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REVIEW

Contributions of Specialized Nurses to Medication Management for Older People in Home Care: A Mixed-Method Systematic Review

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Abstract: There is a growing international interest in defining the roles, responsibilities, and contributions of specialized nurses across various aspects of home care to establish them as effective members of multidisciplinary home care teams. This study aimed to identify and describe the contributions of specialized nurses to medication management for older people in home care. This systematic review was performed using a mixed method approach. A thorough search was conducted across PubMed (including MEDLINE), Scopus, CINAHL, ProQuest, and Embase, focusing on studies published in English over the last decade, from 2014 to 2024. The convergent synthesis was used to combine and analyze qualitative and quantitative evidence in parallel to address the review question. The initial search yielded 875 studies, which were then refined to 32 studies selected for data-based convergent synthesis. The findings of the review were organized into three categories: "specialized nurses' identities", "specialized nurses' roles and responsibilities", and "impact of specialized nurses' medication management in home care". Specialized nurses played key roles in enhancing medication safety, improving older adults' quality of life, and reducing emergency visits. Their support in medication management eased the home care burden and ensured timely interventions for better symptom control and healthcare outcomes. Specialized nurses bring vital expertise to home care multidisciplinary medication team, promoting safe medication practices and helping older adults manage chronic conditions effectively at home.

Keywords: home care, medication management, medication outcome, non-physician prescriber, older people, specialized nurse, patient safety

Introduction

Specialized nursing involves bachelor's degree and master's degree nurses who pursue additional education and training to assume advanced roles and practices in a specific area of the healthcare system. This specialization encompasses various definitions influenced by differing expertise, education, and skills pertinent to specific care contexts across the globe. The International Council of Nurses (ICN) outlines two key roles within specialized or advanced practice nursing: clinical nurse specialists (CNS) and nurse practitioners (NP), differentiated by their educational and training requirements.[1] There is a lack of consensus on the terminology used for specialized nursing, educational requirements, and regulatory approaches for its effective implementation in practice nursing.[2] Nevertheless, Advanced Practice Nurse (APN) and NP roles have been established in a number of countries, including the USA, Canada, Australia, Ireland, and the Netherlands.[3] In the UK, terms such as CNS, APN, and NP are used with variations in seniority and function.[4] In the USA, the term Advanced Practice Registered Nurse (APRN) is commonly used, encompassing both CNS and NP roles.[5,6] Autonomy is a characteristic of specialized nursing encompassing independent practice entry, authority and access to diagnostics, and recognition as a primary care provider.[7] The capabilities and roles of specialized nurses facilitate coordination between aged care and general practice, address the needs of the aging population, and address the growing burden of chronic conditions leading to cost-effective, holistic primary care.[8,9] In some cases, primary care

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delivered by specialized nurses has been shown to be superior to that provided by physicians, demonstrating that they can also offer safe and effective primary care.[10] Specialized nurses improve health care outcomes and behaviors in older adults in long-term care settings and enhance family satisfaction.[11]

A comprehensive analysis of the global burden of disease for 371 diseases and injuries across 204 countries and territories covering 811 subnational locations, reveals a rise in global disability-adjusted life-years from 2.63 billion (95% uncertainty interval: 2.44–2.85) in 2010 to 2.88 billion (2.64–3.15) by 2021 due to demographic changes including ageing.[12] This trend has led to a significant increase in older adults using home care services, signaling a critical need for healthcare managers and policymakers to address the quality and safety of home care.[13] Moreover, older people primarily wish to live in their own homes for as long as possible and therefore need improved home coping and safety.[14] Home care services try to align with this emerging preference, enabling older people to "age in place" in familiar surroundings rather than receiving care for chronic health conditions or aging needs in institutional care settings.[15]

Older age causes chronic diseases, complex healthcare needs, and comorbidities, typically resulting in frailty and use of multiple medication use.[16] Administrative records from 133 certified home healthcare agencies across 32 states in the USA revealed that, among older adults receiving home healthcare services (n=87,780), 44% received opioids, 19% were prescribed benzodiazepines, and nearly 7% were prescribed non-benzodiazepine sleep medications.[17] In addition, a retrospective analysis of 100 older adults in Australia seeking community care support for medication management found that 66% used ≥5 medications, and 48% used at least one high-risk medication, mainly opioids, anticoagulants, and insulin. Additionally, medication errors occurred in 41% of the patients, with 13% experiencing an adverse medication event requiring medical consultation or hospitalization, of which 64% were preventable.[18] Polypharmacy and multimorbidity due to drug interactions affect 25.1% to 100% of older people internationally, with 30 to 388.3 drug interactions per 100 persons with higher values in home care given less controlled medication management than in nursing homes.[19] A study of older people's home medications at hospital admission revealed an average of 11.6 ± 4.5 medications per person, of which 95% experienced polypharmacy, 69% hyper-polypharmacy, and 77.5% had at least one severe potential drug-drug interaction.[20] In a study in the Netherlands, 15% of readmissions of older adults within 30 days of discharge were medication-related, with 23% potentially preventable.[21] Therefore, early and continuous interventions in the community are crucial for healthy aging,[16] and for reducing emergency department visits and hospitalization.[22]

Due to the complexity of older people's medication regimens, managing chronic medications is best handled by multidisciplinary medication team,[23] and specialized nurses have been nominated to offer crucial support in medication management and provide support to other healthcare staff.[24]

Current questions in the international literature involve identifying and describing the roles of specialized nurses in delivering geriatric care in primary healthcare settings.[25] International literature lacks comprehensive insights into the integration and advancement of specialized nurses' roles in medication management within home care. This review aimed to cover this knowledge gap and provide an understanding of policies, strategies, and interventions that enhance the role of specialized nursing practice in home care. Therefore, this review aimed to identify and describe the contributions of specialized nurses to medication management for older people in home care. The guiding review question was: What is the scope and impact of specialized nurses' contribution to medication management for older people to ensure patient safety in home care?

Materials and Methods

Review Design

This systematic review utilized a mixed-method approach, which helps understand how complex interventions function, for whom they are effective, and how healthcare systems adapt to their implementation.[26] This approach aligns with the traditional integrative review framework, which connects quantitative and qualitative data to synthesize current knowledge and enhance practice.[27] This review adhered to the PRISMA guideline to ensure structured development and reporting findings (Supplementary File 1).

Protocol and Registration

The international research team collaboratively developed a review protocol before conducting the review to promote transparency, maintain integrity, and minimize bias. The protocol was registered in PROSPERO, detailing the review objectives, methodology, and search plan (ID: CRD42024523188), accessible at the following link: crd.york.ac.uk/PROSPERO/display_record.php?RecordID=523188.

Accordingly, the review aim was structured using the PICO framework as follows:

P (population): Specialized nurses are registered nurses (RNs) who focus on a specific area of nursing practice. With additional education and training at the bachelor's or master's level, nurses such as NPs, APNs, and CNS are prepared to deliver expert care in fields such as geriatrics, oncology, critical care, and mental health. Their advanced knowledge and skills enable them to provide targeted support and care for patients requiring monitoring and continuous care.

I (interest): The current frameworks, responsibilities, and contributions of specialized nurses in medication management defined as "to address medicines-related problems and optimize the use of medicines by providing advice on prescribing, medication monitoring, management of repeat prescribing systems and education and training on prescribing and the use of medicines".[28] The initial interest lies in understanding how to optimize the contribution of specialized nurses in enhancing medication safety and improving the quality of care for older people.

