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The Role of Nurses in Strengthening Health Security (Nursing – Health Security)

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Abstract

This review systematically examines the critical and evolving role of nurses in strengthening global health security. Health security, defined by WHO and CDC as the capacity to prevent, detect, and respond to transnational health threats, has expanded beyond infectious diseases to encompass "all-hazards" (natural disasters, bioterrorism, etc.). Nurses are indispensable frontline responders in crises, as demonstrated historically (1918 influenza, SARS, Ebola) and recently (COVID-19), where they provide direct patient care, infection control, leadership, and community engagement. However, significant challenges impede their effectiveness, including global nursing shortages, inadequate disaster training, mental health risks, and occupational safety gaps. The analysis highlights the need for robust policy reforms, expanded interdisciplinary education (integrating public health, technology, and cultural competence), and stronger support systems. Optimizing nurses' contributions requires addressing these barriers to ensure a resilient health security infrastructure.

Keywords: Nurses, Health Security, Disaster Response, Pandemic Preparedness, Nursing Shortage, Workforce Challenges.

Introduction

Health security represents an evolving paradigm within the fields of international relations and security studies, encompassing a broad spectrum of activities and measures designed to mitigate public health incidents and safeguard population health across sovereign boundaries (1). This critical domain involves proactive efforts in preventing, detecting, and responding to a diverse array of health threats at global, national, regional, and local levels (2). The Centers for Disease Control and Prevention (CDC) articulates global health security as the collective capacity to prevent, detect, and effectively respond to infectious disease threats worldwide, with the overarching aim of fostering a world free from the dangers of all infectious diseases (3). This understanding underscores that health security is not a static concept but rather a dynamic field that continuously adapts to emerging and re-emerging threats. The dynamic nature of health security necessitates a corresponding adaptability in the roles of healthcare professionals, particularly nurses, and in the policies and educational frameworks that support them. As global health challenges shift, the responsibilities and required competencies of frontline healthcare providers must also evolve to keep pace with new threats and expanding responsibilities.

Furthermore, the International Health Regulations (IHR) have shifted from a disease-specific model to an "all-hazards" strategy, recognizing that health security extends beyond infectious diseases to encompass a wider array of events, including natural disasters, chemical incidents, biological threats, radiological/nuclear events, and explosive incidents (4). This comprehensive approach broadens the scope of nursing contributions and the necessary competencies. It implies that nursing training cannot be limited to protocols for infectious diseases but must extend to general disaster management, triage, psychological first aid, and community resilience. This broader understanding of health security necessitates a more comprehensive and diversified training approach for nurses, moving beyond purely clinical skills to encompass a wider public health and emergency response skillset.

Nurses have consistently stood at the vanguard of public health crises and emergencies throughout history. Their contributions are fundamental to life-saving efforts, as they frequently serve as the initial medical personnel encountered by patients during a wide range of health emergencies, from widespread epidemics to devastating natural disasters (5). The roles of nurses have continuously expanded over time, solidifying their pivotal position in safeguarding public health across all phases of a disaster event—encompassing preparedness before, active response during, and sustained recovery after the immediate crisis (6). Their enduring presence and adaptability underscore their critical importance in the global health landscape.

This literature review aims to systematically synthesize existing academic and professional literature to thoroughly explore the multifaceted role of nurses in strengthening health security. The paper will delve into the conceptual understanding of health security, trace the historical evolution of nursing roles in crises, detail their contributions to emergency preparedness and response, identify critical challenges impeding their effectiveness, and examine current policy and educational perspectives. Ultimately, this review seeks to highlight existing gaps in research and practice, proposing future directions to optimize nurses' contributions to global health security efforts.

Research Review

1. Conceptualizing Health Security

Definitions from Key Organizations

The concept of health security is defined consistently across major global health organizations, emphasizing a shared understanding of its core components. The **World Health Organization (WHO)** defines health security as the array of activities and measures implemented at global, national, regional, and local levels to safeguard the health of populations against threats or events that could cause harm. These measures are primarily focused on the critical functions of preventing, detecting, and responding to a broad spectrum of health threats. Furthermore, the WHO perspective highlights that health security encompasses activities and measures that transcend sovereign boundaries, aiming to mitigate public health incidents to ensure the health of populations globally (7).

