease in their own homes.

The Geisinger health system is an integrated provider network located in 31 counties in Pennsylvania with 52 clinic sites, 2 hospitals and 600 employed physicians. This not-for-profit system was founded in 1915 (Hassol 2004 JAMIA).

3.3 DETAILED DESCRIPTION OF SEAMLESS CARE INITIATIVES OF INTEREST

3.3.1 Australia

Title of initiative	**The National Inpatient Medication Chart (NIMC)**
Country	**Australia**
Period	Development between 2003 and 2006; implementation from then
Aims	To use the same medication chart wherever a doctor or nurse works, and wherever a patient is in hospital. Expected benefits: • standardisation of best practice throughout the medication management pathway • improved mutual understanding of respective roles in prescribing, administration and supply • standardised, integrated education at post graduate and undergraduate level • no need for major retraining as staff move between healthcare services • improved documentation and therefore improved patient safety
Initiator(s)	Australian Health Ministers; Australian Council for Safety and Quality in Healthcare
Environment	Hospitals
Professionals involved	NIMC was worked out by a NIMC Oversight Committee, jurisdictional representatives and state based as well as local working parties
Description of the development process	The development of the NIMC took different steps, of which the first ones were taken in Queensland, the lead state: 1) audits of >15,000 prescriptions; 2) observations of > 2000 administrations; 3) review of > 2500 medication incidents; 4) review of literature; 5) focus groups with all levels of staff; 6) three revisions of the chart; 7)statewide baseline audit >12,000 orders The National Multidisciplinary working group learnt from existing work, developed an implementation plan, piloted the NIMC and amended it following feedback
Evidence of intake in practice (data from October 2007)	• Victoria : implemented in over 100 hospitals ; • New South Wales: implemented in 192 out of 216 facilities ; • Northern Territory: implemented across all 5 hospitals ; • Queensland: implemented in 98% of all acute health facilities ; • South Australia : ?; • Tasmania : rolled out in 3 major hospitals ; • Western Australia : implemented in all public hospitals
Impact	The pilot program showed that: • documentation of adverse drug reaction details improved from 21 to 50%; • re-prescribing of drugs to which a patient was allergic decreased from 9 to 6%; • drug dose unclear or wrong decreased from 7.4 to 3.9%; • drug frequency unclear or wrong decreased from 7.2 to 4.8%; • 'prn' prescription with the indication stated improved from 13 to 26%; • 'prn' prescription with a maximum dose stated increased from 24 to 36%; • prescriber identifiable improved from 41 to 79%. Implementation in different states showed: • increased awareness of medication safety issues • a higher level of consistency around education and training of staff re prescribing and administration; some undergrad courses now include this in their curriculum • that NIMC provides a standardised baseline for electronic medication management • that NIMC created an opportunity to drive home med safety within one's hospital • that pharmacists are organised and can get things done
Advantages and critical	Critical success factors: • structured standardised change management

success factors	• standardised (further) education • comprehensive communication strategies • planned evaluation • transparent version control process • unified approach to ancillary chart development required
Disadvantages, difficulties and factors contributing to failure	• Clinician resistance and scepticism
Follow-up	Development of ancillary forms Implementation of a paperless system
Funding and cost	?
References	The national inpatient medication chart (NIMC) : has it worked ? What are the issues ? Found at : http://www.safetyandquality.gov.au/internet/safety/publishing.nsf/content/NIMC_001 Helen Leach, senior advisor, QUM Program,Victoria The National Inpatient Medication Chart Implementation. H. Leach. Journal of Pharmacy Practice and Research Volume 36, No. 1, 2006

3.3.2 Canada

Title of initiative	**Safer Health Care Now! Campaign. Section: medication reconciliation (MedRec)**
Country	**Canada**
Period	Initiated since April 2005
Aims	The SHN! Campaign focuses on sharing Canadian experiences to facilitate implementation and learning to increase the use of MedRec across Canada with the goal of reducing potential adverse outcomes of patient care related to medication therapy. The aim is to eliminate undocumented intentional discrepancies and unintentional discrepancies by reconciling all medications, at all interfaces of care.
Initiator(s)	Institute for Safe Medication Practices (ISMP) Canada (independent national not-for-profit agency committed to the advancement of medication safety in all healthcare settings), and Canadian Patient Safety Institute (CPSI)
Environment	Facilities targeted: registered Canadian healthcare facilities (acute, long term and home care settings), on a voluntary basis Target population of patients: any, but the Getting Started Kit specifies that there should be criteria for those patients who should benefit first from MedRec (several examples are provided) – those criteria are agreed upon at local levels
Professionals involved	Multidisciplinary teams. The composition is decided upon at local levels. Commonly involve doctors (including interns and residents), nurses, pharmacists and pharmacy technicians.
Description of the intervention	• MedRec on admission to hospital: different models exist: proactive reconciliation, retroactive reconciliation, or hybrid model • MedRec upon discharge A Getting Started Kit (GSK) provides support to start the process on small numbers of patients, makes changes, and gradually develop, implement and evaluate MedRec more broadly using quality improvement processes. The updated kit (May 2007) includes medication reconciliation at admission, internal transfer and discharge from a healthcare facility. For each of them, the GSK provides a conceptual framework for doing it, the process to do it, as well as sample tools (examples from hospitals or centers). The GSK also highlights the importance to identify criteria for those patients who should benefit first from MedRec.
Evidence of intake in practice	The number of teams enrolled in the SHN! MedRec in Acute Care intervention includes 339 acute care teams (march 2009). National MedRec teams reporting

	data to the Central Measurement Team has increased from 39% in May 2006 to 77% in May 2008 and 86% (291/339) in May 2009. In march 2009, 71 long term care teams, and 15 home care pilot teams were also reporting data. Teams implementing MedRec at discharge is currently low due to teams wanting to have the MedRec process working well at admission and spread to all areas of their facility before starting on the next phase
Impact	The SHN framework measures improvement by focusing on a consistent set of core measures. All participants are encouraged to report the three core medication reconciliation measures (undocumented intentional discrepancies, unintentional discrepancies, and percent of patients reconciled at discharge) to the Central Measurement Team of SHN monthly. 10-20 charts should be reviewed and data collected each month. Undocumented intentional discrepancies have decreased from 1.1 per patient to 0.34 per patient by the end of the phase I of the campaign. Unintentional discrepancies have decreased from 1.2 per patient to 0.42 per patient by the end of phase I of the campaign.
Advantages and critical success factors	• Accreditation Canada requires all Canadian hospitals to do medication reconciliation. • Creating and maintaining partnerships with Canadian organisations (CPSI, Accreditation Canada, WHO,…) • National intervention leadership for medication reconciliation supporting nodes and connecting and sharing the work of teams builds national capacity for the intervention. • Implementation of teleconference national calls, workshops and conferences to educate teams; face-to-face meetings between the MedRec National Faculty and members help to re-engage and reconnect members; SHN mentorship program (links successful teams to teams that require assistance with their programs). • Existence and success of "Communities of Practice" (CoP): web-based communities for healthcare professionals involved in implementing the SHN interventions -- accessible anytime, from any computer with an Internet connection. The sites include online discussion, file sharing, events calendars and more
Disadvantages, difficulties and factors contributing to failure	• Medication reconciliation is complex, requires time, leadership and commitment. • Lack of resources (how to train enough people).
Follow-up	09/2009: many teams have moved toward sustaining admission MedRec and are now earnestly focused on transfer and discharge The Campaign initially focused in acute care, and is now being extended to MedRec in ambulatory care, homecare, long-term care.
Funding and cost	At national level: full costs not available. ISMP Canada, summary of costs for CPSI Grant for the six month period ending March 21, 2009: 96,000 (covers personnel, translation, travel, supplies/communication) Local levels: costs of hiring leaders, … taken over by each individual institution
References	• Safer Healthcare Now! Getting Started Kit: Medication Reconciliation prevention of adverse drug events: how to guide. May 2007 (72 pages) • Safer Healthcare Now! ISMP Canada Annual Report. Medication reconciliation intervention. April 2007 to March 2008 • Safer Healthcare Now! ISMP Canada Semi-Annual Report. Medication reconciliation intervention. October 2008 to March 2009 • Bayoumi I, Howard M, Holbrook AM, Schabort I. Interventions to improve medication reconciliation in primary care. Ann Pharmacother. 2009;43:1667-75. • Ong SW, Fernandes OA, Cesta A, Bajcar JM. Drug_related problems on hospital admission: relationship to medication information transfer. Ann Pharmacother. 2006 Mar;40:408-13

Title of initiative	**Linking MedsCheck to MedRec**
Country	**Canada (Province: Ontario)**
Period	Pilot phase: February 2008 – March 2009
Aims	To link the community-based MedsCheck program with medication reconciliation programs in hospitals, in order to obtain the best possible medication history (BPMH) for patients preparing to be admitted to hospital for surgery.
Initiator(s)	ISMP Canada (with the support of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the Ontario Pharmacy Council
Environment	Ten Ontario Hospitals
Professionals involved	• Ambulatory setting: community pharmacists • Acute care setting: surgeons, receptionists, support staff, nurses and pharmacists in the pre-admission clinics
Description of the intervention	• Eligible elective surgical patients were asked to bring a *MedsCheck* to their pre-admission clinical appointments. This MedsCheck was used to obtain the BPMH. • 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.
Evidence of intake in practice	6/10 hospitals reported data that were requested for the pilot project.
Impact	Baseline data (n=140 surgical patients): average time to complete a BPMH: 12 minutes per patient. No patients brought a MedsCheck to the BPMH interview 12-month data (n=113 MedsCheck from 6 hospital sites): 12 minutes per patient to complete the BPMH. 180 discrepancies between the MedsCheck and the BPMH taken by the pre-admission clinical staff (approximately 1.6 discrepancies per MedsCheck).
Advantages and critical success factors	• ISMP Canada coordinated monthly teleconference calls to discuss progress and share ideas, developed communication tools, assisted hospitals with implementation of internal change processes, communicated with community pharmacies,…
Disadvantages and factors contributing to failure	• The MedsCheck quality was not consistent and at a professional standard → teaching community pharmacists a systematic process for completing MedsCheck at the highest possible level is an important next step to moving this initiative forward • Difficulties: coordination of resources and time to implement
Follow-up	Perspective: expanding the initiative province-wide
Funding and cost	• Ontario Ministry of Health care Long-Term Care – cost unknown
References	• Institute for Safe Medication Practices Canada. Linking MedsCheck to MedRec. ISMP Canada Progress Report to the Ontario Ministry of Health and Long-Term Care and the Ontario Pharmacy Council. June 2009. • The MedsCheck Program Guidebook. http://www.medscheck.ca (accessed 2010, January 17) • Kwan Y, Fernandes OA, Nagge JJ, et al. Pharmacist Medication Assessments in a Surgical Preadmission Clinic. Arch Intern Med 2007; 167: 1034-40. SPPACE study

Title of initiative	**Canada Health Infoway (Infoway)**
Country	**Canada (all Provinces)**
Period	2001 to present
Aims	To accelerate the use of electronic health records[a] (EHRs) in Canada. Ten investment programs are defined. Specific aim relative to Infoway's Drug Information Systems (DIS) investment program: to support jurisdictional projects that will result in interoperable systems that enable authorized health care providers to access, manage, share and safeguard patients' medication histories
Initiator(s)	Canada Health Infoway (independent, not-for-profit organization funded by the federal government) Collaborates with the provinces and territories, health care providers and technology solution providers
Environment	Health care environment – all settings of care involved
Professionals involved	All
Description of the intervention	Infoway has approved funding for 291 projects across Canada as of September 30, 2009. This number includes all projects, including those in the comprehensive planning stage of development. DIS projects: Authorized health care providers have access to a patient's secure and complete medication profile, as well as decision support tools to assist in achieving significant improvements in patient safety
Evidence of intake in practice	• Progress for DIS programs (March 31, 2009): 95-100% complete in 5 provinces; partially complete in 3 provinces; planning underway in 4 provinces; forecast in one province. • DIS projects: planning is complete for 18 projects All Provinces have electronic medication databases; 7/10 provinces have communication between the community pharmacy and institutional sector
Impact	Expected: Patients will suffer fewer adverse drug events, and reduced mortality. Health system costs will be lowered thanks to fewer physician visits, hospitalizations and long-term care placements related to drug complications
Advantages and critical success factors	• Not reported
Disadvantages and factors contributing to failure	• Not reported
Follow-up	Selected priorities for 2009-2010: • measure results and benefits for selected early completed projects
Funding and cost	• $1.6 billion had been allocated by the federal government to the end of 2008, including 241 million for DIS programs • The Federal Budget 2009 provides Infoway with $500 million to support the goal of ensuring 50 per cent of Canadians have an EHR by the end of 2010
References	• Canada Health Infoway. Annual report 2008/2009. Building a healthy legacy together. • IBM Drug Information System (DIS) Overview. IBM Canada Health Care Team.

[a] An electronic health record is defined as the availability of client demographic, provider demographic, public facility diagnostic images, laboratory test results, dispensed pharmaceuticals, as well as clinical reports or immunization data.

3.3.3 Denmark

Title of initiative	**Electronic Medicine Profile (EMP)**
Country	**Denmark**
Period	From 2004 until now
Aims	To permit to patient, doctors and pharmacist to gain an up-to-date overview of the individual Dane's medication history since the previous two years , an overview that did not exist before. Only prescribed medications are registered.
Initiator(s)	Ministry of Health and Prevention (through the National Strategy for Digitalisation of the Health sector 2008-2012). Medicines Agency is responsible for the development and the storage on a server of the Medicine Profile.
Environment	Every citizen, physicians (general practitioner, specialist doctor, hospital doctor from every wards – emergency and others) and community pharmacies
Professionals involved	Physicians (general practitioner, specialist doctor, hospital doctor from every wards – emergency and others) and community pharmacy
Description of the intervention	The EMP is an electronic overview of the purchase of prescription medications. All purchases are automatically registered and gathered in an individual, personal medical profile for every citizen. Medicine agency is responsible of the secure system which permits to handle electronic prescription from doctor. EMP contains: • A full list of all the citizen's purchased medications prescribed during the last two years. • Information about the patient's general practitioner. • Information about the doctor who prescribed medicines. • Information on which pharmacies medications prescribed are delivered. • Information about the citizen medicine. • Checking whether the prescribed medications interact. • Information on products or classes of drugs that the citizen cannot tolerate. • A log access with which the citizen can see who has viewed information in citizen's medication profile, when and what information has been looked at. Citizen can access the EMP via the National eHealth Portal www.sundhed.dk or via www.medicin-it.dk. A digital signature permits each citizen to sign in his medicine profile. Physicians have access to the EMP without his consent. However, physician must declare electronically that he is treating patient, the information of the medicine profile is necessary for patient's treatment and that the information are used to ensure quality, safety and efficacy of patient's treatment. His access is gained only for physicians using a special certificate. Pharmacist cannot access a EMP without his consent. Once patient has given his consent to a pharmacist, pharmacy staff must declare electronically that the pharmacy have the patient consent, the information in the medicine profile is needed to guide the patient and that the information are used to ensure quality, safety and efficacy of patient's treatment.
Evidence of intake in practice	100% of community pharmacies (prescriptions from all doctors)
Impact	Measured: two studies assessed if the EMP could contribute to the completeness of patient medication information at hospital admission: • Larsen M.D. et al. : an additional check in the EMP after a patient medication history realized by a clinical pharmacist based on a semi-structured interview with patient revealed 12 errors (n=67 patients). Authors concluded that PEM can contribute to improved hospital stay. • Glintborg B. et al.: 500 patients prospectively included at acute medical department admission. In individual patients, the EMP was compared with (i)

	the medication list written in the patient chart and (ii) drug information provided by the patient during a structured drug interview upon admission and during a home visit 4 weeks after discharge. Results: Upon admission, 1958 prescription-only medications (POM) reported by patients and/or hospital file, of which 114 (6%) not registered in EPM. In EPM, 1153 POM registered during the month preceding admission. 309 (27%) of these not reported upon admission by patients. Home visits performed in a subgroup of 115 patients. During home visits, 18% of POM registered in EPM during the preceding month were not reported. Underreporting might be due to recall bias, non-adherence or discontinuation of drugs. Conclusion: Omission errors are frequent despite structured medication interviews. Pharmacy records or medication lists from all treating doctors must be included in medication reviews in order to reduce recall bias.
Advantages and critical success factors	Not reported
Disadvantages and factors contributing to failure	Not reported
Follow-up	100% pharmacies
Funding and cost	Not reported
References	• Danish Medicine Agency. Medicine Profile. 2010 Available from: www.laegemiddelstyrelsen.dk (last update date 11.01.2010) (accessed 2010, 12th January) • The Danish Pharmaceutical Association, Annual report 2003/2004. 2004: København. • Ministry of Health and Prevention, Healthcare in Denmark, Chapter 7: IT in health care, version 1.0, September 2008, available from: http://www.sum.dk/publikationer/healthcare_in_dk_2008/kap07.htm (accessed 2009, 6th December) • Sundhedsstyrelsen (Danish National Board of Health), Bilag til rapporten: kvaliteten i den danske lægevagtsordning. 2009, København. Available from : http://www.sst.dk/publ/Publ2009/SUPL/Laegevagt/Bilagsdel_laegevagtordn_dk.pdf (accessed 2010, 6th December) • Larsen, M.D., et al., [Medication errors on hospital admission]. Ugeskr Laeger, 2006. 168(35): p. 2887-90. • Glintborg, B., H.E. Poulsen, and K.P. Dalhoff, The use of nationwide on-line prescription records improves the drug history in hospitalized patients. Br J Clin Pharmacol, 2008. 65(2): p. 265-9.

