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EMERGENCY DEPARTMENT PREPAREDNESS AND RESPONSE TO DISASTERS: LESSONS FROM THE COVID-19 PANDEMIC

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Abstract

Objective: The COVID-19 pandemic revealed major gaps in emergency departments' (EDs) preparedness and response, including patient surges and shortages of personal protective equipment (PPE). Understanding ED healthcare professionals' experiences is vital for improving future crisis readiness.

Methods: This qualitative phenomenological study explored the experiences of 20 ED healthcare professionals through semi-structured interviews. Topics included disaster preparedness, logistics, communication, training, psychological support, technology use, and intersectoral collaboration. Thematic analysis was conducted to identify key themes.

Results: The study identified several themes. Existing disaster protocols were insufficient for a crisis of this scale, necessitating revision. PPE shortages and logistical hurdles severely strained staff. Clear internal and intersectoral communication facilitated operations. Continuous training and realistic drills enhanced preparedness, while psychological support helped manage stress. Telemedicine adoption improved service delivery, and strong intersectoral collaboration helped mitigate resource limitations.

Conclusion: The pandemic underscored the importance of updating disaster protocols, strengthening logistics, and providing psychological support for ED personnel. Technological adaptation and cross-sector collaboration were key to improving crisis response. These lessons are essential for enhancing future preparedness.

Keywords: COVID-19, Disaster Preparedness, Emergency Department, Healthcare Professionals, Pandemic Response

INTRODUCTION

The COVID-19 pandemic has had a significant impact on global health systems, including in Indonesia (Harapan et al., 2023). It has brought to light critical weaknesses in the preparedness and response mechanisms of Emergency Departments (EDs) when dealing with large-scale health crises (Carr et al., 2017; Love et al., 2016). As the frontline of healthcare services, EDs were under immense pressure, testing the resilience, adaptability, and efficiency of existing systems.

During the pandemic, EDs were forced to rapidly accommodate a surge in patient volume, including varying severities of COVID-19 cases. In many instances, hospital capacities were overwhelmed, prompting the implementation of stricter triage systems and more efficient patient flow protocols (Chou et al., 2022). Although many EDs had disaster protocols in place, research shows that pandemic preparedness remains an ongoing challenge (Bressan et al., 2020).

One of the key issues was the availability of medical equipment, particularly personal protective equipment (PPE). Shortages jeopardized healthcare worker safety and service continuity (Ramdani et al., 2023). This underlined the need for improved procurement and distribution systems. In parallel, clear and timely communication both internally within hospitals and externally with government bodies was crucial for effective coordination (Kampf et al., 2020; Patients et al., 2020).

The pandemic also emphasized the importance of ongoing training and realistic emergency simulations. Medical personnel were required to swiftly adapt to new protocols and care standards (Ayati et al., 2020). Flexible infrastructure such as rapid conversion of hospital spaces and scalable bed capacity also proved essential in responding to patient surges (Fan et al., 2021). During the pandemic, many EDs faced challenges in ensuring smooth communication, both internally and externally, which affected the effectiveness of their response (Gasser et al., 2020; Haldane et al., 2021).

Technology emerged as a powerful support tool. Health information systems improved case monitoring, patient data management, and interdepartmental coordination, signaling the need for continued investment in digital infrastructure (Shrestha et al., 2022).

Finally, intersectoral collaboration played a decisive role in crisis response. Strong coordination between hospitals, local governments, and national agencies was essential (Baughman et al., 2020; Tjahjono et al., 2021). Effective disaster and outbreak response required good coordination between hospitals, local governments, and national agencies (D. W. Lee, 2019). Lessons from COVID-19 can inform future policies to build a more resilient and integrated health response system.

This study adopts a qualitative phenomenological approach to explore how doctors, nurses, and other ED healthcare workers prepared for and responded to disasters and outbreaks. This method is well-suited to capturing the lived experiences and in-depth perspectives of frontline personnel directly involved in emergency care.

Research Objective, to explore the preparedness and response of Emergency Department healthcare professional's nurses, doctors, and others to disasters and outbreaks, using insights gained from the COVID-19 pandemic. This exploration aims to

identify real-world challenges and effective practices that can strengthen future disaster readiness in ED settings.

METHODS

Research Design

This phenomenological research focuses on the lived experiences of medical personnel in EDs during the COVID-19 pandemic. The study aims to understand the meaning of these experiences and how they influence their preparedness and response to disasters and outbreaks.