Similarly, the **Centers for Disease Control and Prevention (CDC)** articulates global health security as the fundamental capacity to prevent, detect, and respond effectively to infectious disease threats across the globe (3). The CDC's Global Health Security Agenda (GHSA), launched in 2014, was specifically designed to foster a world that is safe and secure from the threat of all infectious diseases, thereby elevating global health security as both a national and international priority (8). The convergence of these definitions from the WHO and CDC, consistently emphasizing prevention, detection, and response, underscores a global consensus on the core functions of health security. This shared understanding provides a clear mandate for the roles nurses play and implies a universal set of core competencies required for nursing in this domain. This agreement across leading global health organizations validates the critical and ubiquitous involvement of nurses in all three phases of health security, regardless of specific national contexts.

Key Frameworks and Models Related to Health Security

Modern health security is underpinned by several key frameworks and models that guide global and national efforts. The **Global Health Security Agenda (GHSA) Framework** provides a high-level overview of strategic goals and objectives for the period of 2024-2028, detailing how the GHSA operates and tracks progress towards its aims. This framework serves as a blueprint for coordinated international action (9).

Complementing this, the **CDC's Global Health Strategic Framework** acts as a unifying bridge for all of the CDC's global health activities. It dictates how the organization builds, executes, and evaluates its worldwide health initiatives. This framework is structured around four global goals: (1) stopping health threats at their source before international spread; (2) containing disruptive global disease outbreaks; (3) leveraging global data for disease prevention and mitigation programs; and (4) saving lives and improving health globally. These goals are achieved through six core capabilities: Data & Surveillance, Laboratory, Workforce & Institutions, Prevention & Response, Innovation & Research, and Policy, Communications, & Diplomacy (10).

The **WHO's Health for All initiative** stands as a prominent example of a global health security framework, which strives to ensure equitable access to healthcare for all individuals. This initiative is founded on the principles of universal health

coverage, robust primary healthcare, and comprehensive health system strengthening. Beyond these, the **Public Health Model** offers a comprehensive approach to prevention, exemplified by the U.S. CDC's strategy for violence prevention. This model focuses on identifying indicative behaviors, addressing risk factors (such as social isolation), and promoting protective factors (like social connectedness) at both individual and community levels. It emphasizes the implementation of evidence-based programs across primordial, primary, secondary, and tertiary prevention tiers, necessitating the involvement of diverse multi-disciplinary stakeholders (11).

A critical evolution in health security frameworks is the increasing **role of technology**. Modern health security increasingly integrates advanced technological solutions. Emerging tools, including digital surveillance systems, telemedicine platforms, and mobile health applications, have revolutionized the monitoring and management of health threats. Furthermore, artificial intelligence (AI) and machine learning (ML) are transforming health security by enabling predictive analytics, automating decision-making processes, and optimizing resource allocation (12). The explicit inclusion of IT security frameworks, such as HITRUST CSF, NIST Cybersecurity Framework, ISO/IEC 27001, HIPAA, and GDPR, within discussions of health security models indicates a critical expansion of the domain (13). Health security is no longer solely concerned with biological threats but increasingly encompasses cybersecurity and data integrity. This necessitates the development of new competencies for healthcare professionals, including nurses, in areas such as data protection and digital literacy, thereby significantly expanding the traditional understanding of "health security." Nurses, as primary users of electronic health records and digital health technologies, are at the frontline of data interaction. Therefore, their role in health security extends beyond clinical care to include adherence to data privacy regulations, understanding cybersecurity risks, and contributing to a secure digital health environment (14).

Effective **governance models** are also integral to health security. Health systems governance refers to the established processes, structures, and institutions that oversee and manage a country's healthcare system. It involves strategic policy frameworks, effective oversight, coalition-building among stakeholders, appropriate regulations and incentives, and robust accountability mechanisms to ensure healthcare services are accessible, equitable, efficient, affordable, and of high quality for all (15). Professional governance models within nursing specifically emphasize clinician ownership of practice, accountability, and partnership with organizational leadership. These models help foster a culture of shared decision-making and continuous improvement (16).

