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ORIGINAL RESEARCH

Engaging Community Pharmacies in Promoting Outpatient Medication Safety – Identifying and Prioritizing Research Needs by Modified Nominal Group Technique

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Introduction: Medication errors are one of the most endangering factors for patient safety, and they have become a key target for improvement in health- and social care systems worldwide. The most current development needs are related to outpatient care; however, up-to-date medication safety research and improvement activities have primarily focused on hospital environments. To promote medication safety in outpatient care, community pharmacies could be more effectively utilized.

Objective: To identify the most central research needs, which would promote the use of community pharmacies in outpatient medication risk management and enhance collaboration between community pharmacies and other parts of the health- and social care system.

Methods: The study applied a modified nominal group technique. A group of Finnish patient and medication safety experts (n=28) participated in the study and were divided into four nominal groups (incl. a pilot group). Data collection was conducted through electronic surveys and facilitated online group meetings. The collected data were analyzed using qualitative inductive thematic analysis and quantitative descriptive analysis by the van Breda technique.

Results: The final data comprised 83 research needs organized under five main themes with 22 subthemes. The most prioritized research needs covered all five main themes, which were: medication safety collaboration (final rank proportion 30%); medication care pathways (27%); operating processes of community pharmacies (17%); medication safety incident reporting (16%); and community pharmacy-based services improving medication safety (11%).

Conclusion: The identified research needs for promoting outpatient medication safety by involving community pharmacies in medication risk management, covered a wide range of areas. Producing evidence about the effectiveness and cost-effectiveness of activities in these areas is particularly needed for practice development and policymaking, together with updating regulations supporting the implementation of the produced evidence.

Keywords: collaboration, community pharmacy service, medication care pathway, medication safety incident, medication risk management

Introduction

Ensuring patient safety has been recognized as a global challenge in health- and social care systems.[1] Medication errors are one of the most endangering factors for this global challenge.[1–3] Besides human suffering, preventable medication errors are estimated to cause 42 billion USD in annual costs to health- and social care systems globally.[4,5] Particularly vulnerable to medication errors are patients with comorbidities and polypharmacy, making the medication management

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processes complex and error-prone. These medication-related challenges will grow and become more prevalent in health- and social care policymaking as populations age in many countries. As the majority of the aged and comorbidity patients are routinely treated outside hospitals, the mentioned challenges especially influence the outpatient medication management processes.[6–8] Although medication-related outpatient harm is relatively common, medication safety research and improvement activities have primarily focused on hospital settings instead of outpatient care.[3,5,7,9]

Several health- and social care providers take part in the multi-professional outpatient medication management process. In this process, community pharmacies are often the last and, in some cases even the only, healthcare provider where patients encounter a licensed healthcare professional before initiating their medication treatment. Also, patients using long-term medications in home settings meet community pharmacists regularly. Despite community pharmacists' well-placed position in medication care pathways and expertise in the safe and rational use of pharmacotherapies, health- and social care systems worldwide tend not to fully utilize this available resource for medication risk management of outpatients.[10–18]

While collaboration models are recognized to positively impact patient outcomes, established models for ensuring medication safety are lacking in many countries; community pharmacists could be more valuable partners for other health- and social care professionals as they inherently contribute to managing medication risks through their daily activities.[10,12,19–27] These activities comprise tasks integrated into routine medication dispensing, such as medication counseling and the management of overlapping medications, clinically significant interactions, and medicine-induced risk loads (eg, serotonergic or anticholinergic load), but also services such as medication reviews, assessment of correct inhalation technique, and different types of new medicine services.[21,28] Optimizing the use of community pharmacists' expertise could potentially improve health outcomes of patients, while simultaneously reducing the workload of other health- and social care providers in various countries and settings.[11,29,30] In addition to collaboration models, the optimal use of community pharmacists has been recommended to be executed by implementing policies that recognize community pharmacists as healthcare providers and facilitate pharmacist provision of services.[10,25–27,31] These actions should be further supported by developing information system infrastructure that permits sharing medication-related information between community pharmacists and other health- and social care professionals.[31] Although some international evidence exists in these areas, a more systematic description of current research needs on how to effectively integrate community pharmacies into outpatient medication risk management is still lacking.[26,29,32,33] Such an outline would be needed to inform academic research and consequent policymaking in the present area. This study used the Finnish health- and social care system as an example, aiming to identify the most central research needs, which would promote the use of community pharmacies in medication risk management and enhance collaboration between community pharmacies and other parts of the health- and social care system.

Methods

Study Context

The Finnish health- and social care system is primarily based on public care services, complemented by private and occupational care.[34] The system serves a population of 5.6 million inhabitants.[35] Primary healthcare services are provided in health centers, while the specialized care is mainly organized in hospitals.[34] At the beginning of 2023, a major health- and social care system reform took place in Finland to ensure equal access to care while simultaneously balancing the growing health- and social care costs of the aging population.[36–40] The main goal of the reform was to shift the focus from specialized care services to preventive work and to improve coordination, integration, and availability of care. Those goals will be achieved by reinforcing primary care services and their integration with social welfare services, enhancing multi-professional collaboration, and streamlining fragmentary care pathways. During the reform, the responsibility for organizing and funding health- and social care services was transferred from municipalities to 21 wellbeing services counties.

In Finland, community pharmacies are responsible for the supply of prescription and over-the-counter medicines in outpatient care.[41] There are over 800 private pharmacist-owned (M.Sc.) community pharmacy outlets throughout the sparsely populated country, employing nearly 4800 pharmacists with approximately 78.6 million dispensed prescriptions

in 2023. Community pharmacy owners have both professional and financial responsibility for their pharmacy outlet.[41] The number of community pharmacy outlets is regulated by a licensing system administered by the Finnish Medicines Agency Fimea. All prescriptions are prescribed electronically by physicians and stored in a nationwide, centralized electronic database, Prescription Centre, maintained by the Social Insurance Institution of Finland (Kela).[42,43] The Prescription Centre is a part of the Kanta services, a central repository for all health- and social care data, and also containing the dispensing records made by community pharmacists.

Finnish community pharmacies have adapted over time to various societal and statutory changes, such as the requirement for medication counseling, generic substitution, and the introduction of electronic prescriptions.[10,44,45] Additionally, Finnish community pharmacy infrastructure has been developed proactively with medication safety in focus, and this national long-term commitment has been systematically supported by national health policies since the mid-2000s.[10,21,23,46–51] Despite the evolving national statutory changes and health policies, operational integration between community pharmacies and health- and social care organizations is yet to be implemented.[10] To meet this need, the Association of Finnish Pharmacies and the Finnish Centre for Client and Patient Safety launched a six-year National Medication Safety Programme for Community Pharmacies in Finland (ie, the Valo program) in 2021.[52] The program is a continuation of long-term, strategically-guided professional development for Finnish community pharmacies and aims to enhance outpatient medication safety in scarcely-resourced health- and social care by improving the contribution of community pharmacies in preventive medication risk management.

As a preliminary result of the Valo program, medication safety work in community pharmacies has become more extensive and organized in Finland.[52] For example, during the Valo program, the community pharmacies changed their previous incident reporting system to a more comprehensive patient safety incident reporting and learning system (HaiPro).[53] The HaiPro system has a long tradition of use in other Finnish health- and social care organizations, and as a unique feature, it can be used to transmit medication safety incidents (eg, a prescription error detected by a community pharmacist or an error in medication counseling by a community pharmacy detected by a physician in a health center) to the care unit where the incident actually occurred. This facilitates more systematic and comprehensive incident reporting and learning of incidents at different points of care.[53,54] In addition, the Valo program has led to the appointment of a medication safety pharmacist in almost every community pharmacy. In some wellbeing services counties, there are also evolving networks of medication safety pharmacists. The networks facilitate the development of collaborative medication safety structures and practices with other health- and social care providers in the respective region.

