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ENHANCING HEALTHCARE WORKERS' KNOWLEDGE OF PATIENT SAFETY AND INFECTION CONTROL THROUGH TARGETED TRAINING AT DIEN BIEN PROVINCIAL GENERAL HOSPITAL

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ABSTRACT

Aim: To assess the effectiveness of targeted interventions to improve health care workers (HCWs)' knowledge of COVID-19 patient safety at Dien Bien Provincial General Hospital.

Methods: A pre- and post-intervention study was conducted among 275 full-time HCWs at Dien Bien Provincial General Hospital from July 2021 to July 2022. Participants attended five structured training sessions focused on patient safety and COVID-19 prevention, including personal protective equipment (PPE) use and hand hygiene. Knowledge was measured using a questionnaire based on Vietnam's Ministry of Health patient safety guidelines. Data were analyzed using SPSS 22.0, with statistical significance set at $p < 0.05$.

Results: The intervention led to significant improvements in HCWs' knowledge of COVID-19 prevention measures. Compliance with mask-wearing increased from 86.9% to 92.7%, and knowledge scores for infection control measures rose substantially. Standard precautions improved from 72.0% to 85.1%, and transmission-based precautions from 47.6% to 76.4%. Mean knowledge scores increased across general prevention (1.71 to 1.81), infection control (2.87 to 3.90), and laundry handling (5.32 to 6.29) domains.

Conclusion: The targeted training interventions successfully increased HCWs' adherence to essential COVID-19 prevention protocols, demonstrating the potential of similar programs to improve healthcare safety in Vietnam. Continuous education is recommended to sustain high compliance and address logistical barriers in infection control practices.

Keywords: COVID-19 prevention, patient safety, healthcare workers, safety protocols, community intervention.

1. INTRODUCTION

In recent years, Vietnam's healthcare landscape has undergone significant transformations. While non-communicable diseases have risen in prevalence, several infectious diseases have also re-emerged, posing dual challenges to the healthcare system [1]. The COVID-19 pandemic added an unprecedented strain, profoundly impacting all sectors of the economy and exposing critical weaknesses within healthcare infrastructure [2]. This situation underscored the importance of infection prevention and control measures within healthcare facilities, particularly to safeguard both patients and healthcare workers who regularly interact with numerous patients and colleagues.

Healthcare workers are at the forefront of the pandemic response and are vulnerable due to the nature of their work, which often involves close contact with potentially infectious individuals [3]. Consequently, their knowledge and adherence to COVID-19 safety protocols are essential for preventing the spread of the virus within healthcare settings. However, some studies suggest that existing knowledge of COVID-19 safety among healthcare workers may be inadequate to effectively mitigate transmission risks within healthcare facilities. Despite the critical role of healthcare workers in infection prevention, there has been no study in Vietnam to systematically assess the impact of interventions designed to enhance their knowledge and application of COVID-19 safety measures.

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Our preliminary research found that healthcare workers' knowledge of COVID-19 safety protocols was at 70.2%. Although the COVID-19 situation has stabilized, hospitals must continue to enforce preventive measures for respiratory infections, including COVID-19. Based on these initial findings, we implemented targeted interventions to enhance healthcare workers' knowledge of patient safety and COVID-19 prevention measures, focusing on areas such as personal protective equipment (PPE) use and adherence to hand hygiene.

This study aims to fill that gap by evaluating the effectiveness of interventions to improve healthcare workers' knowledge of COVID-19 patients' safety at Dien Bien Provincial General Hospital from 2021 to 2022. Through this research, we aim to provide evidence that will inform future policies and training programs to strengthen healthcare workers' preparedness and protect public health.

2. METHODS

2.1. Participants

Full-time healthcare workers at Dien Bien Provincial General Hospital, selected for the hospital's epidemic prevention and rapid response information teams, participated in this study from July 2021 to July 2022.

2.2. Study design

A pre- and post-evaluation community intervention study.

2.3. Intervention method

We conducted a series of training sessions designed to enhance healthcare workers' knowledge of patient safety and COVID-19 prevention. The program spanned one month and included five structured teaching sessions. This training forms part of the authors' broader initiatives to improve hospital quality in epidemic prevention.

2.4. Sample Size and Sampling method

A sample size formula specific to intervention studies was applied, with a confidence level of alpha = 0.05. For the calculation, we used an initial knowledge rate (p1) of 0.14 and a post-intervention target rate (p2) of 0.08, taken from previous research, with a margin of error (e) of 0.05. This calculation estimated a sample size of n = 273 healthcare workers with correct knowledge of patient safety; in practice, 275 healthcare workers were surveyed.

