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Nurses' Awareness and Strategies for Safe Polypharmacy Practices in Geriatric Care

A Literature Review

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Abstract

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Polypharmacy has emerged as a heightened concern in geriatric care amid the demographic shift towards an older population. It is estimated that by 2050, one out of every six individuals globally is projected to be over 65. The study aimed to describe nurses' awareness of and challenges in safe polypharmacy practices in geriatric care. The study aimed to provide new knowledge on strategies and challenges associated with safe polypharmacy management in geriatric patients.

A qualitative methodological approach was employed in the study, and a descriptive literature review was conducted as the method. Articles were retrieved from academic databases such as PubMed, CINAHL, and MEDLINE. Nine (09) articles were aligned with inclusion and exclusion criteria for the analysis phase. Inductive reasoning was utilised to analyze the data in the study.

The results of the study demonstrated nurses' awareness of challenges in geriatric polypharmacy, which centered on two key aspects: nurses' awareness of polypharmacy risks and nurses' awareness of quality care concerns. Beyond the nurses' awareness of challenges in polypharmacy care, the study further emphasized strategies for safe pharmacological practices in geriatric care based on two fundamentals: promotion of healthcare practices and promotion of nurses' expertise.

Although nurses may demonstrate basic understanding about challenges and other possible complexities related to geriatric polypharmacy care, nurses still exhibit deficient skills in the actual medication management process. These deficiencies are multifaceted, including nurses' inadequate identification of medication errors, high-risk medications, communication gaps, and medication management gaps. The incorporation of strategies such as patient-tailored care, patient care prioritisation, effective communication strategies, collaborative teamwork, nurses' proper documentation, career-long professional initiatives for nurses, evidence-based nursing care practice, and comprehensive care planning contributes to promoting safe pharmacological practices in geriatric care.

Keywords: nurses' awareness, polypharmacy, geriatric care, strategies

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Contents

1 Introduction

Polypharmacy can be defined as the concurrent usage of five or more medications, such as medications that are available without a prescription (over-the-counter medications), prescribed medications, traditional medicines, and alternative treatment options, simultaneously for a long period (World Health Organization 2019: 11; Sheikh-Taha and Asmar 2021: 2). Consumption of medications to treat multiple diseases as well as to extend the life span of individuals who live with various comorbidities is caused to increase the significance of making a discussion on polypharmacy (Taghy, Cambon, Boulliat, Aromatarion and Dussart 2021: 1).

In the present day, polypharmacy has become a global health concern and is considerably noted in the geriatric population as they spend their lives with multiple chronic medical conditions such as diabetes, hypertension, asthma, and heart diseases and they are on several medications to treat these medical issues concurrently (Sheikh-Taha and Asmar 2021: 2). Prescribing multiple medications in the aging population is needed practices which ensures an appropriate polypharmacy. However, the application of inappropriate polypharmacy in treating numerous health problems can cause patient harm, including deaths, adverse drug reactions, dangerous drug-drug reactions, and various side effects. Moreover, it has a significant impact on extending the length of hospitalization and increasing healthcare expenditures, and it acts as a challenge in polypharmacy. (Delara et al. 2022: 2; WHO 2019: 12; Rodrigues and Oliveira 2016: 2.)

Nurses are important in managing polypharmacy among the geriatric population. Thus, they should remain well aware of the impact of polypharmacy and the challenges in managing polypharmacy, making appropriate medication management to avoid unnecessary effects of polypharmacy. They should acknowledge in collaborative team approach towards effective polypharmacy management. (Cheng, Yu and Wang 2023: 1.) Nurses' lack of awareness, knowledge, confidence, and patient observation may lead to negative impacts of polypharmacy. Therefore, raising the awareness of nurses on polypharmacy ensures the appropriate management of polypharmacy as well as the evidence-based solutions. Nurses' knowledge and awareness about deprescribing medications in geriatric care settings are important in enhancing medication safety, as well as reducing the negative effects of polypharmacy. (Vaismoradi, Mardani, Crespo, Logan and Sak-Dankosky 2024: 1.) Therefore, this study aims to provide an understanding of nurses' awareness of polypharmacy to ensure medication safety in geriatric care settings.

2 Background and key terms

2.1 Polypharmacy in geriatric care

Polypharmacy can be defined as the continuous, and regular consumption of five or more medications to treat several medical conditions or multiple comorbidities for a prolonged time (WHO 2019: 11). Recently, polypharmacy has become a global health issue as it has considerable and significant negative impacts on geriatric population by associating adverse drug reactions, poor prognosis, and increasing the hospital-related cost and care length (Taghy et al. 2021: 1). Moreover, it leads to increase the risks of medication-related toxicity, falls, delirium, and non-compliance in treatment plan (Hassan, Elden, Hamdi and Aboudonya 2021: 56).

Polypharmacy is necessary, and it has profitable outcomes in the secondary prevention of medical conditions such as myocardial infarction. For instance, combined treatment therapy with statins, antiplatelet agents, and different classes of antihypertensive agents leads to a reduction in the further risk of myocardial infarction. However, polypharmacy involves more negative impacts than desirable outcomes, it emphasizes the importance of evidence-based practices to ensure effective, appropriate polypharmacy as well as to reduce medication-related patient harm. (WHO 2019: 12.)

Appropriate polypharmacy is a crucial element in geriatric care as it can treat diseases and improve health outcomes. Appropriate polypharmacy is established, especially based on a long-term need and is necessary in managing multiple comorbidities to achieve a therapeutic outcome, or to optimize medication therapy. Inappropriate polypharmacy can occur when multiple medications are prescribed without having any specific need or evidence-based indication to start a treatment plan, and it leads to polypharmacy-related patient harm. (WHO 2019: 12.)

2.2 Challenges in polypharmacy

Inappropriate polypharmacy or being on multiple medications for a prolonged period can pose numerous challenges in geriatric care. Moreover, it paves a pathway for medication-related harm, and it is identified as a major health issue in the older population, which is related to polypharmacy. Substandard living status, inadequate compliance with medical treatment plans, adverse drug reactions, increased death rate, increased

incidence of illness, recurrent hospitalisation, extended hospitalisation periods, and financial issues related to the healthcare facility are examples of the challenges in polypharmacy. (poelgeest et al. 2023: 1196; Taghy et al. 2021: 1.)

Managing older patients who are on multiple medications is considerably complex during their hospitalization period, as well as after discharge. The number of medications, frequency, and the length of the treatment plan contribute to increasing the complexity of geriatric medication management. As a result of this, medication errors are prominent in geriatric care management due to the complexity of managing polypharmacy. The possibility of losing information, a doubtful or false conception about the treatment plan, and interruptions in the treatment plan are also playing as key challenges in geriatric polypharmacy management. (Mikkelsen et al. 2023: 2.) Suboptimal medication adherence involves significant healthcare challenges, including poor prognosis, recurrent hospital admissions, extended hospitalization period, increased healthcare cost, elevated mortality rate, and elevated morbidity rate (Oliveira et al. 2024: 1735).

2.3 Nurses' awareness of polypharmacy in geriatric care

Nurses' involvement in polypharmacy management is crucial as they are directly involved in medication procedures. Therefore, nurses' knowledge of the numerous effects of multiple drugs, performing daily assessments and monitoring of patient's medication plans, maintaining effective nurse-patient relationships, patient education on medication adherence, identifying challenges in polypharmacy to address optimal care, doing nurses' documentation, taking a multidisciplinary approach in safe patient care, and making interventions to address patient's safety in according to the polypharmacy risks are important in managing polypharmacy by nurses' side. (Hassan et al. 2021: 57.)

Nurses are the key responsible persons in delivering accurate information about patients' medication plans throughout the process of patient care. Therefore, nurses need to be aware of medication reconciliation as it confirms medication safety as well as patient safety by preventing medication errors. Moreover, it is important in preventing adverse drug reactions. Nurses who participate in medication reconciliation check the medication list, follow-up medication plan, and provide patient education on medication adherence. (Zhu, Wang, Lan and Zhou 2024: 371.)

Nurses have a huge responsibility in preventing medication errors. However, a considerable number of medication errors occur in the stages of drug preparation and administration. So, nurses should have self-adherence and awareness of the medication guidelines to reduce medication-related errors. In addition to this, nurses should be alert about other errors related to medications, such as incorrect dosage, incorrect medication, and administering medication to the wrong patient. This means nurses should be aware of the five rights in medication procedures to ensure patient safety (Karttunen, Sneck, Jokelainen and Elo 2020: 108.)

2.4 Strategies for safe polypharmacy practices

As the polypharmacy culture is a growing issue currently, need to find new interventions and strategies which based on clinical practices as well as technology, and they should be evidence-based. The usage of screening tools like the Screening Tool of Older Persons' Potentially Inappropriate Prescriptions and the Screening Tool to Alert to Right Treatment (STOPP/START) is important in addressing medication safety. In addition to that, risk prediction tools are important in detecting adverse drug reactions. Making strategies to improve medication reconciliation helps to improve the continuity of medication information throughout the process of patient care. Moreover, the usage of smart technology allows for the enhancement of the knowledge of nurses as well as patients regarding medication. (Molokhia and Majeed 2017: 7.)

Increasing the nurses' awareness of identifying inappropriate medication prescribing is important in managing polypharmacy, and addressing the assessment tools is crucial. Moreover, improving nurses' understanding of identifying high-risk medication can reduce the adverse effects of polypharmacy. Optimization of the usage of medication is one of the important steps to address polypharmacy challenges. Regular medication reviews provide support for patients who are on regular multiple medication therapy or who are going to start new medication therapy to reduce the negative impacts of polypharmacy. Arranging multidisciplinary teamwork and making patient-tailored treatment plans are crucial in enhancing safe polypharmacy practices. (Jelenc and Gabrovec 2019: 55, 59-61; Pocknell, Fudge, Collins, Roberts and Swinglehurst 2024: 2.)

2.5 Key terms

Nurses' awareness means understanding or knowledge about different aspects of nursing.

Polypharmacy means the usage of multiple medications, typically five or more, for multiple medical conditions.

Geriatric care means healthcare support that is provided to older people.

Strategies are designed interventions or plans to achieve specific goals or outcomes.