Participants

Participants in this study are medical personnel working in EDs, including nurses, doctors, and other healthcare professionals with direct experience in handling the COVID-19 pandemic. Participants are selected using purposive sampling to ensure they have relevant experience and knowledge related to the research topic. The target is 20 participants from different hospitals in Yogyakarta, Indonesia to obtain a rich variation of data.

Data Collection

Data is collected through semi-structured in-depth interviews designed to explore participants' experiences, feelings, and thoughts regarding their preparedness and response to the COVID-19 pandemic. Interviews will be recorded and transcribed for further analysis. The interview questions will focus on:

a. Daily experiences working in the ED during the pandemic.
b. Challenges faced in preparedness and response to COVID-19.
c. Strategies and solutions implemented to overcome these challenges.
d. Lessons learned and recommendations for improving future preparedness.
e. Data Analysis
f. Data analyzed using phenomenological analysis techniques, involving several key steps:
g. Transcription: Creating interview transcripts to ensure data accuracy.
h. Initial Reading: Reading the transcripts repeatedly to understand the essence of participants' experiences.
i. Initial Coding: Identifying meaning units from the transcripts related to participants' experiences.
j. Theme Grouping: Identifying and grouping main themes based on similar meanings.
k. Thematic Description: Developing thematic descriptions of participants' experiences, encompassing the main themes.
l. Integration and Interpretation: Integrating the main themes to produce a deep understanding of participants' experiences and their implications for ED preparedness and response.

Validity and Reliability

To ensure the validity and reliability of the data, this study uses data source triangulation by collecting data from various hospitals and different types of medical personnel. Member checking is conducted by asking participants to review and verify the interview transcripts and analysis results.

Research Ethics

This study has received ethical approval from the health research ethics committee with number KE/FK/055/EC/2022. All participants will provide written consent after receiving a complete explanation of the research objectives, procedures, and their rights as participants. Participant confidentiality will be strictly maintained, and all data obtained will be used solely for research purposes.

RESULTS

This study identifies several main themes, sub-themes, categories, and participant quotes that describe the experiences and perspectives of medical personnel in Emergency Departments (EDs) in dealing with disasters and outbreaks, based on lessons learned from the COVID-19 pandemic.

Theme 1: Preparedness and Protocols

Most participants reported that although disaster preparedness protocols were in place before the pandemic, many felt that these protocols needed to be adjusted to the specific scale and nature of COVID-19. Triage protocols and patient flow management had to be quickly updated to handle the significant surge in cases. Some participants stated that additional training and disaster simulations were very helpful in enhancing their preparedness. One participant said, "Triage protocols had to be quickly updated to handle the significant surge in cases" (P.5), while another added, "Additional training was very helpful in enhancing our preparedness" (P.10).

Theme 2: Logistical and Resource Challenges

Many participants reported significant challenges related to shortages of medical equipment and personal protective equipment (PPE). These shortages added stress for medical personnel, who were concerned about their own safety and that of their patients. For example, one participant revealed, "PPE shortages added extra stress as we were worried about our own safety and that of our patients" (P.3). Some hospitals managed to overcome these challenges by forming special teams to manage the procurement and distribution of PPE, as one participant mentioned, "We had to form special teams to manage the procurement and distribution of PPE" (P.7).

Theme 3: Communication and Coordination

Effective communication within the ED and with other hospital departments was crucial in facing the pandemic. Participants highlighted the importance of clear and open

communication channels to ensure accurate and timely information. "Effective communication was essential to ensure accurate and timely information" (P.11), said one participant. There were also reports of initial communication challenges, which gradually improved over time with the implementation of better coordination systems. "Initial communication challenges gradually improved with the implementation of better coordination systems" (P.6).

Theme 4: Training and Medical Personnel Preparedness

Ongoing training and disaster simulations were deemed very important by participants. Many felt that intensive training on handling COVID-19, proper PPE usage, and critical patient management greatly increased their confidence and preparedness. One participant stated, "Intensive training on handling COVID-19 greatly increased our confidence" (P.13). Training programs based on real-world scenarios were seen as highly effective in preparing medical personnel for similar future situations. "Disaster simulations based on real-world scenarios were very effective" (P.4).

Theme 5: Psychological Support

The pandemic also highlighted the importance of psychological support for medical personnel. Many participants expressed feelings of stress, fatigue, and high anxiety during the pandemic. Some hospitals provided counseling services and psychological support to help medical personnel cope with the mental pressures they faced. "Stress, fatigue, and high anxiety during the pandemic made psychological support very important" (P.15), said one participant. These services were considered very helpful, as stated by another participant, "Counseling services helped us cope with the mental pressures" (P.19).

