



Nurses' Knowledge, Perceptions, and Preventive Beliefs Regarding Emerging Respiratory Infections: Application of the Health Belief Model

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Abstract

Background: Emerging respiratory infections continue to pose a substantial threat to global health security because of their potential for rapid transmission, severe clinical outcomes, healthcare-associated spread, and disruption of health systems. Nurses are especially vulnerable because they maintain prolonged and close contact with patients, perform high-risk procedures, and play a central role in surveillance, triage, infection prevention, patient education, and outbreak response. Their knowledge, perceptions, and preventive beliefs therefore directly influence adherence to infection-control measures and the effectiveness of institutional preparedness. However, adequate knowledge alone does not consistently translate into protective behavior, as preventive practices are also shaped by perceived risk, confidence, organizational support, resource availability, and psychological readiness.

This review aims to examine nurses' knowledge, perceptions, and preventive beliefs regarding emerging respiratory infections through the application of the Health Belief Model. The model provides a structured framework for understanding how perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy influence nurses' willingness and ability to adopt recommended preventive behaviors. These behaviors include hand hygiene, correct use of personal protective equipment, vaccination, respiratory etiquette, isolation precautions, early case recognition, and compliance with institutional infection-control policies. The review also considers the occupational risks faced by nurses, the influence of previous outbreak experience, and the role of institutional factors such as training, communication, staffing, access to protective equipment, supervision, and psychological support.

Available evidence indicates that nurses often demonstrate moderate or variable knowledge of emerging respiratory infections, while gaps remain in pathogen-specific understanding, transmission routes, correct use of protective measures, and preparedness for unfamiliar outbreaks. High perceived severity and susceptibility may motivate preventive action, but excessive fear, limited resources, unclear guidelines, workload pressure, and low self-efficacy may reduce adherence. Educational interventions based on the Health Belief Model appear promising because they address not only knowledge deficits but also the beliefs and barriers that shape behavior. Strengthening nurses' preparedness therefore requires continuous competency-based education, reliable institutional support, clear risk communication, adequate supplies, and interventions designed around behavioral theory. Applying the Health Belief Model can support more effective nursing education and infection-prevention strategies and may improve occupational safety, patient protection, and healthcare-system resilience during future respiratory outbreaks.

Keywords: Nurses; emerging respiratory infections; Health Belief Model; preventive behavior



Introduction

Nurses constitute the largest frontline professional group involved in the continuous care of patients with suspected or confirmed respiratory infections. Their responsibilities include triage, clinical assessment, collection of diagnostic specimens, administration of treatment, monitoring of clinical deterioration, implementation of isolation precautions, and education of patients and families. These duties frequently require prolonged and close contact with patients and may involve exposure to respiratory droplets, aerosols, contaminated surfaces, and infectious secretions. Consequently, nurses face considerable occupational risk during outbreaks and can also become links in healthcare-associated transmission when infection-prevention practices are inconsistently applied. Evidence from Egypt during the COVID-19 pandemic showed that healthcare workers' knowledge, attitudes, and perceptions varied according to professional and educational characteristics, demonstrating the need for targeted rather than uniform preparedness interventions. [2]

Knowledge is an essential component of preparedness because nurses must understand the causative pathogen, routes of transmission, clinical manifestations, incubation period, diagnostic procedures, isolation requirements, and appropriate use of personal protective equipment. Nevertheless, knowledge alone does not guarantee consistent preventive practice. Nurses may understand recommended measures but encounter practical and psychological barriers such as inadequate supplies, heavy workload, discomfort associated with protective equipment, unclear institutional guidance, fear of infection, or concern about transmitting disease to family members. Research involving emergency nurses found that infection-control practice was influenced not only by knowledge but also by the infection-prevention environment, monitoring of personal protective equipment, perceived severity, and perceived barriers. These findings demonstrate that preventive behavior results from an interaction between individual understanding and the organizational conditions in which nursing care is delivered. [3]

The Health Belief Model provides a suitable theoretical framework for explaining this interaction. It proposes that preventive behavior is influenced by an individual's perceived susceptibility to a disease, perceived severity of its consequences, perceived benefits of the recommended action, perceived barriers to performing that action, cues that stimulate action, and confidence in the ability to perform the behavior successfully. A systematic review of COVID-19 preventive behaviors found that the model demonstrated useful predictive ability in most included studies, although the relative influence of its constructs differed among populations and settings. For nurses, the model can clarify why two individuals with comparable clinical knowledge may demonstrate different levels of compliance with masking, hand hygiene, vaccination, isolation procedures, or other infection-control measures. [4]