3 Purpose, aim, and research questions

The purpose of the study is to describe nurses' awareness of and challenges in safe polypharmacy practices in geriatric care. The study aims to provide new knowledge on strategies and challenges associated with safe polypharmacy management in geriatric patients. Based on the purpose and aim, the research questions will be:

1. How aware are nurses of polypharmacy challenges in geriatric care?
2. What strategies do nurses demonstrate in their approaches to safe pharmacological practices?

4 Methodology and methods

4.1 Data collection methods

When doing this study, the selection of appropriate data collection methods is crucial in describing the research topic. The articles used to do the study allowed for comprehensive focus and insight on the research topic through the numerous data collection methods tailored to address different aspects of the topic. Data retrieval was done using academic databases such as CINAHL, PubMed, and MEDLINE.

Descriptive qualitative designs were used in the articles, and most of them conducted semi-structured interviews to collect data. Most of the research articles used interviews to gather information on particular aspects of polypharmacy in geriatric care. Some research studies used a focused group approach to collect data regarding the thoughts, beliefs, and perceptions among healthcare professionals on drug-related problems in geriatric polypharmacy.

In addition to that, some research articles used multiple approaches to collect data. For instance, observations and document reviews were used in addition to the interviews to gather comprehensive information on ethical and legal challenges in geriatric nursing care when managing polypharmacy.

4.2 Data search and selection

Data search and selection were conducted through database search terms using the PICo framework as mentioned below (Table 1).

Table 1. Defining search terms using the PICO framework.

Population Concept 1		Interest Concept 2		Context Concept 3
Nurse		Polypharmacy		Elderly
OR		**OR**		**OR**
Registered Nurses	**AND**	Polymedication	**AND**	Older Adult
		OR		**OR**
OR				
Nursing Staff		Multiple Drug Therapy		Geriatric Patients
OR		**OR**		**OR**
Staff Nurse		Multiple Medication		Aged
				OR
				Elder Population

The population represents nurses who work in geriatric care settings. Interest was described based on polypharmacy, and context was identified as geriatric patients. After determining the search terms, inclusion and exclusion criteria were designed to find appropriate research articles to address the research topic. The elderly population aged 65 years and above and those with multimorbidity are used as the population group criteria, and articles which were written in English are used to address the research questions. Furthermore, peer-reviewed primary studies were used as criteria according to the Metropolia guidelines. The time duration was set as 10 years from 2015 to 2025 to collect the latest data on the research topic. In addition to that, research articles with abstracts were used to describe the study due to the time limitations in selecting articles. The inclusion and exclusion criteria used for the literature search are mentioned below (Table 2).

Table 2. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria	Rationale
Primary and Peer-reviewed studies from 2015-2025	Review, review of review, meta-synthesis, and dissertations from 2015 to 2025	Metropolia guidelines
Studies written and published in the English language	Studies written and published in other languages	Academic standards and wider accessibility
Studies focused on the registered nurses' role	Non-nurses studies (doctors and pharmacists)	The focus is on nursing perspectives
The elderly population aged 65 years and above	The elderly population below 65 years	The focus population group is older people aged 65 years and above
The elderly population with multiple comorbidities	The elderly population without comorbidities	The topic is focused on polypharmacy in multiple comorbidities
Articles with abstracts and full-text	Articles without abstracts and full-text	Time limitations in selecting articles
Articles which relevant to the topic and answer the research questions	Non-relevant articles to the topic and research questions	Cover the overall aspects of the topic
Studies in a hospital setting	Studies in nursing care homes	Depending on the authority of medication prescribing

The search terms used in data collection were “Nurse” OR “Registered Nurses” OR “Nursing Staff” OR “Staff Nurse” AND “Polypharmacy” OR “Polymedication” OR “Multiple Drug Therapy” OR “Multiple Medication” AND “Elderly” OR “Older Adult” OR “Geriatric Patients” OR “Aged” OR “Elder Population”. The search terms produced 325 articles as the total database count from CINAHL, MEDLINE, and PubMed.

A librarian specialist was consulted to validate the search terms used to retrieve information in databases. The PRISMA flow chart diagram was designed to visualize the database search approach. According to the PRISMA chart, CINAHL produced 84 articles, PubMed produced 123 articles, and MEDLINE produced 118 articles.

The total database search was 325 articles by the inclusion criteria. Out of 325 articles, 261 articles were excluded based on title and duplicates. The 64 articles were selected based on title, and 60 articles were selected based on abstract. The 4 articles were excluded based on the abstract. Of the 60 articles, 43 were excluded based on full text, and 17 articles were selected based on full text. The selected 17 articles were submitted for review for eligibility. Out of them, 9 articles have been selected for inductive content analysis.

The selected articles for inductive content analysis were arranged in the evaluated articles table (data analysis), and the results are shown in Appendix 2. PRISMA flow chart is mentioned below (Figure 1). The database search results are shown in Appendix 1.

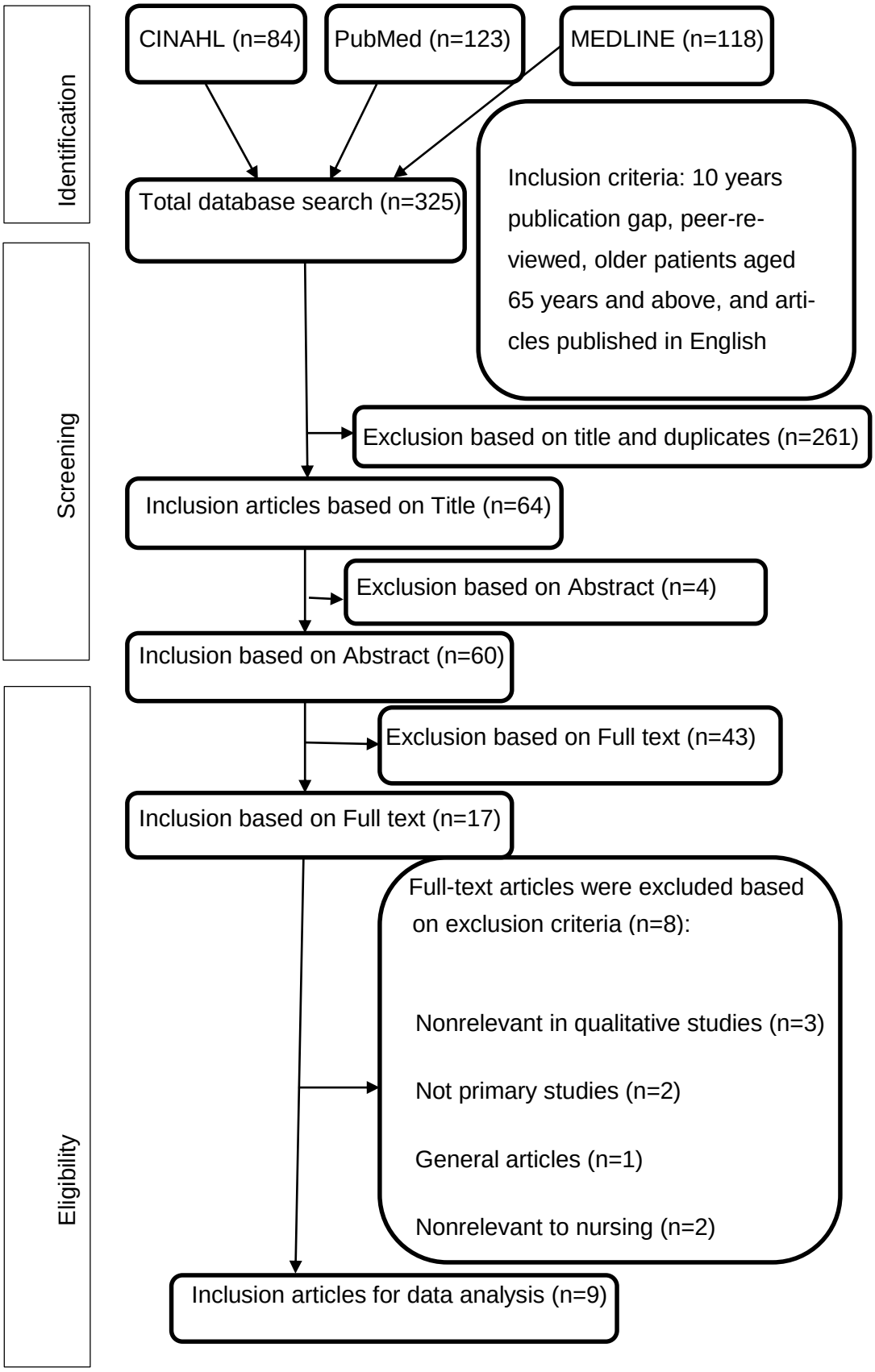

Figure 1. PRISMA flow diagram

4.3 Data Analysis

Content analysis is a well-established data analysis method that is used to study various types of data, either written, spoken, or other forms of information. Moreover, the way of doing content analysis can be driven through different pathways according to the researchers' understanding and perception of the data analysis, or may be according to the formal guidelines which is predefined. Content analysis can be classified into qualitative and quantitative according to its different perspectives. In qualitative content analysis, it is focused on outlining a wide range of overview as well as compressing the concepts and ideas into categories rather than doing numerical analysis. With the purpose of categorizing concepts and ideas, the approach might be either inductive or deductive. (Lynch, Gillam and Vears 2024: 1126.)

Inductive content analysis is based on textual data, and it provides an all-inclusive understanding or perception of the content of the analysis. In addition to that, inductive analysis is developed step by step through the deeper reading and understanding of the content that is going to be analysed, rather than discovering the pre-existing or pre-listed criteria to initiate analysis. (Vears and Gillam 2022: 112.) Deductive content analysis is the data analysis which based on pre-listed or pre-identified criteria, which are developed through already available current literature databases (Lynch et al. 2024: 1128).

In this thesis work, inductive content analysis was used to analyse the data in the selected literature articles, and deep reading continued over all nine articles to find out relevant information that answers the research questions. First, key findings were recognized, and built meaning units to identify subcategories. Finally, the main categories were built, which provide meaningful answers to the research questions. The table below (Table 3) illustrates the inductive content analysis approach for the first research question in the thesis work. The table below (Table 4) illustrates the inductive content analysis for the second research question. The whole inductive data analysis summary is shown in (Appendix 3 and Appendix 4).

Table 3. Examples: Inductive content analysis for the research question 1.