2. Historical and Evolving Role of Nurses

Enduring Presence in Crises

Nurses possess a long-standing tradition of providing essential care and assistance during disasters, operating effectively at both local and global levels (17). Their consistent presence on the front lines of global health outbreaks underscores their resilience and unwavering commitment to public well-being. This enduring engagement in times of crisis has solidified their indispensable role in health security.

Case Studies of Noteworthy Crises

The evolution of nursing roles in strengthening health security can be clearly observed through their contributions during significant public health emergencies:

1918 Influenza Pandemic: Nurses played a critical and foundational role in combating this deadly strain of influenza, which had a disproportionate impact on young adults. Their contributions during this historical crisis established early precedents for organized nursing response in large-scale public health emergencies (18).

Severe Acute Respiratory Syndrome (SARS) Outbreak (2003): During the SARS outbreak, nurses were among the first healthcare workers to provide care for patients presenting with pneumonia-like symptoms, often before the epidemic was widely recognized and, initially, without adequate self-protective measures (19). Their roles were extensive, encompassing the management of patient placement in wards, rigorous implementation of infection control and disinfection measures, and ensuring proper isolation interventions for infectious patients. Nurses had to significantly adapt their usual clinical practices, wearing full personal protective equipment (PPE) that included sealed protective gowns, goggles, and N95 or P100 face masks, alongside diligent hand hygiene, especially when in close contact with patients (20).

Ebola Virus Disease (EVD) Outbreak (2014-2015): Nurses were crucial first responders during the West African Ebola outbreak, demonstrating their capacity for rapid deployment and adaptation in highly challenging environments. Their responsibilities were broad, including the isolation and care of patients in specialized Ebola Treatment Centers (ETCs), ensuring safe burial practices, disseminating vital public health information, meticulously tracing infections, and providing care for individuals who had not been infected but were impacted by the crisis. This work was inherently demanding, often conducted with scarce resources and under extremely difficult working conditions. The global nature of health security was highlighted by the necessity for international reinforcement, with approximately 80 nurses volunteering to establish and operate an ETC in Kenema, Sierra Leone (17). The Ebola outbreaks served as critical teaching points for nurse educators, reinforcing essential curriculum elements related to emerging infectious diseases, infection prevention, isolation precautions, and the correct use of PPE. The American Nurses Association's (ANA) Code of Ethics for Nurses provided a guiding framework, emphasizing compassion, respect for inherent dignity, protection of patient health, safety, and rights, alongside the nurse's fundamental duty to self (21).

COVID-19 Pandemic (2020-): The COVID-19 pandemic unequivocally demonstrated the critical and central roles nurses held at the frontline of patient care within hospitals and their active involvement in community-level evaluation and monitoring. Nurses were tasked with ensuring that all patients received personalized, high-quality services, regardless of their infectious status. Their responsibilities extended to proactive planning for anticipated outbreaks, meticulous management of the supply and usage of sanitation materials and PPE, and the provision of accurate screening information, confinement guidelines, and triage protocols based on the latest public health guidance. Nurses were key players in clinical management, facilitating awareness and knowledge exchange, and implementing public safety initiatives, including countering misinformation and guiding individuals to available health services (22).

The ANA Code of Ethics (2015) highlighted a significant ethical challenge during the pandemic: the potential conflict between a nurse's "sole responsibility... toward the patient" (Clause 2) and the "same obligation to themselves and to others" (Clause 5), particularly in situations marked by scarce resources and unrestrained contagion (23). Nurses actively educated the public on disease transmission and led efforts to enhance hospital safety for all healthcare personnel. The pandemic acutely underscored the urgent and ongoing need for a larger, better-trained nursing workforce (24). Beyond direct patient care, nurses were instrumental in activating organizational emergency operations plans, participating in incident command systems, overseeing PPE use, and providing crucial crisis leadership and communications, often at significant personal risk. In community settings, they managed and opened shelters, organized blood drives, and conducted outreach to underserved populations, addressing critical social needs. Public health nurses were particularly instrumental in coordinating disaster plans and detecting outbreaks, as exemplified by a school nurse who first observed and notified the CDC about the H1N1 outbreak in 2009 (6).

