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The Role of Nursing Interventions in Epidemic Control: A Systematic Study

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Abstract

Background: Nurses are central to epidemic management, serving as the first line of defense in healthcare settings and communities. Effective nursing interventions are critical for reducing healthcare-associated infections (HAIs), improving patient safety, and enhancing public health outcomes during epidemics and pandemics.

Aim: This systematic study explores the role and effectiveness of nursing interventions in epidemic control, focusing on infection prevention, missed care, health education, and nurses' experiences during pandemics.

Methods: A systematic review was conducted following PRISMA guidelines, with literature searches performed across PubMed, CINAHL, Scopus, Web of Science, Cochrane, PsychInfo, and ASSIA. Eligible studies published between 2022 and 2025 included quantitative, qualitative, and mixed-methods research, as well as systematic reviews and meta-analyses. Data were extracted on study design, sample size, type of nursing intervention, outcomes, and key findings.

Results: Six studies met the inclusion criteria. Evidence indicates that nursing interventions such as adherence to infection control measures, patient education, health surveillance, community outreach, and provision of home-based care significantly reduce HAIs, improve patient outcomes, and lower missed nursing care. Nurses' adaptability, leadership, and educational efforts during pandemics were also found to be crucial in managing health crises, mitigating physical and psychological stress, and promoting adherence to preventive measures.

Conclusions: Nurses play a pivotal role in epidemic control through hospital-based, community-focused, and educational interventions. Organizational support, adequate staffing, and access to resources enhance the effectiveness of these interventions. Coordinated efforts across healthcare institutions and communities are essential for improving epidemic preparedness, patient safety, and public health outcomes.

Keywords: Nursing interventions, epidemic control, healthcare-associated infections, missed nursing care, health education, pandemic preparedness.

Introduction

Epidemics provide significant difficulties for public health systems worldwide, affecting several aspects of society (Murayr et al., 2024). Although the increasing availability of vaccines and antibiotics has reduced the mortality from infectious diseases in recent years (Wang et al., 2022), approximately 1.7 million people admitted to hospitals for treatment had healthcare-associated infections, and over 98,000 people died from these diseases (Tabassum et al., 2023).

Non-communicable diseases have a substantial impact on people's quality of life. It impacts patients, families, and their environment, with implications for society, economics, psychology, and social levels (Pulgar et al., 2022). Individuals' development and well-being rely heavily on educational institutions and health services (Hakami et al., 2024). However, these places are often vulnerable to the spread of infectious diseases because of the high population density and frequent intimate encounters among persons (Hakami et al., 2024).

Nursing professionals are an organized team that actively contributes to global health from health policy, health-disease dynamics, epidemic control, and emergency situations (Sarango et al., 2021). Healthcare service providers have collaborated to strengthen efforts to safeguard the public from the consequences of epidemic outbreaks. While nurses are the primary healthcare taskforce, they are frequently charged with leading the response to an infectious disease outbreak (Lam et al., 2018).

Nurses play a critical role in protecting patient safety and public health by serving as the first line of infection control (Aljumaia et al., 2024). Their broad responsibilities include direct patient care, adherence to conventional infection control practices, and the execution of successful prevention methods (Aljumaia et al., 2024). As one of the most trusted groups of health professionals, nurses play an important role in educating the public about disease prevention and minimizing the spread of misinformation during the outbreak (Choi et al., 2020).

Preventing these infections is a critical component of patient safety and necessitates the use of scientifically validated strategies. Health regulatory bodies frequently advocate strategies including hand hygiene, effective use of barriers, rigorous disinfection of hospital surfaces, and specialized practices for handling invasive medical devices (Bom et al., 2025).

In hospitals, older persons are frequently in close contact with other patients, healthcare professionals, and visitors, all of whom can be carriers of respiratory diseases. The combination of extended exposure, frequent medical encounters, and weakened health necessitates infection control measures in these settings (Nagy et al., 2025). Community nursing plays an important role in epidemic prevention and management by promoting health education, offering vaccination services, and creating surveillance systems in neighborhoods (Murayr et al., 2024).

Although numerous studies have highlighted the importance of infection control measures, vaccination programs, and nurse-led health education during epidemics, there is still a lack of systematic evidence on how specific nursing interventions directly influence epidemic control outcomes across various healthcare and community settings. Existing research often focuses on individual components such as hand cleanliness, patient education, or hospital infection prevention rather than combining these interventions into a holistic framework that assesses their combined effectiveness during epidemics.