Despite the expansion of research during the COVID-19 pandemic, important evidence gaps remain. Much of the literature has addressed a single infection, combined nurses with other healthcare workers, or measured knowledge and practices without systematically examining the beliefs that connect them. Evidence focusing on nurses across different emerging respiratory infections remains limited, particularly in Egypt and comparable resource-constrained settings. Moreover, relatively few studies have integrated individual health beliefs with organizational determinants such as staffing, training, safety climate, availability of protective equipment, and institutional communication. Health Belief Model-based nursing interventions have improved awareness, perceived benefits, self-efficacy, and preventive performance in infection-control contexts, supporting the value of theoretically grounded education. Accordingly, this review aims to synthesize evidence on nurses' knowledge, perceptions, and preventive beliefs regarding emerging respiratory infections and to examine how Health Belief Model constructs can guide education, infection-control policy, and preparedness interventions. [5]



Respiratory Tract Infections and Emerging Respiratory Threats

Respiratory tract infections are infectious diseases affecting the airways and lungs. They are commonly classified as upper respiratory tract infections, involving the nose, sinuses, pharynx, and larynx, or lower respiratory tract infections, involving the trachea, bronchi, bronchioles, and lungs. Their manifestations range from mild cough, fever, and sore throat to pneumonia, respiratory failure, and death. Viral pathogens cause many acute infections, although bacteria and fungi may also be responsible, particularly among hospitalized or immunocompromised patients. [6]

Emerging respiratory infections are caused by newly identified pathogens or known pathogens that rapidly increase in incidence, severity, or geographic distribution. Major examples include severe acute respiratory syndrome coronavirus, Middle East respiratory syndrome coronavirus, pandemic influenza A(H1N1), avian influenza viruses, and SARS-CoV-2. Zoonotic transmission, viral mutation, population mobility, environmental change, and limited population immunity contribute to their emergence and international spread. [7]

SARS, MERS, influenza A(H1N1), and COVID-19 differ in their epidemiology and clinical severity but share important prevention requirements. These include early case detection, isolation, contact tracing, appropriate use of personal protective equipment, hand hygiene, respiratory protection, adequate ventilation, and vaccination when available. Healthcare facilities may amplify transmission because infected patients are concentrated in enclosed settings and healthcare workers perform close-contact and aerosol-generating procedures. [8]

Emerging respiratory infections impose health, social, and economic burdens through increased morbidity, mortality, hospitalization, occupational exposure, and interruption of essential health services. Nurses are particularly important because they provide continuous frontline care and implement most routine infection-prevention measures. Their ability to recognize risks and consistently apply preventive practices is therefore essential for protecting patients, healthcare workers, and communities during respiratory outbreaks. [9]

Nurses and Emerging Respiratory Infections

Nurses are highly vulnerable during respiratory outbreaks because they provide prolonged, close-contact care, assist with aerosol-generating procedures, and repeatedly handle respiratory secretions and contaminated equipment. Their occupational exposure is intensified by staff shortages, heavy workloads, delayed diagnosis, and inadequate availability of personal protective equipment. [10]

Beyond personal infection risk, nurses frequently fear transmitting infection to family members, colleagues, and vulnerable patients. Such concerns can increase anxiety, stress, and stigma and may affect concentration, confidence, and willingness to work in high-risk settings. Adequate psychological support and clear institutional communication are therefore essential components of outbreak preparedness. [11]

Nurses also have a central preventive role. They perform triage, recognize warning signs, apply isolation precautions, ensure hand hygiene and correct PPE use, educate patients, support vaccination, and monitor adherence to infection-control protocols. Their knowledge and preventive behavior directly influence healthcare-associated transmission and patient safety. [12]

However, preventive practices are not determined by knowledge alone. Nurses may demonstrate acceptable awareness while still showing inconsistent compliance because of time pressure, discomfort from PPE, limited supplies, inadequate supervision, or low confidence in managing unfamiliar pathogens. Strengthening practice therefore requires continuous training, supportive leadership, and an enabling infection-control environment. [13]

Knowledge, Perceptions, and Preventive Beliefs of Nurses

Nurses' knowledge of emerging respiratory infections includes awareness of causative agents, symptoms, transmission routes, incubation periods, isolation procedures, and appropriate protective measures. Studies conducted during COVID-19 and other outbreaks have shown generally moderate knowledge levels, but persistent gaps remain in pathogen-specific guidance, correct respirator use, and management of rapidly



changing recommendations. [14]

Risk perception strongly affects preventive behavior. Nurses who believe they are susceptible to infection and perceive the disease as severe are more likely to use PPE, follow isolation precautions, and support vaccination. However, excessive fear may also contribute to stress, avoidance, and reduced occupational confidence. [15]