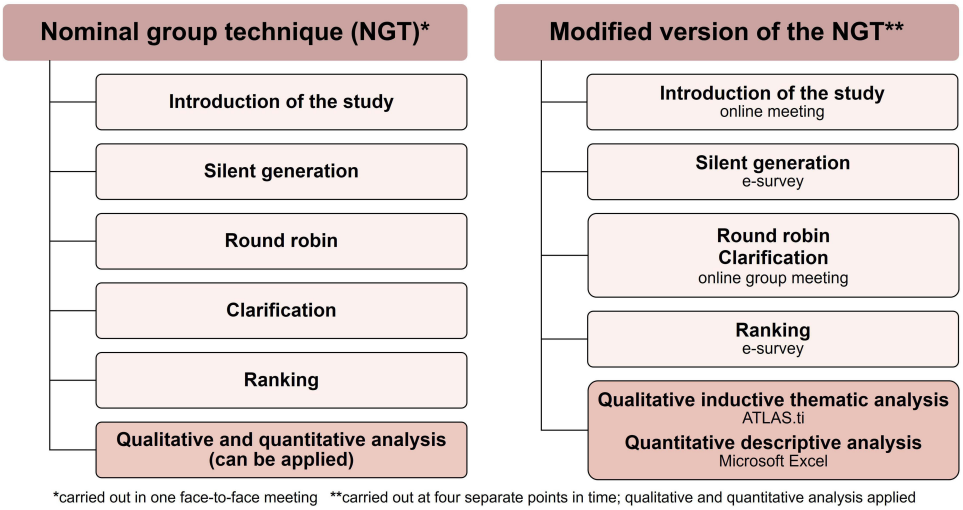

Figure 1 The comparison of the steps of the traditional nominal group technique (NGT) and the modified NGT used in this study.

Study Design

The present study applied a modified nominal group technique (NGT) (Figure 1). The NGT is a qualitative structured consensus research methodology that has been previously used in various healthcare settings, eg, for identifying research priorities for practice.[55–59] In the NGT, the participants act in a group setting, but the emphasis is on collecting individual views; the methodology encourages active participation from all participants and ensures that everyone's opinion is considered when building the group consensus. Studies applying a traditional NGT methodology have typically comprised one face-to-face meeting involving 2–14 participants for data collection.[55,60,61] Although previous studies have used various applications of the NGT, there is a general consensus on four core steps of the NGT: silent generation, round robin, clarification, and ranking.[61]

In the present study, the modifications were related to online implementation; the data collection applied various tools such as electronic surveys and online group meetings, and the NGT steps were carried out at four separate points in time (Figure 1). The data analysis was primarily qualitative and complemented with quantification. The Consolidated Criteria for Reporting Qualitative Research (COREQ) was used to ensure the reporting quality of the present study (Supplementary Material 1).[62]

Recruiting Study Participants

The research group used purposive expert sampling to select a group of Finnish patient and medication safety experts to participate in the study.[63] To be selected, the expert had to have robust expertise in patient and/or medication safety and an understanding of the Finnish health- and social care and community pharmacy systems. The representation of the different health- and social care professions and organizational backgrounds was also ensured. These above-mentioned choices were intended to strengthen the information power of the sample.[64]

The study invitations, with the information about the study's context and content, privacy statements, and an electronic questionnaire about participants' background information (ie, profession and organization) were emailed to the selected experts at the beginning of February 2022. The experts agreeing to participate in the study were divided into four nominal groups (of which one comprised a pilot group) for data collection. To enrich the data, each nominal group was formed heterogeneously to represent experts with different professional and organizational backgrounds.[65]

Study Preparation and Data Collection

After a thorough preparation for conducting the study, the research group formulated a nominal group question (Figure 2). Also, the necessary materials for participation invitations, the introduction of the study and the silent generation were prepared. The data collection stage was piloted among a pilot group consisting of seven experts. The pilot ensured the functionality of the modified NGT process before actual data collection.

The data collection occurred between February and April 2022 (Figure 2). The first step was the introduction of the study, aiming to ensure that every participant had similar basic information about the study's context, structure, and aim. The study introduction meeting was carried out as a facilitated, structured, online meeting (EM, AKT) at a total of three different points in time (30 minutes per meeting); participants could select the most appropriate one for their personal schedules. The introduction meeting was recorded and provided to those who could not participate and to members of the pilot group.

In the second step, a silent generation of research needs was carried out using an electronic survey (E-form tool from the University of Helsinki) (Figure 2 and Supplementary Material 2). A link to the survey form was provided to the participants immediately after the introductory meetings with 1–2 weeks to respond. The survey comprised two open-ended questions asking the participants 1) to innovate research needs that would promote outpatient medication safety through the use of community pharmacies in medication risk management and through the collaboration between community pharmacies and the health- and social care system (the nominal group question), and 2) to indicate five of the most important before-innovated research needs.

The third and fourth steps of the data collection, round robin and clarification, were carried out in a two-hour, online, group meeting for each nominal group following a predetermined structured outline (Figure 2). The researchers (EM, AKT, ARH) acted as facilitators while not participating directly in the round robin and clarification.[55,61] Each meeting started with the

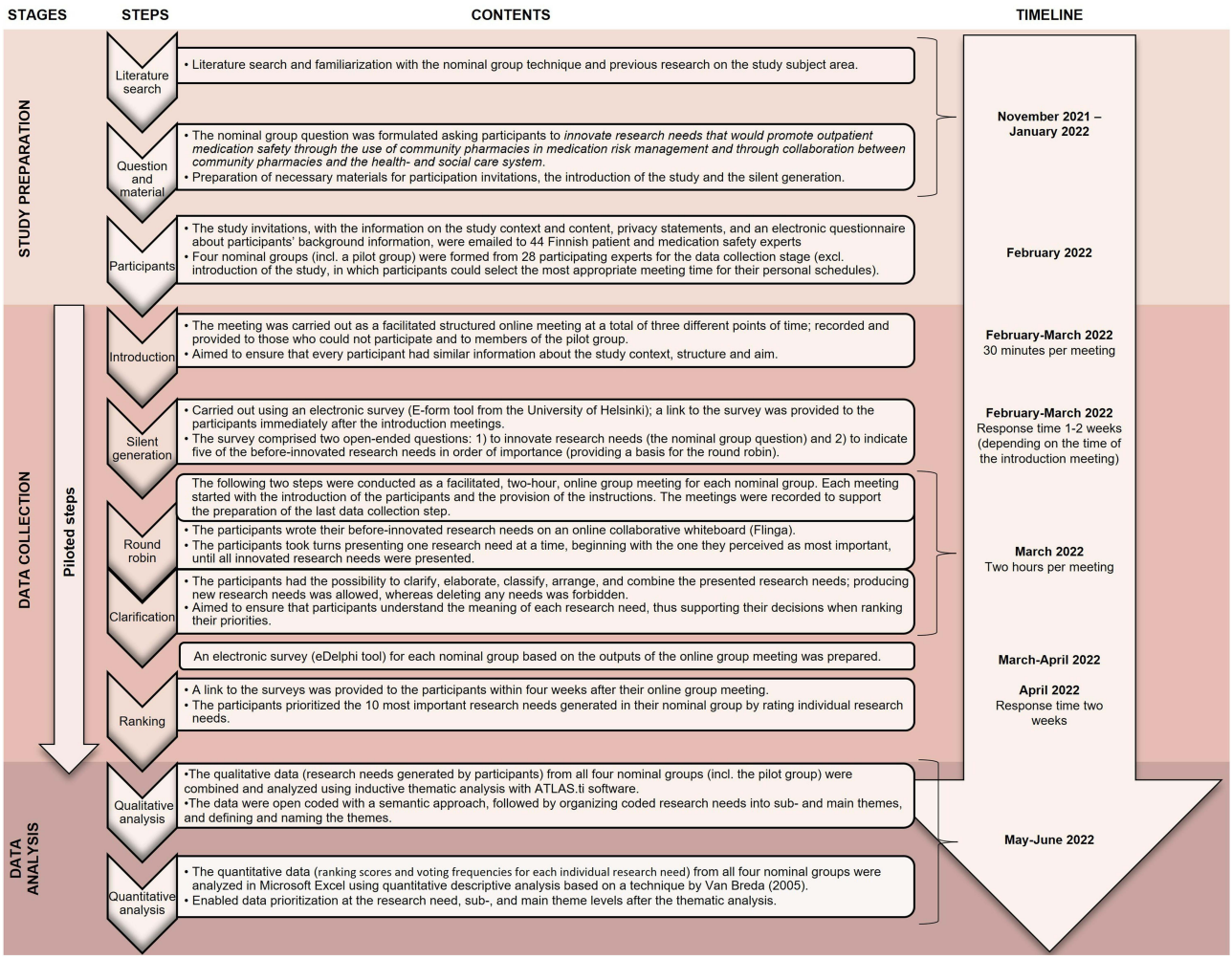

Figure 2 Outline of the modified nominal group technique (NGT) study.

introduction of the participants and the provision of the instructions. After this, the participants wrote their before-innovated research needs on an online collaborative whiteboard (Flinga), followed by the round robin, where the participants took turns to present one research need at a time, beginning with the one they perceived most important. The rounds were carried on until all innovated research needs were presented.

The clarification step started with the possibility for the group to clarify or elaborate on the presented research needs (Figure 2). Also, the nominal group members could collaboratively classify, arrange, and combine the presented research needs using Flinga. Generating new research needs was allowed, whereas deleting any needs was forbidden. The clarification step aimed to ensure that participants understand the meaning of each individual research need, thus enabling them to make an informed decision when ranking their priorities.[61] The meetings were recorded with the consent of all participants to support the preparation of the last data collection step.

