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Narrative Review

Enhancing Home-Based Nursing Care for Older Adults: A Scoping Review of Artificial Intelligence Applications

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Abstract

Objectives: The rapid expansion of artificial intelligence (AI) in healthcare presents new opportunities to enhance home-based nursing care for older adults amid global population aging and the increasing burden of chronic diseases. This review aimed to map the existing evidence on AI applications in home-based nursing care for older adults, identify reported outcomes, and explore implementation challenges and future directions.

Design: This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).

Setting(s): Studies conducted in home-based nursing, home care, and community care settings for older adults were included.

Participants: The review included studies investigating older adults receiving home-based or community-based nursing care and evaluating AI-supported interventions or technologies.

Interventions: AI-based interventions including machine learning models, deep learning systems, telemonitoring technologies, clinical decision-support tools, assistive robotics, and virtual health assistants were examined.

Outcome Measures: Extracted outcomes included AI application category, reported clinical and operational outcomes, prediction performance, hospital admission reduction, medication adherence, workflow efficiency, patient engagement, and implementation-related challenges.

Results: Forty-one studies met the inclusion criteria. AI applications were categorized into ML-based predictive models (n = 16), DL systems (n = 8), AI-enabled telemonitoring (n = 7), clinical decision-support tools (n = 6), and assistive robotics or virtual agents (n = 4). Reported outcomes included fall prediction accuracy (75–92%), reductions in hospital admissions, improved medication adherence, enhanced workflow efficiency, and increased patient engagement. Moreover, recurring challenges encompassed data privacy concerns, algorithm bias, interoperability barriers, user trust issues, and regulatory uncertainties.

Conclusions: Overall, AI demonstrates substantial potential to enhance home-based nursing care by supporting early risk detection, personalized care planning, and workflow optimization. However, successful integration requires robust ethical governance, workforce training, transparent evaluation frameworks, and sustained interdisciplinary collaboration to ensure that AI augments, but does not replace, the human-centered foundation of nursing practices.

Keywords: Artificial intelligence, Clinical decision Support, Home-based nursing care, Older adults, Telehealth, Remote monitoring

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Introduction

Artificial intelligence (AI) is reshaping healthcare worldwide by introducing new tools to analyze data, support decisions, and improve the delivery of care. Some methods, such as machine learning (ML), natural language processing, computer vision, and robotics, are being adopted more frequently to tackle major clinical and organizational challenges in health systems.[1,2] Healthcare providers are facing increasing pressure as the population ages and chronic diseases become more common. They are now required to deliver long-term, high-quality care to a growing number of patients.[3] Home nursing allows patients, especially older adults and those with chronic conditions, to receive professional care in their own homes.[4,5] This field is one of the places where AI can have a major impact. More precisely, AI can improve home-based nursing by helping detect health problems early, taking over routine tasks, and supporting more personalized care decisions.[6] Recent reviews on AI-based remote monitoring for older adults support this idea. They demonstrate that

advanced sensors and ML models can greatly improve the early detection of health problems in the home.[7] Given the increasing complexity of chronic disease management in home-based settings, combined with workforce shortages and the growing preference for aging in place, integrating AI into home nursing represents a strategic approach to enhance early risk detection, optimize care coordination, and improve long-term health outcomes.

The world's population is aging, making the need for new solutions even more urgent. According to the World Health Organization, nearly 22% of people will be 60 or older by 2050.[3] Countries like China and Japan are already witnessing the effects of an aging population, including fewer workers and rising healthcare costs.[8] A growing share of government spending in Europe is now being used for pensions and long-term care. This trend may create economic problems in the future. Many older adults prefer to stay in their own homes as they grow older. They feel safer and more independent there, rather than in a care facility. However, families can now offer less support because more people live in cities, family sizes are shrinking, taand social dynamics are changing.[8] These challenges highlight why AI-powered home care solutions are highly important. They can help make up for the shortage of caregivers while keeping older adults safe, independent, and able to live a good life. According to research on home-based supportive care programs, advanced digital tools and AI systems can increase patient independence and help manage complex care needs in community settings.[9]

In the healthcare context, AI can assist in diagnosing diseases, providing clinical decision support, and making hospital workflows more efficient.[4,5] Nonetheless, its use in-home nursing is in the early stages. According to some studies, AI-enabled monitoring systems can help find health risks, cut down on hospital stays that are unnecessary, and help patients live more independently at home.[8,10,11] Early studies on AI-assisted diagnostic and triage tools in virtual and telehealth services demonstrate great results. These systems can help clinicians make faster decisions and reduce delays in managing care at home.[12]

Likewise, virtual assistants and socially assistive robots can help in enhancing medication adherence, emotional well-being, and daily self-management.[13-15] Even with these improvements, the evidence is still incomplete. Most AI applications have been created and tested in hospitals or other institutional settings instead of homes, implying that we do not know much about how these technologies work in decentralized, changing home environments where nurses are the main providers.[16,17] In addition, questions remain about how to use AI ethically, how to protect user privacy, how to build trust, and how to integrate AI into workflows. These questions often make it harder for people to use AI widely.[18,19] Recent studies on AI tools for wound care have pointed out several challenges with using these systems in practice.