Perceived benefits encourage adherence when nurses believe that hand hygiene, masking, vaccination, and environmental controls effectively reduce infection. Conversely, perceived barriers such as PPE discomfort, workload, staff shortages, inadequate supplies, and unclear policies may weaken compliance despite adequate knowledge. [16]

Cues to action include outbreak alerts, institutional protocols, training sessions, supervisor reminders, and exposure to infected colleagues or patients. These cues can strengthen preventive behavior by translating general awareness into immediate action. [17]

Self-efficacy is equally important because nurses must feel capable of correctly applying infection-control procedures. Practical training, simulation, supervision, and repeated competency assessment improve confidence and make preventive behavior more consistent during outbreaks. [18]

Application of the Health Belief Model

The Health Belief Model explains preventive behavior through six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. It is particularly relevant to nursing because infection-control behavior depends not only on knowledge but also on how nurses interpret occupational risk and their ability to respond effectively. [19]

Perceived susceptibility reflects nurses' beliefs about their likelihood of acquiring infection. Perceived severity concerns the expected clinical, occupational, and social consequences, including illness, work absence, and transmission to relatives or patients. Higher perceived risk generally promotes stronger preventive intentions. [20]

Perceived benefits refer to confidence that measures such as vaccination, respirator use, hand hygiene, and isolation reduce transmission. Perceived barriers include discomfort, time pressure, insufficient supplies, communication difficulties, and doubts about effectiveness. Preventive action becomes more likely when perceived benefits outweigh these barriers. [21]

Cues to action include outbreak announcements, institutional reminders, training, visible protocols, and exposure to infected colleagues. Self-efficacy reflects confidence in performing protective behaviors correctly. Simulation, practical demonstrations, supportive supervision, and competency-based education can strengthen both constructs. [22]

HBM-based interventions are more useful than information-only programs because they address the beliefs underlying behavior. Studies among nurses have shown that theoretically structured education can improve awareness, perceived benefits, self-efficacy, and adherence to infection-prevention practices. [23]

Evidence Gaps and Public Health Implications

Available evidence shows that nurses' knowledge and preventive practices vary across settings, professional experience, training exposure, and institutional support. Many studies combine nurses with other healthcare workers, making it difficult to identify profession-specific determinants of behavior. [24]

Research has also focused heavily on COVID-19, while fewer studies compare nurses' responses across SARS, MERS, influenza, and other emerging respiratory threats. This limits understanding of whether beliefs remain stable across outbreaks or change according to perceived lethality, transmissibility, and treatment availability. [25]

Evidence from Egypt and the Middle East remains limited, particularly regarding the full application of Health Belief Model constructs among practicing nurses. More context-specific studies are needed to examine how staffing, resource availability, workplace culture, and previous outbreak experience influence preventive behavior. [26]

Future interventions should combine updated clinical education with practical PPE training, simulation, clear risk communication, psychological support, and continuous supervision. Programs should specifically reduce perceived barriers, strengthen self-efficacy, and provide repeated cues to action through



reminders and institutional protocols. [27]

From a public health perspective, strengthening nurses' beliefs and preparedness can reduce occupational infections, healthcare-associated transmission, absenteeism, and service disruption. Integrating Health Belief Model-based education into routine infection-control programs may therefore improve both individual protection and health-system resilience. [28]

Recommendations

Healthcare institutions should provide regular competency-based training on emerging respiratory infections, including case recognition, transmission routes, isolation procedures, respirator use, and outbreak communication. Training should be reinforced through simulation, demonstrations, and periodic assessment rather than relying only on lectures. [29]

Infection-control programs should address Health Belief Model constructs directly by increasing nurses' awareness of occupational susceptibility and disease severity, emphasizing the benefits of preventive measures, reducing practical barriers, and strengthening self-efficacy. [30]

Adequate PPE supplies, safe staffing levels, clear protocols, supportive supervision, and timely institutional updates are essential for translating knowledge into consistent practice. Psychological support should also be integrated into preparedness plans to reduce fear, stress, and burnout during outbreaks. [31]

Future research should focus specifically on practicing nurses, use validated HBM-based instruments, and examine differences across clinical departments and respiratory pathogens. Longitudinal and intervention studies are needed to determine whether improved beliefs produce sustained changes in preventive behavior and infection outcomes. [32]

Conclusion

Nurses are central to the prevention and control of emerging respiratory infections because their knowledge, risk perceptions, and preventive beliefs directly influence infection-control behavior. The Health Belief Model provides a useful framework for understanding how perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy shape adherence to protective measures. Strengthening nurses' preparedness therefore requires more than information alone; it depends on continuous practical education, adequate resources, clear institutional communication, supportive supervision, and psychological readiness. Integrating these elements into routine infection-prevention programs can improve occupational safety, reduce healthcare-associated transmission, and strengthen health-system resilience during future respiratory outbreaks.

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