For the last data collection step, ranking, the researchers (EM, AKT) prepared an electronic survey (eDelphi tool) (Figure 2 and Supplementary Material 3). The survey was prepared for each nominal group individually based on the outputs of their online group meeting. A link to the electronic survey was sent to participants within four weeks after the meeting. The participants prioritized the 10 most important research needs generated in their nominal group by rating individual research needs on a scale of 1–10 (10 points to the most important one, 9 points to the second one, etc); in the existing literature, the ranked items have varied from five to ten or even more.[61]

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Table 1 Key Concepts and Their Applications Related to the Thematic Analysis

Concept	Definition	Application
Thematic analysis	Thematic analysis is a qualitative descriptive analytic method for identifying, analyzing, and reporting patterns (themes) within data.[66,67]	
Data corpus	All data collected for a particular research project.[67]	Qualitative and quantitative data that were collected using nominal group technique.
Data set	All the data from the *data corpus* used for a particular analysis.[67]	Qualitative data that were generated by study participants in all four nominal groups.
Data item	Each individual piece of data collected and which together comprise the *data set* or *data corpus*.[67]	Qualitative data that were generated by study participants in one of four nominal groups.
Data extract	An individual coded chunk of data, which has been identified within and extracted from a *data item*.[67]	Individual research need that was generated by study participants.
Thematic map	A visual representation of the hierarchical relationship between data patterns, including their descriptions. It can be presented in various forms, such as a mind map or a table.[67]	A thematic map of research needs, subthemes, and main themes is presented in table form with ranking scores, average ranking scores, voting frequencies, and final ranks in Supplementary Material 4. Descriptions for the main themes are presented in Table 4.

Table 2 Key Concepts and Their Applications Related to the Quantitative Analysis Conducted by the van Breda technique[68]

Concept	Description	Application
Ranking score	The total number of ranking points assigned by participants to a particular research need. A total of 1540 ranking points were assigned (28 participants x (10+9+8+7+6+5+4+3+2+1)[a] =1540 ranking points).	Obtained from the data collection phase for each research need. Used for calculating average ranking scores for individual research needs.
Average ranking score (for each research need)	The ranking score of a research need divided by the total number of people in a nominal group. If the same research need arose in different nominal groups, these were combined as one research need and average ranking scores were added up.	Calculated for each research need to identify the priority of research needs.
Final rank	A detailed description of calculating the final rank is provided in van Breda (2005).[68]	Calculated for each individual sub- and main themes to identify the priority of themes.
Final rank proportion	The final rank of an individual main theme divided by the sum of all main theme final ranks.	Calculated for each main theme to describe the final rank proportion of the main theme over other main themes.
Voting frequency	The number of times an individual research need was voted.	Used if two research needs had an equal average ranking score.
Sum of voting frequencies (for each sub- and main themes)	The sum of the voting frequencies of research needs under the individual theme.	Calculated and used if two subthemes or two main themes had an equal final rank; the one with the highest sum of voting frequencies was prioritized first.

Notes: [a]The participants scored the 10 most important research needs generated in their nominal group by providing rates to individual research needs on a scale of 1–10 (10 points to the most important one, 9 points to the second one, etc).

Data Analysis

In the present study, the data corpus included both qualitative data (research needs generated by participants) and quantitative data (ranking scores and voting frequencies for each individual research need) obtained from the data collection phase using the modified NGT. Descriptions of key concepts related to the qualitative analysis are presented in Table 1, and key concepts related to the quantitative analysis in Table 2. The pilot data were included in the analysis because no alterations were required to the study steps based on the pilot.

The data items (ie, qualitative data from four nominal groups) were combined to create a data set for inductive thematic analysis, which was conducted using ATLAS.ti software (Table 1 and Figure 2).[66,67,69,70] The analysis followed the six-step thematic analysis process described by Braun and Clarke (2006).[67] The researchers began by familiarizing themselves with the data set. The data, comprising the research needs, were open coded with a semantic approach by one researcher (EM). An individual research need was used as a data extract. During the coding, some research needs were found to arise in different nominal groups and were consequently combined. The coded research needs were further organized into sub- and main themes, followed by defining and naming the themes. To ensure the validity of the analysis, two researchers (AKT, ARH) reviewed the thematization, followed by a consensus discussion of the entire research group (EM, AKT, ARH, CS, AS) to approve the final thematization. Finally, a thematic map was developed to describe the hierarchy of the data.

To determine research priorities, a quantitative descriptive analysis was conducted utilizing the technique by van Breda, enabling data prioritization at the research need, sub-, and main theme levels (Table 2 and Figure 2).[68] The priority order was determined for individual research needs by their average ranking score, and for the main and subthemes by their final rank. If the same research need arose from more than one nominal group, also their average ranking scores were combined by summing up. Data management in the quantitative data analysis was conducted using Microsoft Excel.

Results

Of the Finnish patient and medication safety experts invited to the study (n=44), altogether 28 participated (participation rate 64%). Four nominal groups with 5–8 participants were conducted (incl. the pilot group); all participants remained included for the whole study. Participants represented various health- and social care professions and organizational backgrounds from different geographical locations of Finland (Table 3). Most of the experts were pharmacists (83%; n=25), and the majority represented an academic organization (28%; n=9).

The experts generated 111 research needs altogether, with a range of 24 to 30 research needs per nominal group. After combining identical research needs, the final data comprised 83 research needs. As a result of the thematic analysis, the research needs were organized under 22 sub- and five main themes (Table 4). The quantitative analysis determined their hierarchical relationships, which are presented in Supplementary Material 4.

Table 3 Background Information About Participants (n=28)

Characteristic	n	%
Profession		
Pharmacist	25	83.3
Nurse	3	10.0
Physician	2	6.7
Total[a]	30	100.0
Organization type[b]		
Academic organization	9	28.1
Governmental institution or medicines authority	5	15.6
Professional organization	5	15.6
Community pharmacy	4	12.5
Health- and social care organization	4	12.5
Hospital pharmacy	4	12.5
Industry	1	3.1
Total[c]	32	100.0

Notes: [a]Two participants represented two different health- and social care professions. [b]At the time of the study. [c]Three participants represented two or more different organizations.

Table 4 Descriptions of Main Themes for Outpatient Medication Safety Research[a]

Main Theme	Description	Subthemes[b]
Medication safety collaboration	Collaboration between community pharmacies and other health- and social care providers, as well as the information and electronic health record system providers to promote outpatient medication safety at different operating levels; organization, coordination, implementation, development, and effectiveness of the collaboration.	Regional collaboration in wellbeing services counties Local collaboration National coordination of collaboration Collaboration with other stakeholders
Medication care pathways	Safe and seamless patient-centered medication care pathways in outpatient care that are regionally identified, defined, described, and customized, and are consistently and effectively implemented. Up-to-date medication information is transmitted with engaged patients through the medication care pathway.	Describing medication care pathways Up-to-date medication information Medication safety at home Medication adherence Prescription prescribing and renewing Risk patients
Operating processes of community pharmacies	Promoting medication safety in different operating processes of community pharmacies. Operating processes encompass community pharmacy operations, procedures and workflows, and structured methods to ensure the community pharmacy operates effectively and complies with legal and regulatory requirements.	Implementation and impacts of safe operations Medication safety competence Medication success monitoring Medication safety culture and management Over-The-counter medicine dispensing Remote medicine dispensing
Medication safety incident reporting	Reporting of, and learning from, medication safety incidents in outpatient care as a tool for risk management. Identifying the most common medication safety incidents and risks, learning from incidents, and promoting medication safety by utilizing a patient safety incident reporting and learning system with best reporting practices and strong competence of community pharmacy professionals.	Identifying central medication safety incidents and risks Learning from medication safety incidents Reporting practices and competences in community pharmacies
Community pharmacy-based services improving medication safety	Medication counseling and other community pharmacy services that improve medication safety; special properties and needs for services in different patient and medication groups, and definition, implementation, and development of services, and service-related competencies of health- and social care professionals.	Particular needs for services Definition, implementation, and development of services Service-related competencies of health- and social care professionals

Notes: [a]Generated by thematic analysis of research needs identified by nominal group technique. [b]Subthemes under the main themes are presented in decreasing prioritization order.