C (context): Home care refers to older peopel living in their own homes while receiving supervised, multi-professional short- and long-term care provided within the community.

O (outcome): Minimizing the probability of medication errors, enhancing older people's outcomes, and overcoming challenges in medication management to improve overall patient safety.

Literature Search

A systematic search of the international literature was performed across databases, including PubMed (covering MEDLINE), Scopus, CINAHL, ProQuest, and Embase, focusing on studies published from January 1, 2014, to August 31, 2024, to capture recent research within the last decade. A pilot search on Google Scholar helped identify relevant keywords. Search strings were developed by translating Medical Subject Headings (MeSH) and thesaurus terms into database-compatible terms using Boolean logic and truncation with AND/OR operators. Consultation with a librarian ensured accuracy. Various versions of key terms related to "specialized nurse", "medication management", and "home care" were used (Supplementary File 2). Cross-references from article bibliographies were also examined to broaden search coverage.

Selection of Studies

All original research studies employing qualitative, quantitative, or mixed-methods designs were considered, with selection criteria focusing on medication management involving specialized nurses within the patient's home, adult home care, published in peer-reviewed scientific journals, in English, and in the last decade (2014–2024). The exclusion criteria were commentaries, letters, case reports, case studies, conference proceedings, and books; studies without specific details on specialized nurses' roles in medication management; studies focused on non-specialized nurses, nurse assistants, or associates; pediatric, child, or neonatal care (under 18 years); publications before 2014; and non-English language studies.

Search results were uploaded to the Rayyan platform for screening. Two authors (MV and PAL) independently screened and selected studies based on the eligibility criteria, first reviewing titles and abstracts, followed by full-text reviews. They reached a consensus on article selection through discussions and shared insights by creating tables that summarized the studies' characteristics, relevance, and suitability for inclusion. Discrepancies were resolved to finalize the inclusion and exclusion of the studies.

Quality Appraisal and Risk of Bias Assessment

This review included a comprehensive assessment of the credibility, relevance, and findings of the selected studies by two review authors (PAL and MV). The Mixed Methods Appraisal Tool (MMAT), version 2018, was applied to evaluate

studies with diverse methodologies because of its user-friendliness and structured criteria for qualitative, quantitative, and mixed-methods research, ensuring a robust quality assessment across various research designs.[29] To evaluate the risk of bias, RoB2 and ROBINS-I tools were used for randomized clinical trials and cohort studies, respectively. In addition, the Robvis tool was used to visualize the risk of bias assessment.[30] Studies were independently reviewed to ensure a detailed and accurate assessment of bias.

Ethical Considerations

Although this review study did not require ethical approval as it did not involve human samples, the authors have acknowledged all available sources and adhere to citation practices that respect intellectual property rights.

Research Synthesis

Differences in methodologies, objectives, data collection tools, and measurement outcomes across experimental and cohort studies, along with the inclusion of qualitative studies, make conducting a meta-analysis impractical. Therefore, within the mixed-method approach, a data-based convergent synthesis was employed to collate and analyze qualitative and quantitative evidence in a parallel and complementary manner to address the review question. The review results were presented at both descriptive and explanatory levels that incorporated statistical and non-statistical data. This approach aims to describe and integrate quantitative and qualitative findings, extend beyond theoretical insights, and offer practical interpretations for clinical use.[26,31]

The data extracted from the included studies were organized in a table format for straightforward extraction, comparison, and categorization of the key characteristics. It helped to structuralise, summarize, and interpret the results of the studies, allowing for a thematic analysis that informed identifying recurring codes, similarities, and contrasts in findings and comparing them across studies led to the development of categories and subcategories for presenting findings.

Results

Outcome of the Search Process

The initial database search yielded a total of 875 studies. Following the removal of duplicates (n=115) and the screening of titles and abstracts, 78 studies remained. A thorough full-text review further refined the search to include 32 articles (Supplementary File 3). The primary reasons for exclusion were studies that did not focus on medication management initiatives, did not involve specialized nurses, lacked details on their roles in medication management, or were centered on acute or ambulatory healthcare settings, such as hospitals. After evaluating each article using appropriate methodological checklists, all 32 studies were included in the research synthesis (Figure 1).

Overview of Included Studies

The studies were published in English, spanning the last decade from 2014 to 2024. They originated from multiple countries, including the USA,[32–51] Australia,[52,53] the UK,[54–56] Canada,[57–59] Ireland,[60] Italy,[61] South Korea,[62] and the Netherlands.[63]

Most studies utilized quantitative research designs, including three randomized clinical trials,[34,38,47] 12 quasi-experimental studies,[32,37,42,43,46,49,51–53,59,61,63] five cohort studies,[39,40,45,57,58] four cross-sectional studies,[44,48,54,55] and one case-control study.[36] Additionally, the data collection included 2 mixed-method studies,[33,56] 5 qualitative studies.[35,41,50,60,62] The study sample consisted of older adults with various chronic health conditions. Table 1 summarizes the selected studies and their general characteristics.

Evaluation of Methodological Quality

The results of the quality appraisal are presented in Supplementary File 4. All studies met the required quality criteria for their respective methodologies, demonstrating an appropriate study design, suitable data collection methods, coherent derivation of findings from the data, and alignment in data analysis, interpretation, and presentation of the results.

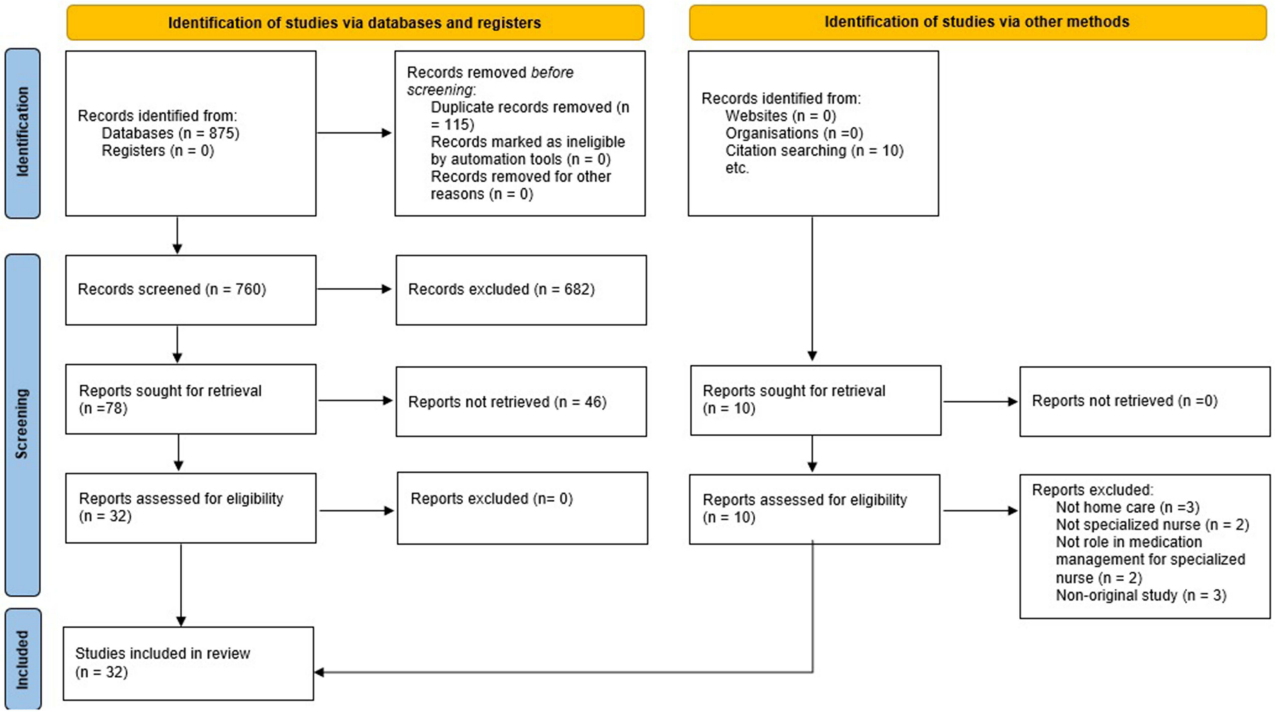

Figure 1 PRISMA diagram of search process. Adapted from Page MJ, McKenzie JE, Bossuyt P, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021; 372 :n71. Creative Commons.