Title of initiative	**The common medication card**
Country	**Denmark**
Period	From 01/01/2010 (implementation would ideally be finish at the end of 2011)
Aims	To obtain an accurate and update current patient medication list at hospital admission and after hospital discharge. The objective is then to transfer the medication information between the hospitals 'medication systems, GP systems and personal medication profile (PEM - see form)
Initiator(s)	Included in the National Strategy for Digitalisation of the Health sector 2008-2012 set up by the Ministry of Health and Prevention. The project was called the FAME project. This project has a lot of contributors and participants: • The Digital Health is responsible for ensuring the program implementation

	in collaboration with stakeholders and donors (www.sdsd.dk). • The Danish regions are responsible for the implementation in both primary as the secondary sector. • The Medicines Agency is responsible for operation and maintenance of the central part of the Common Medication Card (www.dkma.dk). • MedCom is responsible for contacts with - and the development of Health care systems in Denmark, which will integrate with the Joint Medical Cards (www.medcom.dk). • A Program Steering Group: The program's steering committee consists of participants from the various parties responsible for funding and the future use of Community Medicine Cards. This committee has to manage the project and take decisions regarding its application.
Environment	• **Hospital :** all public Danish hospitals • **Ward :** all wards • **Target population of patients :** the whole Danish population **Participant population**: patient who subscribe for a login to the eHealth Portal.
Professionals involved	general practitioner, specialist, public hospitals, pharmacy
Description of the intervention	The Common Medication Card (FMK abbreviated in Danish) contains a patient's current medication, thus giving an electronic oversight to the physician, the patient or his carer (via his profile in the National e-Health portal Sundhed.dk). Data are centrally gathered on the server of the Danish Medicines Agency. In practice, when a patient is admitted to the hospital, hospital doctor can download medication information on the patient hospital electronic record and suspends FMK (other healthcare professionals can see that the patient is hospitalized). During hospitalization, medications are only recorded in the hospital medication module. When patient is discharged, the hospital doctor updates the FMK through the hospital electronic system. Information on medications that the patient needs to take after discharge are transferred from the hospital medicine module to the FMK. The medications that the patient doesn't need after discharge are discontinued and doses are updated. The FMK is no longer suspended. The electronic medicine profile server provides an electronic copy of all prescriptions issued within the past 2 years. The FMK server downloads copies of prescriptions from the previous server. These copies can help doctors to create medication prescriptions in FMK though their own system. From a purely technical perspective, the task involves creating an IT infrastructure where different systems communicate with each other. The different systems comprised: GPs, home care service, hospitals and pharmacies. So, they don't need to buy a new program. The up-to-date medication list will be available from the Danish Medicines Agency. The local medication cards will be updated then from a medication profile installed on a central server system. It will also mean that data from the local medication cards will be transferred to the central solution. Medications administered during hospitalisations are not included in FMK.
Evidence of intake in practice	The national implementation will start in 2010
Impact	The common medication card will eliminate a major source of errors and prevent time waste when establishing the current patient medication list from several health systems. Indeed, the patient received his treatment without any delays or errors and the entire health care sector will be able to improve the quality in terms of prescribing medication, while also saving resources No information on the actual measured impact were found.
Advantages and critical success factors	Comparison of how the healthcare system is working today and how FMK will make a difference: Before FMK: • Hospital staff has to spend a lot of time to obtain the patient's medical information because information has to be gathered from multiple locations. • Hospital staff has to spend time for entering medical information into their

	own medications module of the hospital electronic system. • Nobody is never quite sure whether he has gathered every information about a patient's medication. • Healthcare professionals may have difficulty obtaining medication information in discharge summaries. • If the patient is unconscious, healthcare professionals have many difficulties to obtain a patient's medication. After FMK : • Hospital staff can get an overview of the patient's medication at one point : FMK. • The hospital staff can simply transfer the relevant information from FMK to their own medications module. • Healthcare professional has a much better basis to build up a picture of the patient's medication • Healthcare professionals can simply refer to FMK to obtain the whole patient medication information. • Hospital staff can get an overview of patient medication FMK if the patient is unconscious.
Disadvantages and factors contributing to failure	• Difficulties to establish a common security solution and expending the IT infrastructure • Speed of access will succeed or fail according to the capacity of the individual doctor's internet connection. • Doctors have to change their procedure when they will change a medication: now, if they change a medication of one of their patient, this will no longer just be a matter between their patient and them. With the FMK system, they have to make sure that their colleagues in the other sectors can depend on the information which they input individually.
Follow-up	The first final objective is that the national medication record would be implemented by the end of 2011.
Funding and cost	Not reported
References	• Medcom, On the treshold of a healthcare IT system for a new era, I.J. Lars Hulbæk, Iben Søgaard and Rikke Viggers, Editor. 2007, MedCom-the Danish Health Data Network. • Medico-Industrien, Medication errors cost lives but solutions are delayed in Medico-Insight News & Opinion - Newsletter 2009. • Digital Sundhed, FMK - Fælles Medicinkort, poster for the Danish Society for Patient Safety Conference in 2009. • Ministry of Health and Prevention, Healthcare in Denmark, Chapter 7: IT in health care, version 1.0, September 2008, available from: http://www.sum.dk/publikationer/healthcare_in_dk_2008/kap07.htm (accessed 2009, 6th December) • Sundhed, D. Fælles Medicinkort - Vision og organisation. 2010; Available from: http://sdsd.dk/Det_goer_vi/Faelles_Medicinkort/Om_faelles_medicinkort.aspx (accessed 2010, 10th January). • Ahrensberg, K.B. *Status of the important developments and future challenges in eHealth in Denmark*. 2009 not indicated; Important developments and future challenges in eHealth in Denmark, available from http://www.sdsd.dk/Det_goer_vi/Status.aspx (accessed 2010, 6th December) • Common medication card, 2008 (video viewing on the 31th January 2010): available from: http://greatdanefilm.dk/web/sdsd/medicinkort_11112008/engelsk/index.html

3.3.4 The Netherlands

Title of initiative	**« Overdracht van medicatiegegevens in de keten » *or* « Transfer of information about medication of patients between different health care professionals ».**
Country	**The Netherlands**
Period	From 2005 to 2011
Aims	**Aims** Development and implementation of guidelines for a safe transfer of information on medication of patients. 1. To create awareness, and stimulate the cooperation of different healthcare professionals. 2. To share knowledge and experiences by collecting good practice examples on transfer of medication information of patients and by communicating on these examples on a national level 3. To guarantee that transfer of information on medications is part of medication safety plans. 4. To create transparency by development of performance-indicators for transfer of information on medication of patients in different healthcare settings 5. Todevelop a feasible stepwise plan by introducing guidelines per moment of transfer
Initiator(s)	Inspection of health care
Environment	**Country-wide**: hospitals, warfarin clinics, nursing homes, consultations, homes for disabled persons **Ward :** elective and unelective admissions, internal and surgery wards, day hospitalization **Target population of patients:** all patients on transition moments **Transition moments:** Admission, discharge, intramural transfers, consultation
Professionals involved	Hospital pharmacists, pharmacy technicians, hospital physicians, nurses (home and hospital), community pharmacists, general practitioners, dentists.
Description of the intervention	1)Taking medication histories using a standardized method on admission. To complete the medication by using available sources such as patient, referral letter, fax of community pharmacist or electronic information on medication from the community pharmacist. Informing general practitioner, community pharmacist, nursing home and patient about discharge medication. 2) Evaluation of patient satisfaction of information about medication at admission. 3) Structural implementation of nationwide electronic patient file and electronic medication file www.infoepd.nl
Evidence of intake in practice	See impact and advantages.
Impact	The impact of drug history taking was measured in different local projects (pre- and post measurements). Overall, drug history taking at admission reduced the risk for errors in the medication profile by 17-96%. One project measured a saving of 605.000 euros a year, meaning 32 euro per patient. One study examined the effect of medication reconciliation with and without patient counselling among patients at the time of hospital discharge on the number and type of interventions necessary to prevent drug-related problems. Significantly more interventions were identified when reconciliation included patient counselling (mean of 5.3 interventions/patient for reconciliation including patient counselling versus 2.7 interventions/patient for reconciliation without patient counselling) (Ann Pharmacother. 2009;43(6):1001-1010)
Advantages and critical success factors	Enthusiasm of all the involved health care professionals was noted. All projects showed a profit on quality and efficiency and more patient satisfaction is mentioned.
Disadvantages and	Health care professionals had to get used to a new procedure. Automatically

factors contributing to failure	converting the list of medication of the community pharmacist to the electronic hospital system is not possible, which is a barrier. Sufficient manpower is necessary. Need for training for health care professionals. IT support (as a computerized physician order entry system, electronic medical and electronic patient file) is necessary. Practical organization and logic support of intake and discharge conversations is sometimes difficult.
Follow-up	In process
Funding and cost	Hospitals themselves, health insurances, government
References	www.medicatieoverdracht.nl Ann Pharmacother. 2009;43(6):1001-1010

3.3.5 United Kingdom

Title of initiative	**The management of medicines in acute and specialist trusts (review)**
Country	**United Kingdom**
Period	From 2002 to 2006 (first audit performed in 2002, second audit performed in 2005-2006)
Aims	To identify initiatives to modernise medication management and audit acute hospitals to assess indicators of performance in their implementation and eventually to list priorities for improvement in the future in acute hospitals. The data below focus on key areas to improve seamless care.
Initiator(s)	The Audit Commission, now replaced by the Care Quality Commission (CQC)
Environment	All acute hospitals in NHS (in 2002: 197 out of 199 NHS acute trusts in England)
Professionals involved	All (assessment managed by hospital pharmacy)
Description of recommendations	The common key areas identified in the review made in 2002 and 2005-2006 as to be improved to build effective relationship between primary and secondary care were: (1) Joint-working arrangement such as the development of joint formularies between primary and secondary care. (2) The patients' own medicine (POM) use: to ask patients to take their all medicines into hospital and to check them on admission to assess their suitability for use during the hospital stay (pharmacist or pharmacy technician) (3) Self-administration of medicines by patient or caregiver during the hospital stay under hospital staff supervision. Bedside lockers should be provided to each patient that are self-administering. (4) Medication review on admission by a pharmacist or another hospital healthcare professional that obtain the current drug summary and identify recent changed to medication and allergies to medicines. (5) Original pack dispensing by hospital pharmacy during hospital stay and/or at hospital discharge. The original pack does include patient information leaflet, product's batch number and expiry date and generally for 28 days of treatment. Additional indicators related to seamless care in medication management assessed in 2005-2006: (6) Informing patients on their medicines prior to discharge (7) Quality of information received by hospital at admission for elective patients (8) Quality of hospital medication record and their sharing with primary care: GPs' information on any changes of medicines and their reasons for the change by hospital. Community pharmacist should be informed of any changes in patients' prescriptions. (9) Accessibility of the hospital in the event of a medication problem: a pharmacy helpline should give support to patient experiencing a medication event. (10) Share of patients where patients or carer self-management agreed: to put in place a self-management plan for patients or carers. (11) Influence of local stakeholders on Drug Therapeutic Committee: Stakeholders (patients, primary care professionals and service commissioners) views should be taken into account in deciding which medicines will be the primary and secondary choices within a trust (trust formulary). (12) Share care utilization: there must be good understanding between primary and secondary care on responsibilities to ensure that medication and monitoring regimes are maintained (triggers for when a patient may need to be referred back to secondary

	care and ongoing patient monitoring requirements). The data for the reviews in regard to these key indicators were obtained trough a core questionnaire completed by pharmacy department, pharmacy clinical services audit, national data sources (department of Health, …), a web-based service users satisfaction survey (non-pharmacy staff), a web-based primary care trust satisfaction survey, a outpatient audit, the national patient survey
Evidence of intake in practice	(1) Not reported (2) 2002: procedure to reuse wherever possible all or selected medicines in the majority of trusts; 2005-2006: 40-50% of patients on a ward used their own medicines, (3) 2002: scheme in place for self-administration for some groups of patients in the majority of trusts; 2005-2006: self-administration offered on only 19,5% of wards (highest level in transplant wards). Availability of bedside lockers in wards varying from 0 to 100%. (4) 2005-2006: medication review within 24 hours of admission by a pharmacist or another hospital healthcare professional for 60% to 100% of patients. (5) 2002: dispensing for discharge schemes implemented only in a minority of trusts – issuing original packs on admission or during the patient's stay in hospital; 2005-2006: the proportion of patients dispensed medicines at discharge (in a pack labelled with patients' details) ranged from 25% in a pediatric ward to 70% and over for general surgical and transplant wards. (6) 2005-2006: 7/10 patients received written information with their medicines on discharge (patient survey). (7) 2005-2006: comprehensive drug history for less than 50% of patients in the majority of trusts (98%). Better situation for planned admissions, but still 88% of trusts with less than 50% of patients with comprehensive drug histories from their GPs. (8) 2005-2006: 16% of primary care trusts (PCT) had GPs usually receiving full discharge information before they see patients, 47% this sometimes occurred, while 36% reported that GPs often had not received discharge information before visiting patients. Quality of information considered less than adequate (medication prescribed and ongoing care, diagnosis and reason for medication and shared care). (9) 2005-2006: Helpline for patients in 64% of trusts, of which 28% available as a source of advice for the community, 9% available for recently discharged patients and local pharmacists, 21% available for patients who they had dispensed medicines to, and 5% available only for recently discharged inpatients. The number of helpline contacts handled in a week ranged from none through to 80 (average =9). (10) 2005-2006: Present in nearly 70% of trusts. (11) 2005-2006: Not reported. (12) 2005-2006: If shared care in place, on average 47.5% (from trust point of view) to 57% (from PCT point of view) of protocols covered monitoring and triggers.
Impact	(1) Measured: Saving of £500.000 (from a total medicines expenditure of £63 million) by agreeing protocols on the use for eight conditions (avoid unnecessary therapeutic switching of medicines at transition). (2) Expected: to have an accurate medication record, limit patient confusion by receiving the same medicine presented and packed in 3 or 4 different ways, and to save money in diminishing ward medication supply by hospital pharmacy during the stay and at discharge. Measured: Results on costs saving of 2 studies (1,2) and 1 case study (3) reported in the report a spoonful of sugar (2002): (1) 77% of POM suitable for re-use on admission and 56% pursued at discharge - annual saving of £46 000. (2) 58% of patients brought some of their medicines into hospital with them, of which 60% suitable for re-use - potential savings of £37 000 a year in one trust. (3) £60 000 saved by POM - 10% of items used in the trust (Mid-Sussex NHS trust). £45,209.29 of savings after the initiation of such a scheme with pharmacy technicians - net saving of £24,212.57 per annum after allowing for staffing for 11 wards in an another hospital (Southampton General Hospital). Moreover, poor quality medicines removed from use (inappropriately stored, expired or discontinued medication) and duplication of therapy avoided. (3) Expected: To improve patients' compliance by empowering patient to take an active role in managing their own care and by alerting healthcare professionals to any problems the patient may experience with medication. Improved patient compliance