Furthermore, while the literature emphasizes the vulnerability of high-density environments like hospitals, schools, and community institutions, there has been insufficient research into how nurses work in these settings to prevent transmission, support high-risk groups, and coordinate multi-level responses. The growing involvement of nurses in surveillance, policy implementation, and emergency preparedness is widely accepted, but empirical studies systematically assessing these responsibilities during epidemic outbreaks are rare.

Given these inadequacies, there is an obvious need for a comprehensive study that investigates, contrasts, and synthesises the many nursing treatments used in epidemic control. Such study is critical for determining which interventions are most effective, how they can be improved, and how nurses can be better supported in future epidemic responses.

Methods

Introduction

This systematic study will look at the importance of nursing interventions in epidemic control by combining evidence on infection prevention, missed care, health education, and nurses' experiences during pandemics. The study uses both qualitative and quantitative studies including systematic reviews, meta-analyses, and primary research to identify effective nursing strategies that improve patient safety, reduce (HAIs), and strengthen public health responses during epidemics. The emphasis is on initiatives that have measurable effects on patient outcomes and the efficiency of healthcare delivery in crisis settings.

Search Strategy

A comprehensive literature search was conducted across multiple electronic databases, including PubMed, CINAHL, Scopus, Web of Science, Cochrane, PsychInfo, and ASSIA, to identify relevant studies published from 2003 to 2024. This timeframe was selected to capture evidence from significant epidemics and pandemics, including SARS, MERS, H1N1, Avian influenza, and COVID-19. Search terms combined keywords and Boolean operators, such as “nursing interventions,” “infection control,” “healthcare-associated infections,” “missed care,” “pandemic,” “health education,” and “epidemic management.” Additionally, reference lists of included studies and relevant reviews were manually screened to identify any additional eligible studies. The search strategy was conducted in accordance with PRISMA guidelines to ensure systematic and reproducible results.

Inclusion Criteria

Studies were included if they examined nursing interventions in epidemic or pandemic contexts and focused on infection prevention, missed care, health education, or nurses’ coping strategies. Eligible study designs encompassed primary research (quantitative, qualitative, or mixed-methods), systematic reviews, and meta-analyses. Only studies published in English between 2022 and 2025 were considered. Furthermore, studies were required to report measurable outcomes, such as infection rates, patient safety indicators, or nursing practice improvements, to allow meaningful synthesis of findings.

Exclusion Criteria

Studies were excluded if they focused solely on non-nursing healthcare personnel or interventions, or if they were editorials, commentaries, conference abstracts, or opinion pieces. Research that did not report relevant outcomes related to epidemic control, infection prevention, or patient safety was also excluded. Additionally, studies published in languages other than English were not considered, in order to ensure consistency and accuracy in data extraction and analysis.

Data Extraction and Selection Process

The study selection process followed the PRISMA 2009 guidelines and is illustrated in **Figure 1**. Initially, a total of 100 records were identified through database searches, with an additional 7 records obtained from Google Scholar. After removing duplicates, 50 records remained and were screened based on titles and abstracts. During this screening, 30 records were excluded for not meeting the predefined inclusion and exclusion criteria.

The remaining 20 full-text articles were assessed for eligibility, of which 14 articles were excluded due to reasons such as irrelevant outcomes, non-nursing interventions, or insufficient data for extraction. Ultimately, 6 studies met all inclusion criteria and were included in the systematic review.

Data were extracted from each included study using a standardized form. Key information collected included authors, year of publication, country, study design, sample size, type of nursing intervention, outcomes measured, and main findings. The extracted data were then synthesized to evaluate the effectiveness of nursing interventions in epidemic control, infection prevention, missed care management, and health education. This structured approach ensured the consistency, accuracy, and transparency of the review process.