Regarding risk of bias assessment, randomized clinical trials[34,38,47] showed a low risk of bias in all dimensions, including randomization, intervention, outcome, and reporting results. Cohort studies[39,40,45,57,58] general had a low risk of bias, except for some concerns with the participants' section, missing data, and measurement of outcome (Supplementary file 4). Therefore, all studies were considered of adequate quality and were included in the study.

Specialized Nurses in Home Care Oversee Medication Management

The review findings were grouped into the following categories: "specialized nurses' identities", "specialized nurses' roles and responsibilities", and "impact of specialized nurses' medication management in home care". The last category consisted of the following six subcategories: "quality of life enhancement", "emergency department visits", "burden of care for older adults and caregivers", "monitoring and identification of medication issues", "symptom management", and "workload and burden on the healthcare system". Table 2 summarizes the areas of concentration of the studies' findings regarding the impact of specialized nurses' involvement in medication management within home care.

Specialized Nurses' Identities

Given that specialized nursing practice encompasses a diverse range of definitions and interpretations reflecting varying expertise, education, and skills, the expertise of specialized nurses varied in our review as they fulfilled different roles in medication management within home care. They were mostly NP.[32,34,36–43,46,48–53,57,58,63] They were also identified as APN,[47] advanced practice registered nurse,[35,44,45] advanced nurse practitioner,[56] advanced practice nurse,[59,62] family nurse practitioner,[61] palliative care clinical nurse,[33] palliative care specialist nurse,[54] mental health nurse,[60] home care cardiovascular nurse,[63] and CNS.[55]

Specialized Nurses' Roles and Responsibilities

Specialized nurses assumed multiple roles in medication management within home care, thus ensuring the safety of medication practices. The most highlighted role was medication prescribing.[33,35,39,52,54,56–58,60,62,63]

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Table 1 A Summary of the Selected Studies and Their General Characteristic

Authors and Year, Country	Focus	Research Methodology	Sample and Setting for Older People in Home Care	Intervention	Nurse Degree and Qualification	Role of Nurse in Medication Management	Measure	Implication for Patient Safety
Goldman et al, 2014, USA[38]	Hospital support at home for older people	Randomized controlled trial	700 older people divided to the intervention (n=306) and control (n=319) groups/own home	Peri-discharge, nurse-led intervention via telehealth along with physician, pharmacist, and nurse	Nurse practitioner	Assessing adherence to medications, answered questions about medications; adjusting medications; working with pharmacies to resolve prescription problem	Emergency department visits or readmissions	A nurse-led program involving patient education and follow-up phone calls
Hall et al, 2014, USA[40]	Cardiac surgery nurse practitioner home care for coronary artery bypass graft patients	Retrospective observational cohort	401 coronary artery bypass grafting older patients: 169 patients and 232 controls/own home	Transitional care program: Follow Your Heart	Nurse practitioner	Home visit, reconciliation of discharge medications, assessing patient treatment compliance, providing education to enhance understanding, and making and communicating necessary medication adjustments to primary care physicians, cardiologists, home care providers, and the cardiac surgeons	30-day readmission and death	Ensuring continuity of care, serving as a communication hub, and managing medications, while giving home care nurses the opportunity to familiarize themselves with the patient's specific issues, treatments, and unresolved concerns.

Chan et al, 2015, USA[34]	Care transition for older multi-lingual adults in the safety net	Randomized controlled trial	685 older people: 347 to the intervention and 353 to the control groups/own home	Nurse-led hospital-based care transition via telehealth with the participation of registered nurse and physician	Nurse practitioner	Assessing adherence to medications, informing primary care provider about medication adjustments	Discharge-related patient experiences	Need for more intensive post-hospitalization interventions among multilingual, and cognitively impaired patients
Mitchell et al, 2016, Australia[52]	Nurse practitioner-led for rural palliative care	Pilot intervention	62 older people/ own home	Single multidisciplinary case conference by nurse practitioner-led care with the participation of community-based health professionals and general physician	Nurse practitioner	Medication prescription	Patient-reported outcomes, depression and anxiety, palliative symptoms, satisfaction	Initial assessments by nurse to uncovered urgent clinical issues in advanced palliative patients through multidisciplinary care, improving care coordination and boosting patient and carer confidence in symptom management, making dying at home more feasible
Moore et al, 2016, USA[46]	Nurse practitioner-led home care for congestive heart failure	Pilot study	22 older people/ own home	Nurse practitioner-led interdisciplinary program with home telemonitoring along with nurse, physical therapists, occupational therapists, a dietician, pharmacists, social workers, home health aides	Nurse practitioner	Reconciling medication and medication refill, assessing changes in medications	Readmission	Effectiveness of home nurse-led program in reducing emergency and hospital visits

(*Continued*)

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Table 1 (Continued).

Authors and Year, Country	Focus	Research Methodology	Sample and Setting for Older People in Home Care	Intervention	Nurse Degree and Qualification	Role of Nurse in Medication Management	Measure	Implication for Patient Safety
Quist et al, 2016, USA[48]	Medication management team-based care for older people	Retrospective descriptive study	152 older people	GRACE team care along with social worker, geriatrician, pharmacist, mental-health professional	Nurse practitioner	Assessment and recommendation to the team for medication management	Implementation of recommendations	Facilitating medication reconciliation, education, communication, and care coordination
Hernandez, 2017, USA[41]	Medication management for older people	Narrative inquiry	15 nurse practitioners/own home	Expertise in providing care for older adults while managing the complexities of medication administration	Nurse practitioner	Managing complex medication needs of patients	Experiences and perspectives	Remaining attentive to polypharmacy and the challenges of managing complex medication regimens, while simplifying medication management and ensuring continuity of care through digital solutions, as well as empowering and educating older people
Bagchi et al, 2018, USA[32]	Telemedicine care for older people	Pilot study with a mixed methods approach	10 older people	Telemedicine application	Nurse practitioner	Medication review	Satisfaction and experiences and perspectives	Identifying needs and preferences of underserved communities