They indicate that workflow disruptions, data privacy concerns, and questions about model reliability are still major barriers in home-care settings.[20]

For nurses, bringing AI into home care has its own advantages and challenges. On the positive side, AI can provide quick, data-driven insights that help nurses create personalized care plans, involve patients more, and reduce time spent on paperwork.[16,21] However, using AI effectively means that people need digital skills, good technical infrastructure, and clear ethical rules. These issues are important to ensure that technology supports the nurse-patient relationship instead of replacing it.[13,18] AI may cause new challenges or weaken the trust that is essential in-home care if it is used without proper planning. Accordingly, research on AI in-home nursing must focus on more than just the technology itself. Additionally, it must address the ethical considerations, the influence on the nursing staff, and whether such systems can perform successfully in the long run.

A growing number of nursing studies indicate that using AI in practice requires new skills for the workforce. Nurses need support in learning how to interpret algorithm results, maintaining strong clinical judgment, and adjusting to new digital workflows.[22]

This review aims to gather the most recent data about the application of AI in-home care. More precisely, it analyzes original sources to find how AI supports areas such as remote monitoring, predictive analytics, medication management, robotics, and virtual health assistants. The review further examines the benefits of using AI, as well as the ethical and practical challenges that accompany this technology. Similarly, it describes strategies for applying AI effectively in-home care and highlights future priorities for research and clinical practices.

Further research on AI-supported transitions from hospital to home demonstrates positive results, suggesting that structured digital pathways can improve continuity of care while reducing gaps in the care process. They also support patients so they can stay healthy at home over time.[23]

Methods

Study Design

This study was conducted as a scoping review to map the existing evidence on the applications of AI in home-based nursing care for older adults. Given the heterogeneity of AI techniques, study designs, and reported outcomes in this field, which limits the feasibility and appropriateness of systematic meta-analytic approaches, a scoping review was considered the most suitable methodology.

The review was performed and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines. According to the guidelines of the International Prospective Register of Systematic Reviews (PROSPERO), scoping reviews focusing on evidence mapping rather than outcome synthesis are generally not eligible for registration. Therefore, this review was not registered in PROSPERO; however, the

protocol was predefined prior to study selection in order to enhance transparency and methodological rigor.

Search Strategy

A comprehensive literature search was conducted in PubMed, Scopus, and Google Scholar to identify studies on AI applications in home-based nursing care for older adults.

The PubMed search strategy included the following Boolean combination:

("Artificial Intelligence" OR "Machine Learning" OR "Deep Learning") AND ("home-based nursing" OR "home care" OR "community care") AND ("older adults" OR "aging in place").

Equivalent search strategies were adapted for Scopus and Google Scholar. Moreover, searches were limited to English-language publications between January 2000 and December 2025. The final database search was performed on December 20, 2025.

All retrieved records were imported into a reference manager, and duplicate entries were removed. Then, two independent reviewers screened titles and abstracts for relevance, followed by full-text assessment to determine eligibility. The inclusion criteria comprised studies reporting AI applications in home-based nursing care for older adults. On the other hand, the exclusion criteria were conference abstracts, non-English publications, hospital-based interventions without home-care relevance, and non-AI-related studies.

Data charting included extraction of author(s), publication year, country, study design, AI category (e.g., ML and DL), specific application domain, and reported outcomes. In addition, AI categories were defined according to their primary learning methodology.[24] When studies involved multiple AI modalities, classification was based on the primary reported AI technique.

Study Selection/Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews Flow

The study selection process is summarized in Figure 1.

Eligibility Criteria

Studies were included if they discussed AI, ML, robotics, virtual assistants, telemonitoring, or decision-support technologies (1) and addressed home care, home nursing, community health, aging in place, or chronic care delivered outside institutional environments (2). Other inclusion criteria were studies that provided empirical data, conceptual analysis, or policy perspectives relevant to AI integration in nursing practice (3) and were written in English (4).

Broader structured reviews of AI in healthcare similarly emphasize including conceptual, technical, and applied studies due to the interdisciplinary nature of AI-supported care innovations.[25,26]

However, articles that were unrelated to healthcare or nursing (1), studies limited to hospital or acute-care settings without relevance to home environments (2), and non-academic sources lacking scientific credibility (3) were excluded from the investigation.

The exclusion of non-peer-reviewed or clinically irrelevant material is consistent with established methodological guidelines in emerging-technology nursing research, ensuring that only scientifically credible and contextually applicable studies inform the synthesis [27].

Data Extraction and Synthesis

Important details (e.g., AI uses, care outcomes, benefits, challenges, ethical issues, and recommendations) were manually taken from the selected articles. Then, the obtained information was organized into themes that aligned with the aims of the review:

- Applications of AI in home nursing
- Benefits and impacts on patient care
- Challenges and barriers to implementation
- Integration strategies for effective adoption
- Future directions and emerging trends

A structured descriptive analysis was conducted to map and summarize patterns across the included studies. In fact, this approach facilitated the identification of common themes, areas of convergence and divergence, and gaps in the existing literature.

A thematic categorization strategy was applied to organize heterogeneous evidence, ranging from technical validation studies to ethical and implementation analyses, without aiming to synthesize pooled effects.[28]

Data extraction was structured to capture key variables, including type of AI learning paradigm (e.g., supervised ML, DL architectures, and natural language processing), application domain, and reported quantitative or qualitative outcomes.

The primary outcomes of interest included clinical effectiveness (e.g., hospitalization reduction and fall prediction accuracy), care efficiency, patient satisfaction, and implementation feasibility.