	with medication regimes and so treatment failure prevented. The failure of patients and clinicians to reach concordance about medication regimes is a major cause of increased morbidity and cost (due to patient readmission). (4) Expected: To identify incorrect or incomplete medicines or allergies recorded by pharmacists and to identify medication related hospital admission. (5) Expected: To reduce process cost as medicines are dispensed only once, greater convenience for patients, to reduce GP workload after discharge, to reduce overall costs of medicines to the local health economy (hospital prices are usually lower than those available to GPs), to allow time for GP to be fully informed on any problems or changes in treatment before the patient presents for a repeat prescription (if a 28 days original pack is dispensed at admission the patient will left hospital with at least two weeks of supply), to reduce medicine administration error rates, to reduce the discharge delay as medicines are readily available at patient bedside, to favor the patients' own medicines use. Measured: Overall saving of £200 000 a year to the local economy through better procurement after introduction of this initiative at a 1500-bed hospital. (6) Expected: To promote patient compliance. (7) Expected: To have a complete medication history at patient admission. (8) Expected: Explaining the rational of medication change will be important background for those taking over the care and could influence future choice (ie. It is important to share that a patient failed to respond to a first choice). (9) Expected: To quickly resolve patient medication problems. (10) Expected: To support patients' compliance with their medications. (11) Expected: To minimize disruption to medication as patients move between services. (12) Expected: To minimize risk of poor follow up for patients (ie. routine tests normally associated with a medication do not occur).
Advantages and critical success factors	(3) A national contract to offer an attractive price for individual medicine locker that need to be available at each bedside should be established by the NHS Purchasing and Supply Agency, self administration scheme (standard procedure to assess patients' ability to self medicate) should be in place, staff use of self administration to reinforce message about medicines, patients' competency at self administering is assessed prior to discharge, mechanisms are in place to identify those who will require additional support in the community. Successful introduction of self-administration relies on the commitment of nurses and their available time, as they are the staff who usually assess and educate patients. (2, 4) National coordination of publicity posters to support an awareness campaign to promote the importance of taking all medication (including complementary therapies) into hospital (5) Trusts need to discuss local implementation with their health authorities and primary care trusts (PCTs) particularly for the transfer of money from primary care to hospitals and the consequent impact on general practitioners budget. This initiative depends also on the stability of the patients' medication regimen (12) Nationally agreed list of medicines suitable for shared care should be produced. Health communities should implement shared care agreements for this nationally agreed list of medicines. To encourage GPs to engage in shared care, consideration should be given by commissioners to using the qualities and outcomes framework (QOF –assessment of general practice performance based on different type of indicators aims to deliver substantial financial rewards for high-quality care in NHS – clinical, organizational, patient experience and additional services). A suitable mechanism should be introduced for sharing existing shared care agreements to assist development.
Disadvantages and factors contributing to failure	(3) The initial investment in time and money that is required. (5) Failure to establish an agreement on reallocation of money between health authorities, PCTs and hospitals. (6) A proportion of the medicines without leaflets are unlicensed medicines, packs are being split as the patient does not need a full pack and there is only one leaflet to be shared between two or more patients. (12) GPs' workloads and costs of medicines.
Follow-up	Not reported

Funding and cost	No except when being assess by CQC and not meeting the relevant points will prevent the trusts become foundation trusts as an example so more about penalization if that don't meet the relevant standards.
References	[10] The_Audit_Commission, A spoonful of sugar - medicines management in NHS hospitals, The_Audit_Commission, Editor. 2001, The_Audit_Commission: London., [11]The_Audit_Commission, Acute hospital portfolio: review of national findings : medicines management, The_Audit_Commission, Editor. 2002, The_Audit_Commission: London., [12] The_Healthcare_Commission, Acute hospital portfolio reviews 2005/2006 : Guide to Medicines Management (v2), The_Healthcare_Commission, Editor. 2006, The_Healthcare_Commission: London., [13] Commission_for_Healthcare_Audit_and_Inspection, The best medicine - The management of medicines in acute and specialist trusts, C.f.H.A.a. _Inspection, Editor. 2007, Commission_for_Healthcare_Audit_and _Inspection: London., [14] The_Royal_Pharmaceutical_Society_of-Great_Britain, T.G.o.H.P., The_Pharmaceutical_Services_Negociating_Commitee, The_Pharmaceutical_Services_Negociating_Committee, The_Primary_Care_Pharmacists'Association, Moving Patients, moving medicines, moving safely : Guidance on discharge and transfer planning. 2006. p. 124. , Available from: http://www.nhsemployers.org/PayAndContracts/GeneralMedicalServicesContract/QOF/Pages/QualityOutcomesFramework.aspx.

Title of initiative	**Managing patients' medicine after discharge from hospital (review)**
Country	**United Kingdom (England)**
Period	2008-2009
Aims	To look at what organizations were doing to ensure the safety of patients who had been discharged from hospital with a change of medication, along the key steps of the pathway in this process.
Initiator(s)	The Care Quality Commission
Environment	12 Primary Care Trusts (PCTs) in NHS
Professionals involved	Mainly health care providers (HCPs) in PCTs
Description of the intervention	No intervention was implemented and/or evaluated, as this was more an observational study. The different key indicators evaluated were: (1) Information provided by general practitioners (GPs) to acute trusts for referred patients (list of medicines currently prescribed for the patient, co-morbidities, allergies, drug reactions and medicines that should be stopped); (2) Information provided by acute trusts to GPs, patients and community pharmacist at discharge (timeliness and information of changes of medications); (3) GP systems and processes for medicines reconciliation after discharge. (4) GP systems and processes for medicines review after discharge. (5) PCTs mechanisms other than (4) to improve patient medication adherence The study was based on: (1) The assessment based on a formal framework (literature review and consultation with subsequent key stakeholders), (2) a documentary evidence request to PCT for their answer, (3) a GP practice survey, (4) study visits including interviews with senior PCT staff and practice-based staff, (5) the assessment of PCT for each part of the study was based on the study expectation developed by the Care Quality Commission.
Evidence of intake in practice	(1) 11 of the 12 PCTs visited had little or no reliable, systematic knowledge of whether GPs were sending the correct information at the right time to hospitals. When referring patients in non-emergency cases provided (view of GPs), 98% provided a list of all medicines currently prescribed for the patient, but only a minority (11 to 24%)

	systematically provided information on co-morbidities, allergies, drug reactions and medicines that should be stopped. The transmission of information by GPs for people admitted through the emergency department was too slow and informal. (2) 53% of GP practices reported that discharge summaries received on time were useful either "all" or "most" of the time; 27% of GP practices found that discharge summaries were "hardly ever" or "never" inaccurate or incomplete; and 81% of practices reported that "all" or "most" of the time details of prescribed medicines were incomplete or inaccurate on discharge summaries. A copy of the discharge letter was given to patients in only 7 PCTs. Six PCTs shared information with community pharmacy only if patients was using a compliance aid or was prescribed a high-risk drug. (3) Agreed protocol for reconciliation not operated by a large number of practices. Only half of the PCTs provided GPs with any specific guidance on reconciliation, and in these PCTs the majority of GP practices were not aware of the guidance. In the six PCTs, where no guidance on reconciliation was issued, only 25% of GP practices set out their own guidance. Furthermore, no system to monitor reconciliation available in 8 of the 12 PCTs and evidence to confirm whether reconciliation was timely or accurate provided by any PCTs. Responsibility for reconciliation in the majority of practices given to GPs and other clinical staff (nurse prescriber or practice pharmacist), but a small number of practices (17%) delegated the responsibility for medicines reconciliation to managerial or clerical staff. (4) 57% to 63% of GP practices conduct a medication review within the first month of discharge from hospital for patients aged 65 or older with one or more high risk drugs (NSAIDS, anti-platelets, diuretics). Over 70% of the GP practices surveyed said that they discuss patients' experience, side effects, drug monitoring, test results and length of treatment during medication reviews "most of the time". 10 out of 12 of the PCTs provided GP practices with some form of written guidance for medication review and in 9 out of these 10 PCTs, GPs were prioritising patients for review, on the basis of population group, medical condition, or type of medicine. However, only one PCT monitored both the timeliness and quality of medication reviews. (5) Patients were provided with copies of discharge letters in only 7 of the 12 PCTs. Medication reviews provide a forum for patients to discuss any concerns they might have with their GP and identify changes needed, but only 55% of practices said that patients are present during medication review "most of the time"; and 5% said patients were "hardly ever" present. All the PCTs had some other mechanisms in place to pick up on whether particular groups of patients were following their medication regimen, and all either employed or commissioned pharmacists, nurses and matrons to support patients. However, there was a great variation in the way pharmacists were used, which reflected the fact that the pharmacist resource available to practices varied by a factor of 10 across PCTs. In the best PCT, pharmacists reviewed patients with complex medication needs, undertook home visits and identified potential changes in treatment. Community (high street) pharmacies can also talk through medications with patients in 'medicine use reviews', but the take-up of these has been slow, as not all community pharmacies are accredited to provide this service, and the number of accredited pharmacies varies greatly by PCT
Impact	Expected: To promote high-quality care when patients are transferred from one setting to another– especially on medication management after hospital discharge. No objective measurement reported.
Advantages and critical success factors	(1) Existence of clear guidelines or standardised referral forms on the flow of information between GPs/out-of-hours services and acute trusts, to ensure consistency and promote patients' safety, for both elective and emergency admissions (guidelines or standardized referral forms). (2) Development of extra ways of communicating drug regimens to encourage patients to bring their medication (over-the-counter and prescribed drugs) into hospital (patients' own drugs or green bag schemes) or folder kept at patients' home containing their emergency care plan (yellow folder scheme) to guide HCPs in case of emergency for patients with long-term conditions (ie: anticoagulant). (2) Use of standard, electronic discharge forms. 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. Encouragement of acute trusts by PCTs for providing timely and accurate discharge information by including financial penalties or incentives within their local discharge protocol. (3) PCTs should carry out reconciliation according to agreed local processes and guidelines and monitor process to assess their quality. (4) as (3) above for medication review. (5) Various professionals involved in the patient pathway can provide information and support patients to take their medicines and PCTs should evaluate the pharmacist and nursing resources available across their practices and the community, and target them on the practices and the patients most in need
Disadvantages and factors contributing to failure	Not reported
Follow-up	Not reported
Funding and cost	Not reported
References	The Care Quality Commission, Managing patients' medicines after discharge from hospital, Special Review, 2009, London. National Prescribing Center. Managing patients' medicines after discharge from hospital – a National Study from the Care Quality Commission, 2009, Available from: http://www.npci.org.uk/blog/?p=870 (accessed 2010, 17th January) The Care Quality Commission, Managing patients' medicines after discharge - study report 2008/2009 - Coventry Teaching Primary Care Trust, study report, 2009, London. The care Quality Commission, Managing patients' medicines after discharge from hospital - a self assessment tool, 2009, London. The Care Quality Commission. NHS must do more to prevent harm to patients from prescribed medicines after leaving hospital, says CQC, 2009; Available from: http://www.cqc.org.uk/newsandevents/pressreleases.cfm?cit_id=35474&FAArea1=customWidgets.content_view_1&usecache=false (accessed 2010, 17th January)

3.3.6 United States - Veterans Health Information Services and Technology Architecture (VistA)

Title of initiative	**Veterans Health Information Services and Technology Architecture (VistA)**
Country	**United States**
Period	From 1997 to actually for the Computerized Patient Record System (CPRS). Data has been stored on a national databank since 2005. By the end of 2006, all veterans can access their personal health record through My HealtheVet program.
Aims	The aim of the Vista project is to fully support safe, effective, and efficient care by providing integrated, longitudinal health information and a management system throughout VA medical facilities and clinic sites with CPRS. and to improve patient accountability and awareness of their health care thanks to an engagement of patients as key partner in health care team by providing them the ability to see and connect to their health record at any time or place through My HealtheVet.
Initiator(s)	The Department of Veterans Affairs (VA) - Veterans Health Administration (VHA)
Environment	VistA covers more than 1,200 sites of care, including acute care hospitals, ambulatory facilities, skilled nursing facilities, and pharmacies.
Professionals involved	All members of the health care team, including desk registration clerks, nurses, and physicians, can access portions of the electronic health record through the Computerized Patient Record System (CPRS) as needed to fulfill their duties. VA provides greater coordination of care when all members of the team can quickly access the record.
Description	The clinical computer system, VistA, includes the following components:

of the intervention	• Computerized Patient Records System (CPRS) • VistA Imaging • Bar Code Medication Administration (BCMA) • My HealtheVet (or personal health records) The CPRS and My healtheVet are the 2 components of VistA that improve continuity of care in medication management and that we will describe. **Computerized Patient Record System Graphical User Interface (VistA CPRS GUI)** enables clinicians to enter, review and continuously update all order-related information connected with any patient throughout VA's 1,400 site system. Clinicians can order lab tests, medications, diets, radiology tests, and procedures; record a patient's allergies or adverse reactions to medications; request and track consultations; and enter progress notes, diagnoses, treatments for each encounter, and discharge summaries. Electronic health records allow hospital personnel to keep comprehensive patient records and enables clinicians, managers, and Quality Assurance staff to review and analyze data on any patient to directly support clinical decision-making. In 2005, a national databank for standardized, patient-specific clinical data was introduced: the central Health Data Repository (HDR). Then, each patient's records will be stored as a true longitudinal healthcare record what means that authorized clinicians have access to any veteran's record, regardless of which region they reside in. During hospital stay, admission orders may be written weeks ahead of an admission. Discharge orders may be written throughout a hospital stay and modified as needed. These orders are easily available for review. Similarly, when writing admission orders, a patient's current outpatient prescriptions are easily viewed and may be transferred to become inpatient orders, if appropriate *from CPRS*. Veterans increasingly have access to their records and more opportunity to successfully manage their own health because of personalized electronic health records, through a derivative of the EHR called **My HealtheVet.** A section called "pharmacy" in the program gives the opportunity to the patient to : • refill their prescriptions • view their prescriptions history • record their non VA medications, OTC, Herbals, Supplements (name, dosage, frequency, date of introduction and stop) • see their complete medication list Patient can also search information on medications. Actually, patients are incited to keep an updated medication list handy – at home and wherever they go. So patients can print out their medication profile from their health journal that they managed in their "My HeatlheVet" session. In the future, information managed by patients could be shared after patients' permission with their healthcare provider (. and see informations extracted from their CPRS.
Evidence of intake in practice	100% coverage of VA healthcare system for EPHR In 2005, the system contains a single health record of 8.5 million veterans in 22 regions across the entire United States. In July 2009, more than 810 000 veterans (16.5% of veterans currently receiving VA healthcare services) had subscribe for an access to My HealtheVet

Impact	The cost of care per patient in the VA has remained the same for the past 10 years, while costs in other health care systems have risen dramatically during the same period. Key factors for cost effectiveness of VA health care from CPRS, with regard to medications: The cost of each medication prescribed is listed in the electronic health records order entry system, encouraging providers, whenever possible, to select the most effective and least costly medication VA's electronic health record has largely eliminated all errors stemming from lost or incomplete medical records. One in every seven hospital admissions is due to the lack of a medical record and 20 percent of all lab tests are repeated because the physician cannot access the results. VA is a leader in quality of care and patient satisfaction and is considered one of the safest health care systems in the country. More information of the impact of VistA (electronic patient records - CPRS) on quality of healthcare could be finding in the paper: Jha, A.K., et al., Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. N Engl J Med, 2003. 348(22): p. 2218-27. My HealtheVet portal has been assessed since 2007 by users via the American Customer Satisfaction Index (ASCI) survey to better understand their needs and preferences in view of future development of the program. Results from 100 617 surveys showed a high satisfaction (8.3/10) and users are highly likely to return to the site (8.6/10.0) and recommend the site to other veterans (9.1/10.0). The majority of system adopters are male (91%), between the ages of 51 and 70 (68%), and served in the Vietnam War (60%). Most veterans currently visit the site to utilize pharmacy-related features. See : Nazi, K.M., Veterans' voices: use of the American Customer Satisfaction Index (ACSI) Survey to identify My HealtheVet personal health record users' characteristics, needs, and preferences. J Am Med Inform Assoc, 2010. 17(2): p. 203-11.
Advantages and critical success factors	Not reported
Disadvantages and factors contributing to failure	Not reported
Follow-up	Yes
Funding and cost	The current cost of CPRS to VA is approximately $87 per patient per year, whereas the average cost of a repeated test is $80.
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4 APPENDIX CHAPTER 6. BELGIAN PROJECTS

4.1 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

4.1.1 Indexed literature search

The authors checked if there was any relevant Belgian citation from the set of eligible citations retrieved in the systematic literature review (chapter 3 of the scientific report).