Study	Meaning unit	Code	Sub category	Generic category	Main category
4	Nurses face struggles when managing the negative effects of poor compliance in a comprehensive medication treatment plan. Decentralized patient care and ineffective communication cause to poor quality care. (Plácido et al. 2021)	Nurses' perceived issues with poor compliance. Nurses recognized decentralized patient care issues. Nurses identified communication gaps.	Nurses' awareness of therapeutic care concerns.	Nurses' awareness of quality care concerns.	Nurses' awareness of challenges in geriatric polypharmacy.

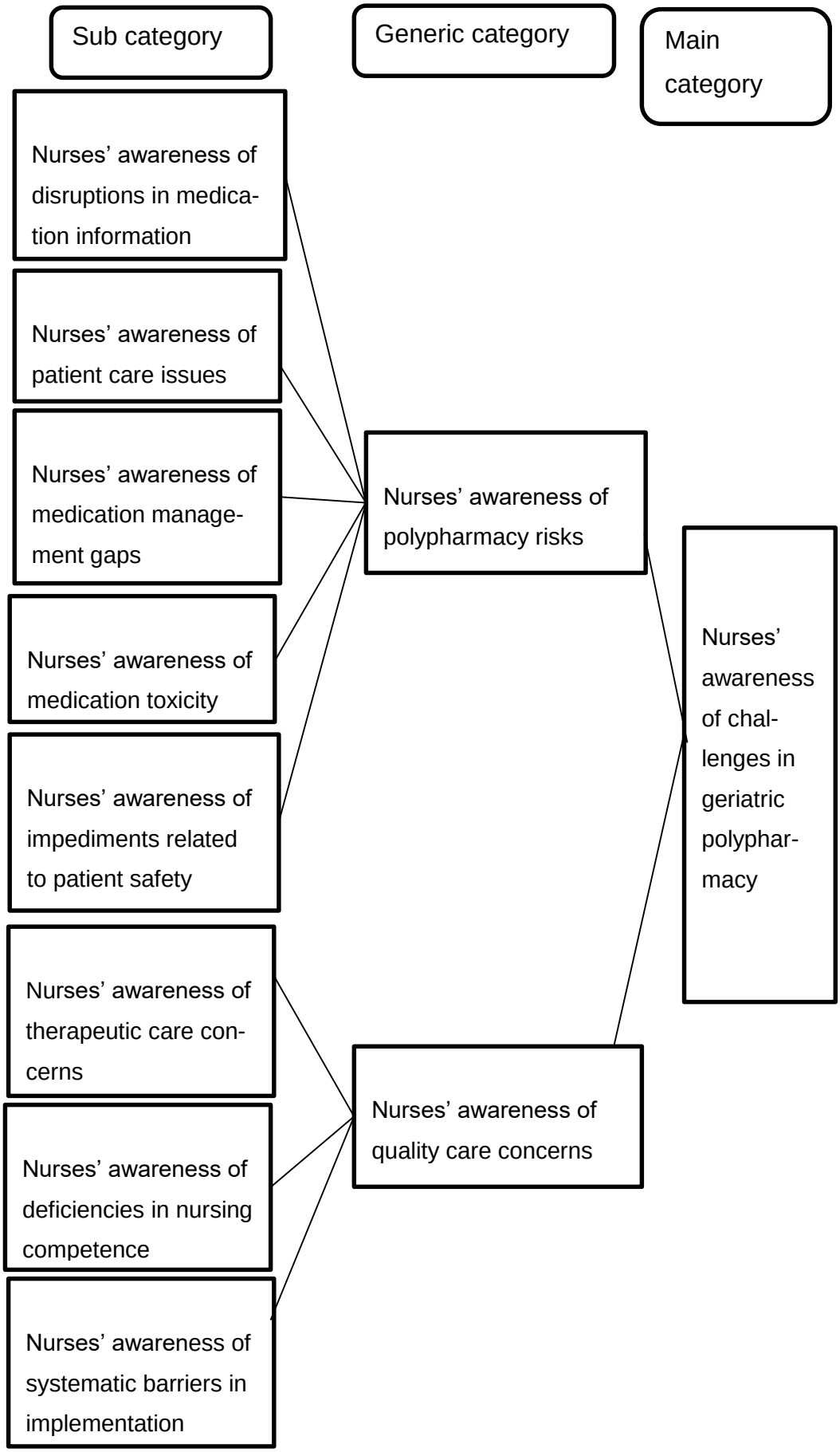

Figure 2. Inductive content analysis for research question 1.

Table 4. Examples: Inductive content analysis for the research question 2.

Study	Meaning unit	code	Sub category	Generic category	Main category
1	Identification and making an appropriate plan for problems in a specific context, introducing interventions to improve communications, leads to enhanced safe polypharmacy. Establishing a guidance process on polypharmacy management results in optimizing medication adherence. (Brueckle et al. 2022)	Context-specific problem identification. Communication advancement. Guideline implementation.	Nurses' clinical practice optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

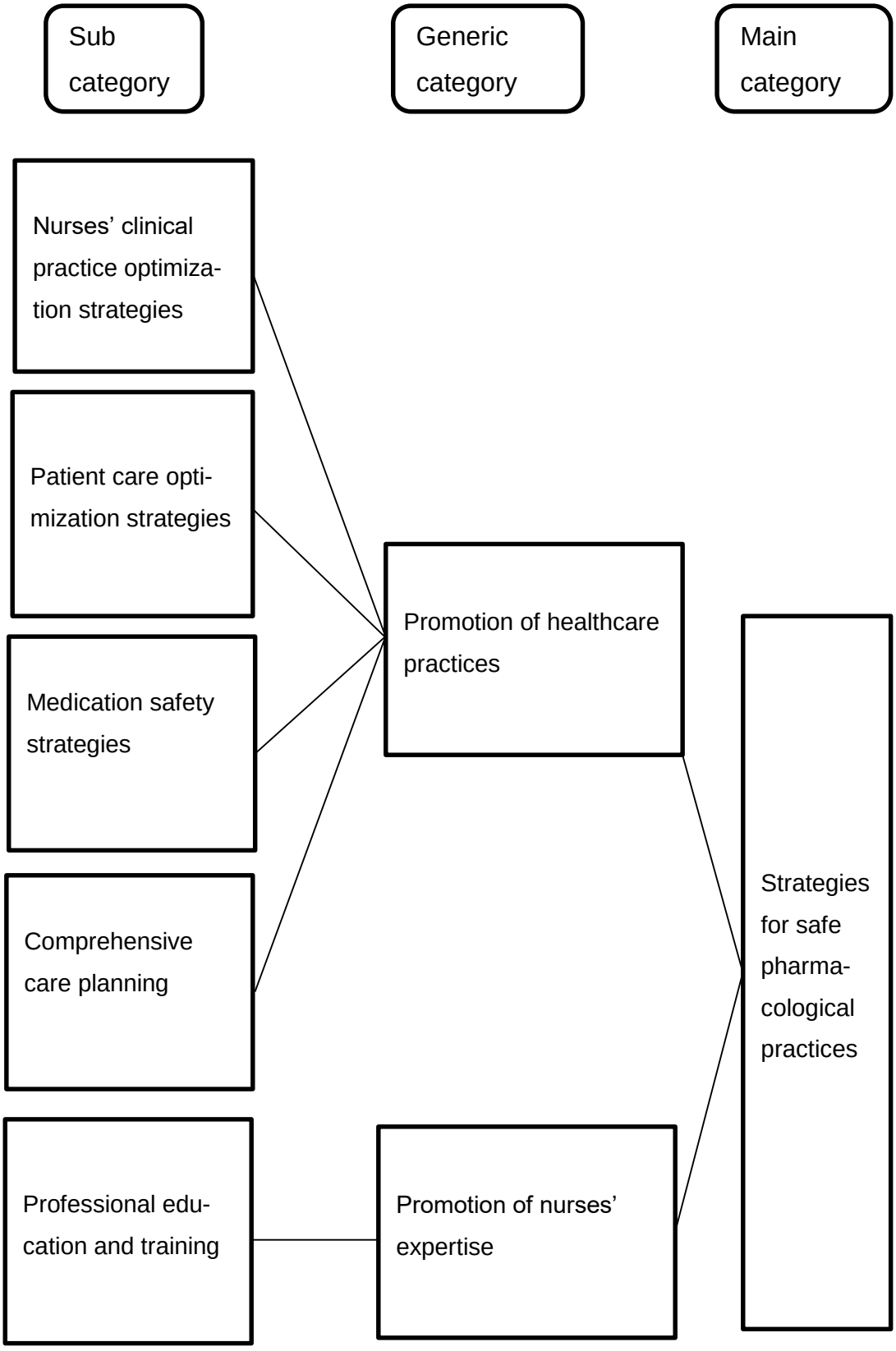

Figure 3. Inductive content analysis for research question 2.

5 Results

5.1 Summary of the utilized data

Nine selected articles were used to complete this study, which were published from 2015 to 2025. These articles were published in six different countries, including Germany, Portugal, Australia, the United States, Nigeria, and Saudi Arabia. All studies were based on a hospital care setting. The participants in these studies were elderly patients who were aged 65 years and above, as well as registered nurses. Qualitative and quantitative methodologies were used in these selected articles. Focused group and semi-structured interviews were used as data collection methods.

5.2 Analysis of the collected data

During the inductive content analysis, three steps were followed as open coding, grouping codes, and abstraction to overarch themes. The two research questions such as “How aware are nurses of polypharmacy challenges in geriatric care?” and “What strategies do nurses demonstrate in their approaches to safe pharmacological practices?” were addressed as the main categories.

The results of the nine research articles were used to create meaning units. Subcategories were formed based on meaning units, and generic categories were formed considering similarities in codes. Subcategories and generic categories were developed based on meaning units.

For the first research question, eight subcategories were developed based on the meaning units. Two generic categories were identified through the comparisons and contrasts between used subcategories, as nurses’ awareness of polypharmacy risks and nurses’ awareness of quality care concerns. Ultimately, two generic categories contribute to answering the main category related to the first research question.

For the second research question, five subcategories were identified. These subcategories are used to form two generic categories, including promotion of healthcare practices and promotion of nurses’ expertise, to create a main category for the inductive content analysis for the second research question.

Table 5. Categories relevant to research question 1.