Data extraction was independently performed by two reviewers, and discrepancies were resolved through discussion.

Quality Considerations

In accordance with PRISMA-ScR guidelines, formal pooled risk-of-bias scoring is not mandatory in scoping reviews, as their primary objective is to map the breadth and characteristics of available evidence rather than to generate effect size estimates. Given the methodological heterogeneity of the included studies, ranging from technical validation research to observational and conceptual analyses, application of a single standardized risk-of-bias instrument across all study types was considered inappropriate.

However, domains selected from the PROBAST-AI framework were incorporated during data extraction, including the assessment of data source transparency, the clarity of model development procedures, internal or external validation reporting, and the adequacy of

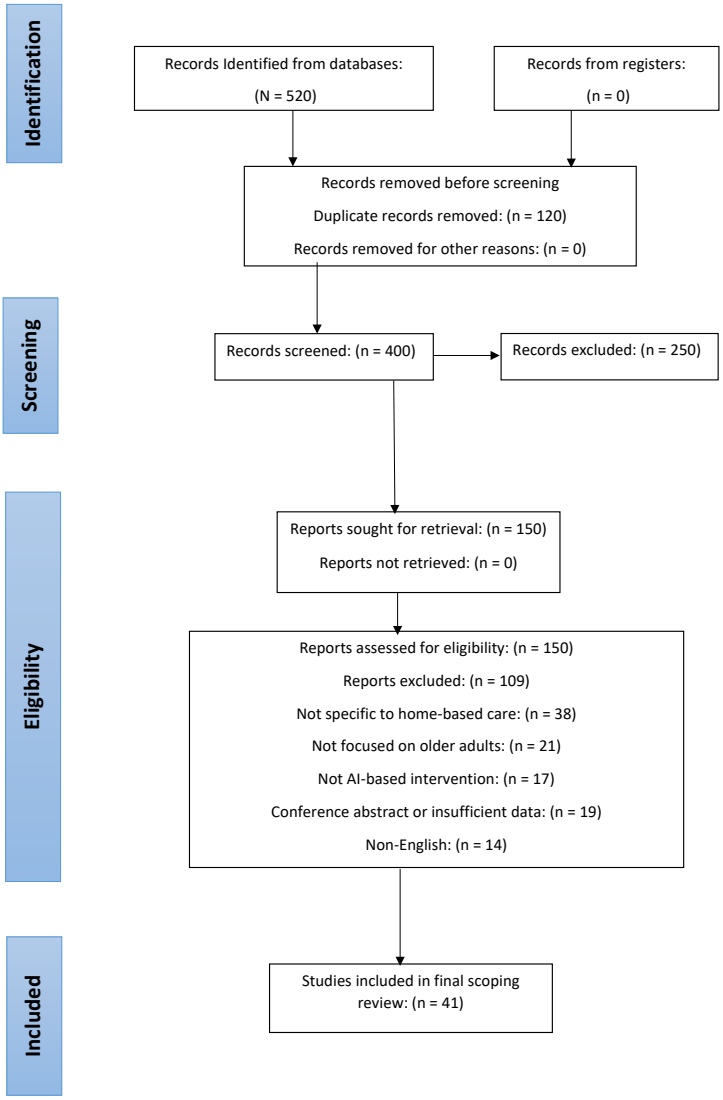

Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process
Note. PRISMA: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews

performance metrics. This structured appraisal enhanced interpretive rigor while remaining consistent with scoping review methodology.

To further ensure methodological quality, the following issue were taken into consideration:

- Methodological transparency of each study,
- Appropriateness of AI validation procedures,
- Sample size and study design,
- Clinical relevance to home-based nursing practices,
- Journal credibility and peer-review status.

In accordance with scoping review methodology, studies were described without formal weighting or quantitative comparison.

It should be noted that, due to substantial heterogeneity in AI methodologies, outcome measures, and reporting standards, quantitative synthesis and meta-analysis were not feasible.

Results

Study Selection

The study selection process is presented in Figure 1. A total of 520 records were identified through database searching (PubMed: 190; Scopus: 210; Google Scholar: 120). After the removal of 120 duplicates, 400 records were screened based on titles and abstracts. Of these, 250 records were excluded due to irrelevance to the research topic. Overall, 150 full-text articles were assessed for eligibility. Following full-text review, 109 articles were excluded for predefined reasons, including hospital-based focus (n = 30), non–AI-related interventions (n = 25), non–home-care settings (n = 20), non–peer-reviewed sources (n = 18), and non-English publications (n = 16). Ultimately, 41 studies met the inclusion criteria and were included in this scoping review.

Characteristics of Included Studies

The 41 included studies were published between 2000 and 2025, reflecting the increasing integration of AI technologies into home-based nursing care for older adults. In addition, the majority of studies originated from high-income countries, particularly the United States, followed by European and Asian regions. Detailed characteristics and AI application domains of the included studies are summarized in Table 1.

Moreover, the intended articles represented diverse methodological approaches, including observational studies, pilot and feasibility studies, quasi-experimental designs, technical validation studies, and conceptual or policy-oriented analyses. This heterogeneity reflects the interdisciplinary nature of AI implementation in community-based healthcare environments.