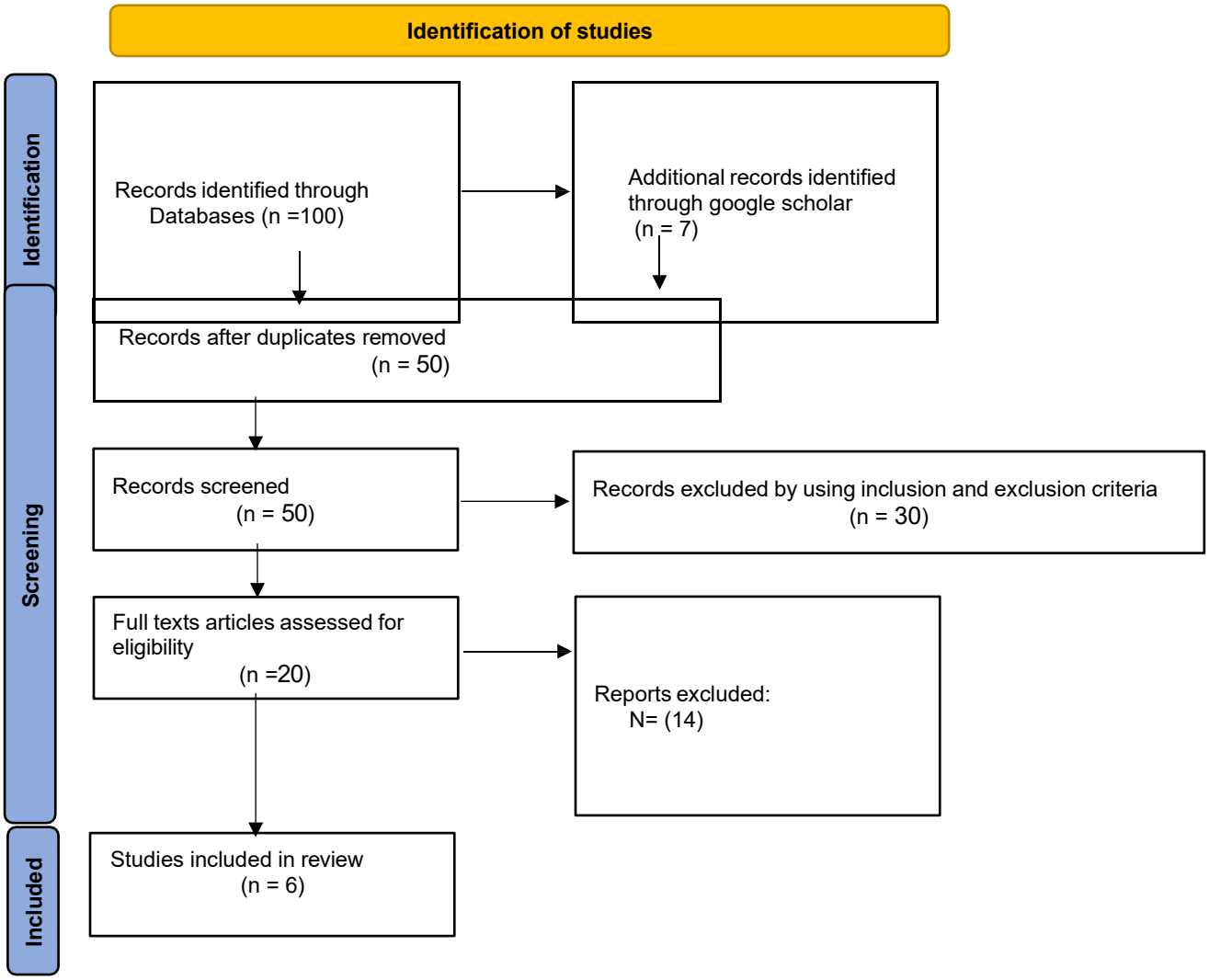

Fig. 1. PRISMA 2009 Flow Diagram

Results

Healthcare-associated infections are a serious global public health concern, resulting in increased morbidity and mortality, longer hospital stays, and higher healthcare expenses. Nurses play an important role in reducing HAIs by implementing evidence-based strategies that lower infection risks. Systematic evaluations conducted in accordance with JBI and PRISMA standards identified successful nursing methods, such as adherence to preventative measures, patient education, and infection surveillance, across a variety of clinical settings. These strategies have been found to minimize the incidence of HAIs, shorten hospital stays, cut readmission rates, and enhance overall patient safety. The findings support the standardization of evidence-based nursing practices and provide guidance to healthcare professionals and policymakers as they implement targeted infection control methods (Bom et al., 2025).