Subcategories	Generic categories	Main categories
Nurses' awareness of disruptions in medication information	Nurses' awareness of polypharmacy risks	Nurses' awareness of challenges in geriatric polypharmacy
Nurses' awareness of patient care issues		
Nurses' awareness of medication management gaps		
Nurses' awareness of medication toxicity risks		
Nurses' awareness of impediments related to patient safety		
Nurses' awareness of therapeutic care concerns	Nurses' awareness of quality care concerns	
Nurses' awareness of deficiencies in nursing competence		
Nurses' awareness of systematic barriers in implementation		

Table 6. Categories relevant to research question 2.

Subcategories	Generic categories	Main categories
Nurses’ clinical practice optimisation strategies	Promotion of healthcare practices	Strategies for safe pharmacological practices
Patient care optimisation strategies		
Medication safety strategies		
Comprehensive care planning		
Professional education and training	Promotion of nurses’ expertise	

5.3 Nurses' awareness of challenges in geriatric polypharmacy

Nine research articles were used to answer the first research question regarding nurses' awareness of challenges in geriatric polypharmacy. As mentioned above in Figure 2, two generic categories were identified as nurses' awareness of polypharmacy risks and nurses' awareness of quality care concerns.

5.3.1 Nurses' awareness of polypharmacy risks

Recently, Nurses' awareness of polypharmacy risks has become significantly vital, as managing polypharmacy has become a major healthcare concern as well as a progressive challenge in geriatric multimorbidity care management (Brueckle et al. 2022: 1; Alodhialah, Almutairi and Almutairi 2024: 1). In the study conducted by Brueckle et al. (2022: 4), reported about nurses' awareness of disruptions in medication information and their interference in geriatric transitional care. Polypharmacy risks can occur due to the unintentional medication prescription rather than the patient's current medication regimen and can steer towards medication errors such as adverse effects, drug-drug interactions, suboptimal treatments, and overmedication.

The study emphasized more that nurses' awareness should be focused more on medication errors and other possible detrimental outcomes as they play a major role in medication process, because these risks lead to disrupt the informational continuity and escalate the possibilities for polypharmacy risks and result ultimately contributing to the development of polypharmacy challenges in geriatric transitional care. Nurses' awareness of polypharmacy risks is still insufficient, even though 50% of the hospitalized patients are on more than 10 medications, and in complex geriatric care management, which has disruptions in medication information continuity. Furthermore, the study highlighted that nurses' awareness of these challenges is paramount in safe geriatric polypharmacy care. (Brueckle et al. 2022:4.)

According to Alodhialah et al. (2024: 1-2), multimorbidity refers to an incident of an individual has two or more chronic medical conditions simultaneously. Nurses' awareness of polypharmacy risks related to the patient care issues in managing cognitively impaired geriatric patients was described, especially in obtaining informed consent and taking a history of current medications due to their impaired understanding level. It emphasized more that the communication deficit between the nurse and the cognitively impaired patient exacerbates aggressive outcomes on compromised care, together with the patient's suboptimal understanding.

Other than that, Alodhialah et al. (2024: 14) suggested attentive patient monitoring, merging medication records, attending regular team meetings, and using alternative communication strategies such as telehealth matter to improve nurses' awareness of polypharmacy risks, as nurses' awareness remains insufficient. Furthermore, it outlined that these deficits lead to inaccurate medication information retrieval and inaccurate documentation.

Along with this, they acknowledged that a lack of accuracy exists in patient care issues and results in polypharmacy-related challenges and provided practical insight to improve nurses' awareness of polypharmacy risks by addressing ongoing education and establishing strong, reliable, and effective communication with patients and their families. Furthermore, the study reported that nurses' awareness of above mentioned challenges is pivotal in geriatric polypharmacy management, as such inaccuracies increase medication errors and contribute to increasing the probability of polypharmacy risks. (Alodhialah et al. 2024: 14.)

Based on Kim and Parish (2021: 2-3), it illustrates nurses' awareness of polypharmacy risks, which are related to medication management gaps. The study showed that nurses' awareness of medication assessment is still growing, even though 50% of the geriatric population in the United States has growing complications related to polypharmacy, such as complicated drug regimens, adverse drug events, and unfavourable outcomes related to uncoordinated care. Additionally, stated that the majority of nurses demonstrated a lack of comprehensive awareness regarding the complexity of the patient's medication regimen, even if a significant proportion, 98% of the geriatric population, presented with two or more chronic conditions and used at least five medications concurrently.

As polypharmacy is unavoidable in geriatric multimorbidity care, the study highlighted that nurses' regular assessment of appropriateness and effectiveness of medication plan reduces the detrimental effects of potentially inappropriate medication usage. Moreover, they outlined that nurses' awareness of high-risk factors for polypharmacy, such as complexity of medication regimen, errors in prescribing cascade, and uncoordinated care, is crucial in identifying gaps in the medication process and preventing medication errors to address better patient care. (Kim and Parish 2021: 3.)

Inadequate nurses' identification and observations on high-risk medications and complications related to the multiple medication therapies lead to negative consequences of polypharmacy. Nurses' awareness was highlighted as crucial regarding medication tox-

icity risks such as age-related pharmacodynamical changes namely declined drug clearance ability and drug accumulation, lengthy medication lists, concurrent usage of multiple high-risk medications with other medications, and adherence difficulties as they promote the growth of polypharmacy risks including medication errors, drug interactions, delirium, morbidity and falls with injuries. (Hoel, Connolly and Takahashi 2021: 243-244.)

According to the study of Hoel et al. (2021: 244), patients who were on more than four high-risk medications had a 21% risk of polypharmacy compared to the patients who were on fewer medications. Application of comprehensive guidelines and education initiated to improve nurses' awareness of deprescribing high-risk medications, adjustments of medication dosages to resolve problems related to drug metabolism, and this led to a reduction in inappropriate medication usage by 36.4%.

Alshanberi (2022: 2) demonstrated nurses' awareness of impediments related to patient safety to address polypharmacy risks. It emphasized that the nurses' tendency in the integration of new screening tools for the identification of potentially inappropriate medications is still not at a satisfactory level due to their perception that it is time-consuming. Furthermore, the study highlighted that nurses' inadequate adherence to screening tools leads to increased medication duplication and interactions.

In addition to that, the study highlighted that nurses' suboptimal engagement in the patient education and documentation phase increases the complications related to inappropriate polypharmacy as well as patients' nonadherence to their medication plan. They identified that nurses' active engagement in patient education was directly linked with patients' adherence to their treatment plan after holding pre-intervention workshops. Moreover, nurses' active participation in proper documentation is described as a cause to decrease the usage of non-essential medications, as well as providing opportunities to change medications and drug dosages to reduce inappropriate polypharmacy. Finally, they realized a 40% rate of inappropriate polypharmacy reduction after arranging workshops to increase nurses' awareness of assessment tools, patient education, and documentation. (Alshanberi 2022: 2-4.)

5.3.2 Nurses' awareness of quality care concerns

Providing patient-centred, appropriate quality care has become an exponentially growing challenge in multimorbidity and polypharmacy care. Semi-structured interviews were conducted to evaluate nurses' awareness of quality concerns in geriatric polypharmacy care. Considering about nurses' negative perspectives on therapeutic

care concerns including coordination issues, extended working period, responsibilities, and inadequacy of nurses' competency in using assessment tools, they detailed that nurses do not have proper knowledge and practice on established guidelines and approaches to address patients' perspectives in decision making phase and to improve patient medication adherence towards optimized quality care. Moreover, the study detailed that nurses' perceived challenges with exhausted working hours, indistinctly defined care responsibilities, and multiple inconveniences with uncoordinated care direct the geriatric multimorbidity and polypharmacy care to non-ergonomic conditions. (Mc Namara et al. 2017:292-294.)

Instead of this perspective, Mc Namara et al. (2017: 298) proposed a set of potential strategies to enhance nurses' awareness of challenges related to quality care. According to the study's demonstration, improving interprofessional relationships to establish coordinated care, avoiding unnecessary burdens in multimorbidity management, such as referrals, and facilitating evidence-based nursing practices, are linked with quality-based optimized geriatric polypharmacy care.

The study was conducted using thirteen focused group discussions to determine nurses' awareness of therapeutic care concerns and identified time constraints in patient assessment, ineffective communication between nurses and other healthcare professionals, decentralized patient care, nonadherence to treatment plan, and an uncollaborative healthcare system as challenges in geriatric polypharmacy care. Addressing optimized quality care is still challenging, as nurses' current awareness remains insufficient. Scarcity of time in nurse-patient discussion, presented as a challenge for nurses due to intensive work schedule and affects in disrupts effective communication as well as increases patients' poor compliance with a treatment plan. Besides that, promoting patients' health literacy was disrupted. In addition to that, nursing care based on nurses' perspectives and beliefs was observed rather than patient-centred care, and patient satisfaction regarding overall medication management declined. (Plácido et al. 2021: 6.)

Based on the study of Plácido et al. (2021: 7), professional educational programs and expanding therapeutic review time were recommended to empower nurses' awareness regarding quality care concerns as well as to improve geriatric polypharmacy care outcomes.

According to the study of Afolalu et al. (2021:37), it highlighted nurses' inadequate ability in medication management, and nurses demonstrated inadequate competency in

the deprescribing phase in geriatric polypharmacy care. They observed nurses' uncertainty in facing challenges related to medication withdrawal, medication adjustments, and detected a lack of vigilance in identifying adverse outcomes of inappropriate polypharmacy. Moreover, it described nurses' perceived communication issues (57.8%) and identified them as a significant quality care concern. Furthermore, it emphasized that nurses have a knowledge-perception gap (76.3%) between inappropriate medication use and its possible effects.

According to the findings, the study emphasized nurses' inadequate medication management ability, nurses' perceived communication issues, and nurses' perceived knowledge-perception gaps towards nurses' awareness of quality care concerns, as these factors directly involve in compromising patient care and suboptimal medication management. Moreover, the study suggested modifications in increasing in-service training and education opportunities to enhance nurses' knowledge and awareness, and introducing an effective communication platform to enhance the nurse-patient relationship. (Afolalu et al. 2021: 38.)

Nurses' knowledge and awareness of utilizing appropriate screening tool like the American Geriatrics Society Beers Criteria for Potentially Inappropriate Medication Use in Older Adults (AGS Beers criteria) is still unsatisfactory and significant quality care concern for suboptimal medication management and compromised patient outcome as they reduce the opportunities for nurses to identify adverse drug reactions and other possible issues of inappropriate polypharmacy. (Inocian, Dillon, Reynaldo and Ignacio 2021: 115.)

