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Capacity development of nursing professionals for the next pandemic: Nursing education, on-the-job training, and networking

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Abstract: The COVID-19 pandemic highlighted the essential role of nursing professionals in infection control and patient care across various healthcare settings in Japan. Despite their dedication, the crisis exposed significant gaps in preparedness, training, and leadership development. This paper examines the challenges nurses and public health nurses faced during the pandemic and proposes a framework for strengthening capacity development to enhance future public health emergency responses. Fundamental infection control education must be systematically incorporated into basic nursing curricula, equipping nurses with essential skills such as proper use of personal protective equipment, zoning principles, and infection prevention strategies. Simulation-based training should complement theoretical instruction to ensure practical application. Continuous professional development through structured on-the-job training is crucial, particularly for smaller hospitals and elderly care facilities where infection control expertise remains limited. Public health nurses require specialized training in epidemiological investigations and outbreak management to coordinate community health responses effectively. Leadership in clinical settings and public health must be reinforced. The Infectious Disease Health Emergency Assistance Team (IHEAT) and supervisory public health nurses played key roles in the pandemic response. Still, challenges in rapid deployment and infrastructure readiness hindered their effectiveness. Strengthening managerial education and crisis response training will be critical to improving future outcomes. Additionally, networking and knowledge-sharing systems should be expanded to enhance communication and coordination. Mental health support for nursing professionals engaged in infection control must also be prioritized. This paper advocates a comprehensive approach to nursing education, training, and leadership development to fortify Japan's healthcare system against future pandemics.

***Keywords*:** capacity development, nursing professionals, nursing education, on-the-job training, networking

Introduction

During the COVID-19 pandemic, nursing professionals in Japan played a crucial frontline role, demonstrating their commitment and resilience in various healthcare settings. Japan's national nursing licenses include public health nurses, midwives, and registered nurses. While registered nurses work primarily in hospitals and home care settings, public health nurses are employed by local government offices at the prefectural and municipal levels, as well as in occupational health settings (*1*). Public health centers play a key role in infection prevention, response, and containment in local communities, with public health nurses addressing these challenges within their jurisdictions.

To enhance specialized nursing capabilities, the Japanese Nursing Association operates a certification system for nurses with advanced expertise in specific fields, such as infection control nursing (*2*). Certified Nurse Specialists (CNS) are highly trained professionals who apply their deep knowledge and clinical skills to provide high-quality nursing care to individuals, families, and communities facing complex health challenges (*2*). They obtain certification after completing a master's program, acquiring relevant work experience, and passing a national credentialing examination (*2*). Similarly, Certified Nurses (CN) are expected to provide high-level nursing care in specialized fields, utilizing advanced nursing techniques and knowledge. They achieve certification by accumulating practical

experience after obtaining their national nursing license. Public health nurses play a critical role in community health, focusing on disease prevention, health promotion, and governmental support not only for medical care but also for welfare services. Their responsibilities span public health centers, municipal health offices, industries, and some hospital settings (*2*). In infection control, public health nurses possess specialized skills in contact tracing, epidemiological surveillance, health education, and risk communication, which are essential for managing public health emergencies.

During the pandemic, registered nurses contributed to a wide range of settings beyond hospitals, including elderly care facilities and home care, although they faced significant challenges in infection control (*3*). Moreover, public health nurses collaborated with local governments and healthcare institutions to implement public health measures effectively. The crisis underscored the need for specialized infection control knowledge and skills, but conventional in-person training programs were difficult to conduct. Instead, online education, particularly e-learning, became an essential tool for providing necessary education and training.

The COVID-19 pandemic highlighted the essential role of infection control in nursing and revealed gaps in preparedness across all levels of nursing. On the basis of this experience, we recognize the need to integrate infection control education into basic nursing education, postgraduate education, and continuous professional development. It is also crucial to establish advanced training systems to equip nurses with the skills necessary to respond effectively to future health emergencies.

In response to these challenges, the Japanese government established the Japan Institute for Health Security (JIHS). The JIHS, set to launch on April 1, 2025, will serve as a central body for research, medical care, international cooperation, and workforce training in infectious diseases and other emerging health threats. The organization will conduct epidemiological surveys and clinical research and provide scientific knowledge to strengthen the nation's health security system. The JIHS will integrate the National Institute of Infectious Diseases and the National Center for Global Health and Medicine, with the aim of enhancing Japan's response capabilities for future pandemics (*4*).