4.1.2 Handsearch of Belgian journals

The journals listed below were searched from January 2000 until July 2009. These journals were chosen in consensus between the researchers because of their relevance in the field and because of the possibility that projects or initiatives related to seamless care could have been described herein.

- Acta Clinica Belgica
- Archives of Public Health
- Apothekersblad / Annales Pharmaceutiques Belges
- Journal de Pharmacie de Belgique / Farmaceutisch Tijdschrift voor België
- Huisarts nu

Louvain Medical

- Tijdschrijft voor Geneeskunde
- Pharmakon
- Revue Médicale de Liège
- Revue Médicale de Bruxelles

In addition, the following abstract books were reviewed:

- abstract books of the Forum of Pharmaceutical Sciences (Belgian Society of Pharmaceutical Sciences) for 2000-2009.
- abstract books of the Eerste Lijns Symposium (organised by Domus Medica) for 2000-2008

4.1.3 Grey literature – questionnaire survey

Based on our own experience and through contacts with people in the field, a questionnaire was developed to inventory the characteristics of the different seamless care studies / projects that have been performed in Belgium. The questionnaire was pilot tested in French and Flemish on a small number of studies before the final version was decided upon (Appendix 4).

A substantial amount of projects was identified through the Seamless Care Taskforce. This taskforce was founded in October 2006 by the APB (Algemene Pharmaceutische Bond- Association Pharmaceutique Belge). It brings together people who are actively involved in projects or initiatives to optimize seamless care with relation to medication. The taskforce gives members the opportunity to share their experiences and to keep on track of current developments in seamless care.

The following persons or groups were contacted (195 in total):

- Contact person(s) of each seamless care project listed by the APB Seamless Care Task Force;

Clinical pharmacists involved in the 28 Pilot Projects Clinical Pharmacy, sponsored by the Ministry of Public Health. The aim of these pilot projects, started in July 2007, is to develop and evaluate the added value of clinical pharmacy services.

- Professional organizations e.g. SSMG (Société Scientifique de Médecine Générale), SSPF (Société Scientifique des Pharmaciens Francophones), Domus Medica, IPSA (Instituut voor Permanente Studie voor Apothekers), Wit Gele Kruis, Soins A Domicile, SEL's (Samenwerking Eerste Lijn) ;
- Hospital networks: Vlaams Ziekenhuisnetwerk K.U.Leuven;
- All 105 Flemish discharge managers (list provided by the Ministry of Public Health). A discharge manager is a social nurse or social assistant working at the hospital and in charge of activities in relation to continuity of care.
- Faculties/Departments of Pharmacy, General Practice, and Nursing of all Belgian universities, in order to identify theses related to the theme.

All experts were contacted by phone and were asked to describe briefly the project(s) they have been involved in. When appropriate, the contact person was sent an e-mail containing the structured questionnaire asking for the characteristics and results of the project in question. Experts were asked to return this questionnaire by July 15, 2009. If no answer was received, an additional phone call was made, or a reminder was sent by e-mail. Sampling of data was finished by October 09, 2009.

Finally, the Antigifcentrum-Centre Antipoisons was contacted to ask for data on drug related problems that might have been caused by transition of care.

4.2 SELECTING STUDIES

4.2.1 Study selection criteria

Studies needed to comply with the following study selection criteria for inclusion in the literature review:

Topic	Inclusion criteria
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 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:

Topic	Exclusion criteria
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 (ie hospital care and ambulatory care)

Exclusion criteria related to study design were not specified due to the expected limited amount of information gathered.

4.2.2 Inclusion process

For the indexed literature search as well as for the handsearch in a preliminary sift, papers that were clearly not relevant to the review question were eliminated based on their title. Abstracts of remaining papers were then examined and any that failed to meet specific inclusion/exclusion criteria were also eliminated. All titles and abstracts identified as being potentially relevant were provisionally included. The final inclusion or exclusion was decided after retrieving all full texts. To support reliability all papers were first assessed by one member of the research team. Pre-selected papers were then reviewed by two other members of the team (AS and/or VF). Discrepancies were resolved by consensus.

For the grey literature search, inclusion or exclusion was first based on information given during the conversation on the phone, and secondly on the answer received on the questionnaire. If necessary, contact persons were joined by telephone or e-mail to collect additional information before deciding for inclusion. Pre-selected projects and initiatives were then reviewed by two other members of the team (AS and/or VF). Discrepancies were resolved by consensus.

4.3 DATA EXTRACTION

Two data extraction forms were developed : one for research projects reporting on drug related problems secondary to discontinuity of care, and/or the impact of interventions aiming at avoiding drug related problems, and another for initiatives aiming at improving continuity of care.

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. Data extraction was first performed by one member of the research team, and was done in the language that was used by the expert to fill in the questionnaire (either Dutch or French). Data extraction forms were then reviewed by two other members of the team (AS and/or VF). Disagreements were resolved by consensus. An example of data extraction form is provided below.

4.3.1 Data extraction form for research projects

The data extraction form for research projects enabled the gathering of general as well as specific information, such as:

- clinical question
- research setting
- focus of transition (admission and/or discharge)
- study population (type of patients and/or health care professionals, n participants,...)
- study design (descriptive, (quasi) experimental, qualitative,...)
- type and characteristics of intervention, if applicable (what, by who, to whom, how long,…)

- outcome measures (process and ECHO measures)
- adverse events
- dropout
- driving forces
- barriers / difficulties
- follow-up
- authors' conclusion
- financial support
- conflicts of interest

4.3.2 Data extraction form for initiatives

- setting
- target group
- description of the initiative (what, by who, to whom, how long,…)
- driving forces
- barriers / difficulties
- financial support

4.4 DATA ANALYSIS AND INTERPRETATION

Due to the heterogeneity of the primary studies, a descriptive or non-quantitative synthesis of the extracted data was made. The characteristics and the results of the included studies and initiatives are summarized via tabulation. 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

4.5 RESULTS

4.5.1 Search results: number of projects identified by source

4.5.1.1 Indexed literature search

No Belgian citation was identified from the systematic literature review.

4.5.1.2 Handsearch of Belgian journals

Three articles were identified through handsearch of Pharmakon ([15],[16],[17]). Searching Journal de Pharmacie de Belgique yielded two papers ([18],[19]).

No other papers have been found by checking the following journals: Tijdschrift voor Geneeskunde, Huisarts NU, Archives of Public Health, Apothekersblad / Annales Pharmaceutiques Belges, Revue Médicale de Liège, Revue Médicale de Bruxelles

Scattered initiatives have been identified in abstracts from Belgian conferences (2000-2008). An overview of these initiatives can be found in Appendix 4.

4.5.1.3 Evidence obtained from experts in the field

Identification of projects and initiatives: seamless care task force, initiatives sponsored by the Ministry of public health, hospital discharge managers

A substantial amount of projects was identified through the Seamless Care Taskforce.

Of the hospitals involved in pilot projects on clinical pharmacy, 24 seem to have developed initiatives on seamless care.

The contacts with the Flemish discharge managers resulted in 5 completed questionnaires.

Unfortunately, the Antigifcentrum-Centre Antipoisons was not able to deliver data on drug related problems due to transition of care, as reported errors are not coded according to their cause.

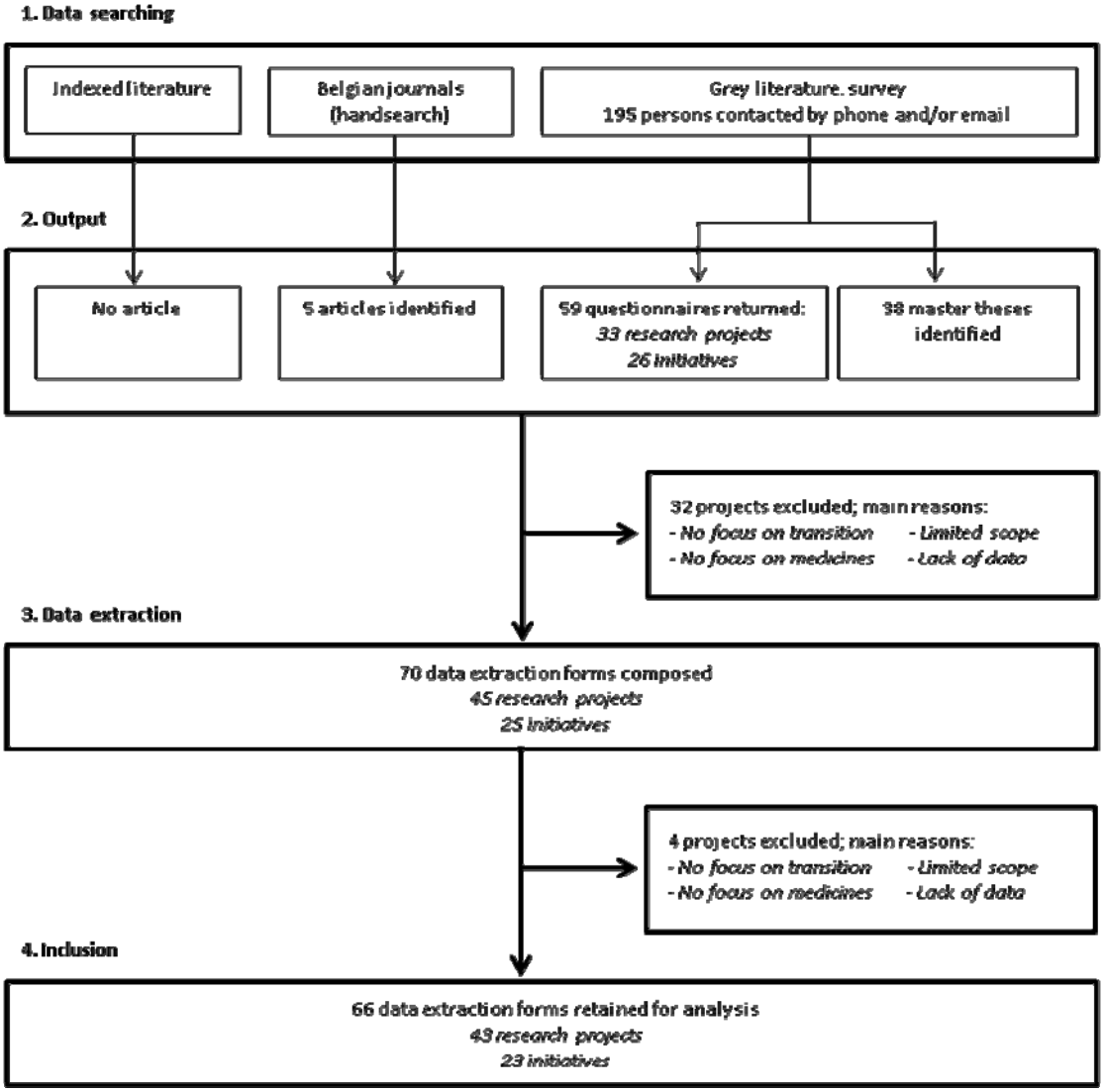
Number of projects reported by experts

In total, 196 persons were contacted by phone and/or e-mail. 59 completed questionnaires were returned. Upon analysis, 33 questionnaires delivered details on projects, either reporting on the number and type of drug related problems due to transition of care or on the impact of initiatives aiming to improve the continuity of care with regard to medications. 26 questionnaires delivered details on initiatives, without measurement of the impact on any outcome parameter. In addition, 38 master theses related to the theme were identified.

4.5.2 Data extraction and evidence sifting

32 projects were excluded from further analysis, mainly because there was no clear focus on transition or medicines, or because of limited scope or output. 70 data extraction forms were drawn up, of which 66 were retained for analysis.

Overview of search strategy



4.5.3 Initiatives presented at national conferences

The following initiatives have been presented at the "Eerstelijnssymposium / Wetenschapsdag", a congress for the first line of care coordinated by Domus Medica:

- Naar een optimale informatieoverdracht tussen thuiszorg en ziekenhuis; project opname-en ontslagmanagement regio Oostende (2001)
- Feedback aan huisartsen over verwijzingen naar de internist (2002)
- Goed verwezen is half genezen: kritische analyse van verwijsbrieven naar de spoedopname (2002)
- Een gestandardiseerde verwijsbrief voor een betere kwaliteit van zorg (2005)
- De onmiddelijke ontslagbrief: een praktijkbevorderend project (2006)
- De verwijzing van huisarts naar de tweede lijn (2006)
- Communicatie met de behandelende huisarts en de spoeddienst met behulp van de HDB-Mailer of de Domus Medica-Mailer (2006)
- Een studie naar de objectieve en subjectieve kwaliteit van het hospitalisatieverslag (2006)
- Verwijs- en ontslagbeleid van zwaar zorgbehoevende patiënten met een zorgplan opgenomen in het ziekenhuis (2006)
- Het transmuraal klinisch pad "totale radicale prostatectomie": een pioniersverhaal (2007)
- Zorgpaden in de oncologie: naar een gestructureerde patiëntgestuurde samenwerking tussen eerste en tweed lijn in de oncologische zorg. Pilootproject Limburg: transmuraal zorgpad voor patienten met borstcarcinoom (2007)
- De medische thuiszorgmap: de praktische aanpak van de palliatieve thuiszorg in de huisartsenpraktijk (2008)
- Zorgpaden in de oncologie: naar een gestructureerde patiëntgestuurde samenwerking tussen eerste en tweed lijn in de oncologische zorg. Pilootproject Limburg: transmuraal zorgpad voor patienten met borstcarcinoom (2008)

5 APPENDIX CHAPTER 7. ANALYSIS OF IMA DATA

5.1 DATA CLEANING AND DEFINITIONS

IMA-AIM datasets were available for 2006 & 2007, restricted to the EPS (permanent sample).

5.1.1 Data cleaning

In order to construct the dataset needed for analyses, some data cleaning and convention rules were taken as follows:

Issue	Action
1 patient with different gender in the dataset 2006 & 2007	deletion of the patient
2 patients with different year of birth in the dataset 2006 & 2007	deletion of the patients
Last year information is the most updated information	take the last information by patient after concatenation of the dataset 2006 & 2007 for the demographic data analyses
CNK code not found in the reference dataset: **12 records over 1.651.872 records of FARMANET dataset.**	Deletion
After regularization of the data (sum of reimbursement + sum of personal intervention + sum of suppl): **39.488 records** lead to negative or zero sum of cost	Deletion
number of package for one delivery date for 1 product was above or equals to 25 packs: **4 records**	Deletion

5.1.2 Conventions

Determination of start and end dates for the hospitalization:

- 2 hospitalizations with a gap of max 3 days between each other will be considered as **ONE** hospitalization (called it "merged hospitalizations")
- Begin date = Date of the first records of the "merged hospitalizations"
- End date = Date of end of the last records of the "merged hospitalizations" – 1

Consideration only of hospitalizations apart from each other of at least 3 months and begin date after 31 MAR 2006 and end date < 01 OCT 2007 – those are the hospitalizations taken into account for the analyses in order to have the FARMANET information before and after the hospitalization.

Take the information in FARMANET (ambulatory delivery data) within the 3-months before and after the hospitalization.

5.1.3 Structure of the datasets for analyses

The output SAS dataset called **FINAL** was made available in SAS format. The table below shows the list of variables included in the FINAL dataset

Variable label	Variable name	Format	Length	Detail
Patient identifier	ANON_BASER	CHAR	8	
Gender	GENDER	NUM		1 = Men 2 = Women
Gender (nl)	GENDER_NL	CHAR	1	M = Man V = Vrouw
Gender (fr)	GENDER_FR	CHAR	1	H = Homme F = Femme
Gender (en)	GENDER_EN	CHAR	1	M = Male F = Female
Year of Birth	BIRTH_YEAR	NUM	5	
Month and Year of Death	DEATH	CHAR	26	
CNK number	CNK	NUM	8	
Commercial label of the package form - Fr	CNK_label_fr	CHAR	55	
Commercial label of the package form - Nl	CNK_label_nl	CHAR	55	
ATC level 5 code	ATC	CHAR	11	
ATC level 3 code	ATC_code3	CHAR	4	
ATC level 3 – Label - Fr	Libel_atc3_fr	CHAR	55	
ATC level 3 – Label - nl	Libel_atc3_nl	CHAR	55	
ATC level 3 – Label - en	Libel_atc3_en	CHAR	55	
Date of Delivery	DATE_DELIVERY	NUM	8	Format date: DATE9.
Defined Daily Dose	DDD	NUM	8	
Unit of the DDD	DDU	CHAR	7	
DDD per package	DPP	NUM	8	
Number of packages	NUM_P	NUM	8	
Total DDD	TOT_DDD	NUM	8	= DPP*NUM_P
Reimbursement	TERUG	NUM	8	
Patient's contribution	MOD	NUM	8	
Supplement	SUPP	NUM	8	
Total	TOTAL	NUM	8	Sum TERUG, MOD, SUPP
Flag for generic (nl)	OGC_lbl_nl	CHAR	32	• Generiek • Kopie • Originele specialteit • Parallel ingevoerde specialteit • Referentiespecialteit • Weesgeneesmiddel
Flag for generic (fr)	OGC_lbl_fr	CHAR	32	• Générique • Copie • Spécialité originale • Spécialité de référence • Spécialité importée de façon parallèle • Médicament orphelin
Flag for low cost	LOW	NUM	8	0 = NO (Not considered

Variable label	Variable name	Format	Length	Detail
drug				as low cost) 1 = YES (Considered as Low cost)
Flag of the Period	FLAG	CHAR	4	PRE = within a 3-month period prior the hospitalization POST = within a 3-month period after the hospitalization
Begin Date of Hospitalization	BEGD	NUM	8	Format date: DATE9.
End Date of Hospitalization	ENDD	NUM	8	Format date: DATE9.

Two additional datasets were created from the FINAL dataset:

- **FINAL DEMO**: containing one records by patient with the gender, number of hospitalization considered in the FINAL dataset and the age of the patient.
- **FINAL BEFORE AFTER**: containing one record by patient, hospitalization and ATC code. The information contained in the dataset are the information before and after the hospitalization.

The dataset Final DEMO was based on the **FINAL** dataset. The Derived variables and the rules applied are as followed:

- The **age** of the patient was calculated based on the Year of Birth and the Year of the last delivery date for this patient.
- **Age** = year(delivery_date) – birth_year
- The number of hospitalization was a count of hospitalizations included in the FINAL dataset for the patient.

Variable label	Variable name	Format	Length	Detail
Patient identifier	ANON_BASER	CHAR	8	
Gender	GENDER	NUM		1 = Men 2 = Women
Gender (nl)	GENDER_NL	CHAR	1	M = Man V = Vrouw
Gender (fr)	GENDER_FR	CHAR	1	H = Homme F = Femme
Gender (en)	GENDER_EN	CHAR	1	M = Male F = Female
Age (in year)	AGE	NUM	5	year(delivery_date) – birth_year
Number of Hospitalization(s)	number_hosp	NUM	8	

The dataset FINAL_BEFORE_AFTER was based on the **FINAL** dataset. The information contained in this dataset was presented by Patient, hospitalization, and, ATC code.

- Type of the drug used before/after the hospitalization: Generic & Copy OR Originator
  - Rule applied on the variable from the FINAL dataset:
    - IF OGC_lbl_fr = "Généric" or OGC_lbl_fr = "Copie" then the type of drug used was defined as "Generic or Copy"
    - Otherwise, the type of drug used was defined as "Originator"
- Reimbursment by unit was calculated as the division between the Reimbursement and the number of pack.

- RULE: BY patient, hospitalization and ATC, take the information the closest to the date of hospitalization and with the largest amount in **reimbursement by unit (= reimbursement / number of packages)**.
- The Reimbursement by unit was computed as = reimbursement / number of packages.

Variable label	Variable name	Format	Length	Detail
Patient identifier	ANON_BASER	CHAR	8	
ATC level 5 code	ATC	CHAR	11	
ATC level 3 code	ATC_code3	CHAR	4	
ATC level 3 – Label - Fr	Libel_atc3_fr	CHAR	55	
ATC level 3 – Label - nl	Libel_atc3_nl	CHAR	55	
ATC level 3 – Label - en	Libel_atc3_en	CHAR	55	
Begin Date of Hospitalization	BEGD	NUM	8	Format date: DATE9.
End Date of Hospitalization	ENDD	NUM	8	Format date: DATE9.
Type of drug (Generic & Copy vs Originator)/Before Hospitalization	Flag_before	CHAR	15	**IF** OGC_lbl_fr = "Généric" or OGC_lbl_fr = "Copie" then the type of drug used was defined as "Generic or Copy" **Otherwise**, the type of drug used was defined as "Originator"
Number of packages / Before Hospitalization	NUM_P _before	NUM	8	Information before the hospitalization
Total DDD)/Before Hospitalization	TOT_DDD_before	NUM	8	Information before the hospitalization
Reimbursement)/Before Hospitalization	Terug_ before	NUM	8	Information before the hospitalization
Reimbursement by unit /Before Hospitalization	Terug_unit_before	NUM	8	TERUG_BEFORE/NUM_P_BEFORE
Type of drug (Generic & Copy vs Originator)/After Hospitalization	Flag_after	CHAR	15	**IF** OGC_lbl_fr = "Généric" or OGC_lbl_fr = "Copie" then the type of drug used was defined as "Generic or Copy" **Otherwise**, the type of drug used was defined as "Originator"
Number of packages /After Hospitalization	NUM_P _ after	NUM	8	Information after the hospitalization
Total DDD /After Hospitalization	TOT_DDD_ after	NUM	8	Information after the hospitalization
Reimbursement /After Hospitalization	Terug_ after	NUM	8	Information after the hospitalization
Reimbursement by unit /After Hospitalization	Terug_unit_ after	NUM	8	TERUG_ after /NUM_P_ after

5.2 DEMOGRAPHIC DATA

5.2.1 Age Distribution of the patients

N	17764	Sum Weights	447900
Mean	65.9418174	Sum Observations	29535340
Std Deviation	16.1285597	Variance	260.130439
Skewness	.	Kurtosis	.
Uncorrected SS	2064126420	Corrected SS	116512424
Coeff Variation	24.4587735	Std Error Mean	.

Location		Variability	
Mean	65.94182	Std Deviation	16.12856
Median	69.00000	Variance	260.13044
Mode	76.00000	Range	104.00000
		Interquartile Range	22.00000

Quantile	Estimate
100% Max	104
99%	93
95%	87
90%	84
75% Q3	78
50% Median	69
25% Q1	56
10%	44
5%	36
1%	21
0% Min	0

5.2.2 Gender of the patients

Data Summary	
Number of Observations	17764
Sum of Weights	447900

Gender							
	Frequency	**Weighted Frequency**	**Std Dev of Wgt Freq**	**Percent**	**Std Err of Percent**	**95% Confidence Limits for Percent**	
M	7098	182580	1844	40.7636	0.3918	39.9957	41.5315
W	10666	265320	1850	59.2364	0.3918	58.4685	60.0043
Total	17764	447900	1170	100.000			

5.3 SUBSTITUTION BETWEEN GENERIC AND ORIGINATOR DRUGS

5.3.1 Substitution of drugs at the ATC level 5 presented at ATC class level 3

ATC level 3 code=A02B: Drugs for peptic ulcer and gastro-oesophageal reflux disease

Number of Observations	4990
Sum of Weights	124460

FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	2829	69260	965.02564
Generic & Copie – Originator	91	2160	236.38149
Originator - Generic & Copie	47	1140	174.77323
Originator - Originator	2023	51900	977.74740
Total	4990	124460	609.43218

FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	55.6484	0.7463	54.1854	57.1114
Generic & Copie – Originator	1.7355	0.1899	1.3631	2.1079
Originator - Generic & Copie	0.9160	0.1404	0.6407	1.1912
Originator - Originator	41.7001	0.7420	40.2455	43.1548
Total	100.000			

ATC level 3 code=A10B = Blood glucose lowering drugs, excl. insulins

Data Summary	
Number of Observations	3327
Sum of Weights	79660

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	338	7880	428.70906
Generic & Copie – Originator	67	1580	201.15123
Originator - Generic & Copie	27	680.00000	138.08239
Originator - Originator	2895	69520	634.54853
Total	3327	79660	459.04762

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	9.8920	0.5372	8.8387	10.9453
Generic & Copie – Originator	1.9834	0.2524	1.4886	2.4782
Originator - Generic & Copie	0.8536	0.1732	0.5141	1.1932
Originator - Originator	87.2709	0.6024	86.0898	88.4520
Total	100.000			

ATC level 3 code=C03B = Low-ceiling diuretics, excl. thiazides

Data Summary	
Number of Observations	544

Data Summary	
Sum of Weights	12300

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	263	5960	286.45030
Generic & Copie - Originator	18	360.00000	83.51398
Originator - Generic & Copie	11	220.00000	65.71886
Originator - Originator	252	5760	288.38280
Total	544	12300	157.28591

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	48.4553	2.2381	44.0589	52.8517
Generic & Copie - Originator	2.9268	0.6827	1.5858	4.2678
Originator - Generic & Copie	1.7886	0.5361	0.7356	2.8416
Originator - Originator	46.8293	2.2365	42.4360	51.2225
Total	100.000			

ATC level 3 code=C03C: High-ceiling diuretics

Data Summary	
Number of Observations	2068
Sum of Weights	44940

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	470	10300	436.79685
Generic & Copie - Originator	59	1200	155.29113
Originator - Generic & Copie	47	1020	152.01342
Originator - Originator	1492	32420	493.42675
Total	2068	44940	255.80101

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	22.9194	0.9594	21.0379	24.8009
Generic & Copie - Originator	2.6702	0.3464	1.9909	3.3495
Originator - Generic & Copie	2.2697	0.3380	1.6068	2.9326
Originator - Originator	72.1406	1.0187	70.1429	74.1383
Total	100.000			

ATC level 3 code=C03D = Potassium-sparing agents

Data Summary	
Number of Observations	1001
Sum of Weights	22640

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	275	6380	349.65469
Generic & Copie - Originator	32	740.00000	135.17100
Originator - Generic & Copie	23	520.00000	111.99286
Originator - Originator	671	15000	372.24078
Total	1001	22640	213.51347

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	28.1802	1.5007	25.2353	31.1252
Generic & Copie - Originator	3.2686	0.5956	2.0997	4.4374
Originator - Generic & Copie	2.2968	0.4942	1.3270	3.2666
Originator - Originator	66.2544	1.5730	63.1677	69.3411
Total	100.000			

ATC level 3 code=C07A = Beta blocking agents

Data Summary	
Number of Observations	6258
Sum of Weights	151180

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	1743	42960	942.56543
Generic & Copie - Originator	205	4700	338.36136
Originator - Generic & Copie	77	1820	216.97515
Originator - Originator	4233	101700	1031
Total	6258	151180	642.08870

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	28.4165	0.6059	27.2287	29.6043
Generic & Copie - Originator	3.1089	0.2239	2.6699	3.5479
Originator - Generic & Copie	1.2039	0.1435	0.9226	1.4851
Originator - Originator	67.2708	0.6280	66.0397	68.5019
Total	100.000			

ATC level 3 code=C08C = Selective calcium channel blockers with mainly vascular effects

Data Summary	
Number of Observations	2638
Sum of Weights	59680

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	443	10020	456.96813
Generic & Copie - Originator	74	1680	201.35905
Originator - Generic & Copie	47	1100	167.18826
Originator - Originator	2074	46880	566.22897
Total	2638	59680	346.83290

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	16.7895	0.7595	15.3003	18.2788
Generic & Copie - Originator	2.8150	0.3370	2.1543	3.4757
Originator - Generic & Copie	1.8432	0.2797	1.2947	2.3916
Originator - Originator	78.5523	0.8355	76.9139	80.1906
Total	100.000			

ATC level 3 code=C09A = ACE inhibitors

Data Summary	
Number of Observations	3667
Sum of Weights	84460

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	670	15680	581.24422
Generic & Copie - Originator	58	1320	179.81563
Originator - Generic & Copie	35	840.00000	149.04241
Originator - Originator	2904	66620	681.03721
Total	3667	84460	434.43136

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	18.5650	0.6782	17.2353	19.8947
Generic & Copie - Originator	1.5629	0.2128	1.1456	1.9801
Originator - Generic & Copie	0.9946	0.1763	0.6489	1.3402
Originator - Originator	78.8776	0.7114	77.4829	80.2723
Total	100.000			

ATC level 3 code=C10A = Lipid modifying agents

Data Summary	
Number of Observations	4843
Sum of Weights	115640

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	1360	32960	815.73376
Generic & Copie - Originator	93	1960	205.95031
Originator - Generic & Copie	40	920.00000	151.75634
Originator - Originator	3350	79800	890.65598
Total	4843	115640	550.30734

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	28.5022	0.6872	27.1550	29.8495
Generic & Copie - Originator	1.6949	0.1785	1.3449	2.0449
Originator - Generic & Copie	0.7956	0.1312	0.5383	1.0528
Originator - Originator	69.0073	0.7014	67.6322	70.3823
Total	100.000			

ATC level 3 code=M01A : Anti-inflammatory and anti-rheumatic products, non-steroids

Data Summary	
Number of Observations	1947
Sum of Weights	52860

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	448	12460	556.43521
Generic & Copie - Originator	102	3200	324.33726
Originator - Generic & Copie	84	2540	286.23149
Originator - Originator	1313	34660	642.18633
Total	1947	52860	423.05015

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	23.5717	1.0285	21.5547	25.5887
Generic & Copie - Originator	6.0537	0.6071	4.8630	7.2445
Originator - Generic & Copie	4.8051	0.5377	3.7507	5.8596
Originator - Originator	65.5694	1.1564	63.3016	67.8373
Total	100.000			

ATC level 3 code=M05B : Drugs affecting bone structure and mineralization

Data Summary	
Number of Observations	837
Sum of Weights	17920

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	2	40.00000	28.26735
Originator - Generic & Copie	3	60.00000	34.59955
Originator - Originator	832	17820	155.67725
Total	837	17920	148.19811

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	0.2232	0.1578	0.0000	0.5329
Originator - Generic & Copie	0.3348	0.1931	0.0000	0.7139
Originator - Originator	99.4420	0.2491	98.9530	99.9309
Total	100.000			

ATC level 3 code=N02A = Opioids

Data Summary	
Number of Observations	2262
Sum of Weights	56640

Table of FLAG			
FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	265	6800	419.08896
Generic & Copie - Originator	57	1420	196.78846
Originator - Generic & Copie	51	1500	219.60561
Originator - Originator	1889	46920	575.23781
Total	2262	56640	413.06398

Table of FLAG				
FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	12.0056	0.7320	10.5701	13.4412
Generic & Copie - Originator	2.5071	0.3470	1.8266	3.1875
Originator - Generic & Copie	2.6483	0.3857	1.8919	3.4047
Originator - Originator	82.8390	0.8540	81.1644	84.5136
Total	100.000			

ATC level 3 code=N05A = Antipsychotics

Data Summary	
Number of Observations	1602
Sum of Weights	43800

FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	127	3280	297.55615
Generic & Copie - Originator	6	120.00000	48.91324
Originator - Generic & Copie	5	100.00000	44.66546
Originator - Originator	1464	40300	482.86285
Total	1602	43800	385.95971

FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	7.4886	0.6794	6.1560	8.8212
Generic & Copie - Originator	0.2740	0.1118	0.0547	0.4933
Originator - Generic & Copie	0.2283	0.1021	0.0281	0.4285
Originator - Originator	92.0091	0.6938	90.6483	93.3699
Total	100.000			

ATC level 3 code=N06A : Antidepressants

Data Summary	
Number of Observations	5649
Sum of Weights	152700

FLAG	**Frequency**	**Weighted Frequency**	**Std Dev of Wgt Freq**
Generic & Copie - Generic & Copie	1284	34260	905.96114
Generic & Copie - Originator	144	4020	350.94308
Originator - Generic & Copie	80	2440	285.23759
Originator - Originator	4141	111980	1089
Total	5649	152700	717.77898

FLAG	**Percent**	**Std Err of Percent**	**95% Confidence Limits for Percent**	
Generic & Copie - Generic & Copie	22.4361	0.5860	21.2873	23.5850
Generic & Copie - Originator	2.6326	0.2293	2.1831	3.0821
Originator - Generic & Copie	1.5979	0.1863	1.2326	1.9632
Originator - Originator	73.3333	0.6239	72.1103	74.5563
Total	100.000			

ATC level 3 code = ALL ATC Level 3 code (TOTAL of all ATC presented above)

Data Summary	
Number of Observations	41633
Sum of Weights	1018880

FLAG	Frequency	Weighted Frequency	Std Dev of Wgt Freq
Generic & Copie - Generic & Copie	10517	258240	2341
Generic & Copie - Originator	1006	24460	805.26081
Originator - Generic & Copie	577	14900	653.51183
Originator - Originator	29533	721280	2675
Total	41633	1018880	1700

FLAG	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie - Generic & Copie	25.3455	0.2255	24.9035	25.7875
Generic & Copie - Originator	2.4007	0.0789	2.2459	2.5554
Originator - Generic & Copie	1.4624	0.0640	1.3369	1.5879
Originator - Originator	70.7915	0.2358	70.3292	71.2537
Total	100.000			

5.4 SUBSTITUTION WITHIN THE SAME CHEMICAL SUBGROUP

Analyses at the ATC 4 level By Drug Type prior the hospitalization - Weighted Analyses

ATC4=A02BC : Proton pump inhibitor drugs

Data Summary	
Number of Observations	4206
Sum of Weights	105600

Before Hospitalisation	Type of Change (prior and following hospitalization)	Frequency	Weighted Frequency	Std Dev of Wgt Freq	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie	Both change (name & dosage)	143	3640	317.60639	3.4470	0.3000	2.8587	4.0352
	Change in ATC level 5	264	6720	425.80094	6.3636	0.4014	5.5768	7.1505
	Change only in dosage	96	2280	242.44180	2.1591	0.2296	1.7089	2.6093
	Change only in name	367	9100	482.45912	8.6174	0.4552	7.7251	9.5098
	No change	1657	40640	848.70009	38.4848	0.7903	36.9354	40.0343
	Total	2527	62380	892.31130	59.0720	0.8061	57.4915	60.6524
Originator	Both change (name & dosage)	13	280.00000	79.89291	0.2652	0.0757	0.1168	0.4135
	Change in ATC level 5	198	5120	377.62585	4.8485	0.3561	4.1504	5.5466
	Change only in dosage	112	3100	306.81843	2.9356	0.2893	2.3684	3.5028
	Change only in name	20	480.00000	112.90816	0.4545	0.1069	0.2449	0.6642
	No change	1336	34240	840.85003	32.4242	0.7687	30.9171	33.9314
	Total	1679	43220	897.81497	40.9280	0.8061	39.3476	42.5085
Total	Both change (name & dosage)	156	3920	326.75976	3.7121	0.3088	3.1067	4.3175
	Change in ATC level 5	462	11840	554.56579	11.2121	0.5202	10.1922	12.2320
	Change only in dosage	208	5380	386.72195	5.0947	0.3646	4.3800	5.8094
	Change only in name	387	9580	493.39389	9.0720	0.4655	8.1594	9.9845
	No change	2993	74880	874.91885	70.9091	0.7436	69.4513	72.3669
	Total	4206	105600	565.66592	100.000			

ATC4=A02BC = proton pump inhibitor drugs (Continued)

Before Hospitalisation	Type of Change (prior and following hospitalization)	Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent	
Generic & Copie	Both change (name & dosage)	5.8352	0.5012	4.8526	6.8178
	Change in ATC level 5	10.7727	0.6622	9.4744	12.0710
	Change only in dosage	3.6550	0.3858	2.8986	4.4114
	Change only in name	14.5880	0.7441	13.1292	16.0468
	No change	65.1491	1.0056	63.1776	67.1206
	Total	100.000			
Originator	Both change (name & dosage)	0.6478	0.1847	0.2858	1.0099
	Change in ATC level 5	11.8464	0.8378	10.2038	13.4889
	Change only in dosage	7.1726	0.6903	5.8192	8.5260
	Change only in name	1.1106	0.2605	0.5999	1.6213
	No change	79.2226	1.0566	77.1511	81.2941

Before Hospitalisation	Type of Change (prior and following hospitalization)	Column Percent	Std Err of Col Percent	95% Confidence Limits for Col Percent	
Generic & Copie	Both change (name & dosage)	92.8571	1.9843	88.9669	96.7474
	Change in ATC level 5	56.7568	2.4458	51.9617	61.5518
	Change only in dosage	42.3792	3.5871	35.3466	49.4118
	Change only in name	94.9896	1.1523	92.7304	97.2487
	No change	54.2735	0.9659	52.3798	56.1672
	Total				
Originator	Both change (name & dosage)	7.1429	1.9843	3.2526	11.0331
	Change in ATC level 5	43.2432	2.4458	38.4482	48.0383
	Change only in dosage	57.6208	3.5871	50.5882	64.6534
	Change only in name	5.0104	1.1523	2.7513	7.2696
	No change	45.7265	0.9659	43.8328	47.6202

ATC4=C10AA = HMG CoA Reductase Inhibitors (statins)

Data Summary	
Number of Observations	4325

Data Summary	
Sum of Weights	103720

Before Hospitalisation	Type of Change (prior and following hospitalization)	Frequency	Weighted Frequency	Std Dev of Wgt Freq	Percent	Std Err of Percent	95% Confidence Limits for Percent	
Generic & Copie	Both change (name & dosage)	82	1860	212.62772	1.7933	0.2051	1.3912	2.1954
	Change in ATC level 5	60	1600	217.75917	1.5426	0.2094	1.1320	1.9532
	Change only in dosage	45	1080	168.92871	1.0413	0.1628	0.7221	1.3604
	Change only in name	250	5740	369.88335	5.5341	0.3567	4.8347	6.2335
	No change	993	24200	722.71203	23.3320	0.6826	21.9938	24.6703
	Total	1430	34480	806.26731	33.2433	0.7564	31.7605	34.7262
Originator	Both change (name & dosage)	9	180.00000	59.94447	0.1735	0.0578	0.0602	0.2869
	Change in ATC level 5	92	2440	267.28255	2.3525	0.2568	1.8491	2.8559
	Change only in dosage	161	3760	305.86406	3.6251	0.2947	3.0474	4.2029
	Change only in name	36	840.00000	146.43023	0.8099	0.1412	0.5331	1.0866
	No change	2597	62020	868.57055	59.7956	0.7869	58.2529	61.3383
	Total	2895	69240	854.45213	66.7567	0.7564	65.2738	68.2395
Total	Both change (name & dosage)	91	2040	220.56525	1.9668	0.2128	1.5496	2.3841
	Change in ATC level 5	152	4040	342.13051	3.8951	0.3278	3.2524	4.5378
	Change only in dosage	206	4840	346.71526	4.6664	0.3339	4.0118	5.3210
	Change only in name	286	6580	395.00044	6.3440	0.3809	5.5972	7.0908
	No change	3590	86220	763.22772	83.1277	0.5981	81.9550	84.3003
	Total	4325	103720	525.26404	100.000			

ATC4=C10AA = HMG CoA Reductase Inhibitors (statins) (Continued)

Before Hospitalisation	Type of Change (prior and following hospitalization)	Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent	
Generic & Copie	Both change (name & dosage)	5.3944	0.6065	4.2053	4.2053
	Change in ATC level 5	4.6404	0.6190	3.4269	3.4269
	Change only in dosage	3.1323	0.4845	2.1823	2.1823
	Change only in name	16.6473	1.0129	14.6615	14.6615
	No change	70.1856	1.2646	67.7064	67.7064
	Total	100.000			
Originator	Both change (name & dosage)	0.2600	0.0866	0.0902	0.0902
	Change in ATC level 5	3.5240	0.3820	2.7750	2.7750
	Change only in dosage	5.4304	0.4374	4.5728	4.5728
	Change only in name	1.2132	0.2110	0.7994	0.7994
	No change	89.5725	0.6028	88.3907	88.3907

Before Hospitalisation	Type of Change (prior and following hospitalization)	Column Percent	Std Err of Col Percent	95% Confidence Limits for Col Percent	
Generic & Copie	Both change (name & dosage)	91.1765	2.8379	85.6127	96.7402
	Change in ATC level 5	39.6040	4.2104	31.3494	47.8585
	Change only in dosage	22.3140	3.0789	16.2779	28.3502
	Change only in name	87.2340	2.0835	83.1493	91.3188
	No change	28.0677	0.7950	26.5091	29.6264
	Total				
Originator	Both change (name & dosage)	8.8235	2.8379	3.2598	14.3873
	Change in ATC level 5	60.3960	4.2104	52.1415	68.6506
	Change only in dosage	77.6860	3.0789	71.6498	83.7221
	Change only in name	12.7660	2.0835	8.6812	16.8507
	No change	71.9323	0.7950	70.3736	73.4909

6 APPENDIX CHAPTER 8. QUALITATIVE STUDY

6.1 METHODOLOGY

Given the research questions and the benefit of interactions between participants, a combination of nominal and focus groups were selected as qualitative research method. This method stimulates interaction among participants, which has the potential for greater insights to be developed

6.1.1 Organisation of the groups

Eleven groups were organised, nine with a multidisciplinary group of health care professionals (HCPs) and patient representatives (referred to as 'focus groups with health care professionals'), and two with stakeholders. The focus groups with health care professionals were organised at different locations, geographically spread all over the country. Attention was paid having focus groups in urban as well as in more rural regions. The two groups with stakeholders were organised in Brussels.

At the expert meeting on this part (KCE, 29/04/2010), one expert mentioned that the representativity of the views of specialized physicians was probably limited, as mostly geriatricians had been met and only a limited number of other specialists in internal medicine. Therefore, the researchers added two additional semi-structured one-to-one interviews with specialized physicians in internal medicine. The interviews were based on a similar protocol as the one used for the focus groups; additional information has been added in the results.

6.1.2 Participants

6.1.2.1 Sampling method

Purposive sampling was used to ensure representation of a range of characteristics likely to influence experience and opinions (i.e. presence of different health care professionals and stakeholders in the field). The health care professionals selected were those directly involved in medication management at transition moments. In order to avoid duplication of data from the survey (see chapter 6 of the scientific), we decided to invite HCPs that had no specific previous experience in pilot projects around seamless care with regard to medications. Purposive sampling is a frequently used sampling method in qualitative research, whereby the knowledge of the research problem allows the selection of persons with a specific profile for inclusion in the sample.

6.1.2.2 Composition of the focus groups

Health care Professionals

For each of the HCP focus groups, the following types (n=10) of participants were invited: a general practitioner, a general practitioner-coordinator in nursing home, a hospital physician (preferentially from geriatric, surgery or emergency ward), a community pharmacist, a hospital pharmacist, a ward nurse, a home care nurse, a care coordinator, a discharge manager, a patient (recently discharged from hospital and familiar with health care transition), a patient carer or representative, or a caregiver. This multidisciplinary composition enabled the interaction between the participants and warranted the collection of experienced based information.
The list of types of participants to be invited was based on earlier information on seamless care projects and on lists of people mostly involved in continuity of medication management.

For the hospital physicians, the selection of disciplines was based on international data that showed that most problems and / or initiatives related to seamless care were encountered at geriatric, surgical and emergency departments. Overall, an attempt was made to maximize the number of participants to 10, which is a well accepted number for focus group discussions.

Stakeholders

For the focus groups with stakeholders, people having responsibility in professional organizations of the different disciplines were invited: Domus Medica / SSMG (Société Scientifique de Médecine Générale): general practitioners; BVGG/SBGG (Belgische Vereniging voor Gerontologie en Geriatrie/Société Belge de gériatrie et de gerontology): geriatricians; APB (Algemene Pharmaceutische Bond/Association Pharmaceutique Belge) and OPHACO: community pharmacists; BVZA/ABPH (Belgische Vereniging voor Ziekenhuis Apothekers/Association Belge des Pharmaciens Hospitaliers): hospital pharmacists; Wit Gele Kruis/Croix Jaune et Blanche: home care nurses; Listel Limburg: care coordinators; FOD Volksgezondheid: discharge management and clinical pharmacy; Vlaams patiëntenplatform / LUSS (Ligue des Usagers des Services de Santé): patients; RIZIV/INAMI (Rijksinstituut voor ziekte- en invaliditeitsverzekering / Institut national d'assurance maladie-invalidité). Two additional interviews were conducted with members of unions of medical specialists (VBS/GBS).

This composition allowed to investigate the feasibility of the proposed initiatives from a policy perspective.

6.1.2.3 Sampling procedure

In each selected region (see table below), a hospital was the starting point for participant sampling for the focus groups with HCPs. Hospitals were chosen as a starting point because there is an operational structure (e.g. steering group, discharge management team) having contact with all sectors of health care (the hospital, GPs, nursing homes, pharmacists etc.). The selection of the hospitals was based on the condition that the hospital and surrounding ambulatory care practices had no or limited experience with seamless care initiatives focusing on medication, as the ideas of experts in the field were inventoried in chapter 6.

A good mix of rather rural versus urban, and teaching versus non-teaching hospitals was set up in order to make sure that all types of problems and solutions would be inventoried.

In an initial phase, discharge managers of the selected hospitals were contacted to present the research objectives and methodology, and to ask for possible participation. Further contacts were further made with the hospital management. In close collaboration with the contact persons at the different sites, possible names of representatives of the different disciplines were listed. Attendees were invited through the contact persons of the participating hospitals and/or by a member of the research team. According to the local structure and organisation either the contact person of the hospital or a member of the research team monitored the confirmation of attendance of the different disciplines. The invitation process started at the end of October 2009.

For the focus groups with stakeholders, contact persons of the before mentioned organisations were summoned by the coordinator of this part of the project (JDL; invitation letters: see Appendix 5.2). Stakeholders could indicate their preference for one of two dates and times; confirmation of attendance for both focus groups was monitored by JDL.

All attendees received a gift voucher of € 30 as a reward for their participation.

6.1.3 Running the focus groups

The groups with HCPs were run by a moderator (JDL) and a co-moderator (AS for French focus groups; VF for Dutch focus groups), who also collected illustrative fragments. For the French speaking focus groups, AS and VL made observations and took notes; FD and VF performed these tasks in the Dutch speaking focus groups. Observations and notes were taken on a laptop using the grid of the topic guide.

The focus groups with stakeholders were run by a moderator (JDL) and a co-moderator (VF), who also summarized the ideas in a slide presentation that was used to structure the discussion. FD, VL and AS took notes and made observations.

In the introduction, participants were welcomed by the moderator. Moderator, co-moderator and observer presented themselves to the participants and clarified their role during the focus group. The moderator explained the objectives and the procedure of the focus group.

Participants were asked to sign an informed consent.

A slide presentation (Dutch and/or French for the focus groups with HCPs; English for the focus groups with stakeholders) was used to guide the participants through the different questions of the topic guide (see 1.2.5). For each consecutive question, every participant was first asked to write down his / her own ideas on a form. Subsequently, the moderator started by asking all participants to present their ideas. This was followed by clarification and discussion on the topic by all participants.

For the second focus group with stakeholders, participants were sent some documents by e-mail two days before the meeting, in order to be able to prepare the focus group and make the meeting more efficient. In an accompanying message, they were explained the aim of the focus group, and what preparation from them would fruit the discussion. The same process was applied for the two additional one-to-one interviews.

At the end of all the focus groups, participants were asked to hand in their notes.

All focus groups were tape digitally recorded. All data were handled anonymously.

6.1.4 Topic guide

6.1.4.1 Development of the topic guide

Two topic guides were developed by the research team: one for the focus groups with health care professionals, and one for the focus groups with stakeholders.

Focus groups with healthcare professionals

Themes for the focus groups with HCP were delineated from previous parts in the research project. Open ended questions were chosen, as this type of questions demands for more description and explanation of the participants (Krueger RA, Casey MA. Focus groups. A practical guide for applied research. 3rd edition. California: Sage Publications Inc.; 2000; 215p)

Questions related to 1) problems experienced by participants; 2) solutions highlighted 3) opinion on six key elements of medication management at transition moments, as defined in the Australian guidelines (http://www.health.gov.au/internet/main/publishing.nsf/Content/4182D79CFCB23CA2CA25738E001B94C2/$File/guiding.pdf) proposed initiatives; 4) ideas on which health care professional should coordinate medication management; 5) selection of priorities; 6) barriers, facilitators and prerequisites for the implementation of a top-3 of solutions and 7) prerequisites and preferred target groups for implementation. The complete topic guide is displayed below.

1	Please present yourself (name, professional activities, affiliation with the hospital,…). If you previously or currently participate in seamless care initiatives, please mention briefly.	10 min (10')
2 Introductory question	From your professional point of view, which problems related to drug therapy do you encounter when patients are transferred from one care setting to another? *Please write down on the form you received.* Can each of you report the most important problem you identified?	10 min (25')
3 Transition question	In order to optimize this process, a) what kind of information would you like to receive from other health care professionals, and b) what kind of information can you deliver to others? *Please write down on the form you received.*	10 min (33')
4 Key question	Which solutions do you propose to answer the identified needs (question 2 and 3)? *Please write down on the form you received.*	20 min (53')
5	From previous parts in this research project, different strategies were identified to prevent or minimize drug related problems at transition moments. We would like to discuss several of them with you and ask your opinion on their feasibility (barriers and facilitators).	
5.1 Transition question	From the literature, we identified the following critical steps in medication management: accurate medication history; assessment of current medication management; medication action plan; supply of medicines information to patients; ongoing access to medicines; communicating medicines information. Are these steps familiar to you? Which other steps would you identify? *Please write down on the form you received.*	5 min (58')
5.2 Key question	There seems to be a need for coordination of this process of medication management. According to your opinion, what kind of HCP could, and should, perform this task? *Please write down on the form you received.* To what extent could a clinical pharmacist perform this task?	13 min (71')
5.3 Key question	What kind of technical support systems are needed to support your role and/or the role of the coordinator in medication management at transition moments? What are the characteristics of these systems? *Please write down on the form you received.*	16 min (84')
6 Transition question	From the elements discussed before, what actions need priority? *Please list your top three.*	8 min (92')
7 Key question	In order to implement the priorities, what are Barriers? Facilitators? Prerequisites? *Please write down on the form you received.*	15 min (107')
8 Key question	According to your opinion, which profiles of patients need priority and would benefit most from these interventions? *Please write down on the form you received.*	8 min (115')
9 Concluding question	What would you like to add to this discussion that was not covered by previous questions?	5 min (120')

Focus groups with stakeholders

Themes for the focus groups with stakeholders were identified from the focus groups with the health care professionals. Questions related to 1) problems highlighted by the HCPs; 2) initiatives taken by professional organisations; 3) solutions mentioned in focus groups with HCPs; 4) barriers, facilitators and prerequisites for the implementation of a selection of these solutions (see procedure) and 5) ideas on further steps to be taken in order to enhance seamless care.

The complete topic guide is displayed below.

1Opening question	Please present yourself (name, professional activities, professional organisation,…).	5 min (5')
2 Introductory question	From the first round of nine focus groups with people from the field, we identified the following problems. Which of these problems are known **within your professional organization**? *Please tick on the form you received.* Can each of you give an overview of the problems you ticked?	12 min (17')
3 Transition question	Which of these problems are you currently working on in your professional organization? *Please tick on the form you received.* Can each of you give an overview of the problems you are working on?	5 min (22')
4 Key question	Please clarify briefly how you tackle these problems. What kind of solution are you working on? Which phase (concept phase / pilot / implemented)? Any partners?	15 min (37')
5	From the literature, we identified the following critical steps in medication management: accurate medication history; assessment of current medication management; medication action plan; supply of medicines information to patients; ongoing access to medicines; communicating medicines information. (see information under 1.3; will be summarized and presented in a Figure on slide) These steps seem to fit well with the problems encountered and expectations of the people in the field regarding good medication management. Consequently, solutions should support the implementation of these steps.	3' (40')
5.1 Key question	This is a list of solutions that were identified by people in the field during the previous focus groups. To your opinion (professional organization!), which solutions would have the largest impact on medication management at transition moments? Why? Which solutions are feasible? Which barriers, facilitators and prerequisites do you identify? *Please indicate on the form you received.*	35 min (75')
5.2 Key question	For the problems identified, do you see other solutions than those listed? *Please write down on the form you received.*	10 min (85')
6 Key question	From the elements discussed before, which solutions would you support from your professional organisation? Why or why not?	10 min (95')
7 Key question	How to proceed? Who should take leadership in the development of seamless care: At national level? At local / practice level?	10 min (105')
8 Concluding question	What would you like to add to this discussion that was not covered by previous questions?	5 min (110')

6.1.5 Data analysis

Data analysis started from the notes taken during the focus groups. . Given the short time span, verbatim transcription of the focus groups and in-depth text-based analysis was not feasible.

A framework analysis approach was applied. This analysis is suited for policy research: the objectives of the investigation are set in advance and shaped by the information requirements of the project. Besides, it allows analyzing issues raised from the respondents themselves and views or experiences that recur in the data (Pope C, Mays N. Qualitative research in health care. Third ed. Oxford: Blackwell Publishing; 2006; 156p.)

After each focus group, the research team (moderator, co-moderator and observer) resumed and discussed the main themes emerging from the focus group, to list the problems and solutions mentioned and to discuss the most striking impressions and results. The observers of each group merged their observations and notes to one unique text file.

In a first round, one researcher (JDL) coded the items as they appeared in the unique observation files. When a code was present, it was marked with a cross in a summarizing file, generating a semi-quantitative overview of the codes. This summarizing file was composed in English, in order to facilitate joint coding from the Dutch and French observation files.

When something was unclear, the personal notes of the participants were manually reviewed and audiotapes were consulted.

Two overview files of respectively all problems and all solutions were composed after the last focus group with HCPs, and were structured according to either the specific part of the transition process or the characteristics of the problem / solution. The codes were reviewed, regrouped and clustered (JDL, VF, FD).These files served as the main documents to be discussed during the focus groups with stakeholders.

In a second round of analyzing the data, the observation files of each of the focus groups with HCPs were re-read and coded using the numbering in the problems' and solutions' file respectively. For each of the problems / solutions identified, it was indicated who of the HCPs mentioned the respective item, and, if appropriate, quotes were added to the coding document. These quotes (which were in Dutch or French), were later on translated in English. For the solutions, also the barriers, facilitators and prerequisites were listed. The latter analysis was limited to the solutions that were at least in one of the focus group mentioned as a 'top 3' solution, i.e. a solution for which most of the participants agreed that it needed priority. Coding was done by FD for the focus groups in Dutch and the focus group in Brussels. VF checked the codes; final allocations were decided in consensus. VL and AS coded the observation files of the French focus groups.

6.2 RESULTS

6.2.1 Description of the focus groups

Between mid-December 2009 and the beginning of February 2010, eleven focus groups were performed: nine focus groups with health care professionals, two with stakeholders. On average the groups lasted the planned two hours.

Overview of the groups

N°	Date	Location	Language	Participants
FG1	16/12/2009	Charleroi	French	HCPs
FG2	16/12/2009	Ieper	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%). Forty (40.0%) participants were French speaking, 60 (60.0%) were Dutch speaking. All the aforementioned disciplines were present in most focus groups.

6.2.1.1 Composition of the groups with HCPs and patient representatives

The composition of the HCPs groups is provided below.

Participants	**FG1**	**FG2**	**FG3**	**FG4**	**FG5**	**FG6**	**FG7**	**FG8**	**FG9**	**Total**
Care coordinator (CC)		1		2			3		2	**8**
Community pharmacist (CP)	1	3	1	1	1		1		1	**9**
Discharge manager (DM)	1		1		1	1				**4**
General practitioner (GP)	2	2	1	1	1	1	2	1	1	**12**
Home nurse (HN)	1	1	1	1	1		2	1	1	**9**
Hospital pharmacist (HP)	1	1	1	1	1	1	1	1	1	**9**
Patient/Carer (P)	1	1	1	1	1	1	1	1	1	**9**
Specialized physician (SP) *-Geriatrics* *-Nephrology* *- Cardiology* *-Hygienist* *-Psychiatry*	*1*	*1*	*1*	*1*	*1* *1* *1* *1*	*1*	*1*	*1*		**11**
Ward Nurse (WN)	1	2		1	1	1		1	1	**8**
Home assistance (HA) *Nursing home manager (NM)* *Social service (SS)*		*1* *1* *1*				*1*		*1*		***1*** ***1*** ***3***
Number of participants	**9**	**15**	**7**	**9**	**11**	**7**	**11**	**7**	**8**	**84**

Three of the 12 GPs were also GP coordinators in a nursing home. In some focus groups, the care coordinator worked part time in social service or as ward nurse. Their opinion on the topics discussed was therefore based on both experiences. In one Flemish group the patient perspective was presented by a GP who discussed the experiences of five written patient cases from his practice. In one French-speaking group the patient perspective was presented by a member of a patient association.

The community pharmacist was lacking in FG 6 due to a car accident on the way to the meeting. He commented later on the observation file of the respective group. In FG 8 the community pharmacist was not present due to unexpected circumstances. An indirect input from a community pharmacist was provided by the hospital pharmacist, whose wife was a community pharmacist. He therefore commented from both perspectives. In one Flemish focus group the ward nurse was not present due to unexpected admission of patients.

6.2.1.2 Composition of the focus groups with stakeholders

The composition of the stakeholders' focus groups is shown in the table below.

Representatives of	**FG10**	**FG11**	**Total**
Care coordinators		1	**1**
Community pharmacists	1		**1**
General practitioners	2	2	**4**
Geriatricians	1	1	**2**
FOD	1		**1**
Home nurses	1		**1**
Hospital pharmacists	1	2	**3**
Patients	1	1	**2**
RIZIV / INAMI		1	**1**
Number of participants	**8**	**8**	**16**

As explained above, the two additional one-to-one interviews were conducted with specialists in internal medicine.

6.2.2 List of all participants

Locatie focus group	**Naam**	**Voornaam**	**Functie/Titel**
Ieper	Catteeuw	Chantal	Ward nurse
Ieper	Leroy	Viviane	community pharmacist
Ieper	Lauwers	Eveline	hospital pharmacist
Ieper	Wyseur	Patrick	GP
Ieper	Caenepeel	Emmely	social service
Ieper	Coeman	Carine	home nurse
Ieper	Demeyer	Danny	specialist geriatrician
Ieper	Lecluyse	Lieve	patient/patient/carer/ patient representative
Ieper	Vandewal	Jacques	community pharmacist
Ieper	Vervisch	Pieter	community pharmacist
Ieper	Vandeale	Hendrik	Ward nurse
Ieper	Vulsteke	Jef	GP
Ieper	Maerten	Johan	care coordinator
Ieper	Hemelsoen	Hilde	hospital direction
Ieper	Vandeputte	Hilde	home assistance
Duffel	Reyntjens	Wim	GP
Duffel	Verheyen	Lore	home nurse
Duffel	Peeters	Martine	care coordinator

Duffel	Mergaerts	Patricia	patient/patient/carer/ patient representative
Duffel	Van Dijck	Herwig	hospital direction
Duffel	De Schepper	Marc	hospital pharmacist
Duffel	Smeets	Tom	community pharmacist
Eeklo	Lievens	Christine	community pharmacist
Eeklo	De Schrijver	Marianne	patient/patient/carer/ patient representative
Eeklo	Baeyens	Hilde	specialist geriatrician
Eeklo	Van Rossom	Agnes	care coordinator
Eeklo	Bulcaen	Sandrine	Ward nurse
Eeklo	Snoeck	Leen	hospital pharmacist
Eeklo	Mouton	Petra	home nurse
Eeklo	Van Wonterghem	Jo	GP
Eeklo	Apers	Odri	care coordinator
Charleroi	Rochet	Jean Francois	coordinator GP nursing home
Charleroi	Blanche	Jean Louis	community pharmacist
Charleroi	Fevrier	Dominique	home nurse
Charleroi	Godart	Frederique	discharge manager
Charleroi	Tenheede	Franz	patient/patient/carer/ patient representative
Charleroi	Eloy	Maryvonne	care coordinator
Charleroi	Kenguitameze	Joseph	specialist geriatrician
Charleroi	Geniesse	Christian	coordinator GP nursing home
Charleroi	Douchamps	Jacques	Hospital pharmacist
Ottignies	Gillain	Benoit	specialist psychiatrist
Ottignies	Lemaire	Monique	hospital pharmacist
Ottignies	Dehopre	Stéphanie	Ward nurse
Ottignies	Bernard	Xavier	specialist cardiology
Ottignies	Peneff	Brigitte	home nurse
Ottignies	Vandendorpe	Jean Marie	patient/patient/carer/ patient representative
Ottignies	Crutzen	Luc	community pharmacist
Ottignies	De Waele	Jean Francois	discharge manager
Ottignies	Wauthier	Michel	specialist nefrologist
Ottignies	Luyx	Catherine	specialist geriatrician
Ottignies	Bleeckx	Alain-François	GP
Genk	Dillen	Geert	care coordinator
Genk	Christa	Gilissen	hospital pharmacist
Genk	Kindt	Inge	home nurse
Genk	Martens	Marc	patient/patient/carer/ patient representative
Genk	Vandeweerd	Dirk	coordinator GP nursing home
Genk	Vansloen	Marc	home nurse
Genk	Voets	An	care coordinator
Genk	Maesen	Viviane	care coordinator
Genk	Quintiens	Eddy	community pharmacist
Genk	Van Loon	Ronny	specialist geriatrician
Genk	Vanhoof	Jos	GP
Liège	lambert	pascale	social service
Liège	Boüüart	Corinne	GP
Liège	Peterman	Jean	specialist geriatrician

Liège	Samalea	Audrey	hospital pharmacist
Liège	Bouvanger	jean marie	Ward nurse
Liège	Fierens	Micky	patient/patient/carer/ patient representative
Liège	Mathurin		social service
Libramont	Juckler	Jean Paul	hospital pharmacist
Libramont	Thiry	Myriam	GP
Libramont	Deneffe	Marylene	Ward nurse
Libramont	Gilles	Christian	specialist psychiatrist
Libramont	Henin	Frederic	home nurse
Libramont	Zigrand	M	patient/patient/carer/ patient representative
Libramont	Slachmuylders	anne	social service
Brussel	Arnout	Liesbet	hospital pharmacist
Brussel	De Smet	Willy	home nurse
Brussel	Louwagie	Erika	care coordinator
Brussel	Aeyels	Daan	care coordinator
Brussel	Geens	Florimond	patient/patient/carer/ patient representative
Brussel	Croon	Jos	Ward nurse
Brussel	Clément	Nathalie	community pharmacist
Brussel	Vanhalewyn	Michel	GP
Bru stakeholder 1	Jehaes	Michel	stakeholder coordinator gp nursing home
Bru stakeholder 1	Deneyer	Hilde	stakeholder pharmacy community
Bru stakeholder 1	Even-Adin	Danniele	stakeholder pharmacy hospital
Bru stakeholder 1	Petrovic	Mirko	stakeholder specialist geriatrician
Bru stakeholder 1	Paquay	Louis	stakeholder home nurse
Bru stakeholder 1	Dewez	Evelyne	stakeholder patient
Bru stakeholder 1	Vanden Bremt	Irene	stakeholder fod
Bru stakeholder 1	Vandevoorde	Jan	stakeholder GP
Bru stakeholder 2	Baeyens	Stéphane	stakeholder GP
Bru stakeholder 2	van Meer	Nele	Stakeholder home care coordinator
Bru stakeholder 2	Boland	Benoit	stakeholder specialist
Bru stakeholder 2	De Swaef	André	stakeholder pharmacy
Bru stakeholder 2	Faelens	Rudy	stakeholder coordinator gp nursing home
Bru stakeholder 2	Van Beek	Frank	stakeholder pharmacy
Bru stakeholder 2	Bruyninckx	Klaartje	stakeholder patient
Bru stakeholder 2	Willems	ludo	stakeholder pharmacy