Moreover, it observed reduced utilization of assessment tools and misinterpreted results with errors among nurses related to nurses' perceived criteria complexity as a matter of quality care, illuminating a detailed picture about nurses' lack of confidence and decelerated workflow. The study detailed that extensive workload and extreme pressure in completing tasks as the causes for nurses' perceived time restraints and which lead to reduced nurses' comprehensiveness in treatment delivery in geriatric polypharmacy care. (Inocian et al. 2021:116.)

5.4 Strategies for safe pharmacological practices

All nine articles were used in answering the second research question, and two generic categories were identified as promotion of healthcare practices and promotion of nurses' expertise (Figure 3).

5.4.1 Promotion of healthcare practices

Addressing strategies to optimize clinical practice is an imperative task in advancing medication adherence as well as safe pharmacological practices. Recognition of issues and inadequacies in medication management related to geriatric transitional care and prompt detection of enablers and impediments in transitional care gives the potential to strengthen the context-specific problem identification. (Brueckle et al. 2022: 3.)

The study of Brueckle et al. (2022: 5), suggested that conceivable countermeasures to enhance safe geriatric polypharmacy care by focusing on solutions such as enhancing nurses' participatory involvement in care facilitation, implementing guidelines to improve innovative nursing measures to advance safe polypharmacy care, and tailoring measures to promote communication using computer-assisted strategies and participatory involvement of nurses and patients to address patients' polypharmacy care needs.

Proper and meticulous nursing documentation on patients' medications enables medication monitoring and tracking medication compliance to ensure safe pharmacological practices in geriatric care. Moreover, precise documentation aids in identifying possible drug interactions between multiple medications, and nurses should do documentation regarding medication modifications and adjustments to ensure sustained geriatric care. Nurses should focus on collaborative team care, working with other healthcare professionals to discuss strategies, and exchange medication information to implement updates and changes in patients' medication management processes. (Alodhialah et al. 2024: 9.)

According to the study of Alodhialah et al. (2024:10), effective communication between nurse and patient, as well as adding communication augmentations, leads to strengthening the active patient empowerment in patients' medication management decisions to ensure safe pharmacological practices in geriatric care. As nurses serve key functions in ensuring patients' accurate medication compliance by compiling patients' medications, engaging in patient education, and nurses' attentive monitoring of high-risk medications grants scope for identifying possible drug-drug interactions as well as provides an advantage in balancing benefits and risks related to geriatric polypharmacy care.

Nurses' engagement in coordinated polypharmacy care contributes to holistic care optimization. Nurses' proactiveness in coordinated care, especially in decision making, pri-

oritizing patients' issues related to medication management, and patient education, facilitates the integration of other healthcare professionals and patients in overcoming hindrances towards safe pharmacological practices where patients are accountable in their medication regimen. (Mc Namara et al. 2017: 298.)

As nurses are contributing significantly in the discharge phase, nurses have a great responsibility in arranging a post-discharge plan for the patients. The study highlighted that nurses' compliance in electronic health systems is beneficial in overcoming issues related to discharge plans, as there is a greater potential for postponements and discrepancies when maintaining detailed medication profiles and generating patients' discharge documentation. Moreover, prioritization of patients according to the urgency of post-discharge care consents to arrange appropriate post-discharge appointments to evaluate patients' adherence to their post-discharge medication plan. (Mc Namara et al. 2017: 297.)

The study of Plácido et al. (2021: 6) suggested that medication management gaps complicate drug-related problems, as well as highlighted empowering patient engagement in their medication management, which leads to a decrease in the issues related to medication management and health literacy. Absence of advantageous communication between nurses, other healthcare professionals, and patients was recognized as the primary cause of inappropriate polypharmacy. Moreover, the study stressed that defining apparent care roles and responsibilities of healthcare professionals in collaborative care, employing electronic platforms to validate and update patient information and communication, and developing transparent and effective communication pathways to enhance information sharing between multiple tiers of safe pharmacological practices in geriatric polypharmacy care. (Plácido et al. 2021: 7.)

The study of Kim and Parish (2021: 2) stressed that promoting non-pharmacological interventions and lifestyle modifications greatly reduce the necessity for medication, and they highlighted as a wise solution in addressing safe polypharmacy through safe healthcare practices. Moreover, the study emphasized that the combination of medication management with non-pharmacological interventions contributes to high-quality patient care. Usage of AGS Beers criteria and STOPP as care optimization strategies facilitates the evidence-based practice in safe polypharmacy and reduces the possibilities of adverse drug events to improve patient safety (Kim and Parish 2021: 4.)

Patient-centred care aims to promote healthcare practices as it involves tailoring medication management interventions to patient needs and preferences. It yields better patient outcomes by enhancing patient satisfaction and improving medication compliance towards safe geriatric polypharmacy management. (Kim and Parish 2021: 3.)

According to the study of Hoel et al. (2021: 244), suggested comprehensive care planning has a great impact in enhancing safe geriatric polypharmacy care. By this, the study explained that the application of a systematic approach allows early identification of drug-related problems to solve polypharmacy-related issues as well as to improve compliance with the medication regimen. Introduction of a patient-centred deprescribing medication plan that avoids the integration of high-risk medication in the medication plan always retains patient comfort and satisfaction, which ensures the degree of quality geriatric polypharmacy care (Hoel et al. 2021: 242).

Goal-oriented care planning allows nurses to implement treatment strategies by the patients' care needs, and this is significantly important in managing patients with aggravated multimorbidity who are on complex polypharmacy management. Moreover, it helps nurses to determine the suitability of treatment to achieve the ultimate patient care goal in safe pharmacological practices. (Hoel et al. 2021:243.) The nurses' prompt assessment on patients' medication adherence using appropriate screening tools safeguards against adverse outcomes of high-risk medications and increases the treatment benefits to ensure safe pharmacological practices in geriatric care (Hoel et al. 2021:244).

Effective utilization of a proper assessment tool, such as AGS Beers criteria or STOPP, is crucial in gaining a profound idea about the right medication treatment, avoiding inappropriate polypharmacy. Comprehensive geriatric assessment allows nurses to implement a coordinated care plan considering patients' psychological, physiological limitations to provide safe and high-quality polypharmacy care to older patients. Moreover, the study emphasized nurses' involvement in collaborative team care, where nurses can facilitate treatments and rehabilitation towards the promotion of healthcare practices. (Alshanberi 2022: 5-6.)

The entire study mainly emphasized the best strategy to implement in the promotion of healthcare practices, as well as to optimize the care is nurses' attentive action in assessments, observations, and compiling accurate patients' history on medication management. It highlighted that the application of AGS Beers criteria is important in avoiding

inappropriate polypharmacy towards medication safety. In addition to that, the study suggested the usage of updated technological advancements, such as electronic health records, and improving nurses' digital literacy directly involves promoting healthcare practices towards safe pharmacological practices in geriatric care. (Inocian et al. 2021: 116.)

5.4.2 Promotion of nurses' expertise

Establishing appropriate strategies and measures to improve nurses' knowledge regarding the rational usage of medications is crucial in ensuring safe pharmacological practices in geriatric polypharmacy care. The study identified that nurses degrade performance in the deprescribing phase related to geriatric polypharmacy care and highlighted that nurses have uncertainty in addressing polypharmacy issues, such as challenges related to medication withdrawal, medication adjustments, as well as nurses are in absence of vigilance in care. By this point, the study highlighted that organizing training programs, seminars, and workshops for nurses to continue professional education to upskill their career performance in preventing drug-related problems, to ensure safe polypharmacy practices in geriatric care. (Afolalu et al. 2021: 38.)

6 Discussion

6.1 Ethics and validity

Ethics is a crucial guiding principle that defines the behaviour and integrity of researchers, influencing their actions and decisions in the pursuit of knowledge. It affects both the discovery process and the implications and applications of scientific findings. (Miteu 2024: 2395.) This thesis was executed ethically, transparently, and justifiable manner, upholding the research principles of reliability, honesty, respect, and accountability. The study was well aligned with ethical guidelines and preserved research integrity from the commencement to the conclusion. (All European Academies 2023: 9; Finnish National Board on Research Integrity 2023: 11.)

Database searches were conducted comprehensively, and selected articles were based on their high accuracy, adhering to ethical principles. All the articles utilized in this study were appropriately acknowledged through proper citations and a comprehensive bibliography. Ethical practices, including rigorous peer-review, transparent methodology, and adherence to established protocols, guarantee the reliability and validity of research findings. (Bos 2020: 227.)

Inclusion of well-defined inclusion and exclusion criteria is crucial in presenting a meticulous research study (Patino and Ferreira 2018: 84). Inclusion and exclusion criteria were precisely defined to enhance the external validity of the thesis work. A Librarian specialist was consulted to verify the search terms used in the study to confirm the accuracy. Primary and peer-reviewed articles were retrieved from credible and reliable academic databases such as CINAHL, PubMed, and MEDLINE. The selected articles underwent a thorough and systematic evaluation to ensure they met the inclusion criteria and effectively addressed the research questions.

The evaluation process involved several screening stages to uphold the integrity of the review. This approach allowed one team member to critically assess another's work, encouraging collaboration. Ultimately, nine articles were selected based on specific inclusion and exclusion criteria, with the literature review concentrating solely on primary, peer-reviewed articles from reputable sources.

To eliminate bias, the findings were presented honestly, and the thesis was checked for plagiarism using Turnitin. Additionally, the supervising teacher was consulted to validate the inclusion of any articles that raised potential concerns. This research was conducted under supervision and followed the Metropolia Guidelines (2024) as well as the ethical standards established by the Finnish Advisory Board. The highest ethical standards were maintained to ensure the reliability, transparency, and accountability of the research thesis.

6.2 Discussion of results

In contemporary times, polypharmacy has evolved into global health concern and significantly observed in geriatric population, as their concurrent usage of five or more medications to treat in multiple comorbidities to extend the life expectancy (WHO 2019: 11; Brueckle et al. 2022: 1; Alodhialah et al. 2024: 1).). Even assuming that polypharmacy has profitable outcomes in secondary prevention of medical conditions, it possessed numerous negative impacts as polypharmacy risks concerns including adverse drug reactions, drug-drug interactions, delirium, mortality as well as quality care concerns such as non- effective communication, decentralized patient care, and suboptimal medication compliance (Hassan et al. 2021: 56; Taghy et al. 2021: 1; Brueckle et al. 2022: 4; Mc Namara et al. 2017: 298).