This paper outlines the difficulties faced by Japanese nursing professionals during the COVID-19 pandemic and provides recommendations for a capacity development system to better prepare for future pandemics.

Education for infection control during normal phase

Basic nursing education: training for registered nurses and public health nurses

At the beginning of the pandemic, registered nurses in clinical settings were required to support infection control efforts, including working in dedicated COVID-19 wards. Many people required on-the-job training in essential practices such as donning and doffing personal protective equipment (PPE) and implementing standard infection control measures (*5*). Public health nurses faced extreme challenges in managing health monitoring and hospitalization coordination of infected individuals while handling call center duties at public health centers. During the COVID-19 pandemic, many public health nurses allocated to municipalities lacked experience in epidemiological investigations and implementing infection control measures, which made their roles particularly demanding. These challenges are not unique to Japan and reflect the difficulties that nursing professionals faced globally during the pandemic (*6*). The infection control skills required during pandemics must be systematically incorporated into basic nursing education. Essential competencies should include proper PPE use, zoning principles, and standard precautionary measures. To enhance practical application, nursing curricula should integrate simulation-based training alongside theoretical instruction, ensuring that nurses develop the hands-on expertise required for real-world infection control situations (*7*).

On the job training for nurses and public health nurses

During the pandemic, public health nurses played a pivotal role in advising households on infection prevention, monitoring mild cases, and helping prevent the spread of the virus. In hospitals, strengthening infection control skills among all nurses is essential. Effective infection control requires not only basic knowledge but also practical management skills. Many smaller hospitals, psychiatric hospitals, and elderly care facilities lacked Certified Nurses in infection control, highlighting the need for outreach support (*8*). To enhance infection control capabilities at all levels, structured training programs should be developed and led by infection control-Certified Nurse Specialists as well as Certified Nurses in infection control. These programs should include PPE training, zoning management, and simulation-based response drills. For new nurses, early exposure to PPE protocols and basic infection control techniques should be integrated into on-the-job training programs, ensuring continuous skill development across all hospital departments. Additionally, low nurse-to-patient ratios in ICUs have been associated with decreased care implementation rates (*9*). In comparison to other countries, Japan's low nurse-to-ICU bed ratio requires reassessment to optimize critical care responses. Encouraging generalist nurses to gain experience in critical care can be another effective strategy. Furthermore, strengthening infection control personnel in local healthcare settings is essential, particularly through outreach training programs for smaller hospitals

and nonspecialist facilities. Public health nurses should receive practical training in epidemiological investigations, cluster outbreak response, and infection control interventions. Existing e-learning resources (*10,11*), developed during the COVID-19 pandemic, should be leveraged to increase accessibility and efficiency in training programs.

Expected leadership in public health centers and hospitals: supervising public health nurses and nursing administrators

Public health nurses played a critical role in responding to the COVID-19 pandemic through the Infectious Disease Health Emergency Assistance Team (IHEAT) program (*12*). IHEAT is a mechanism that mobilizes regional public health nurses and other specialized professionals to support public health centers during public health emergencies, such as infectious disease outbreaks. When local governments with public health centers struggle to manage the response, they can request support from IHEAT personnel. Additionally, IHEAT members are required to undergo preparatory training to ensure that they can provide effective assistance when deployed. When public health centers were overwhelmed, IHEAT personnel were dispatched to assist. To ensure rapid deployment, IHEAT members were required to undergo specialized training. During the COVID-19 pandemic, IHEAT public health nurses were instrumental in conducting epidemiological investigations and managing home-care patients. However, despite the establishment of a registration and dispatch system, challenges arose due to insufficient training infrastructure and unprepared local governments, which hindered timely deployment in some cases during the pandemic.

Currently, supervisory public health nurses are assigned to each prefecture and municipality, leading public health strategies at the regional level. Their expertise in disease management and response is particularly crucial. In times of health crisis, public health centers play a key role in coordinating with medical institutions and local governments to implement effective infection control measures. To increase pandemic preparedness, it is essential to cultivate strong management skills in public health nurses with who will coordinate resources and implement effective response strategies in collaboration with municipalities. At the prefectural level, supervisory public health nurses have a broader perspective on regional public health and must be able to assess challenges across municipalities, facilitate rapid decision-making, and strengthen interregional collaboration to ensure an effective response system.