2.5. Measurement method

A questionnaire, developed by the authors and based on the Ministry of Health's patient safety guidelines [4–6], was used to assess healthcare workers' knowledge of patient safety measures related to COVID-19.

2.6. Data analyses

Data were collected via paper forms and entered into Epidata 3.1, then cleaned and analyzed using SPSS 22.0. Quantitative variables with normal distribution were reported as mean and standard deviation, while skewed distributions were described using median and interquartile ranges. Qualitative variables were described using frequency and percentage.

2.7. Ethical consideration

The study received approval from the Doctoral Dissertation Protocol Review Council of Thai Binh University of Medicine and Pharmacy under Decision No. 567/QD-YDTB dated April 22, 2021. All healthcare worker participants signed a consent form prior to participation.

3. RESULTS

Table 1. Changes in Knowledge of General Prevention Measures

	Before Intervention n (%), (n=275)	After Intervention n (%), (n=275)	p-value
Compliance with mask wearing	239 (86.9)	255 (92.7)	<0.05
Compliance with hand hygiene	230 (83.6)	242 (88.0)	>0.05
Mean knowledge score, standard deviation (sd)	1.71 (0.63)	1.81 (0.54)	<0.05

Table 1 shows a statistically significant improvement in healthcare workers' knowledge of general prevention measures to ensure patient safety following the intervention ($p < 0.05$). Compliance with mask-wearing increased from 86.9% to 92.7%, and compliance with hand hygiene rose from 83.6% to 88.0%. The mean knowledge score increased from 1.71 (SD = 0.63) to 1.81 (SD = 0.54).

Table 2. Changes in Knowledge of COVID-19 Infection Control Measures

	Before Intervention n (%), (n=275)	After Intervention n (%), (n=275)	p-value
Implementation of standard precautions	198 (72.0)	234 (85.1)	<0.05
Transmission-based precautions	131 (47.6)	210 (76.4)	<0.05
Environmental control	153 (55.6)	212 (77.1)	<0.05
Community spread prevention	165 (60.0)	231 (84.0)	<0.05
Mean knowledge score, standard deviation (SD)	2.87 (1.74)	3.90 (1.45)	<0.05

Table 2 shows that healthcare workers' knowledge of COVID-19 infection control measures significantly improved post-intervention across all categories ($p < 0.05$). The mean knowledge score increased from 2.87 (SD=1.74) to 3.90 (SD=1.45).

Table 3. Healthcare Workers' Knowledge of Precautions in COVID-19 Infection Control

	Before Intervention n (%), (n=275)	After Intervention n (%), (n=275)	p-value
Hand hygiene	242 (88.0)	258 (93.8)	<0.05
Use of personal protective equipment (PPE)	236 (85.8)	263 (95.6)	<0.05
Respiratory hygiene	218 (79.3)	244 (88.7)	<0.05
Prevention of sharp injuries	95 (34.5)	148 (53.8)	<0.05
Reuse of patient care equipment	163 (59.3)	215 (78.2)	<0.05
Environmental hygiene in patient care	210 (76.4)	235 (85.5)	<0.05
Safe disposal of medical waste	143 (52.0)	204 (74.2)	<0.05
Mean knowledge score, standard deviation (SD)	5.44 (2.4)	6.46 (2.12)	<0.05

Table 3 shows a significant improvement in healthcare workers' knowledge of precautions in COVID-19 infection control. Hand hygiene compliance increased from 88.0% before the intervention to 93.8% afterward, while the use of PPE rose from 85.8% to 95.6%. Improvements were also observed in respiratory hygiene, which went from 79.3% to 88.7%, and in the prevention of sharp injuries, from 34.5% to 53.8%. Knowledge of proper reuse of patient care equipment grew from 59.3% to 78.2%, and environmental hygiene in patient care improved from 76.4% to 85.5%. Furthermore, safe disposal of medical waste saw a rise from 52.0% to 74.2%. Overall, the mean knowledge score showed a statistically significant increase from 5.44 (SD = 2.4) to 6.46 (SD = 2.12), $p < 0.05$.

Table 4. Healthcare Workers' Knowledge of Laundry Handling for Suspected or Confirmed COVID-19 Patients

	Before Intervention n (%), (n=275)	After Intervention n (%), (n=275)	p-value
Collecting laundry	227 (82.5)	233 (84.7)	>0.05
Not counting collected laundry at disposal site	135 (49.1)	186 (67.6)	<0.05
Placing laundry in double-layer, sealed bags	227 (82.5)	252 (91.6)	<0.05
Treating laundry bags as infectious waste	213 (77.5)	235 (85.5)	<0.05
Separate washing without soaking	128 (46.5)	190 (69.1)	<0.05
Machine washing at 60-70°c	131 (47.6)	179 (65.1)	>0.05
Use of chlorine-based disinfectant for washing	174 (63.3)	208 (75.6)	<0.05
Labeling laundry bags as "Covid-19 risk"	229 (83.3)	247 (89.8)	>0.05
Mean knowledge score, standard deviation (SD)	5.32 (2.46)	6.29 (2.16)	<0.05