Given the importance of nurses in patient-centred care, they play a crucial role in the medication process, therapeutic communication, documentation, observation, and context-specific problem identification. As nurses are indispensable in geriatric polypharmacy care management, nurses' awareness of polypharmacy risks and quality care concerns (Brueckle et al. 2022: 4; Alodhialah et al. 2024: 2; Kim and Parish 2021: 3; Hoel et al. 2021: 244; Alshanberi 2022: 2; Mc Namara et al. 2017: 298; Plácido et al. 2021: 6; Afolalu et al. 2021:37; Inocian et al. 2021:115), is important in implementing strategies which address promotion of health care practices (Brueckle et al. 2022: 3-5; Alodhialah et al. 2024: 9-10; Kim and Parish 2021: 3-4; Hoel et al. 2021: 242-244; Alshanberi 2022: 5-6; Mc Namara et al. 2017: 297-298; Plácido et al. 2021: 6-7; Afolalu et al. 2021:37; Inocian et al. 2021:116) and promotion of nurses expertise (Afolalu et al. 2021:38).to ensure safe pharmacological practices.

Reviewing the results of nine research articles, they detailed obvious gaps in nurses' awareness of challenges in polypharmacy, including polypharmacy risks and quality care matters. For instance, nurses have with suboptimal understanding of the identification of potentially inappropriate polypharmacy, high-risk medications, and complex medication regimens, and nurses possess underdeveloped competency in handling therapeutic communication, proper documentation, and effective patient education. Furthermore, they emphasized that nurses' skills in the utilization of assessment tools such as AGS Beers criteria, and implementing skills in comprehensive care planning are still growing at a substandard rate.

Addressing these issues necessitates a bifurcated strategy. The first strategic step is the promotion of healthcare practices to ensure safe pharmacological practices in geriatric care. Implementation of guidelines and interventions to improve nurses' participatory involvement in secured medication information continuity (Brueckle et al. 2022: 3), promoting effective therapeutic communication pathways and nurses' engagement (Brueckle et al. 2022: 3; Alodhialah et al. 2024: 9), enhancing nurses' skills in precise medication information documentation and usage of electronic health records (Alodhialah et al. 2024: 10; Inocian et al. 2021:116), are identified as beneficial.

Moreover, promoting nurses' engagement in collaborative team care (Alodhialah et al.2024: 9; Mc Namara et al. 2017: 297; Plácido et al. 2021: 6), applying evidence-based nursing practice and non- pharmacological interventions (Kim and Parish 2021: 3), enhancing nurses' competency of assessment tools such as AGS Beers criteria (Alshanberi 2022: 5; Inocian et al. 2021: 116), enhancing patient empowerment in patient care decision making phase (Plácido et al. 2021:7), and implementing goal- oriented

comprehensive care planning (Hoel et al. 2021: 242), acknowledged as other positive steps.

Secondly, implementing efficacious interventions to improve nurses' expertise in polypharmacy care management ensures the strengthening of safe pharmacological practices in geriatric care. Consequently, it requires ongoing educational programs such as seminars, workshops, and training programs to improve nurses' professional development as well as to improve nurses' knowledge and skills in complex geriatric polypharmacy management which necessitate nurses' attentive monitoring and observations on medication errors and other possible adverse outcomes of potentially inappropriate medications (Afolalu et al. 2021:38). By concurrently, integration of improvements in both systemic healthcare practices and nurses' proficiency in geriatric polypharmacy care management leads to thrive towards safe pharmacological practices dismantling challenges in geriatric polypharmacy care.

6.3 Conclusion and recommendations

The body of the thesis revealed the analysis of nine research articles, indicating nurses' awareness of challenges in geriatric polypharmacy care, complex medication management, and knowledge-practical gaps in implementing interventions. Furthermore, the study outlined potential strategies and recommendations to ensure safe pharmacological practices to promote safe geriatric polypharmacy management.

However, the evidence repeatedly detailed that nurses' awareness of polypharmacy challenges is persisting as inadequate in multiple key domains, including deficiencies in identifying high-risk medications and adverse outcomes of potentially inappropriate medication, deficiencies in doing meticulous documentation, deficiencies in establishing therapeutic communication, deficiencies in maintaining medication information continuity and deficiencies in utilizing appropriate assessment tools. These domains are identified as polypharmacy challenges related to polypharmacy risks and quality care concerns. Consequently, these sequelae contribute to increasing the risks of medication errors, which can ultimately lead to polypharmacy risks and compromised patient care.

Nurses' effective engagement in different key areas, including doing proper documentation, establishing therapeutic communication and collaborative care, enhancing patient empowerment in medication management, utilizing appropriate assessment tools

to reduce medication errors, doing attentive monitoring on patients' medication adherence, addressing safe pharmacological practices to ensure safe polypharmacy management, and patient well-being. Furthermore, implementing educational programs such as seminars and workshops contributes to enhancing nurses' proficiency in safe pharmacological practices.

Focusing on the limitations of the study, this thesis study was conducted to provide new knowledge on strategies and challenges associated with safe polypharmacy management in geriatric patients. However, it is constrained by several limitations, for example, as it is based on previously published research articles. This thesis study is entirely based on previously published research articles, and the quality and scope of the research articles used directly affect the validity of the thesis work. Moreover, the bias of each research study collectively impacts the thesis work, as it is a literature-based review.

Furthermore, the database searches to sort out literature articles and the inclusion of a comprehensive range of articles had to be limited due to the given time constraints. In addition to that, as this is a bachelor's thesis, it is not a comprehensive study. The depth of the content information and extensive database searches were limited as it is at the undergraduate level. Besides that, the scope of the study was limited compared to the postgraduate research studies.

Based on the study findings, several recommendations can be introduced for nurses to ensure safe geriatric polypharmacy care, including increase awareness of medication errors, drug-drug interactions, and high- risk medications; participate in ongoing educational programs to increase awareness of comprehensive medication management; maintain accurate and up-to-date medication information; utilize the non-pharmacological interventions and life style modification parallel to the medication management; and engage in therapeutic communication to address optimal patient care. Furthermore, this study is a vital reference for future researchers to possess comprehensive knowledge on polypharmacy challenges, nurses' awareness of them, and strategies for safe polypharmacy practices to guide their work.

References

Afolalu, O.O., Atekoja, O.E., Akingbade, O., Jolayemi, K.I., Oyewumi, Z.O., Oyelabi, B.D. and Adeyeye, S.O. 2021. Knowledge and perceived effect of polypharmacy and potentially inappropriate medication use among nurses in a Nigerian Tertiary Hospital. Journal of research development in nursing and midwifery 18 (2). 36-40.

All European Academies (ALLEA) 2023. The European Code of Conduct for Research Integrity. < https://allea.org/wp-content/uploads/2023/06/European-Code-of-Conduct-Revised-Edition-2023.pdf>. Accessed 06 May 2025.

Alodhialah, A.M., Almutairi, A.A. and Almutairi, M. 2024. Ethical and legal challenges in caring for older adults with multimorbidities. Best practices for nurses. Healthcare 12 (1585). 1-17.

Alshanberi, A.M. 2022. Recent updates on risk and management plans associated with polypharmacy in the older population. Geriatrics 7 (97). 1-10.

Bos, J. 2020. Research Ethics for Students in the Social Sciences.Springer International Publishing. < https://core.ac.uk/download/pdf/344665944.pdf>. Accessed 29 April 2025.

Brueckle, M.-S., Dinh, T.S., Klein, A.-A., Rietschel, L., Petermann, J., Brosse, F., Schulz-Rothe, S., Gonzalez- Gonzalez, A.I., Kramer, M., Engler, J., Margenthal, K., Muth, C., Voigt, K. and van den Akker, M. 2022. Development of an intervention to improve informational continuity of care in older patients with polypharmacy at the interface between general practice and hospital care: protocol for a participatory qualitative study in Germany. BMJ Open 12. 1-6.

Cheng, C., Yu, H. and Wang, Q. 2023. Nurses' experiences concerning older adults with polypharmacy: A meta-synthesis of qualitative findings. Healthcare 11 (334). 1-12.

Delara, M., Murray, L., Jafari, B., Bahji, A., Goodarzi, Z., Kirkham, J., Chowdhury, M. and Seitz, D.P. 2022. Prevalence and factors associated with polypharmacy: A systematic review and meta-analysis 22 (601). 1-12.

Finnish National Board on Research Integrity (TENK) 2023. The Finnish Code of Conduct for Research Integrity and Procedures for Handling Alleged Violations of Research Integrity in Finland. < https://tenk.fi/sites/default/files/2023-11/RI_Guidelines_2023.pdf>. Accessed 06 May 2025.

Hassan, H.E., Elden, S.B., Hamdi, S., Aboundonya, M.E. 2021. Control polypharmacy: Elderly patients' practices. American Journal of Pharmacological Sciences 9 (2). 56-62.

Hoel, R.W., Giddings Connolly, R.M. and Takahashi, P.Y. 2021. Polypharmacy management in older patients. Mayo Clinic Proceedings 96 (1). 242-256.

Inocian, E.P., Dillon, D., Reynaldo, R.F.D.F. and Ignacio, E.H. 2021. Using Beers' criteria to avoid inappropriate prescribing for older adults. Nursing pharmacology 30 (2). 113-117.

Jelenc, M. and Gabrovec, B. 2019. Strategies for improving polypharmacy in the elderly population in Europe- evidence from Advantage Joint Action. 54-68.

Karttunen, M., Sneck, S., Jokelainen, J. and Elo, S. 2020. Nurses ' self-assessments of adherence to guidelines on safe medication preparation and administration in long-term elderly care. Scandinavian Journal of Caring Sciences 34. 108-117.

Kim, J. and Parish, A.L. 2021. Nursing: polypharmacy and medication management in older adults. Clinics in integrated care. 1-6.

Lynch, F., Gillam, L. and Vears, D.F. 2024. Alleviating the confusion around content analysis: comment in response to Wainstein, Elliott and Austin 2023. Journal of Genetic Counselling 33. 1126-1129.