3. Nurses in Emergency Preparedness and Response

Roles in Disaster Management

Nurses are extensively trained and play a crucial role across the entire spectrum of disaster management, encompassing preparedness, active response, and sustained recovery efforts. Their pivotal involvement in safeguarding the public is evident throughout all phases of a disaster event. In the immediate aftermath of a disaster, their responsibilities are critical and diverse. These include providing essential first aid, delivering advanced clinical care, administering life-saving medications, conducting rapid assessment and triage of victims, judiciously allocating scarce resources, and continuously monitoring the ongoing physical and mental health needs of affected populations (25).

Beyond direct patient care, nurses are instrumental in activating organizational emergency operations plans and actively participating in incident command systems, ensuring a coordinated and effective institutional response. In community settings, their roles expand to include opening and managing shelters, organizing vital blood drives, and conducting outreach to underserved populations, often addressing critical social needs that emerge during crises. Furthermore, nurses play a specialized role in assisting particularly vulnerable groups, such as the frail elderly and pregnant women, working to ensure safe childbirth and facilitate family reunification efforts during disasters (25).

Roles in Biothreat Response and Outbreak Containment

In the context of biothreat response and outbreak containment, nurses serve as critical frontline professionals. They play a crucial role in epidemic surveillance and detection, including essential activities like contact tracing. A notable historical example is the school nurse who first observed and subsequently notified the Centers for Disease Control and Prevention (CDC) about the H1N1 outbreak in 2009, highlighting their vital position as early detectors within the health system (26).

Nurses are actively involved in point-of-distribution clinics, where they conduct screening, testing, and distribute vaccines and other medical countermeasures during public health emergencies. They are instrumental in implementing prevention and response interventions, providing direct hospital-based treatment for affected individuals, and educating patients and the broader public to decrease infection risk and alleviate fear and anxiety. Specialized nursing roles, such as respiratory nurses, are particularly critical during respiratory disease outbreaks, as they are skilled in managing ventilators, dispensing oxygen, and administering vital medications. Nurses also contribute significantly to public awareness campaigns regarding disease prevention and are crucial in countering the dissemination of myths and misinformation during health crises (26).

Examples of Frontline Contributions

The contributions of nurses on the frontline of health security are multifaceted and indispensable:

- **Direct Patient Care:** Nurses consistently provide care for patients with highly infectious diseases, often under challenging conditions characterized by scarce resources. This necessitates adapting their usual nursing practices to incorporate the rigorous use of full personal protective equipment (PPE) and diligent handwashing protocols.
- **Infection Control:** They are instrumental in ensuring the proper implementation of infection control and disinfection measures, including strict isolation interventions. Nurses are key in maintaining an effective supply and usage of sanitation materials and PPE, which are critical for preventing disease transmission.
- **Leadership and Coordination:** Nurses provide vital crisis leadership and communications, overseeing the appropriate use of PPE and organizing effective teamwork within healthcare settings during emergencies.
- **Community Engagement:** A significant aspect of their role involves building trust within communities, actively assisting people in preparing for and responding to health threats, and fostering resilience to facilitate community recovery. This includes supporting underserved communities with disaster preparedness kits and advocating for equitable access to life-saving resources.
- **Self-Care and Family Protection:** Nurses demonstrate remarkable problem-oriented behaviors, such as minimizing the removal of protective clothing, consolidating tasks to reduce exposure, actively maximizing their own health, and taking proactive measures to protect their families from infection.

4. Challenges to Nurses' Contribution

Despite their indispensable role, nurses face significant challenges that impede their full contribution to strengthening health security. These challenges are often interconnected, creating complex barriers to effective preparedness and response.

Workforce Shortages

The United States, like many other regions globally, is grappling with an alarming and persistent nursing shortage, where demand consistently outpaces the available supply. Projections indicate a deficit of approximately 78,000 Registered Nurses (RNs) by 2025, with only a slight improvement anticipated to around 63,000 by 2030 (27). The COVID-19 pandemic severely exacerbated this issue, leading to over 100,000 nurses leaving the workforce in 2020-2021 alone due to overwhelming stress, burnout, or early retirement (28). An additional 130,000+ nurses have departed since 2022 as burnout persists, with many more opting to reduce their working hours (29).