Dawson et al, 2018, UK[55]	Home-based medication transitioning for patients with pulmonary arterial hypertension	Retrospective analysis	92 older people/ own home	Home-based medication transitioning by telehealth	Clinical Nurse Specialist	Explaining medication changes, new dosing schedule, potential side effects, and drug interactions, advising to report any adverse events, communicating medication issues to the healthcare team	Post-transition adverse event, feasibility, safety, effectiveness	Clinical stability and tolerance due to the transitional program
Wong et al, 2018, Canada[59]	Transitional care from hospital to home for older people after transcatheter aortic valve implantation	Pilot study	77 older people with transcatheter aortic valve implantation/own home	Evaluating transitional care strategies	Advanced practice nurse	Assessing medication, rectifying medication discrepancies. Self-care education around medication management	Fluid balance monitoring, medication management, and addressing anxiety and depression	Need to establish consistent processes to support older people during vulnerable care
Edge et al, 2019, Canada[57]	Medication prescription by nurse practitioners and family physicians	Population-based descriptive retrospective cohort	25,220 older people/own home	Sociodemographic characteristics and comorbidities of older adults prescribed medications by nurse practitioners and family physicians	Nurse practitioner	Medication prescription	Prescription data based on demographic and health-related characteristics	Understanding care patterns for shaping primary care policy
Fisher et al, 2019, USA[37]	Remote, nonphysician-led hypertension management	Pilot intervention	130 older people/ own home	Remote, navigator-led hypertension innovation program along with a pharmacist	Nurse practitioners	Medication titration and training patient's navigator	Blood pressure	Efficiency and safety of care by non-physician models

(*Continued*)

Table 1 (Continued).

Authors and Year, Country	Focus	Research Methodology	Sample and Setting for Older People in Home Care	Intervention	Nurse Degree and Qualification	Role of Nurse in Medication Management	Measure	Implication for Patient Safety
Leask & Tennant, 2019, UK[56]	Unscheduled care advanced nurse practitioners in primary care	Mixed-methods design	239 home visits to older people/own home	Unscheduled home visits on behalf of physician in primary care	Advanced nurse practitioner	Medication prescription	Number of referrals, experiences of nurses and physicians of services	Ensuring that nurse-led care delivery is feasible and acceptable to physicians
Possin et al, 2019, USA[47]	Collaborative dementia care via telephone and internet in dementia	Single-blind, randomized clinical trial with a pragmatic design	Older people with dementia and their caregivers: 512 dyads in the intervention and 268 in the control group/own home	Telephone-based collaborative dementia care	Advanced practice nurse within the dementia expert providers' team along with social worker and pharmacist	Helping to convey medication recommendations from pharmacist to patients	Quality of life, emergency department/ system use, readmission, caregiver depression/burden	Access to experts for issues beyond the care team's scope, like medical needs, behavioural problems, legal or financial complexities, and safety concerns.
Warren et al, 2019, USA[51]	Community-based care transition	Quality improvement program	7931 older people/ own home	Community-based care transitions program	Nurse practitioner	Addressing medication questions or identifying medication-related issues involves referring patients to a pharmacist and assisting in identifying and resolving various drug-related issues	30-day all-cause readmission rate, readmission rate among the high-risk cohort, achievement of target volumes for full enrolment	Successful transitions through relying on the collaboration of healthcare providers, social workers, nurse practitioners, physicians, community pharmacists, and visiting nurses

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Antunes et al, 2020, UK[54]	Anticipatory prescribing for end-of-life care in community	Online survey	261 consisting palliative medicine consultants, general practitioners, palliative care specialist nurses (n=31), general community nurses, palliative medicine trainees, other doctors, pharmacists, other nurses, and other professional group/ home care	Anticipatory prescribing in community end-of-life care	Palliative care specialist nurse	Prescribing and dispensing injectable medications in anticipation of clinical need	Concerning changes in anticipatory prescribing during the COVID-19 pandemic and recommendations for improvement.	Challenge to community palliative care during pandemics
Guo et al, 2020, USA[39]	Diabetes mellitus care by primary care team	Cohort	306741 older people within 3524 primary care practices/own home	Different types of team primary care models	Nurse practitioner	Medication prescription	Guideline-recommended diabetes care, prescription of high-risk medications, hospitalization rate	Team-based care with nurses improved adherence to diabetes guidelines compared to physician-only practices
Kulsick et al, 2020, USA[43]	Medication adherence in older people at nurse practitioner clinic	Quality improvement project	319 older people/ own home	A review of medical records for patients over 52 weeks before an educational seminar and 13 weeks afterward; educating nurses on evidence-based, provider-driven strategies for medication management	Nurse practitioner	Enhancing medication adherence, prescriber consistency, provider-patient interaction, and medication reminders	Medication adherence rate and clinical biomarkers including blood pressure, lipid profile, blood glucose indicators	A need for ongoing monitoring of adherence and clinical outcomes in this specific patient population

(*Continued*)

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Table 1 (Continued).

Authors and Year, Country	Focus	Research Methodology	Sample and Setting for Older People in Home Care	Intervention	Nurse Degree and Qualification	Role of Nurse in Medication Management	Measure	Implication for Patient Safety
Squires et al, 2020, USA[50]	Medication complexity in home care	Qualitative secondary data analysis using directed and summative content analysis	77 home healthcare professionals including 12 nurse practitioner preceptors	Interprofessional intervention based in home care with nurse practitioner, social workers, and pharmacists and their student trainees	Nurse practitioner preceptor	Medication management	Perspectives and experiences of medication management challenge	Patient, provider, and system-level factors affecting medication complexity and management leading to communication and coordination challenges
Ernecoff et al, 2021, USA[36]	Home-based, nurse practitioner-led care	Retrospective case-control study	110 older people and 371 controls/ own home	A nurse practitioner-led, home-based care program for individuals with serious or complex chronic illnesses on palliative care needs and coordinating with patients' primary care and specialist providers	Nurse practitioner	Complex home support for antibiotics, screening for medication adherence	30- and 90- day emergency department visits and hospitalization, hospice conversion, and 30- and 90-day mortality	Addressing care needs and gaps early to avoid unnecessary hospitalizations and receive timely hospice services
Frain et al, 2021, Ireland[60]	Mental health nurse prescribing in home care	Qualitative thematic analysis	12 mental health nurses in home care/own home	Mental health nurse prescribing	Mental health nurse	Medication prescription	Perspectives and experiences	Nurse prescribing enhances care for individuals and improve access to services. Need for facilitating discussions about reducing or discontinuing medications

Levine et al, 2021, USA[44]	Medication therapy problems involving cognition among older people	Retrospective analysis	105 older people/ own home	Advanced practice registered nurse-led, multidisciplinary home-based care team	Advanced practice registered nurse	In-home medication reconciliations and feeding pharmacist, geriatrician, and psychiatrist with data for further actions; engaging patients and caregivers in discussions about medication recommendations	Medication therapy problems: indication, effectiveness, safety	Multidisciplinary teamwork to identify cognitively harmful medications, side effects of dementia treatments, and untreated cognitive conditions
Misra-Hebert et al, 2021, USA[45]	Home visit for patients discharged from the hospital	Retrospective cohort using convergent mixed methods	468 older people in two phases within 17 months/own home	Post-discharge home visit program by nurse and paramedics	Advanced practice registered nurse	Educating patients on the reasons for their medications and how to use them properly	Hospital admissions, emergency department visits, and mortality	Medication education and enhancing understanding of discharge recommendations can benefit medically complex patients and enhance care outcomes
Rose et al, 2021, USA[49]	Transitional care following a skilled nursing facility by nurse practitioners	Quality improvement	129 older people/ own home	Transitional care visit following skilled nurse facility	Nurse practitioner	Medication assessment	30-day readmission rate, identifying gaps and needs in care	Identifying high-risk patients discharged from the hospital to home for potential readmission

(*Continued*)

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Table 1 (Continued).

Authors and Year, Country	Focus	Research Methodology	Sample and Setting for Older People in Home Care	Intervention	Nurse Degree and Qualification	Role of Nurse in Medication Management	Measure	Implication for Patient Safety
Savini et al, 2021, Italy[61]	A family nurse-led intervention for patients with chronic diseases	Non-randomized before-after pilot study	70 older people/ own home	Nurse-led educational intervention	Family nurse practitioner	Educating home nurses about self-management skills, such as medication adherence and recognizing and managing signs and symptoms for patient empowerment	Rate of health services' use	Nurse-led education has the potential to reduce healthcare utilization in older patients with chronic diseases
Pond et al, 2021, Australia[53]	Nurse practitioner-led collaborative dementia care	Feasibility study	76 older people/ own home	Nurse practitioner-led mobile memory clinic	Nurse practitioner	Advising general physician to conduct medication review	Satisfaction and advice to physician	Early diagnosis and assessment, improvement of access to care for this at-risk population
Campling et al, 2022, USA[33]	Palliative care medication in the community	Evaluative, mixed method case studies of service delivery models	40 older patients' records/own home	A structured log documenting medication access experiences over an 8-week period.	Palliative care clinical nurse specialist prescribers	Medication prescription	Perspective and experiences, cost	Growing number of nurse prescribers, along with enhanced shared inter-professional access to electronic prescribing systems, improves continuity of care and strengthens professional relationships.

Lee et al, 2022, South Korea[62]	Advanced practice nurses and patient safety culture in hospital-based home care	Qualitative	20 nurses specialized in home care/own home	Patient safety culture in hospital-based home healthcare	Advanced practice nurse	Medication prescription	Experiences and perspectives of patient safety	Effective communication and collaboration and involving patients, caregivers, colleagues, and medical professionals within community partnership
van Ramshorst et al, 2022, the Netherlands[63]	Connected care for endocarditis and heart failure via hospital-at-home care	Feasibility study	600 older people with endocarditis/ own home	Hospital-at-home model using virtual ward with home care nurse and cardiologist	Nurse practitioner and home care cardiovascular nurse	Intravenous treatment at home and prescribing the necessary doctor's orders	Patient satisfaction, clinical efficacy outcomes	Safety of ambulatory medication treatment at home and its role in reducing length of hospital stays
Kanne et al, 2023, USA[42]	The interagency care team for older people in primary care	Quality improvement with a single site, multi-method design	123 older patients/ own home	Interagency care team of geriatrics providers and community partners collaborating through electronic consultations	Nurse practitioner	Reviewing medications and patient-reported barriers, such as affordability and side effects via telephone along with pharmacist	Identification of medication issues	Linking older adults with complex care needs to geriatric expertise and community services through collaborations with primary care providers
Scott et al, 2023, Canada[58]	End of life home care by nurse practitioner and physician	Retrospective cohort study	103 664 decedents older people/own home	End of life care home visit	Nurse practitioner	Medication prescription for symptom management	At least one medication claim related to pain and symptom management occurring during the last 90 days of life	Receiving home visits from a nurse near the end of life may lead to better outcomes aligned with patients' preferences.
Datta et al, 2024, USA[35]	Decision-making in home-based primary care	Qualitative using grounded theory	13 advanced practice registered nurses/home care	Home-based primary care program	Advanced practice registered nurses	Antibiotic prescription	Experiences and perspectives	Managing uncertainty while weighing competing factors in infection treatment.

Abbreviations: GRACE: Geriatric Resources for Assessment and Care of Elders; COVID-19: Coronavirus Disease 2019.

Table 2 Outcome Indicators of Specialized Nurses' Medication Management Within Home Care Discussed in the Reports of 32 Included Studies

Author, Year	Impact on Medication Management					
	Quality of Life Enhancements	Emergency Department Visits	Burden of Care for Older Adults and Caregivers	Monitoring and Identification of Medication Issues	Symptom Management	Workload and Burden on the Healthcare System
Goldman et al, 2014[38]		×				
Hall et al, 2014[40]						×
Chan et al, 2015[34]				×		
Mitchell et al, 2016[52]					×	×
Moore et al, 2016[46]						×
Hernandez, 2017[41]			×	×	×	
Bagchi et al, 2018[32]				×		
Dawson et al, 2018[55]				×		
Wong et al, 2018[59]					×	
Edge et al, 2019[57]				×		
Fisher et al, 2019[37]					×	
Leask & Tennant, 2019[56]						×
Possin et al, 2019[47]	×	×	×			
Warren et al, 2019[51]						×
Antunes et al, 2020[54]					×	
Guo et al, 2020[39]			×		×	
Kulsick et al, 2020[43]			×			
Squires et al, 2020[50]				×		
Ernecoff et al, 2021[36]		×		×		×
Frain et al, 2021[60]				×		
Levine et al, 2021[44]				×		
Misra-Hebert et al, 2021[45]						×
Quist et al, 2016[48]				×		
Rose et al, 2021[49]			×	×		
Savini et al, 2021[61]						×
Pond et al, 2021[53]				×		
Campling et al, 2022[33]			×	×	×	×
Lee et al, 2022[62]					×	
van Ramshorst et al, 2022[63]	×		×			×
Kanne et al, 2023[42]			×	×		
Scott et al, 2023[58]					×	
Datta et al, 2024[35]				×		×

Within the multidisciplinary medication team, their roles encompassed bridging the healthcare team members and older people by providing data to healthcare providers at various healthcare levels for further actions,[43,44] communicating medication issues and necessary medication adjustments,[34,40,55] conveying medication recommendations from pharmacists to older people[47] and referring older people to a pharmacist, helping to identify and resolve drug-related concerns,[51] and following up older people-reported barriers such as affordability and medication side effects through telephone consultations with a pharmacist.[42] Moreover, they advised collaboration with physicians and pharmacies to perform medication reviews, resolve prescription issues, and manage medications.[38,48,53]

In terms of educational role, specialized nurses educated other home nurses on remote navigation for medication monitoring,[37] self-management skills including medication adherence, and recognizing and managing signs and symptoms.[61] They were educated about the reasons for their medications and proper usage,[36,40,45] engaged older people

and caregivers in discussions about medication recommendations and self-care medication management,[44,59] answered their questions about medications,[38,51] explained medication changes, new dosing schedules, potential side effects, or drug interactions, and advised older people to report any adverse events.[55]

Their monitoring role was to screen older people's medication adherence,[34,36,38,40,43] improve it through prescriber consistency and medication reminders.[43]

Regarding the general aspects of medication management, they reviewed medications,[32,42] undertook medication management based on older people's complex medication needs,[41,50] assessed medications,[34,48,49,59] rectified and adjusted discrepancies,[38,59] reconciled medications,[40,44,46] titrated medications, and refilled dispensing devices while assessing changes in prescriptions[37,46] and administered intravenous medications.[63]

Impact of Specialized Nurses' Medication Management in Home Care

They were classified into six subcategories. A summary of specialized nurses' contributions to and their impact on medication management in home care for older people is presented in Table 3.

Table 3 A Summary of the Contributions and Impact of Specialized Nurses on Medication Management in Home Care

Subcategory	Description of Impact
Quality of life enhancement	Personalized-treatment and care; Assessment for medication issues; Monitoring medications' effects and side effects; Promotion of adherence to medications; Collaboration with the pharmaceutical care team; Meeting older people's need and expectations
Emergency department visits	Proactive medication management; Prevention of complications; Sensitization to medications effects and side effects
Burden of care for older adults and caregivers	Medication prescription and administration; Improvement of mood, reduction of caregiver's being overwhelmed; Education and empowerment of older people and caregivers regarding polypharmacy, medication effect, side effect and adherence and communication with provider; Identification and management of polypharmacy; Support to access medications; Follow up of guidelines and the use of data for medication management
Monitoring and identification of medication issues	Detection of medication discrepancies; Monitoring adverse drug reactions and risk of complications; Ongoing assessment of medication use at home; Communication of medication issues with the therapeutic team; Use of electronic health record system; Medication list review to check dosage, frequency, use of herbal and over the counter drugs, listening to older people and families' concerns; Detection of duplications, drugs interactions over- and under -use and effectiveness level of medications; Recommendations for medication review, dose reduction and deprescription of potentially inappropriate medications, discharge medication counselling and detection of discrepancies; Updating medication list for primary care provider's follow up; Reduction of comorbidity; encouragement of older people to collaborate in decision making; Suggestion of alternative treatment options; Readily accessible to older people; Handling medications in a timely accessible manner

(*Continued*)

Table 3 (Continued).

Subcategory	Description of Impact
Symptom management	Assessment of reaching intended therapeutic outcomes; Balancing older people's needs with the necessity of medication use; Balancing medications' risks and benefits; End of life medication prescription; Management of polypharmacy through identification of reasons for medication use, effects and side effects; Deprescription of medications; Palliative care medication re-prescription; Promote symptoms' relief; Securing home medication storage; Adaptation of medication type based on availability
Workload and burden on the healthcare system	Reduction of hospitalization and home visit; Close medication use monitoring; Education of older people of effects, side effects and adherence; Early identification of symptoms and prompt intervention; Education of older people about self-management, medication verification; End of life care medication prescription; Ambulatory medication treatment

Quality of Life Enhancement

Specialized nurses play a crucial role in home-care medication management, directly impacting older adults' quality of life by ensuring safe, effective, and personalized treatment. This was the result of careful assessment, identification of potential medication issues, monitoring of side effects, and promotion of adherence to prescribed regimens, in collaboration with other healthcare professionals. Accordingly, specialized nurses' active involvement in medication management in home care enhanced older people's quality of life (B = 0.53; 95% CI: 0.25–1.30; P = 0.04).[47] Older adults also stated that home care meets their expectations and needs. They would recommend such care at home and would choose this option again.[63]

Emergency Department Visits

The impact of specialized nurses' participation in medication management in home care was changing the pattern of emergency department visits through proactive medication management and preventing complications that led to emergency care. It has improved the outcomes of older people and helped alleviate the strain on emergency healthcare services. The results showed that specialized nurses' efforts in medication management lowered emergency department visits among older adults (B = −0.14; 95% CI: −0.29, −0.01; P = 0.04).[47] In contrast, in one study, older people were more likely to have emergency department visits at 30 days (15.1 percentage points, CI: 4.9–25.3; P = 0.004) and 90 days (27.8 percentage points, CI: 16.0–39.6; P < 0.001) of the specialized nurse' care intervention.[36] Similarly, in another study, specialized nurses referred 3.6% of older adults to urgent care, 1.3% to the emergency department, and 1.6% to paramedics.[38] The increased number of emergency department visits could be due to the early identification, referral, and sensitization of older people to medication side effects.

Burden of Care for Older Adults and Caregivers

The involvement of specialized nurses in medication management enhances care quality by reducing the burden on both older people and their caregivers in home care, as highlighted in their statements, perspectives, and statistical results. For instance, specialized nurses, through intravenous treatment and prescription at home, met older people's expectations and needs, as they expressed that they would recommend it to others.[63] Moreover, it reduced caregiver depression (B = −1.14; 95% CI, −2.15, −0.13; P = 0.03) and burden (B = −1.90; 95% CI: −3.89, −0.08; P = 0.046).[47]

Specialized nurses empowered older adults and caregivers via health information, and played a key role in identifying and managing polypharmacy, focusing on community-level efforts by educating older adults and their

caregivers. They informed the older people's family, significant others, or close friends to be aware of and recognize if they were struggling to manage or take their medications consistently.[41] They also provided older adults with information on how to obtain medications, and checked for stock availability at pharmacies.[33] The outcome was that older people in the nurse-practitioner-led team received more guideline-recommended diabetes care, such as annual eye examinations (adjusted OR, 1.04; 95% CI, 1.00–1.08) and HbA1C tests (adjusted OR: 1.11, 95% CI: 1.04–1.18), affecting the process of medication management and better adherence to clinical practice guidelines for diabetes management compared to physician-only practices.[39] After home visits by specialized nurses, older adults' understanding of their medications improved significantly, with 33.9% reporting significant improvement and 44.44% noting some improvement.[49] In addition, 94% of primary care team members understood the program's purpose, found the recommendations easy to implement, and believed that their older adults were more likely to remain safe at home longer because of consultation with a specialized nurse. Healthcare team members also reported feeling less overwhelmed when managing complex older adults and addressing polypharmacy.[42] Education on medication management and interaction with providers, reviews, and reminders to older people by specialized nurses improved the adherence rate for diabetes management from 85.7% (SD = 19.58) to 94.6% (SD = 13.73, P = 0.019).[43]

Monitoring and Identification of Medication Issues

Specialized nurses identified and monitored medication issues as detected discrepancies and monitored for adverse reactions to prevent medication errors and reduce the risk of complications. Their ongoing assessment and communication with healthcare professionals regarding medication regimens ensured the quality of care. They used electronic health records (EHR) to reduce potentially inappropriate medications (PIMs) by verifying medication lists, clarifying dosages and frequencies, and addressing older people's concerns, including over-the-counter and herbal products. This involves the identification of therapeutic duplications and potential drug interactions.[41] Specialized nurses in home care practices helped identify indication medication therapy problems accounting for 34% (57 out of 166) of total medication therapy problems, with 79% (45 out of 57) related to underuse and 21% (12 out of 57) to overuse, and effectiveness medication therapy problems representing 13% of the total, and safety medication therapy problems comprising over half (52%) of all medication therapy problems, often involving benzodiazepines and anticholinergics. The specialized nurse-led program, along with a multidisciplinary medication team, identified and provided recommendations including 23% for discontinuation and 19% for dose reduction. Cognitive medication therapy problems were found in 79% of older people with undesirable effects, comprising 41% (36 out of 87) of safety medication therapy problems. Acetylcholinesterase inhibitors (AChEIs) were responsible for 67% (24 out of 36) of these occurrences, leading to recommendations for discontinuation (25%) or dose reduction (8%). Inappropriate medication adherence was identified in terms of underuse, including potentially untreated dementia (62%, 28 out of 45) and depression (38%, 17 out of 45). Dose reductions (58%) or discontinuations (28%) due to unsafe medications were applied to benzodiazepines, anticholinergics, non-benzodiazepine receptor agonists (Z-drugs) and antipsychotics.[44] Specialized nurses monitored medication issues to make decisions regarding medication changes due to inadequate responses (92% for macitentan and 77% for ambrisentan), side effects (one person switched to macitentan due to side effects, and four transitioned from bosentan to ambrisentan for issues such as rash (n=2), headache (n=1), low oxygen (n=1), abnormal liver tests, diarrhea (n=1), and intolerance (n=1). Mild ankle edema occurred in 7 macitentans and 12 ambrisentan persons.[55] In a specialized nurse care program, nine out of ten people indicated that they were likely or very likely to recommend telemedicine services to friends and family. The benefits of specialized nursing care include consultations and medication refills, observation of medication adherence, medication reviews.[32] Older people and caregivers found the assessment by the specialized nurse acceptable and useful; out of 76 older people, the specialized nurse requested the general physician for a medication review for 23 older people.[53]