Mc Namara, K.P., Breken, B.D., Alzubaidi, H.T., Bell, J.S., Dunbar, J.A., Walker, C. and Hernan, A. 2017. Health professional perspectives on the management of multimorbidity and polypharmacy for older patients in Australia. Age and aging 46. 291-299.

Mikkelsen, T.H., Søndergaard, J., Kjaer, N.K., Nielsen, J.B., Ryg, J., Kyeldsen, L.J. and Mogensen, C.B. 2023. Handling polypharmacy- a qualitative study using focus group interviews with older patients, their relatives, and healthcare professionals. BMC Geriatrics 23 (477). 1-11.

Miteu, G.D. 2024. Ethics in scientific research: a lens into its importance, history, and future. Annals of medicine and surgery 86. 2395-2398.

Molokhia, M. and Majeed, A. 2017. Current and future perspectives on the management of polypharmacy. BMC family practice 18 (70). 1-9.

Oliveira, C.J., José, H.M.G. and Teixeira da Costa, E.I.M. 2024. Medication adherence in adults with chronic diseases in primary healthcare: A quality improvement project. Nursing Reports 14. 1735-1749.

Patino, C.M. and Ferreira, J.C. 2018. Inclusion and exclusion criteria in research studies: definitions and why they matter. Jornal Brasiliero de Pneumologia 44 (2). 84-84.

Plácido, A.I., Herdeiro, M.T., Simões, J.L., Amaral, O., Figueiras, A. and Roque, F. 2021. Health professionals' perception and beliefs about drug-related problems in polymedicated older adults- a focus group study. BMC Geriatrics 21 (27). 1-10.

Pocknell, S., Fudge, N., Collins, S., Roberts, C. and Swinglehurst, D. 2024. 'Troubling' medication reviews in the context of polypharmacy and aging: A linguistic ethnography. Social Science and Medicine 352. 1-10.

Poelgeest, E.V., Seppala, L., Bahat, G., Ilhan, B., Mair, A., Marum, R.V., Onder, G., Ryg, J., Fernandes, M.A., Cherubini, A., Denkinger, M., Eidam, A., Egberts, A., Gudmundsson, A., Koçak, F.Ö.K., Soulis, G., Tournoy, J., Masud, T., Wehling, M. and van der Velde, N. 2023. Optimising pharmacotherapy and deprescribing strategies in older adults living with multimorbidity and polypharmacy: EuGMS SIG on the pharmacology position paper. European Geriatric Medicine 14. 1192-1209.

Rodrigues, M.C.S. and Oliveira, C.D. 2016. Drug-drug interaction and adverse drug reactions in polypharmacy among older adults: An integrative review. Revista Latino-Americana de Enfermagem 24 (e 2800). 1-17.

Sheikh-Taha, M. and Asmar, M. 2021. Polypharmacy and severe potential drug-drug interactions among older adults with cardiovascular disease in the United States. BMC Geriatrics 21 (233). 1-6.

Taghy, N., Cambon, L., Boulliat, C., Aromatario, O. and Dussart, C. 2021. Exploring the determinants of polypharmacy prescribing and dispensing behaviours in primary care for the elderly- Protocol for the qualitative study. International Journal of Environmental Research and Public Health 18 (7656). 1-10.

Vaismoradi, M., Mardani, A., Crespo, M.L., Logan, P.A. and Sak-Dankosky, N. 2024. An integrated systematic review of nurses' involvement in medication prescription in long-term healthcare settings for older people. Therapeutic advances in drug safety 15. 1-25.

Vears, D.F. and Gillam, L. 2022. Inductive content analysis: A guide for the beginning qualitative researchers. Focus on health professional education 23 (1). 111-127.

World Health Organisation. 2019. Medication safety in polypharmacy (Technical report). < https://iris.who.int/bitstream/handle/10665/325454/WHO-UHC-SDS-2019.11-eng.pdf?sequence=1>. Accessed 25 February 2025.

Zhu, L.-L., Wang, Y.-H., Lan, M.-J. and Zhou, Q. 2024. Exploring the roles of nurses in medication reconciliation for older adults at hospital discharge: A narrative approach. Clinical interventions in aging 19. 367-373.

Appendices

Appendix 1. Table 1. Database Search Results.

Database/Date/Limits	Search phrase	Total number of hits/citations	Papers/records included based on the title	Papers/ records included based on abstracts	Papers/ records included based on Full Text
CINAHL / 22 February 2025 English, 10 years, peer-reviewed, older people aged 65 years and above	(" Nurse" OR" Registered Nurses" OR "Nursing Staff" OR " Staff Nurse") AND("Polypharmacy " OR "Polymedication" OR "Multiple Drug Therapy" OR " Multiple Medication") AND (“Elderly” OR “Older Adult” OR “Geriatric Patients” OR “Aged” OR “Elder Population”)	84	16	15	02
PubMed/ 22 February 2025 English, 10 years, older people aged 65 years and above		123	25	23	09
MEDLINE / 22 February 2025 English, 10 years, peer-reviewed, older people aged 65 years and above		118	23	22	06
Records in total		325	64	60	17
Records after duplicate removal		320	64	60	17
Total number of included articles					09

Appendix 2. Table 2. Evaluated articles (data analysis).

Author and year	Title	Methodology	Sample/ population	Results
Brueckle et al. 2022	Development of an intervention to improve informational continuity of care in older patients with polypharmacy.	Qualitative	32 semi-structured interviews.	The study detailed nurses' awareness of disruptions in medication information continuity in geriatric transitional care and emphasised the high incidence of polypharmacy risks, including drug-drug interactions, suboptimal treatments, and overmedication treatments due to the deviations in patients' medication plans in the phases of transitional care. It emphasised that nurses should be more attentive regarding medication errors as they play a significant role in the medication management process. Context-problem identification, proper documentation, enhancing nurses' participatory involvement in care facilitation, and implementation of computer-based communication strategies in medication information management are identified as the strategies for safe pharmacological practices in geriatric care.

Author and year	Title	Methodology	Sample/ population	Results
Alodhialah et al. 2024	Ethical and legal challenges in caring for older adults with multimorbidities.	Qualitative	Semi-structured interviews with 15 nurses.	The study explained about nurses' awareness of polypharmacy risks related to the patient care issues in managing cognitively impaired patients and emphasised that it remains insufficient among nurses. These deficiencies were detected especially in obtaining informed consent, taking medication history from the patient, and ultimately led to nurse-patient communication gaps and compromised patient care. It highlighted that suboptimal understanding due to these factors leads to an increase in medication errors. Moreover, it suggested to improve nurses' confidence in this kind of situation as well as to reduce polypharmacy risks in geriatric care by engaging ongoing education, improving nurses' attentive monitoring on high-risk medications, and establishing strong, reliable communication between patient and their families.

Author and year	Title	Methodology	Sample/ population	Results
Mc Namara et al. 2017	Health professionals' perspectives on the management of multimorbidity and polypharmacy for older patients.	Qualitative	semi-structured interviews with 26 nurses.	This study highlights nurses' awareness of the challenges associated with providing quality care. It reveals that nurses hold negative perceptions regarding therapeutic care issues, such as coordination problems and extended working hours. The study details how nurses perceive challenges stemming from exhausting work hours, poorly defined care responsibilities, and various obstacles related to uncoordinated care. These factors contribute to the non-ergonomic delivery of care for patients with geriatric multimorbidity and polypharmacy.

Author and year	Title	Methodology	Sample/ population	Results
Plácido et al. 2021	Health professionals' perception and beliefs about drug-related problems in polymedicated older adults.	Qualitative	Focused group study with 34 nurses.	This study highlights the need for professional educational programs and increased therapeutic review time to enhance nurses' awareness of quality care in geriatric polypharmacy. It emphasises defining healthcare professionals' roles in collaborative care and using electronic platforms for updating patient information. Effective communication pathways are also crucial for safe pharmacological practices in this field.

Author and year	Title	Methodology	Sample/ population	Results
Afolalu et al. 2021	Knowledge and perceived effect of polypharmacy and potentially inappropriate medication use among nurses.	Quantitative	190 nurses in a Nigerian tertiary hospital.	The study found that nurses often lack skills in medication management, particularly during the deprescribing phase of geriatric care. It also highlighted communication issues and knowledge gaps that can compromise patient care. To address this, the study emphasised the need for training programs, seminars, and workshops to enhance nurses' competencies in preventing drug-related problems and ensuring safe polypharmacy practices.

Author and year	Title	Methodology	Sample/ population	Results
Kim and Parish 2021	Polypharmacy and medication management in older adults.	Qualitative	Registered nurses.	The study highlights the importance of nurses' awareness of polypharmacy risks for effective medication management. Understanding high-risk factors, complex regimens, and issues like prescribing cascades and uncoordinated care is essential. It also emphasised that combining medication management with non-pharmacological interventions leads to higher quality care, resulting in safer management of geriatric polypharmacy.

Author and year	Title	Methodology	Sample/ population	Results
Hoel et al. 2021	Polypharmacy management in older patients.	Qualitative	Registered nurses and older adults aged 65 years and above	This study highlights that nurses' inability to identify high-risk medications and complications from polypharmacy can lead to negative outcomes. Awareness of deprescribing and adjusting medication dosages is essential to prevent medication toxicity. Additionally, nurses must assess patients' medication adherence using appropriate screening tools to enhance treatment benefits and ensure safe pharmacological practices in geriatric care.

Author and year	Title	Methodology	Sample/ population	Results
Alshanberi 2022	Recent updates on risk and management plans associated with polypharmacy in the older population.	Qualitative	Registered nurses and older adults aged 65 years and above.	This study highlights the importance of nurses recognising obstacles to patient safety in managing polypharmacy risks. Inadequate use of screening tools by nurses can lead to medication duplication and interactions. Additionally, limited engagement in patient education and documentation may result in complications. The study emphasises the need for nurses to actively participate in collaborative team care to enhance treatment and rehabilitation and promote better healthcare practices.

Author and year	Title	Methodology	Sample/ population	Results
Inocian et al. 2021	Using Beers' criteria to avoid inappropriate prescribing for older adults.	Qualitative	Registered nurses	This study shows that nurses often underuse assessment tools and misinterpret results due to perceived complexity, which leads to decreased confidence and slower workflows. It highlights the importance of applying the AGS Beers criteria to prevent inappropriate polypharmacy and ensure medication safety. Additionally, recommends leveraging electronic health records and improving nurses' digital literacy to promote safe pharmacological practices in geriatric care.