Types of Artificial Intelligence Applications

The reviewed studies demonstrated a broad spectrum of AI applications in home-based nursing care. Among the 41 included studies, 16 employed ML algorithms for predictive modeling and risk stratification, and 8 utilized DL architectures for sensor-based or behavioral data interpretation. Additionally, 7 studies focused on remote monitoring and AI-supported telehealth systems, and 6 studies implemented clinical decision-support systems. Eventually, 4 studies explored robotic assistants or virtual AI-driven agents for patient interaction and support.

The distribution of AI application categories across the included studies is illustrated in Figure 2, while broader benefits and implementation challenges are summarized in Table 2.

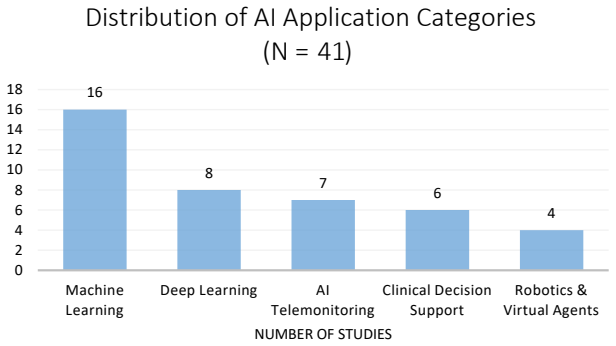

Figure 2. Distribution of AI Application Categories Across the 41 Included Studies
Note. AI: Artificial intelligence

ML approaches represented 39% of the included studies, followed by DL systems (19%), AI-enabled telemonitoring (17%), clinical decision-support tools (15%), and robotics or virtual agents (10%).

It is noteworthy that ML models were primarily used for fall risk prediction, hospitalization risk estimation, and chronic disease management. In addition, DL techniques were often applied to real-time data processing from wearable or home-based sensors.

Reported Outcomes

The primary outcomes reported across the included studies involved clinical effectiveness, care efficiency, patient safety, and implementation feasibility.

Several studies reported predictive performance metrics, with accuracy rates for fall detection and readmission risk prediction generally ranging between approximately 75% and 92%. Additional outcomes included reductions in unnecessary hospital admissions, improved medication adherence, enhanced early detection of clinical deterioration, and increased support for aging in place.

Moreover, qualitative and conceptual studies emphasized improvements in workflow efficiency, nurse decision-making support, and patient satisfaction while also identifying barriers such as interoperability challenges with Electronic Health Records (EHRs), data privacy concerns, and ethical considerations.

Applications of Artificial Intelligence in Home Nursing Practices

AI is now used in several areas of home healthcare, including remote patient monitoring, telehealth services, assistive robotics, medication management, clinical

Table 1. Key Applications of AI in Home Nursing Practice

AI Category	Number of Studies (N = 41)	Primary Application	Reported Outcomes
Machine learning	16	Risk prediction, fall detection, and hospitalization forecasting	Prediction accuracy 75–92%; reduced readmission rates
Deep learning	8	Sensor-based behavioral analysis	Improved pattern recognition and early deterioration detection
AI telemonitoring	7	Remote vital sign monitoring	Reduced hospital admissions; improved chronic disease monitoring
Clinical decision support	6	Risk stratification and care planning alerts	Enhanced prioritization and workflow efficiency
Robotics and virtual agents	4	Medication reminders and social engagement	Improved adherence; enhanced patient engagement

Note. AI: Artificial intelligence.

Table 2. Benefits and Challenges of AI in Home Nursing

Category	Benefits	Challenges/Risks
Patient outcomes	Early detection of deterioration; reduced admissions; better chronic management	Misinterpretation of alerts; data-quality inconsistencies
Nurse workflow	Automated documentation, triage, and reminders	Workflow disruption, alert fatigue, and added training needs
Patient experience	Enhanced independence, safety, and emotional support (robots and assistants)	Reduced human interaction; potential overreliance on technology
Health system	Cost savings and efficient resource allocation	High implementation costs; lack of standard regulatory frameworks
Ethical and social	Better equitable access through remote care	Privacy risks, bias in algorithms, and unclear accountability

Note. AI: Artificial intelligence.

decision support, and virtual health assistants. These technologies aim to assist home nursing and make home-based care safer and more effective for patients. Recent reviews of AI adoption in nursing emphasize that these application domains represent the core technological pillars currently shaping home-based care innovation.[29]

Remote Monitoring and Telehealth

A major way AI supports home care is by enabling the remote monitoring of patients. Wearable devices and home sensors can measure vital signs (e.g., blood pressure, heart rate, and glucose levels) throughout the day and send that information to healthcare providers from the patient's home. AI reviews the incoming data as it arrives and can pick up on unusual changes. These changes can be early signs that a patient's health is getting worse. For example, AI monitoring tools can warn nurses when someone with a chronic illness (e.g., heart failure or diabetes) starts to show problems. This can involve a decline in vital signs or a missed dose of medication. When these early warnings appear, nurses can act quickly before the problem becomes serious.[30,31]

Furthermore, AI can use sensors installed around the home, including motion detectors and smart appliances. These sensors allow the system to learn a person's usual daily activities. If the routine changes, the system can send an alert. These ambient assisted living tools can detect falls or small shifts in activity, helping keep older adults who live alone safer.[10] Moreover, telehealth platforms allow nurses to stay in touch with patients from a distance, using video calls or messages. Between these check-ins, AI chatbots can ask basic health questions or do simple symptom checks.[21] AI-enabled telemonitoring systems have been shown to increase early detection of physiological deterioration and support more reliable assessment of daily functional status in home-dwelling older adults, contributing to more timely and targeted nursing interventions.[32]

Overall, AI-enabled remote monitoring makes home nursing more accessible by providing continuous oversight that can improve patient outcomes and make people more confident in managing their health at home.