At the time of discharge from skilled nursing facilities to home, older adults experienced conflicting medication lists from both the hospital and nursing facilities, leading to confusion. Of the older adults receiving home visits by specialized nurses, 81.25% were identified as having medication discrepancies, often because they did not pick up prescriptions, resuming discontinued medications, or confusion over changes made between the hospital and nursing

home stay.[49] Discharge medication counselling by specialized nurses led to an improvement in older adults' inquiries about medications 30 days after discharge compared to the control (92.1 vs 86.0, P = 0.02).[34] Specialized nurses identified areas for improvement by medication assessments in home visits, including tapering narcotics, transitioning older people off sliding-scale insulin, updating the medication list in the electronic health record before discharge, and improving primary care provider follow-up, as only 25% of discharged older people had follow-ups within seven days.[49] Of the 924 medication-related recommendations provided by specialized nurses, 96% (887) were implemented. The majority (94%) involved reviewing medications (151), updating medication lists (153), and educating patients about medication safety (132). Among 58 drug-specific recommendations, 36% (n = 21) were adopted. Three of the four suggestions for discontinuing medication were as follows: Specific recommendations included starting multivitamins (15 suggested, 3 implemented), calcium with vitamin D (20, 4 implemented), antidepressants (6, 6 implemented), analgesics (2, 2 implemented), anticholinergics (6, 4 implemented) and antipsychotics (2, 1 implemented). Seven of the nine recommendations to modify or stop PIMs were also followed, including amitriptyline and diphenhydramine.[48] In another study, specialized nurses identified various medication issues (84%) related to medications leading to dose adjustment, alerts about drug interaction, geriatric precautions, and adherence.[42]

Older people treated by specialized nurses than those primarily seen by family physicians (1.30 vs 2.04) had lower mean comorbidity index scores.[57] Additionally, Older people value being encouraged by nurse prescribers to collaborate in decision making and explore alternative treatment options for a person-centered approach to care. They appreciated the therapeutic relationship in a flexible and unhurried manner, and provided prompt access to nurses for medication-related issues and unresolved symptoms.[60] However, coordination issues within the information exchange, disagreements, and unclear line of responsibilities, such as medication reconciliation between specialized nurses and other healthcare providers, hindered medication safety as it highlighted restrictions on their practice as a key aspect of their professional authority in home care in managing complex medication regimens.[50] Moreover, older people and families are reassured by specialized nurses' medical authority so that actions can be taken, leading to enhanced medication use.[35] While nurse prescribers typically transferred responsibility for repeat prescriptions to physicians, they sometimes handled repeat prescriptions themselves when they judged that it would be faster for older people, such as during symptom exacerbations or when a holiday or weekend was approaching.[33]

Symptom Management

Specialized nurses helped with symptom management by accurately assessing older adults' symptoms and ensuring that medications were prescribed, administered, and monitored correctly to achieve the intended therapeutic effects, leading to improved well-being. For appropriate medication management by specialized nurses, it is crucial to recognize that not everything that older people need should be fixed using medications. Additionally, one aspect of specialized nurses' responsibilities for managing polypharmacy requires that they balance quality of life with the risks and benefits of medication prescriptions.[41] For older people undergoing end-of-life care, a study showed that receiving a home visit from specialized nurses increased the odds of receiving medication for symptom management in the last three weeks of life (OR: 2.54, 95% CI: 2.33 to 2.76).[58] Specialized nurses considered the dysfunctional cycle in which the side effects of one medication were mistaken for new issues, leading to more prescriptions. Therefore, they identified older people with polypharmacy and the reasons behind the use of each medication, ensuring that they were not just treating the side effects of other medications. An example was given to older people with multiple care providers and numerous medications, in which the specialized nurse referred a person to the specialist who then prescribed a medication that led to delirium and was misattributed to dementia, but the nurses recognized medication side effects and ceased the medication.[41] However, in another study, older people had a higher risk of being prescribed high-risk medications by specialized nurses (adjusted OR: 1.03, 95% CI: 1.00–1.07), such as anticholinergics, antithrombotics, alpha agonists, barbiturates, vasodilators, non-benzodiazepine hypnotics.[39] Specialized nurses for palliative care prescribed 24 new medications for 12 older people and adjusted the dose of nine medications in six persons as for analgesia, including antiepileptics and antidepressants, to relieve neuropathic pain.[52] They also used their knowledge of end-of-life medicines to source and represcribe appropriate medications in a timely manner when symptoms arose during home care.[33] Specialized nurses' medication assessment and rectification helped older people (87.2%) reach no symptom and activity limitation state, with scores ranging from 1

to 4 (mean: 1.32) after 30 days.[59] In the case of symptoms arising, specialized nurses promptly investigated and addressed them using medications along with long-term symptom management through secure medication storage at home.[62] A study on hypertension management using amlodipine as the most frequently added drug to specialized nurses showed that 91% of 116 older adults reached their target BP at an average of 7 ± 7 weeks. Systolic BP decreased from 155 ± 18 mmHg in the clinic to 124 ± 8 mmHg at home, and diastolic BP decreased from 92 ± 13 to 74 ± 8 mmHg ($P < 0.001$) over 6 months, with a minimal increase (1.4–1.8 on average).[37] During the COVID pandemic for end-of-life care, specialized nurses adapted medications based on availability, using hyoscine patches instead of glycopyrronium. They prioritized the subcutaneous route and utilized buccal or transdermal options if subcutaneous drugs were unavailable and increased coverage on weekends and holidays.[54]

Workload and Burden on the Healthcare System

Medication management by specialized nurses reduced the workload of the healthcare system, especially regarding hospitalizations and home visits. By closely monitoring older people's medication schedules, managing potential side effects, and educating older people on adherence, they improved care outcomes and prevented medication-related complications, leading to extra burden on healthcare systems. For older people with Parkinson's disease who are prone to aspiration pneumonia and recurrent hospitalizations, early treatment was prioritized if symptoms such as increased cough or mild shortness of breath increased, avoiding hospitalization, even if it risked overprescribing.[35] Specialized nurse-medication management reduced probability of hospitalization at 30 days (11.4 percentage points, CI: −17.7 to −5.0; $P < 0.001$), and instead enhanced more transition to hospice care (22.4 percentage points, CI: 11.4–33.3; $P < 0.001$).[36] In another study, the readmission rate decreased to 12.5%, representing an 11% decline from the inception program by a specialized nurse to address medication issues.[51] Discharge medication management intervention by specialized nurses resulted in a significantly lower 30-day readmission or death rate of 3.85% (6 out of 156) compared to 11.54% (18 out of 156) in the usual care matched group ($P = 0.023$) (Hall et al, 2014). Educating specialized nurses on self-management led to a reduction in health service utilization ($\chi^2 = 28.03$, $P < 0.001$, OR = 0.016, Cohen's d = 0.48).[61] Education on medication use by specialized nurses for older people in home visits reduced the odds ratios (OR) of 30-day readmissions: 0.886 (95% CI: 0.808–0.971, $P = 0.010$), 90-day (OR: 0.913; 95% CI: 0.843–0.989, $P = 0.026$), and 180-day readmissions (OR: 0.911, 95% CI: 0.847–0.980, $P = 0.013$).[45] Medication prescriptions by specialized nurses in home care caused no older people to go to residential aged care facilities or hospitals after it.[52] Medication verification by sending photos to specialized nurses with daily medical specialist consultations eliminated the need for home visits and saved 847 hospital days for older people.[63] Medication prescriptions for end-of-life care projects by specialized nurses resulted in 20% of older adults dying at home instead of hospitals or remaining at home longer than usual.[52] Ambulatory intravenous antibiotic and diuretic treatment by specialized nurses reduced hospital stays by 847 and 201 days for endocarditis and heart failure, respectively, and reduced the average length of stay by 25 days for older people with endocarditis without major cardiovascular events.[63] A clinical pathway for medication management led by specialized nurses for cardiac older people enrolling 22 older people reduced the 30-day readmission rates to 9%, which is well below the national average of 23%.[46]