Table 4 illustrates healthcare workers' knowledge of safe laundry handling for suspected or confirmed

COVID-19 patients. The percentage of workers who avoided counting laundry at the disposal site rose from 49.1% to 67.6%, and compliance with placing laundry in double-layered, sealed bags improved from 82.5% to 91.6%. Additionally, the treatment of laundry bags as infectious waste increased from 77.5% to 85.5%, and adherence to separate washing without soaking rose from 46.5% to 69.1%. Use of chlorine-based disinfectant for washing also saw a notable increase from 63.3% to 75.6%. However, practices such as collecting laundry (82.5% to 84.7%), machine washing at 60–70°C (47.6% to 65.1%), and labeling laundry bags as "Covid-19 risk" (83.3% to 89.8%) showed slight improvements. Overall, the mean knowledge score improved significantly from 5.32 (SD = 2.46) to 6.29 (SD = 2.16), p-value < 0.05.

4. DISCUSSION

The intervention aimed to improve healthcare workers' knowledge and compliance with COVID-19 prevention and control measures at Dien Bien Provincial General Hospital and demonstrated significant success across several key areas. The results show substantial improvements in general prevention measures, infection control, personal precautions, and safe handling knowledge.

In terms of general prevention measures, the increase in mask-wearing compliance (from 86.9% to 92.7%) reflects an enhanced awareness of personal protective practices, which are vital in minimizing COVID-19 transmission risks in healthcare environments. While hand hygiene compliance improved, the less pronounced increase (83.6% to 88.0%) suggests that future interventions could emphasize practical barriers or strategies for achieving even higher compliance rates.

Significant gains were also noted in COVID-19-specific infection control knowledge, particularly in the understanding and implementation of standard precautions (72.0% to 85.1%) and transmission-based precautions (47.6% to 76.4%). These findings indicate that the training sessions effectively addressed knowledge gaps in critical areas, reinforcing the importance of targeted education to prepare healthcare workers for evolving infectious threats. Improvements in environmental control (from 55.6% to 77.1%) and community spread prevention (60.0% to 84.0%) also highlight the program's success in promoting holistic infection prevention practices within and beyond the hospital setting.

The intervention further improved knowledge in specific precautionary practices, with notable increases in compliance with respiratory hygiene (79.3% to 88.7%) and safe disposal of medical waste (52.0% to 74.2%). Enhanced knowledge of PPE use (85.8% to 95.6%) demonstrates a critical advance, as consistent PPE use remains fundamental in protecting healthcare workers and patients from airborne infections. The increased understanding of safe handling practices, such as avoiding the reuse of patient care equipment, emphasizes the role of these protocols in infection control, particularly in preventing indirect virus transmission.

Additionally, the improved knowledge of laundry handling protocols for COVID-19 patients reflects strengthened compliance with infection-specific safety practices. Significant gains were seen in double-bagging laundry (82.5% to 91.6%), treating laundry as infectious waste (77.5% to 85.5%), and separate washing without soaking (46.5% to 69.1%). These results suggest that participants recognized the role of laundry handling in infection control, though moderate improvement in practices such as labeling bags as "Covid-19 risk" (83.3% to 89.8%) and machine washing at recommended temperatures (47.6% to 65.1%) suggests areas for additional reinforcement.

Overall, the statistically significant increase in mean knowledge scores across all areas confirms the intervention's effectiveness in enhancing healthcare workers' preparedness for infection prevention. The outcomes underscore the importance of continuous education and training as a foundation for maintaining high standards of patient safety and infection control. Future programs could benefit from building on these gains, particularly by focusing on sustaining high compliance in areas with smaller improvements and by addressing any logistical barriers that may hinder compliance in specific practices. These insights provide valuable guidance for policymakers and healthcare institutions in developing targeted interventions that protect both healthcare workers and patients in an ongoing and post-pandemic context.

5. CONCLUSION

Our targeted training interventions can significantly enhance healthcare workers' knowledge in COVID-19 prevention measures, improving overall safety in hospital settings. Post-intervention, healthcare workers showed increased adherence to essential protocols, including PPE use, hand hygiene, and safe disposal of medical waste. The rise in mean knowledge scores reflects the training's effectiveness, suggesting that similar initiatives could be beneficial across other healthcare facilities. While some areas, like consistent hand hygiene, still need reinforcement, these findings underscore the importance of continuous training to support infection prevention efforts and create a safer environment for healthcare staff and patients alike.

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