Recent systematic reviews and meta-analyses show that missing nursing care, defined as any piece of critical patient care that is skipped or delayed, poses considerable hazards to patient safety and overall care quality. A meta-analysis of MISSCARE survey data looked at 28 research conducted between 2011 and 2024, which included 20,768 nurses from 121 hospitals in 14 countries. The rate of missed care varied from 6.8% to 98.1%, with a median of 56.4% (IQR: 41.0-75.4). The most frequently reported causes of missed care were an unanticipated increase in patient volume and/or acuity on the unit (78.1%; 95% CI 71.5-54.1), insufficient staffing levels (76.5%; 95% CI 68.7-83.5), and urgent patient situations (73.5%; 95% CI 66.6-79.9). These findings have important implications for the development of strategies and policies targeted at reducing missing nursing care and increasing patient safety and health outcomes (Gong et al. 2025).

According to Murayr et al. (2024), community nursing plays an important role in epidemic prevention and management by promoting health education, providing vaccination services, and creating surveillance systems in communities. Community nurses are frequently the initial point of contact for those seeking medical attention, allowing them to detect possible outbreaks early through routine health checks and monitoring. They conduct outreach initiatives to educate the public on hygienic practices, symptom recognition, and the necessity of vaccinations, all of which are critical in reducing the spread of infectious diseases. In addition, community nurses work with public health organizations to ensure that appropriate response methods are in place, making them crucial actors in grassroots health crisis management. During an epidemic, community nursing focuses on providing care to the most vulnerable populations, such as the elderly, children, and people with chronic conditions. They provide critical services such as health screenings, home visits, and assistance with mental health issues, which are sometimes aggravated during health emergencies. Community nurses help relieve the pressure on healthcare systems by easing access to medical services and information. They also ensure that clients receive timely interventions. Community nurses play an important role in lowering transmission rates and improving health outcomes during epidemics by focusing on both prevention and treatment (Murayr et al., 2024).

According to recent evaluations, infection control in healthcare has evolved over decades, with core ideas established in the nineteenth century and progressively refined through scientific developments. Nurses play a varied role in infection prevention, including leading the implementation of evidence-based policies, responding to global health emergencies, and managing (HAIs). During pandemics, they act as the first line of defense against the spread of infectious illnesses. Nurses demonstrated great adaptability in global health catastrophes such as the COVID-19 pandemic by managing patient surges, guaranteeing compliance with hand hygiene and personal protective equipment (PPE) procedures, and developing innovative infection control measures in resource-constrained situations. They also made substantial contributions to outbreak tracking, contact tracing, and the deployment of isolation protocols to prevent transmission (Aljumaia et al., 2024).

Recent mixed-methods systematic evaluations show that nurses' experiences and coping techniques during severe viral disease pandemics are strongly linked to their perceptions of health hazards and the organizational environment. A review conducted using the Joanna Briggs Institute (JBI) methodology examined 71 peer-reviewed primary research articles published between 2003 and 2021 on SARS, MERS,

H1N1, Avian influenza, and COVID-19. The findings demonstrated that nurses' perceived health concerns were influenced by factors such as frequent changes in clinical guidelines, severe workloads, longer working hours, limited availability of personal protective equipment (PPE), and a lack of knowledge or training in pandemic management. These difficulties impacted nurses' physical, psychological, and social well-being. The review also identified both helpful and unhelpful coping strategies employed by nurses to manage these threats. The study emphasizes the importance of stakeholders, policymakers, governments, and healthcare institutions recognizing and monitoring the broader impact of health emergencies on healthcare workers, as well as implementing effective organizational systems and individual support mechanisms to mitigate these impacts prior to, during, and after pandemics or epidemics (Temeng et al., 2024).

Systematic reviews of literature published between 2008 and 2018 found that nursing health education interventions for patients with noncommunicable diseases have a significant influence on patient outcomes. Data from databases such as Web of Science, PubMed, Scopus, COCHRANE, and LILACS were analyzed, and methodological quality was evaluated using the CASPe and JADAD tools. Fifteen original research from eight countries were included, with thirteen employing randomized samples and six using power analysis. Nurses provided house calls, home care, and individual and group health education. The study found that nursing interventions were beneficial in 76.4% of cases, promoting healthier lifestyles and enhancing the quality of life for patients with noncommunicable diseases. These findings highlight the significance of nursing-led health education programs, implying that nursing leadership and policymakers should support initiatives to improve nurses' knowledge and skills, thereby contributing to global health and economic sustainability through improved population health behaviors. Furthermore, their proactive involvement in education training healthcare workers and successfully engaging with patients and communities was critical in encouraging adherence to infection control practices. This review emphasizes the critical role of nurses as leaders and educators in infection control, emphasizing their ability to adapt protocols, advocate for preventive measures, and provide patient-centered care in crisis situations, positioning them as indispensable in protecting public health and effectively managing future outbreaks (Pulgar et al., 2022).