In hospitals, infection control leadership roles are filled by Certified Nurses in infection control and infection control-Certified Nurse Specialists, alongside nursing administrators. Currently, Certified Nurses in infection control and infection control- Certified Nurse Specialists are present in fewer than 40% of hospitals across Japan. Consequently, these professionals not only contribute to in-hospital infection control but also provide outreach support to smaller hospitals and healthcare facilities (*8*).

On the other hand, nursing administrators are responsible for overseeing infection control in hospitals and care facilities. They must ensure that staff are adequately trained and that crisis response capabilities are continually enhanced (*13*). One major challenge during the COVID-19 pandemic was that many hospitals operated with a minimal workforce during normal periods, making it difficult to scale up infection control management when crises emerged. To address this, nursing administrators must possess strong resource management skills, ensuring that hospitals can adapt quickly and deploy personnel to ICUs, other hospitals, and home care nursing stations when necessary. Strengthening rapid decision-making and personnel allocation capabilities will be essential for future pandemic preparedness.

Response to health emergencies: networking and mental health support

Rapid and effective information-sharing networks are essential during pandemics. Leveraging existing networks efficiently can improve response efforts. During the COVID-19 pandemic, many directives and official communications were issued daily by the Cabinet Office and the Ministry of Health, Labour and Welfare, requiring public health centers to adapt their responses accordingly. The ever-changing information created confusion in the field. To address this confusion, key information relevant to nursing professionals was extracted from these communications and disseminated through networks (*14*). During a pandemic, it is crucial not only to gather and distribute necessary and critical information but also to prioritize and explain essential content for nursing professionals. Providing this information in an accessible manner to infection control leaders and nursing administrators ensures a more effective and streamlined response. Additionally, the Japanese Nursing Association has received numerous inquiries regarding the expanded roles of nurses, including administering intravenous fluids and oxygen therapy at quarantine facilities (*15*). Lessons from the Disaster Support Nurses Program and IHEAT (*12*) suggest that structured information sharing, needs-based rapid response, and optimal personnel allocation are necessary for future crises.

Moreover, mental health support for nursing professionals engaged in infection control is a critical issue. Nurses, including public health nurses, who were in prolonged contact with infected patients experienced significant psychological stress, including anxiety about transmitting the virus to their families and distress from

inadequate end-of-life care for patients. As a result, they were identified as a high-risk group for suicide and mental health disorders (*16,17*). In Japan, the Disaster Psychiatric Assistance Team (DPAT) provided acute psychiatric care during the crisis (*18*), and various organizations, such as academic associations, offered online counseling and guidelines (*19*). Going forward, it is essential to enhance the existing support systems while strengthening cooperation between the Ministry of Health, Labor and Welfare and professional organizations. This includes establishing a structured counseling system and implementing stress reduction programs to ensure the mental wellbeing of nursing professionals engaged in infection control.

Sharing good practices and strengthening networks

The COVID-19 pandemic has provided valuable lessons for nursing professionals. Building networks that enable nurses to learn from different approaches taken by hospitals and municipalities can enhance their ability to respond effectively. Therefore, it is vital to systematically share good infection control practices nationwide so that they can be adapted at local levels. Having such a system in place during normal phases will facilitate the rapid exchange of good practices during emergencies. For example, there were cases in which successful outreach support models led by Certified Nurses in infection control, as mentioned previously, were actively compiled and used to refine training programs (*15*). Additionally, strengthening networks both within and across organizations is highly desirable. In one municipality, public health nurses successfully utilized an SNS communication tool, LINE, to rapidly share information with medical and welfare service providers, which significantly improved coordination. To enhance preparedness, it is essential to establish a system that allows public health centers, medical institutions, and nursing associations to maintain regular communication beyond organizational and sectional boundaries.

Furthermore, networks among hospitals, academic societies, and other professional organizations have proven effective. By leveraging these networks, training opportunities can be expanded nationwide, and a framework for collecting and sharing essential information can be developed. This not only facilitates seamless communication but also contributes to swift and well-coordinated responses during emergencies.