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Table 5 Top Prioritized Research Needs Among the Data. The Table Includes Research Needs from All Main Themes

Prioritization Order	Research Need	Main and Subtheme of a Research Need	Average Ranking Score[a]	Voting Frequency[b]
#1	Effectiveness and cost-effectiveness of medication safety work conducted in community pharmacy operations, especially in over-The-counter medicine counseling and managing patients' medication safety risks during prescription medicine dispensing	Operating processes of community pharmacies; Implementation and impacts of safe operations	8.4	11
#2	The prerequisites for organizing and carrying out medication safety collaboration in wellbeing services counties	Medication safety collaboration; Regional collaboration in wellbeing services counties	7.4	4
#3	Root cause analysis for community pharmacy-reported medication safety incidents, especially dispensing errors, and identification of the best practices to prevent incidents	Medication safety incident reporting; Learning from medication safety incidents	7.0	7
#4	Collaborative local operating models and communication channels for preventing and solving patient-specific medication-related problems and the cost-effectiveness of this preventable work conducted in community pharmacies	Medication safety collaboration; Local collaboration	6.3	9
#5	The most central safety risks in outpatient care medication safety incidents on the most common prescription and over-The-counter medicines and various patient groups; contributing factors for these incidents	Medication safety incident reporting; Identifying central medication safety incidents and risks	6.3	7
#6	The role of the community pharmacies in monitoring medication success; developing an operating model (incl. communication channels), and defining patient information required in monitoring	Operating processes of community pharmacies; Medication success monitoring	6.2	4
#7	Roles and tasks of health- and social care providers (incl. community pharmacies) and professionals in medication care pathways, as well as risk settings	Medication care pathways; Describing medication care pathways	6.1	9
#8	Definition of contents, organizing, operating models, and quality criteria of community pharmacy services (especially different levels of reviews of medications, automated dose dispensing, and medication safety assessment), and their challenges, effectiveness, and cost-effectiveness	Community pharmacy-based services improving medication safety; Definition, implementation, and development of services	5.9	8
#9	Challenges in investigating a patient's up-to-date medication information (medication information at the electronic Prescription Centre and medications the patient is actually taking do not match), especially at the community pharmacy and when a patient requiring dependent care comes under crisis services; risks when available medication information is not up-to-date	Medication care pathways; Up-to-date medication information	5.9	7
#10	Medication safety incidents occurring in different patient groups (especially children), medicine substance groups (especially low-dose acetylsalicylic acid and potassium) and community pharmacy settings (especially in the over-The-counter service section)	Medication safety incident reporting; Identifying central medication safety incidents and risks	5.6	6

(*Continued*)

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Table 5 (Continued).

Prioritization Order	Research Need	Main and Subtheme of a Research Need	Average Ranking Score[a]	Voting Frequency[b]
#11	The role of community pharmacies in ensuring medication safety in processes that require collaboration between local care providers, eg, an automated dose dispensing process involving community pharmacies as the service providers and home care settings as service requesters	Medication safety collaboration; Local collaboration	5.5	6
#12	The current status of community pharmacy professionals' medication safety competence and related education needs in various operations of community pharmacies	Operating processes of community pharmacies; Medication safety competence	5.4	5
#13	The most cost-effective ways, and policymakers' and practitioners' views of utilizing the expertise of community pharmacy professionals in promoting medication safety of outpatients in wellbeing services counties	Medication safety collaboration; Regional collaboration in wellbeing services counties	5.2	7
#14	Structures, operating models, and barriers to promote medication safety with collaboration between community pharmacies and other health- and social care providers in wellbeing services counties	Medication safety collaboration; Regional collaboration in wellbeing services counties	5.0	5
#15	The current status and development of safety culture in community pharmacies; the effects of safety culture on the operation of community pharmacies, development of the operation, medication risk management and collaboration with health- and social care	Operating processes of community pharmacies; Medication safety culture and management	4.8	7
#16	The current status of implementation of medication safety collaboration at the national level and its recent development	Medication safety collaboration; National coordination of collaboration	4.8	6
#17	The content, quality, and effects of patient-needs-based medication and non-medication treatments related counseling in community pharmacies	Community pharmacy-based services improving medication safety; Definition, implementation, and development of services	4.8	4
#18	Means to maintain patient's up-to-date medication information and to ensure information transmission between the health- and social care providers involved in the patient's care pathway	Medication care pathways; Up-to-date medication information	4.4	3
#19	Particular properties, challenges, and development areas related to medication counseling in different patient groups, especially children, and in different medicine substance groups	Community pharmacy-based services improving medication safety; Particular needs for services	4.3	4
#20	Identification of patients who most benefit from medication counseling and other community pharmacy services	Community pharmacy-based services improving medication safety; Particular needs for services	4.0	6

Notes: [a]The ranking score of a research need divided by the total number of people in a nominal group. If the same research need arose in different nominal groups, these were combined as one research need and average ranking scores were added up. [b]The number of times an individual research need was voted. If two research needs had an equal average ranking score, the one with the highest frequency of votes was prioritized first.

The average ranking scores ranged between 0.0 and 8.4 per research need (mean 2.7). The most prioritized individual research needs with respective average ranking scores are presented in Table 5; the most prioritized comprised the studying of "Effectiveness and cost-effectiveness of medication safety work conducted in community pharmacy operations, especially in over-The-counter medicine counseling and managing patients' medication safety risks during prescription medicine dispensing". The most prioritized research needs covered all five main themes, which were: medication safety collaboration (final rank 13.5; final rank proportion 30.0%); medication care pathways (12.0; 26.7%); operating processes of community pharmacies (7.5; 16.7%); medication safety incident reporting (7.0; 15.6%); and community pharmacy-based services improving medication safety (5.0; 11.1%) (final rank mean 9.0).

Discussion

This study presents an outline for future research, which would promote outpatient medication safety through a more optimized use of community pharmacies and collaboration between community pharmacies and other health- and social care providers. While the gaps in outpatient medication safety research and development actions tend to be similar worldwide, the present results have a high potential for international transferability.[3,5,7] Thus, the results can be applied by other countries to reflect their own medication safety research needs in outpatient care. However, variations in health- and social care systems, information and incident reporting systems, and policies should be considered before the research needs are applied.

In the present study, all the research needs suggested by the experts represent practice-based implementation research requiring the application of both observational and experimental designs, as well as various quantitative and qualitative research methodologies. The suggested research would strongly benefit from employing systems-based risk management theories, which have been widely used in patient and medication safety research.[71–73] Such systems-based research on the contribution and services of community pharmacies in medication safety have been conducted to some extent in Finland and internationally, serving as a foundation for the present research outline.[14,21,23,45,54,74–76]

The need for effectiveness and cost-effectiveness research emerged in almost all themes covering many of the most prioritized individual research needs; indeed, to support practice development and evidence-based policymaking, outpatient medication risk management research should be moving from sole service development to measuring outcomes of the established services. Although outcomes research of community pharmacy services has increased globally from the 2010s onwards, there is still limited and inconsistent evidence to conclude their effectiveness.[32,33,77] However, this type of evidence would be critically needed to inform health- and social care systems on which medication safety interventions produce the desired safety outcomes for patients and, hence, are worth the financial investments.

The priorities set by experts reflect results from other international studies in which more coordinated collaboration between outpatient care providers has been raised as an important area of development.[26,29] Although global medication safety research and consequent practical development have primarily focused on the hospital environment and collaboration between physicians and nurses, there is some encouraging evidence of emerging collaboration models between community pharmacists and other health- and social care professionals in outpatient care settings.[3,5,7,20,25,26,29,30,78,79] However, several identified barriers to such activities exist, including physical separation between community pharmacies and other health- and social care units, traditional hierarchical thinking and power relations between professional groups, the perception of community pharmacies as logistical medicine distribution points rather than healthcare providers, lack of legislation describing the responsibilities and communication standards for health- and social care professionals, and inadequate access to patient information by community pharmacists.[12,29–31,78] In the future, it would be essential to focus on tackling the presented challenges and finding robust solutions for the practical implementation of the collaboration. In this task, local or national reforms subjected to health- and social care systems can provide opportunities; in Finland, the major health- and social care system reform at the beginning of 2023 has provided momentum for the systematic integration of community pharmacies in outpatient medication safety collaboration while organizational structures are organizing within wellbeing services counties.[36–40] This development direction has been facilitated nationally by the Valo program and the Client and Patient Safety Strategy (2022–2026) by the Ministry of Social Affairs and Health.[52,80]

The experts gave a high priority to research facilitating safe and seamless medication care pathways in which up-to-date medication information is transmitted between health- and social care providers, eg, in hospital discharge. The World Health Organization (WHO) has defined transitions of care as critical risk points because they increase the possibility of communication errors, which in turn, can lead to serious medication errors.[2,81] Indeed, studies have shown that almost 60% of patients in transitions of care are at risk for one or more medication errors.[5,82] Community pharmacies have a core position in care transitions to outpatient care because they distribute medications for outpatients; however, they are often not recognized as an integral part of the care pathways.[83] As the experts outlined in this study, research and consequent agreement on the roles of different care providers in medication care pathways are critically needed to support safe care transitions to outpatient care.