Clinical Decision Support and Predictive Analytics

AI further supports nurses when they make decisions about patients at home. ML models can study large amounts of information, such as medical records, past hospital visits, medication lists, and real-time monitoring data. Using this information, AI can suggest possible care actions and estimate how much risk a patient may face. This is especially useful in home care, where nurses need to identify which patients may need urgent attention or even hospitalization. For instance, scientists have created predictive algorithms that can find home health patients who are likely to need to go back to the hospital or the emergency room. This lets nurses put those patients at the top of their list for the follow-up.[11]

Similarly, AI-powered decision support systems can help nurses make or change plans for care. AI can look at patterns in patients' conditions and suggest possible treatments or tell the nurse to think about certain tests.[33] Natural language processing tools can automatically read nursing visit notes or reports and find important symptoms and patterns. Additionally, wearable sensor systems integrated with AI algorithms have demonstrated significant potential for remote monitoring and early detection of health deterioration in home-based care settings.[34]

It can be difficult to find this information in story form, but the tools can send the care team summaries or alerts. AI gives nurses extra information, almost like having another set of eyes. The nurse still makes the final decisions. However, AI offers helpful, fact-based insights that support better care for each patient at home.

Assistive Robotics and Automation

AI also plays a major role in home care through robotics. There are many types of helpful robots. Some robots assist patients with daily activities, while others offer interpersonal relations and help keep their minds engaged. In real life, robots that help with home nursing can remind patients to take their medicine. They can bring things to lower the risk of falls or show you how to do the exercises that have been prescribed. More advanced AI-powered mobile robots can roam around a house to check on a patient or bring them things they need. Further, social robots with conversational AI features (e.g., robots that can talk or play games) can help older adults who are stuck at home feel less lonely and depressed. According to research, socially assistive robots can enhance mood and engagement in older adults.[13]

Furthermore, robots can help human caregivers and family members by doing repetitive tasks and providing interaction. Nonetheless, for robots to work well, people need to accept and trust them. A scoping review found that older adults' willingness to interact with care robots varies. This is based on things like the robot's design, how useful it seems, and how much it respects the person's autonomy. The contemporary analyses of home-care robotics underline that successful adoption requires alignment with nursing ethical frameworks and attention to the relational aspects of caregiving, reinforcing that robots should augment, not replace, nurse-patient interactions.[35]

These results revealed that robots can be highly useful in home care, but they need to be introduced carefully, as tools to help nurses and patients, not as a replacement for human companionship.

Medication Management and Adherence

Managing medications is a large part of home nursing care, especially for people who have more than one chronic condition. Individuals are working on AI-powered tools to help with taking medications and sticking to them. For instance, "smart" pill dispensers can be set up with a person's pill schedule and use AI to figure out how

often they take their medicine. These devices can remind patients to take their medications at the right times and keep an eye on whether they do. If a dose is missed, the system can let the patient, family, or nurse know so they can follow up. In a pilot study, a robotic medication management system used in the home safely helped older adult patients keep track of their medications and demonstrated that it was easy to use.[14]

Researchers have also looked into using computer vision (an AI technology) to help people stick to their medication schedules. For example, there are smartphone apps that use the camera and AI to find if a patient has taken their pills. Emerging research suggests potential improvements in medication adherence and reductions in errors by automatically documenting dose-taking behavior, which can be particularly beneficial for patients with multimorbidity and cognitive decline.[36]

These AI tools help nurses make sure patients take their medications as prescribed by reducing mistakes and forgetfulness. Likewise, the systems create logs that nurses can review during home visits. These records help nurses notice patterns, such as a patient often missing an evening dose. When a pattern like this is found, the nurse can change the medication schedule or offer additional teaching. By improving medication accuracy, AI systems help keep treatments effective while reducing problems caused by missed or incorrect doses.

Virtual Health Assistants and Chatbots

AI chatbots and voice-activated smart speakers are becoming more common as virtual health assistants to help patients at home. These AI-powered agents can talk to patients in simple terms, answer common health questions, and give advice on how to take care of themselves. For instance, a patient can tell a chatbot about their symptoms or vital signs, and the chatbot will use an expert system or trained model to give advice or figure out if a nurse needs to be called. A systematic review of conversational agents in healthcare revealed that these tools can significantly enhance patient engagement and knowledge in health management.[11]

Virtual assistants can be available 24/7 in home nursing to help with care plans. For example, they could remind a heart failure patient to check their weight and eat right every day, or they can help a diabetes patient log their blood sugar and give them feedback right away. Additionally, some AI assistants can keep an eye on a patient's mood and mental health by looking at how they talk and respond during daily conversations. This can help catch problems like depression or anxiety early on. Emerging evidence indicates that AI-based conversational agents can further support emotional well-being and reduce self-management burden by providing consistent, low-complexity guidance between nursing visits.[14]

These virtual assistants do not take the place of the personal connection that happens between a nurse and a patient, but they do help. They can handle various simple interactions and keep you company between scheduled nurse visits. As natural language processing and AI algorithms improve, these virtual health assistants should get better at understanding natural language and responding empathetically, which will make home care even better.