Policy recommendations

To respond effectively to future health emergencies, the JIHS must play a key role in implementing the following measures: *i*) Infection control skills should be integrated into basic nursing education (for public

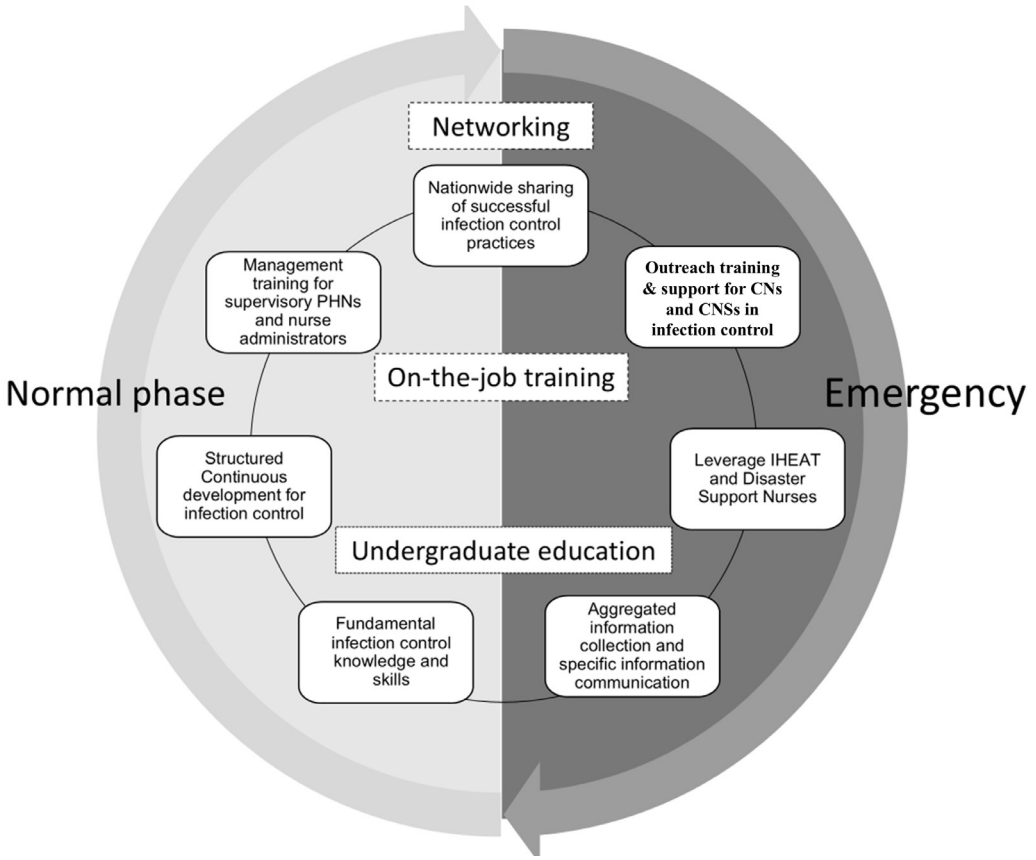

Figure 1. A comprehensive training platform for infection control to respond effectively to future health emergencies.

health nurses, midwives, and registered nurses), and practical simulation-based training should be enhanced; *ii*) Develop and organize structured training programs for continuing education and new nurse training, ensuring accessibility for nurses in small- and medium-sized hospitals, as well as welfare and long-term care facilities (mainly generalist nurses); *iii*) The training and management education of supervisory public health nurses should be strengthened, and their capacity to lead infection control measures at public health centers and at the local government level should be increased; *iv*) IHEAT and Disaster Support Nurses should be encouraged to reinforce emergency network collaboration systems while expanding mental health support programs; *v*) Organize and utilize training programs required for infection control-Certified Nurse Specialists and Certified Nurses in infection control engaged in outreach support for welfare and long-term care facilities; *vi*) Facilitate the nationwide sharing of successful infection control practices and strengthen network collaboration between medical institutions and local governments; *vii*) The official notifications, directives, and administrative communications issued by the cabinet office and the Ministry of Health, Labor and Welfare during emergencies should be aggregated and interpreted, ensuring that relevant information is effectively communicated to nursing professionals.

To fulfill these roles, it is suggested that the JIHS establish a comprehensive training platform (Figure 1) for infection control, which would serve as a hub for disseminating the latest information on infection nursing during health emergencies, compiling existing e-learning materials, and facilitating communication, information-sharing, and professional exchange.

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