The experts also proposed research on systems-based development of community pharmacies' internal processes, such as risk management in medication dispensing, and provision of services improving medication safety. A wide range of such services exist, but their implementation level varies significantly between countries.[28] Although these services are also provided in Finnish outpatient care to some extent, only medication dispensing, related counseling, and automated dose dispensing are well integrated into daily practice.[51] The mentioned services are partly reimbursed from public funds.[10,51,74,84] In Finland, large-scale implementation of community pharmacy-provided medication safety services has been hindered by regulative barriers because community pharmacies' income consists primarily of prescription and over-The-counter medicine sales.[10] The experts suggested research to define the services' contents and to design their operating models within the health- and social care system to enable larger-scale implementation of the services in the future. Indeed, this type of service research and development would also have international relevancy; it would provide homogeneity, equalize patient access to community pharmacy services, and facilitate high-quality effectiveness research when the content and operational outlines of the services are nationally standardized. Also, ensuring the supporting legislation and incentives, eg, service-based medicine tariff and remuneration of services, should be considered for their profitable provision.[10,12,51,85–87]

Based on this study, the comprehensive utilization of medication safety incident information in outpatient medication safety research and development is recommended. Indeed, the implementation of incident reporting and learning systems and the utilization of their data is one of the key strategies for reducing patient harm.[88,89] The present study raised several research opportunities created by the patient safety incident reporting and learning system, HaiPro, newly adopted in the Finnish community pharmacies.[52,53] While the existing literature on incident reporting systems mainly concentrates on quantitative description of the incidents, the present research needs covered the use of medication safety incident data for developing systems-based defenses, as well as optimizing the reporting process and competencies of the personnel.[5,54,90] The suggested research needs also employed an internationally unique feature of the HaiPro system; it shares medication safety incident information between organizations involved in the reported incident and simultaneously accumulates incident data at the wellbeing services county and national levels. This enables data utilization for medication risk management at multiple levels of the system. As well, involving community pharmacy professionals in inter-unit medication safety incident reporting concretizes the safeguarding role of community pharmacies when they detect, solve, and report medication incidents that have occurred in other health- and social care units. Through local incident information sharing, the system provides opportunities for developing local medication risk management models involving community pharmacies as partners. However, this kind of practice should be supported by national policies; eg, in Finland, community pharmacies are not legally defined as healthcare providers. Consequently, any legislative prerequisites to involve community pharmacy professionals in the patient safety incident documentation do not apply either. Nevertheless, national authorities and research literature have recommended introducing a shared patient safety incident reporting and learning system, involving community pharmacies in all regions, and establishing explicit operating models for sharing incident information.[91] These experiences underscore the practical importance of national health policy measures and evidence-based policymaking to improve community pharmacy involvement in medication risk monitoring.

Study Strengths and Limitations

The NGT is a flexible method often subjected to modifications, which were necessary in this research as well.[61,92,93] The study comprised all the traditional steps of the NGT, even though they were separated (Figure 1). In the present study, the modified NGT with separated steps made it possible for the participants to longer reflect on the proposed research needs and their prioritization, potentially increasing the study's validity.[94] The study was conducted entirely online and did not involve face-to-face interaction between the participants due to the COVID-19 pandemic.[93,95,96] A similar modernizing approach has also been adopted by other studies with an increased methodological feasibility.[59,93,95–99] The strengths of an online implementation were considered to outweigh its potential limitations and the benefits of a face-to-face meeting (eg, the possibility to better influence group interaction dynamics); the online implementation has enabled participation across larger geographical regions, accommodated time constraints, and reduced the costs associated with traditional face-to-face meetings.[93,95,100] The number and size of the nominal groups and the number of ranked research needs were based on existing literature; they and the overall functionality of the modified NGT process were ensured with the pilot study, and yielded no changes to the process.[61]

The study participants were selected based on a purposive expert sampling using precise selection criteria, which also could involve potential limitations.[101] Although individuals with varying professional backgrounds and a wide range of expertise in medication risk management were recruited to participate, some experts may have been left unidentified and, hence, could not provide their perspectives.[94] Pharmacists were the most represented profession (83% of all experts participated), which could have influenced the prioritization. However, the pharmacists had varying organizational backgrounds (not only community pharmacies), and the resulting prioritization widely reflected outpatient care and the health- and social care system. Consequently, the experts were able to produce a topical framework for outpatient medication safety research, which was also manifested through the large extent of the innovated research needs.

Study Implication

The present study has resulted in a national research strategy for the Valo program, which was developed to support systematic research into, the development of, and policymaking of medication safety in Finnish outpatient care.[52] The strategy reinforces other research strategies for rational pharmacotherapy and pharmaceutical services established by the Ministry of Social Affairs and Health (2018–2022) and the Finnish Medicines Agency Fimea (2025–2029).[102,103] Such strategies are needed as evidence-based policymaking and development will become even more pronounced in many countries; eg, in Finland a growing societal and political pressure exists to reform the community pharmacy system with expanding medication sale channels, while simultaneously the health- and social care system is under pressure to introduce cost savings. Consequently, the effective utilization of all available resources for ensuring medication risk management of outpatients is urgently needed.

To implement research in the outlined areas into practice, countries should identify their local and national health- and social care structures and ensure that the community pharmacies are involved as part of those structures. From the regulatory perspective, this would require defining community pharmacies as health- and social care providers. Policies should facilitate collaboration and information sharing between community pharmacies and other health- and social care organizations. Conversely, excluding community pharmacies from policies can hinder building collaboration and their active role in outpatient medication risk management.

Conclusions

The modified NGT proved an efficient data collection method for producing an outline for current research priorities in outpatient medication safety. The research needs cover a wide range of areas on strengthening the collaboration between community pharmacies and other health- and social care providers, developing regional medication care pathways, optimizing medication safety incident reporting and learning, and promoting medication safety processes and services of community pharmacies. Producing evidence about the effectiveness and cost-effectiveness of activities in the before-mentioned areas is particularly important for practice development and policymaking. While the identified research needs have the potential to be applied across countries, variations in the operational environments of health- and social care systems should be considered before their application. The implementation of the outlined research should be supported

by updated regulations on community pharmacies' role in outpatient medication risk management and respective collaboration models in health- and social care systems.

Abbreviations

NGT, nominal group technique; COREQ, consolidated criteria for reporting qualitative research.

Data Sharing Statement

The data generated and analyzed during the present study are not publicly available, but the possibility to accessing the data can be negotiated with the corresponding author.

Ethics Approval and Informed Consent

The study was carried out in accordance with the national guidelines for responsible and ethical conduct of research in human sciences.[104–106] According to the Finnish Act on Medical Study (1999/488) and the guidelines by the Finnish National Board on Research Integrity, this study did not require formal ethics review and approval by the research ethics committee.[104–107] Consequently, the University of Helsinki Research Ethics Committee in the Humanities and Social and Behavioral Sciences deemed no need for an ethics review for the present study.

Participating in the study was voluntary, and written informed consent was obtained from all the participants. The research data protection statement, according to articles 12–14 of the EU General Data Protection Regulation (GDPR), was provided to participants, and all research material was handled and stored confidentially and securely.[108] The data collected from the study was anonymized and used only for the purposes described in the research data protection statement.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

References

1. World Health Organization. *Global Patient Safety Action Plan 2021-2030: Towards Eliminating Avoidable Harm in Health Care*. Geneva: World Health Organization; 2021. Available from: https://iris.who.int/bitstream/handle/10665/343477/9789240032705-eng.pdf?sequence=1. Accessed December 21, 2024.
2. World Health Organization. *The Global Patient Safety Challenge: Medication Without Harm*. Geneva: World Health Organization; 2017. Available from: https://iris.who.int/bitstream/handle/10665/255263/who-his-sds-2017.6-eng.pdf?sequence=1. Accessed December 21, 2024.
3. World Health Organization. *Medication Errors: Technical Series on Safer Primary Care*. Geneva: World Health Organization; 2016. Available from: https://iris.who.int/bitstream/handle/10665/252274/9789241511643-eng.pdf?sequence=1&isAllowed=y. Accessed December 21, 2024.
4. Aitken M, Gorokhovich L. *Advancing the Responsible Use of Medicines: Applying Levers for Change*. Parsippany: IMS institute of healthcare informatics; 2012. doi:10.2139/ssrn.2222541