ML approaches were the most frequently reported AI category, accounting for 39% of the included studies, with reported predictive accuracy ranging from 75% to 92% in fall detection and hospitalization risk models.

Benefits and Impacts of Artificial Intelligence on Home Care

AI can support patients, caregivers, and the healthcare system in many ways when used in home nursing. Early research and pilot projects demonstrate positive results when AI tools are properly applied in home care. These findings suggest that AI can improve patient recovery, make care more efficient, and increase patient satisfaction. Recent evidence from home-care research indicates that incorporating AI-driven assessment and monitoring systems can enhance continuity of care while reducing variability in clinical decision-making, especially for older adults with complex needs.[37]

Improved Clinical Outcomes

AI-based home care can help maintain patient health and reduce unnecessary hospital admissions. For example, some remote monitoring systems automatically alert healthcare providers when they detect concerning health changes. According to some studies, these systems can reduce hospitalizations while improving the management of chronic disease markers compared with standard care.[30,31] AI can support people with conditions such as heart failure, diabetes, and chronic obstructive pulmonary disease by helping them manage their health more effectively at home. Considering that AI provides real-time information, care plans (e.g., medication adjustments or dietary guidance) can be updated more quickly and more often. In addition, timely telehealth interventions supported by AI and other technologies may reduce mortality in certain patient groups.[30]

Enhanced Care Efficiency

AI can take over various routine and time-consuming tasks in home care. By handling these duties, AI gives nurses more time to focus on direct patient care. Smart systems can assist with everyday activities, such as scheduling appointments, drafting care notes, or sorting through patient messages. For example, an AI-based triage tool can help nurses plan their home visits by identifying which patients need urgent attention. By reducing paperwork and guiding nurses to the most important cases, AI can also make home care services more efficient.[4,21] Over time, these efficiency gains may also lower costs for healthcare organizations, since nurses can manage more patients without reducing the quality of care. Studies on the internet of things (IoT)- and AI-integrated nursing systems further

demonstrate that automated data collection and risk alerts can significantly reduce the administrative burden on clinicians, allowing more efficient allocation of home-care resources.[38]

Patient Empowerment and Satisfaction

AI tools can give patients and their families more control over their own care, which usually makes them happier. Patients feel like they have a "safety net" at home because they know that someone (or something) is always watching over them. This can help ease anxiety, especially for people who have just been released from the hospital. Older people have mentioned that they feel safer and more independent when they live with smart home systems or companion robots that can call for help if they need it.[10,13] AI helps many older people stay in their own homes instead of moving to a nursing home, which is good for their mental and social health. Moreover, AI makes care more personalized by using algorithms to make recommendations and teach people based on their specific needs, making interventions more relevant and effective.[33] In brief, AI can make life better for people who get home care by improving their health, making care more responsive, and giving them more confidence in managing their health.

Challenges and Barriers to Implementation

Although AI demonstrate considerable promise for home nursing, several challenges must be addressed before it can be implemented effectively. Some of the main problems are technical problems, user acceptance, ethical concerns, and unclear rules. A list of some of the some serious problems is provided as follows:

Data Privacy and Security

AI tools in home care collect sensitive health information, including vital signs and audio or video recordings. They also send these data to healthcare providers. As a result, worries about data privacy and security are growing. If a home monitoring system is breached, patient information can be exposed, and unauthorized individuals may gain access to live or recorded footage. In the US, Health Insurance Portability and Accountability Act and in Europe, General Data Protection Regulation are two rules that protect health data. It is crucial to have strong cybersecurity measures and follow these laws. Home care providers should make sure that the data that AI tools utilize is safe. They also need to get the patients' permission. These methods help keep patients' trust.

Algorithm Bias and Accuracy

If the training data contain bias, the AI can repeat those same biases. If home care AI tools are not developed and validated on diverse patient populations (e.g., if they are trained mostly on younger or hospital-based patients), their predictions may be less accurate for the older adults or homebound populations. This may result in disparities or inaccuracies in care recommendations.[18,33] AI systems can occasionally send signals that are wrong or not useful. This can cause "alert fatigue," which is when nurses get too many warnings and cannot handle them all. Accordingly, AI must be carefully evaluated and watched over on a regular basis to make sure it performs correctly and fairly in home care.

User Acceptance and Trust

For AI to work well in home nursing, nurses, patients, and family caregivers need to trust and feel comfortable with these technologies. Some doctors may not trust AI suggestions or worry that automation will make their jobs less skilled. Patients, especially older ones, might be scared of new devices or worry that using AI means they will not get the personal touch they need in their care. Research shows that people are more likely to use AI tools when they see clear benefits and when the tools are easy to use [13, 16]. Similarly, recent nursing studies emphasize that trust-building must involve transparent communication about the capabilities and limitations of AI systems, ensuring that patients and caregivers understand how decisions are generated and how human oversight is maintained [22]. Over time, AI systems will need to be taught, designed in a way that makes sense, and shown to be reliable in order to build trust.