Their involvement in home care reduced physicians' workload for home visits due to alarms about medication, worsening statements (n=107), and self-care advice (n=47), leading to general practitioners' satisfaction (90% average score)[56] and appreciation of nurses' advice.[52] The identification of medication issues by specialized nurses in home care led to early intervention and 28 hospital admissions.[56] Physician satisfaction was high, averaging 9/10, with all attendees recommending the service to other practices in the city, noting reduced stress, and improved capacity. With a low referral rejection rate, specialized nurses discussed the potential to expand the service to more practices.[56] The involvement of a specialized nurse prescriber streamlined and sped up the prescription process, especially when delays caused medication shortages at older people's usual pharmacies, additional medications were needed for holidays, or prescribed treatments were ineffective. Coordinated care, such as contacting pharmacists or physicians through Email or phone calls, ensures that older people have timely access to necessary medications.[33]

Discussion

This review aimed to identify and describe the contributions of specialized nurses to medication management for older people in home care. According to the review results, specialized nurses assume multiple roles in medication management within home care. In addition, their contribution to medication management in home care influenced older people's quality of life, emergency department visits, burden of care for older people and caregivers, other healthcare providers, and the healthcare system and helped with the detection and resolution of medication issues and management of symptoms. The roles and responsibilities of specialized nurses in home care services have been emphasized in the international literature. Specialized nurses play a vital role in improving safety in home care by addressing potential issues with medications used at home, leading to better adherence to the therapeutic regimen and a reduced risk of adverse events.[64] Specialized nurses are recognized as key members of the multidisciplinary medication team, offering numerous benefits to the healthcare system in terms of care quality and overall patient outcomes. For example, the new multidisciplinary team systemic anti-cancer therapy clinic for neuroendocrine tumor patients in the UK, with the inclusion of CNS as a non-physician prescriber, demonstrated the positive impact of innovative clinics leveraging the expertise of specialized nurses along with the medical team.[65] In addition, a prospective safety audit of a nurse specialized-delivered injection service in an ophthalmology clinic in New Zealand revealed low incidences of post-injection complications, such as endophthalmitis (0.07%), vitreous hemorrhage (0.07%), and elevated intraocular pressure (0.17%). These findings indicate that services delivered by specialized nurses are safe and effective.[66] However, coordination and collaboration challenges between specialized nurses and other healthcare professionals persist due to disagreements and unclear lines of responsibility within healthcare, as indicated in our review results. Internationally, the role of specialized nurses as non-physician prescribers is evolving, with factors such as heightened accountability impacting nurses' confidence and competence.[67] Nurse empowerment involves nurses taking control of their practices and careers to advance nursing professionals and has a stronger impact on communities.[68] Multidisciplinary support is essential for empowering specialized nurses to advance healthcare services.[67] There is also a need to enhance standards for certification and regulation of these nurses, as well as the interpretation of their roles and competencies, in addition to the development of health policies that recognize their specialties.[69] This calls for optimizing their roles and scopes of practice across the entire care spectrum, from healthcare facilities to home care, alongside establishing strategic alignment and accountability frameworks within healthcare systems.[70]

Our review found that specialized nursing practices were associated with a higher risk of prescribing high-risk medications and an increased likelihood of emergency department visits for older people. Regarding medications, in primary care, high-risk prescribing increased significantly with age, rising from 2.5% in patients under 40 years to 20.2% in those aged 80 years and above (adjusted OR: 8.64, 95% CI: 7.69–9.71). It is also associated with the number of chronic medications; 10.6% of patients taking 0–2 chronic drugs received high-risk prescriptions, compared to 19.0% of those taking 11 or more chronic medications (adjusted OR: 1.35, 95% CI: 1.29–1.40).[71] Ineffective communication with individuals outside the core therapeutic team and organizational factors, such as including trade names in hospital formularies and on-call hours' prescriptions, create latent risks for high-risk medications prescribed.[72] This indicates room for improvement in prescribing practices, and a need for more targeted education on prescribing for older people to enhance safe medication practices.[73] In addition, quality improvement strategies such as clinical decision support to identify inappropriate prescribing and guide deprescribing protocols, performance feedback, and pharmacist-led interventions have been shown to be effective in reducing prescription errors. The growing use of electronic health records in primary care presents new opportunities to enhance medication safety and coordinate services among diverse healthcare stakeholders.[74,75]

To our knowledge, this is the first systematic review to integrate the current international knowledge of specialized nurses' contributions to medication management in home care for older people. This review excluded materials predating 2014, which may have excluded relevant research from that period, and those in other languages. There is insufficient international literature to clearly identify the roles, responsibilities, and benefits of specialized nurses in medication management within home care. Although selection bias was minimized by including both qualitative and quantitative studies, the varied quality and diverse study designs could have influenced the integration of the findings. Further studies

are needed to identify the roles and competencies of specialized nurses within interdisciplinary teams for medication management in home care and their impact on the home care outcomes of various older adults, including physical, psychological, and social indicators.

Conclusion

This review highlights the critical role of specialized nurses in medication management within home care. Their diverse expertise, education, and skills are essential in supporting older adults and their caregivers who face chronic health challenges.

Specialized nurses assume multiple roles to ensure safe and effective medication practices. Their proactive involvement not only enhances medication safety but also significantly improves the quality of life for older adults. By reducing emergency department visits, they help alleviate the strain on healthcare systems and minimize disruptions for patients and caregivers.

Addressing the unique needs of older adults, specialized nurses provide the necessary support for effective medication management to achieve therapeutic goals. Their proficiency in monitoring and resolving medication-related issues ensures timely interventions, better symptom control, and improved health outcomes. Through a holistic approach, specialized nurses address immediate medication concerns while fostering a supportive environment that empowers older people and caregivers to manage chronic conditions at home.

The positive impact of their practice underscores the need for continued investment in this field. By recognizing and promoting the contributions of specialized nurses, healthcare systems can optimize medication management, improve home care for older adults, and reduce the burden on healthcare resources. Supporting specialized nurses by clarifying their roles and responsibilities will help ensure high-quality care for older adults in their homes.

Policies are needed to translate the positive impacts of specialized nursing on medication management into sustainable outcomes for home care. Priority should be given to developing funding models that explicitly reflect the long-term cost savings achieved through specialized nurses' involvement in home care, including reductions in emergency department visits, hospitalizations, and the overall strain on the healthcare system.

Data Sharing Statement

Data supporting the findings of this review are available upon reasonable request from the corresponding author.

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