Theme 6: Adaptation and Innovation

The COVID-19 pandemic drove many innovations in how EDs operated. Some participants reported changes in workflows and the use of technology to improve efficiency. For instance, the implementation of telemedicine systems for initial consultations and remote patient monitoring was considered very helpful. "The implementation of telemedicine systems helped with initial consultations and remote patient monitoring" (P.5), said one participant. These innovations not only helped in facing the pandemic but also have the potential to be applied in other emergency situations in the future. "Changes in workflows and the use of technology increased efficiency" (P.7).

Theme 7: Intersectoral Collaboration

Collaboration between various sectors, including the government, hospitals, and the community, was deemed very important in facing the pandemic. Participants reported that good collaboration helped overcome logistical and resource challenges and improved the overall effectiveness of the response. "Good collaboration helped

overcome logistical and resource challenges" (P.14), said one participant. This experience highlights the need to strengthen cross-sector collaboration in future disaster preparedness. "This experience highlights the need to strengthen cross-sector collaboration" (P.10).

Theme 8: Learning and Recommendations

From their experiences during the pandemic, participants provided several recommendations to improve future ED preparedness. These include developing more flexible and adaptive protocols, enhancing training and simulations, investing in health technology, and strengthening psychological and logistical support for medical personnel. "We recommend developing more flexible and adaptive protocols" (P.4), said one participant. Investment in health technology was also considered very important, as stated by another participant, "Investing in health technology is crucial to improve our future response" (P.11).

DISCUSSION

Theme 1: Preparedness and Protocols

This study reveals that the preparedness and response of EDs to the COVID-19 pandemic were heavily reliant on the flexibility and updating of existing protocols. Participants emphasized that triage protocols and patient flow management had to be quickly adjusted to handle sudden patient surges. This aligns with previous research emphasizing the importance of rapid adaptation in medical protocols during health emergencies (Burkle, 2006; Deng et al., 2006). Dynamically updating protocols enabled medical staff to respond more effectively to the evolving scenarios during the pandemic. Additionally, supplemental training and disaster simulations were considered highly effective in enhancing medical personnel's preparedness (Risavi et al., 2001). Intensive training on handling COVID-19, including proper PPE usage and critical patient management, helped boost the confidence and readiness of healthcare workers (Sakr et al., 2024). Real-world scenario-based simulations allowed medical staff to understand and tackle potential challenges, thereby strengthening their preparedness for similar future situations (Hanvoravongchai et al., 2010).

Theme 2: Logistical and Resource Challenges

The shortage of medical equipment and PPE emerged as a major challenge during the COVID-19 pandemic. Participants reported that these shortages not only increased their workload but also heightened stress due to concerns about their own safety and that of their patients. The PPE shortage underscored the need for better procurement and distribution strategies to ensure adequate availability during crises (Rubashkin et al., 2023). Uneven distribution of PPE became a significant issue that needed immediate resolution to enhance operational efficiency and medical staff safety (Bongers et al., 2021; de Korte et al., 2022).

The formation of special teams to manage the procurement and distribution of PPE in some hospitals proved effective in mitigating these issues. These teams were responsible for ensuring that all medical personnel had adequate access to necessary PPE. However, not all hospitals had the resources to form such teams, highlighting the need for further support from the government and health organizations to comprehensively address logistical shortages (Honda et al., 2022; Park et al., 2021).

Theme 3: Communication and Coordination

Effective communication within EDs and with other hospital departments was a critical factor in handling the pandemic. Participants stressed the importance of clear and open communication channels to ensure accurate and timely information. This study supports previous findings that effective communication is essential for coordinating medical responses during emergencies (Gharaveis et al., 2018). Improving internal communication and coordination systems can reduce patient handling errors and enhance operational efficiency.

Furthermore, effective interdepartmental communication played a crucial role in the rapid response to changing situations. The implementation of better coordination systems helped ensure that all medical personnel and hospital management had the necessary information to take appropriate actions (Pun et al., 2015). The use of integrated communication technology and regular communication drills can help improve preparedness and response to future crises (Leinhos et al., 2014).