5. World Health Organization. *Global Burden of Preventable Medication-Related Harm in Health Care: A Systematic Review*. Geneva: World Health Organization; 2023. Available from: https://iris.who.int/bitstream/handle/10665/376203/9789240088887-eng.pdf?sequence=1.
6. Naseralallah L, Stewart D, Price M, Paudyal V. Prevalence, contributing factors, and interventions to reduce medication errors in outpatient and ambulatory settings: a systematic review. *Int J Clin Pharm*. 2023;45(6):1359–1377. doi:10.1007/s11096-023-01626-5
7. Panesar SS, Desilva D, Carson-Stevens A, et al. How safe is primary care? A systematic review. *BMJ Qual Saf*. 2016;25(7):544–553. doi:10.1136/bmjqs-2015-004178
8. Kuriakose R, Aggarwal A, Sohi RK, Goel R, Rashmi N, Gambhir RS. Patient safety in primary and outpatient health care. *J Family Med Prim Care*. 2020;9(1):7–11. doi:10.4103/jfmpc.jfmpc_837_19
9. Wasserman RL, Edrees HH, Amato MG, et al. Frequency and preventability of adverse drug events in the outpatient setting. *BMJ Qual Saf*. 2024;2024:1–8. doi:10.1136/bmjqs-2024-017098
10. Airaksinen M, Toivo T, Jokinen L, et al. Policy and vision for community pharmacies in Finland: a roadmap towards enhanced integration and reduced costs. *Pharm Pract*. 2021;19(1):2288. doi:10.18549/pharmpract.2021.1.2288
11. Kehrer JP, Eberhart G, Wing M, Horon K. Pharmacy's role in a modern health continuum. *Can Pharmacists J*. 2013;146(6):321–324. doi:10.1177/1715163513506370
12. Mossialos E, Courtin E, Naci H, et al. From "retailers" to health care providers: transforming the role of community pharmacists in chronic disease management. *Health Policy*. 2015;119(5):628–639. doi:10.1016/j.healthpol.2015.02.007
13. Kallio S, Eskola T, Pohjanoksa-Mäntylä M, Airaksinen M. Medication risk management in routine dispensing in community pharmacies. *Int J Environ Res Public Health*. 2020;17(21):8186. doi:10.3390/ijerph17218186
14. Ylä-Rautio H, Siissalo S, Leikola S. Drug-related problems and pharmacy interventions in non-prescription medication, with a focus on high-risk over-the-counter medications. *Int J Clin Pharm*. 2020;42(2):786–795. doi:10.1007/s11096-020-00984-8
15. Vik S, Weidemann P, Gangås IEM, Knapstad SE, Haavik S. Pharmaceutical interventions on prescriptions in Norwegian community and hospital pharmacies. *Int J Clin Pharm*. 2021;43(4):872–877. doi:10.1007/s11096-020-01188-w
16. Valliant SN, Burbage SC, Pathak S, Urick BY. Pharmacists as accessible health care providers: quantifying the opportunity. *J Manag Care Spec Pharm*. 2022;28(1):85–90. doi:10.18553/jmcp.2022.28.1.85
17. Bader L, Kusynová Z, Duggan C. FIP Perspectives: realising global patient safety goals requires an integrated approach with pharmacy at the core. *Res Social Adm Pharm*. 2019;15(7):815–817. doi:10.1016/j.sapharm.2019.02.012
18. Mansur JM. Medication safety systems and the important role of pharmacists. *Drugs Aging*. 2016;33(3):213–221. doi:10.1007/s40266-016-0358-1
19. Hong K, Hong YD, Cooke CE. Medication errors in community pharmacies: the need for commitment, transparency, and research. *Res Soc Adm Pharm*. 2019;15(7):823–826. doi:10.1016/j.sapharm.2018.11.014
20. Rathbone AP, Mansoor SM, Krass I, Hamrosi K, Aslani P. Qualitative study to conceptualise a model of interprofessional collaboration between pharmacists and general practitioners to support patients' adherence to medication. *BMJ Open*. 2016;6(3):e010488. doi:10.1136/bmjopen-2015-010488
21. Kallio S. *Community Pharmacists' Contribution to Prospective Medication Risk Management for Older Adults in the Context of Network Theory*. Doctoral dissertation. Helsinki: University of Helsinki; 2021. http://urn.fi/urn:isbn:978-951-51-7606-6.
22. Dalton K, Byrne S. Role of the pharmacist in reducing healthcare costs: current insights. *Integr Pharm Res Pract*. 2017;6:37–46. doi:10.2147/iprp.s108047
23. Toivo T. *Prospective Medication Risk Management in Primary Care: Enhancing Coordination of Care and Community Pharmacists' Participation*. Doctoral dissertation. Helsinki: University of Helsinki; 2020. http://urn.fi/urn:isbn:978-951-51-6464-3.
24. Gilbert JHV, Yan J, Hoffman SJ. A WHO report: framework for action on interprofessional education and collaborative practice. *J Allied Health*. 2010;39(3):196–197.
25. Ravi P, Pfaff K, Ralph J, Cruz E, Bellaire M, Fontanin G. Nurse-pharmacist collaborations for promoting medication safety among community-dwelling adults: a scoping review. *Int J Nurs Stud Adv*. 2022;4:100079. doi:10.1016/j.ijnsa.2022.100079
26. Angibaud M, Jourdain M, Girard S, et al. Involving community pharmacists in interprofessional collaboration in primary care: a systematic review. *BMC Prim Care*. 2024;25(1):103. doi:10.1186/s12875-024-02326-3
27. International Pharmaceutical Federation (FIP). *The Role of Pharmacists in Promoting Patient Safety. FIP Statement of Policy*. The Hague: FIP; 2020. Available from: https://www.fip.org/file/4788.
28. Soares IB, Imfeld-Isenegger TL, Makovec UN, et al. A survey to assess the availability, implementation rate and remuneration of pharmacist-led cognitive services throughout Europe. *Res Social Adm Pharm*. 2020;16(1):41–47. doi:10.1016/j.sapharm.2019.02.002
29. White A, Fulda KG, Blythe R, et al. Defining and enhancing collaboration between community pharmacists and primary care providers to improve medication safety. *Expert Opin Drug Saf*. 2022;21(11):1357–1364. doi:10.1080/14740338.2022.2147923
30. Kucukarslan S, Lai S, Dong Y, Al-Bassam N, Kim K. Physician beliefs and attitudes toward collaboration with community pharmacists. *Res Social Adm Pharm*. 2011;7(3):224–232. doi:10.1016/j.sapharm.2010.07.003
31. Newman TV, Hernandez I, Keyser D, et al. Optimizing the role of community pharmacists in managing the health of populations: barriers, facilitators, and policy recommendations. *J Manag Care Spec Pharm*. 2019;25(9):995–1000. doi:10.18553/jmcp.2019.25.9.995
32. Perraudin C, Bugnon O, Pelletier-Fleury N. Expanding professional pharmacy services in European community setting: is it cost-effective? A systematic review for health policy considerations. *Health Policy*. 2016;120(12):1350–1362. doi:10.1016/j.healthpol.2016.09.013
33. Mossialos E, Naci H, Courtin E. Expanding the role of community pharmacists: policymaking in the absence of policy-relevant evidence? *Health Policy*. 2013;111(2):135–148. doi:10.1016/j.healthpol.2013.04.003
34. Ministry of Social Affairs and Health. Health services. Available from: https://stm.fi/en/health-services. Accessed April 3, 2024.
35. Statistics Finland. Population structure. StatFin database. Available from: https://stat.fi/en/statistics/vaerak. Accessed June 19, 2024
36. Ministry of Social Affairs and Health. Wellbeing services counties. Available from: https://stm.fi/en/wellbeing-services-counties. Accessed April 3, 2024
37. Keskimäki I, Tynkkynen LK, Reissell E, et al. *Health Systems in Transition: Finland Health System Review 2019*. European Observatory on Health Systems and Policies, World Health Organization; Copenhagen: 2019. https://iris.who.int/bitstream/handle/10665/327538/hit-21-2-2019-eng.pdf?sequence=7.