The primary drivers of this shortage are multifaceted. An aging population requires increasingly complex care, leading to higher demand for nursing services. Simultaneously, a significant wave of nurse retirements is underway, with one in five nurses currently over the age of 65 or nearing retirement, and over 1 million RNs projected to retire by 2030. Compounding

this issue is an insufficient pipeline of new graduates; in 2023, over 65,000 qualified applications were turned away from nursing schools due to faculty and capacity shortages. Globally, while the nursing workforce has seen some growth, wide regional disparities persist, with 78% of nurses concentrated in countries representing only 49% of the global population. Low- and middle-income countries particularly struggle to graduate, employ, and retain nurses within their health systems (30).

The consequences of this pervasive shortage are severe, leading to reduced healthcare services, longer patient wait times, and overcrowding in facilities. Critically, it poses a direct threat to patient safety and the quality of care, as numerous studies consistently link low nurse staffing levels to worse patient outcomes, increased medical errors, higher morbidity and mortality rates, and heightened nurse burnout and job dissatisfaction (31).

Lack of Training and Inadequate Education

Despite the critical need for a well-prepared nursing workforce in health security, significant gaps in training and education persist. On average, American nursing colleges and universities offer only about one hour of instruction dedicated to handling catastrophic situations such as pandemics or water contamination crises. Surveys consistently reveal that both nursing students and their professors often feel inadequately prepared to teach or receive sufficient emergency response training (32).

Studies further indicate persistent deficiencies in nursing students' practical knowledge and disaster response skills, even with recent initiatives aimed at integrating disaster management modules into curricula (33). Challenges also extend to the incorporation of cultural competence and effective intercultural communication into nursing education, which are vital for navigating diverse global health security contexts (34). The COVID-19 pandemic particularly highlighted significant gaps in the availability of clinical experience and the widespread unpreparedness of educational programs for rapid shifts to remote learning methodologies (35).

Mental Health Risks and Burnout

Nurses frequently experience extreme stress and significant psychological conflict, particularly during prolonged public health crises (20). The COVID-19 pandemic, for instance, led to substantially increased workloads and profound trauma for nurses globally. A critical concern is the widespread lack of adequate mental health support; only 42% of responding countries report having provisions for nurses' mental health support, despite the immense burdens they face (36). Burnout and stress have been identified as major contributors to the substantial departure of nurses from the workforce (30). In the context of global health nursing, exposure to severe trauma, poverty, and loss can lead to compassion fatigue and emotional burnout, underscoring the urgent need for robust support systems to sustain these professionals (37).

Occupational Safety and Health Security for Nurses Themselves

The occupational safety and health security of nurses are paramount, yet frequently compromised. Poor working conditions are directly associated with increased risks for occupational infections and injuries among nursing staff (31). During pandemics, nurses have been disproportionately affected by viruses, often due to a lack of adequate Personal Protective Equipment (PPE). Workplace violence and harassment also represent significant concerns that directly impact nurses' safety and overall well-being (38).

There is an urgent and ongoing need to protect healthcare workers in conflict zones, where nurses frequently face unsafe working conditions, direct attacks on health facilities, and administrative barriers that impede their ability to provide care (38). Ensuring occupational safety is fundamental, requiring the establishment of healthy work environments, a judgment-free atmosphere for reporting incidents, clear and stringent infection control procedures, and the ample provision of protective gear (23). Nurses often face a profound ethical conflict between their professional duty to care for patients and their personal duty to ensure their own safety and health (22). Unresolved issues regarding the legal, ethical, and professional considerations of disaster response continue to pose a significant challenge (25).

Conclusion

Nurses are unequivocally central to global health security, serving as first responders across all phases of emergencies—preparedness, response, and recovery. Their roles have evolved beyond clinical care to encompass outbreak surveillance,

community resilience-building, crisis leadership, and technological adaptation (e.g., digital health tools). Historical and contemporary crises consistently demonstrate their adaptability and frontline impact. Yet, persistent systemic challenges threaten this critical workforce: severe global shortages exacerbated by burnout, insufficient disaster-specific education, mental health strains, and occupational safety risks (e.g., inadequate PPE, workplace violence).

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