Technical Infrastructure

To use AI at home, you need to meet specific technological criteria. Many AI systems need a good internet connection, power, and devices that function together in the patient's house. Not all patients in the real world have fast internet or the newest cellphones and sensors. Additionally, technical support is needed to set up and maintain these systems working, such as mending a blood pressure monitor that connects to Wi-Fi. Moreover, AI solutions need to be able to integrate with current EHR systems so that data may readily transfer across them. This is a problem since healthcare IT systems are often not connected. If AI cannot work with other systems or follow standards, it can be hard to use it in everyday home care.[21]

Workforce Training and Workflow Integration

If you do not train your staff and change the way they work, AI tools can be frustrating and waste time. Home care nurses and other staff should learn how to read AI outputs (e.g., what a risk score means and what to do with it) and how to fix basic problems with devices for patients. In addition, recent studies emphasize that the integration of AI technologies may redefine traditional nursing roles, requiring the adaptation of professional responsibilities and interdisciplinary collaboration within digitally supported care environments.[39] Further, workflows may need to be changed. For instance, if an AI system alerts nurses about patients every morning, there needs to be a way for a nurse to look at those alerts and respond. Without changes, AI can make work harder at first by adding to it (checking another system) instead of making it easier. Hence, focused training programs and change-

management activities should be considered to make AI a normal part of everyday life.[3,21]

Regulatory and Legal Uncertainties

The rules for using AI in healthcare are still being worked out, and not many AI tools have been given clear permission by health authorities to be used at home.[15] When an AI tool fails to identify a dangerous situation or offers poor advice that harms a patient, it is still uncertain who should be accountable. Discussions about this problem are continuing.[19] Furthermore, laws often do not keep up with new technologies. For example, there is an ongoing debate about whether it is ethical to use cameras or audio tools to monitor patients at home without harming their privacy. Policymakers and professional groups are beginning to address these concerns. However, until clearer rules and standards are created, many organizations may hesitate to use certain AI tools on a large scale.[8] Based on recent analyses of AI governance in community healthcare, liability frameworks, data-ownership rules, and transparency requirements must evolve to support safe deployment in non-institutional settings, where oversight and documentation structures are less standardized.[20]

Integration of Artificial Intelligence Into Home Nursing Practices

Healthcare organizations need to plan to make sure that AI can be effectively used in home care. Integration is not just about putting software or hardware in place; it is also about making sure that technology works well with people and processes. Key integration requirements and associated challenges are summarized in Table 3. Involving end-users (home care nurses, patients, and family caregivers) in choosing and designing AI tools is a highly important first step.[16] Nurses are more likely to trust and support the use of an AI system if they have a word in which one to use. In the same way, knowing what patients need and what makes them comfortable can help you customize AI interventions so that they fit into their daily lives instead of getting in the way.

For integration to work, training and education must be thorough. Nurses and home care workers should get hands-on training on how to use new AI tools (e.g., how to read AI outputs and how to respond to alerts or suggestions). Teaching people how to use computers and making them feel good about it will help them find AI as a useful tool instead of a confusing black box. International guidelines emphasize the need for clear policies on AI use in care settings, including defining review schedules for patient data, assigning responsibility for AI-generated alerts, and setting rules for when doctors should be consulted.[3] These kinds of rules help AI fit into the workflow so that it improves care delivery instead of getting in the way.

Additionally, there needs to be infrastructure and support. This includes technical help to quickly fix problems with devices or connections in patients' homes, as well as assuring that AI platforms can work with the EHR systems used by the home care agency.

Beginning with small pilot projects is a practical way to introduce AI into home care. For instance, an AI monitoring system can be tested first with a single care team or a specific patient group, such as individuals with heart failure. The insights gained from these early trials (i.e., what works well and what does not) can guide larger implementation efforts and support broader adoption of the technology.[21] After deploying AI tools, it is also important to keep an eye on them and evaluate them regularly. This implies measuring performance, getting feedback from users, and keeping track of patient outcomes. The system or training methods should be improved if necessary. Recent reviews of nursing-led AI implementations highlight that continuous evaluation frameworks (i.e., covering usability, equity, clinical effectiveness, and workflow impact) are essential for long-term adoption and scaling in home-care environments.[29]

Finally, using AI in home care must always keep the patient at the center and follow ethical standards. Home nursing is personal, and any technology should protect the nurse-patient relationship, as well as the patient's privacy and dignity. Nurse leaders and administrators must explain that AI is there to support the care team, rather

Table 3. Integration Requirements for AI in Home Nursing

Category	Integration Requirements	Challenges/Risks
End-user engagement	Involving nurses, patients, and family caregivers in selecting and co-designing AI tools to ensure usability and acceptance	Low adoption if tools do not match user needs; resistance due to the lack of involvement
Training and education	Providing hands-on training on interpreting AI outputs, responding to alerts, troubleshooting devices, building digital literacy and confidence	Increased workload without proper training; risk of misuse or misunderstanding of AI recommendations
Workflow and policy alignment	Establishing clear policies for AI use, including alert-handling protocols, documentation standards, and supervision roles	Workflow disruption; unclear accountability; inconsistent use across teams
Technical infrastructure	Ensuring reliable internet, device compatibility, and integration with Electronic Health Records and providing rapid technical support	Connectivity issues in patients' homes; interoperability barriers; system downtime
Pilot testing and continuous evaluation	Starting with small-scale pilots, monitoring performance, usability, equity, and clinical effectiveness, and updating tools and training based on feedback	Inadequate evaluation leading to unnoticed bias or safety issues; limited scalability without ongoing refinement
Ethical and patient-centered safeguards	Maintaining privacy, dignity, and transparency, thereby ensuring AI enhances—not replaces—human care relationships	Privacy risks; ethical concerns about surveillance; overreliance on AI diminishing human interaction