Appendix 3. Table 3. Inductive content analysis for the research question 1.

Study	Meaning unit	Code	Sub category	Generic category	Main category
1	Lack of informational continuity in trans care in geriatric polypharmacy leads to an increase the negative outcomes in polypharmacy, such as medication errors, increased mortality rate, extended hospitalisation period, concerns related to patient safety, and inappropriate treatment plans. Nurses express uncertainty about information on patients' medication, and poor communication results in medication-related treatment errors. Nurses' awareness of these concerns influences appropriate decision-making in the context of polypharmacy. (Brueckle et al. 2022)	Nurses reported issues of informational continuity. Nurses' uncertainty regarding medication records. Nurses acknowledged communication gaps.	Nurses' awareness of disruptions in medication information.	Nurses' awareness of Polypharmacy risks.	Nurses' awareness of challenges in geriatric polypharmacy.

Study	Meaning unit	Code	Sub category	Generic category	Main category
2	Nurses verbalized the difficulties in geriatric polypharmacy care when obtaining informed consent from patients with impaired decision-making abilities. Lack of communication leads to medication errors. Nurses face ethical dilemmas when managing geriatric patients with cognitive disabilities and lead to a compromised patient care approach. (Alodhialah et al. 2024)	Nurses reported difficulties related to cognitively impaired patients. Nurses recognized communication gaps. Nurses' perceived compromised patient care.	Nurses' awareness of patient care issues.	Nurses' awareness of polypharmacy risks.	Nurses' awareness of challenges in geriatric polypharmacy.

Study	Meaning unit	Code	Sub category	Generic category	Main category
3	Nurses came across challenges with coordination and continuity of care, as well as stated about pressures of workload and poorly defined individual responsibilities for care. Unawareness of medical decisions happens due to the lack of available tools in decision-making. (Mc Namara et al. 2017)	Nurses' perceived coordination issues. Nurses recognized issues related to workload and responsibilities. Nurses identified issues with tools in treatment decisions.	Nurses' awareness of therapeutic care concerns.	Nurses' awareness of quality care concerns.	Nurses' awareness of challenges in geriatric polypharmacy.
4	Nurses face struggles when managing the negative effects of poor compliance in a comprehensive medication treatment plan. Decentralized patient care and ineffective communication cause to poor quality care. (Plácido et al. 2021)	Nurses' perceived issues with poor compliance. Nurses recognized decentralized patient care issues. Nurses identified communication gaps.	Nurses' awareness of therapeutic care concerns.	Nurses' awareness of quality care concerns.	Nurses' awareness of challenges in geriatric polypharmacy.

Study	Meaning unit	Code	Sub category	Generic category	Main category
5	Nurses' lack of ability in managing polypharmacy leads to drug-related negative outcomes. Nurses claimed that poor communication causes to increase in the tendency of medication errors. The study highlighted a significant gap between nurses' knowledge and perceived effects of polypharmacy. (Afolalu et al. 2021)	Nurses' inadequate management ability. Nurses' perceived communication issues. Nurses' possessed knowledge-perception gap.	Nurses' awareness of deficiencies in nursing competence.	Nurses' awareness of quality care concerns.	Nurses' awareness of challenges in geriatric polypharmacy.
6	Nurses stated that inadequate regular medication assessment, risk factors for polypharmacy such as uncoordinated care, usage of complex medication regimen and prescribing cascade, and complicated management in chronic diseases increase risks and medication-related errors. (Kim and Parish 2021)	Nurses identified obstacles in medication assessment. Nurses identified risk factors. Nurses identified issues with medication management complexity.	Nurses' awareness of medication management gaps.	Nurses' awareness of polypharmacy risks.	Nurses' awareness of challenges in geriatric polypharmacy.

Study	Meaning unit	Code	Sub category	Generic category	Main category
7	Nurses stated that the usage of medications to treat diseases increases the risk of polypharmacy, and it provides adverse effects such as drug toxicity, delirium, and negative interactions. Sensitivity to the drugs becomes heightened with aging. (Hoel et al. 2021)	Nurses identified risks of multiple medication usage. Optimisation of medication-related adverse effects. Nurses recognized age-related pharmacodynamics issues.	Nurses' awareness of medication toxicity risks.	Nurses' awareness of polypharmacy risks.	Nurses' awareness of challenges in geriatric polypharmacy.
8	Nurses identified that inadequate usage of proper assessment tools, inadequate patient education, and inability to keep medication records contribute to interfering the polypharmacy nursing management and directly involve in medication errors. (Alshanberi 2022)	Nurses identified issues with assessment tools. Nurses identified issues related to patient education. Nurses recognized issues with documentation.	Nurses' awareness of impediments related to patient safety.	Nurses' awareness of polypharmacy risks.	Nurses' awareness of challenges in geriatric polypharmacy.

Study	Meaning unit	Code	Sub category	Generic category	Main category
9	Nurses stated that the lack of time, complexity of screening criteria such as AGS Beers, and lack of familiarity with Beers criteria make polypharmacy management complicated. (Inocian et al. 2021)	Nurses' perceived time restraints. Nurses recognized criteria complexity. Nurses' lack of awareness of AGS Beers criteria.	Nurses' awareness of systematic barriers in implementation.	Nurses' awareness of quality care concerns.	Nurses' awareness of challenges in geriatric polypharmacy.

Appendix 4. Table 4. Inductive content analysis for the research question 2.

Study	Meaning unit	code	Sub category	Generic category	Main category
1	Identification and making an appropriate plan for problems in a specific context, introducing interventions to improve communications, leads to enhanced safe polypharmacy. Establishing a guidance process on polypharmacy management results in optimizing medication adherence. (Brueckle et al. 2022)	Context-specific problem identification. Communication advancement. Guideline implementation.	Nurses' clinical practice optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.
2	Clear, detailed, and concise documentation regarding patients' medication information helps in minimizing medication-related harms. Well-organized healthcare team work is crucial in safe polypharmacy. Nurses' active monitoring and establishment of transparent communication result in reducing medication errors. (Alodhialah et al. 2024)	Proper documentation. Coordinated and collaborative team care. Communication enhancement. Nurses' vigilant monitoring	Nurses' clinical practice optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

Study	Meaning units	Code	Sub category	Generic category	Main category
3	Coordinated care leads to a decrease in medication-related errors. Arranging post-discharge appointments facilitates medication reviews. Updated tools for identifying inappropriate polypharmacy lead to optimizing care treatments. (Mc Namara et al. 2017)	Coordinated care. Post-discharge plan.	Patient care optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.
4	Enhancing patients' engagement in the treatment plan prevents inappropriate polypharmacy and increases compliance with the treatment plan. Support team working and therapeutic communication lead to making proper decisions on patients' treatment plans and compliance. (Plácido et al. 2021)	Patient empowerment. Collaborative team care. Therapeutic communication.	Patient care optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

Study	Meaning units	Code	Sub category	Generic Category	Main category
5	Educational programs such as workshops and seminars are crucial in developing nurses' knowledge of polypharmacy. Continuing education through the training programs leads to a reduction in medication-related adverse outcomes. Collaborative team education facilitates opportunities to enhance knowledge on polypharmacy. (Afolalu et al. 2021)	Educational programs. Continuing education. Collaborative team education.	Professional education and training.	Promotion of nurses' expertise.	Strategies for safe pharmacological practices.
6	Promotion of non-pharmacological interventions in treating symptoms to mitigate medication-related adverse effects. The use of evidence-based strategies in polypharmacy leads to a reduction in medication errors. Patient-directed care plans ensure accurate medication adherence. (Kim and Parish 2021)	Promotion of non-pharmacological interventions. Application of Evidence-based practices. Patient-centered care.	Patient care optimisation strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

Study	Meaning unit	Code	Sub category	Generic category	Main category
7	A systematic approach to identifying high-risk medications and medication-related problems can reduce the adverse effects of polypharmacy. Patient-centered medication deprescribing provides patient-tailored medication management care. Making a medication treatment plan should be focused on a goal such as comfort and satisfaction. Routine assessments of patients' adherence to the treatment plans minimize the negative effects of polypharmacy. (Hoel et al. 2021)	Systematic approach. Patient-centered deprescribing medications. Goal-oriented care planning. Assessment of medication adherence.	Comprehensive care planning.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.
8	Nurses' knowledge in usage of the proper assessment tool ensures the correct medication treatment plan. Comprehensive medication assessment ensures the balance in the medication treatment plan. A multidisciplinary care approach facilitates future treatment plans and rehabilitation. (Alshanberi 2022)	Proper assessment tools. Comprehensive medication assessment. Multidisciplinary approach care plan.	Comprehensive care planning.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

Study	Meaning unit	Code	Sub category	Generic category	Main category
9	Application of AGS Beers criteria in polypharmacy management leads to minimizing inappropriate polypharmacy. Nurses' observations and assessments of patients' medication plans facilitate the decision-making phase. The usage of advanced technological appliances, such as electronic health records, minimized the adverse medication errors. Thorough patient history examination ensures care optimisation. (Inocian et al. 2021)	Application of Beers criteria. Nurses' assessments and observations on medication management. Usage of electronic health records. Proper patient history monitoring.	Medication safety strategies.	Promotion of healthcare practices.	Strategies for safe pharmacological practices.

Appendix 5. Table 5. Time table.

10 February 2025	Orientation of the thesis work
12 February 2025	Group meeting for writing a thesis research proposal
14 February 2025	Zoom meeting on information search for the thesis work
17 February 2025	Seminar day and instructions for academic writing 1
19 February 2025	Meeting with the supervisor
20 February 2025	Seminar day and instructions for academic writing 2
07 March 2025	Meeting with the supervisor
10 March 2025	Workshop: Article Selection Day
13 March 2025	Seminar day: orientation to the execution phase and meeting with the supervisor
18 March 2025	Workshop: execution of the thesis work.
24 March 2025	Language teacher’s consultation
27 March 2025	Meeting with the library specialist
07 April 2025	Meeting with the supervisor
16 April 2025	Seminar day
22 April 2025	Writing thesis results
15 May 2025	Writing thesis discussion and conclusion
20 May 2025	Finalizing the thesis document
22 May 2025	Seminar day: reporting phase