Theme 4: Training and Medical Personnel Preparedness

Ongoing training and disaster simulations are vital to ensuring medical personnel's readiness to handle emergency situations. Participants emphasized that intensive training on handling COVID-19, including proper PPE usage and critical patient management, greatly helped boost their confidence and preparedness. Real-world scenario-based simulations enabled medical staff to understand and tackle potential challenges during disasters or outbreaks (Zhang et al., 2020).

Such training also enhances the practical skills and theoretical knowledge of medical personnel, which are crucial for handling health emergencies (Aléx Jonas et al., 2017; Cernuda Martínez et al., 2020). Relevant and realistic training programs must be continuously developed and updated to ensure optimal preparedness. This study indicates that investment in continuous professional development and training can significantly improve the quality of medical response during crises (Gregory et al., 2020)(Hughes et al., 2016).

Theme 5: Psychological Support

The COVID-19 pandemic highlighted the importance of psychological support for medical personnel (Popov et al., 2021; Wojtysiak & Zielińska-Więczkowska, 2022). Many participants expressed feelings of stress, fatigue, and high anxiety during the pandemic.

Adequate psychological support is crucial for maintaining the mental health and performance of healthcare workers. Some hospitals provided counseling services and psychological support to help medical personnel cope with the mental pressures they faced (Witczak-Błoszyk et al., 2022).

This study supports previous findings that the psychological pressure experienced by medical staff during the pandemic can affect their performance (Fu et al., 2021). Therefore, it is essential for hospitals to ensure that comprehensive and accessible psychological support programs are available for all medical personnel. Investing in the mental health of medical staff will help maintain their optimal performance and well-being during crises.

Theme 6: Adaptation and Innovation

The COVID-19 pandemic spurred many innovations in how EDs operated. Participants reported changes in workflows and the use of technology to improve efficiency. For instance, implementing telemedicine systems for initial consultations and remote patient monitoring was considered very helpful. These innovations allowed medical personnel to provide faster and more efficient care while reducing transmission risks (Fix & Serper, 2020; Saleem et al., 2020).

Workflow changes and technology use increased ED operational efficiency. Innovations in services, such as telemedicine, show great potential for application in other emergency situations in the future. Investing in new and innovative health technologies will ensure that EDs are prepared to face various health challenges in the future (Chandra & Cheek, 2001; Mukherjee & Walley, 2022).

Theme 7: Intersectoral Collaboration

Collaboration between various sectors, including the government, hospitals, and the community, was crucial in facing the pandemic. Participants reported that good collaboration helped overcome logistical and resource challenges and enhanced overall response effectiveness. This study supports findings that cross-sector coordination is essential for ensuring quick and effective responses to disasters (K. J. Lee et al., 2023).

Experiences from the COVID-19 pandemic demonstrate that strong cross-sector collaboration can enhance ED preparedness and response to future crises. Cooperation with various stakeholders ensures that each party has clear roles and responsibilities, which in turn strengthens the overall health system. Investing in strengthening cross-sector collaboration will enhance preparedness and response to future disasters (Eneh et al., 2024).

Theme 8: Learning and Recommendations

From their experiences during the pandemic, participants provided several recommendations to improve future ED preparedness. Developing more flexible and adaptive protocols, enhancing training and simulations, and investing in health

technology were considered crucial. This study emphasizes that developing dynamic and adaptive protocols will ensure better preparedness for unexpected emergency situations (Tang et al., 2014).

Additionally, investing in innovative health technology is crucial for improving future responses. Technologies such as telemedicine can help reduce the burden on EDs and ensure that patients receive fast and efficient care. These recommendations are expected to help improve ED preparedness and response to future disasters and outbreaks, building a more resilient health system ready to face various challenges (Fix & Serper, 2020; Fu et al., 2021; Gopinathan et al., 2022; Saleem et al., 2020).

CONCLUSION

The study underscores the critical importance of flexible protocols, continuous training, effective communication, and robust logistical support in enhancing the preparedness and response of Emergency Department (ED) medical personnel during the COVID-19 pandemic. Key challenges included PPE shortages and heightened stress among healthcare workers, highlighting the necessity for better procurement strategies and comprehensive psychological support. Innovations such as telemedicine significantly improved efficiency and safety, while strong intersectoral collaboration proved essential for effective crisis management. Lessons learned emphasize the need for adaptive protocols, ongoing training, investment in health technology, and mental health support to build a resilient healthcare system capable of facing future disasters and outbreaks.

Implications of the Research:

The findings offer valuable insights for hospital administrators, policymakers, and emergency response planners. Strengthening ED preparedness requires not only physical resources but also systemic changes in communication strategies, intersectoral coordination, and psychosocial support mechanisms. Institutions can use this study as a basis to revise emergency protocols, enhance simulation-based training, and integrate digital health technologies into daily operations.

Limitations:

This study is limited by its focus on a single geographic area (Yogyakarta, Indonesia), which may not fully represent the experiences of ED personnel in other regions or healthcare systems. Additionally, the reliance on self-reported experiences may introduce subjective bias, although member checking was conducted to enhance credibility.

Future Research Opportunities:

Further research can explore comparative studies across different regions or countries to identify context-specific and universal challenges in ED preparedness. Quantitative studies could also be employed to measure the effectiveness of specific interventions,

such as telemedicine implementation or psychological support programs, in improving response outcomes during health crises.

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REFERENCES

Aléx Jonas, Lundin Helena, Joansson Charlotta, & Saveman Britt-Inger. (2017). Preparedness of Swedish EMS Personnel for Major Incidents in Underground Mines. J. of Health Science, 5(5), 239–243. https://doi.org/10.17265/2328-7136/2017.05.004

Alhadedy, N. H., & Gabr, H. S. (2022). Home design features post-COVID-19. Journal of Engineering and Applied Science, 69(1), 87. https://doi.org/10.1186/s44147-022-00142-z

Ayati, N., Saiyarsarai, P., & Nikfar, S. (2020). Short and long term impacts of COVID-19 on the pharmaceutical sector. DARU Journal of Pharmaceutical Sciences, 28(2), 799–805. https://doi.org/10.1007/s40199-020-00358-5

Baughman, A. W., Hirschberg, R. E., Lucas, L. J., Suarez, E. D., Stockmann, D., Hutton Johnson, S., Hutter, M. M., Murphy, D. J., Marsh, R. H., Thompson, R. W., Boland, G. W., Ives Erickson, J., & Palamara, K. (2020). Pandemic Care Through Collaboration: Lessons From a COVID-19 Field Hospital. Journal of the American Medical Directors Association, 21(11), 1563–1567. https://doi.org/10.1016/j.jamda.2020.09.003

Bongers, C. C., de Korte, J. Q., Catoire, M., Greefhorst, J., Hopman, M. T. E., Kingma, B., & Eijsvogels, T. M. H. (2021). Infographic. Cooling strategies to attenuate PPE-induced heat strain during the COVID-19 pandemic. British Journal of Sports Medicine, 55(1), 69–70. https://doi.org/10.1136/bjsports-2020-102528

Bressan, S., Buonsenso, D., Farrugia, R., Parri, N., Oostenbrink, R., Titomanlio, L., Roland, D., Nijman, R. G., Maconochie, I., Da Dalt, L., Mintegi, S., Hachimi-Idrissi, S., Sjølin Frederiksen, M., Uustalu, U., Cheron, G., Hoffmann, F., Thors, V., Barrett, M. J., Shavit, I., ... Lacroix, L. (2020). Preparedness and Response to Pediatric

COVID-19 in European Emergency Departments: A Survey of the REPEM and PERUKI Networks. Annals of Emergency Medicine, 76(6), 788–800. https://doi.org/10.1016/j.annemergmed.2020.05.018

Burkle, F. M. (2006). Population-based Triage Management in Response to Surge-capacity Requirements during a Large-scale Bioevent Disaster. Academic Emergency Medicine, 13(11), 1118–1129. https://doi.org/10.1197/j.aem.2006.06.040

Carr, B. G., Holland, T., Cogdell, M., & Margolis, G. (2017). The US Emergency Care Coordination Center. Annals of Emergency Medicine, 69(6), 698–704. https://doi.org/10.1016/j.annemergmed.2017.01.035

Cernuda Martínez, J. A., Castro Delgado, R., & Arcos González, P. (2020). Primary Health Care Pediatricians' Self-Perception of Theoretical Knowledge and Practical Skills in Life-Threatening Emergencies: A Cross-Sectional Study. Prehospital and Disaster Medicine, 35(2), 152–159. https://doi.org/DOI: 10.1017/S1049023X20000114

Chandra, A., & Cheek, R. G. (2001). The Emerging International Health Care Market: The Impact of Technology and Innovation. Journal of Health Management, 3(1), 43–63. https://doi.org/10.1177/097206340100300103

Chou, W., Shih, F., Cheng, M., & Huang, C. (2022). Managing Conventional Mass Casualty Incident during the COVID-19 Pandemic: Lessons Learned and Suggestions. Emergency Medicine Investigations, 7(1), 1–4. https://doi.org/10.29011/2475-5605.010120

de Korte, J. Q., Bongers, C. C. W. G., Catoire, M., Kingma, B. R. M., & Eijsvogels, T. M. H. (2022). Cooling vests alleviate perceptual heat strain perceived by COVID-19 nurses. Temperature, 9(1), 103–113. https://doi.org/10.1080/23328940.2020.1868386

Deng, J.-F., Olowokure, B., Kaydos-Daniels, S. C., Chang, H.-J., Barwick, R. S., Lee, M.-L., Deng, C.-Y., Factor, S. H., Chiang, C.-E., Maloney, S. A., & The SARS International Field Team. (2006). Severe acute respiratory syndrome (SARS): Knowledge, attitudes, practices and sources of information among physicians answering a SARS fever hotline service. Public Health, 120(1), 15–19. https://doi.org/https://doi.org/10.1016/j.puhe.2005.10.001

Eneh, N. E., Bakare, S. S., & Akpuokwe, C. U. (2024). Cross-jurisdictional disaster preparedness : A Nigeria-USA data-analytical approach.

Fan, R., Wang, Y., & Lin, J. (2021). Study on multi-agent evolutionary game of emergency management of public health emergencies based on dynamic rewards and punishments. International Journal of Environmental Research and Public Health, 18(16). https://doi.org/10.3390/ijerph18168278

Fix, O. K., & Serper, M. (2020). Telemedicine and Telehepatology During the COVID-19 Pandemic. Clinical Liver Disease, 15(5).

https://journals.lww.com/cld/fulltext/2020/05000/telemedicine_and_telehepatology_during_the.5.aspx

Fu, M., Han, D., Xu, M., Mao, C., & Wang, D. (2021). The psychological impact of anxiety and depression on chinese medical staff during the outbreak of the covid-19 pandemic: A cross-sectional study. Annals of Palliative Medicine, 10(7), 7759–7774. https://doi.org/10.21037/apm-21-1261

Gasser, U., Ienca, M., Scheibner, J., Sleigh, J., & Vayena, E. (2020). Digital tools against COVID-19: taxonomy, ethical challenges, and navigation aid. The Lancet Digital Health, 2(8), e425–e434. https://doi.org/10.1016/S2589-7500(20)30137-0

Gharaveis, A., Hamilton, D. K., Pati, D., & Shepley, M. (2018). The Impact of Visibility on Teamwork, Collaborative Communication, and Security in Emergency Departments: An Exploratory Study. HERD: Health Environments Research & Design Journal, 11(4), 37–49. https://doi.org/10.1177/1937586717735290

Gopinathan, V., Kunju, S. A., Krishnan S, V., Sirur, F. M., & Balakrishnan, J. M. (2022). Assessment of the Preparedness and Planning of Academic Emergency Departments in India During the COVID-19 Pandemic: A Multicentric Survey. Disaster Medicine and Public Health Preparedness, 16(5), 1910–1915. https://doi.org/DOI: 10.1017/dmp.2021.73

Gregory, M. E., Rosenthal, S. W., Hysong, S. J., Anderson, J., Woodard, L., Naik, A. D., & Godwin, K. M. (2020). Examining changes in interprofessional attitudes associated with virtual interprofessional training. Journal of Interprofessional Care, 34(1), 124–127. https://doi.org/10.1080/13561820.2019.1637335

Haldane, V., Jung, A. S., De Foo, C., Bonk, M., Jamieson, M., Wu, S., Verma, M., Abdalla, S. M., Singh, S., Nordström, A., & Legido-Quigley, H. (2021). Strengthening the basics: Public health responses to prevent the next pandemic. The BMJ, 375(fig 1), 1–4. https://doi.org/10.1136/bmj-2021-067510

Hanvoravongchai, P., Adisasmito, W., Chau, P. N., Conseil, A., de Sa, J., Krumkamp, R., Mounier-Jack, S., Phommasack, B., Putthasri, W., Shih, C.-S., Touch, S., Coker, R., & project, for the A. (2010). Pandemic influenza preparedness and health systems challenges in Asia: results from rapid analyses in 6 Asian countries. BMC Public Health, 10(1), 322. https://doi.org/10.1186/1471-2458-10-322

Harapan, B. N., