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Division of Pharmacology and Pharmacotherapy  
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# **FROM PAPER TO CYBER**

## **– Medicines Information as a Strategic Goal in Finland and the European Union**

**Niina Mononen**

DOCTORAL DISSERTATION

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*Never be too big to ask questions,  
never know too much to learn something new.*

*- Augustine Mandino –*

# ABSTRACT

Medicines information (MI) is an essential part of rational pharmacotherapy. Intensified clinical research and more matured pharmacovigilance systems have produced more information on therapeutic effects of pharmacotherapies to facilitate more detailed profiling of their benefits and risks. In turn, more open communication on medications with patients has been facilitated by drug safety issues, patients' right to know about their treatments and by a significant increase in electronic information sources. Even though a wide variety of evidence-based MI sources for patients and consumers is currently available, the coordination between MI sources and their providers has been limited. The need for coordination has become more evident as the number of MI sources and providers has substantially increased over time.

Improved communication on medicines to patients and consumers has been a strategic priority in developing MI practices in the European Union, including Finland, during the 2000s. To enhance the coordination of MI practices in Finland, the Finnish Medicines Agency Fimea published the first national MI strategy in 2012. The primary goal of the national MI strategy is to influence MI practices in all social and healthcare settings to reach the ultimate goal of well-informed patients who adhere to their medication.

This thesis examines MI practices and policies in Finland during the 2000s. The primary goal of the thesis is to support the strategic development of MI and the implementation of the national MI strategy. The thesis comprises three independent studies (I–III) in which both quantitative and qualitative research methods were applied. They investigated development targets for MI practices in Finland based on a systematic review of the existing literature (I), assessed long-term trends in the receipt of MI among the Finnish adults (II), and evaluated how well the ultimate goal of the national MI strategy regarding well-informed adherent patients with chronic diseases had been achieved at the midpoint of the strategy period in 2015 (III).

The systematic review on MI research conducted in Finland during 2000–2016 found 126 studies that covered a wide range of approaches applying various research methods (Study I). More than half of the studies were qualitative (54% of all studies,  $n=68$ ), although surveys were the most commonly used individual method (47%,  $n=59$ ). Twelve studies were interventions and only six studies applied a theory. Patient counselling in community pharmacies was the most commonly studied topic (19%,  $n=24$ ). Regardless of some methodological pitfalls, MI research provides a multifaceted understanding of MI practices and their development needs in Finland. Research should shift towards larger research lines having a stronger

theory base and study designs. Future research should be focused on the effectiveness of MI in different healthcare settings, along with the use of electronic MI sources and services, MI literacy, MI needs among patients and healthcare professionals (HCPs).

Based on the nationally representative repeated postal survey “Health Behaviour and Health among the Finnish Adult Population” conducted by the National Institute for Health and Welfare during 1999–2014, physicians, community pharmacists and package leaflets were the main MI sources among adult medicine users aged 15–64 years (n=18862) throughout the study period (Study II). The use of the Internet as a MI source increased the most noticeably, being used by 1% of the adult medicine users in 1999 and 16% in 2014. The number of medicine users who did not receive MI from HCPs more than doubled (17% to 38%), and the number of medicine users who did not receive MI from any sources increased by sevenfold (4% to 28%) during the study period. It is necessary to continue research on trends in the receipt of MI at the population level and to identify population groups requiring special attention, such as senior citizens with multiple medications. Further evidence is also needed on factors contributing to a growing number of medicine users not receiving MI.

According to the interviews among stakeholder representatives (n=79, 71%) involved in the implementation of the national MI strategy, the medication use processes for patients with chronic diseases requires development at every level of implementation (i.e., *macro*, *meso*, *micro*) (Study III). Medication counselling and other care advice by HCPs, particularly by community pharmacists, were the best implemented actions in general. The major actions needing development at the infrastructure level (*macro*) concern the coordination of care, transfer of patient information between care units, lack of reconciled medication lists, and local and national agreements on the responsibilities of patients and HCPs involved in the medication use process; at the HCP level (*meso*), focus on implementing the entire medication use process in primary and social care, particularly in geriatric units; and at patient level (*micro*), related to limited patient involvement in their care, lack of patients’ adherence to treatment and the inability of patients to retrieve information. Patients need to be better involved in implementing their treatment by improving empowerment and partnership to achieve the goal of well-informed adherent patients.

## **KEYWORDS**

Medicines information, medicine user, patient, strategy, Finland

# TIIVISTELMÄ

Lääkeinformaatio on keskeinen osa rationaalista lääkehoitoa. Kliinisten lääketutkimusten lisääntyminen ja lääketurvatoiminnan kehittyminen ovat lisänneet tietämystä lääkkeiden vaikutuksista. Lääkitysturvallisuuden edistämistyö, potilaan oikeus saada tietoa käyttämistään lääkkeistä ja sähköisten lääkeinformaatiolähteiden määrän merkittävä kasvu ovat mahdollistaneet potilaille avoimemman tiedonsaannin lääkeshoidoista. Vaikka näyttöön perustuvia lääkeinformaatiolähteitä potilaille ja kuluttajielle on nykyisin saatavilla yhä enemmän, koordinaatio informaatiolähteiden ja niiden tuottajien välillä on ollut puutteellista.

Potilaiden ja kuluttajien lääkeinformaation saannin parantaminen on ollut strateginen tavoite Euroopan unionissa 2000-luvulla. Tähän liittyen Lääkealan turvallisuus- ja kehittämiskeskus Fimea julkaisi ensimmäisen kansallisen lääkeinformaatiostrategian vuonna 2012. Strategialla halutaan vaikuttaa lääkeinformaatiokäytänteisiin kaikkialla sosiaali- ja terveydenhuollossa, jotta saavutettaisiin tavoite hyvin informoiduista ja lääkehoitoihinsa sitoutuneista potilaista.

Väitöskirjatutkimuksessa tutkittiin lääkeinformaatiokäytänteiden kehittymistä Suomessa 2000-luvulla sekä sitä, miten Euroopan unionin linjaukset ovat näkyneet siinä. Tutkimus jakautui kolmeen osatyöhön, joissa tutkittiin 1) lääkeinformaatiokäytänteiden kehittymistä Suomessa tutkimustiedon valossa 2000-luvulla, 2) aikuisväestön lääkeinformaation saannin kehittymistä vuosina 1999–2014 ja 3) kansallisen lääkeinformaatiostrategian toteutumista kolme vuotta sen käynnistymisen jälkeen vuonna 2015.

Ensimmäinen osatyö toteutettiin järjestelmällisenä kirjallisuuskatsauksena Suomessa vuosina 2000–2016 julkaistuista lääkeinformaatiotutkimuksista (n=126). Yli puolet (54 %, n=68) tutkimuksista oli laadullisia, vaikkakin kysely oli yleisimmin käytetty yksittäinen tutkimusmenetelmä (47 %, n=59). Interventiotutkimuksia oli yhteensä 12. Kuudessa tutkimuksessa oli hyödynnetty teoriaa viitekehystenä. Lääkineuvonta avohoidon apteekeissa oli yleisimmin tutkittu teema (19 %, n=24). Huolimatta joistakin tutkimusmenetelmällisistä puutteista, lääkeinformaatiotutkimus antaa kattavan käsityksen Suomen lääkeinformaatiokäytännestä ja kehitystarpeista. Jatkossa lääkeinformaatiotutkimuksen tulisi suuntautua laajempiin tutkimuskokonaisuuksiin, jotka pohjautuisivat vahvemmin teorioihin ja teoriasta johdettuihin tutkimusasetelmiin. Lääkeinformaation vaikuttavuutta eri terveydenhuoltoympäristöissä, sähköisten lääkeinformaatiolähteiden ja palvelujen käyttöä, lääkeinformaation lukutaitoa sekä kuluttajien ja terveydenhuollon ammattilaisten lääketiedon tarpeita tulisi tutkia syvällisemmin.



Toinen osatyö perustui Terveyden ja hyvinvoinnin laitoksen valtakunnallisesti edustavaan vuosittaiseen postikyselyyn ”Suomalaisen aikuisväestön terveyskäyttäytyminen ja terveys” (AVTK) vuosiväliltä 1999–2014. Tulosten perusteella lääkärit, farmaseutit ja proviisorit sekä pakkausselosteet olivat yleisimmät lääkeinformaation lähteet aikuisilla lääkkeiden käyttäjillä (15–64-vuotiaat, n=18862) koko tutkimusajanjakson ajan. Eniten kasvoi internetiä lääketiedon lähteenä käyttävien osuus: vuonna 1999 osuus oli 1 % vastaajista ja vuonna 2014 osuus oli 16 %. Tutkimusajanjakson aikana niiden lääkkeen käyttäjien määrä yli kaksinkertaistui (17 %:sta 38 %:iin), jotka ilmoittivat, etteivät olleet saaneet tietoa käyttämistään lääkkeistä terveydenhuollon ammattilaisilta. Vastaavasti niiden lääkkeiden käyttäjien määrä seitsenkertaistui (4 %:sta 28 %:iin), jotka ilmoittivat, etteivät olleet saaneet mistään informaatiolähteestä tietoa käyttämistään lääkkeistä. Lääkeinformaation saannin trendejä väestötasolla tulee seurata jatkossakin ja tunnistaa potilasryhmät, joilla on erityistarpeita lääkeinformaation saannissa, kuten iäkkäät monilääkityt potilaat. Lisäksi tietoa tarvitaan niistä tekijöistä, jotka vaikuttavat kasvavaan määrään lääkkeiden käyttäjiä, jotka jäävät ilman tietoa.

Kansallisen lääkeinformaatiostrategian toteutumista tutkittiin haastatteleamalla strategian toteuttamiseen osallistuvien sidosryhmien edustajat (n=79, osallistumisprosentti 71). Tulosten perusteella pitkäaikaissairaiden lääkehoitoprosessi vaatii kehittämistä prosessin jokaisella toteutustasolla (makro-, meso- ja mikrotaso). Lääkeneuvonta, erityisesti apteekeissa, ja terveydenhuollon ammattilaisten toteuttama muu hoidon ohjaus olivat parhaiten toteutuneet toimenpiteet. Toimintaympäristön (makrotaso) merkittävimmät kehittämistarpeet koskivat lääkehoidon koordinointia, potilastiedon siirtymistä hoitoyksiköiden välillä, ajantasaisen lääkitystiedon saatavuutta sekä paikallisia ja kansallisia sopimuksia potilaiden ja terveydenhuollon ammattilaisten tehtävistä ja vastuista lääkehoitoprosessissa. Terveydenhuollon ammattilaisilla (mesotaso) suurimmat kehittämistarpeet tunnistettiin perusterveydenhuollossa ja sosiaalihuollossa tapahtuvassa lääkehoidon toteutuksessa, erityisesti vanhustenhuollon yksiköissä. Ensisijaisina puutteina potilailla (mikrotaso) esille nostettiin potilaiden rajoittunut osallistuminen omaan hoitoonsa, puutteellinen hoitoon sitoutuminen sekä riittämättömät tiedonhakutaidot luotettavan lääkeinformaation etsimiseen. Potilaita tulisi ottaa enemmän mukaan hoidon toteuttamiseen vahvistamalla potilaiden voimaantumista omaan hoitoonsa sekä tukemalla potilaiden kumppanuutta, jotta saavutettaisiin tavoite hyvin informoiduista ja hoitoonsitoutuneista potilaista.

## **AVAINSANAT**

Lääkeinformaatio, lääkkeen käyttäjä, potilas, strategia, Suomi

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# LIST OF ORIGINAL PUBLICATIONS

This PhD thesis is based on the following original publications:

- I     **Mononen N**, Järvinen R, Hämeen-Anttila K, Airaksinen M, Bonhomme C, Kleme J, Pohjanoksa-Mäntylä M. A national approach to medicines information research: A systematic review. *Research in Social and Administrative Pharmacy* 2018;14:1106–1124.  
DOI: <https://doi.org/10.1016/j.sapharm.2018.01.011>.
- II    **Mononen N**, Airaksinen M, Hämeen-Anttila K, Helakorpi S, Pohjanoksa-Mäntylä M. Trends in the receipt of medicines information among Finnish adults in 1999–2014: A nationwide repeated cross-sectional survey. *BMJ Open* 2019;9:e026377.  
DOI: <http://dx.doi.org/10.1136/bmjopen-2018-026377>.
- III   **Mononen N**, Pohjanoksa-Mäntylä M, Airaksinen M, Hämeen-Anttila K. How far are we from a medication use process aiming at well-informed adherent patients with long-term medications? A qualitative study (*manuscript, accepted*)

The publications are referred in the text by their Roman numerals (I–III). The original publications are reprinted with permission of the copyright holders.

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# GLOSSARY

## ADHERENCE

Adherence can be defined as “the extent to which a person’s behaviour, e.g., taking medicines, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from healthcare professionals”.<sup>1</sup> Adherence requires that patients are active partners with healthcare professionals in their own care, and that they have open communication with healthcare professionals in order to ensure an effective clinical practice.

## CLINICAL PRACTICE GUIDELINES

Clinical practice guidelines are independent, evidence-based guidelines that are intended as a basis for treatment decisions, and can be used by physicians, other healthcare professionals and patients.<sup>2</sup> These guidelines cover important issues related to health, medical treatment as well as the prevention of diseases. In Finland, the national guidelines are called the *Current Care Guidelines*.

## CONCORDANCE

Concordance refers to mutual understanding of the treatment as a result of a negotiation between the patient and the healthcare professional that respects the patient’s wishes, beliefs and underlying knowledge.<sup>3,4</sup> Concordance views the patient as being the equal of the healthcare provider and as having a right to make informed decisions. Concordance is related to ‘*empowerment*’ and ‘*patient-centred care*’.

## DRUG SAFETY

Drug safety covers knowledge and assessment of pharmacological properties and effects, quality of the manufacturing process, labelling and information relating to medicines as a product.<sup>5</sup>

## ELECTRONIC MEDICINES INFORMATION

In this thesis, electronic medicines information covers all information related to medicines and medicine use provided in electronic form, e.g., the Internet, mobile applications in smartphones and multimedia.

## **EMPOWERMENT**

In the context of health, empowerment is a process through which people gain greater control over decisions and actions affecting their health by developing skills, knowledge, competence and opportunities to influence the factors affecting their health and well-being.<sup>6</sup>

## **HEALTH EDUCATION**

Health education comprises consciously constructed opportunities for improving health knowledge and health literacy.<sup>7</sup> It fosters the motivation, skills and confidence necessary to take action to improve health. Health education includes the communication of information concerning the underlying social, economic and environmental conditions impacting on health, as well as individual risk factors and risk behaviours, and the use of the healthcare services.

## **HEALTHCARE PROFESSIONAL (HCP)**

A person who is trained and licensed to provide healthcare to humans, and to maintain health in humans through the application of the principles and procedures of evidence-based medicine and caring, including physicians, dentists, pharmacists, nurses, midwives; excluding veterinarians.<sup>8,9</sup>

## **HEALTH LITERACY**

Health literacy is linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgements and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course.<sup>10</sup> A recent definition is as follows: 'the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions'.<sup>11</sup>

## **MEDICATION SAFETY**

Medication safety covers the principles and functions of healthcare professionals and organisations to ensure safe medicine use and protect patients from harm.<sup>5</sup>

## **MEDICATION USE PROCESS**

A patient's medication use process is an operative chain comprising the assessment of medication need, the choice and dispensing of the medicine, its dosage and administration, the patient's motivation, advice and commitment to the therapy, organisation of the treatment follow-up and the evaluation of the outcome, as well as ensuring that the patient, the organisations and persons involved in the treatment are well-informed of the medication use process.<sup>3</sup>

## **MEDICINAL PRODUCT**

A medicinal product is a substance or combination of substances presented for treating or preventing disease in human beings which may be administered with a view to making a medical diagnosis or to restoring, correcting or modifying physiological functions is likewise considered a medicinal product.<sup>12</sup> There are also veterinary products for animals, but this thesis focuses on medicinal products for human use. In this thesis, '*medicine*', '*medication*' and '*pharmacotherapy*' are used to describe this term when appropriate.

## **MEDICINES EDUCATION**

Medicines/Medication education refers to teaching about the rational medicine use.<sup>4,13-15</sup> It is a planned individual and/or group interactive and collaborative learning experience and process with the aim of providing information that increases and influences people's knowledge, skills and competences regarding medicines and their use. The learning process is individualised in that it accounts for the person's different information needs, such as children or the elderly. In this thesis, the term '*medicines education*' is used.

## **MEDICINES INFORMATION (MI)**

Medicines information covers medicines-related information accessible to consumers and healthcare professionals in diversified forms, such as in written, verbal or electronic form.<sup>16</sup> Medicines information includes statutory and product specific-information on medicines; written and online medicines information materials targeted at patients and healthcare professionals; medicines information tools, databases and information systems used in daily practice by healthcare professionals; medicines information provided by medicines information centres; and oral patient education and counselling. Medicines information should be designed according to target audience, e.g., medicines information targeted to healthcare professionals and to consumers is different.

## **MEDICINES INFORMATION CONTEXT**

In this thesis, medicines information context refers to the circumstances in which communication in regard to medicines occurs or medicines information exists. The medicines information context is influenced by the source of information (e.g., healthcare professionals, package leaflets, the Internet), information user (e.g., consumer, medicine user) and mode of information (written, verbal, electronic).<sup>17-19</sup>

## **MEDICINES INFORMATION LITERACY**

Multiple concepts exist to define health literacy in the context of medicine use, such as '*medication literacy*', '*pharmacotherapy literacy*', '*pharmacy health literacy*'.<sup>20</sup> A recently published definition is as follows: 'the degree to which individuals can obtain, comprehend, communicate, calculate and process patient-specific information about their medicines to make informed pharmacotherapy and health decisions in order to safely and effectively use their medications, regardless of the mode by which the content is delivered (e.g., written, oral and visual)'.<sup>20</sup> In this thesis, the term '*medicines information literacy*' is used.

## **MEDICINES INFORMATION PRACTICES**

In this thesis, medicines information practices refers to actual medicines information performance at a national level (*macro level*) such as the practices of authorities to provide reliable medicines information to consumers and healthcare professionals, at an organisational level (*meso level*) such as practices of healthcare organisations and institutions to ensure adequate medicines information resources for healthcare professionals and at patient care level (*micro level*) such as practices of healthcare professionals to communicate on medicines with patients.

## **MEDICINES INFORMATION STRATEGY**

Medicines information strategy is a policy guideline which provides recommendations on how medicines information could be developed, provided and organised nationally or regionally for healthcare professionals and patients.<sup>16</sup>

## **MEDICINES POLICY**

Medicines policy is a part of the social welfare and health policy.<sup>3</sup> Medicines policy aims at ensuring that appropriate medicines are reliably and equally available in health facilities, medicines are prescribed and dispensed appropriately, and that medicines are affordable and are protected against catastrophic expenditure.<sup>21</sup> In this thesis, '*medicines information policy*' refers to policy aims in regards to medicines information which are in line with national medicines policy with supporting rational pharmacotherapy.<sup>3,22</sup>

## **PACKAGE LEAFLET (PL)**

A package leaflet is a legal document approved as part of the marketing authorisation of each medicinal product within the European Union.<sup>12</sup> It contains statutory medicine-specific information for the medicine user and it should be based on the Summary of Product Characteristics. Package leaflets are currently also available online and audio format. Previously the term '*patient information leaflet*' has been used in the European Union.

## **PATIENT**

Patient refers to a person awaiting or being under medical or healthcare treatment or using medical or health care services.<sup>8,23</sup> This concept includes anyone who is taking medicines, including non-prescription medicines as self-medication. In this thesis, the term '*patient*' is also used when referring to the person receiving medicines information.<sup>24,25</sup> Depending on the context, other terms are used in this thesis, such as '*medicine users*' when referring to actual users of medicines and '*general public*', '*public*' or '*consumers*' when referring to people in general (i.e., not necessary actual patients).

## **PATIENT COUNSELLING/MEDICATION COUNSELLING**

Patient counselling is closely related to the concepts of '*medication counselling*', '*patient education*', '*pharmacist-patient-communication*', '*patient information*' and '*advice-giving*'. These concepts have been used to refer to the verbal communication in regard to medicines between healthcare professionals and patients where the healthcare professionals take the patients' personal needs and situation into consideration and supports their coping with the medications.<sup>3,4,26</sup> Patient counselling is seen as an approach that focuses on enhancing problem solving for the patient to improve or maintain quality of health and quality of life. This conceptualisation emphasises that counselling should be a dialogue between patient and healthcare professionals.

## **PHARMACOVIGILANCE**

Pharmacovigilance is defined as the science and activities relating to the detection, assessment, understanding and prevention of adverse drug reactions or any other drug-related problem.<sup>27</sup> It is an essential component of patient care and the rational medicine use. It is also variously referred to as adverse drug reaction monitoring, drug safety surveillance, side effect monitoring, spontaneous reporting, post-marketing surveillance or variations of these. Pharmacovigilance involves the safety monitoring of all medicines including herbal and complementary remedies, vaccines and biological substances.

## **RATIONAL PHARMACOTHERAPY**

Rational pharmacotherapy is effective, safe, high quality, economical and equal.<sup>28</sup> The prerequisites of successful pharmacotherapy improve when patients participate in the planning and implementation of their own pharmacotherapy as partners, when the regimen of pharmacotherapies is jointly agreed, and when patients receive support in the medicine use.

## **SIGNIFICANCE OF MEDICINES INFORMATION**

In this thesis, the significance of medicines information refers to medicines information as a factor contributing to the outcomes and effectiveness of pharmacotherapies. It covers the ways of designing and using medicines information so that it facilitates optimising positive outcomes and minimising negative outcomes of medicinal products in patient care.

## **SUMMARY OF PRODUCT CHARACTERISTICS (SmPC)**

Summary of Product Characteristics is a legal document approved as part of the marketing authorisation of each medicinal product.<sup>29</sup> It contains the basis of information for healthcare professionals on how to use medicines safely and effectively. Package leaflets should be drawn up in accordance with the Summary of Product Characteristics.

## **WRITTEN MEDICINES INFORMATION (WMI)**

In this thesis, written medicines information refers to medicine-specific information in printed form for patients, such as statutory package leaflets.<sup>30</sup> Written medicines information is commonly produced by pharmaceutical manufacturers, government bodies or third parties.

# ABBREVIATIONS

<b>ADR</b>	Adverse drug reaction
<b>CMR</b>	Comprehensive medication review
<b>DRP</b>	Drug-related problem
<b>EHR</b>	Electronic health record
<b>EU</b>	European Union
<b>EUPC</b>	Effect, Use, Problems, Checkups Method
<b>Fimea</b>	Finnish Medicines Agency
<b>HCP</b>	Healthcare professional
<b>mHealth</b>	Mobile health
<b>MI</b>	Medicines information
<b>MI Network</b>	National Medicines Information Network (Finland)
<b>MIC</b>	Medicines information centre
<b>OC</b>	Oral contraceptive
<b>OTC</b>	Over-the-counter medicine, non-prescription medicine
<b>PL</b>	Package leaflet (for patients)
<b>QALY</b>	Quality-adjusted life-year
<b>QaM</b>	Questions to Ask about Your Medicines campaign
<b>RCT</b>	Randomised controlled trial
<b>SmPC</b>	Summary of Product Characteristics (for HCPs)
<b>UK</b>	United Kingdom
<b>USA</b>	United States of America
<b>USP</b>	United States Pharmacopeia
<b>WHO</b>	World Health Organization
<b>WMI</b>	Written medicines information

# 1 INTRODUCTION

Medicines are among the most common interventions in healthcare to protect, maintain and restore people's health.<sup>1,31</sup> However, even in developed countries, approximately half of medicine users are estimated to fail to take their medications as prescribed.<sup>1</sup> Easy access to medicines information (MI) is one of the key facilitators in empowering people to engage in appropriate and safe medicine use.<sup>32</sup>

Patients' access to MI has significantly improved during the last few decades.<sup>16,18,19,22,33-35</sup> Drug safety issues, patients' right to know about medicinal interventions that they are exposed to and tendency to empower patients in taking more responsibility for self-management of their diseases have been driving forces for more open access to MI.<sup>16,18,22,24</sup> The shift "from paper to cyber" has led to the improved availability of MI to patients via the Internet and electronic applications in smartphones and other electronic devices. These novel information technology innovations are fast evolving towards systems enabling customised MI, interactive communications and follow-up treatments.<sup>16,33,34,36-38</sup> Improved communication concerning medicines has also been a strategic priority in national and international medicines policies, e.g., within the European Union (EU).<sup>3,22,25,39-42</sup>

In Finland, MI to patients and better coordination of MI have been among the key public health and health policy goals since the 1980s.<sup>19,43,44</sup> The landmarks towards more open access to MI among patients have been pharmacists' duty to counsel on prescription and non-prescription medicines since 1983, and the first computerised system to produce MI leaflets for patients in 1986.<sup>18,43</sup> At the turn of the millennium, package leaflets (PLs) became mandatory in all EU countries, including Finland.<sup>45</sup> Since the early 2000s, the Internet and other electronic MI sources have become more common and eventually revolutionised access to statutory MI, e.g., by making PLs available online in written and audio format.<sup>18</sup> In fact, the MI context has changed substantially over time and novel information technology innovations create new ways of communicating on medicines.



In order to coordinate MI practices and enhance public-private partnerships in Finland, the Finnish Medicines Agency Fimea published the first national MI strategy in 2012.<sup>22</sup> The primary goal of the national MI strategy is to influence system- and organisation-based MI practices in all social and healthcare environments in order to reach the ultimate goal of the well-informed patient who adheres to the therapy. To implement the national MI strategy by 2020, a National Medicines Information Network (MI Network) was established involving the key stakeholders providing and producing MI. The MI Network also includes various patient organisations representing diversified patient groups. This type of networking is ground-breaking in Finland and also unique globally, even beyond the EU. Finland can be considered as a textbook example in developing MI practices strategically.<sup>16</sup>

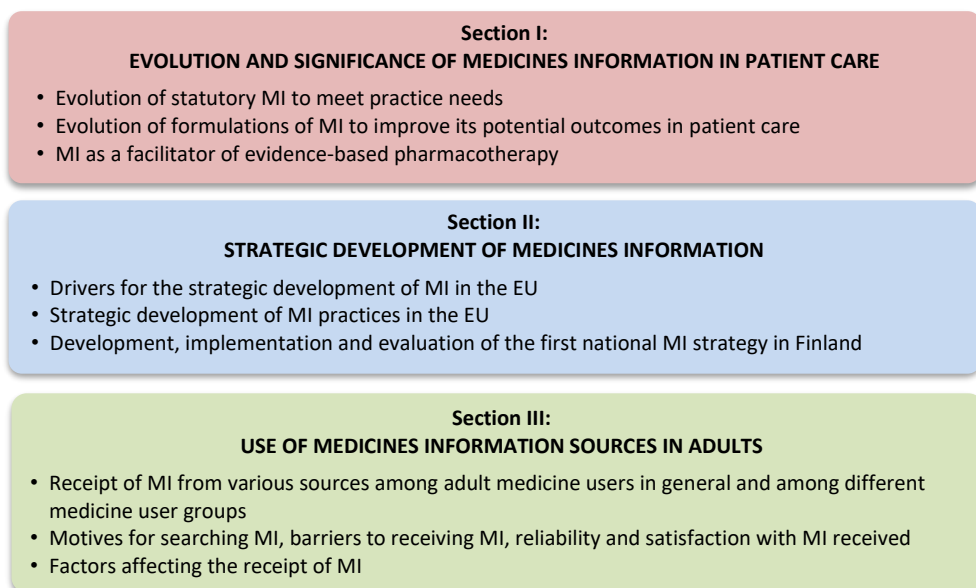
This thesis aims to examine MI practices and policies in Finland during the 2000s. The primary goal is to collect and provide information to support the strategic development of MI at the national level and assist in implementing the first national MI strategy. The literature review of the thesis (*Chapter 2*) describes the significance and outcomes of MI in patient care and the strategic development of MI practices in the EU, particularly in Finland. Furthermore, the results of the systematic literature review of the recent research on the use of MI sources in adult medicine users are presented. The empirical part (*Chapters 3–7*) investigates development targets for MI practices in Finland based on a systematic review of the existing literature (*Original publication I*), assesses long-term trends in the receipt of MI among the Finnish adults (*Original publication II*), and evaluates to what extent the ultimate goal of the national MI strategy about well-informed adherent patients with long-term medications had been achieved at the midpoint of the MI strategy period in 2015 (*Original publication III*). This thesis is a part of a larger MI-related line of research of the Clinical Pharmacy Group at the Faculty of Pharmacy, University of Helsinki.

## 2 REVIEW OF THE LITERATURE

The literature review of the thesis comprises three sections (Figure 1). The first section discusses the evolution of medicines information (MI) targeted at patients and consumers. The historical overview is presented through the different MI sources in written, verbal and electronic forms, focusing in particular on the changes in the European Union (EU). This section also presents the significance of MI in influencing potential outcomes and effectiveness of pharmacotherapies in patient care.

In the second section, the strategic development of MI at the national and international level over the last few decades is demonstrated with special reference to the developments within the EU. Particular focus is on the first national MI strategy in Finland, its roots and implementation.

The third section presents the use of MI sources among adult medicine users during the period of 2000–2018. Understanding the current practices in using MI sources is essential for evaluating the use, accessibility and significance of MI and developing further reliable MI services targeted to consumers and various medicine user groups.

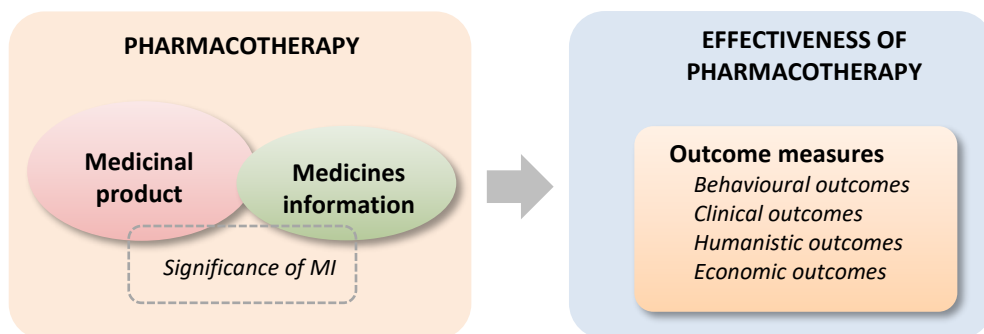


**Figure 1.** *Structure and contents of the literature review of the thesis.*

## 2.1 EVOLUTION AND SIGNIFICANCE OF MEDICINES INFORMATION IN PATIENT CARE

In the first part of this section, the evolution of MI to patients and the background for statutory MI are described (Figure 1). In this review, MI refers to statutory and general product-specific information on medicines accessible to patients and healthcare professionals (HCPs) in written, verbal and electronic formats.

The second part focuses on the significance of MI in patient care and its effects on the outcomes of pharmacotherapies (Figure 1). In this thesis, pharmacotherapy is illustrated to have two essential components: 1) a medicinal product of acceptable quality ensured through marketing authorisation, 2) accompanied by statutory and other MI ensuring its rational use in patient care (Figure 2). These two integrated components generate the effectiveness of pharmacotherapy which can be measured as various outcomes, such as behavioural, clinical, humanistic or economic outcomes.



**Figure 2.** *Illustration of significance of medicines information (MI) as a factor contributing to outcomes and effectiveness of pharmacotherapies*

The significance of MI refers to ways of using MI as a vehicle for optimising positive outcomes and minimising negative outcomes of medicinal products. These outcomes can be direct or indirect behavioural outcomes (e.g., medication adherence), clinical outcomes (e.g., normalisation of blood pressure or glucose level), humanistic outcomes (e.g., quality of life, satisfaction of treatment) or economic outcomes (e.g., cost savings in medicines or use of health services).

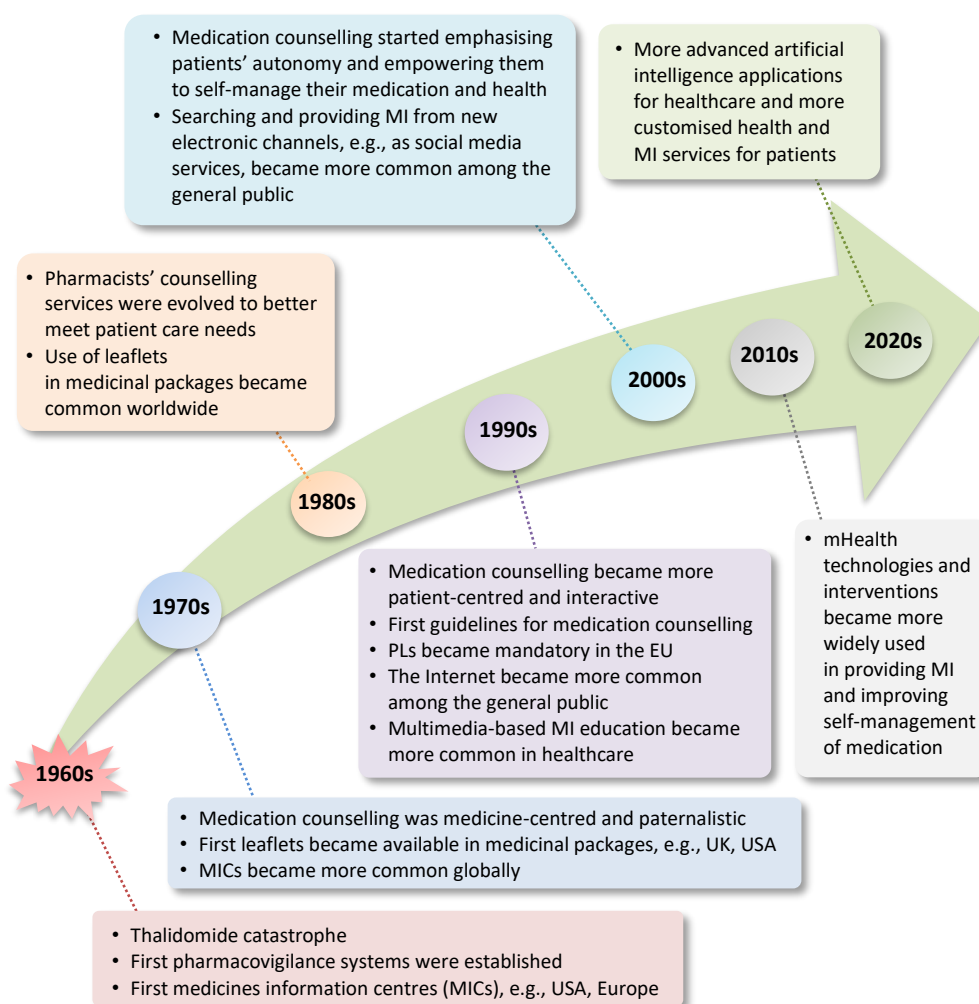
Although the therapeutic effect is due to the medicine use, the prerequisite of that effect is research-based evidence on the clinical characteristics of the medicinal substance and preparation: for what ailment and how the preparation works, for whom it is suitable and for how long it should be used and in what dose in order to obtain the optimum therapeutic effect. MI should provide answers to the above-mentioned questions, making it a key element in a successful pharmacotherapy outcome, although its impact on the outcomes of pharmacotherapies is difficult to assess.

### **2.1.1 EVOLUTION OF MEDICINES INFORMATION IN PATIENT CARE**

This historical overview presents the evolution of MI targeted to patients since the most significant worldwide medicine disasters had occurred after World War II (1939–1945) (Figure 3).

In the late 1950s, the thalidomide catastrophe demonstrated the importance of reliable MI in the worst possible way.<sup>19,27,46–48</sup> Pregnant women prescribed thalidomide for treating morning sickness became the victims during 1956–1962. Soon after thalidomide had extended to a wider use altogether in 46 countries, the number of miscarriages increased in pregnant women in the early 1960s, and more severe and debilitating malformations occurred in more than 10,000 newborns and children. At that time, the effects of the medicines were poorly known as pharmaceutical companies were not obliged to generate clinical evidence, e.g., about adverse reactions of the medicines they were selling. Even though HCPs did not have available adequate information about medicines they prescribed and dispensed them to patients.

After the thalidomide catastrophe, many countries started to more systematically gather information about the adverse drug reactions (ADRs) (Figure 3).<sup>19,27,46,49</sup> This led to the establishment of marketing authorisation and pharmacovigilance systems in many developed countries to prevent the harmful effects of medicines. In the EU, marketing authorisation holders were also obligated to make MI available to both HCPs in the form of Summary of Product Characteristics (SmPCs) and for patients in the form of package leaflets (PLs) based on the SmPC.<sup>12,49</sup>



**Figure 3.** *Evolution of medicines information (MI) to patients since the 1960s.*

Written medicines information (WMI) has been an integral part of improving the receipt of MI among patients since the first legal requirements on the mandatory medicines information leaflets came into force in the USA and the UK during the 1970s (Figure 3).<sup>50,51</sup> The leaflets in medicinal packages also gradually became more common in other countries over the 1980s, and the uniform legislation for PLs in the EU was enacted in the 1990s.<sup>18,19,49,52</sup> In 1992, the European Commission issued a Directive on the labelling of medicinal products for human use and PLs.<sup>45</sup> Since 1999, a comprehensive PL

has been required to be included in all medicinal packages in the EU member states.<sup>45,52</sup> The legislation requires that PLs supplied by the manufacturers of the medicinal products should be compiled in accordance with the SmPCs in a form comprehensible to the patients.<sup>45,53</sup> The readability of PLs must be ensured. During the 2000s, patients have been increasingly involved in the development of PLs and their quality.<sup>54-61</sup> A significant milestone in developing the quality of PLs took place in 2004 when a new legal obligation was introduced to all marketing authorisation holders.<sup>62</sup> A Directive requires that PLs reflect the results of consultations relating to user testing of PLs with target user groups. As a result, user testing on PLs was implemented across the EU to identify the shortcomings of PLs and to improve their quality and readability.<sup>59,63-66</sup>

In the early 1960s the first medicines information centres (MICs) were established in the USA and Europe, and they became more common globally during the 1970s (Figure 3).<sup>67-69</sup> MICs are information service units maintained by pharmacists and other HCPs, originally designed to assist HCPs in their clinical practice.<sup>70-73</sup> Later, a growing number of MICs also started to provide health and MI to consumers and co-operating organisations. Many of the MICs are integrated with clinical services and they usually operate in hospitals, healthcare centres, pharmaceutical training organisations (e.g., universities) or pharmacies. Currently, MICs provide objective and reliable MI in multiple formats, such as by telephone, email, chat and one-to-one meetings with HCPs. Additionally, MICs can conduct research and maintain reporting systems for ADRs and medication errors.

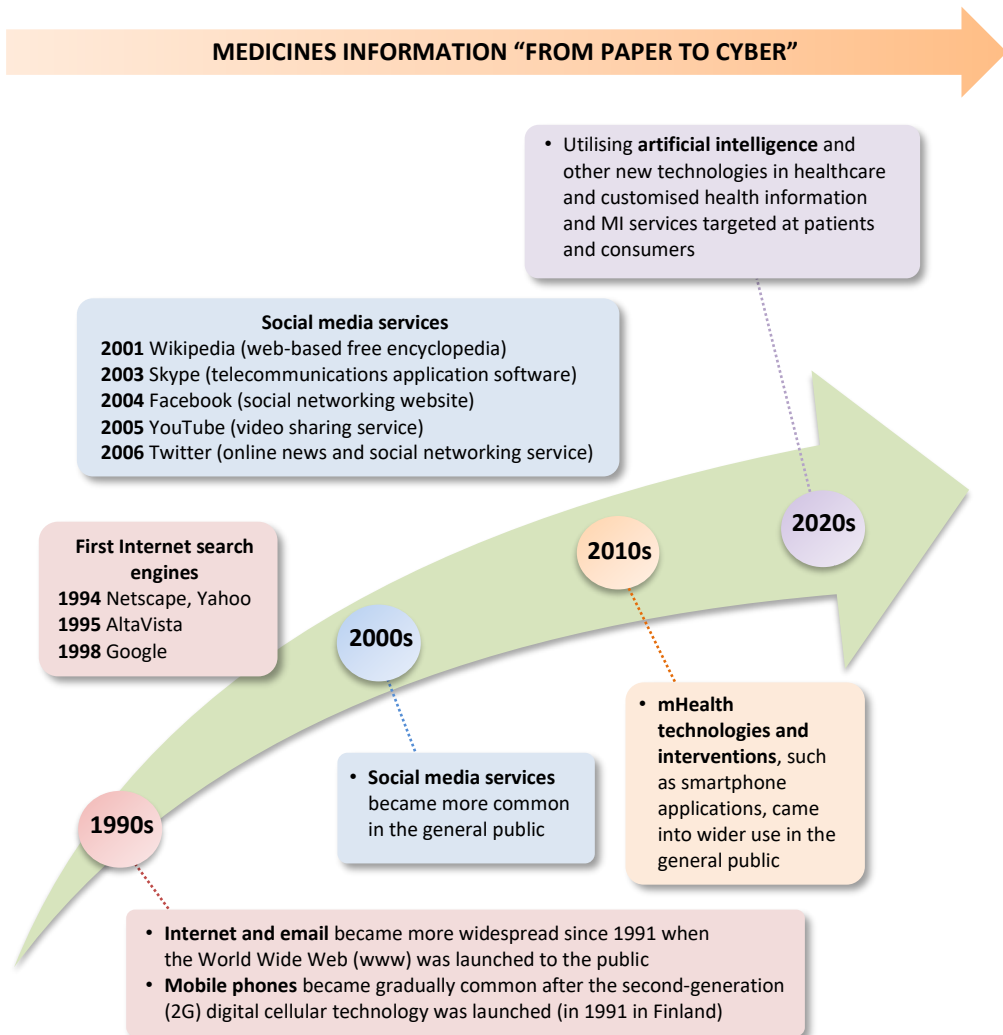
Since the 1960s, medication counselling provided by HCPs gradually evolved from medicine-centred, paternalistic, physician-privileged duty towards more patient-centred and interactive communication involving pharmacists and the entire healthcare team with the goal of empowering medicine users to self-manage their diseases and pharmacotherapies (Figure 3).<sup>14,26,43,74</sup> Although medication counselling has been recognised as an essential part of rational pharmacotherapy for a long time, not until 1994 were the first pharmacopeia-level guidelines and recommendations for medication counselling published by the United States Pharmacopeia (USP).<sup>14,15,26</sup> *The USP Medication Counselling Behavior Guidelines* were established to ensure the quality of MI, to promote public health and to develop authoritative information about rational medicine use.<sup>15</sup> During 1994–1997, the USP developed a comprehensive medication counselling assessment tool for HCPs to assess and improve their counselling skills in different medication

counselling contexts.<sup>14</sup> The tool was based on an extensive inventory of existing tools used in medical, nursing and pharmacy schools primarily in the USA. Of that tool, a pharmacist-specific tool was developed and validated.<sup>4,15,26,75,76</sup> The implementation of the USP's guidelines has been promoted by such international professional organisations as the International Pharmaceutical Federation (FIP) and International Pharmaceutical Students' Federation (IPSF).<sup>4,77</sup>

Multimedia-based interventions have been used in patient education since the 1970s, but their use in healthcare became more common in the 1990s (Figure 3).<sup>78</sup> Multimedia education provides information using multiple media formats, including textual data and graphic presentations with the use of audio, visual, animation or video recordings or interactive programmes, such as CDs, DVDs or computer-playable files delivered via portable media or internet resources.<sup>78,79</sup>

Since the early 1990s, digitalisation and the development of electronic communications (e.g., the Internet) generated novel information technologies applicable to almost every area of life, including healthcare and well-being (Figures 3 and 4).<sup>80</sup> The growing shift “from paper to cyber” through novel and innovative ways of communicating, such as social media services, was rapid during the 2000s.<sup>37,81-86</sup> This has dramatically changed consumers' information-seeking behaviours and has enabled a more diversified and easier access to health information and MI.<sup>87</sup> Along with the expanding availability of electronic information sources, patients have had the opportunity to communicate with HCPs, as well as with other patients interactively (e.g., chat-based MI services provided by community pharmacies) and orally via telecommunications software applications (e.g., via Skype).<sup>34,37,88-92</sup> Furthermore, various parties producing MI (e.g., authorities, pharmaceutical companies, patient organisations) started to provide MI to patients in electronic and audio form, such as online PLs.<sup>18</sup>

The use of more advanced mobile health (mHealth) technologies and interventions grew rapidly over the 2010s, such as personalised smartphone applications assisting in disease management (Figures 3 and 4).<sup>93,94</sup> In 2014, there were over 400 smartphone applications available worldwide for patients purely targeted to improve medication adherence.<sup>95</sup> Multimedia-based interventions also adapted to support patients in managing with their diseases, such as videogames in self-management of diabetes.<sup>96,97</sup>



**Figure 4.** Evolution of digitalisation and electronic communication used by patients and consumers to seek medicines information (MI) and communicate about their medicines since the 1990s.

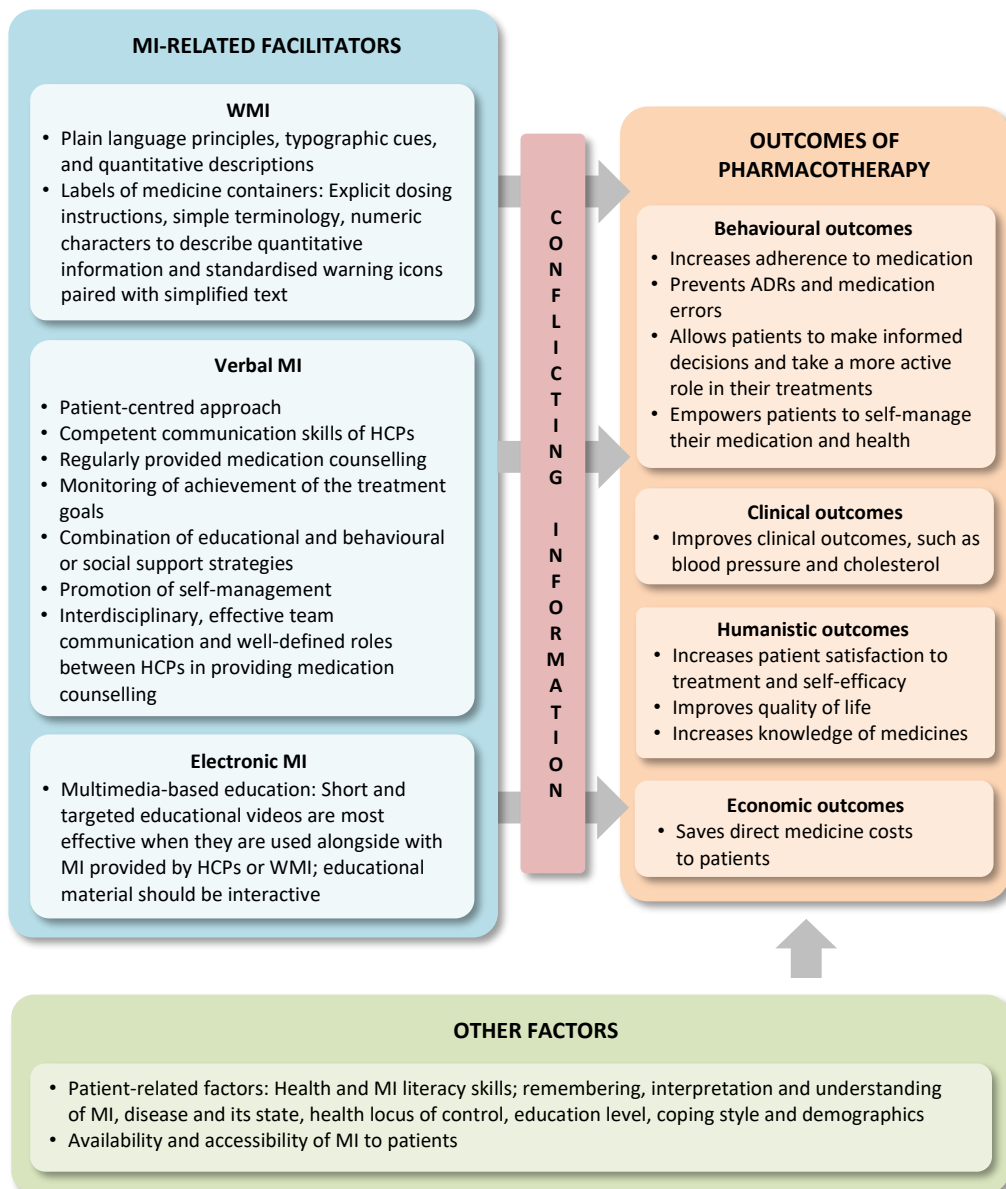


### **2.1.2 SIGNIFICANCE OF MEDICINES INFORMATION IN PATIENT CARE**

Optimum content and format of MI has been under continuous development and investigation since it became evident through severe medicine disasters that MI is essential for preventing risks related to medicine use.<sup>19,27,46-48</sup> This inventory describes the attributes which have been associated with MI in order to improve its significance in patient care in terms of outcomes of pharmacotherapies (Figure 5). Evidence for this qualitative review has been compiled from meta-analyses and systematic reviews published over the past ten years (2009–2019) (Table 1).<sup>96,98-111</sup> Publications focusing on interventions exploring the significance of written, verbal or electronic MI in patient care were included. Also included were studies in which the context of the study indicated that MI was part of the intervention, e.g., prescribing medicines by physicians and services provided by community pharmacists. However, this review does not reflect the complete body of literature as included studies were not collected systematically.

The significance of MI in patient care has been studied since the early 1970s (Table 1).<sup>96,98-111</sup> Figure 5 summarises the attributes extracted from the included meta-analyses (n=5) and systematic reviews (n=10) facilitating the significance of MI in patient care in terms of improved outcomes. The attributes were different for written, verbal and electronic MI. In addition to the MI-related attributes that modify the significance of MI, there are other modifying factors. These factors were categorised to: 1) patient-related factors, such as health information and MI literacy skills; remembering, interpretation and understanding of MI, disease and its state, health locus of control, educational level, coping style and demographics; and 2) availability and accessibility of MI to patients.

The outcome measures used in the studies presented in Table 1 to assess the significance of MI in patient care fell into the following four categories: 1) behavioural outcomes, such as medication adherence; 2) clinical outcomes, such as blood pressure, haemoglobin level and health status; 3) humanistic outcomes, such as knowledge about medicines, patient's quality of life and satisfaction with care or MI received; and 4) economic outcomes, such as direct medicine cost savings to patients (Figure 5).<sup>96,98-111</sup> Of these outcomes, behavioural outcomes have been most commonly studied, particularly medication adherence, whereas economic outcomes have been only marginally studied (Table 1).



**Figure 5.** Medicines information (MI)-related factors and other factors that are found to contribute to the outcomes of pharmacotherapies. The figure is a qualitative synthesis of the literature presented in Table 1.

A MI-related issue that has not gained sufficient attention as a factor influencing outcomes of pharmacotherapies is conflicting information (Figure 5). Given that these days patients seek and receive MI from multiple sources, they may encounter conflicting MI.<sup>112-115</sup> Over half (51–80%) of adults with chronic disease<sup>112,113</sup> and almost a quarter (23%) of pregnant women have reported receiving conflicting information about their medicines.<sup>115</sup> Other than own physician, media (e.g., television, radio) and the Internet are the most common sources of conflicting MI to patients.<sup>112</sup> ADRs, duration of treatment and dosage are the most frequent topics about which patients have received conflicting information.<sup>112,113</sup> Conflicting MI may increase anxiety, cause unnecessary concern about medicine use, and as a consequence, decrease medication adherence.<sup>112,115</sup> Although the extent to and conditions under which patients receive conflicting MI has been recently documented, this phenomenon should be further studied systematically and better taken into account in education of HCPs and in the strategic development of MI and MI services targeted to patients.

**Table 1.** Meta-analyses (n=5) and systematic reviews (n=10) on the significance of medicines information (MI) in patient care. Studies are presented according to the study methods in alphabetical order by the names of the authors.

META-ANALYSES (n=5)					
Authors Publication year <sup>Ref.</sup>	Aspect studied	Method Number of studies Publication period	Types of interventions	Outcome measures <sup>a</sup>	Key outcomes on significance of MI
Chisholm-Burns et al. 2010 <sup>101</sup>	Pharmacist-led direct patient care interventions	<ul style="list-style-type: none"> <li>Meta-analysis/ systematic review</li> <li>71 RCTs and 227 other studies</li> <li>1973–2009</li> </ul>	Main interventions: Patient education Medicines utilisation review Chronic disease management	B,C,H	Pharmacist-led counselling interventions significantly reduced glycated haemoglobin (HbA1c) values (mean difference between the pharmacist intervention group and the comparison group 0.8%); low density lipoprotein cholesterol by 6.3 mg/dL; systolic blood pressure by 7.8 mmHg; and diastolic blood pressure by 2.9 mmHg. Pharmacist-led interventions were found to positively affect patients' knowledge in 20 out of 35 studies; medication adherence in 26 out of 54 studies; patient satisfaction in 20 out of 41 studies; medication errors in 9 out of 11 studies; and on ADRs in 9 out of 15 studies. Effects on the quality of life were mixed (12 out of 31 studies) or intervention had no effects (14 out of 31 studies).
Deters et al. 2018 <sup>102</sup>	Community pharmacist-led interventions for diabetics	<ul style="list-style-type: none"> <li>Meta-analysis</li> <li>6 RCTs</li> <li>2007–2015</li> </ul>	Personal visits Printed leaflets Telephone calls	B,C	Community pharmacist-led counselling interventions significantly improved adherence and glycemic control in patients with type 1 and 2 diabetes. These interventions reduced glycated haemoglobin (HbA1c): mean difference was 0.66%. The most effective intervention components were interdisciplinary and patient-centred, such as sending feedback to the physician, setting individual goals with the patient and analysing the medication of the patient and identifying drug-related problems (DRPs).
Omboni et al. 2018 <sup>108</sup>	Effectiveness of pharmacists' interventions on the management of cardiovascular diseases	<ul style="list-style-type: none"> <li>Meta-analysis</li> <li>22 meta- analyses/ systematic reviews</li> <li>2003–2016</li> </ul>	Patient education Medication management Measurement and management of disease risk factors	B,C,H,E	Pharmacists' interventions were associated with a significant reduction in blood pressure and serum cholesterol levels and a reduction in the risk of smoking. They had a positive or no effect on the reductions of risk behaviours and control of risk factors for coronary heart disease. Limited evidence was available on the effectiveness of pharmacist-led interventions on patient satisfaction, adherence, knowledge and economic outcomes. A multidisciplinary approach, including medical input plus a pharmacist, specialist nurse or both, and a greater involvement of community rather than hospital pharmacists, represented the most efficient and modern healthcare delivery model.
Van Camp et al. 2013 <sup>109</sup>	Nurse-led interventions to enhance adherence to long- term medication	<ul style="list-style-type: none"> <li>Meta-analysis/ systematic review</li> <li>10 RCTs</li> <li>2006–2011</li> </ul>	Electronic messages Individual and group session counselling Nurse care management	B	Nurse-led individual counselling appeared effective in improving adherence to long-term medications. Nurse-led counselling in groups and via electronic messages also enhanced adherence but further research is needed on the effectiveness of these interventions. Nurse-led counselling conducted over a longer period (6 to 12 months) tended to have a greater impact than 3 months of counselling. Long-term interventions were more sustainable compared to the short-term interventions. Complex interventions, such as tailored counselling combined with social support, education and/or reminders, seemed to enhance adherence more compared to using single interventions.
Zolnieriek et al. 2009 <sup>111</sup>	Physician-led interventions on patient medication adherence	<ul style="list-style-type: none"> <li>Meta-analysis</li> <li>127 studies</li> <li>1976–2007</li> </ul>	Counselling	B	Physician-led counselling significantly positively affected medication adherence among their patients. There was a 19% higher risk of non-adherence among patients whose physician communicated poorly than among patients whose physician communicated well. Training physicians in communication skills improved patient adherence by 12%. Physician communication skills training had less effect on adherence the more serious a patient's disease was, and more effect if the physicians trained were paediatricians.

# SYSTEMATIC REVIEWS (n=10)

Authors Publication year <sup>Ref.</sup>	Aspect studied	Method Number of studies Publication period	Types of interventions	Outcome measures <sup>a</sup>	Key outcomes on significance of MI
Antoine et al. 2014 <sup>98</sup>	Pharmacist-led counselling interventions for oral medicines in type 2 diabetics	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 6 RCTs</li> <li>• 2003–2011</li> </ul>	Counselling Educative group activities Nutrition consultation Telephone calls	B,C,H	A pharmacist-led counselling intervention improved adherence to type 2 diabetes medications in all 6 studies, but a statistically significant effect was shown in only 2 studies. Education provided regularly compared to a single education session tended to improve adherence. Adherence was primarily measured by self-reports and prescription refill rates. Pharmacist-led intervention significantly improved blood pressure and blood glucose levels in 5 out of 6 studies. The involvement of a pharmacist contributed to an improvement of knowledge and self-care activities in 3 out of 6 studies.
Blalock et al. 2012 <sup>99</sup>	Community pharmacist-led interventions on patient health outcomes	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 12 RCTs and 9 other studies</li> <li>• 1973–2011</li> </ul>	Community pharmacists-delivered patient care services	B,C,H	Community pharmacists-led interventions showed statistically significant improvement in medication adherence in 6 out of 12 studies and in appropriate medicines use in 3 out of 5 studies. Pharmacists-led interventions had the best effects on lowering blood pressure. Interventions showed no effects on cholesterol level, safety outcomes or quality of life. There was insufficient or unclear evidence on the significance of pharmacist-led interventions on patient satisfaction, knowledge and healthcare utilisation.
Celio et al. 2018 <sup>100</sup>	Pharmacist-nurse collaborations in medication adherence-enhancing interventions	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 5 RCTs, 9 other studies and 7 conference abstracts</li> <li>• 1996–2016</li> </ul>	Multiprofessional interventions and educational programmes	B,C,E	Pharmacists and nurses are in a strategic position to identify patients for adherence interventions. Pharmacists specifically ensure treatment efficacy, security and access, and provide MI and lifestyle advice. Nurses clinically co-managed patients with physicians and provided patients with information on their diseases. Five studies described significant improvements in clinical outcomes (e.g., blood pressure), while 4 studies showed significant improvements in both medication adherence and clinical outcomes. Effective team communication and well-defined roles between HCPs were key components to enhance adherence. Economic outcomes of the multiprofessional support programme was explored in only one RCT study in which cost-savings per patients were higher and quality-adjusted life-year (QALY) per patients were increased compared to the control group. Collaborative pharmacist-nurse medication adherence enhancing interventions are rare, and they are often at an early developmental stage. More evidence is needed on the effective models of collaborative practice among pharmacists, nurses, physicians and other HCPs to support and reinforce medication adherence in different chronic patient groups.
Ciciriello et al. 2013 <sup>96</sup>	Multimedia educational interventions for patients about prescription and OTC medicines	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 24 RCTs</li> <li>• 1982–2011</li> </ul>	Computer-based programmes Slide-tape audio visual presentations Videos	B,C,H	Multimedia education about medicines was more effective than no education or non-standardised education provided by HCPs as part of usual clinical care in improving knowledge and skill acquisition (inhaler technique). There is some evidence that multimedia education is at least equivalent to other forms of education, including written education and education provided by HCPs. Multimedia education can be considered as an adjunct to usual care rather than as sole education. Multimedia education can be considered as an alternative to education provided by HCPs when MI provided by HCPs is not available.
Jose et al. 2018 <sup>103</sup>	Negative impacts of side effects information for patients	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 17 RCTs</li> <li>• 1982–2017</li> </ul>	Medicine-specific information on safety-related aspects provided in verbal and/or written format <sup>b</sup>	B,C,H	Only limited evidence was found to indicate that informing patients about the side effects of medicines has a significant negative impact on the patient (e.g., increased reporting of side effects, anxiety for side effects or medicines use), treatment process or treatment outcomes. Sharing information about side effects of medicines had significantly increased occurrence or reporting of side effects among medicine users in 4 out of 17 studies. Anxiety of negative events of medicines were observed in 2 out of 4 studies. No significant impact was observed on compliance to medication or negative clinical outcomes (e.g., disease relapse).

Authors Publication year <sup>Ref.</sup>	Aspect studied	Method Number of studies Publication period	Types of interventions	Outcome measures <sup>a</sup>	Key outcomes on significance of MI
Kuntz et al. 2014 <sup>104</sup>	Patient-centred interventions to improve medication management and adherence	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 43 RCTs and 17 other studies</li> <li>• 2007–2013</li> </ul>	Patient education and counselling Pharmacy services Decision aids Shared decision-making Case management Feedback interventions	B,C,E,H	<p><i>Educational interventions</i> were most effective when combined with coaching or behavioural and social support. Educational interventions often resulted in greater knowledge and better medication adherence, self-efficacy and self monitoring skills. Educational intervention produced no significant long-term impact on adherence in 5 out of 16 studies. One study noted that educational interventions might be most cost-effective among less-adherent patients. Effects of <i>pharmacy service interventions</i> on medication adherence were mixed, but more often positive. Patients were often satisfied with their interactions with pharmacists and with potential cost savings.</p> <p><i>Decision aids and shared decision-making interventions</i> increased knowledge, participation, confidence in decision-making and satisfaction with care among patients. Three studies showed that patients' understanding of risk was improved and decisional conflict lessened. Increased patient knowledge did not change the patient decision-making process, and there was little evidence that treatment choice or patient beliefs changed even when patients were more informed about benefits and risks of their medicines.</p> <p><i>Case management interventions</i> delivered by nurses or care teams, such as assessment of barriers to medication-taking among patients, significantly improved medication adherence and clinical outcomes, but they had no effect on quality of life.</p> <p><i>Feedback interventions</i> carried out by pharmacists or physicians, such as discussions with the patient to inform changes to the regimen, increased patient satisfaction regarding care and concordance between patient preferences and prescribed regimens in 2 out of 5 studies.</p>
Milosavljevic et al. 2018 <sup>105</sup>	Impact of community pharmacist-led interventions on health outcomes	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 16 RCTs and 6 other studies</li> <li>• 1973–2015</li> </ul>	Counselling Focus groups Monitoring DRPs Pharmacists' home visits Take-home videos and WMI Telephone calls	B,C,E,H	<p>Pharmacist-led counselling interventions improved patients' medication adherence and disease control. Interventions contributed best to asthma and blood pressure control, management of cholesterol and chronic obstructive pulmonary disease. Studies did not find an effect of interventions on glycated haemoglobin levels or depressive symptom control. The results of the pharmacist-led interventions to economic outcomes were mixed.</p>
Mullen et al. 2018 <sup>106</sup>	Best practices for prescription medicines labelling and educational materials	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 49 RCTs</li> <li>• 1976–2016</li> </ul>	WMI Pharmacy-generated container labelling Supplemental instructions Multimedia tools (e.g., audio-visual and computer-based materials)	B,H	<p><i>Strongest evidence on best practices:</i></p> <p><i>For WMI:</i> Materials written at lower reading level (<math>\leq</math> 5th grade) resulted in greater perceived clarity, increased comprehension and fewer medication errors. Use of plain and simplified language enhanced patients' medication adherence, attitudes, navigability and comprehension of WMI and reduced worry regarding the treatment. Typographic cues (e.g., use of bolding, bullet points, underlining) and standardised formats enhanced patients' comprehension.</p> <p><i>For container labelling:</i> Standardised warning icons paired with simplified text increased attendance to and comprehension of medicine warnings compared to warning text on its own. Combined use of standardised icons for dosing intervals (e.g., morning, noon evening, bedtime), numeric characters to describe quantitative information, explicit dosing instructions, simple terminology and <math>\geq</math> 12-point font size increased patient comprehension.</p> <p><i>For supplemental instructions:</i> Use of explicit dosing instructions, plain and simplified text and grid format improved adherence, but study findings were mixed.</p> <p><i>For multimedia tools:</i> Short and targeted educational videos resulted in improved short and long-term knowledge and enhanced beliefs on medications compared to longer video interventions or written materials. Videos did not appear to influence adherence. Interactive computer or web-based programmes had a positive impact on knowledge about medicines and self-efficacy. Incorporation of visual aids (e.g., animations) in multimedia tools did not appear to have an impact on patients' behaviour, knowledge or adherence.</p>

Authors Publication year <sup>Ref.</sup>	Aspect studied	Method Number of studies Publication period	Types of interventions	Outcome measures <sup>a</sup>	Key outcomes on significance of MI
Nicolson et al. 2009 <sup>107</sup>	WMI on patient outcomes in relation to prescription and OTC medicines	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 25 RCTs</li> <li>• 1972–2002</li> </ul>	WMI (e.g., PLs, supplementary leaflets) Non-print WMI (e.g., WMI on websites)	B,H	WMI significantly improved knowledge about a medicine in 6 out of 12 studies compared with no WMI. Patients provided with WMI had significantly higher knowledge of side effects in 3 out of 6 studies compared with those given no WMI. Patients given WMI expressed greater satisfaction with the information provided, reported less worry about the treatment and understood the information better, but the significance of these outcomes on medicines use should be further studied. Three studies found that those who had received WMI were more adherent to their medication. No such difference was found when biological markers were used to assess adherence. Eight studies compared the effects of presenting WMI in different ways: Programmed instructions significantly increased understanding of medicine use compared with the standard format handout. Providing information on the risk of side effects as a numerical description was significantly more effective in helping people make a correct estimation of risk than giving the same information as a verbal description. People were significantly less favourable to the treatment when information about the risks of the medicine was given after information about the benefits of the medicine. Studies that evaluated the effects of WMI on clinical outcomes were not found.
Zapata et al. 2013 <sup>110</sup>	Women's understanding of written instructions on an oral contraceptive (OC) pill	<ul style="list-style-type: none"> <li>• Systematic review</li> <li>• 3 RCTs and 6 other studies</li> <li>• 1983–2009</li> </ul>	Impact of WMI (e.g., PLs, brochures) on patients' understanding of what to do after forgetting to take an OC pill	B,H	Providing WMI on missed pill instructions with contraceptive counselling significantly improved knowledge of how to manage missed pills for up to 3 months compared to contraceptive counselling alone. Findings indicated a wide variability in women having correct knowledge, with 37–94% knowing what to do after missing one pill, 16–83% knowing what to do after missing two pills and 3–72% knowing what to do after missing three pills. Many women missing pills did not intend to follow recommended actions per missed pill instructions despite understanding the guidance. Graphic-based missed pill instructions were better than text only instructions and less information resulted in improved comprehension.

<sup>a</sup>Significance of medicines information (MI) in patient care and medicines use has been measured as behavioural (B), clinical (C), economic (E) or humanistic (H) outcomes; <sup>b</sup>Regular or specific patient information leaflets or standardised information sheet/handouts.

## **SIGNIFICANCE OF WRITTEN MEDICINES INFORMATION (WMI)**

Studies that explored the significance of WMI in patient care focused on WMI on prescription and OTC medicines,<sup>107</sup> prescription medicines labelling,<sup>106</sup> the impact of information on side effects on medicine use<sup>103</sup> and patients' understanding of dosage instructions in PLs related to oral contraceptives (OCs)<sup>110</sup> (Table 1). There is reasonable evidence that WMI can significantly improve patients' knowledge about medicines.<sup>107,110</sup> However, there is also some evidence, although partly limited or contradictory, that WMI can have an effect on changing the patient's attitudes or behaviours, such as improving medication adherence.<sup>103,107,110</sup> Patients who are able to use WMI in addition to verbal MI have reported being less concerned about their medication and have expressed better knowledge, understanding and satisfaction with MI provided than patients who received only verbal MI.<sup>107,110</sup> Moreover, adherence to the medicines' instructions is found to be higher among patients provided with WMI, even they have reported slightly more side effects than those who have not received WMI.<sup>107</sup>

The strongest evidence on best practices of WMI has been shown when plain and simplified language has been used combined with typographic cues (e.g., bolding, bullets points, underlining), graphic-based instructions and quantitative descriptions (Figure 5, Table 1).<sup>106,110</sup> For example, providing information of the risk of ADRs as a numerical description is significantly more effective in supporting patients to make correct risk estimations than giving the same information as a verbal description (e.g., "10 out of 100 medicine users are expected to experience particular adverse drug reactions" instead of providing a general expression that "adverse drug reaction is common").<sup>107</sup> Furthermore, patients are found to be significantly less likely to take their medicine when information about the risks of medicine is given after information about the benefits of medicine. Adjusting the reading level ( $\leq 5^{\text{th}}$  grade) in WMI on prescription medicines has found to result in greater perceived clarity, increased comprehension and fewer medication errors among patients.<sup>106</sup> There is evidence that standardised warning icons or pictograms paired with simplified text in labels of medicine containers increase attendance to and comprehension of medicine warnings compared to warning text on its own.<sup>106</sup>



## **SIGNIFICANCE OF VERBAL MEDICINES INFORMATION**

The significance of verbal interventions in patient care provided by HCPs, such as medication education and counselling has been a widely studied topic (Figure 5, Table 1).<sup>98-102,104,105,108,109,111</sup> Medication counselling provided by physicians, pharmacists and nurses has been shown to improve medication adherence in many patient groups, such as diabetics.<sup>98,99,102,105,111</sup> Nurse-led counselling in groups and via electronic messages may also enhance adherence but more evidence is needed on the effectiveness of these interventions.<sup>109</sup>

The most effective intervention components in verbal MI to enhance medication adherence have been found to be HCPs' competent communication skills and patient-centred approach, interdisciplinary and effective team communication, well-defined roles between HCPs, regularly provided counselling and promotion of self-management (Figure 5, Table 1).<sup>98,100,102,108,111</sup> Combining interventions, such as tailored counselling combined with social support, education and/or reminders, enhance adherence more than using a single intervention.<sup>104,109</sup>

Many of the pharmacist-led verbal MI interventions have been shown to have a statistically significant impact on clinical outcomes, such as lowering blood pressure and blood glucose levels, and enhancing glycemic control (Figure 5, Table 1).<sup>98,99,101,102,108</sup> The best effects of the pharmacists' verbal MI interventions have been seen on blood pressure control, but the evidence of their effectiveness on patient satisfaction, knowledge, quality of life and healthcare utilisations is insufficient or contradictory.<sup>99,101,105,108</sup> Pharmacist-led interventions have also been proven to have positive effects on safety outcomes, such as preventing ADRs and medication errors.<sup>101</sup> The significance of pharmacist-led verbal MI interventions to economic outcomes is mixed.<sup>105,108</sup>

Case management interventions by nurses or care teams, such as the assessment of barriers to medication-taking among patients, have been indicated to significantly improve medication adherence and clinical outcomes, but not quality of life (Table 1).<sup>104</sup> In some cases, feedback interventions carried out by pharmacists or physicians, such as discussions with the patient to inform about the changes to the regimen, increase patient satisfaction with their care and concordance between patient preferences and prescribed regimens.<sup>104</sup> There is robust evidence that informing patients about potential ADRs by educational verbal MI interventions does not increase the

reporting of ADRs in most of the cases and does not impact negatively on medication adherence or clinical outcomes.<sup>103</sup>

## **SIGNIFICANCE OF MULTIMEDIA-BASED MEDICINES INFORMATION**

There is limited but optimistic evidence that multimedia-based MI interventions are more effective than no education or non-standardised education provided by HCPs as part of usual clinical care in improving skill acquisition (e.g., inhaler technique among asthmatics) and knowledge about medicines (Table 1).<sup>96</sup> Multimedia-based education could be used alongside MI provided by HCPs, but not as a replacement for medication counselling or WMI. Studies related to the best-practices for MI on prescription medicines have found that short and targeted educational videos improve short- and long-term knowledge compared to longer video interventions or written materials.<sup>106</sup> Interactive computer or web-based programmes have shown a positive impact on knowledge and self-efficacy. Incorporation of visual aids, such as animations, in multimedia tools have not been indicated to impact on patients' behaviour, knowledge or medication adherence.

## **2.2 STRATEGIC DEVELOPMENT OF MEDICINES INFORMATION**

This section focuses on the strategic development of MI in the EU, especially in the 2000s. Finland is used as a textbook example country as the development of MI practices there has been systematic and long-term. In particular, the focus is in the development, implementation and evaluation of the Finnish first national MI strategy.<sup>22</sup>

### **2.2.1 STRATEGIC ACTIONS TO ENHANCE MEDICINES INFORMATION TO PATIENTS IN THE EUROPEAN UNION DURING THE 2000s**

The availability and quality of MI has been key topic of debate globally as an integral prerequisite for rational pharmacotherapy since the 1960s.<sup>27,46</sup> To ensure patients have access to high-quality and balanced MI, adequate coordination and organisation of MI practices between public and private stakeholders are required.<sup>16,25,32,116</sup>

Since the early 2000s, developing the coordination of MI has been one of the strategic aims to improve the access of MI to patients and to enhance the implementation of rational pharmacotherapy in the EU. In 2001, the High Level Group on Innovation and Provision of Medicines, known as the G10 Medicines Group, was set by the European Commission to enhance competitiveness in the pharmaceutical industry and to encourage high levels of health protection.<sup>24</sup> In 2002, the G10 Medicines Group published recommendations for action to improve the quality and access of MI to patients. In 2005, the European Commission established the High Level Pharmaceutical Forum, known as the Pharmaceutical Forum, to continue the implementation of the recommendations published by the G10 Medicines Group.<sup>25</sup> The Pharmaceutical Forum was mandated to assess current MI practices in the EU countries and develop a set of core quality principles for improving quality of MI.<sup>25</sup>

In 2008, the Pharmaceutical Forum concluded in its recommendations that patients in different EU countries do not have equal access to MI (Table 2).<sup>25</sup> Variation in MI practices particularly concerned the use of the Internet as a source of MI and cooperation between public and private sector MI providers. The Pharmaceutical Forum's recommendations on information to patients emphasised the responsibility and cooperation of various actors in MI (e.g., HCPs, patients and representatives of the pharmaceutical industry) in the production of the reliable MI (Table 2). Furthermore, the recommendations proposed that the EU member states should establish long-term strategic work to coordinate MI practices nationwide.

Within the EU, the UK has been a pioneer country for the long-term national development of MI practices, especially WMI to patients.<sup>16,39,51</sup> The work done in the UK has had a spillover effect on the EU regulations concerning WMI, particularly PLs (e.g., structure and content, availability in braille format, user testing of readability).<sup>45,53,62</sup> Many of the UK initiatives have had their roots in the developments in the USA, a long-term research cooperation between British, American and Australian MI researchers being the vehicle for transfer.<sup>117</sup>

**Table 2. Recommendations of the High Level Pharmaceutical Forum (Pharmaceutical Forum) on information to patients published in 2008 addressed to the European Commission, interested stakeholders and the European Union member states.<sup>25</sup> All the recommendations are subject to the European and national legal provisions.**

RECOMMENDATIONS AND ACTIONS FOR IMPLEMENTATION
<p><b>Recommendation 1: ENHANCE QUALITY OF INFORMATION</b></p> <p><i>Actions for implementation:</i></p> <ol style="list-style-type: none"> <li>1. The Forum recognises that the mandate of the Pharmaceutical Forum is part of a broader health information context, as identified by a number of important elements which Member States and the Commission should commit themselves to taking into consideration when developing work in this field.</li> <li>2. All the relevant players, including national competent authorities, the Commission, public health stakeholders and industry, should ensure high quality information and thereafter should commit themselves to implementing and using the core quality principles and their methodology of use for the development of information, and to identifying poor quality information.</li> <li>3. The Forum recognises the added value for patients and citizens of providing information on medical conditions jointly with information on treatment options. All the relevant players should ensure that the identified key elements for information to patients on medical conditions and treatment options are taken into consideration when information to patients is produced, assessed and improved.</li> <li>4. The Commission should consider using the EU Health Portal to raise the visibility of good information sources and ensure that all principles developed by the Forum are applied. Member States and stakeholders, with the assistance of the Commission, should commit themselves to continuing to share information about new initiatives regarding information that are in line with the principles.</li> <li>5. The Commission together with the Member States and the relevant stakeholders should consider developing a common approach to quality assurance of information.</li> <li>6. The ban on advertising of prescription medicines to the general public should continue.</li> </ol>
<p><b>Recommendation 2: INCREASE ACCESSIBILITY AND DISSEMINATION OF INFORMATION</b></p> <p><i>Actions for implementation:</i></p> <ol style="list-style-type: none"> <li>7. Member States, stakeholders and the Commission should accelerate their engagement toward generation of information to citizens in effective communication formats (electronic and non-electronic means), taking account of local traditions, healthcare systems and languages. To initiate the process, Member States, stakeholders and the Commission are invited to implementing the specific recommendations identified to increase accessibility and dissemination of health information in the various healthcare settings.</li> <li>8. The Commission should commit itself to making visible the best practices identified in the Member States and to promoting cooperation between the Member States and the relevant stakeholders to further exchange experiences.</li> <li>9. The European Medicines Agency should continue, and be financially enabled to continue, its efforts in improving the database on medicinal products authorised in the EU as foreseen in Article 57, 1(l) of Regulation (EC) No 726/2004 and its cooperation with Member States and stakeholders with regard to information on medicinal products.</li> </ol>
<p><b>Recommendation 3: GENERATION OF INFORMATION BY MAKING THE BEST USE OF ALL ACTORS</b></p> <p><i>Actions for implementation:</i></p> <ol style="list-style-type: none"> <li>10. Member States, the Commission and other stakeholders should take note of existing partnerships and collaborations between the various parties that mobilise knowledge and resources for producing and disseminating information to patients.</li> <li>11. Member States, the Commission and other stakeholders should exchange information about the different approaches existing across Europe in the choice of partners, structures and responsibilities. They should also consider whether further collaborations could be created.</li> <li>12. Where such partnerships and collaborations are set up, Member States and stakeholders should commit themselves to respecting the minimum ethical requirements of i) transparency, ii) disclosure of financial and other support and iii) definition of responsibilities as identified in the Forum process.</li> <li>13. The Commission should raise the visibility of existing partnerships and collaborations, for instance by using the EU Health Portal, which respect the ethical guidance and produce information in line with the core quality principles.</li> </ol>
<p><b>Recommendation 4: CONTINUED MOMENTUM ON INFORMATION TO PATIENTS</b></p> <p><i>Actions for implementation:</i></p> <ol style="list-style-type: none"> <li>14. The members of the Pharmaceutical Forum are invited to disseminate the outcomes of the Forum to all interested parties and citizens, e.g., through workshops.</li> <li>15. Member States and the relevant stakeholders are expected to ensure that the recommendations are followed up at national level. Member States and the Commission in cooperation with the relevant stakeholders should within the next two years undertake a first review of what exists, and what has been created and/or improved following the recommendations from the Pharmaceutical Forum in the field of information to patients.</li> <li>16. Further cooperation and sharing of experiences at EU level is needed, and thus the Commission should set up a process building on the Information to Patients working group to evaluate the direct outcomes and follow-up of the Pharmaceutical Forum.</li> </ol>

Among the most remarkable milestones in the UK guiding the development of national MI practices has been the shift from compliance to concordance.<sup>1,118,119</sup> It was initiated in mid-1990s through extensive research by the Royal Pharmaceutical Society of Great Britain (RPSGB) to identify the root causes of poor compliance.<sup>118,119</sup> However, instead of root causes, the researchers ended up with an entirely new approach to medicine taking and recommended to disregard compliance as a concept.<sup>14,119,120</sup>

The new concept, concordance, refers to mutual understanding of the treatment as a result of a negotiation between the patient and the HCPs professional that respects the patient's wishes, beliefs and underlying knowledge.<sup>3,4,119</sup> Concordance views the patient as being the equal of the healthcare provider and as having a right to make informed decisions. Concordance is related to empowerment and patient-centred care, thus it is not a synonym of compliance.<sup>1,121-123</sup> To implement concordance-based practices in the UK, a national long-lasting strategic *Partnership in Medicine Taking* programme was initiated by the National Health Service (NHS) in 1997.<sup>119</sup> The programme was supported in many ways, e.g., by the development of an instrument to operationalise the concept of concordance to assess HCPs' attitudes towards it.<sup>124,125</sup> This instrument and its modifications have been applied beyond the UK, for instance in Finland.<sup>120,126,127</sup>

In 2004, the UK created a national health information strategy, *Better Information, Better Choices, Better Health*, as a 3-year action plan at local and national levels with a vision of putting information at the centre of healthcare within the UK.<sup>40</sup> The strategy was designed to influence the way people seek and use health information in informing their healthcare decisions. The strategy included 25 activities which were outlined to improve access to health information, signposting and quality of information, and open up the relationship between HCPs and patients, organisational roles and responsibilities and communications and support.

During the compilation of the first national MI strategy in Finland, in 2010 a Master's thesis was conducted at the University of Helsinki in cooperation with the University of Bath to evaluate the implementation of the various actions of the UK's national health information strategy.<sup>128</sup> An evaluation found that the best implemented activities were primarily those which were already underway when the strategy was compiled, e.g., websites available nationally to provide general health information and information about prescription medicines. The weakest accomplished activities were those which were considered unnecessary during the strategy or where there was no

clearly addressed responsible stakeholder to implement the activity, e.g., a web-based search engine for health information. The planned 3-year timescale was possibly too short to deliver all of the activities planned in the strategy.

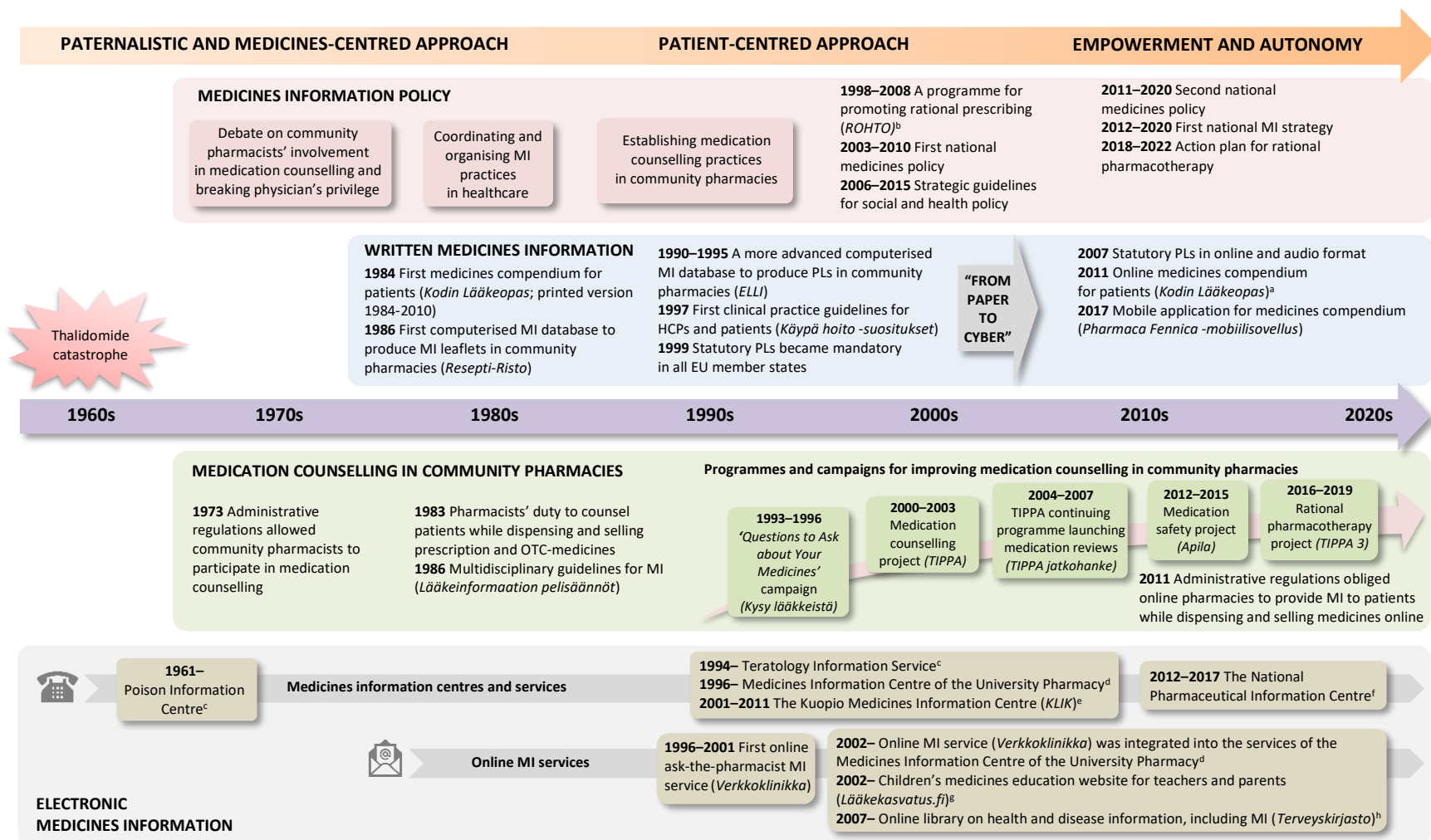
In the UK, the idea of the strategic development of MI was adopted from the USA in which public and private stakeholders had been brought together already by the beginning of 1970s as a consequence of a failure to oblige package inserts in pharmaceutical products.<sup>129</sup> The initiative was blocked by the drug industry, which led to the formation of a coordinating body of MI to consumers named National Council of Patient Information and Education (NCPIE) in 1982.<sup>130</sup> NCPIE has been facilitating research and development of MI practices to consumers, primarily in the USA. However, it has also had spillover effects to other countries, including in Europe, e.g., through the WHO EuroPharm Forum: one of its programmes to enhance community pharmacists' involvement in patient care and health promotion was adopted from NCPIE (*Questions to Ask About Your Medicines* campaign).<sup>131,132</sup>

## **2.2.2 DEVELOPMENT OF MEDICINES INFORMATION IN FINLAND**

As in many other countries, the roots of MI to patients in Finland are in the realisation of drug safety risks in the 1960s (Figure 6). Already by 1961, the first nationwide MIC with a call centre service specialising in prevention and treatment of acute poisonings was founded in the Helsinki University Hospital.<sup>18</sup> In the early 1970s, a debate was raised on patients' rights to know about the medicines they take and the need to also involve pharmacists in medication counselling to enhance rational medicine use.<sup>17,43,74</sup> At that time, the perceptions of HCPs, particularly those of physicians, were paternalistic on patients' role in their own care, even though the rights of the patients were recognised in principle. The debate led to the administrative regulation in 1973 that allowed community pharmacists to participate in medication counselling. Prior to this, medication counselling was limited to physicians' duty and pharmacists were only allowed to provide MI at the request of the patients.

In the 1980s, the request for active medication counselling became even more dominant along with public health orientation in healthcare developments which emphasised health education (Figure 6).<sup>43</sup> Efforts were made to coordinate and organise MI practices in healthcare.<sup>17,43</sup> Pharmacists' statutory obligation to provide counselling to patients while dispensing

prescription medicines and selling non-prescription medicines came into force in 1983. The first major action to improve the coordination of MI between the various actors in healthcare, particularly between physicians and community pharmacists, took place in 1986 when the multidisciplinary guidelines for MI, called *Lääkeinformaation pelisäännöt* in Finnish, were published. Together with the increased availability of MI targeted to patients, the need for reliable WMI sources increased. The first medicines compendium for consumers, called *Kodin Lääkeopas* in Finnish, was published in 1984, and the first computerised database system to produce medicines information leaflets to patients in community pharmacies was launched in 1986.<sup>18</sup> There were no uniform regulations for the statutory PLs in the EU until 1999 when PLs became mandatory in all EU member states, including Finland.<sup>19</sup> The first national clinical practice guidelines for HCPs and patients, called *Käypä hoito-suositukset* in Finnish, were published in Finland in 1997.<sup>133-135</sup>



<sup>a</sup>Integrated into the online health library (*Terveyskirjasto*), <sup>b</sup>ROHTO initially worked as a project in 1998–2001, and after that it operated as the Centre for Pharmacotherapy Development ROHTO under the Ministry of Social Affairs and Health (2002–2008), <sup>c</sup>Service provided by the Hospital District of Helsinki and Uusimaa (HUS), <sup>d</sup>Service provided by the University Pharmacy which is owned by University of Helsinki, <sup>e</sup>Owned by the University of Kuopio/the University of Eastern Finland, <sup>f</sup>Owned by the University of Eastern Finland and Pharmaceutical Information Centre in 2012–2014, owned by Pharmaceutical Information Centre since 2015, and provided MI service to consumers until 2017, <sup>g</sup>Website portal owned by the University of Kuopio/the University of Eastern Finland during 2002–2011, since 2012 owned by the Finnish Medicines Agency Fimea, <sup>h</sup>Owned by Duodecim Publishing Company Ltd.

**Figure 6. History and evolution of medicines information (MI) to patients in Finland since the 1960s.**



Since the early 1990s, patients' self-management and responsibility for their own medication, medication monitoring and the shared-decision-making between patients and HCPs has been emphasised (Figure 6).<sup>43</sup> The first effort to shift from medicine-centred counselling to more individual and tailored counselling was taken through a national campaign in community pharmacies in 1993–1996.<sup>17,18,43,131</sup> The *Questions to Ask about Your Medicines* campaign (QaM), called *Kysy lääkkeistä* in Finnish, was adapted from the WHO EuroPharm Forum's programme.<sup>131,132</sup> The campaign was an attempt to encourage medicine users to ask about their medicines by creating awareness of what they should know about their medicines (five core questions).<sup>131</sup> Community pharmacies were encouraged to provide patient counselling training for their staff and to set national and local standards for medication counselling. During the QaM campaign, pharmacists' counselling became more customised and more empathy was shown toward the patients. Additionally, pharmacists started to more spontaneously provide MI both orally and written. However, a discrepancy was found in the priority content of MI between consumer and community pharmacists: pharmacists emphasised technical aspects, such as repeating the label information and explaining how to store the medicine at home, while the consumers primarily wanted to learn about therapeutic effects of their medications, particularly about interactions, ADRs and therapeutic effects.<sup>136</sup> Furthermore, the non-participatory observations of medication counselling content in community pharmacies indicated the content to be limited, varying by the therapeutic group.<sup>137</sup> These findings and experiences with the QaM campaign laid the foundation for the development of new tools, databases and continuing education assisting community pharmacists in their counselling practice.

The most intensive period in the strategic development of medication counselling in community pharmacies occurred in the early 2000s when the *TIPPA Project* (2000–2003) was carried out to enhance MI provided by community pharmacists (Figure 6).<sup>14,17,26</sup> *TIPPA Project* and its consequent projects in 2004–2019 have promoted the shift from traditional paternalistic medication counselling culture towards patient-centred approach, empowerment and respecting patients autonomy. Furthermore, it has aimed at strengthening the role of community pharmacies in the medication use process and as part of social and healthcare.

It became evident during the first phase of the *TIPPA Project* in 2000–2003 that not all of the problems that medicine users experience with their medications can be solved by counselling, but require a more comprehensive approach.<sup>17</sup> Thus, the next phase of the project in 2004–2007 focused on developing collaborative medication review procedures and related competences for pharmacists (Figure 6).<sup>17</sup> As a result, a standardised comprehensive medication review (CMR) procedure and related qualification training were created through this project.<sup>138–140</sup> Since then, the collaborative medication review procedures involving pharmacists have diversified and evolved in various settings, particularly in geriatric care in Finland.<sup>141–146</sup>

The third phase of development that emerged from the *TIPPA Project*, called *Apila Project* (2012–2015) focused on community pharmacists' contributions to patient and medication safety (Figure 6). It was linked to the national implementation programme of the first *Finnish Patient Safety Strategy 2009–2013* established by the Ministry of Social Affairs and Health.<sup>147</sup> The national implementation programme, called *Potilasturvallisuutta taidolla* in Finnish, was run by the National Institute of Health and Welfare during 2011–2014.<sup>148</sup>

*Apila Project* encouraged community pharmacies: 1) to ensure safe medication practices within their outlets, and 2) to assist home care and other primary care units, as well as social service units, to ensure medication safety in their practice. For these purposes, community pharmacies were recommended to actively use a wide range of tools, such as a self-audit tool for assessing safe medication practices, adopted and validated from the US Institute for Safe Medication Practices' (ISMP) Medication Safety Self-Assessment (MSSA) tool,<sup>149</sup> electronic databases assisting in medication reviews by identifying, for example, interactions, anticholinergic and serotonergic load and potentially inappropriate medications for older adults. Furthermore, the Association of Finnish Pharmacies launched a new electronic reporting system for reporting prescribing and dispensing errors identified in community pharmacies.

The most recent phase of the *TIPPA Project*, called *TIPPA 3 Project* (2016–2019) continued with the goals of the previous projects to strengthen the contributions of community pharmacists in promoting rational medicine use and to give pharmacists a more visible part of the medication use process (Figure 6).<sup>150</sup> *TIPPA 3 Project* was, in particular, planned to support the *Rational Pharmacotherapy Action Plan* (2018–2022) established by the Ministry of Social Affairs and Health as part of the *Strategic Programme of*

*Prime Minister Juha Sipilä's Government (2015–2019)*.<sup>28,151</sup> One of the major strategic goals of the Government Programme was a national reform of social and health services system.<sup>151</sup>

Another remarkable national long-term effort to promote rational pharmacotherapy was primarily targeted at primary care physicians. The goal of the *ROHTO* (1998–2008) was to influence physicians' prescribing behaviour by promoting implementation of the Current Care Guidelines, called *Käypä hoito -suositukset* in Finnish (Figure 6).<sup>152</sup> *ROHTO* was initiated as a 4-year programme (1998–2001), and was then changed to an independent unit operating under the Ministry of Social Affairs and Health (Centre for Pharmacotherapy Development ROHTO). The centre was merged to the National Institute of Health and Welfare in 2009.<sup>153</sup>

Since the 2000s, the Internet and other electronic information sources have improved access to health information and MI among consumers, for example by making statutory PLs available online and increasing online MI services for consumers (Figure 6).<sup>18,154</sup> In the 1990s, before online pharmacies were allowed in Finland, community pharmacies started to establish MICs and provide call-centre-based MI services to their customers. The first national call centre was established by the University Pharmacy (YA) in 1996, which has since grown to multi-channel MI services with high magnitude (Figure 6).<sup>18</sup> Another national call centre (The Kuopio Medicines Information Centre KLIK) was established by the University Pharmacy of the University of Kuopio (currently the University of Eastern Finland) in 2001.<sup>155</sup> It contracted private community pharmacies so that their clients could call the centre when they had medication-related problems (e.g., beyond opening hours). During 2012–2014, KLIK operated under the name The National Pharmaceutical Information Centre, which was jointly owned by the University of Eastern Finland and Pharmaceutical Information Centre. Since 2015, The National Pharmaceutical Information Centre has been owned by the Pharmaceutical Information Centre. Since 2017, the call centre has served only HCPs through online services.

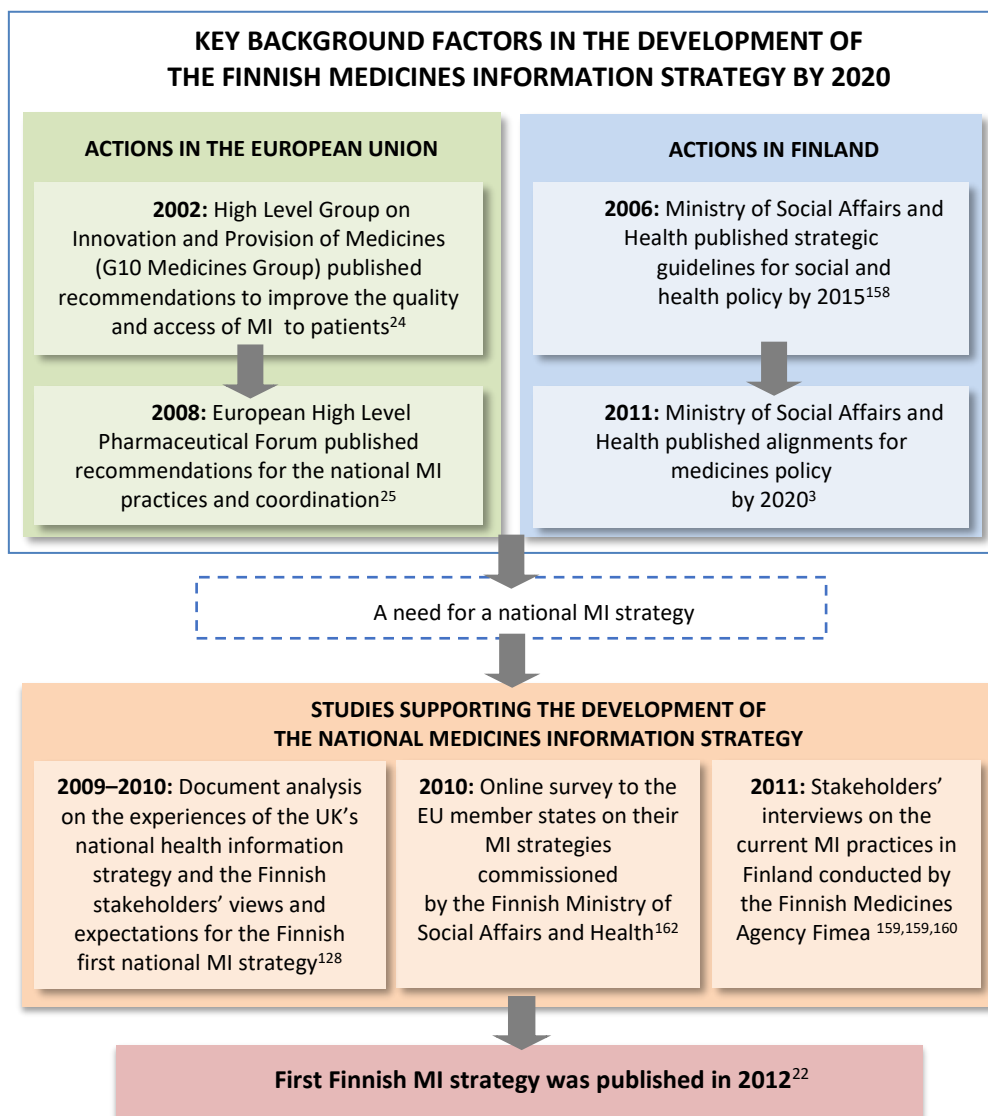
Online pharmacies have been allowed in Finland since 2011 and they are obliged to ensure rational medicines use by providing MI to patients while dispensing and selling prescription and non-prescription medicines online (Figure 6).<sup>156,157</sup>

### 2.2.3 STRATEGIC DEVELOPMENT OF MEDICINES INFORMATION IN FINLAND DURING THE 2010s

As the previous chapters indicate, MI has been a special priority in Finland for a long period of time in terms of medicines policy, research and practice development. The most recent developments during this decade have been based on the *Medicines Policy 2020* established by the Ministry of Social Affairs and Health in 2011 as an outcome of an intensive stakeholder cooperation.<sup>3</sup> *Medicines Policy 2020* document is in line with the strategic guidelines for social and health policy by 2015 established by the Ministry of Social Affairs and Health in 2006.<sup>158</sup> MI was prioritised in medicines policy because numerous MI sources and databases were available for medicine users and HCPs, but there was a lack of coordination between actors in the production and utilisation of different information sources in social and health services.<sup>3</sup>

In 2011, the Finnish Medicines Agency Fimea was given a mandate to launch a long-term national programme to coordinate MI practices and to develop a national MI strategy. The national MI strategy was developed in cooperation with stakeholder representatives, including patient organisations, universities, pharmacies, and professional associations in medicine, pharmacy and nursing (Figure 7).<sup>159-161</sup> Moreover, previous studies and experiences of MI practices and existing MI strategies in other EU member states were utilised.<sup>128,162</sup> Guided by these studies and experiences, along with the recommendations of the Pharmaceutical Forum for strategic development of MI,<sup>25</sup> Fimea published Finland's first MI strategy, *Rational Use of Medicines through Information and Guidance – Medicines Information Services: Current State and the Strategy for 2020*, covering the years 2012–2020 in February 2012.<sup>22</sup>

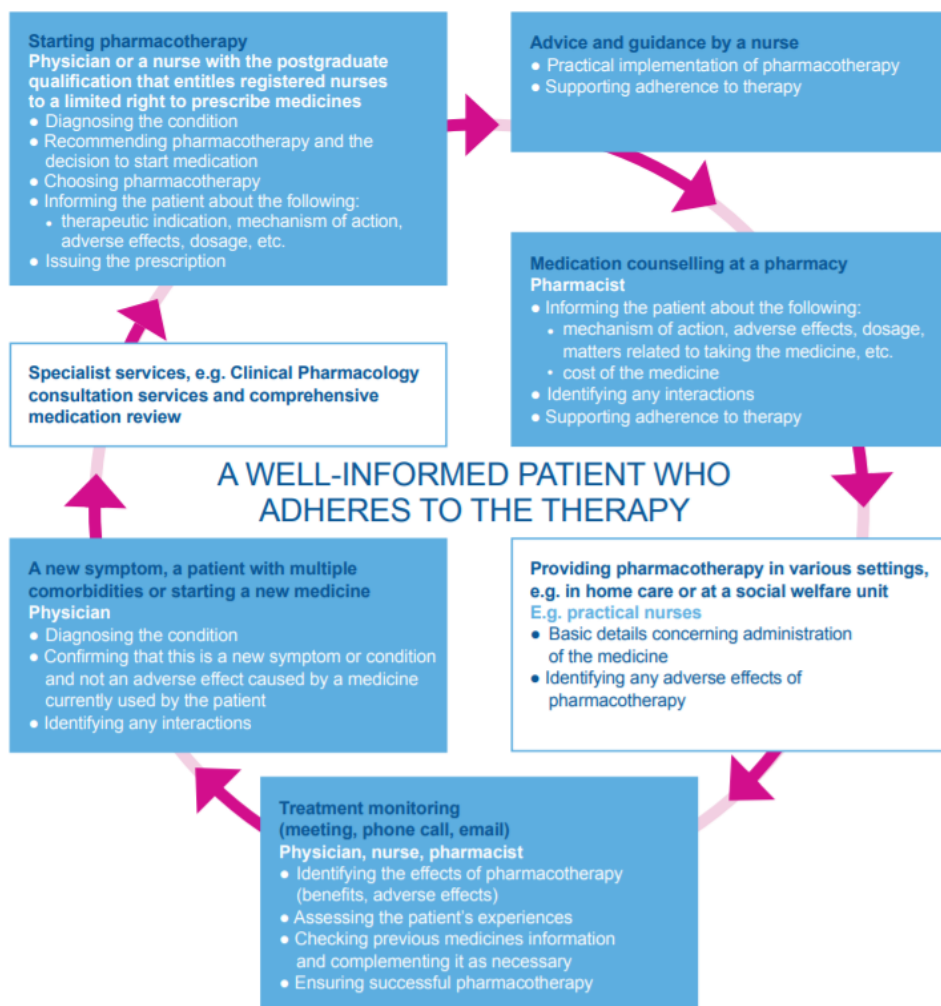
The ultimate goal of the national MI strategy is to have well-informed patients who adhere to their medications (Figure 8).<sup>22</sup> This strategic goal is in line with the *Chronic Care Model*,<sup>163,164</sup> which was quite extensively piloted in Finland in the beginning of the 2010s (i.e., at the time the national MI strategy established) as a potential basis for a new social and health services system.<sup>165</sup> The model puts the patient into the center and encourages creation of structures and processes that support self-management of chronic diseases.



**Figure 7.** Development of the first national medicines information (MI) strategy in Finland.

The primary target of the national MI strategy is patients with long-term medication. The main phases and actions of different HCPs involved in the medication use process are illustrated in Figure 8. Patients have a statutory right to be informed about the reasons and effects of their treatment, alternative treatment forms and their effects and other factors which may affect the decision to select the treatment.<sup>23</sup> The aim is strengthen patients'

involvement in their own care and enhancing adherence. The national MI strategy has 6 main goals with 37 proposals for the actions (Table 3).<sup>22</sup> The primary values of the national MI strategy are to promote patient-centredness and multidisciplinary practices. Achieving the strategic goals requires engagement of the stakeholders in pharmaceutical sector and their willingness to implement the goals of the strategy in practices.



**Figure 8.** Medication use process for patients with chronic diseases as illustrated in the Finnish national medicines information (MI) strategy by 2020.<sup>22</sup>

**Table 3.** Strategic goals, objectives and proposals for the actions of the Finnish national medicines information (MI) strategy 2012–2020.<sup>22</sup>

MAIN STRATEGIC GOALS	OBJECTIVES	PROPOSALS FOR THE ACTIONS
<b>1. To establish a multidisciplinary MI network in Finland</b>	1. Establishing a national MI network	1. Establish a MI network in order to increase cooperation, a more systematic approach and greater multidisciplinary in developing MI activities and to promote collaboration between public and private sectors.
	2. Incorporating research and follow-up in MI activities	2. To direct the activities of the MI network, the following will be assessed: the need for information among HCPs, the need in the different sectors and the effectiveness of medication counselling and guidance.
	3. Participating in international initiatives	3. Assess the applicability of international models and MI tools for use in Finland.
<b>2. To ensure that HCPs utilise reliable information sources and services</b>	4. Increasing awareness of reliable information sources	4. Produce summaries of pharmacotherapies.
		5. Produce evaluations and summaries of the therapeutic and economic value of medicines for HCPs and patients. Encourage greater utilisation of evaluated evidence.
		6. Improve the availability of MI in Swedish for HCPs.
		7. Establish an effective information management system for crisis situations and pharmacovigilance-related information to ensure that all HCPs can be contacted during the same day.
	5. Improving the accessibility and usability of MI	8. Ensure through basic and complementary education that HCPs are aware of the various information sources and databases and are able to use them.
		9. Develop electronic clinical decision support systems and integrate them into existing information systems.
		10. Ensure easy access to SmPCs. Improve the quality of SmPCs in the EU.
		11. Produce a MI formulary in Finnish based on generic names.
	6. Utilising experts and existing specialist services	12. Evaluate opportunities for networking and coordination of activities between the stakeholder currently providing MI services.
		13. Evaluate and monitor the quality of MI disseminated by stakeholders providing MI services.
		14. Increase awareness of and collaboration between Clinical Pharmacology and Clinical Pharmacy services. <ul style="list-style-type: none"> <li>• Develop Clinical Pharmacology and Clinical Pharmacy services and ensure access to them everywhere in Finland, for instance by creating</li> <li>• A network-type consultations service for HCPs.</li> <li>• Shift the focus of ward pharmacy activities from medicines logistics towards clinical pharmacy: medication review and medication counselling for patients (e.g., admission interview, review of admitted patients' medication, medication counselling on discharge together with a physician and a nurse).</li> </ul>
		15. Step up collaboration in producing hospital-specific internal Standard Operating Procedures and in disseminating these SOPs and best practices in pharmacotherapy. Opportunities to utilise guidelines and practices from other countries should also be evaluated.

<b>3. To ensure a high level of medicines expertise and multi-disciplinarity in healthcare</b>	7. Improving medicines expertise and developing training in medication counselling	16. Develop basic and complementary education for all professional groups. <ul style="list-style-type: none"> <li>• Develop existing syllabuses and ensure that physicians and other HCPs are well prepared for reading, assessing and applying published research, treatment guidelines and assessments of the therapeutic and economic value of medicines.</li> <li>• Increase the practical application of theoretical knowledge in clinical pharmacy teaching for pharmacy students.</li> <li>• Further develop medicines expertise among nurses and ensure equal skills everywhere in Finland.</li> <li>• Further develop practical nurses' medicines expertise.</li> </ul>
	8. In basic and complementary education emphasising a patient-centred attitude, a multi-disciplinary approach and support for patient self-management	17. Ensure that basic and complementary education for all groups of professionals contain multidisciplinary courses. Teaching should address at least the following areas: a patient-centred approach and support for self-management, tailored medication counseling, a multidisciplinary approach, and increasing awareness of the competence of one's own professional group among other groups of professionals.
		18. Consider special groups: MI should be included in the basic and complementary education of sign language interpreters and interpreters working with immigrants.
<b>4. To base medication counselling on national guidelines and local agreements</b>	9. Harmonising the provision of medicines counselling in healthcare	19. Increase collaboration between pharmacies and healthcare units and encourage more local agreements on monitoring long-term treatments. Medication counselling practices should also be agreed on.
		20. Define quality and structural standards for medication counselling and assess the possibility to document and monitor medication counselling.
	10. Using MI to support the provision of pharmacotherapy in various settings	21. Ensure that units have unit-based pharmacotherapy plans that also include MI activities.
<b>5. To ensure that medicine users utilise reliable information sources and services</b>		22. Ensure that persons providing pharmacotherapy have access to MI.
	11. Ensuring medication counselling in self-care	23. Support the work of professionals by producing evidence-based treatment guidelines concerning self-medication and self-care and integrate these into existing treatment guidelines wherever possible.
		24. Incorporate guidance for self-care and self-medication into the national self-care programme.
	12. Ensuring the availability of reliable MI	25. Assess and monitor the quality of MI and medication counselling available from online pharmacy services and pharmacy service points.
		26. Increase collaboration between patient organisations and other stakeholders in this field to improve MI.
	13. Promoting the readability and usability of PLs	27. Further enhance package leaflet readability and contents in the EU.
	14. Producing MI in minority languages and for other special groups	28. Produce MI in Swedish.
<b>6. To achieve a high level of health literacy among the general public</b>		29. Produce MI for special groups (immigrants, deaf and hard of hearing, visually impaired, elderly, children, patients with public health problems).
	15. Increasing the use of information and communications technology to disseminate MI	30. Incorporate general MI for citizens into other social affairs and healthcare information in the SAdE Project <sup>a</sup> .
		31. Link general MI, including information on medicines currently used by the patient, to patient-specific information in the National Archive of Health Information's ePrescription system.
		32. Create a list of links to reliable sources of MI or establish a quality label.
		33. Develop and promote the visibility and participation of HCPs in social media.
		34. Promote the use of the DARTS checklist <sup>b</sup> , developed to help assess whether MI is reliable, among the public and in school teaching.
	16. Promoting health literacy among children and adults	35. Carry out a multidisciplinary population-level campaign on the safe and appropriate use of medicines.
		36. Update MI webpages to produce a generic source of MI for the general public.
		37. Ensure that the appropriate use of medicines and MI literacy continue to be included in the Core Curriculum for basic education. <ul style="list-style-type: none"> <li>• Create national medicines education guidelines for schools in which the appropriate use of medicines is integrated into a wider educational context.</li> <li>• Encourage medicines education collaboration between schools and the healthcare system and develop guidelines and material to support HCPs giving medicines education lessons.</li> <li>• Ensure teaching material is provided for special groups such as sign language users.</li> </ul>

<sup>a</sup>National program for accelerating electronic services and democracy (2010–2015) by the Ministry of Finance, <sup>b</sup>A five-item tool to assess the quality of online MI.



## 2.2.4 IMPLEMENTATION OF THE NATIONAL MEDICINES INFORMATION STRATEGY

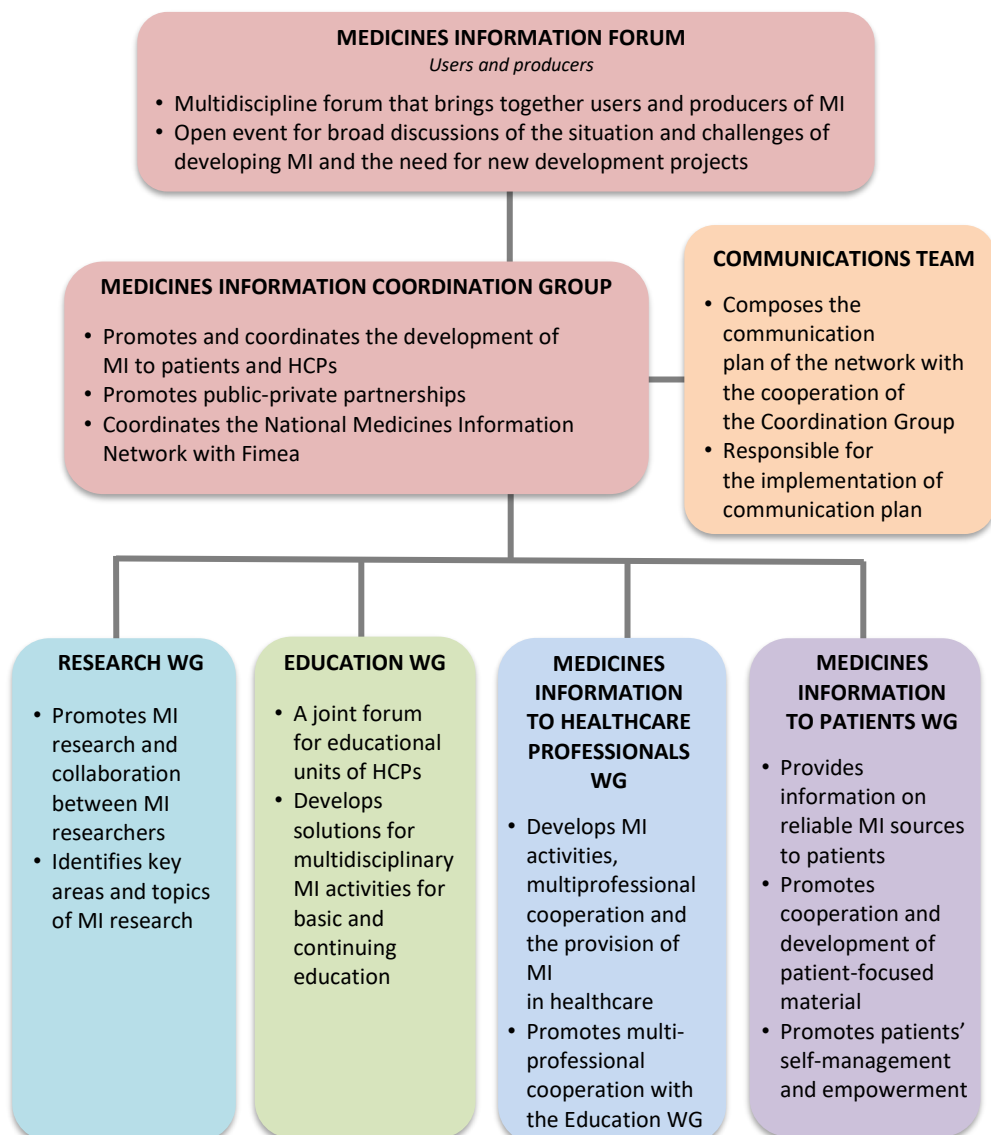
The National Medicines Information Network (MI Network) was established in September 2012 to support the implementation of the national MI strategy (Table 4, Figure 9).<sup>159</sup> The aim of the MI Network is to increase national and international multidisciplinary cooperation in the promotion of reliable MI and MI services and in assessing their effectiveness. Fimea has overall responsibility for coordinating the MI Network's activities. The activity of the MI Network is based on the collaboration of the Coordination Group and four working groups (Figure 9). The proposed actions (n=37, Table 3) of the national MI strategy were divided between the working groups in 2012 when the MI Network was built up. The MI Network consists of a wide range of key stakeholder representatives involved in providing and producing MI (Table 4). At the network-building phase, a total of around 110 stakeholders representing about 50 organisations participated in the MI Network. Such a network is unique both in Finland and internationally.

**Table 4.** *Stakeholder groups represented in the Finnish National Medicines Information Network during 2012–2020.*

STAKEHOLDER GROUPS
Community pharmacies
Educational units: universities, polytechnics, vocational institutions and continuing education units
Primary healthcare centres
Hospital pharmacies and dispensaries
Patient associations and organisations
Pharmaceutical industry organisations
Public administrations
Scientific societies
Student associations
Trade and professional unions and organisations
University hospitals and hospital districts

Implementation of the national MI strategy is divided into three operational periods (2012–2014, 2015–2017, 2018–2020). Stakeholder representatives are selected at the beginning of each operational period. The MI Network is open and public, and new member organisations or members can be suggested by anyone. Each stakeholder decides what is their

contribution to the activities of the MI Network and development projects. No resources have been allocated to the MI Network by the government or Fimea, other than the salary of the coordinator of the MI Network. All the documents produced in the MI Network, such as working groups' action plans, reports and meeting memos, are available freely online.<sup>166</sup>



**Figure 9.** Structure of the National Medicines Information (MI) Network and purposes and main objectives of the working groups (WG).

The *Coordination Group* consists of representatives from all key stakeholders from the pharmaceutical sector, HCPs and patient organisations. The group promotes and coordinates the development of MI, monitors development projects and comments on their progress. *Communications Team* assists the Coordination Group and transmits information between the working groups. The team includes communication experts from the stakeholders involved in the MI Network.

The *Research Working Group* includes stakeholders who carry out research on MI. The group does not perform the research itself, but it promotes the research and collaboration in this field and outlines key research areas and topics related to MI at national level.

The *Education Working Group* is a forum for teachers working in education units for HCPs (e.g., universities, polytechnics, vocational institutions, complementary education units) educating current and future professionals in medicine, nursing and pharmacy. Members of the group develop solutions to promote a multidisciplinary approach and MI activities in basic and continuing education taking into account working life needs.

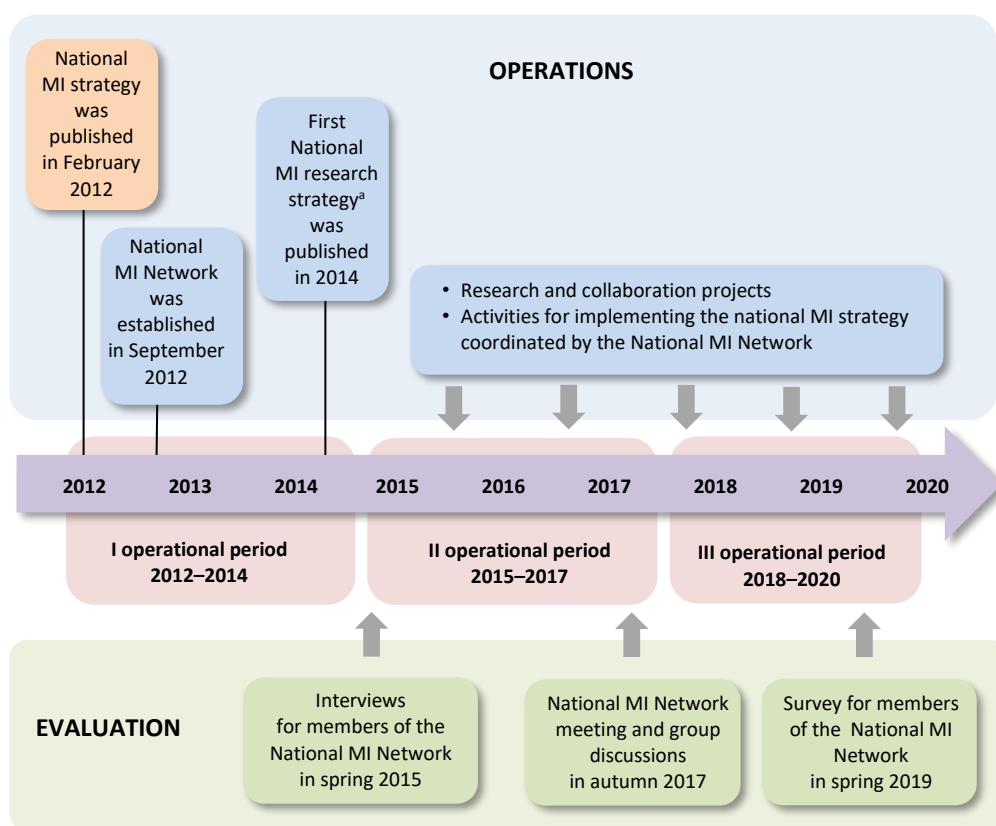
The *Medicines Information to Healthcare Professionals Working Group* consists of HCPs from various stakeholders (e.g., universities, healthcare units, scientific societies, national authorities, trade organisations). The aim of the group is to develop MI activities, multiprofessional cooperation and the provision of MI at practical level in healthcare.

The *Medicines Information to Patients Working Group* comprises stakeholders from patient organisations, pharmacies, pharmaceutical industry, trade unions and national authorities. The group provides information on reliable MI sources to patients and promotes cooperation and development of patient-focused MI material. Activities of the group strengthens support for self-management and patient empowerment.

The *Medicines Information Forum* is a multidisciplinary seminar which brings together the users and producers of MI. The Forum aims to promote a wide-ranging debate on the current status and challenges of developing MI. The Forum is carried out once a year in autumn and it is open for public.

## 2.2.5 RESEARCH TO GUIDE AND EVALUATE THE IMPLEMENTATION OF THE NATIONAL MEDICINES INFORMATION STRATEGY

Research has been an integral part of the activities of the MI Network.<sup>22</sup> Information obtained through periodic evaluations of the national MI strategy and other research coordinated by the MI Network has guided the national MI strategy's implementation (Figure 10). Research has been organised by establishing the first national MI research strategy in 2014.<sup>167</sup> Table 5 presents the finalised studies and projects under the national MI research strategy during a 10-year period of 2009–2019.<sup>87,128,159–162,168–176</sup>



<sup>a</sup>Updated for each operational period.

**Figure 10.** Operations and evaluation of the national medicines information (MI) strategy.

**Table 5. Studies related to the national medicines information (MI) strategy and its implementation in Finland during 2009–2019. Information in this table is based on the review published previously.<sup>177</sup>**

STUDIES SUPPORTING DEVELOPMENT OF THE NATIONAL MEDICINES INFORMATION STRATEGY					
Authors Publication year <sup>Ref.</sup> (Type of publication <sup>a</sup> )	Study year	Aspects studied	Study population	Method	Key findings
Salonen 2010 <sup>162</sup> (M)	2009	Role of MI in the national legislation, activities taken in developing MI practices nationally and coordination of MI to patients	Medicines regulatory authorities in the EU member states (n=27), response rate 63%	Cross-sectional online survey	The national health information/MI strategy was published in the UK, Italy and Germany in 2009. The development of MI targeted to the public emphasised the use of information technology, which had been utilised in different countries by publishing online PLs, developing MI websites for consumers, electronic MI services and quality certificates. To support the development of the Finnish national MI strategy, it is important to consult stakeholders producing MI at a national level and medicine users about their thoughts of good practices and development needs in MI.
Young 2010 <sup>128</sup> (O)	2009– 2010	Experiences on the implementation of the UK's national health information strategy and the Finnish stakeholders' views and future expectations of the new national MI strategy in Finland	The UK's national health information strategy, "Better Information, Better Choices, Better Health", published in 2004 and key stakeholders of MI in Finland	Document analysis and interviews	Effects of a 3-year national health information strategy of the UK on MI and MI services were positive, although not all 25 activities of the strategy were implemented completely. Political support as well as the availability of funding and support from stakeholders contributed to this success. The strategic activities for which planning, and implementation had already been started before the publication of the strategy were the best implemented. Finnish stakeholders emphasised that MI has been a focus for authorities in Finland since the 1990s and has been improving since then. Despite this Finland has never had a national strategy for MI. It is likely that the use of a strategy would further improve MI to patients. Stakeholder involvement will be key to the planning and implementation stages of a new national MI strategy.
Hämeen-Anttila et al. 2012 <sup>160</sup> (P) Hämeen-Anttila et al. 2013 <sup>159</sup> (P) Luhtanen 2012 <sup>161</sup> (M)	2011	Role of stakeholders as producers of MI, views on coordination of MI and good practices, challenges and development needs in Finland	Stakeholder representatives (n=28) from patient organisations, universities, pharmacies and professional associations in medicine, pharmacy and nursing	Interviews	Stakeholders emphasised the need to increase multiprofessional collaboration in the development of MI and to develop MI services for the public sector. Deficiencies were demonstrated in the access of MI, pharmacotherapy competence and teaching medication counselling in basic and in continuing education among HCPs. The receipt of reliable MI in different social and healthcare environments among patients and HCPs was presented as a challenging issue by the stakeholders.
STUDIES SUPPORTING ACTIVITIES OF THE NATIONAL MEDICINES INFORMATION NETWORK					
Järvinen et al. 2013 <sup>171</sup> (O)	2000– 2013	Description of the current MI practices in Finland and the research areas to be addressed in the future	Original peer-reviewed publications conducted in Finland 2000–2013 (n=116)	Systematic review	Research on MI has been conducted in Finland from many different perspectives and topics, especially from community pharmacies' and pharmacists' point of view as well as from the MI sources and needs of different patients groups. Public's health and MI literacy, MI needs and sources of HCPs and the use of electronic MI sources have been the least studied. Obstacles in the use of reliable MI among HCPs, effectiveness of MI and MI needs among special patient groups (e.g., the deaf, the blind, immigrants, the elderly) should be researched in further studies.
Hämeen-Anttila et al. 2019 <sup>169</sup> (P)	2000– 2017	Effectiveness of patient counselling and WMI targeted to patients	Systematic reviews (n=6) and original peer-reviewed studies (n=16) published in 2000–2017	Review	MI has had a primarily positive effect on patients' adherence and knowledge about medicines. Effects of WMI seemed to be contradictory. There was only limited evidence on the economic impact of MI and effects of MI on patient satisfaction and quality of life.
Pajunen 2017 <sup>178</sup> (M)	2002– 2014	Long-term trends in the receipt of MI among adolescents and young adults medicine users	People aged 15–29 participated in the national health behaviour study <sup>b</sup> in 2002, 2005, 2008–2014	Nationwide repeated cross-sectional survey	Physicians, pharmacists and PLs were the main MI sources throughout the study period. The receipt of MI decreased most from PLs (45% to 31%) and physicians (40% to 30%) while increased most from the Internet (4% to 17%). The proportion of medicine users who did not receive MI from any of the sources increased from 29% to 42% during the study period.
Ryhänen 2013 <sup>179</sup> (U)	2013	Feasibility of the assessment tools on the quality of MI for consumers	International assessment tools for quality of MI (n=7)	Report	There are various effective tools for assessing the quality of MI for consumers. The tools have often used the same evaluation criteria, but there were also differences. The most commonly used criteria were topicality, authors, sponsors, correctness of information, links and references used.

## STUDIES GUIDING DEVELOPMENT OF MEDICINES INFORMATION DURING STRATEGY PERIOD 2012–2019

Authors Publication year <sup>Ref.</sup> (Type of publication <sup>a</sup> )	Study year	Aspects studied	Study population	Method	Key findings
Junnila 2015 <sup>170</sup> (M)	1999– 2013	Long-term trends in the receipt of MI among ageing medicine users	People aged 55–64 participated in the national health behaviour study <sup>b</sup> in 1999, 2002, 2005, 2008–2013 (n=6644)	Nationwide repeated cross-sectional survey	Physicians, community pharmacies and PLs were the main MI sources throughout the study period. The receipt of MI decreased most from physicians (61% to 46%) while increased the most from the community pharmacies (27% to 43%) and the Internet (1% to 12%). The proportion of ageing medicine users who did not receive MI from any of the sources increased from 19% to 23% during the study period.
Pakarainen 2015 <sup>173</sup> (M)	2013	MI needs and sources of practical nurses working in atypical areas <sup>c</sup>	Members of the Finnish Union of Practical Nurses (n=666)	Cross-sectional online survey	PLs, the medical database (in Finnish: Terveystietä) and colleagues were the most common MI sources for practical nurses. Practical nurses were mostly satisfied with the current MI sources, but MI is not always available when needed. More information was needed about the interactions and ADRs. Nurses need further training on the use of MI sources and the application of knowledge in practice.
Hämeen-Anttila 2014 <sup>168</sup> (O) Hämeen-Anttila et al. 2018 <sup>87</sup> (P) Pietilä 2015 <sup>174</sup> (M) Vornanen 2016 <sup>176</sup> (M)	2014	Needs and sources of MI among medicine users	Participants were collected through the websites and email lists of patient organisations and community pharmacies (n=2489)	Cross-sectional online survey	PLs (90%), pharmacists (83%), physicians (72%) and the Internet (68%) were the most common MI sources among medicine users using the Internet. Young, highly educated and people with long-term medication, such as patients with neurological or orphan diseases, reported needing more MI. Need for MI was highest when physician prescribed a new medicine (76%) or when a new medicine was started at home (51%). More information was needed on interactions with other medicines (79 %) and ADRs (83%). One-third (33%) reported conflicting information received from different sources as a major challenge in utilising MI.
Kuosmanen 2015 <sup>172</sup> (M)	2014	Health and MI literacy, information-seeking behaviours and MI sources of adolescents	Adolescents aged 18–20 studying in the Finnish vocational schools (n=20)	Group discussions and individual vignette-based solution tasks	The Internet, PLs and parents were the primary sources of information on medicines-related questions for young people. The Internet and nurses were the most commonly used sources on health-related questions. Health and medicines information-seeking among young people was influenced by experience of symptoms, previous experiences, situation in life, social environment, access to information, sensitivity of the topic and reliability of information.
STUDIES ASSESSING IMPLEMENTATION OF THE NATIONAL MEDICINES INFORMATION STRATEGY					
<i>Unpublished work in progress, University of Helsinki</i>	2015	Assessment on implementing the goals and the activities of the Finnish national MI strategy after the first operational period	Stakeholder representatives of the National Medicines Information Network (n=79/111), participating rate 71%	Semi-structured interviews	The activities of the MI Network were assessed to be meaningful and necessary during the first operational period (2012–2014) of the national MI strategy in spring 2015. The strategic goals had become more concrete and activities in MI more coordinated. Moreover, networking has promoted communication and multiprofessional collaboration between different stakeholders. Networking under working groups has inspired multiple research and development projects. Lack of resources was considered to cause challenges for implementing the national MI strategy.
Urpelainen 2018 <sup>175</sup> (B)	2017	Assessment on implementing the goals and the activities of the Finnish national MI strategy after the second operational period	Stakeholder representatives of the National Medicines Information Network (n=41/110), participating rate 37%	Workshop discussion notes	At the end of the second operational period (2015–2017) of the national MI strategy, the performance of the MI Network was still assessed to be successful. The most challenging goals were the use of reliable MI sources among medicine users and public's health and MI literacy. Due to the digitalisation and the increased use of electronic information sources, awareness and availability of reliable and user-friendly information sources should be developed further along with medicines education.

<sup>a</sup>B=Bachelor's thesis, M=Master's thesis, O=Other research report, P=Peer-reviewed article, U=Unpublished report; <sup>b</sup>"Health Behaviour and Health among the Finnish Adult Population" was a national study conducted by the Finnish National Institute for Health and Welfare during 1978-2014, <sup>c</sup>Home care and social welfare units.

The progress of the implementation of the national MI strategy has been regularly evaluated by Fimea at the end of each operational period (Figure 10).<sup>177</sup> The evaluation of the first operational period (2012–2014) was carried out by interviewing all members of the MI Network in spring 2015. Data from group discussions conducted as part of the MI Network meeting in autumn 2017 were used to evaluate the second operational period (2015–2017). The evaluation of the third operational period (2018–2020) was recently conducted by surveying the members of the MI Network in spring 2019.

In addition to evaluating progress in implementing actions, the performance of the MI Network as a facilitator of the implementation has been regularly evaluated throughout the strategy process. The preliminary results of the evaluation of the functionality of the MI Network in 2015, by the author of this dissertation, have been published in 2017 (see International Pharmaceutical Federation FIP: Medicines Information, Strategic Development, page 25, Table 5)<sup>16</sup> (see also Appendix 1: Questions 5 and 6).

## **2.2.6 ACHIEVEMENTS IN THE IMPLEMENTATION OF THE NATIONAL MEDICINES INFORMATION STRATEGY BY 2019**

One of the most significant achievements in the implementation of the national MI strategy has been the establishment of the MI Network shortly after the national MI strategy was published.<sup>177</sup> The multiprofessional MI Network has proven to be highly functional and to have actively facilitated the launch of many key actions of the national MI strategy (Table 6). Among the most important actions implemented so far are: 1) *Tunne lääkkeesi* (Know your medicines), a Facebook site targeted at consumers for guiding rational medicine use and the use of reliable MI sources in managing medications, and 2) *Lääkehoidon päivä* (Pharmacotherapy Day), an annual national awareness campaign targeted at consumers and HCPs for promoting rational pharmacotherapy. Carrying out both these actions involves a wide range of stakeholders and the goal is highlight practical tools and resources for making medicine use rational and safe. These actions have been recently integrated into the national implementation campaign of the *Rational Pharmacotherapy Action Plan*<sup>28</sup> by the Ministry of Social Affairs and Health.

**Table 6.** Examples of actions taken by the National Medicines Information Network within seven years since the launch of the national medicines information strategy in 2012.

MAIN STRATEGIC GOALS	EXAMPLES OF ACTIONS
<b>1. To establish a multidisciplinary MI network in Finland</b>	<ul style="list-style-type: none"> <li>The National Medicines Information Network has been active since 2012 with five working groups.</li> </ul>
<b>2. To ensure that HCPs utilise reliable information sources and services</b>	<ul style="list-style-type: none"> <li>List of reliable and useful MI sources targeted to different HCPs (e.g., physicians, pharmacists, nurses) were published.</li> </ul>
<b>3. To ensure a high level of medicines expertise and multi-disciplinarity in healthcare</b>	<ul style="list-style-type: none"> <li>Multiprofessional forum for pharmacotherapy teachers has been organised three times since 2014 (In Finnish: <i>Lääkehoidon opettajien moniammatillinen foorumi</i>).</li> </ul>
<b>4. To base medication counselling on national guidelines and local agreements</b>	<ul style="list-style-type: none"> <li>Clinical Practice Guidelines for self-medication was published in 2016 (In Finnish: <i>Käypä Hoito -suositus: Itselääkitys</i>).</li> </ul>
<b>5. To ensure that medicine users utilise reliable information sources and services</b>	<ul style="list-style-type: none"> <li>One-day national event for patients and HCPs to enhance rational pharmacotherapy has been organised every year since 2012 (In Finnish: <i>Lääkehoidon päivä</i>).</li> <li>Medicines Information Forum for patients and HCPs that brings together users and producers of MI has been organised every year since 2012 (In Finnish: <i>Lääkeinformatiofoorumi</i>).</li> <li>Facebook website for directing consumers to use reliable MI sources was published in 2016 and is maintained by the National Medicines Information Network (In Finnish: <i>Tunne lääkkeesi -Facebook-sivu</i>).</li> </ul>
<b>6. To achieve a high level of health literacy among the general public</b>	<ul style="list-style-type: none"> <li>During 2014–2016, pharmacy students held medicine education lessons for schoolchildren in 203 schools around Finland.</li> </ul>

## 2.3 USE OF MEDICINES INFORMATION SOURCES IN ADULTS – INTERNATIONAL PERSPECTIVE

This section presents the current evidence on the use of MI sources among the adults using medicines obtained from a systematic literature search. The origin of the review was to gather background information for the Study II which examined long-term trends in the receipt of MI among Finnish adult population during the 2000s (see *Chapters 4.2, 5.2 and 6.1.2*). Hence, the ultimate aim of this review was to find if there were longitudinal studies describing long-term trends in the use of MI sources at population level. Furthermore, factors affecting MI-seeking behaviour are described based on the included studies.



### 2.3.1 SYSTEMATIC LITERATURE SEARCH

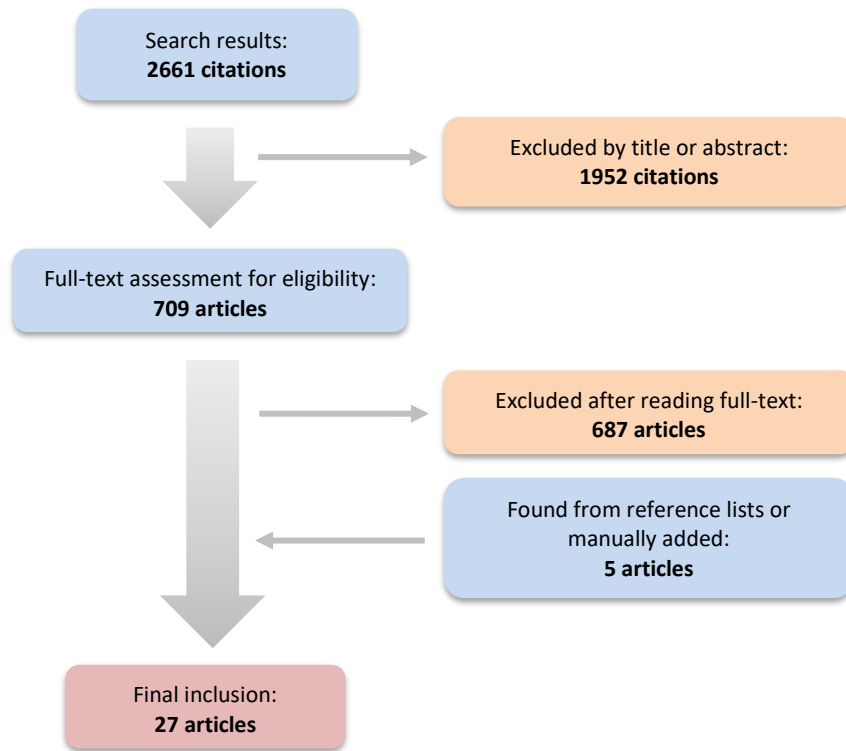
The review is based on a systematic literature search using predetermined inclusion and exclusion criteria (Table 7). Only studies that met clearly the predetermined inclusion criteria were included in the review. A systematic search was conducted to obtain a comprehensive understanding on the topic in question.

**Table 7.** *Inclusion and exclusion criteria for the systematic literature search.*

INCLUSION CRITERIA	EXCLUSION CRITERIA
<b>Population</b> Participants aged 18–65 years Medicine users	Participants aged under 18 years or over 65 years People not using medicines
<b>Study focus</b> MI sources actually used	Study did not focus on MI sources used The following topics were excluded: seeking information about healthcare services, food and nutrition information, travel health advice and information about someone else's medicines; usability of online MI; receipt of MI has not been clearly separated from health information; receipt of MI among the illiterate or people with limited literacy skills; and research focused on only one source of information, e.g., the Internet.
<b>Context</b> Study conducted in developed economy <sup>a</sup> Full original research articles or systematic reviews and meta-analysis Published in peer-reviewed international scientific journal in English All types of interventions and research methods	Conference abstracts, editorials, narrative reviews, doctoral theses, Master's or other theses
<b>Time</b> Study has been conducted and published within Jan 1, 2000 – May 31, 2018	Study has been conducted and published before 2000

<sup>a</sup>Country selection was based on the classification by the United Nations.<sup>180</sup>

One researcher (the author of this thesis) performed the literature search using an international bibliographic database MEDLINE® (Proquest) (Figure 11). The following search terms were used: medicines/drug information, receipt/receive, search/seek, and medicines/drug information source. Studies conducted during the course of 2000–2018 were included in the review. Included studies were content-analysed and categorised according to study country, study year and year of publication, aspects studied, study population, setting, study methods used, and key findings related to the use of MI sources.



**Figure 11.** A flow diagram of the study selection process for the systematic literature search.

## 2.3.2 CHARACTERISTICS OF THE STUDIES

A total of 27 studies met the inclusion criteria (Tables 8 and 9).<sup>30,87,115,181-204</sup> Nearly half of the studies (n=11) were carried out in European countries (Table 8).<sup>87,183,190,193-197,199-201</sup> Two studies were multinational<sup>115,189</sup> and nine were national.<sup>87,187,188,193-196,199,200</sup> A cross-sectional survey was the most dominant study method (n=14).<sup>87,115,182,184-186,189,190,192,194-196,199,201</sup> HCPs (e.g., physicians, pharmacists, nurses), relatives, friends and the Internet were the most commonly studied MI sources.

**Table 8.** Characteristics of the studies (n=27) on the use of medicines information sources among adult population.

CHARACTERISTICS (n) <sup>Ref.</sup>
<b>Country</b>
Finland (n=8) <sup>87,193-196,199-201</sup>
Australia (n=7) <sup>30,185,187,188,191,192,202</sup>
USA (n=4) <sup>181,184,198,204</sup>
Canada (n=3) <sup>182,186,203</sup>
Multinational (n=2) <sup>115,189</sup>
UK (n=2) <sup>190,197</sup>
The Netherlands (n=1) <sup>183</sup>
<b>Year of publication</b>
2000–2004 (n=4) <sup>186,191,197,198</sup>
2005–2009 (n=8) <sup>181,182,193-195,199,202,203</sup>
2010–2014 (n=14) <sup>30,115,183-185,187-190,192,196,200,201,204</sup>
2015–2018 (n=1) <sup>87</sup>
<b>Study population</b>
Specific medicine user groups (n=11) <sup>115,181,182,189,192,194,198-201,203</sup>
Heterogenous medicine user groups (n=10) <sup>30,87,185,187,188,190,191,193,195,202</sup>
Medicine users with a chronic disease (n=6) <sup>113,183,186,196,197,204</sup>
<b>Study method</b>
Survey, cross-sectional (n=14) <sup>87,115,182,184-186,189,190,192,194-196,199,201</sup>
Qualitative interview (n=6) <sup>181,183,193,198,202,204</sup>
Focus groups (n=2) <sup>30,197</sup>
Mixed-method (n=2) <sup>191,203</sup>
Telephone survey, cross-sectional (n=2) <sup>187,188</sup>
Survey, repeated, cross-sectional (n=1) <sup>200</sup>
<b>MI sources included in the study</b>
Physician, specialist (n=27) <sup>30,87,115,181-204</sup>
Pharmacist (n=24) <sup>30,87,115,181,182,184,185,187-203</sup>
Internet (n=22) <sup>30,87,115,181,184-190,192-196,198,200-204</sup>
Relatives, friends (n=21) <sup>30,87,115,181,183-186,189-196,198-201,203</sup>
Nurse, midwife (n=17) <sup>87,115,181,184,185,189-198,200,203</sup>
Package leaflet (n=15) <sup>30,87,115,184,185,187-196</sup>
Books, magazines, newspapers (n=14) <sup>87,115,181,184,185,190-196,198,203</sup>
Radio, television, media (n=12) <sup>87,115,181,185,193-196,199-202</sup>
Telephone services, call centres, medicines information centres (n=7) <sup>87,115,189,193-196</sup>
Advertisements (n=6) <sup>181,192-196</sup>
Health food store (n=6) <sup>115,191,194-196,203</sup>
Other written patient information <sup>a</sup> (n=6) <sup>87,181,184,185,191,202</sup>
Support groups <sup>b</sup> (n=4) <sup>184,186,193,202</sup>
Medical book, drug handbook, health journal (n=3) <sup>87,186,193</sup>
Pharmaceutical company (n=3) <sup>188,193,197</sup>
Hospital (n=2) <sup>188,191</sup>
Drug regulatory authority (n=1) <sup>193</sup>
Seminars, talks (n=1) <sup>185</sup>

n=number of studies; <sup>a</sup> Brochures, labels, newsletters, posters, product inserts, written patient information leaflet provided by healthcare organisation; <sup>b</sup> Patient organisations and societies, peers and other individuals.

**Table 9.** Studies published in 2000–2018 on the use of medicines information (MI) sources among adult population (n=27) according to the publication year.

STUDIES ON THE USE OF MEDICINES INFORMATION SOURCES AMONG ADULTS USING PARTICULAR MEDICINE (n=11)						
Authors Publication year <sup>Ref.</sup> Country	Study year	Aspects studied	Study population	Setting	Method	Key findings related to the use of MI sources
Sleath et al. 2003 <sup>198</sup> USA	2000	Patients' sources of antidepressant information	Antidepressant users, n=81 Female 79% 19-83 years	Community pharmacies (n=8) in central North Carolina	Individual interview	Most commonly reported sources were pharmacists (58%), primary care physicians (51%), mental specialists (41%), friends and family members (32%) and the Internet (19%). Younger patients were significantly more likely to report receiving antidepressant information from the Internet than older patients.
Wathen et al. 2006 <sup>203</sup> Canada	2002– 2003	Information seeking behaviour and decision-making regarding menopause, hormone replacement therapy and use of complementary and alternative medicines	Current or former hormone replacement therapy users, n=285 Female 100% 45-65 years	Southwestern Ontario	Individual interview and local cross-sectional survey	Women's information-seeking behaviour and choice of different information sources differed according to decision they were making. Most of the women (85%) reported their physician as their most frequently used source of information when they decided to start hormone replacement therapy. Most of the women (90%) used multiple sources of information before making their final decision.
Närhi et al. 2007 <sup>194</sup> Finland	2005	Sources of MI used by analgesic users	Analgesic users, n=502 Female 50% 15–64 years	Nationwide	National cross-sectional survey	Analgesic users reported physicians (35%), PLs (33%) and community pharmacists (33%) as their most common sources of MI. Almost half (49%) of the analgesic users did not report any HCPs (physician, pharmacist, nurse) as their source of MI. Gender impacted to the choice of source of MI.
Tiihonen et al. 2007 <sup>199</sup> Finland	2003	Information sources about hormone replacement therapy among women	Hormone replacement therapy users, n=315 Female 100%	Nationwide; community pharmacies from each hospital district (n=15)	National cross-sectional survey	Physicians and the media were the most common sources of information concerning benefits (74% vs. 56%) and ADRs (45% vs. 78%) of hormone replacement therapy. Only 3% of the respondents reported that they had received information from the pharmacy concerning both benefits and adverse reactions of hormone replacement therapy.
Baldwin et al. 2008 <sup>181</sup> USA	–	Patients' receipt of information about the medicines they use, and patients' preferred role orientation associated with MI-seeking behaviour	Blood pressure medicine users, n=189 Male 97% 66 years (mean)	Medical centres (n=2) in Iowa City and Minneapolis, and community-based outpatient clinics (n=4)	Individual interview	Patients reported receiving information on their blood pressure medicines most commonly from the Internet, community pharmacists and brochures. A more patient-centred role of which was associated with: 1) a greater likelihood to seek MI, 2) seeking MI from a greater number of information sources, and 3) initiating a conversation with HCPs about their medication.
Black et al. 2008 <sup>182</sup> Canada	2008	Patients' preferences, satisfaction and perceived stigma related to community pharmacists	Psychotropic medicine users, n=79 Female 60% 42 years (mean)	Mental health outpatient clinics (n=4) in Halifax	Multicentre cross-sectional survey	Psychiatrists, pharmacists and family physicians were the most commonly used sources for information on psychotropic medicines among patients receiving psychotropic medicines.
Ngo et al. 2010 <sup>192</sup> Australia	–	Patients' perceptions and understanding on the appropriate use of non-prescription ibuprofen	Non-prescription ibuprofen users, n=183 Female 76% 18 years or older	Community pharmacies (n=8) in South Australia and the Northern Territory	Multicentre cross-sectional survey	One-third of the respondents (36%) reported receiving MI from their physician or pharmacist, whereas 32% received information from friends or relatives, and 26% from advertisements. Most patients (65%) did not seek medical advice before using non-prescription ibuprofen. Most patients (66%) sometimes or never read PLs.

Authors Publication year <sup>Ref.</sup> Country	Study year	Aspects studied	Study population	Setting	Method	Key findings related to the use of MI sources
Tiihonen et al. 2010 <sup>200</sup> Finland	2001, 2007	Information sources among women using hormonal contraceptives and the influences of sources on women's attitudes and perceptions	Hormonal contraceptive users, n=700 (n=264 in 2001 and n=436 in 2007) Female 100% 26 years (mean)	Nationwide; university pharmacies across Finland (n=17 in 2001, n=18 in 2007)	National repeated cross-sectional survey	The most common source of information on the benefits of hormonal contraceptives was the physician (43% in 2001 vs. 63% in 2007) and the most common sources of information on ADRs were friends and relatives in 2001 (43%) and physician in 2007 (35%). In 2007, one-sixth of respondents reported the Internet to be an important source of information on benefits (16%) and ADRs (17%) of hormonal contraceptives.
Tiihonen et al. 2011 <sup>201</sup> Finland	2009	Experiences, perceptions and information sources among women using hormone therapy	Hormone therapy users, n=281 Female 100% 59 years (mean)	Community pharmacies owned by the University	National cross-sectional survey	Women reported the physician (91%) as their most common source of information on the benefits of hormone therapy, whereas the media (54%) was the most common information source on ADRs of hormone therapy. A relatively small number of respondents reported the Internet or pharmacy as an important source of information on the benefits (12% vs. 6%) and ADRs (14% vs. 7%) of hormone therapy.
Hämeen-Anttila et al. 2013 <sup>189</sup> Multinational <sup>a</sup>	2011– 2012	Needs of MI and MI sources for pregnant women in various countries	Pregnant women (n=5090) and women with children less than 25 weeks (n=2002), n=7092 Female 100% 20-38 years	Countries from Eastern Europe (n=5), Western Europe (n=6), Northern Europe (n=4), Americas (n=3) and Australia	Online cross-sectional survey	The most commonly used information sources for women were physicians (73%), the Internet (60%), pharmacists (46%) and nurses or midwives (33%) when all participating countries were considered. Respondents used three information sources on average. There were differences in the information sources used in different countries.
Hämeen-Anttila et al. 2014 <sup>115</sup> Multinational <sup>a</sup>	2011– 2012	Use of MI sources, consequences of conflicting information and factors associated with these objectives among pregnant women	Pregnant women (n=5090) and women with children less than 25 weeks (n=2002), n=7092 Female 100% 20-38 years	Countries from Eastern Europe (n=5), Western Europe (n=6), Northern Europe (n=4), Americas (n=3) and Australia	Online cross-sectional survey	Most of the pregnant women (84%) reported using more than one source (mean 3 sources) for seeking information on medicines use during pregnancy. Over one-fifth (23%) of the respondents using multiple MI sources stated that information received was conflicting, leading to the decision not to use medicines during pregnancy (44%), chose to rely on one MI source and ignore the conflicting one (33%), sought a new information source (30%), became anxious (25%) and did nothing (3%).
<b>STUDIES ON THE USE OF MEDICINES INFORMATION SOURCES AMONG HETEROGENEOUS MEDICINE USER GROUPS (n=10)</b>						
Newby et al. 2001 <sup>191</sup> Australia	–	Medicines use, MI-seeking behaviour, satisfaction and understanding of the information received, and barriers and facilitators of information-seeking	Medicine users and people who care for someone who uses a medicine, n=786 Female 56% 18 years or older	Households in the Hunter region in New South Wales	Individual telephone interview and follow-up in-depth interview	Physicians (46%) and pharmacists (23%) were the most common sources of MI. Most participants had received information from one source. A total of 93% were satisfied with the information they had received. However, 42% did not seek information and did not want to seek information about their medicines. There were many reasons why people do not seek MI, such as limited access to information sources or lack of awareness of other sources apart from HCPs.

Authors Publication year <sup>Ref.</sup> Country	Study year	Aspects studied	Study population	Setting	Method	Key findings related to the use of MI sources
Närhi 2007 <sup>193</sup> Finland	2005	Medicine users' source of MI and the perceived reliability of these sources	Prescription and non-prescription medicine users, n=704 Female 55% 15-74 years	Nationwide	Individual telephone interview	Respondents reported PLs (74%), physicians (68%) and pharmacists (60%) as their most common sources of MI, and these sources were considered to be the most reliable sources in every age group. One-fifth (20%) of the respondents reported using the Internet as a source of MI. Half of the respondents (49%) mentioned two to four sources of MI.
Närhi et al. 2007 <sup>195</sup> Finland	2005	Sources of MI among adult medicine users	Medicine users, n=2348 Female 61% 15-64 years	Nationwide	National cross-sectional survey	Physicians (61%), pharmacists (49%) and PLs (44%) were the most common sources of MI. Of the respondents, 9% reported that they had used the Internet as a source of MI. Women reported more sources and they seemed to use more written and non-professional sources than men. Older people seemed to use HCPs as their source, while younger people preferred the Internet.
Tio et al. 2007 <sup>202</sup> Australia	2004	MI sources used by patients	Medicine users, n=110 Female 66% 42-67 years	Community pharmacies (n=3) in Brisbane	Individual interview	The most frequent MI sources cited by the patients were physicians (83%), written information (82%) and pharmacists (78%). The physician was identified as the predominant source of information for prescription medicines (37%), the pharmacist for non-prescription medicines (32%) and written information obtained from the supermarket (26%).
Carter et al. 2013 <sup>185</sup> Australia	2008–2009	Patients' MI seeking behaviour and developing a scale for measuring MI-seeking behaviour	Patient using multiple medicines, n=910 Female 50% ≥18 years	Community pharmacies and medication management services around Australia	National cross-sectional survey	Patients primarily sought MI from physicians, pharmacists and PLs. A new MI seeking behaviour (MISB) scale was developed which provide a useful tool for both practice and research. Information-seeking was the most intense among respondents who had recent changes in their medicine regimen and worries about their medicines.
Krska et al. 2013 <sup>190</sup> UK	–	Hospital patients' use of PLs or other MI sources about ADRs	Hospital patients, n=1218 Female 51% 18 years or older	National Health Service hospitals (n=6) in North West England	Local cross-sectional survey	Less than half of the respondents (42%) usually read PLs and 19% never read PLs. Over half (56%) of the patients never sought more information about possible ADRs of their medicines. Patients searched additional information from HCPs (51%) and from the Internet (29%).
Hamrosi et al. 2012 <sup>30</sup> Australia	2008	Medicine users' opinions on their WMI needs and barriers and facilitators to provision and use of WMI	Prescription medicine users, n=62, Female 61% 18 years or older	Residents of New South Wales	Focus groups	Less than half of medicine users had received WMI. Many wanted WMI to supplement the verbal MI they received but not to replace it. WMI was used to facilitate informed decision, ascertain medicine suitability and review instructions. PLs were considered technical and too long.
Hamrosi et al. 2014 <sup>187</sup> Australia	2009	Medicine users' preferences for MI provision and barriers and facilitators to the utilisation of MI	Prescription medicine users, n=1000 Female 52% 18 years or older	Nationwide	Cross-sectional telephone survey	PLs (68%) and computer-generated information from physician or pharmacist (54%) were the most preferred MI sources among medicine users. Almost half (44%) of medicine users wanted spoken MI from their physician or pharmacists, and only a small percentage (13%) seek MI from the Internet.
Hamrosi et al. 2014 <sup>188</sup> Australia	2009	Medicine users' awareness and use of WMI for prescription medicines	Medicine users, n=226 Female 52% 18 years or older	Nationwide	Cross-sectional telephone survey	Community pharmacists (88%), PLs (86%) and physicians (70%) were the main MI sources reported by medicine users. Most consumers (69%) reported receiving MI for their prescription medicines. Half (47%) of medicine users received MI every time they received a new medicine.
Hämeen-Anttila et al. 2018 <sup>87</sup> Finland	2014	Internet as a source of MI compared to other sources of MI	Prescription and non-prescription medicine users, n=2489 Female 85%	Nationwide	Online cross-sectional survey	PLs (90%), pharmacists (83%) and physicians (72%) were more common MI sources than the Internet (68%). Internet use for MI was associated with female gender, age < 65 years, higher education, daily use of the Internet and continuous use of vitamins or herbals.

# STUDIES ON THE USE OF MEDICINES INFORMATION SOURCES AMONG MEDICINE USERS WITH A CHRONIC DISEASE (n=6)

Authors Publication year <sup>Ref.</sup> Country	Study year	Aspects studied	Study population	Setting	Method	Key findings related to the use of MI sources
Chen et al. 2001 <sup>186</sup> Canada	2000	MI sources among cancer patients and physicians	Cancer patients, n=191 Female 64% 17-77 years	Cancer care hospital (n=1) in Toronto	Local cross-sectional survey	Physicians were the primary MI source for the majority (83%) of cancer patients. Only 7% of patients reported having sought MI on the Internet in 2000.
Raynor et al. 2004 <sup>197</sup> UK	–	Patients' perspectives on MI and views on the PLs	Asthmatics, n=23 Female 52% 13-82 years	Community pharmacies (n=6) in Leeds, North of England	Focus groups	HCPs in primary care were the main information source for asthmatics. Information on interactions primarily came from community pharmacists. Individualised information was valued. PLs were perceived as being less helpful than face-to-face advice.
Carpenter et al. 2011 <sup>184</sup> USA	–	Vasculitis patients' most commonly used MI sources and perceived credibility of information sources	Vasculitis patients, n=232 Female 69% 21-82 years	Patients were recruited through multiple sources, such as patient conferences and disease-specific collaborative networks	Online cross-sectional survey	Physicians were the most frequently used MI sources for both men and women. Women received MI from the Internet and PLs more often than men, whereas men receive MI from spouse, partner or nurse more often. Physicians, the Internet, pharmacists and other vasculitis patients were perceived as the most credible sources of MI for both genders.
Pohjanoksa-Mäntylä et al. 2011 <sup>196</sup> Finland	2005	Sources of MI used by people with and without mental disorders	People with mental disorders (n=228) and without mental disorders (n=2120), n=2348 Female 61% 15-64 years	Nationwide	National cross-sectional survey	Physicians (83% of the people with mental disorders vs. 59% of the people without mental disorders), pharmacists (56% vs. 49%) and PLs (53% vs. 43%) were the most common MI sources. People with mental disorders sought more frequent MI from the Internet than people without mental disorders (15% vs. 8%). The most commonly respondents used two to four MI sources.
Zukoski et al. 2011 <sup>204</sup> USA	2005–2006	Primary information sources, types of information sought and barriers to accessing information	People living with HIV/AIDS, n=16 Female 44% 18 years or older	Rural three-county area in Oregon	Individual interview	Two-thirds of participants reported their local HIV/AIDS physician as their primary source of MI. The second primary source of MI was the Internet. A community-based organisation who contacted patients individually and health department caseworker were also reported as essential MI sources. Patients reported barriers to seeking MI, such as fear, stigma, concern about disclosure and feelings of futility and anger.
Bults et al. 2012 <sup>183</sup> Netherlands	2011	Patients' information-seeking about Q fever vaccination	Patients with specific cardiovascular diseases, n=413 Female 39% 70% older than 60 years	Municipal public health service (n=1) in the south of the Netherlands	Individual interview	The most frequently reported sources for information about Q fever vaccination were general physicians (60%), family (32%), specialists (13%) and friends (13%). Of the respondents, 30% had actively sought information about Q fever vaccination. Respondents aged 60 years or younger (39%), those with a higher educational level (42%), and those employed (41%) more often sought information.

<sup>a</sup>Respondents from Australia, Austria, Canada, Croatia, Finland, France, Iceland, Italy, the Netherlands, Norway, Poland, Russia, Serbia, Slovenia, South America, Switzerland, UK and USA.

### **2.3.3 KEY FINDINGS OF THE STUDIES**

MI sources for medicine users have diversified in the last few decades (Table 9).<sup>30,87,115,181-204</sup> Medicine users increasingly seek MI from multiple sources, and they receive MI from more than one information source, such as HCPs (e.g., physicians, pharmacists, nurses), traditional media (e.g., television, radio, newspapers), the Internet, specific patient-directed information sources (e.g., PLs, telephone services), and personal contacts (e.g., family, friends, peers).

#### **MEDICINES USERS' MOTIVES FOR SEARCHING MEDICINES INFORMATION**

Medicine users search information about their medicines for multiple reasons (Table 9).<sup>30,182,191</sup> Usually, people seek information to obtain advice when changing medicine or confirming information from other sources. Information is also needed for reviewing instructions of HCPs, assisting in informed decision making and clarifying questions not raised during prescribing or dispensing. People tend to choose information sources which they perceive as the most reliable and appropriate for their purposes. Patients' trust in physicians and pharmacists is the main reason for asking advice from them. Additionally, they choose their information source based on their perceptions of the severity or importance of their health condition. Medicine users aged 60 years or younger, those with a higher educational level and with a job and those with recent changes to their medication or worries about their medicines commonly seek MI more often than other people.<sup>183,185</sup>

Sometimes medicine users do not consider it necessary to seek more information about their medicines.<sup>30,191</sup> They might not have encountered any problems with their medicines or they believe that they are generally healthy. They may also trust their HCPs (e.g., pharmacist or physician) so that they have no need for a second opinion or complementing information on what their HCP has told them earlier about their medications.



## **USE OF MEDICINES INFORMATION SOURCES AMONG SPECIFIC MEDICINE USER GROUPS**

Studies focused on the use of MI sources among women on hormone replacement therapy or using oral contraceptives state that the majority of them primarily receive information from their physician when considering to start or stop using the hormone replacement therapy (Table 9).<sup>199-201,203</sup> The physician is also the most common source when asking in regard to the benefits of systemic hormone replacement therapy, whereas the media and physician are commonly used information sources for ADRs.<sup>199</sup> Only a small percentage (3–6%) of hormone replacement therapy users consider a pharmacist as an important source of information on hormone replacement therapy. Similar findings have been obtained in women on hormonal contraceptives.<sup>200</sup> The physician is the most common information source concerning the benefits of hormonal contraceptives, and physician, friends and relatives are the most common information sources relating to the risks of hormonal contraceptives. Only a small percentage (2–3%) of the hormonal contraceptive users consider pharmacy as the most important information source to receive information about the benefits of hormonal contraceptives.

Similar findings have been observed in studies with other medicine user groups.<sup>115,181,189,192,194,198</sup> People using antidepressants or psychotropics primarily receive information about their medication from the physician, psychiatrist or pharmacist.<sup>181,198</sup> Moreover, almost one-fifth (19%) of antidepressant users seek MI from the Internet.<sup>198</sup> The most common MI sources for patients using prescription or non-prescription analgesics are HCPs such as physicians and pharmacists, and PLs.<sup>192,194</sup> People commonly receive information about their blood pressure medicines from the Internet, pharmacists and different type of written leaflets and brochures.<sup>181</sup> According to the multinational studies, a majority of pregnant women are most likely to receive information about their medicines from physicians, the Internet and pharmacists.<sup>115,189</sup>

## **USE OF MEDICINES INFORMATION SOURCES AMONG HETEROGENEOUS MEDICINE USER GROUPS**

Generally, consistent findings from the studies involving heterogeneous medicine user groups are that physicians, community pharmacists and PLs are the most common MI sources regardless of the research method, the study year, the research population or the country in which the research has been conducted (Table 9).<sup>30,87,185,187,188,190,191,193,195,202</sup> However, the use of information sources varies between prescription and non-prescription medicine users.<sup>188,191,202</sup> Physicians, pharmacists and PLs are the main information sources of prescription medicines, and, respectively, pharmacists are information sources from which medicine users receive information about non-prescription medicines.

Despite the fact that most medicine users want information about the medicines they use, only about half (47%) reported receiving MI every time they received a new medicine, and less than half (40%) received MI when collecting a repeat prescription for a regular medicine.<sup>188</sup> Although the PLs are among the most commonly used MI sources, not all medicine users will read them.<sup>190</sup> For example, 42% of the hospital patients reported that they usually read PLs for medicines prescribed, whereas almost one-fifth (19%) of the patients reported that they never read the PLs.

## **USE OF MEDICINE INFORMATION SOURCES AMONG MEDICINE USERS WITH A CHRONIC DISEASE**

The use of MI sources has been diversely studied among medicine users having a chronic disease, such as asthma,<sup>197</sup> cancer,<sup>186</sup> cardiovascular diseases,<sup>183</sup> HIV,<sup>204</sup> mental disorders<sup>196</sup> or vasculitis (Table 9).<sup>184</sup> People with asthma actively seek MI from a variety of sources, commonly from HCPs in primary care along with practice and clinic nurses.<sup>197</sup> Pharmacists are the primary source of medicine interactions among asthmatics. They value individualised information and PLs are generally seen as less helpful than face-to-face counselling which could be tailored to the patient needs and abilities.

The majority (83%) of cancer patients receive MI from their physician.<sup>186</sup> Seeking MI from the Internet is rare (7%) among cancer patients. Physicians (60%) and family members (32%) are the most frequently reported sources for advice regarding Q fever vaccination among patients with cardiovascular disease.<sup>183</sup> Among patients living with HIV reported their physician, the Internet and specific people from a community-based organisation as their most common sources of MI.<sup>204</sup> People with a mental disorder use their physician (83%), pharmacist (56%) and PLs (53%) as their primary MI source.<sup>196</sup> The Internet was used as a source of information by 15% of people with a mental disorder. Vasculitis patients receive MI most frequently from physician and the Internet which they also consider as the most reliable information sources.<sup>184</sup>

## **NUMBER OF INFORMATION SOURCES USED BY MEDICINE USERS**

The number of MI sources used by medicine users has increased slightly since the beginning of 2000s, when information was usually obtained from a single source (Table 9).<sup>191</sup> Nowadays medicine users usually receive or seek MI from two to four information sources regardless of age.<sup>115,189,193,196,198</sup> Medicine users who use the Internet as a source of information seek information on average from three different websites.<sup>87</sup>

## **THE INTERNET AS A SOURCE OF MEDICINE INFORMATION**

The use of the Internet as a source of MI varied depending on the study population, the study method used and the study country (Table 9).<sup>87,186,187,190,193,195,196,198,202,203</sup> Based on the cross-sectional questionnaires and interviews, 8-29% of medicine users seek MI from the Internet,<sup>186,187,190,193,195,196,198,202,203</sup> whereas, according to an online survey in Finland, 68% of respondents reported having used the Internet when searching for MI.<sup>87</sup> However, many patients are concerned about the quantity of information on the Internet or do not know how to assess the quality and reliability of information obtained from the Internet.<sup>30,202,203</sup>

The Internet use as an MI source is associated with female gender, age less than 65 years, polytechnics, college or university degree, and daily use of the Internet.<sup>87</sup> Patients commonly search for MI from health portals (56%), search engines (43%) and pharmacy websites (41%). Some patient groups use certain websites more often than other patient groups for searching MI, such

as people with mental disorders. In doing so, they use pharmacy websites (50%) and discussion forums (32%), and patients with thyroid diseases use commercial health portals (42%) and discussion forums (26%). Some patients, such as asthmatics, do not see the Internet as particularly useful.<sup>197</sup> They consider that MI found from the Internet is ambiguous or unreliable, or the Internet offers too much information.

## **BARRIERS TO RECEIVING MEDICINES INFORMATION**

Patients may encounter barriers when receiving or seeking information on their medicines (Table 9).<sup>30,186,191,204</sup> Such barriers may be due to the patients themselves (e.g., lack of confidence or necessary communication skills, difficulty in understanding the information provided, lack of positive HCP-patient relationship or a feeling of powerless within this relationship, lack of awareness of other information sources than HCPs), HCPs (e.g., providing insufficient information, lack of time or interest to provide information) or other reasons (e.g., limited access to HCPs). Moreover, patient's educational limitations, language barriers and lack of literacy may influence to desirability to seek or receipt WMI.<sup>30</sup> Specific barriers for HIV positive patients are the impediments of seeking information such as stigma, fear, embarrassment and frustration.

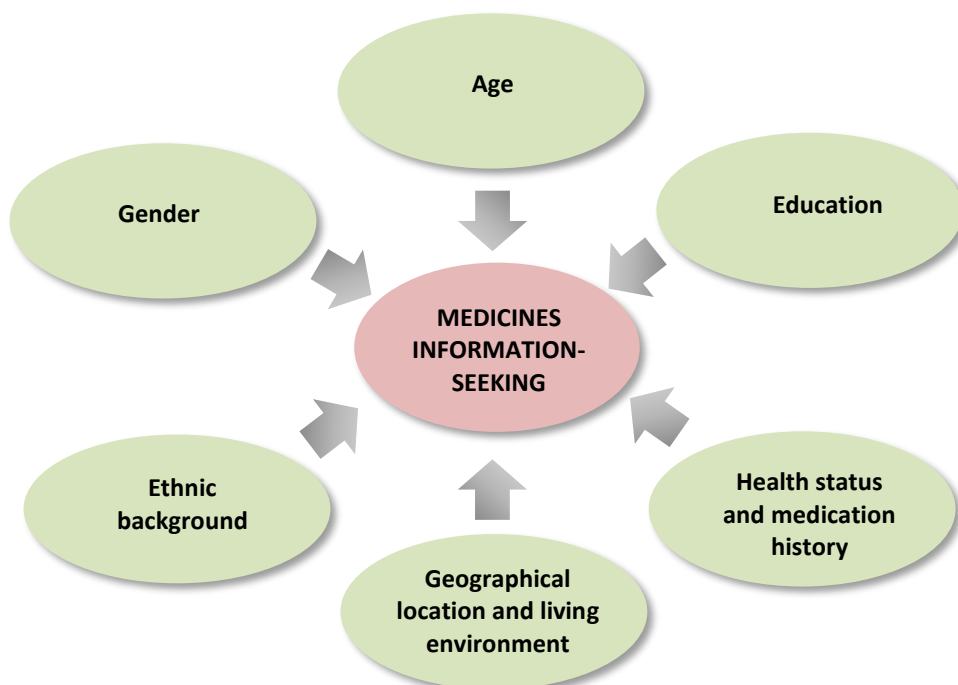
## **SATISFACTION WITH AND RELIABILITY OF THE INFORMATION RECEIVED**

Half of the medicine users (48%) are satisfied with MI they received in general (Table 9).<sup>191</sup> However, not all medicine users consider that they receive enough information about their medicines from HCPs, such as 47% of cancer patients have reported.<sup>186</sup> Hormone replacement therapy users consider the receipt of information about their medicines from their physician is very (57%) or somewhat (31%) useful.<sup>203</sup> Moreover, while many medicine users want WMI, many of those have reported that WMI should be more patient-centred, less ambiguous and easier to understand.<sup>30</sup>

Medicine users consider physicians (31–99%), pharmacists (36–99%) and PLs (40–98%) as the most reliable information sources in all age groups.<sup>193,202</sup> Medicine users under 50 years (45%) rely more on MI found from the Internet than older ( $\geq 50$  years) medicine users (24%).<sup>193</sup> Both men and women rate their family members as the least credible source.<sup>184</sup>

### 2.3.4 FACTORS AFFECTING MEDICINES INFORMATION SEEKING BEHAVIOUR

Studies showed multiple factors affecting MI-seeking behaviour (Figure 12).



**Figure 12.** *Factors affecting medicines information-seeking behaviour.*

Women seek information more often and use more information sources than men to obtain information about medicines they use.<sup>183,194</sup> Men typically receive MI from their physicians more often than women, and women receive MI from other sources (e.g., pharmacists, PLs, the Internet, newspapers and books).<sup>87,184,194-196</sup>

Young people are more likely to seek MI from the Internet than older age groups.<sup>87,193,195,196,198</sup> In contrast, older people are likely to use HCPs, especially physicians, as their MI source, and they rely on interpersonal contact with HCPs more than younger people for receiving MI.<sup>185,193,195,196</sup> Young people are more likely to obtain information about prescription

medicines from nurses, relatives and friends than older counterparts.<sup>200</sup> However, younger people ( $\leq 30$  years) commonly receive information about adverse reactions of hormonal contraceptives from a physician, friends and relatives, while older people find the media as the most important information source for that.<sup>200</sup>

People with a higher level of education (university or higher degree) are more likely to search MI, especially from the Internet, compared to people with a lower level of education.<sup>87,183,196</sup> Respectively, less educated ( $\leq 9$  years) people are more likely to receive information from nurses, family members or friends than higher educated people.<sup>87,196,198</sup>

Morbidity and medicines use also affect the receipt of MI. The more diseases people have, the more they use different information sources to receive MI.<sup>196</sup> Diabetics and people with mental or thyroid diseases more commonly receive advice and counselling from nurses compared to other information sources.<sup>87</sup> Respectively, people with cardiovascular disease or musculoskeletal system disease use PLs more than other sources to receive MI. Patients with three or more prescription or non-prescription medicines in use receive MI more from HCPs than those using less medicines.

The receipt of MI and use of different information sources may vary between countries. Pregnant women in Northern Europe (66%) received less information from their physician than pregnant women living in other countries (on average 78%).<sup>189</sup> On the other hand, pregnant women in Northern Europe (50%) and Australia (49%) preferably use midwives and nurses for information, whereas their counterparts in North America (27%) and in Eastern Europe (14%) contact these HCPs much less frequently. The pharmacist as a MI source is rarely used in South America (23%) compared to other countries (50% on average). Eastern Europeans (75%), especially Russians (90%), use the Internet as a source of MI.

### **2.3.5 QUALITY OF THE STUDIES AND LIMITATIONS**

To provide a comprehensive picture of the use of MI sources among adult medicine users, all the studies that met the inclusion criteria were included in the review. The quality of the studies in the review described above was not systemically assessed. Studies were carried out fairly evenly over the study period of 2000–2018. Size of the study population varied greatly between studies and in accordance with study methods. One-third of the studies examined heterogeneous medicine user groups and it was not possible to

identify what medicines the patients were using. Therefore, the findings of these studies could not be compared to the studies involving patients taking certain medicines or patients with specific chronic diseases.

Research was conducted in various settings. Variation in study settings may affect the study results, for example patients recruited from the hospitals may use different information sources than those recruited from the community pharmacies. Some of the studies were performed locally and some were at a national level. Almost half of the studies were from different European countries. Furthermore, the review included only the studies carried out in developed countries.<sup>180</sup> These aspects should be taken into account in generalising the results as MI practices vary between the countries and continents, such as use and accessibility of the WMI and Internet. Multiple research methods had been used, but almost all had applied a single cross-sectional study design. Only one study compared the results from 2 years covering a 7-year period.<sup>200</sup> There is a need for studies with long-term population-based trend analysis on the use of MI sources among medicine users as none of these studies applied a longitudinal study design.

## 3 AIMS OF THE STUDY

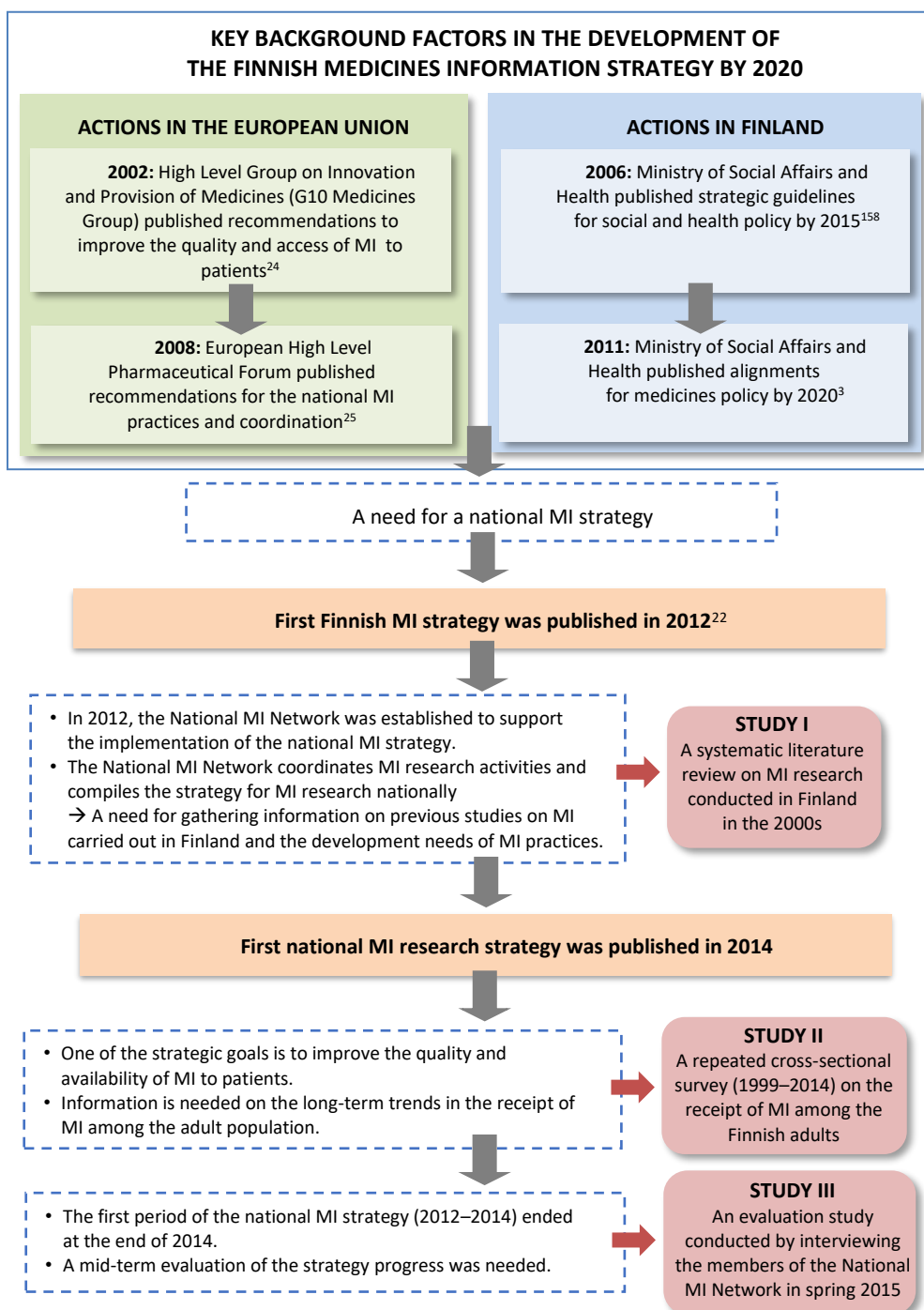
The objective of this study was to examine medicines information (MI) practices and policies in Finland during the 2000s. The ultimate goal was to collect and provide information to assist in strategic development of MI (Studies I and II) and to evaluate the implementation of the national MI strategy (Study III) in Finland. Sub-studies (I–III) and their linkage to the strategic development of MI in Finland is presented in Figure 13.

The specific objectives of the study were:

- 1) To identify focus areas and gaps in MI research in Finland during the 2000s in order to develop and steer MI research and practices in the future ( I)
- 2) To examine long-term trends in the receipt of MI among Finnish adult medicine users in order to be addressed when developing MI practices and sources to consumers (II)
- 3) To investigate well-implemented actions and actions needing development in the medication use process for patients with chronic diseases to evaluate the implementation of the national MI strategy three years after its launch in 2015 (III)

These objectives were addressed in three independent studies of the thesis, resulting in three international peer reviewed scientific publications (I–III)





**Figure 13.** Studies (I–III) and their linkage to the national medicines information (MI) strategy in Finland.

## 4 MATERIALS AND METHODS

This study applied both quantitative and qualitative research methods. The study utilised the methods commonly used in social sciences and policy research. Each sub-study (I–III) is based on its own data (Table 10).

**Table 10.** *Materials and methods used in the Studies I–III.*

STUDY	STUDY AIMS	METHODS	DATA SOURCE	ANALYSIS
I	To identify focus areas and gaps in MI research in Finland	Systematic literature review	Original peer-reviewed studies (n=126) related to MI research in Finland, published between 1 January 2000 and 30 June 2016	Qualitative content analysis
II	To examine long-term trends in the receipt of MI among Finnish adults	Repeated cross-sectional postal population survey	Responses from Finnish adult medicine users (n=18862) to the postal survey ' <i>Health Behaviour and Health among the Finnish Adult Population</i> ' by the National Institute for Health and Welfare, covering responses from years 1999, 2002, 2005, 2008–2014	Quantitative analysis: descriptive statistics and logistic regression
III	To investigate how the ultimate goal of the national MI strategy on a well-informed patient with a long-term medication has been achieved	Qualitative interviews	Members of the National Medicines Information Network (n=79) after the first operational period of the national medicines information strategy (2012–2014) in 2015	Qualitative content analysis

### 4.1 MEDICINES INFORMATION RESEARCH IN FINLAND (I)

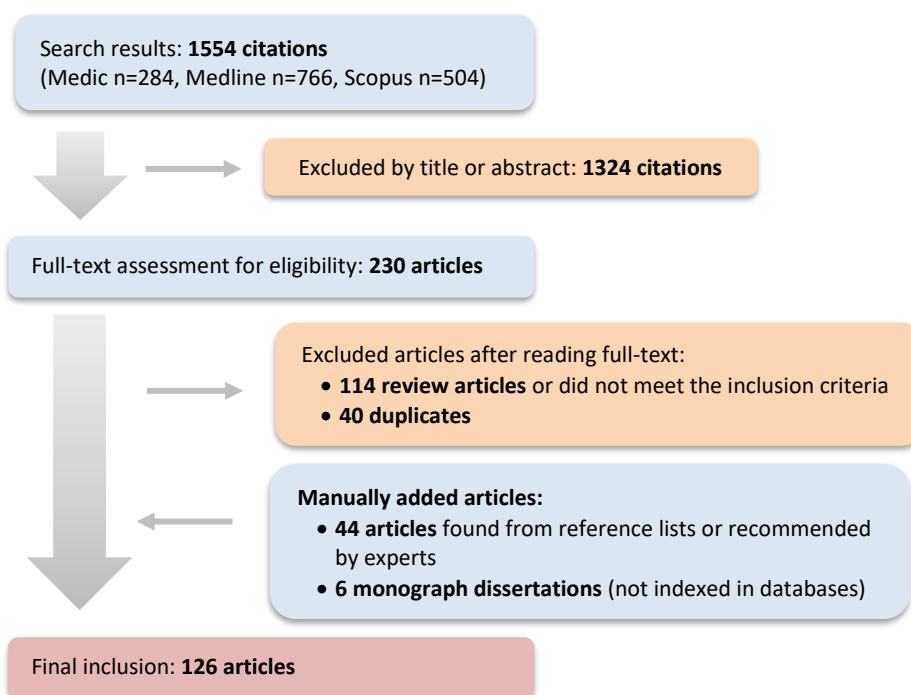
#### 4.1.1 DESIGN AND SETTING (I)

A systematic literature review was conducted in order to understand the medicines information (MI) practices in Finland in the 2000s that could be utilised as a basis for implementing the national MI strategy and targeting actions of the National Medicines Information Network (MI Network). The ultimate aim was to identify research topics and gaps related to MI. The Finnish Medicines Agency Fimea carried out a comprehensive inventory of

existing MI research in 2013.<sup>171</sup> In this study, the review was updated to cover research up to June 30, 2016, and the included articles were qualitatively analysed.

#### 4.1.2 DATA COLLECTION AND EXTRACTION (I)

Predetermined inclusion and exclusion criteria were used for the data collection and extraction (Study I: Table 1). Original peer-reviewed studies related to MI research in Finland and published in English or in Finnish between January 1, 2000 and June 30, 2016 were included in the review. The study material was collected from two international databases, Medline and Scopus, and from a Finnish database, Medic, using keyword screening criteria with the assistance of information specialists (Figure 14, Study I: Figure 1). The search was supplemented by articles found in the reference lists of the included studies. To identify relevant articles and research lines, MI experts and researchers were consulted.



**Figure 14.** A PRISMA flow diagram of the study selection process. (I)

The preliminary selection of the articles was carried out by Fimea's research group that prepared an inventory on MI research conducted in Finland during 2000–2013.<sup>171</sup> The literature search and the selection of the articles was repeated in 2016 and extended to cover the time period until June 30, 2016. At least two authors independently reviewed full-text articles for inclusion and exclusion. Disagreements were resolved through discussion and consensus with the third researcher or within the study group. The *Cochrane Handbook for Systematic Reviews* and the *PRISMA Guidelines* was followed in conducting the review and reporting findings when appropriate.<sup>205,206</sup> A detailed description of the inclusion and exclusion criteria, the key search terms and an example of the search strategy is provided in *Original publication I* (Study I: Figure 1, Table 1 and Appendix A).

### **4.1.3 QUALITATIVE CONTENT ANALYSIS (I)**

Included studies were content analysed according to MI practices identified, trends over time in research methodology and theory. First, studies were classified and then content analysed according to the main objectives of the national MI strategy.<sup>22</sup> Following this, the sub-themes were inductively formulated to reflect the objectives of the included studies. Studies may have focused on more than one aspect, and therefore, some of the studies were categorised under several main themes and sub-themes.

After categorising the studies, they were summarised using an extraction table addressing the aims of the review (Study I: Appendix B). Characteristics extracted included year of publication, aspects studied, research method, study participants or subjects and key findings. Data were extracted by two authors and approved by the other research group members.

## **4.2 TRENDS IN THE RECEIPT OF MEDICINES INFORMATION AMONG THE ADULT POPULATION (II)**

### **4.2.1 DESIGN AND SETTING (II)**

The study was performed as an indicator to identify long-term trends and potential gaps in the receipt of MI among the adult Finnish population that should be addressed when improving MI practices during the strategic

development of MI nationally. In particular, the study focused on the use of the Internet as a source of MI during the study period.

The data were derived from the annual national health behaviour survey *Health Behaviour and Health among the Finnish Adult Population* conducted between 1978 and 2014 by the National Institute for Health and Welfare (formerly the National Public Health Institute).<sup>207</sup> This national survey has its origins in the *North Karelia Project*, started in 1972.<sup>208</sup> The project aimed to comprise etiology and factors related to the high prevalence of cardiovascular diseases in Finland, and regional differences in the prevalence and associated mortality. This survey was established to perform as an indicator for changes in population health and related risk factors, such as smoking, food and alcohol consumption and physical activity. It has been repeated every year in identical form to yield comparable results. The survey instrument included a standard set of structured questions supplemented by other questions over the years. One of the added questions was the one used in this study concerning the receipt of MI from different sources available for the public and medicine users in Finland. The question related to MI was added to the survey instrument in 1999.<sup>209</sup>

#### **4.2.2 SURVEY INSTRUMENT AND DATA COLLECTION (II)**

The survey used in this study was conducted as a repeated cross-sectional postal survey using each year a new nationally representative sample (n=5000) of the Finnish working age population of 15–64 years old.<sup>207</sup> The sample has been derived from the Population Register Centre of Finland which is a government-based register where all Finnish citizens and permanent residents are required to be registered.<sup>207,210</sup> Three reminders were sent each year to maintain a response rate high enough for generalisable results.<sup>211</sup> Data from the years 1999, 2002, 2005, 2008–2014 were compared as these are the years when the survey included the question on the receipt of MI.

Receipt of MI on medicines in use was the main outcome measure used (Figure 15). The question was followed by a list of MI sources available for consumers in Finland at the time of the study. Respondents could indicate from the list as many information sources as applicable. It was not possible to report other sources than those listed in the survey.

**In the past year (12 months), have you received information on the medicines you have used?**

1) No

2) Yes, where?

	Yes		Yes
from a physician.....	1	from relatives, friends.....	1
from a community pharmacy.....	1	from the Internet.....	1
from a package leaflet <sup>a</sup> .....	1	from advertisements.....	1
from a public health nurse, a registered nurse.....	1	from radio, TV.....	1
		from health food stores.....	1
		from telephone services.....	1

<sup>a</sup>Added to the survey in 2002.

**Figure 15.** The question concerning the receipt of medicines information from various sources included in the “Health Behaviour and Health among the Finnish Adult Population” survey.<sup>207</sup>

Socio-demographic variables used in this study were gender, age and education. Health-related variables used were respondents’ medicine use and diagnosed diseases. Medicine use was assessed by the question presented in Figure 16. This question was followed by a list of commonly used prescription and non-prescription medicines for common chronic and acute diseases. Respondents could indicate from the list as many medicines as they had been using within 7 days prior to the survey without the possibility to report any other medicines than those mentioned in the list. The medicines use within the past 7 days was used as a measure in order to control recall bias.<sup>212</sup>

**Have you used any tablets, powders or other medicines within the past week (7 days)?**

	Yes		Yes
blood pressure medication.....	1	antidepressants <sup>b</sup> .....	1
cholesterol medication.....	1	preparations containing vitamin D <sup>c</sup> .....	1
insulin <sup>a</sup> .....	1	other vitamin preparations <sup>c</sup> .....	1
diabetes medication <sup>a</sup> .....	1	cough medication.....	1
painkillers for headache.....	1	cholesterol medication.....	1
other painkillers.....	1	hormone replacement therapy for women.....	1
contraceptives (oral).....	1	medication for erectile dysfunction.....	1
sedatives.....	1		
sleeping pills.....	1		

<sup>a</sup>Added to the survey in 2005, <sup>a</sup>Added to the survey in 2002, <sup>b</sup>Added to the survey in 2005, <sup>c</sup>Vitamin and mineral preparations were specified for vitamin D preparations and other vitamins in 2011.

**Figure 16.** The question concerning medicine use in the “Health Behaviour and Health among the Finnish Adult Population” survey.<sup>207</sup>

Diagnosed diseases were determined by the question presented in Figure 17. This question was followed by a list of chronic and acute diseases common in Finland. Respondents could indicate from the list as many diseases as they had been suffering from within the year prior to the survey without the possibility to report any diseases other than those mentioned in the list.

**Have you had any of the following diagnosed diseases or diseases treated by the physician within the past year (12 months)?**

Yes	Yes
high blood pressure, hypertension..... 1	digestive illness
diabetes..... 1	(gastritis catarrh, gastritis, ulcer)..... 1
coronary disease, angina pectoris	high blood cholesterol <sup>a</sup> ..... 1
(=chest pain during exercise)..... 1	cancer <sup>b</sup> ..... 1
rheumatoid arthritis..... 1	depression <sup>b</sup> ..... 1
degenerative disk disease,	other mental health disorder <sup>b</sup> ..... 1
other back illness..... 1	cholesterol medication <sup>b</sup> ..... 1
chronic bronchitis,	hay or allergic rhinitis <sup>c</sup> ..... 1
pulmonary emphysema..... 1	food allergy <sup>c</sup> ..... 1
asthma..... 1	

<sup>a</sup>Added to the survey in 2002, <sup>b</sup>Added to the survey in 2005, <sup>c</sup>Added to the survey in 2008.

**Figure 17.** The question about diagnosed diseases in the “Health Behaviour and Health among the Finnish Adult Population” survey.<sup>207</sup>

### 4.2.3 QUANTITATIVE ANALYSIS (II)

Statistical analyses were performed using the Statistical Package for Social Sciences software (IBM SPSS Statistics for Windows, Released 2016, Version 24.0. Armonk, NY: IBM Corp.). Respondents who reported using at least one medicine during the 7-day time-frame prior to the survey were included in the analysis as medicine users.

Respondents were divided into predetermined groups by socio-demographic (gender, age, education) and health-related (number of medicines in use, number of diagnosed diseases) variables (Study II: Table 1). Trends in the receipt of MI from different information sources and the number of MI sources used by the respondent were counted for each study year of 1999, 2002, 2005, 2008–2014. The significance of the change in the receipt of MI between the study years was analysed with logistic regression (Study II: Table 2). Analyses were adjusted for potential confounding factors (i.e., age, gender, education, number of medicines in use and number of diagnosed

diseases). The receipt of MI from different sources was calculated by gender, age, number of medicines in use and number of diagnosed diseases for each study year.

### **4.3 IMPLEMENTATION OF MEDICATION USE PROCESS FOR PATIENTS WITH CHRONIC DISEASES (III)**

#### **4.3.1 DESIGN AND SETTING (III)**

This study was conducted as part of the evaluation of the national MI strategy's implementation (Figure 10). The study investigated how the national MI strategy's key goal of a well-informed patient with a long-term medication plan had been achieved after the first 3-year operational period (2012–2014). Medication use process refers to an operative chain of actions starting with the diagnosis and prescribing the medication followed by dispensing, medication counselling and medicine use and ending in monitoring of the effects of the medication (Figure 8, Study III: Appendix B).

The medicine use process with the patient at the center (Figure 8) was chosen as a target of the national MI strategy's evaluation. A pragmatic approach was applied in the evaluation in order to understand the impact of interactions, nonlinear relationships and multi-level influence in the medicine use process.<sup>213</sup> Data were collected by semi-structured interviews. In order to find out a comprehensive view of study question, all members of the MI Network were invited to interviews (purposive sampling). Instead of aiming to reach data saturation, the aim was gather the views of all stakeholders in the MI Network. During the first operational period of the national MI strategy, the MI Network had 111 members representing 53 stakeholder organisations. An invitation to participate in the interview was sent to all members of the MI Network via email, and a more detailed information letter related to the study was sent to those who agreed to participate. The interviews were conducted within the period from January to June, 2015 (Figure 10).



### 4.3.2 DATA COLLECTION AND INTERVIEW GUIDE (III)

In order to gather a comprehensive understanding of stakeholders' views, interviews were carried out as individual, pair and group interviews. Interviews were conducted as face-to-face, by telephone and as video conferencing. The form of the interview was decided upon convenience of the participants from each stakeholder. One moderator (the author of this thesis) facilitated and audiotaped all interviews with permission from the participants.

A semi-structured interview guide with two main themes and eight sub-themes (Appendix 1) was developed by the research group following the goals of the national MI strategy.<sup>22</sup> The interview guide was pre-tested in two interviews with six participants to ensure the face and content validity of the interview protocol. Based on the pilot test study, no significant changes were made, and, therefore, the data from the pilot interviews were included in the study. The interviews focused on two main themes pertaining to: 1) reaching the goals and implementing the actions of the national MI strategy and 2) actions taken by the MI Network.

This study focused on the results of the first theme, which concentrate on the ultimate goal of the national MI strategy of well-informed and adherent medicine users with chronic diseases, and how this goal had been achieved by the point of the interview in spring 2015 (Figure 18, Appendix 1: Question 4). The figure of the medication use process illustrating this ultimate goal in the national MI strategy was shown to the participants of the interviews to stimulate discussion and focus it on the core of the national MI strategy (Figure 8).

If you consider the figure of the medication use process for a patient with chronic disease:

- 1) what are the most crucial actions that have been implemented ?
- 2) what actions should be focused on in the future in order to achieve the goal of a well-informed, adherent patient or medicines user ?

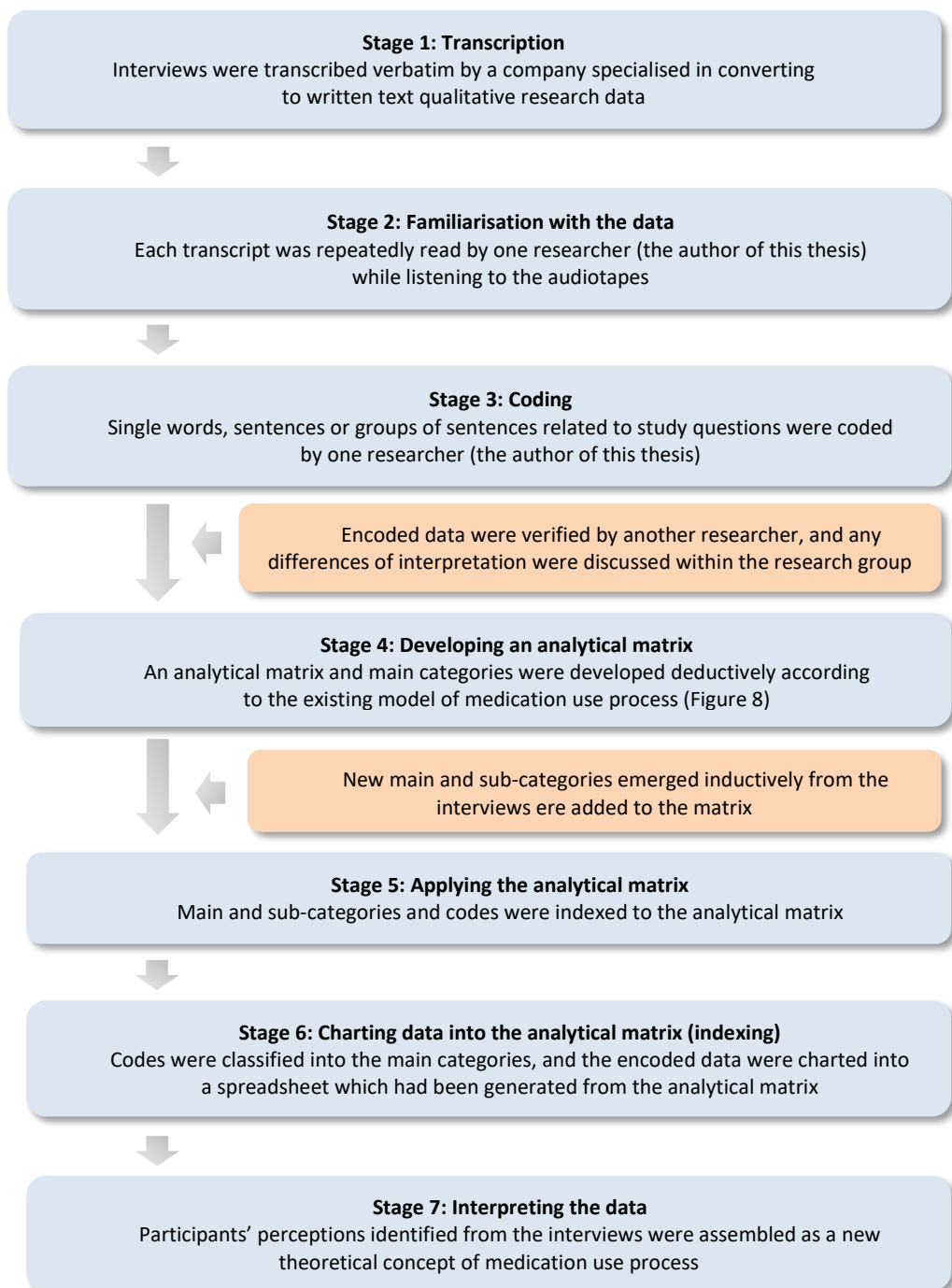
**Figure 18.** *The question used in the interview about the implementation of the medication use process aiming at well-informed and adherent medicine users with chronic diseases during the first operational period of the national medicines information strategy by 2015 (Appendix 1).*

### 4.3.3 ANALYSIS OF THE QUALITATIVE DATA (III)

The interviews were analysed by applying the *Framework Method*.<sup>214</sup> The analysis was performed using both deductive and inductive content analysis through seven stages (Figure 19, Study III: Figure 1). One researcher was responsible for the analysis (the author of this thesis), and another researcher verified the analysis to confirm dependability and confirmability of the study.<sup>215</sup>

The figure of the existing medication use process (Figure 8)<sup>22</sup> was used as a basis for an analysis matrix. To strengthen the credibility of the analysis, the *Framework Method* was chosen as a theoretical method because of its systematic and flexible approach.<sup>214</sup> This method has its origins in social policy research where it has been used extensively since the 1980s. Currently, the *Framework Method* is an increasingly popular in the management and analysis of qualitative data, also in medical and health research.

A new conceptual framework model of the medication use process was developed based on the existing medication use process model (Figure 8)<sup>22</sup> and complemented by participants' views identified from the interviews. The data from different types of interviews were combined and mentions were counted. One researcher (author of this thesis) read the transcripts independently and created code categories and summaries (Figure 19). Another researcher verified the codings by reviewing the coded texts and crosschecking the coding categories created by the first researcher. Any discrepancies of interpretation were discussed within the research group. The content and structure of concepts created by content analysis were presented clearly and systematically with the quotations from various participants to indicate conformability and objectivity (Study III: Appendix C). In the conceptual model building, it was useful to use the breakdown of the data to *macro, meso* and *micro levels*.<sup>216</sup> The profession or stakeholder group was not specified during the analysis, as the aim was to obtain an overall understanding of the implementation of medication use process rather than to compare views between professions or stakeholders.



**Figure 19.** Qualitative content analysis process applying the Framework Method.<sup>214</sup> (III)

The results are presented in a new conceptual model illustrating well-implemented actions and actions needing development in the medication use process. The model was constructed by categorising the themes into three operational levels, namely the infrastructure (*macro*) level, HCP (*meso*) level and patient (*micro*) level. The conceptual framework applied to combine the functions of primary care with the dimensions of integrated care was utilised in categorising the data in these levels.<sup>216</sup> The number of encodings for each theme was counted according to the mentions by each participant. The new conceptual model is presented in two different ways: 1) as two separate figures showing well-implemented actions and actions needing development in the medication use process (Study III: Figures 3 and 4), and 2) as a summary figure based on these separate figures (Figure 24).

#### 4.4 RESEARCH ETHICS

All study procedures were conducted according to good ethical and scientific practice.<sup>217</sup>

Study I was conducted as a systematic literature review. As the study was based solely on published peer-reviewed original research articles and no primary data were collected, the ethical approval was not required.<sup>217</sup>

Study II was based on the secondary analysis using routinely collected and fully anonymised survey data. Permission to use the data was obtained from the National Institute for Health and Welfare. Ethics approval was not applicable, because anonymous surveys are exempt from ethical approval in Finland.<sup>217</sup> Responding to the survey was voluntary and considered as giving informed consent. No personal identifiable information was collected.

Study III was performed as qualitative interviews. The study plan was presented and approved by the MI Network. The study was deemed to be exempt from requiring approval from the research ethics committee as the participants were informed in writing about the interview in advance and they volunteered to participate in the study.<sup>217</sup> Furthermore, each interviewee was informed prior to the interview that the data would be used for research purposes and that data are anonymised in order that no interviewee can subsequently be identified. The interviewees were able to stop the interview at any time and refuse to participate in the study, but no one refused. The recordings and interview notes were digitally stored and were accessible only to the research team. The material was anonymised after the iteration in order to protect the identity of the participants.

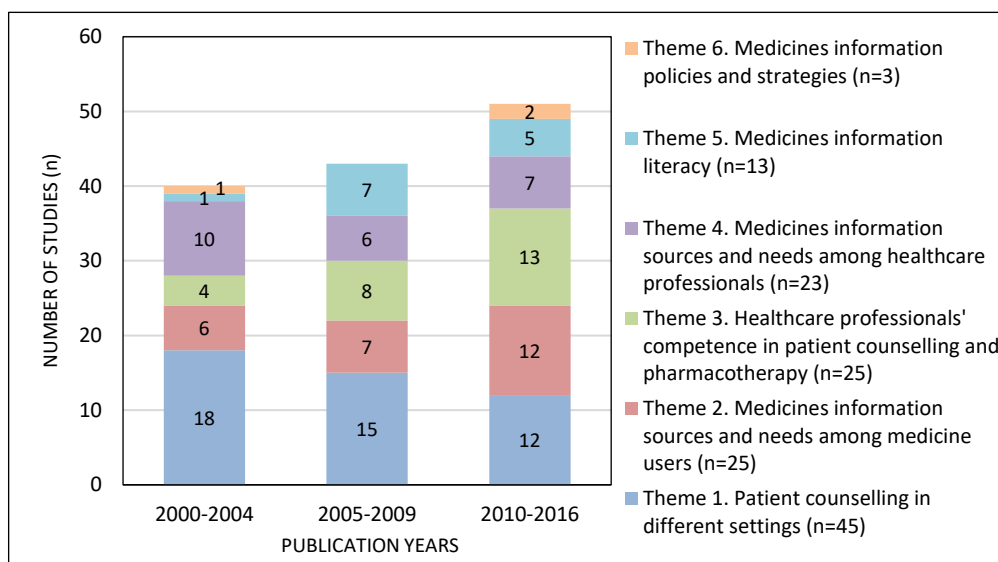
## 5 RESULTS

This chapter summarises the key findings of the Studies I–III.

### 5.1 MEDICINES INFORMATION RESEARCH IN FINLAND (I)

#### 5.1.1 CHARACTERISTICS OF THE STUDIES (I)

A systematic literature search identified 126 original studies covering a broad variety of approaches and themes (Table 11, Study I: Table 2). Included studies were categorised into 6 main themes according to the Finnish national medicines information (MI) strategy.<sup>22</sup> Patient counselling in different settings (36% of all studies, n=45/126) was the most commonly studied main theme (Figure 20, Study I: Table 2). MI literacy (n=13) and MI policies and strategies (n=3) were the least commonly studied main themes. Furthermore, included studies were compiled according to 15 inductively generated sub-themes (Table 11, Study I: Table 2). The most commonly studied sub-themes were patient counselling in community pharmacies (n=24), MI sources among different patient groups (n=22) and MI sources among healthcare professionals (HCPs) (n=22). MI literacy in adults (n=2), development of the national MI strategy (n=2) and evolution of MI regulation in the EU (n=1) were the least commonly studied sub-themes. A more detailed description on the characteristics of the included studies is provided in *Original publication I* (Study I: Appendix B).



**Figure 20.** Medicines information studies ( $n=126$ ) according to the main themes of the national medicines information strategy<sup>22</sup> and publication year. The same study may have had more than one sub-theme, and therefore the study may have been categorised under more than one main theme. (I)

Most of the studies were published in international journals (76%,  $n=96/126$ ). The annual publication rate had remained relatively stable throughout the study period of 2000–2016 (Figure 20, Study I: Figure 2). In the early 2000s (2000–2004), almost half of the publications (45%,  $n=18/40$ ) were related to patient counselling in different settings (*Theme 1*), and a quarter (25%,  $n=10/40$ ) concerned MI sources and needs of HCPs (*Theme 4*). Since then, the research has shifted towards MI sources and needs of medicine users (*Theme 2*), and patient counselling and pharmacotherapy competence of HCPs (*Theme 3*). MI literacy (*Theme 5*) and MI policies and strategies (*Theme 6*) have emerged as new research topics in the 2000's.

**Table 11.** Summary of the original studies (n=126) related to medicines information (MI) which have been conducted in Finland during 2000–2016 organised as six themes derived from the goals of the national medicines information strategy.<sup>22</sup> The same study may have had more than one sub-theme, and therefore the study may have been categorised under several themes. (I)

THEME 1. PATIENT COUNSELLING IN DIFFERENT SETTINGS (n=45)		
Sub-themes (n)	Aspects studied (n) <sup>Ref.</sup>	Key findings related to MI
<b>Patient counselling in community pharmacies (n=24)</b>	Implementation of the national patient counselling development project (TIPPA Project) (n=9) <sup>26,76,120,218-223</sup>	Multiple actions and tools for developing and assessing patient counselling in community pharmacies were applied during the <i>TIPPA Project</i> 2000–2003. Novel in-house training and professional development practices were established to improve pharmacists' patient counselling skills and understanding of concordance and therapeutic alliance in their communication with medicine users. Patient counselling specific quality assurance instrument was developed.
	Patient counselling among different patient groups (n=14) <sup>137,224-236</sup>	Patient counselling by community pharmacists was recognised as important, but the content and amount of MI varied between different patient groups and according to therapeutic class. Pharmacists were found to have false assumptions ("myths") on OTC customers' need for patient counselling. Electronic counselling services provided by community pharmacies started to become common in the early 2000s.
	Patient counselling as a tool for preventing medication errors (n=1) <sup>237</sup>	Physicians considered patient counselling to be the most important action of community pharmacists to reduce medication errors.
<b>Patient counselling in hospitals (n=8)</b>	Patient counselling among different patient groups (n=7) <sup>238-244</sup>	WMI improved patient education, interaction between HCPs and patients and HCPs' readiness for patient counselling. Patients were generally satisfied with counselling in hospitals, but they were dissatisfied with counselling on ADRs and lack of emotional support. Lack of time was reported as most commonly barrier to patient counselling among HCPs. Patients' interest in receiving MI is related to their willingness to participate in medical decision-making.
	Documentation of patient counselling in surgical care (n=1) <sup>245</sup>	The need for patient counselling descriptor codes for the Finnish Classification of Nursing Interventions (FICNi) was identified in surgical care in order to document patient counselling provided and the feedback given by patients.
<b>Patient counselling in MICs, call centres and telephone services (n=8)</b>	Telephone and online counselling (n=8) <sup>73,246-252</sup>	Utilisation of telephone and online patient counselling services was not common at the population level, but these MI sources were regarded as valuable, particularly for some patient groups such as people using psychotropics. Telephone services provided by physicians proved to be useful in resolving patients' DRPs.
<b>Influence of patient counselling on medicines use (n=6)</b>	Influence of patient counselling among different patient and medicine user groups (n=6) <sup>230-232,253-255</sup>	Community pharmacists can improve asthma patients' treatment and clinical outcomes by enhanced counselling. WMI did not enhance compliance or efficacy of escitalopram treatment among people with depression. One-time counselling of the aged with benzodiazepines and other fall-risk-increasing medicines decreased the number of long-term and regular use of benzodiazepines and related medicines. User satisfaction is strongly associated with information provided at the time the levonorgestrel-releasing intrauterine system is inserted.
<b>Theoretical approaches to patient counselling (n=6)</b>	Theoretical and practical models/methods related to patient counselling (n=6) <sup>74,76,120,219,233,256</sup>	The <i>USP Medication Counseling Behavior Guidelines</i> were suitable for evaluating and learning community pharmacists' counselling skills. The <i>EUPC Method</i> was found to be a useful tool for learning patient counselling skills targeted at people with chronic diseases. Paternalism and patient autonomy were applied as philosophical approaches to reflect MI from community pharmacies before the <i>TIPPA Project</i> (2000–2004) followed by the implementation of concordance-based counselling practice. Long-term personal support and applied empowerment to self-management to long-term therapy among diabetics improved the results of diabetes care outcome measures.

## THEME 2. MEDICINES INFORMATION SOURCES AND NEEDS AMONG MEDICINE USERS (n=25)

Sub-themes (n)	Aspects studied (n) <sup>Ref.</sup>	Key findings related to MI
<b>MI sources among different patient groups (n=22)</b>	MI sources among different patient groups (n=19) <sup>90,115,189,193-196,199-201,236,241,257-263</sup>	Consistently in all studies, HCPs, especially physicians, pharmacists and nurses, and PLs were identified as the most common MI sources among patients. Receipt of MI from pharmacists and the Internet has increased during the last few decades. The use of the Internet was more common among people with mental disorders and young people.
	Quality of online antidepressant information (n=1) <sup>264</sup>	The quality of antidepressant information on websites was relatively good and correct, but not always comprehensive.
	Readability and content of PLs of OTC medicines (n=1) <sup>197</sup>	The overall readability of the PLs was good, and the quality of content was not directly associated with the readability.
	Influence of patient information booklet provided to support patient counselling among women with menorrhagia (n=1) <sup>265</sup>	The information booklet influenced treatment choices among women with menorrhagia but did not increase the number of surgical procedures used, improve knowledge, or influence satisfaction or anxiety.
<b>MI needs among different patient groups (n=11)</b>	MI needs reported by different patient groups (n=11) <sup>90,189,199,240,241,257,258,261,263,266,267</sup>	Patients most commonly reported the need for information on ADRs, interactions and effects of medicines. Antidepressant users seek online MI to obtain a second opinion, verify information received from PL, preparing to visit the physician and hearing peer experiences. The majority of pregnant women need MI during pregnancy, especially women with medical problems and lower health literacy.

## THEME 3. HEALTHCARE PROFESSIONALS' COMPETENCE IN PATIENT COUNSELLING AND PHARMACOTHERAPY (n=25)

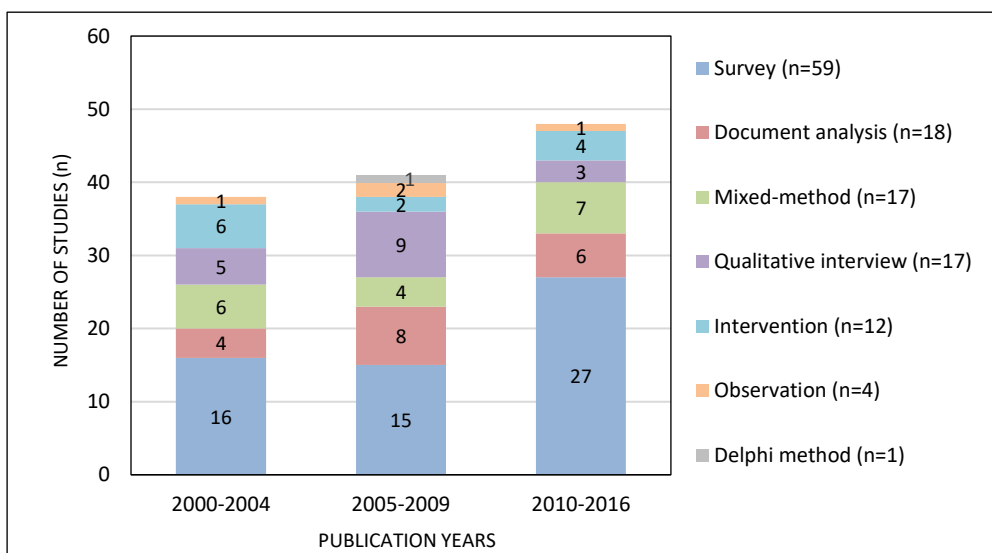
<b>Patient counselling competence (n=13)</b>	Competence in basic pharmacy education (n=7) <sup>224,256,268-272</sup>	Structured guidelines and criteria were recognised as useful tools for assessing, teaching and giving feedback on pharmacy students' patient counselling and communication performance. Lack of adequate knowledge about mental health disorders was found in a six-country study. In Finland 36% of pharmacy students reported patient-related barriers to patient counselling for people with mental disorders. The <i>EUPC Method</i> helped pharmacy students to counsel chronically ill patients. The method was comprehensive and easy to use.
	Competence among pharmacists (n=4) <sup>138,139,219,273</sup>	In-house training, long-term continuing education and online education positively influenced patient counselling competence among pharmacists. One of the successful achievements was a comprehensive medication review (CMR) competency of community pharmacists through a 1.5-year programme.
	Educational interventions (n=2) <sup>274,275</sup>	In-house training improved pharmacists' counselling skills and knowledge of asthma management. Online education of nurses positively influenced on patients and their family members' satisfaction with patient counselling.
<b>Pharmacotherapy competence (n=12)</b>	HCPs' and HCP students' competences (n=10) <sup>276-285</sup>	Nurses and nursing students found pharmacology to be a difficult topic and considered their own skills to be insufficient. Public health nurses were generally familiar with the vaccination recommendations and contraindications, but also found areas of competence where they needed more training. In managing successful vaccinations, both strengthening and weakening factors must be considered.
	Teaching pharmacotherapy in nursing schools (n=2) <sup>286,287</sup>	Nursing teachers rated their competence in teaching pharmacotherapy as good in the late 1990s, but the content and amount of pharmacotherapy teaching varied between undergraduate nursing programmes in Finnish polytechnic schools even in 2010. They evaluated that their best competence was in teaching the implementation of pharmacotherapy and the worst in teaching pharmacology.



THEME 4. MEDICINES INFORMATION SOURCES AND NEEDS AMONG HEALTHCARE PROFESSIONALS (n=23)		
Sub-themes (n)	Aspects studied (n) <sup>Ref.</sup>	Key findings related to MI
<b>MI sources among HCPs (n=22)</b>	Implementation of national clinical practice guidelines (n=13) <sup>230,288-298</sup>	HCPs, especially physicians, were generally familiar with the national and local clinical practice guidelines, although the level of implementation varied. The majority of physicians considered the guidelines to be useful in clinical decision-making. For example, during the <i>MIKSTRA Infectious Disease Program</i> in 1998–2003, the prescribing of antibiotics changed for the better following the national clinical practice guidelines, treatment durations shortened, and clinical outcomes improved.
	Quality assessment and development of MI sources and services (n=6) <sup>299-304</sup>	HCPs were satisfied with the quality of MI services provided by hospital pharmacy, such as telephone services. A MI database to support patient counselling and pharmacy protocol for patient counselling were prioritised features in developing future information technology systems for community pharmacies. Information content on ADRs varied between PLs of different brands of the same active substance.
	Implementation of local clinical practice guidelines (n=2) <sup>305,306</sup>	Local clinical practice guidelines were well known among physicians, but lack of time limited their use in practice. Physicians familiar with the guidelines were more active in offering practical support.
	Community pharmacy as a source of MI for physicians (n=1) <sup>307</sup>	Physicians identified and solved DRPs during repeat prescribing more effectively if they received the patient information from the community pharmacists.
<b>MI needs among HCPs (n=2)</b>	MI needs reported by HCPs (n=2) <sup>302,308</sup>	Home care nurses' access to MI was varied. Information on interactions, ADRs, doses, dosages, effects and use of medicines was commonly needed as reported by hospital nurses and physicians.
THEME 5. MEDICINES INFORMATION LITERACY (n=13)		
<b>Children's medicines education (n=11)</b>	Development and implementation of national children's medicines education programme (n=10) <sup>309-319</sup>	Children's understanding about medicines was somewhat superficial. Teachers' attitudes and beliefs towards medicines influenced their willingness to teach about medicines. The majority of primary and comprehensive school teachers were willing to teach children about medicines. Teachers considered teaching about medicines as being important to be included in the national health education curriculum, and they reported the need for support in teaching the rational use of medicines. Online medicines education materials developed for school teachers and children were useful. Online education materials for teachers should contain a simple structure and ready-to-use materials. The medicines education project was useful for pharmacy students to learn useful skills and competences.
	Pictograms to support MI for children (n=1) <sup>314</sup>	Most of the children understood USP's pictograms correctly, but the context in which pictograms were tested influenced on the results.
<b>MI literacy in adults (n=2)</b>	Seeking and assessing online MI among people with depression (n=2) <sup>30,320</sup>	Studies yielded a model for MI seeking on the Internet among people with depression. A five-item quality assessment tool for MI (called DARTS) was proved to be easy to use and understand.
THEME 6. MEDICINES INFORMATION POLICIES AND STRATEGIES (n=3)		
<b>Development of the national MI strategy (n=2)</b>	Stakeholders' perspectives on development needs of MI practices for developing the national MI strategy (n=2) <sup>159,160</sup>	Key stakeholders in MI considered that better coordination of MI, balancing between Internet-based sources and tailoring patient information is needed in developing MI at national level.
<b>Evolution of MI regulation in the EU (n=1)</b>	Statutory requirements for SmPCs and PLs in 1965-2002 (n=1) <sup>19</sup>	Incorporation of SmPCs and PLs into marketing authorisations of medicinal products has helped to make the EU's pharmaceutical legislation more public health oriented.

n=number of studies

Included studies applied a variety of research methods (Figure 21, Study I: Figure 3). A cross-sectional survey was most commonly used single research method (88%,  $n=51/126$ ),<sup>76,115,120,189,194-196,199,201,218,223,224,228,229,235,237,238,240,243,244,253,256,259,261,262,266,270,272,277,279,280,282,286-292,294,297,299-305,318,319,321</sup> and most of these studies were nationwide ( $n=30$ ).<sup>76,120,194-196,199,201,218,223,228,229,235,237,243,253,259,279,280,286-290,297,305,321</sup> A qualitative study design was applied in more than half of the studies (54%,  $n=68/126$ ).<sup>19,73,74,90,137-139,159,160,193,219-222,225-227,230-234,239,241,242,245-252,254,255,257,258,260,261,263-265,267-269,273-275,278,281,285,293,295,298,306-317,320,322,323</sup> Document analysis ( $n=18$ ),<sup>19,73,74,138,219,245-252,264,267-269,323</sup> mixed-methods ( $n=17$ )<sup>139,159,160,220,226,227,233,241,278,281,293,298,306,311,312,316,317</sup> and qualitative interviews ( $n=17$ )<sup>90,194,222,239,257,258,260,263,273,293,308-310,313-315,320</sup> were the most commonly applied research methods. An intervention was carried out in 12 studies, of which six were randomised and had a control group.<sup>230-232,242,254,255,265,274,275,285,295,307</sup> A more detailed description on the study methods of the included studies is provided in *Original publication I* (Study I: Appendix B).



**Figure 21.** Medicines information studies ( $n=126$ ) categorised according to the research method and the publication year. (I)

### 5.1.2 KEY FINDINGS AND GAPS IN THE METHODOLOGY AND THEORY OF MEDICINES INFORMATION RESEARCH (I)

In Finland, MI practices have been widely investigated and multiple approaches have been covered in MI research during the 2000s (Table 11, Study I: Appendix B). Most of the studies were descriptive. Only six studies applied a theory, and they were all conducted in a community pharmacy context.<sup>74,76,120,219,233,256</sup> Three studies applied theories to patient counselling (i.e., autonomy and paternalism in MI from community pharmacies, community pharmacists' attitudes toward concordance, empowerment in self-management of type 2 diabetes).<sup>74,120,233</sup> A theoretical model to patient counselling behaviour (i.e., *USP Medication Counseling Behavior Guidelines*) was applied in two studies.<sup>76,219</sup> One study applied a practical method for structuring patient counselling in community pharmacies for patients with long-term medications (i.e., *EUPC Method*).<sup>256</sup>

#### RESEARCH ON PATIENT COUNSELLING IN DIFFERENT SETTINGS

More than a third of the studies related to patient counselling in different settings (Table 11, Study I: Appendix B).<sup>73,74,76,120,137,218-256,322</sup> The largest line of research has been patient counselling in community pharmacies.<sup>76,120,137,218-237,322</sup> A national patient counselling development project, the *TIPPA Project* (2000–2003), has been one of the major contributors to the modernisation of patient counselling culture in Finnish community pharmacies.<sup>76,120,218-223,322</sup> The change from traditional paternalistic patient counselling performance towards empowerment and respecting patient autonomy has been actively supported by launching nationally the *USP Medication Counseling Behavior Guidelines*.<sup>76,219,221</sup> A more practical method, the *EUPC Method*, has later been introduced to structure patient counselling with patients having long-term medications.<sup>256</sup> Studies in different patient groups have concluded that MI provided by community pharmacists has been recognised as important, but the content and amount of MI varied between patient groups and according to therapeutic class.<sup>137,226,229-232,236</sup> There was not found sufficient studies to show clearly that patient counselling has an influence on appropriateness of medicine use.<sup>230-232,253-255</sup> Only a few studies have been conducted in this respect and they have indicated improvements in treatments and clinical outcomes among asthmatics due to the counselling provided by community pharmacists.<sup>230-232</sup>

Patient counselling and MI services provided by hospitals<sup>238-245</sup> and medicines information centres (MICs)<sup>73,246-252</sup> have been less commonly studied topics (Table 11, Study I: Appendix B). Cross-sectional surveys in specialised care patients have stated that patients have generally been satisfied with the counselling provided by HCPs in hospitals.<sup>238,243,244</sup> The lack of time and emotional support from HCPs have most commonly been identified as barriers to receiving MI from HCPs in hospitals.<sup>240,243,244</sup> Studies focused on MI services provided by MICs and call centres have revealed that the use of telephone and online patient counselling services has not been common when assessed at the population level but these MI sources have been regarded as valuable, particularly for some patient groups, such as psychotropic users.<sup>73,246,248-252</sup> Telephone counselling services provided by physicians proved to be useful in resolving patients' drug-related problems (DRPs).<sup>247</sup>

## **RESEARCH ON HEALTHCARE PROFESSIONALS' COMPETENCE IN PATIENT COUNSELLING AND PHARMACOTHERAPY**

Studies related to competence of HCPs have primarily been focused on pharmacists' and pharmacy students' competence in patient counselling and nurses' and nursing students' competence in pharmacotherapy (Table 11, Study I: Appendix B).<sup>138,139,219,224,256,268-287</sup> Competence studies on patient counselling have recognised structured guidelines and criteria, e.g., *USP Medication Counseling Behavior Guidelines*, as useful tools for assessing, teaching and giving feedback on pharmacy students' patient counselling and communication performance.<sup>268-271</sup> Moreover, a practical patient counselling method, *EUPC Method*, has proven to be useful for pharmacy students in counselling chronically ill patients.<sup>256</sup> In-house training, long-term continuing education and online education have positively influenced patient counselling competence of practising pharmacists.<sup>138,139,219,273,275</sup>

Studies on pharmacotherapy competence have shown that the content teaching hours in pharmacotherapy training still varied in the 2010s between undergraduate nursing programmes in polytechnic schools although teachers self-rated their competence in teaching pharmacotherapy as good already by the late 1990s (Table 11, Study I: Appendix B).<sup>286,287</sup> Practising nurses and nursing students found pharmacology as difficult topic and considered their own skills to be insufficient.<sup>276,283-285</sup> Vaccination was the most widely studied single competence area among HCPs, especially in nursing.<sup>277,279,280</sup>

## RESEARCH ON MEDICINES INFORMATION SOURCES AND NEEDS AMONG MEDICINE USERS AND HEALTHCARE PROFESSIONALS

Consistently all studies focused on MI sources of medicine users, physicians, pharmacists, nurses and package leaflets (PLs) have been identified as the most common MI sources among patients and medicine users (Table 11, Study I: Appendix B).<sup>90,115,189,193-196,199,200,236,257-260,262,263</sup> The Internet has become a more common source of MI over the last few decades, especially among young people and certain patient groups, such as people with mental disorders.<sup>90,193,195,263</sup> Studies on MI needs among patients have shown that they commonly have needs for additional information on adverse drug reactions (ADRs), interactions and proper medicine use, e.g., administration.<sup>90,199,240,241,257,258,261,263,267</sup>

The implementation of the national and local clinical practice guidelines has been the most commonly studied topic related to MI sources used by HCPs (Table 11, Study I: Appendix B).<sup>229,288-298,305,306,321</sup> HCPs, especially physicians, have generally been familiar with the national clinical practice guidelines in the early 2000s, although the level of implementation has varied.<sup>289,291-294,298,321</sup> A majority of physicians considered the clinical practice guidelines as being useful in clinical decision-making, such as in prescribing antibiotics as shown in the *MIKSTRA Infectious Disease Program* (1998–2003). The MI needs of HCPs have been explored only in two studies which have been conducted in home care or a hospital context.<sup>302,308</sup>

## RESEARCH ON MEDICINES INFORMATION LITERACY

MI literacy research has primarily been focused on children's medicines education, particularly in schools as part of health education (Table 11, Study I: Appendix B).<sup>90,309-320</sup> These studies revealed that children have only superficial knowledge about medicines.<sup>309,317</sup> There is some evidence that pictograms may support counselling on medicines among children but the context in which pictograms are used may affect the understanding of pictograms.<sup>314</sup> School teachers considered teaching about medicines to be important and they were willing to teach about medicines, but they need more support in teaching medicines-related topics.<sup>310,313,316,318</sup> Teachers found online medicines education to be useful if the education materials are simple and ready-to-use.<sup>310,312</sup> Studies on MI literacy in adults have shown that people with depression are generally critical of MI retrieved from the Internet and

they are commonly able to recognise inaccurate or non-evidence-based information from the discussion forums.<sup>90,320</sup> A five-item quality assessment tool for MI (called DARTS) was created by the Finnish Medicines Agency Fimea in 2007 and it has proved to be easy to use and understand.<sup>320</sup>

## RESEARCH ON MEDICINES INFORMATION POLICIES AND STRATEGIES

MI policies and strategies have only been studied to a limited extent with research primarily focusing on the first Finnish national MI strategy (Table 11, Study I: Appendix B).<sup>19,159,160</sup> Studies on the development of the national MI strategy stated that the key stakeholders identified multiple strengths, challenges and opportunities in MI practices. Better coordination of MI, balancing between Internet-based sources and tailoring patient information were highlighted as the most important issues.<sup>159,160</sup> A study of statutory requirements in Summary of Product Characteristics (SmPCs) and PLs has shown that the incorporation of SmPCs and PLs into marketing authorisation of medicinal products has helped to make the EU's pharmaceutical legislation more public health oriented.<sup>19</sup>

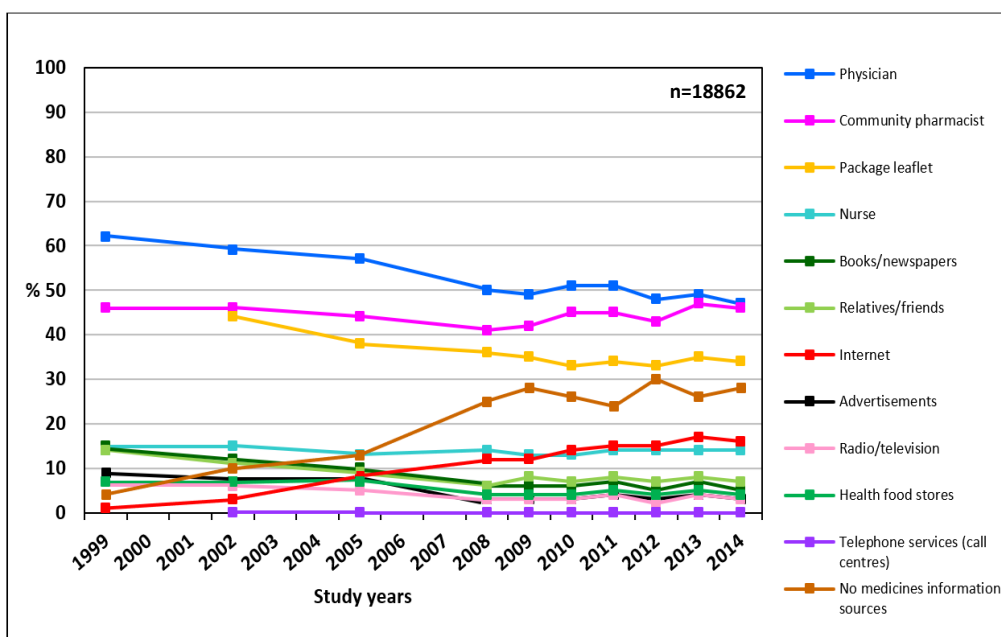
## 5.2 TRENDS IN THE RECEIPT OF MEDICINES INFORMATION AMONG THE ADULT POPULATION (II)

### 5.2.1 CHARACTERISTICS OF THE STUDY POPULATION (II)

In the annual health behaviour population survey, *Health Behaviour and Health among the Finnish Adult Population*, the number of respondents varied by year from 2545 to 3371, and the response rate decreased from 67% in 1999 to 53% in 2014 (Study II: Table 1). Of the total responses (n=29465) 64% were from medicine users (n=18862, ranging by year from 58% to 68%). The gender distribution of the respondents who reported using medicines remained the same throughout the study period, 61–64% being female. The annual mean age varied between 41 and 45 years. The respondents most commonly used one medicine, ranging from 63% in 1999 to 54% in 2014 (included prescription and non-prescription medicines). More than a third of the medicine users reported having at least one diagnosed disease of the diseases listed in the survey instrument, increasing from 37% in 1999 to 59% in 2014. A more detailed description on the characteristics of the study population is provided in *Original publication II* (Study II: Table 1).

## 5.2.2 KEY RESULTS ON THE RECEIPT OF MEDICINES INFORMATION AMONG MEDICINE USERS (II)

Medicine users reported physicians, community pharmacists and PLs as their most common MI sources throughout the study period (Figure 22, Study II: Figure 1). These information sources were the most common despite gender, age, number of medicines in use or number of diagnosed diseases (Appendix 2-5, Study II: Appendix A and B). The Internet was still a relatively rare MI source when considering the entire adult population, although its use as an MI source increased most being 1% in 1999 and 16% in 2014 (Figure 22, Study II: Figure 1). In contrast, the receipt of MI from physicians (62% to 47%) and PLs (44% to 34%) decreased most. The receipt of MI from community pharmacists (46% to 45%) and nurses (14% to 14%) remained relatively stable. Detailed results are provided in *Original publication II*.



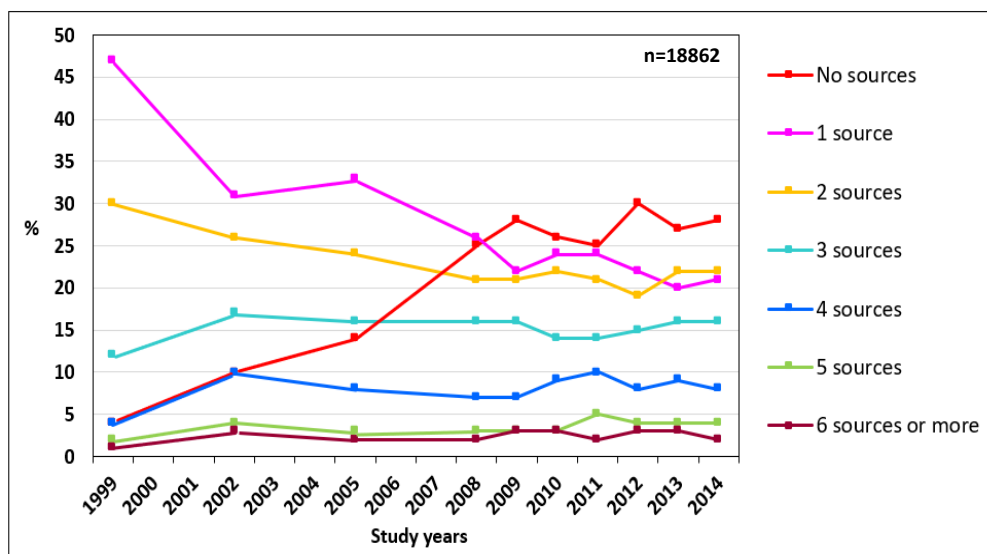
**Figure 22.** Trends in the receipt of medicines information among medicine users (n=18862) in 1999–2014 (percentage of the respondents who reported use of at least one prescription or non-prescription medicine within 7 days prior to the survey). (II)

The greatest changes occurred in the receipt of MI from the physician among women, people aged 55–64 years, people using two or more medicines and medicine users with one or more diagnosed diseases (Appendix 2-5, Study II: Appendix A and B). In these groups, the receipt of MI from the physician decreased by 18–26%. On the other hand, the receipt of MI from the Internet increased in all medicine users regardless of gender, age, number of medicines in use or number of diagnosed diseases. The greatest increase (16–20%) was in women, people under 24 years, people with two or more medicines and medicine users with three or more diagnosed diseases. Receipt of MI from PLs decreased in all medicine users, most commonly among people under 24 years, people with one or two medicines in use and medicine users without diagnosed diseases. The decline in these groups varied between 12% and 22%.

The number of people who did not report any information sources about their medication increased regardless of gender, age number of medicines in use or diagnosed diseases (Appendix 2-5, Study II: Appendix A and B). In 1999, 4% of the medicine users reported not receiving MI from any of the sources listed in the survey, while, remarkably, this proportion had increased to 28% in 2014 (Figures 22 and 23, Study II: Figure 2). Men, medicine users under 45 years, people using one or two medicines and medicine users without any diagnosed diseases were the most common groups in which this appeared. In 1999, 17% of the medicine users did not report any HCPs (e.g., physicians, community pharmacists or nurses) as their MI source, and this proportion had grown to 38% by 2014.

The number of MI sources from which medicine users reported receiving MI changed over the study period 1999–2014 (Figure 23, Study II: Figure 2). The most noticeable decreases occurred in those who reported receiving MI from one (47% to 21%) or two (30 % to 22%) sources. The number of medicine users receiving MI from more than two sources increased moderately. As the number of medicines in use or the number of diagnosed diseases increased, the number of different MI sources increased.





**Figure 23.** Number of medicines information sources from which the adult medicine users had received information on the medicines they used in 1999–2014. (II)

## 5.3 IMPLEMENTATION OF MEDICATION USE PROCESS FOR PATIENTS WITH CHRONIC DISEASES (III)

### 5.3.1 CHARACTERISTICS OF THE STUDY POPULATION (III)

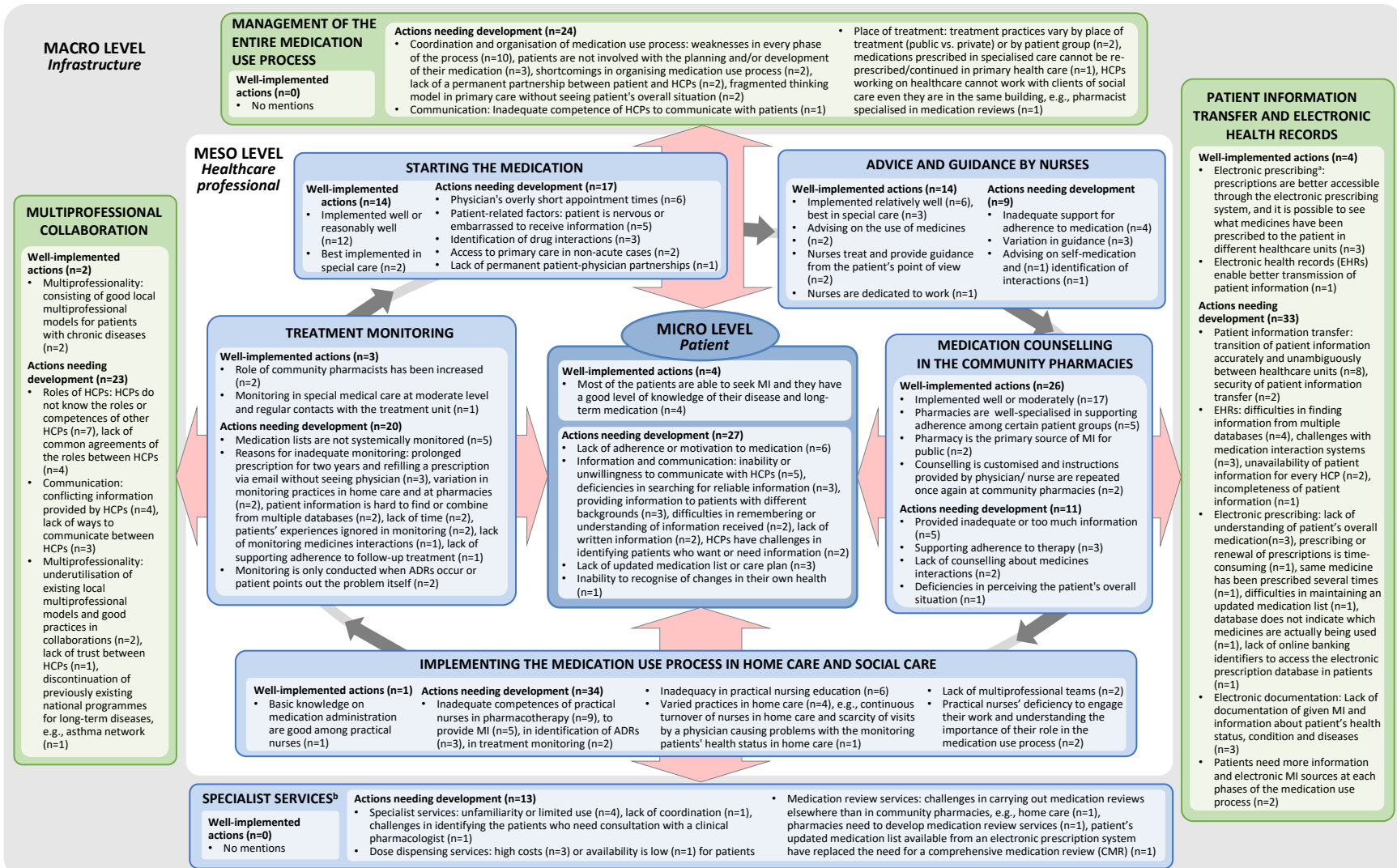
In total, 79 out of 111 members of the National Medicines Information Network (MI Network) participated in the study (participation rate 71%) related to the implementation of medication use process in patients with chronic diseases (Study III: Table 1). Participants represented 42 out of 53 stakeholder organisations. Most of the participants were pharmacists (43% of all participants,  $n=34/79$ ), physicians (22%,  $n=17/79$ ) and nurses (15%,  $n=12/79$ ). Educational units were the most commonly represented stakeholder group (24% of the stakeholder organisations,  $n=10/42$ ), including universities, polytechnics, vocational institutions and continuing education units. A detailed description of the study participants is presented in the *Original publication III* (Study III, Table 1).

Altogether, 43 semi-structured interviews were conducted as individual (n=22), pair (n=11) and group interviews (n=10). Interviews were conducted as face-to-face (n=34), by telephone (n=5), as video conferencing (n=3) or as face-to-face and video conferencing (n=1). In total, 3–6 participants attended the group interviews at a time. Four interviews included participants from several stakeholder organisations.

### **5.3.2 KEY FINDINGS ON THE IMPLEMENTATION OF MEDICATION USE PROCESS AND A NEW CONCEPTUAL MODEL (III)**

A new conceptual framework model was compiled based on the views of the stakeholders on the well-implemented actions and actions needing development in the medication use process among patients with chronic diseases (Figure 24, Study III: Figures 3 and 4). The new model includes ten main categories, of which seven were derived deductively from the previous medication use process (Figure 8)<sup>22</sup>: 1) patient, 2) starting the medication, 3) advice and guidance by nurses, 4) medication counselling in the community pharmacies, 5) implementing the medication use process in home care and social care, 6) treatment monitoring and 7) specialist services. The following three categories were inductively derived from the data: 8) management of the entire medication use process, 9) patient information transfer and electronic health records (EHRs) and 10) multiprofessional collaboration. All the inductively derived categories were at the infrastructure level (*macro*).

Half of the stakeholder representatives (52%) recognised well-implemented actions and almost all of the study participants (94%) indicated actions needing development at all levels (*macro*, *meso*, *micro*) in the medication use process (Figure 24, Study III: Figures 3 and 4). The stakeholders raised far more actions for development than well-established practices in the medication use process (211 vs. 68 mentions, respectively).



n=a summative of number of the single interviewee's mentions; <sup>a</sup>All prescriptions have been electronically prescribed in Finland since 1 January 2017, <sup>b</sup>e.g., clinical pharmacology consultation services and CMRs.

**Figure 24.** Stakeholders' views on well-implemented actions and actions needing development in the medication use process for patients with chronic diseases. Categories derived deductively are marked as blue (n=7) and categories emerged inductively from the stakeholders' interviews are marked as green (n=3). (III)

At infrastructure (*macro*) level, stakeholders presented only a few well-implemented actions related to patient information transfer and EHRs (n=4 mentions of being well-implemented) and multiprofessional collaboration (n=2), while none of the stakeholders mentioned management of the entire medication use process (n=0) or specialist services (n=0) (Figure 24, Study III: Figure 3). Numerous actions needing development were identified, of which the patient information transfer between care units or when the patient is transferred from one care unit to another and limited availability of EHRs assisting in medication risk management in clinical practice were the main concerns (Figure 24, Study III: Figure 4). Stakeholders mentioned that some HCPs do not have access to complete patient information, such as laboratory results, and they have difficulties in finding information from various databases. Furthermore, many stakeholders emphasised that the management of the entire medication use process has not been implemented well as patients are not sufficiently involved in the planning of their own medication. Collaboration between different HCPs was found to be one of the major development needs in the infrastructure level, such as lack of awareness and mutual agreements on the roles between different HCPs.

At the HCP (*meso*) level, stakeholders perceived medication counselling in the community pharmacies, starting the medication and advice by nurses as the best implemented actions (Figure 24, Study III: Figure 3). All stakeholders participated in the study agreed that the biggest challenges are found in implementing the medication use process in home care and social care (Figure 24, Study III: Figure 4). Inadequate education and variation in competence among practical nurses were considered as weakening factors for the implementation of safe and high-quality medication for patients with chronic diseases. Stakeholders also expressed various concerns related to treatment monitoring, such as monitoring is not commonly conducted systematically, and that patients do not have reconciled medication lists.

At patient (*micro*) level, stakeholders shared very few well-implemented actions in the medication use process (Figure 24, Study III: Figure 3). They considered that patients with long-term medications know how to search information about their medication and seem to have the best knowledge of their disease and medication, although stakeholders highlighted that this is not the case among all patients. Patients' lack of motivation or adherence to treatment and inability or unwillingness to communicate with HCPs were the most commonly mentioned development needs (Figure 24, Study III: Figure 4). Patients do not always have a reconciled medication list or a care plan,

which may not only challenge HCPs at the point of prescribing and dispensing medicines, but also patients while using medicines. Additionally, patients' limited skills in searching reliable MI and insufficient medication counselling to particular patient groups, such as the deaf, people with vision impairment and using multiple medications, were among identified as areas needing attention

## 5.4 SUMMARY OF THE KEY FINDINGS

The systematic review found that research related to MI has been carried out from various perspectives over time and has been applied by multiple study methods during the 2000s in Finland (Study I). Most of the included studies were qualitative or cross-sectional surveys, and they were mainly descriptive without a theoretical framework. Patient counselling in community pharmacies was largest research line. One of the major contributors to the modernisation of patient counselling culture in Finnish community pharmacies was achieved during the national *TIPPA Project* (2000–2003). However, there was not found clear evidence to present that patient counselling has an influence on appropriateness of medicine use. In addition to studies conducted with pharmacy personnel, research was conducted mainly from the perspective of HCPs, such as competences in pharmacotherapy among nurses. Studies conducted on consumers focused commonly on MI sources used by medicine users. The implementation of the national and local clinical practice guidelines were the most commonly studied topics related to MI sources used by HCPs, but the MI needs of HCPs had not been widely explored. MI literacy research concentrated primarily on children's medicines education, but MI literacy in adults had not been studied. Least studied topic was MI policies and strategies.

Based on the survey of long-term trends in the receipt of MI, physicians, community pharmacists and PLs were the main MI sources among adult Finnish medicine users during the 2000s (Study II). The receipt of MI from physicians and PLs decreased most and increased most from the Internet, whereas the receipt of MI from community pharmacists and nurses remained relatively stable. The more the patient had medicines in use or diagnosed diseases, the more the patient received MI from multiple information sources. The proportion of medicine users who did not report receiving MI from any

sources grew by sevenfold and the proportion of those who did not report receiving MI from any of HCPs more than doubled during the 2000s.

According to the stakeholders' interviews on the implementation of the medication use process among patients with chronic diseases, the best implemented actions were medication counselling at community pharmacies, starting the medication by physicians and guidance by nurses (Study III). Stakeholders recognised far more actions needing development at all implementation levels in the medication use process. Inadequacy in implementing the medication use process in home care and social care, patient information transfer between healthcare units, use and accessibility of EHRs, lack of knowledge or common agreements on the roles of HCPs, and lack of systematically conducted treatment monitoring were among the major development targets. Furthermore, poor patient involvement during the entire medication use process was a concern reflecting lack of motivation or adherence to treatment and inability or unwillingness to communicate with HCPs. A further concern was that patients do not always have reconciled medication lists or treatment plans, which may challenge not only HCPs at the point of prescribing and dispensing medicines, but also patients while using medicines at home. Additionally, patients' limited skills in searching reliable health information and MI were identified as areas needing attention.

## 6 DISCUSSION

### 6.1 KEY FINDINGS OF THE STUDIES I-III

The research related to the national medicines information (MI) strategy carried out in this doctoral dissertation forms a unique entity with a wide coverage in terms of the time frame and MI research areas. The findings of this dissertation have assisted in understanding the roots and development of current MI practices in Finland, and the next steps to be taken in order to ensure that the strategic goal of well-informed medicine users will be achieved.

Among the most striking findings of this dissertation is the one indicating that an increase in the diversity of MI sources available do not necessarily lead to a better coverage of medicine users receiving MI on the medicines they are taking. The shift “from paper to cyber” may not automatically reach all medicine users. Increasing the use of electronic MI sources in the population seems to be a surprisingly slow process. Receipt of MI among medicine users still appears to be strongly heavily reliant on physicians, community pharmacists and package leaflets (PLs).

The available MI research in Finland has focused on investigating MI practices in community pharmacies and the long-term development efforts undertaken in this context since the 1990s. Surprisingly little research has been conducted on physicians’ MI practices, although they are among the primary MI sources, especially for ageing people and long-term medicine users. Another almost unresearched area is the empowerment of medicine users and its impact on self-management and outcomes of pharmacotherapies. This relates to understanding the medication use process from the medicine users’ perspective.

### **6.1.1 DEVELOPMENT NEEDS OF MEDICINES INFORMATION PRACTICES IN FINLAND AS INDICATED BY RESEARCH CONDUCTED SINCE 2000 (I)**

The systematic review on MI research conducted in Finland since 2000 (Study I) provides a comprehensive overview of the research areas covered and methodology applied. The review found that MI research forms a well-established research area which applies a variety of research methods, albeit most of the studies have been descriptive and small-scale, and lacking a theory-base. Despite the fact that many of the studies have been carried out somewhat a long time ago, some of them have laid the foundation for recent and long-term development of MI practices in Finland, particularly in community pharmacies. The research has guided the implementation of patient-centred counselling first in routine dispensing,<sup>14,17,26,131,137</sup> and more lately as an essential part of collaborative medication reviews.<sup>140,324-326</sup> These communication practices on medications are currently being extended to other healthcare settings in Finland, particularly to hospitals as part of pharmacist-conducted medication history taking, reconciliation and reviews.<sup>76,120,144,145,218,221,322,327</sup>

This systematic review also revealed that medication counselling in community pharmacies was the most widely studied topic in MI research in Finland since the beginning of 2000s.<sup>76,120,137,218-237,322</sup> Patient counselling services have been proactively developed in Finnish community pharmacies since 1983 when pharmacists were given a statutory obligation to provide counselling to patients.<sup>14,17,26,43</sup> Since then, the development of patient counselling competence among pharmacists has been supported by multiple educational interventions which have been evaluated.<sup>14,17,26,131</sup> The most intensive development period was actualised over the initiation phase of the national *TIPPA Project* in the early 2000s, which also reflects the intensity of patient counselling research in this phase.<sup>76,120,138,139,218-223,322</sup>

The quality of MI provided by community pharmacists has shown improvement, e.g., in pseudo customer studies regularly conducted since the late 1990s.<sup>221</sup> However, the most recent pseudo customer study conducted by the Finnish Medicines Agency Fimea in 2018 focusing on OTC counselling by community pharmacists still indicates the need for improvement in terms of clinical content and standardisation of quality.<sup>328</sup> The same seems to apply to medication counselling by other healthcare professionals (HCPs) although evidence is scarce, as shown in this systematic review. Consequently, more



attention should be paid to improving personal medication counselling and using different modes of communication for that purpose, including Internet-based applications that are easily available to consumers, e.g., in smart phones. The priority of personal medication counselling has been demonstrated in, for example, an intervention study among chronic myeloid leukaemia (CML) patients.<sup>329,330</sup>

Patients' receipt of MI from various sources has also been broadly explored in Finland. Few studies have directly focused on empowerment and supporting a more active role for patients which has been a strategic goal in medicines policy nationally and internationally during the last few decades.<sup>3,22,24,25,28</sup> There is great deal of evidence indicating that physicians, pharmacists and statutory PLs have remained as primary MI sources among the Finnish adult population for a long period of time.<sup>90,115,189,193-196,199-201,236,241,257-263</sup> Similar findings have been obtained from other countries during the 2000s (see *Chapter 2.3*).<sup>30,115,181-192,197,198,202-204</sup> More research is needed on consumers' MI-seeking strategies and behaviours as people are expected to become more empowered in searching for MI from various sources easily available to them, particularly via electronic information sources.

Appraising the quality of MI found from different sources requires sufficient health information and MI literacy skills.<sup>25</sup> This is an area that has been in the national MI strategy, but which has not gained much attention in the implementation actions so far. Although literacy is at a high level in Finland, there is lack of research on health information and MI literacy among the population.<sup>90,172,320</sup> Understanding literacy and health literacy have become more timely, because the Finnish population has recently become more diverse, through, for instance, immigration. This may have influenced both literacy and health literacy levels as it has done in other countries with a longer history of high-volume immigration.<sup>331-333</sup> Other special populations whose health information and MI literacy skills should be better understood are adolescents and young adults, as well as older adults. Research into the availability and usability of MI that is especially suitable for older adults will become even more timely in Finland as our population is ageing and shifting towards electronic MI sources, which may be a greater challenge for older than for younger people.

Based on the findings of the Study II, we should examine to what extent health information and MI literacy are contributing to the fact that large numbers of medicine users have not received information about medicines

they use (see *Chapter 5.2*). Previous studies, e.g., from Europe, suggest that health literacy is influenced by demographic status (e.g., age, gender), socioeconomic status (e.g., education, household income), social status, health status and use of healthcare services.<sup>332</sup> The impact of these factors should be also investigated in Finland as our society is undergoing changes that may expand the proportion of the population with poor health information and MI literacy.

Along with the consumer and medicine user approach, this systematic review provides insights into the use of MI sources among HCPs and their competence in patient counselling and pharmacotherapy. Research on the competence of HCPs has primarily focused on patient counselling skills among community pharmacists and pharmacy students,<sup>138,139,219,224,256,268-273,275</sup> pharmacotherapy competence among nurses and nursing students,<sup>276-285</sup> and the use of national clinical practice guidelines among physicians.<sup>288,289,291-295,297,298,321</sup> There is still a lack of evidence on communication culture and pharmacotherapy competence for patient-centred and evidence-informed MI practices throughout the healthcare system. The use of theories and theoretical models, such as empowerment and concordance, as a tool for MI practice change should be also understood better and across various settings. Moreover, the actual use of novel online medication risk management tools in patient care should be investigated further as these tools are routinely available throughout healthcare and in community pharmacies in Finland. Based on preliminary experiences, the use of these tools is still limited compared to the potential they possess for improving quality and safety of medication.<sup>146,334,335</sup>

Research has, to a marginal extent, on the effectiveness of MI in Finland<sup>230-232,253-255</sup> and internationally (see *Chapter 2.1*). Further development is needed, especially in research methodology, to produce stronger evidence from this aspect. However, research should also shift towards assessing the impact of novel MI services on medicines use behaviours, self-management and therapeutic outcomes. There is a lack of recent comparative effectiveness studies to appraise the relative value of various MI practices and services, particularly between digital MI and HCPs as a MI source for consumers. Moreover, a robust body of evidence is missing on the use of electronic MI sources and services which apply modern information technology to clinical decision making and medication reviews.

The findings of this systematic review have served as a foundation for the activities of the first national MI research strategy in Finland and in

following up its implementation.<sup>167</sup> Moreover, the results of the review have also directed recent MI research, particularly under the national MI strategy<sup>22</sup> and the activities of the National Medicines Information Network (MI Network).<sup>166</sup> The achievements of this review could serve as an example for other countries to systematically review existing MI research when establishing their own MI strategies.<sup>16,22,159</sup>

### **6.1.2 TRENDS IN THE RECEIPT OF MEDICINES INFORMATION AMONG ADULT MEDICINE USERS IN FINLAND (II)**

The 15-year period (1999–2014) covered in Study II presents a unique conception on the change of consumers' receipt of MI from various sources. According to the previous studies (see *Chapter 2.3*), this is the first population-based repeated cross-sectional survey examining long-term national trends in the receipt of MI among adult medicine users. The present study found that physicians, community pharmacists and PLs have prevailed as the main MI sources over the 2000s, which has been also shown in previous cross-sectional studies globally.<sup>30,115,181-192,197,198,202-204</sup> Surprisingly, the use of the Internet as a MI source has grown only slowly at population level (from 1% in 1999 to 16% in 2014) even though more than 90% of the Finns aged 16–64 years were Internet users in 2014.<sup>336</sup> The use of the Internet as a source of MI has not increased as of 2017, when 16% of Finnish adult medicine users still reported seeking MI on the Internet.<sup>337</sup>

In the absence of longitudinal studies from other countries, cross-sectional studies not generalisable to the entire population have indicated similar findings in using the Internet as a MI source among adult medicine users during the 2000s (see *Chapter 2.3*).<sup>186,198,202,203</sup> However, some patient and medicine user groups have been found to search MI from the Internet more frequently than the adult population in general, such as people with chronic diseases or pregnant women.<sup>87,115,189</sup> Nevertheless, these results cannot be applicable to the entire population or patient group in question due to the limited study samples or methods causing bias (e.g., targeted online survey, non-population-based). The receipt of MI from the Internet may have been over-estimated as part of the studies have targeted active Internet users. Consequently, this over-estimation may mislead health communication planning by ignoring importance of MI sources other than those accessible via the Internet. Thus, we could not solely count on the Internet-based MI sources and services if we want to reach the majority of the adult population. Further

population-based research is needed to ensure a more comprehensive understanding of the importance and usage patterns of the Internet as a MI source. In Finland, Fimea's national population survey, *Medicines Barometer*, which will be conducted every second year, will provide such information in the future.<sup>337</sup>

Unexpectedly, the study's findings indicated that although the availability and the use of MI sources has diversified among the adult medicine users, a growing number of adults did not report receiving any MI. During the study period, the proportion of medicine users who did not report receiving MI from any of the listed sources grew sevenfold (4% to 28%) and the proportion of those who did not report receiving MI from any of the HCPs more than doubled (17% to 38%). In particular, MI received from physicians declined the most (9–26%) over the study period. These outcomes may imply that physicians are becoming less involved in actual patient care as the healthcare has become more fragmented. One reason for this could be that the time allocated for physician office visits has been shortened, leading to physicians having less time to focus on their patients' medications.<sup>338–341</sup> Therefore, medicine users who were dependent on MI received from their physicians do not have that source available anymore. It also appears that community pharmacists have become more common MI sources for people with multiple medications instead of physicians, but nurses have not replaced physicians as a MI source. In the future, special attention should be paid to the receipt of MI among people with multiple diseases and medications, those who do not receive MI, and the ageing populations whose proportion is growing among the general population.

As the study findings indicate, MI is not evenly distributed among medicine users. Women, people aged 45 years or older, people with three or more medicines in use and people with three or more diagnosed diseases received information on their medicines more often than other adult medicine users. These findings, covering a 15-year timeframe (1999–2014), are in line with the previous cross-sectional studies over the 2000s that were reviewed in *Chapter 2.3* (Table 9). Moreover, factors that have been previously found to influence MI-seeking behaviours and the use of MI sources are education, ethnic background, income, employment, health status and medical history (see *Chapter 2.3.4*, Figure 12). Potential reasons and system-based root causes for differences in the receipt of MI among medicine users need to be addressed in future research. The results from Finland demonstrate that the availability

of a wide range of MI sources does not automatically guarantee their actual and evenly distributed use among medicine users.

### **6.1.3 DEVELOPMENT NEEDS OF THE MEDICATION USE PROCESS OF PATIENTS WITH CHRONIC DISEASES (III)**

The first evaluation of the Finnish national MI strategy's implementation at 3 years after the launch was carried out by interviewing the stakeholders involved in the implementation of the strategy in 2015 (Study III). The interviews provided rich data to understand how the stakeholders perceived the ultimate goal of the national MI strategy, which was a well-informed and adherent medicine user with a chronic disease (see *Chapter 2.2.3*, Figure 8).<sup>22</sup> The overall notion based on the interviews was that it was hard for the participants to form an idea of the medication use process even though the figure illustrating it in the national MI strategy was shown to them in the interviews.

Although numerous well-implemented actions in the medication use process were identified, the stakeholder representatives found even more actions needing development (see *Chapter 5.3.2*, Figure 24). The actions requiring development appeared at all levels of implementation, i.e., at infrastructure (*macro*), HCP (*meso*) and patient (*micro*) level. The dominant actions needing improvements at infrastructure level concerned the transmission of patient information within and between healthcare units, the availability of reconciled medication lists and other patient information in the electronic form, coordination of the entire medication use process, multiprofessional collaboration between HCPs, and defining the roles and responsibilities of patients and HCPs involved in the care process. These findings are in line with other recent observations from Finland.<sup>28,339,342-344</sup>

The origin of the national MI strategy in 2012 was exclusively to improve coordination of MI and MI practices in healthcare.<sup>22</sup> However, this first national MI strategy's evaluation in 2015 has already revealed that MI and its receipt from various sources cannot be separated from the medication use process, nor can MI be separated from patient information. This was indicated by the finding that the availability of the reconciled medication list and/or individual treatment plans and electronic health records (EHRs) were highly prioritised by the stakeholders as actions to improve the management of the

entire medication use process which has also been described in earlier studies.<sup>329,345</sup> A reconciled medication list is essential for HCPs and patients, for example the physician should review available patient information before encountering the patient and use the information gathered to determine what to talk over and agree upon in the treatment with the medicine user.<sup>15,26,329</sup>

As reported by the stakeholders, the greatest challenges in implementing the medication use process emerge in primary care, especially in home care and social care units, such as in nursing homes. This means social and healthcare units providing care for older adults in the poorest conditions. HCPs', especially practical nurses', pharmacotherapy competence and skills in providing MI were recognised to be at an inadequate level, which has also been shown in previous studies.<sup>287,294-297</sup> This result may reflect that the Finnish population is aging rapidly and the care system has not been sufficiently prepared for the growing need, for example, to train care personnel in geriatric pharmacotherapy to safely manage the medications. This is particularly the case for practical nurses, whose responsibility for medication management in geriatric care units has increased remarkably even though their pharmacotherapy training is limited. The same trend and challenges have been found in other research and development programmes in Finland and other countries.<sup>339,346</sup> The challenges of safe management of medications and polypharmacy of older adults have been prioritised globally in the ongoing WHO Global Patient Safety Program *Medication Without Harm*.<sup>347</sup> Further research should focus on geriatric care units in primary and social care to better understand the system-based root causes and contributing factors of actual and potential risks in the current medication use processes.

In spite of the medicines policy initiatives and wide recognition of the importance of patient empowerment and involvement in healthcare during the 2000s,<sup>3,22</sup> patient engagement in the medication use process was still being strongly communicated as an area for development by HCPs and representatives of patients in 2015. Stakeholders viewed that patients may not often actively discuss their medicines and drug-related problems (DRPs) with their HCPs. Communicative relationship between HCPs and patients is an imperative driver for patient involvement in decision making.<sup>348,349</sup> Mutual communication is essential for sharing information and knowledge and giving the patient a sense of control and responsibility.<sup>350,351</sup> HCPs should encourage patients to share experiences and concerns about their treatment and ensure

that patients receive MI throughout the process, not only when starting a new medication.<sup>349</sup> Even though the number of MI sources available for patients has increased over the last few decades, the proportion of adult medicine users who received information about their medication from HCPs or any source had decreased remarkably during 1999–2014, as shown in Study II (see *Chapter 5.2*).

It is worth remembering that a majority of the interviewees were HCPs, even where they represented the voice of patients, thus, the results are skewed to a professional opinion even from the patient perspective. Nevertheless, the results send a clear message that patients' involvement in their long-term medication should be significantly increased. To be successful, research and actions should focus on patient approach in the implementation of long-term medications as only the patients themselves can describe the issues that matter to them affecting their motivation for treatment, success of self-management and empowerment. Even people with poor health literacy want to know about their medications.<sup>352</sup> Infrastructural factors leading to poor access to patient and MI and poor adherence, such as a lack of reconciled medication lists and treatment plans, along with lack of personal communication with care providers should be further investigated from a patient perspective.<sup>329,353</sup>

Since this evaluation was conducted in 2015, deficiencies found in the infrastructure of the medication use process have been recognised in Finland in the ongoing *Rational Pharmacotherapy Action Plan (2018–2022)*.<sup>28</sup> The Government Program<sup>151,354</sup> based action plan is intended to strengthen the actions at the infrastructure level which were minor in 2015. At the same time, it extends the scope of development towards the meta level, including health and medicines policy making that can facilitate infrastructural changes in the medication use process through information guidance, resource allocation and legislation.<sup>355</sup> Furthermore, the description of the medication use process presented in this study supports patient involvement and serves as an useful framework for the training of HCPs by highlighting the roles and responsibilities of different actors in the medication use process. Most recently, the results of this study have guided ongoing compilation of the next national MI strategy for the years 2021–2026 in cooperation with the stakeholders.

## 6.2 STRENGTHS AND LIMITATIONS OF THE STUDIES I–III

### 6.2.1 SYSTEMATIC REVIEW ON PEER-REVIEWED PUBLICATIONS (I)

Study I provided a comprehensive overview of MI research in Finland during the 2000s. This systematic review deepened and updated the previous literature review.<sup>171</sup> Although many of the studies were small-scale and descriptive, without theory base, they gave a multifaceted comprehension of the MI practices and their evolution in Finland over time. The literature search was conducted systematically from multiple appropriate databases (two international and one national) using predetermined inclusion and exclusion criteria. More than a third ( $n=44/126$ , 35%) of the included articles had not been originally found through the systematic literature search. They had been found from the reference lists of the included articles or recommended by experts and researchers. One of the reasons for the relatively high number of manually added articles may be the broad scope of the systematic literature search. Each of the six strategic goals of the national MI strategy could have made a scope of its own for a literature review. Furthermore, as a methodological strengths can be considered the fact that the preliminary selection of the articles was conducted by multiple researchers,<sup>22</sup> and at least two researchers independently reviewed full-text eligible articles for inclusion and exclusion and achieved consensus on which studies to include.

The study protocol followed the *Cochrane Handbook for Systematic Reviews* and the *PRISMA Guidelines* in conducting the review and reporting findings when appropriate.<sup>205,206</sup> Included articles were qualitatively content analysed in more detail and data were extracted by two researchers and approved by the other research group members, which improves the comprehensiveness of the study.<sup>215</sup> The validity of the analysis and interpretation was ensured by discussing the findings with some senior researchers who had been familiar with the research area in Finland for a long period of time.

As the review solely includes full original peer-reviewed research articles, the grey literature (e.g., conference abstracts, theses except doctoral monographs) was excluded. Although grey literature would have deepened and extended the understanding of MI practices in Finland, such literature is mainly related to the same research areas as the articles included in this review.



### 6.2.2 REPEATED CROSS-SECTIONAL SURVEY AMONG FINNISH ADULT POPULATION (II)

Study II enabled an examination of the trends on the receipt of MI among adult medicine users at the population level over time. The response rate of this repeated cross-sectional survey decreased from 67% to 53% during the study period (1999–2014) reflecting that the representativeness of the results to the entire population is getting weaker.<sup>207,356–364</sup> Females were overrepresented (63% vs. 50% of the respective gender among the general population) throughout the study period.<sup>207,356–365</sup> The youngest respondents (<35 years) were underrepresented and the oldest respondents (55–64 years) were overrepresented throughout the study period. The data did not contain the population segment of 65 years or older, which is a constantly growing demographic in Finland. Receipt of MI in this segment should be separately explored using other data. In comparison to the general population, people with the lowest level of education ( $\leq 9$  years) were slightly underrepresented, and, accordingly, those with a higher education ( $> 9$  years) were slightly overrepresented throughout the study period. These facts should be considered when transferring the results for the Finnish adult population (15–64 years).

The study was designed to indicate trends at the population level, not to indicate changes in the receipt of MI at the individual medicine user level. The study was conducted as a repeated cross-sectional survey without the cohorts: each study year a new nationally representative sample of 5000 Finns aged 15–64 years was used. Thus, the survey each year was a cross-section of the Finnish adult population reflecting its health behaviours, morbidity, use of medicines and receipt of MI at that particular point of time. It was a conscious decision to first conduct a descriptive indicative trend analysis providing a foundation for further analysis that could go deeper in understanding the receipt of MI for example among various patient groups.

In the survey instrument, the background question relating to the medicine use (Figure 16) has been drawn up in 1978 when the first survey was carried out. Since then, this question has remained the same to confirm comparability of the data between study years. In 1978, powders were a common dosage form, but in the future this question should be updated to reflect the most common current dosage forms. This survey was discontinued in 2014. Since then, the question about the use of medicines has been included in the *Medicines Barometer* population survey conducted by Fimea.<sup>337</sup>

The study provided information only on MI sources listed in the survey instrument that was compiled as comprehensively as possible (Figure 15). Prescription and OTC medicines were not specified separately. The survey instrument did not specify what kind of websites or other Internet-based MI sources medicine users had used for MI, nor did it specify the use of email or social media services such as chat. Moreover, the quality, validity or amount of the MI received were not explored in this study. Furthermore, the respondents were not distinguished according to their spontaneous activity in MI seeking.

### **6.2.3 SEMI-STRUCTURED INTERVIEWS AMONG STAKEHOLDERS (III)**

Study III gathered stakeholder views on the implementation of the national MI strategy 3 years after its launch from a wide range of stakeholder representatives by use of semi-structured interviews. The pragmatic evaluation used in this study has been criticised that the approach is fragmented, lacking a developed philosophy, and there is limited practical descriptions on how to deal with complex and challenging interventions.<sup>366,367</sup> Based on these facts, there is a demand for this type of assessment that can serve as an example for the future evaluation of the national programs. Similar national long-term programs related to the strategic development of MI have been rare in other countries, i.a. examples can be found from the UK and the USA.<sup>16</sup> Other countries could learn from this case and be encouraged to establish and evaluate their own national programs.

A purposive sample of the stakeholders actively involved in implementing the national MI strategy ensured that all participants were familiar with and interested in the subject. The figure of the medication use process<sup>22</sup> was shown during the interview in order to facilitate participants recollecting different areas of implementing the medication use process. The background of the stakeholders might influence the study results, such as education, organisation or work experience. Half of HCPs participating in the study were pharmacists, which may have skewed the results in recognising the medication counselling given by pharmacists to one of the most successful actions in the medication use process. There was, however, an absence of real patients with chronic diseases and long-term medications from the data as the patient voice distorts results.

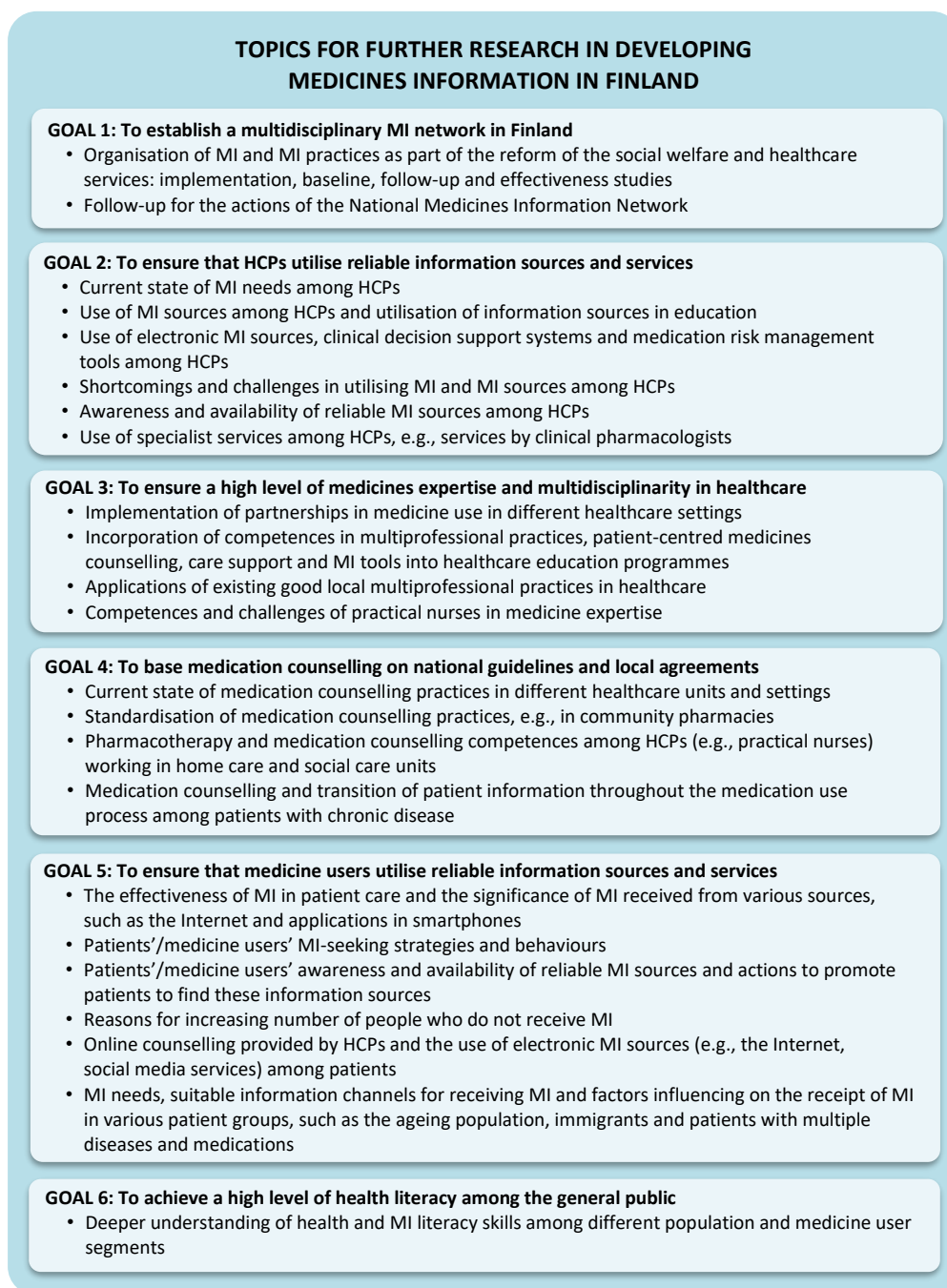
The open question technique (e.g., the question starts with '*what*' or '*how*') was favoured in the interviews as such questions require participants

to answer more comprehensively.<sup>215</sup> Pre-interviews were conducted to establish the credibility of the study. Additionally, the sample size was at a sufficient level for qualitative study as 79 out of 111 stakeholder representatives were interviewed (participation rate 71) representing 43 out of 53 organisations.<sup>368</sup> The number of participants in the group interviews was reasonable (maximum six participants/interview) to allow everyone to express their opinions and experiences. The dynamics of the interviews may have been influenced by the fact that the interviews were conducted as individual, pair or group interviews.

### 6.3 FURTHER RESEARCH

Suggestions for further research topics related to developing MI practices and policy at national level are summarised in Figure 25. The research topics are based on the findings of the studies in this dissertation (Studies I–III), an updated version of the national MI research strategy,<sup>369</sup> the interviews with the members of the MI Network in spring 2015 (Appendix 1) and the research topics related to MI included in the research strategy of the *Rational Pharmacotherapy Action Plan* (2018–2022).<sup>353</sup>

In the future, MI research should shift towards larger research lines with a stronger theory base and study designs. More long-term trend and follow-up studies should be conducted to deepen the understanding of the use and accessibility of MI sources among different patient groups (e.g., the ageing population, immigrants, patients with multiple medications and vulnerability related to socioeconomic factors, such as increasing poverty). Additionally, more population-based research is needed to, for example, gain a comprehensive understanding of the impacts and use of electronic MI, such as the Internet and social media.



**Figure 25.** Suggestions for further research as organised according to the main goals of the national medicines information (MI) strategy in Finland.<sup>22</sup>

## 7 CONCLUSIONS

Based on the Studies I–III and the literature review of the dissertation, the following conclusions can be drawn:

- Medicines information (MI) practices and policies have been widely developed and studied in Finland since the 2000s. After establishment of the national MI strategy in 2012 the coordination between stakeholders and their MI actions has improved.
- Although multiple actions proposed in the national MI strategy have been implemented, the ultimate goal of well-informed and adherent patients had not yet been reached by the first follow-up in 2015.
- The number and availability of MI sources targeted to consumers have increased during the 2000s. However, the shift “from paper to cyber” towards the use of electronic information sources has been moderate. Future research should focus on investigating awareness, accessibility and usability of electronic MI sources from the consumer and medicine user perspective, as well as their integration into the medication use process.
- MI research should shift towards larger research lines with a stronger theory base and study designs. More long-term trend and follow-up studies should be conducted and the effectiveness of MI practices in different healthcare settings should be further investigated.
- Healthcare professionals (HCPs) and package leaflets (PLs) still have dominating importance for adult medicine users in receiving MI despite the growing number of other MI sources available over time during the 2000s.
- A growing number of adult medicine users did not receive MI from any information sources during the 2000s. The proportion of medicine users who did not report receiving MI from any of the listed sources grew by sevenfold and the proportion of those who did not report receiving MI from any of HCPs more than doubled.

- Medication use process of a chronically ill patient using long-term medication requires development at every level of implementation, namely at the infrastructure level (*macro*), HCP level (*meso*) and patient level (*micro*).
  - At the infrastructure level (*macro*), the major development needs concern coordination of care, transfer of patient information between healthcare units, availability of a reconciled medication list, and local and national agreements on tasks and responsibilities of patients and each HCP involved in the medication use process.
  - At the HCP level (*meso*), the most urgent development needs focus on the entire medication use process in primary care and social welfare units, particularly in geriatric care units where practical nurses' competences do not meet their actual work responsibilities.
  - At the patient level (*micro*), the current medication use process lacks genuine patient-centredness, which is manifested by a lack of adherence, motivation and communication, and the inability of patients to retrieve information themselves. Patients on long-term medications need to be better involved in implementing their own treatment by improving empowerment and partnership, and by finding new ways to support self-management and treatment commitment.
  - Many of the challenges identified in this evaluation study have been taken into consideration in the implementation of the national MI strategy since 2015, and the major challenges also in the *Rational Pharmacotherapy Action Plan* (2018–2022) established by the Ministry of Social Affairs and Health.

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Lauttasaari, March 2020



# APPENDICES

## **Appendix 1. Study III: An interview guide.**

### **THEME 1. IMPLEMENTATION OF THE NATIONAL MEDICINES INFORMATION STRATEGY AT NATIONAL LEVEL AND ACTIONS TAKEN IN YOUR OWN ORGANISATION**

*The six strategic objectives of the national medicines information strategy used as a stimulus material.<sup>22</sup>*

- 1) How have the strategic goals described in the national medicines information strategy progressed nationally?
  - Which strategic goals have best been achieved at national level?
  - Which strategic goals have least been achieved at national level?
  - What has been the most significant thing that has been achieved at national level?
- 2) What has been the significance/importance of the national medicines information strategy at:
  - a) national level? b) international level?

Are there other important strategic issues related to medicines information that should be taken into account and possibly lacking in the current national medicines information strategy?
- 3) What is your organisation going to do based on the national medicines information strategy:
  - a) in the near future? b) by 2020?
- 4) If you consider the figure of medication use process for a patient with chronic disease:
  - a) what are the most crucial actions that have been implemented?
  - b) what actions should be focused on in the future in order to achieve the goal of a well-informed, adherent patient or medicines user?

*The figure of medication use process from the national medicines information strategy was shown to the participants during the interview.<sup>22</sup>*



## **THEME 2. EXPERIENCES OF WORKING WITH THE NATIONAL MEDICINES INFORMATION NETWORK AND THE ROLE OF THE NETWORK AT NATIONAL LEVEL**

*Organisational model of the National Medicines Information Network used as a stimulus material (sent to the participants in advance).*

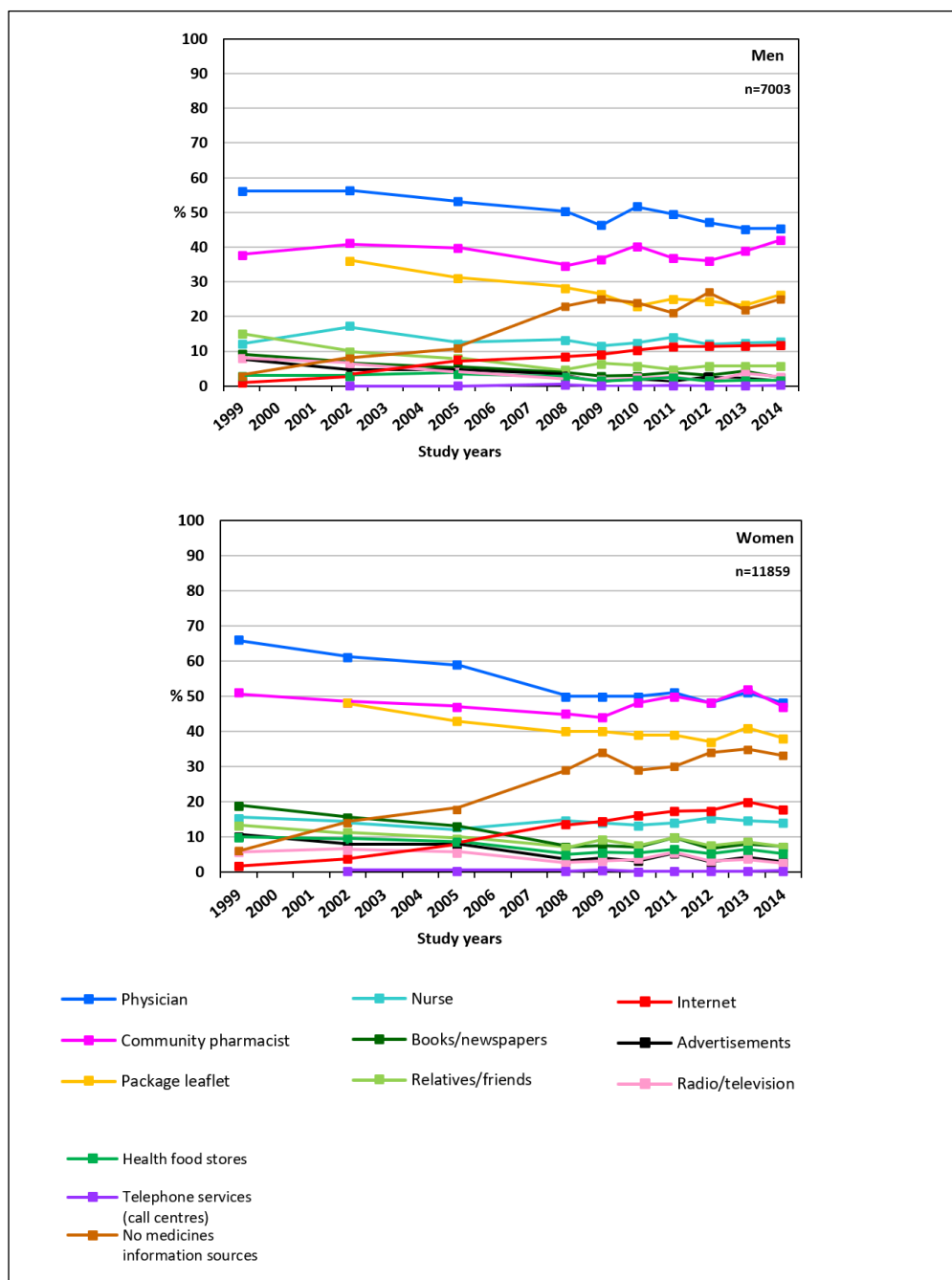
### **NETWORK LEVEL**

- 5) What is the relevance of the National Medicines Information Network activity to the provision of medicines information and the implementation of the national medicines information strategy at national level?
- What are the positive things the National Medicines Information Network has been brought at national level?
  - What are the positive things the National Medicines Information Network has been brought to your organisation?
  - What kind of development needs are at national level/at organisational level?

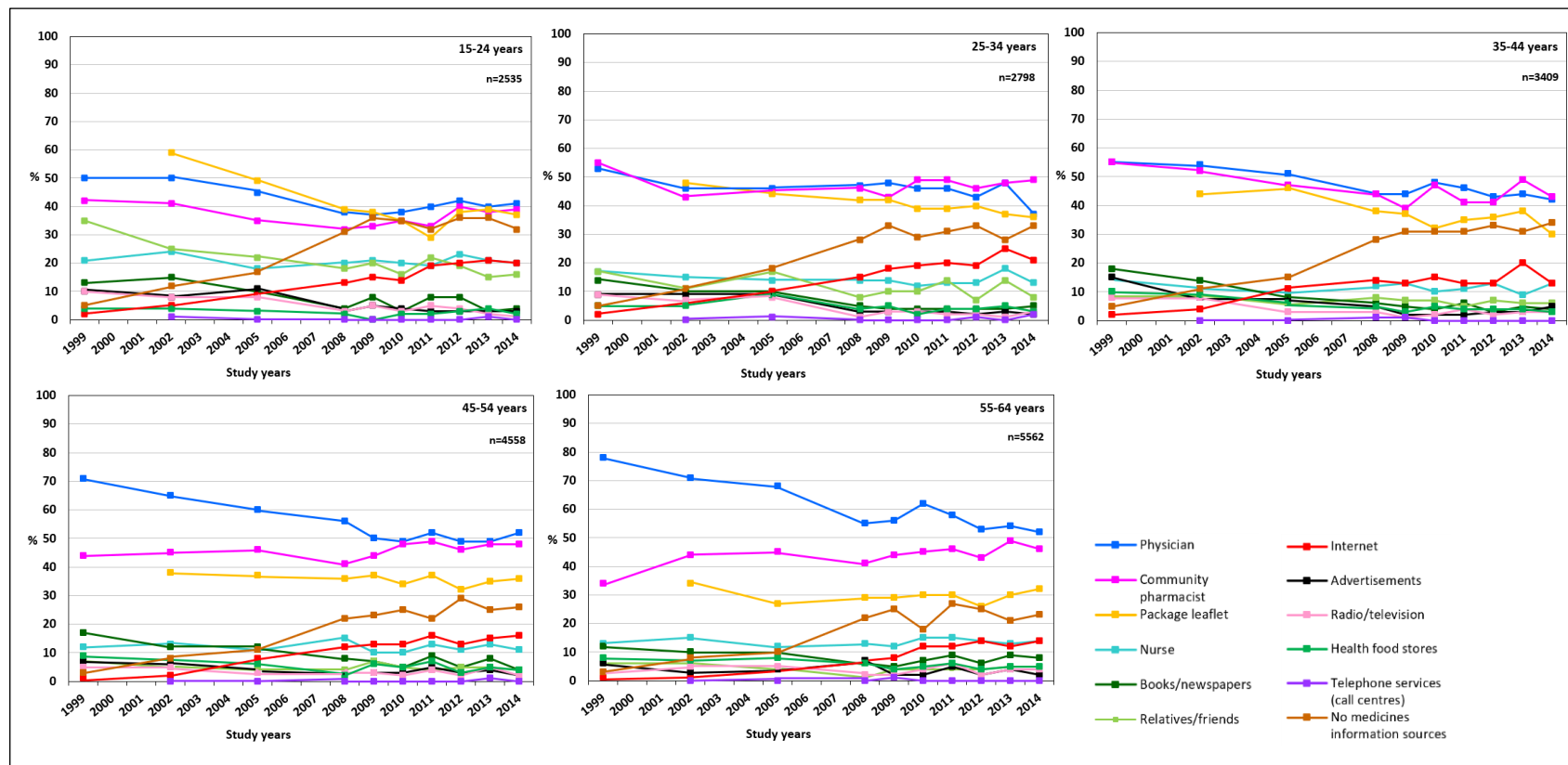
### **WORKING GROUP LEVEL**

- 6) How did the participation in the working group/s affect your own work and/or your organisation? What has been working and what should be further developed?
- What are the positive things that your participation in the National Medicines Information Network has brought to your job/your organisation?
  - What are the negative things that your participation in the National Medicines Information Network has brought to your job/your organisation?
  - How the information on the activities of the National Medicines Information Network has been shared within your organisation?
- 7) How should research be directed to support the strategic development of medicines information practices in Finland?
- 8) What kind of wishes you have for the National Medicines Information Network, working groups and coordination (i.e., Fimea)?

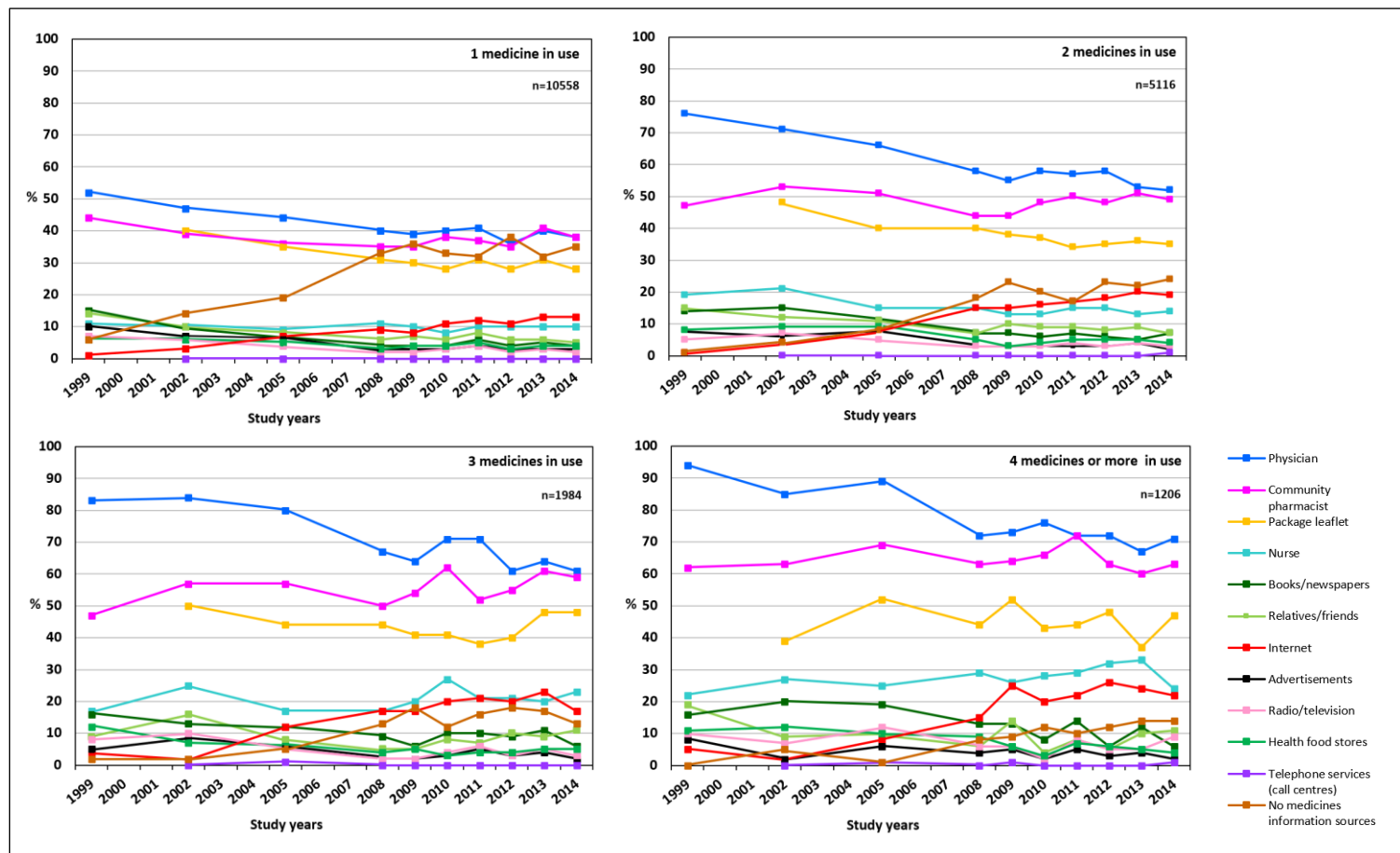
**Appendix 2. Study II: Trends in the receipt of medicines information among men and women in 1999–2014 (percentage of the respondents who reported use of at least one prescription or non-prescription medicine within 7 days prior to the survey).**



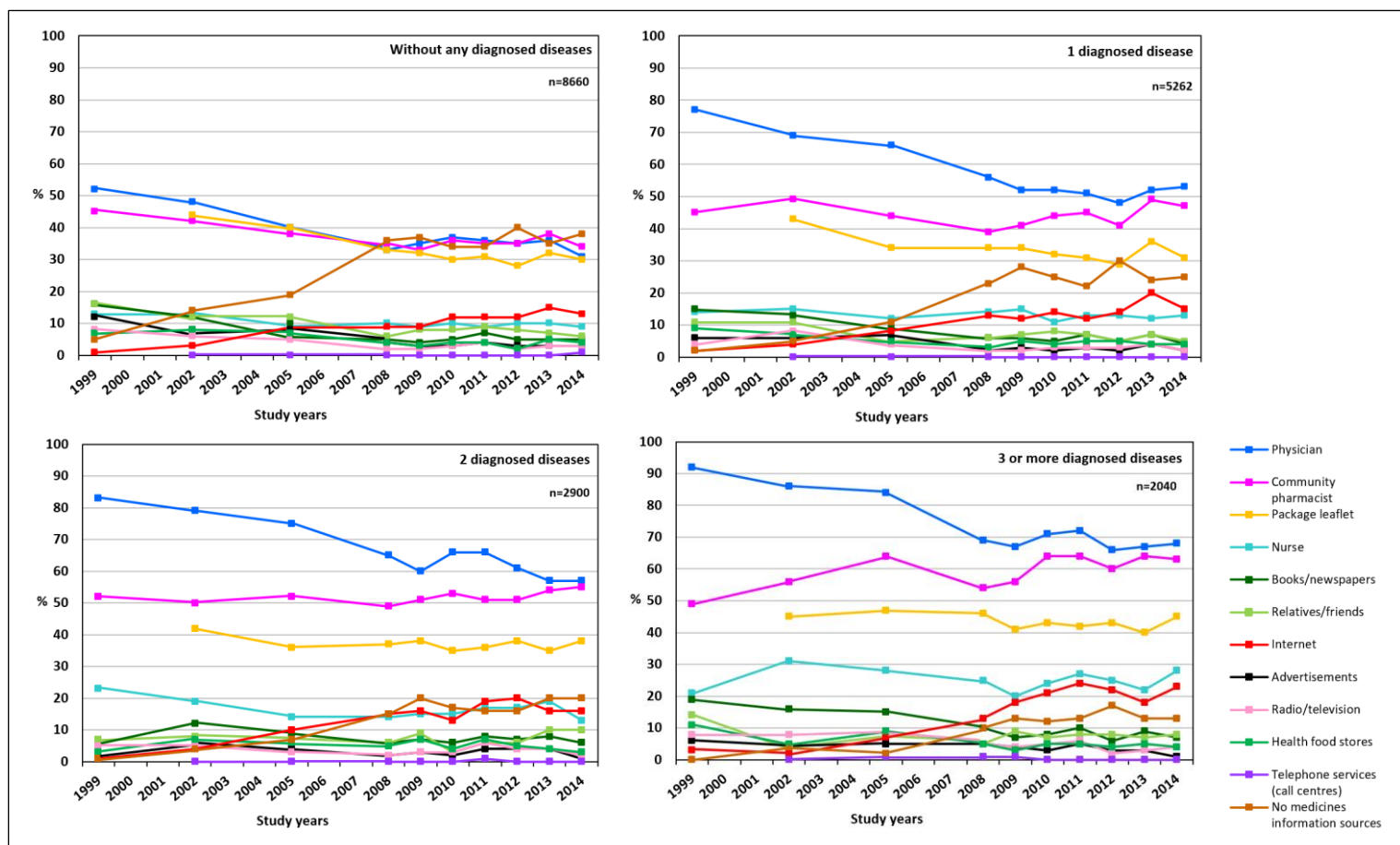
**Appendix 3. Study II: Trends in the receipt of medicines information according to the age groups in 1999–2014 (percentage of the respondents who reported use of at least one prescription or non-prescription medicine within 7 days prior to the survey).**



**Appendix 4. Study II: Trends in the receipt of medicines information according to the number of medicines in use in 1999–2014 (percentage of the respondents who reported use of at least one prescription or non-prescription medicine within 7 days prior to the survey).**



**Appendix 5. Study II: Trends in the receipt of medicines information according to the number of diagnosed diseases in 1999–2014 (percentage of the respondents who reported use of at least one prescription or non-prescription medicine within 7 days prior to the survey).**



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