6.3 LISTS OF IDENTIFIED PROBLEMS AND SOLUTIONS, USED DURING FOCUS GROUPS WITH STAKEHOLDERS

- indication of the groups in which the respective problems or solutions were mentioned, and some illustrative quotes

6.3.1 Overview of problems

	Problems identified	FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8	FG9	Quotes
A	**AT ADMISSION**										
A1	No medication list		X	X		X		X	X	X	*FG2/GP: 'Patients often don't know what they take'* *FG9/P: 'I went to the hospital for a one day procedure. Due to adverse events, I had to stay overnight. Nobody knew my medication list'*
A2	Incomplete medication list: no auto-medication, no OTC, no supplements, no details on patient-specific preparations	X	X	X	X		X	X	X	X	*FG2/CP: 'Sleeping tablets are not mentioned as well as eye drops. The latter ones are not seen as medication'* *FG4/WN: 'When I ask people their list, I get a wrinkled sheet of paper.'*
A3	Incomplete data on medication in medication list: no dose, no specifications on galenic form, no indication, no exact time of intake		X		X	X		X	X		*FG4/SP: 'For anti-coagulants, it is mentioned "dosage: see scheme". But there is no scheme!'*
A4	Lack of information on indication of (prescribed) medicines			X	X			X	X		*FG4/SP: 'There is often no clear information about the indication for a drug, which hinders our decisions.'*
A5	Confusion and little information about generic products	X		X		X				X	*FG3/HP: 'At admission patients talk about "docX" or "a red box". Often a lot of information is missing.'*
A6	Energy and time needed to get insight in patients medications list (phone call to GP, family, community pharmacist, nursing home,...)	X		X	X		X	X	X	X	*FG3/DM: 'At admission we ask the patient and the family and often there is a discrepancy. What do patients know and what do they want to tell?'* *FG7/S 'The files of home nurses are never in accordance with reality.'*
A7	At emergency admission: no information at all					X					*FG5/SP: 'For patients being admitted to the cardiology unit and the emergency departments, we often have no information at all.'*
B	**AT DISCHARGE**										
B1	No contact between hospital and GP to prepare or communicate on discharge					X	X		X		*FG6/GP: 'Another problem is that we are not informed in time so we can't arrange ourselves in an adequate way'*
B2	Timing: discharge at Friday afternoon causes problems	X	X	X		X	X	X	X	X	*FG3/HN: 'There are still many discharges on Fridays. A lot of patients are dependent on other people to go to the pharmacist. If*

											nobody comes on Monday, they are often lacking medication.'
B3	Discharge medication for three days: often not given to patients (as to obtain cost savings on the hospital level); for some patients / situations too little	X	X	X	X	X	X			X	*FG3/HP: 'Due to the medication forfait in hospitals, the budget is limited. Every euro has to be questioned, causing problems of availability.'*
B4	Discordance between different pieces of information, errors and inconsistencies between drugs on the medication list and drugs given to the patient at discharge	X	X	X	X	X	X	X			*FG2/HN: 'It is difficult for home nurses to prepare the medicines if other names than in the file are on the packages.'* *FG7/GP: 'The doses are often not in concordance, e.g. insulin dosage'*
B5	Lack of information for primary care HCPs and patients (e.g. reasons for change; new medicines;...)	X		X	X	X	X	X	X	X	*FG2/NM: 'Discharge information is often missing or not complete.'* *FG6/GP: 'The community pharmacist is not enough involved in the discharge process.'* *FG7/P: 'Especially at discharge from emergency department: documents not readable, hand written.'* *FG8/HN: 'It is important to have explanations about the monitoring of adverse effects.'* *FG8/SP 'We need to explain to our colleagues the reason for starting or stopping some medications, the reasons for modifications.'*
B6	Quite some work for HCPs to compose correct medication list for patient	X		X	X	X				X	*FG3/CP: 'At discharge is a lot of work for us, community pharmacists. We succeed to support the patient, but it remains difficult. It can't be done by the assistant. The pharmacist himself has to do it. And it is even a bigger problem for pharmacists on duty who do not know the patient.'*
B7	Chapter 4 drugs: unclear information about attestation (Eligibility patient? Administrative process started?)	X	X	X	X	X	X	X	X	X	*FG2.SP: 'Bf/chapter 4 drugs are not prescribed in hospitals but they are prescribed in primary care. Nobody knows where the information is.'* *FG7/CP 'For example people with acid inhibitors for Alzheimer's disease: they don't' know if the procedure has already been started'*
B8	Difficulties for primary care HCPs to reach HCPs in the hospital	X									
B9	Availability of drugs: hospital-limited delivery; no availability in Belgium	X					X	X	X	X	*FG8/HP: 'Some drugs are difficult to have access to for the community pharmacist.'*
B10	No transmission of information on medicines given on day care wards (e.g. oncology)			X							*FG3/HP: When the day care centres don't give information, the data are not complete'.*
B 11	Modification of drugs due to hospital formulary that are not changed back at discharge	X				X	X		X		*FG1/ GP and FG5/SP: 'Even when the same product is used, the name changes and they don't switch it again at discharge'* *FG6/GP: 'It happens often that a patient has the same medication*

											twice.'
C	**AS TO PROFESSIONS**										
C1	GP has other ideas about indication than specialist (e.g. anti dementia drugs)								X		*FG2/GP: I don' twant to contradict the specialist, so I continu even if I don't agree with it'*
C2	Hospital pharmacist doesn't meet the patient			X	X						
C3	Assistance of patients in their medication management (including administration), is not reimbursed.				X				X	X	*FG4/HN: 'It is not the nurses' task to go to the pharmacy.'*
C4	HCPs do not succeed in keeping an up to date medication list of their patients			X	X			X		X	*FG3/GP: 'We try to keep the files up to date; but it is difficult.'* *FG4/GP: 'For acute medication it is more difficult to keep everything up to date'* *FG5/SP: 'Even in a dialysis centre where we see the patient three times a week and do a review every month, we miss information, due to changes by the patient himself'*
D	**AS TO PATIENTS AND FAMILY**										
D1	Lack of knowledge on medicines		X	X	X		X	X		X	*FG1/CC: 'The patients often don't know what they take and often they take drugs that are over date'.*
D2	Lack of education by HCPs on medicines		X	X			X	X	X	X	*FG3/P: 'There is lack of time to explain it to the patient. "Ask your GP" they say. You get your drugs in a plastic bag.'* *FG6/P: 'Very soon they think the patient wouldn't understand. First of all take the patient as a responsible person.'*
D3	Uncertainty about patient compliance		X	X	X		X				*FG2/GP: 'Do patients take their drugs as they are supposed to do?'* *FG4/WN: 'We see that Parkinson medication very often is taken the wrong way.'*
D4	Inability to handle drugs (cognitive dysfunction; blister handling; vision impairment) and manage therapy		X	X	X		X	X	X	X	*FG3/P: 'One should be attentive to small disturbances: hearing and vision problems'* *FD2/SS: 'I question whether the patient is sufficiently independent to take the drugs.'* *FG4/HN: 'For some patients we prepare the medication once a week, for others three times a day. This has important financial consequences.'*
D5	Shopping by patients, both at physicians' and pharmacists' level				X				X		*FG8/WN: 'When people have two general practicioners, it is difficult to have accurate information.'*
D6	Changing of drugs by patients, without intervention of a physician	X	X			X					*FG2/ HN 'Patients decide themselves what they take or not. They throw away or add themselves'.*
E	**PROCESSES**										
E1	Loyalty to laws and regulations (GPs are forced			X	X	X	X	X	X		*FG3/SP: 'The hospitals receive a forfait based on the national*

	to prescribe drugs at the lowest cost for society; specialists' choice is driven by formulary of the hospital)										*average consumption. And every year the average goes down. This is causing problems.'* *FG4/GP: 'It is strange that GPs can prescribe everything and that specialists are restricted.'*
E2	Broad offer of generic products on the Belgian market, causing frequent switches between products (including generic – originator switches)			X				X			*FG3/SP: 'We use a formulary at the hospital and are obliged, by pressure of outside the hospital, to use X and Y. Therefore we don't understand each other anymore. We need to apply the formulary outside the hospital as well.* *FG7/CP: 'Why do the names of generics change every two months?'*
E3	Drug substitution (by all HCPs)	X	X	X	X			X		X	*FG2/GP: 'Drug substitution causes problems: patients do not know that drugs are the same. This can lead to mistakes'*
E4	Documents (prescriptions, medication lists,...) not readable and/or not understandable		X	X	X			X	X	X	*FG2/HN 'Tables for professionals are not understandable for patients.'* *FG7/HN 'Different ways of coding schemes between hospital and home care'*
E5	No electronic prescription at the hospital					X					
F	**MISCELLANEOUS**										
F1	Patients can take their drugs themselves, causing fear and double use (automedication)									X	

6.3.2 Overview of solutions

	Solutions identified	FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8	FG9	Quotes
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				X			X			
A2	Encourage patients to bring their medicines on admission, in order to improve and to ease medication history taking		X		X			X		X	*FG9/HP: 'We have a small project using a 'small bag It works.'*
A3	Oblige hospitals to deliver drugs at discharge and to apply existing regulations				X	X	X		X	X	*FG9/CC: 'The hospital direction has financial incentives not to do so*
B	**Small technology and standardisation**										
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.		X	X	X	X	X	X	X	X	*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)"*
B2	Accurate list of medicines, to be carried and managed by the patient (paper-based or electronic, e.g. on SIS card or ID card)	X	X	X	X	X	X	X	X	X	*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.'* *FG5/CP: 'It supposes that every professional completes the card.'* *FG9/CC: 'The patient's role in the management is underestimated. Patient information carier is a pragmatic alternative waiting for an electronic platform'"*
B3	Standardized referral letter to be used from primary care to secondary care				X		X	X	X	X	*FG6/GP: 'GP's should use a standardised referral letter"* *FG4/HN: "We need an up-to-date info from home to hospital including who is involved as HCP's"* *FG7/CP: "Give medication history of the past 6 months"*
B4	Discharge file with all relevant documents for patients and HCPs (from specialist to	X	X	X		X			X	X	*FG1/NM: 'We need dosage, when it has to be taken and when they got it the last time in the hospital.'*

	GP, from hospital pharmacist to community pharmacist, from ward nurse to home care nurse,….)										
B5	Uniform regional drug formulary			X							*FG3/SP: 'We need a standardisation of drug formulary between hospital and nursing home.'*
C	**Technical support (IT)**										
C1	Centralised national electronic database with all information on all **drugs** (+related products) delivered to patients, whatever the setting of care – if patient consents	X	X		X			X			*FG7/P: "So that there is only one list. Then patient do not have to take care of this"*
C2	Centralised electronic **medical** file (standardised, protected), accessible by different HCPs, whatever the setting of care – if patient consents		X					X	X		*FG7/CP:"Medication history should be seen by every caregiver, for example, the GP could check which generic has been prescribed"*
C3	Centralized national electronic patient file, including **medical**, **pharmaceutical, care and social information,** whatever the setting of care – if patient consents	X	X	X	X		X	X		X	*FG3/DM: 'We need an extramural electronic file so we don't need to be detectives.'* *FG4/GP: 'We need good electronic systems with the use of KHMEHR (computerised medical health record)'* *FG6/GP: 'The hierarchy and access must be well developed.'* *FG3/HP: "Data should be collected somewhere. There are so many details, which can be simply joined together"* *FG1/GP: "We don't accept that data are exchanged via internet or mails because they are not protected"*
C4	Electronic prescribing in hospitals, facilitating appropriate prescribing and administration procedures for reimbursement of drugs		X	X		X	X	X	X	X	*FG2/HN: 'At discharge: an electronic module that allows us to go back to the original drug a patient is taking can avoid double intake.'* *FG5/SP: "Pending clinical pharmacists, we should have the electronic prescription with logiciels of interactions"*
C5	Database with contact details for HCPs in primary and secondary care					X	X			X	
C6	On-line and real-time available procedures for chapter 4 drugs				X	X		X			*FG4/SP: About procedures for chapter 4 drugs, "if we now simply electronically could do it..."*
D	**New nomenclature**										
D1	Assistance of patients in their medication management (e.g. for home care nurses)	X	X	X	X			X	X	X	*FG8/SS: "For patients whose cognitive functions are impaired, someone has to prepare medicines at home but this is not included in the nomenclature INAMI of nurses"* *FG9/HN: "There is no nomenclature for nurses to manage*

											medication: we have to do something else, for example wash the patient"
D2	Fully reimbursed visit by the GP for patients post-discharge (2-3 days) in the third payer system	X	X	X	X				X		*FG3/GP: 'The hospital must advice the patient to call his GP.'*
D3	Therapeutic education for patients	X		X	X	X	X	X		X	*FG2/SP: 'ICT installs correctness of the information but not necessary correct transmission of information to the patient.'* *FG4/P: 'Why is this drug prescribed? What are the adverse effects?'* *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 I do not take the medicine.'"*
E	**TRANSITION process**										
E1	Clinical pharmacy (e.g. standardized drug history taking).	X	X	X			X			X	*FG8/SP: "We need the expertise of a clinical pharmacist"*
E2	Contact between the hospital and primary care HCPs shortly before discharge to discuss relevant information			X		X		X	X	X	*FG2/GP: 'I want to discuss on beforehand with the specialist why some drugs are prescribed.'* *FG4/SP: "It should be necessary to consult with the specialist who has prescribed a generic medicine* *FG3/HN: "It would be nice if all dependant patients are systematically followed by the social service, which then can make contact with home and hospital" "*
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		X	X	X		X		X		*FG8/HN: "When patient returns home on Friday and Saturday, for certain types of drugs not necessarily available in pharmacies, difficulty for these people to continue their treatment without stopping."*
E4	Medication discharge plan sent to community pharmacist, GP and home care nurse, upon discharge	X				X	X			X	*FG1/GP: 'We want that the specialist specifies what must be followed-up, especially in oncology"*
F	**GENERAL PROCESSES**										
F1	Reduction of administrative workload (e.g. attestation,...)			X	X						
F2	Reduction of range of generic products on Belgian market			X	X			X			*FG7/P: "Why not only 1 generic for each medicine with the same dose, name, color and box.We need the same size and color for tablets of the same product."*
F3	Use substance names for drug prescribing (DCI / Voorschrift op stofnaam)						X	X			*FG2/SP: "Allow community pharmacists to chose the appropriate brand for a patient to support continuity"'*

F4	Local consultation to enhance cooperation between settings of care and between HCPs (micro- and meso-level).			X	X	X	X	X	X	X	*FG7/P: 'As a patient I want to give a central role to the GP because he knows the antecedents. GP should be central and also an intermediary person. Much more communication is needed'* *FG8/WN: 'ICT can regulate many things but not all: each HCP has to explain his approach'* *FG4/SP: "It would be good to involve the specialist, GP, pharmacists to discuss what to do while incompatibilities"*
G	**Extra**										
	Hospital practitioners					X					
	Perform discharge management			X							
	Fixed 'chaperon' for patient during hospitalisation			X							
	Coordination of care at home and in the hospital			X							
	Transmural care									X	
	Enhance the communication process							X			
	Cahier de liason								X		
	Obligatory registration with GP and ambulatory pharmacy							X		X	
	Taking social factors in mind			X							
	Medical specialist should also prescribe generic products							X			
	Generic products, whatever the name, the same size and colour									X	
	Medication review every year				X						
	Readable information leaflets				X						

7 APPENDIX CHAPTER 9. PERSONS INTERVIEWED DURING THE PREPARATION OF THE CONCLUSIONS

- F. Robben, eHealth
- Prof. Dr. Ir. M. Nyssen, VUB, Recip-e
- Dr. J. De Vlies, Prorec and E-prescribe
- A. De Swaef, RIZIV-INAMI

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