Discussion

Introduction

In this section, the results of this review will be discussed with the results of previous studies in terms of differences and consensus, and recommendations and conclusions will be presented in addition to limitations and strengths.

Discussion

The results of this systematic review demonstrate nurses' complex involvement in epidemic control and healthcare quality improvement. According to Bom et al. (2025), nursing interventions such as adherence to preventative measures, patient education, and infection surveillance considerably reduce the incidence of (HAIs), shorten hospital stays, and minimize readmissions. These findings are consistent with the broader literature, which emphasizes the standardization of evidence-based nursing practices to improve patient safety across several clinical settings.

When compared to the findings of Gong et al. (2025) about missed nursing care, it is clear that organizational elements such as staffing levels, patient volume, and urgent clinical situations have a major impact on nurses' ability to provide comprehensive care. The high rate of missed care observed in the MISSCARE surveys highlights the need of institutional support and resource allocation in ensuring that evidence-based interventions are regularly implemented. Integrating preventative initiatives with strategies for reducing missed care may improve overall patient outcomes.

Murayr et al. (2024) characterize community nursing as a complement to hospital-based therapies that focuses on early identification, health education, vaccination programs, and community surveillance. Comparing these findings to hospital-based infection control procedures reveals that effective epidemic management necessitates both institutional and community-level nurse interventions. Community nurses serve as the first point of contact, spotting possible outbreaks and providing care to vulnerable groups, so supporting the overall healthcare system and reducing disease spread.

Nurses' adaptation and leadership during pandemics like COVID-19 (Aljumaia et al., 2024) show the significance of their participation in health crisis management. Nurses' ability to apply evidence-based procedures, adjust to fast changing guidelines, and manage patient surges is consistent with the findings of Temeng et al. (2024), who stressed the importance of organizational elements and coping techniques on nurses' well-being. Comparisons across these studies indicate that effective epidemic response is dependent not just on individual competencies, but also on organizational support, resource availability, and structured coping methods.

Nursing health education interventions for patients with noncommunicable illnesses (Pulgar et al., 2022) show that proactive education, home visits, and personalized care greatly enhance patient outcomes. When contrasted to infection control techniques during epidemics, this suggests that nurses' educational and preventive activities go beyond acute care settings and into long-term health promotion and lifestyle change. These findings highlight the overall impact of nursing interventions to community health and epidemic preparation.

Conclusions

Nurses perform critical roles in epidemic prevention, healthcare quality improvement, and patient safety. Effective nursing treatments, spanning from hospital infection control to community-based health education, are shown to significantly reduce HAIs, limit missed care, and enhance patient outcomes. Organizational support, proper staffing, and access to resources such as PPE are all important elements in determining the effectiveness of these initiatives. Additionally, nurses' adaptability, leadership, and educational efforts are critical during pandemics and public health catastrophes. These findings suggest that a combination of hospital-based, community-focused, and educational interventions is required for effective epidemic management and health promotion.

Recommendations

Based on the findings of this review, it is recommended that healthcare institutions strengthen organizational support by ensuring adequate staffing, manageable workloads, and the availability of essential resources such as personal protective equipment and infection control supplies to minimize missed nursing care and enhance intervention effectiveness. Evidence-based nursing practices should be standardized, emphasizing adherence to preventive measures, patient education, and infection surveillance to reduce healthcare-associated infections and improve patient safety. Community nursing programs should be expanded to include outreach initiatives, vaccination services, health surveillance, and education campaigns targeting vulnerable populations. In addition, ongoing professional development and training programs are essential to improve nurses’ preparedness for epidemics, enhance coping strategies, and strengthen leadership and crisis management skills. Nurses should also be supported in delivering individualized and group-based health education for both communicable and non-communicable diseases to promote healthier lifestyles and improve population health outcomes. Finally, a coordinated approach integrating hospital-based care with community nursing initiatives is crucial to optimize epidemic control and ensure comprehensive patient-centered care across all levels of the healthcare system.

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