38. Tynkkynen LK, Keskimäki I, Karanikolos M, Litvinova Y. *Finland: Health System Summary 2023*. Copenhagen: European Observatory on Health Systems and Policies, World Health Organization; 2023. https://iris.who.int/bitstream/handle/10665/366710/9789289059398-eng.pdf?sequence=1.
39. Rissanen P, Parhiala K, Hetemaa T, et al. *Social and Healthcare Services in Finland 2018: Expert Evaluation. Policy Brief 4/2020*. The National Institute for Health and Welfare; Helsinki: 2020. https://urn.fi/urn:isbn:978-952-343-360-1.
40. Ministry of Social Affairs and Health. *National Objectives for the Organisation of Healthcare and Social Welfare. Publications of the Ministry of Social Affairs and Health 7/2024*. Helsinki: Ministry of Social Affairs and Health; 2024. Available from: http://urn.fi/urn:isbn:978-952-00-5448-9.
41. Ministry of Social Affairs and Health. Medicines Act 395/1987. Available from: https://fimea.fi/documents/147152901/159465419/18580_Laakelaki_englanniksi_paivitetty_5_2011.pdf/9a5a488a-5744-47b7-9f54-6f4e495760a2/18580_Laakelaki_englanniksi_paivitetty_5_2011.pdf?t=1616752303676. Accessed June 19, 2024
42. Jormanainen V. Large-scale implementation and adoption of the Finnish national Kanta services in 2010–2017: a prospective, longitudinal, indicator-based study. *Finnish J eHealth eWelfare*. 2018;10(4):381–395. doi:10.23996/fjhw.74511
43. Jormanainen V, Vehko T, Lindgren M, et al. Implementation, adoption and use of the Kanta services in Finland 2010–2022. In: Hägglund M, Blusi M, Bonacina S, editors. *Caring is Sharing – Exploiting the Value in Data for Health and Innovation*. Amsterdam: IOS Press BV; 2023:227–231. doi:10.3233/shti230108
44. Puumalainen I. *Development of Instruments to Measure Quality of Patient Counselling*. Doctoral dissertation. Kuopio: University of Kuopio; 2005. http://urn.fi/urn:isbn:951-27-0053-0.
45. Mononen N. *From Paper to Cyber: Medicines Information as a Strategic Goal in Finland and the European Union*. Helsinki: University of Helsinki; 2020. http://urn.fi/urn:isbn:978-951-51-5883-3.
46. Westerling A. *Information Technology Development Needs in Community Pharmacies: A Strategic Approach*. Doctoral dissertation. Helsinki: University of Helsinki; 2011. http://urn.fi/urn:isbn:978-952-10-7222-2.
47. Kauppinen H, Ahonen R, Timonen J. The impact of electronic prescriptions on medication safety in Finnish community pharmacies: a survey of pharmacists. *Int J Med Inform*. 2017;100:56–62. doi:10.1016/j.ijmedinf.2017.01.014
48. Kansanaho H, Puumalainen I, Varunki M, Ahonen R, Airaksinen M. Implementation of a professional program in Finnish community pharmacies in 2000–2002. *Patient Educ Couns*. 2005;57(3):272–279. doi:10.1016/j.pec.2004.07.014
49. Ministry of Social Affairs and Health. Medicines Policy 2020. In: *Publications of the Ministry of Social Affairs and Health 10/2011*. Helsinki: Ministry of Social Affairs and Health; 2011. http://urn.fi/urn:isbn:978-952-00-3165-7.
50. Hämeen-Anttila K, Närhi U, Tahvanainen H. Rational pharmacotherapy action plan: final report. Reports and Memorandums of the Ministry of Social Affairs and Health 19/2018. Helsinki: Ministry of Social Affairs and Health; 2018. Available from: http://urn.fi/urn:isbn:978-952-00-3930-1. Accessed December 21, 2024.
51. Tahvanainen H, Voipio-Pulkki LM, Hämeen-Anttila K, et al. Drawing up the public national rational pharmacotherapy action plan as part of social and health services reform in Finland: a bottom-up approach involving stakeholders. *BMC Health Serv Res*. 2024;24(1):631. doi:10.1186/s12913-024-11068-y
52. The National Medication Safety Programme for Community Pharmacies in Finland (Valo). Information about the Valo programme. Available from: https://valo.apteekki.fi/information-in-english/. Accessed June 19, 2024.
53. Awanic Ltd. HaiPro. Available from: https://awanic.fi/haipro/eng/. Accessed June 4, 2024.
54. Mäkinen E, Holmström AR, Airaksinen M, Schoultz A. Trends in dispensing errors reported in Finnish community pharmacies in 2015–2020: a national retrospective register-based study. *BMC Prim Care*. 2024;25(1):183. doi:10.1186/s12875-024-02428-y
55. McMillan SS, King M, Tully MP. How to use the nominal group and Delphi techniques. *Int J Clin Pharm*. 2016;38(3):655–662. doi:10.1007/s11096-016-0257-x
56. Allen J, Dyas J, Jones M. Building consensus in health care: a guide to using the nominal group technique. *Br J Community Nurs*. 2004;9(3):110–114. doi:10.12968/bjcn.2004.9.3.12432
57. Vella K, Goldfrad C, Rowan K, Bion J, Black N. Use of consensus development to establish national research priorities in critical care. *BMJ*. 2000;320(7240):976–980. doi:10.1136/bmj.320.7240.976
58. Wilkes L, Cummings J, McKay N. Developing a culture to facilitate research capacity building for clinical nurse consultants in generalist paediatric practice. *Nurs Res Pract*. 2013;2013:709025. doi:10.1155/2013/709025
59. Fevang E, Lockey D, Thompson J, Lossius HM. Torpo Research Collaboration. The top five research priorities in physician-provided pre-hospital critical care: a consensus report from a European research collaboration. *Scand J Trauma Resusc Emerg Med*. 2011;19(1):57. doi:10.1186/1757-7241-19-57
60. Humphrey-Murto S, Varpio L, Wood TJ, et al. The use of the Delphi and other consensus group methods in medical education research: a review. *Acad Med*. 2017;92(10):1491–1498. doi:10.1097/acm.0000000000001812
61. McMillan SS, Kelly F, Sav A, et al. Using the nominal group technique: how to analyse across multiple groups. *Health Serv Outcomes Res Methodol*. 2014;14(3):92–108. doi:10.1007/s10742-014-0121-1
62. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19(6):349–357. doi:10.1093/intqhc/mzm042
63. Etikan I, Abubakar Musa S, Sunusi Alkassim R. Comparison of convenience sampling and purposive sampling. *Am J Theor Appl Stat*. 2016;5(1):1–4. doi:10.11648/j.ajtas.20160501.11
64. Braun V, Clarke V. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qual Res Sport Exerc Health*. 2019;13(2):201–216. doi:10.1080/2159676x.2019.1704846
65. Muijeen K, Kongvattananon P, Somprasert C. The key success factors in focus group discussions with the elderly for novice researchers: a review. *J Health Res*. 2020;34(4):359–371. doi:10.1108/jhr-05-2019-0114
66. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: implications for conducting a qualitative descriptive study. *Nurs Health Sci*. 2013;15(3):398–405. doi:10.1111/nhs.12048
67. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77–101. doi:10.1191/1478088706qp063oa
68. Van Breda AD. Steps to analysing multiple-group NGT data. *Soc Work Pract Res*. 2005;17(1):1–14.

69. ATLAS.ti Scientific Software Development GmbH. ATLAS.ti - software for qualitative data analysis. 2024. Available from: https://atlasti.com/. Accessed June 5, 2024
70. Braun V, Clarke V. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qual Res Psychol*. 2020;18(3):328–352. doi:10.1080/14780887.2020.1769238
71. Institute of Medicine (US) Committee on Quality of Health Care in America. *To Err is Human: Building a Safer Health System*. Kohn LT, Corrigan JM, Donaldson MS, eds.. Washington DC: National Academies Press (US); 2000. doi:10.17226/9728
72. Reason J. Human error: models and management. *Br Med J*. 2000;320(7237):768–770. doi:10.1136/bmj.320.7237.768
73. Expert Group on Safe Medication Practices. Creation of a better medication safety culture in Europe: building up safe medication practices. Council of Europe. Available from: http://optimiz-sih-circ-med.fr/documents/council_of_europe_medication_safety_report_19-03-2007.pdf. Accessed June 17, 2024
74. Sinnemäki J. *Automated Dose Dispensing Service for Primary Care Patients and Its Impact on Medication Use, Quality and Safety*. Doctoral dissertation. Helsinki: University of Helsinki; 2020. http://urn.fi/urn:isbn:978-951-51-6537-4.
75. Alastalo N, Siitonen P, Jyrkkä J, Hämeen-Anttila K. The quality of non-prescription medicine counselling in Finnish pharmacies – a simulated patient study. *Explor Res Clin Soc Pharm*. 2023;11:100304. doi:10.1016/j.rcsop.2023.100304
76. Teinilä T, Grönroos V, Airaksinen M. Survey of dispensing error practices in community pharmacies in Finland: a nationwide study. *J Am Pharm Assoc*. 2009;49(5):604–610. doi:10.1331/japha.2009.08075
77. Dawoud DM, Haines A, Wonderling D, et al. Cost effectiveness of advanced pharmacy services provided in the community and primary care settings: a systematic review. *Pharmacoeconomics*. 2019;37(10):1241–1260. doi:10.1007/s40273-019-00814-4
78. Kallio S, Kumpusalo-Vauhkonen A, Järvensivu T, Mäntylä A, Pohjanoksa-Mäntylä M, Airaksinen M. Towards interprofessional networking in medication management of the aged: current challenges and potential solutions in Finland. *Scand J Prim Health Care*. 2016;34(4):368–376. doi:10.1080/02813432.2016.1249055
79. Tang CJ, Chan SW, Zhou WT, Liaw SY. Collaboration between hospital physicians and nurses: an integrated literature review. *Int Nurs Rev*. 2013;60(3):291–302. doi:10.1111/inr.12034
80. Ministry of Social Affairs and Health. *The Client and Patient Safety Strategy and Implementation Plan 2022–2026. Publications of the Ministry of Social Affairs and Health 12/2022*. Helsinki: Ministry of Social Affairs and Health; 2022. Available from: http://urn.fi/urn:isbn:978-952-00-9712-7.
81. World Health Organization. Medication safety in transitions of care: technical report. Geneva: World Health Organization; 2019. Available from: https://iris.who.int/bitstream/handle/10665/325453/who-uhc-sds-2019.9-eng.pdf?sequence=1. Accessed December 21, 2024.
82. Redmond P, Grimes TC, Mcdonnell R, Boland F, Hughes C, Fahey T. Impact of medication reconciliation for improving transitions of care. *Cochrane Database Syst Rev*. 2018;8(8):cd010791. doi:10.1002/14651858.cd010791.pub2
83. Piquer-Martinez C, Urionagüena A, Benrimoj SI, et al. Integration of community pharmacy in primary health care: the challenge. *Res Social Adm Pharm*. 2022;18(8):3444–3447. doi:10.1016/j.sapharm.2021.12.005
84. Ministry of Social Affairs and Health. Health Insurance Act 1224/2004. Available from: https://www.finlex.fi/en/laki/kaannokset/2004/20041224. Accessed June 19, 2024
85. Hussain R, Babar ZUD. Global landscape of community pharmacy services remuneration: a narrative synthesis of the literature. *J Pharm Policy Pract*. 2023;16(1):118. doi:10.1186/s40545-023-00626-0
86. Jokinen L, Puumalainen I, Airaksinen M. Factors associated with health service orientation and active product marketing orientation in Finnish community pharmacies: a nationwide study among private pharmacy owners. *BMC Health Serv Res*. 2020;20(1):667. doi:10.1186/s12913-020-05469-y
87. The Finnish Government. Government decree on the tariff of medicines (Valtioneuvoston asetus lääketaksasta) 713/2013 [in Finnish]. Available from: https://www.finlex.fi/fi/laki/ajantasa/2013/20130713. Accessed June 17, 2024
88. World Health Organization. Patient Safety Incident Reporting and Learning Systems: Technical Report and Guidance. Geneva: World Health Organization; 2020. Available from: https://iris.who.int/bitstream/handle/10665/334323/9789240010338-eng.pdf?sequence=1. Accessed December 21 2024.
89. Holmström AR. *Learning from Medication Errors in Healthcare: How to Make Medication Error Reporting Systems Work? Doctoral Dissertation*. Helsinki: University of Helsinki; 2017. http://urn.fi/urn:isbn:978-951-51-3087-7.
90. Campbell PJ, Patel M, Martin JR, et al. Systematic review and meta-analysis of community pharmacy error rates in the USA: 1993–2015. *BMJ Open Qual*. 2018;7(4):e000193. doi:10.1136/bmjoq-2017-000193
91. Safety Investigation Authority (Finland). *Omission of a Dose-Dispensed Medicine in Satakunta in the Spring of 2023 (T2023-01)*. Helsinki: Safety Investigation Authority (Finland); 2024. Available from: https://www.turvallisuustutkinta.fi/en/index/tutkintaselostukset/socialandhealthcareaccidents/t2023-01omissionofadose-dispensedmedicineinsatakuntainthespringof2023.html
92. Humphrey-Murto S, Lee SH, Gottlieb M, et al. Protocol for an extended scoping review on the use of virtual nominal group technique in research. *PLoS One*. 2023;18(1):e0280764. doi:10.1371/journal.pone.0280764
93. Lee SH, Ten O, Id C, et al. The use of virtual nominal groups in healthcare research: an extended scoping review. *PLoS One*. 2024;19(6):e0302437. doi:10.1371/journal.pone.0302437
94. FitzPatrick B. Validity in qualitative health education research. *Curr Pharm Teach Learn*. 2019;11(2):211–217. doi:10.1016/j.cptl.2018.11.014
95. Mason S, Ling J, Mosoiu D, et al. Undertaking research using online nominal group technique: lessons from an international study (RESPACC). *J Palliat Med*. 2021;24(12):1867–1871. doi:10.1089/jpm.2021.0216
96. Khurshid F, O'Connor E, Thompson R, Hegazi I. Twelve tips for adopting the virtual nominal group technique (vNGT) in medical education research. *MedEdPublish*. 2023;13:18. doi:10.12688/mep.19603.1
97. Backhouse MR, Parker DJ, Morison SC, Anderson J, Cockayne S, Adamson JA. Using a modified nominal group technique to develop complex interventions for a randomised controlled trial in children with symptomatic pes planus. *Trials*. 2022;23(1):286. doi:10.1186/s13063-022-06251-7
98. Newham R, Weir N, Ferguson A, Bennie M. Identifying the important outcomes to measure for pharmacy-led, clinical services within primary care: a nominal group technique approach. *Res Social Adm Pharm*. 2023;19(3):468–476. doi:10.1016/j.sapharm.2022.11.003
99. Newlands RS, Power A, Young L, Watson M. Quality improvement of community pharmacy services: a prioritisation exercise. *Int J Pharm Pract*. 2018;26(1):39–48. doi:10.1111/ijpp.12354

100. D'Cunha NM, Holloway H, Gibson D, et al. Designing an alternative, community integrated model of residential aged care for people living with dementia: nominal group technique and thematic analysis. *J Alzheimers Dis*. 2023;94(3):1247–1263. doi:10.3233/jad-230368
101. Andrade C. The inconvenient truth about convenience and purposive samples. *Indian J Psychol Med*. 2020;43(1):86–88. doi:10.1177/0253717620977000
102. Airaksinen M, Hämeen-Anttila K, Saastamoinen L. Research for Evidence-Informed Decision-Making: Research Strategy for Rational Pharmacotherapy 2018-2022. *Reports and Memorandums of the Ministry of Social Affairs and Health 25/2018*. Helsinki: Ministry of Social Affairs and Health; 2018. Available from: http://urn.fi/urn:isbn:978-952-00-3940-0.
103. Saastamoinen L, Kuosmanen P, Kurko T, Laitinen-Parkkonen P, Timonen J, Tolonen H. Research for Evidence-Informed Decision-Making: Research Strategy for Rational Pharmacotherapy and Pharmaceutical Services 2025-2029 [in Finnish]. *Serial Publication Fimea Develops, Assesses and Informs 15/2024*. Kuopio: Finnish Medicines Agency Fimea; 2024. Available from: https://urn.fi/URN:ISBN:978-952-7299-73-9.
104. Finnish Advisory Board on Research Integrity TENK. Responsible Conduct of Research and Procedures for Handling Allegations of Misconduct in Finland. In: *Guidelines of the Finnish Advisory Board on Research Integrity 2012*. Helsinki: Finnish Advisory Board on Research Integrity TENK; 2012. Available from: https://tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf.
105. Finnish Advisory Board on Research Integrity TENK. The Finnish Code of Conduct for Research Integrity and Procedures for Handling Alleged Violations of Research Integrity in Finland. In: *Publications of the Finnish National Board on Research Integrity TENK 4/2023*. Helsinki: Finnish Advisory Board on Research Integrity TENK; 2023. Available from: https://tenk.fi/sites/default/files/2023-05/RI_Guidelines_2023.pdf.
106. Finnish Advisory Board on Research Integrity TENK. *The Ethical Principles of Research with Human Participants and Ethical Review in the Human Sciences in Finland. Finnish National Board on Research Integrity TENK Guidelines 3/2019*. Helsinki: Finnish Advisory Board on Research Integrity TENK; 2019. Available from: https://tenk.fi/sites/default/files/2021-01/Ethical_review_in_human_sciences_2020.pdf.
107. Ministry of Social Affairs and Health. Medical Research Act 488/1999. Available from: https://www.finlex.fi/en/laki/kaannokset/1999/en19990488. Accessed June 19, 2024
108. European Parliament and of the Council. EU General Data Protection Regulation (GDPR) 2016/679. Available from: http://data.europa.eu/eli/reg/2016/679/oj. Accessed June 19, 2024