Note. AI: Artificial intelligence.

than replacing the human parts of nursing. Organizations can build a culture where technology is viewed as a partner in care. They can do this by showing that AI offers helpful information and handles routine tasks. Nurses can then focus on empathy, critical thinking, and holistic care. When used carefully, AI can strengthen home nursing by supporting proactive and personalized care while keeping compassion at the center.[5]

Future Directions

AI's role in home nursing is anticipated to rise in the future as technology gets better and healthcare needs evolve. There are various things that will happen in the future and trends that will happen:

First Trend: More Powerful and Personalized Algorithms

AI algorithms will become more powerful and better suited to each user. As ML methods improve and more varied healthcare datasets become accessible, forthcoming AI applications may enhance the prediction of health occurrences and tailor therapies for individual patients.[33]

For example, next-generation prediction models can utilize genomic data, lifestyle data, and social determinants of health in addition to medical history and vital signs to deliver risk assessments and care recommendations that are genuinely complete. AI-driven studies that are that much detailed can make home care even more proactive by spotting subtle warning flags in a patient's combined data and suggesting strategies to stop problems from happening in the first place.

Second Trend: Integration With Internet of Things and Wearable Ecosystems

We expect AI to work better with the IoT and wearable technology. As smart home devices and wearable health monitors become more common, there will be a huge increase in the amount of real-time data that can be collected from patients' daily lives.

AI is ready to use these "big data" to keep track of health all the time. In the near future, a home may have a network of connected devices, such as smart beds that can tell how well someone is sleeping, smart refrigerators that can keep track of nutrition, and sensors in the flooring that can tell when someone falls. All these devices will send data to AI, which can then analyze them all at once to keep an eye on the health of the patient.[21]

These AI analyses can happen right away thanks to fast 5G networks and edge computing, which will let caregivers know about problems right away. This kind of constant monitoring can make high-risk patients (e.g., those who are likely to fall or have sudden medical problems) extremely safer. However, it will still be important to deal with false alarms and protect privacy. Recent IoT-based nursing studies emphasize that the success of these systems will heavily depend on interoperability standards and secure data-sharing frameworks that allow devices from different vendors to reliably operate in home care environments.[38,40]

Third Trend: Advanced Conversational Agents and Virtual Assistants

The development of AI-powered chatbots and virtual assistants is another important area for the future.

Today, chatbots are mostly scripted, but AI companions of the future will probably use better natural language understanding (maybe even large language models) to have deeper, more caring conversations with patients. They can simultaneously be health coaches and help with mental health or cognitive stimulation. For example, an AI assistant can help a patient with early dementia do memory exercises every day or help an anxious patient breathe and talk about their problems. As these agents get better, they might become a more accepted part of the home care team, doing regular check-ins and letting human nurses know about more serious problems. Emerging evidence suggests that AI-enabled wearable monitoring systems may further enhance continuous physiological assessment and early risk detection in home-based care settings.[41]

Fourth Trend: Education, Workforce Transformation, and Policy Alignment

As more evidence demonstrates how AI can help with home care, we can expect more people to use it and successful tools to become more common in the healthcare system. Ongoing pilot programs and trials will help us figure out the best ways to use AI. In the next few years, nursing programs and continuing education are likely to include more information about digital health and AI. This will give new nurses the skills they need to work with smart systems.[16] Nonetheless, professional nursing organizations might come up with rules for nurses on how to use AI in a moral and useful way in their work. In addition, there is a strong need for research on patient outcomes, cost-effectiveness, and the human factors of AI in home care; these evidence gaps, once filled, will guide policy and investment. People who use and develop AI tools are already calling for strong rules and ethical standards. In the future, AI systems will likely become more transparent, implying that they will explain why they make certain suggestions. They will further include protections to ensure they are fair and have less bias.[3,18] Future policies must especially address responsibility, transparency, and cross-sector governance models to ensure that AI tools deployed in home settings remain equitable, safe, and aligned with nursing values as they scale nationwide.[20]

The ultimate objective is to establish a synergistic model of care wherein AI enhances the accessibility and efficacy of home nursing, enabling patients to lead healthier and more autonomous lives at home.

Conclusions

This scoping review demonstrated that AI holds substantial promise for enhancing home-based nursing care for older adults. AI applications, including predictive modeling, telemonitoring, robotics, and conversational virtual assistants, have shown potential to improve early

risk detection, medication adherence, workflow efficiency, and patient engagement.

Despite these benefits, successful implementation depends on ethical governance, data security, workforce preparedness, and integration within existing care infrastructures. AI should function as a supportive partner that strengthens the relational and compassionate dimensions of nursing practices rather than replacing them.

Ultimately, future research should prioritize long-term outcome evaluation, equity considerations, and transparent validation frameworks to ensure safe, effective, and sustainable AI integration into home nursing care.

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Data availability statement

No new datasets were generated or analyzed in this study. All data supporting the findings are available within the article and its referenced sources.

Ethical approval

Ethical approval was not required for this study because it was a scoping review based exclusively on previously published literature and did not involve human participants or identifiable data.

Consent for publication

Not applicable.

Conflict of interests

The authors declare that they have no conflict of interests.

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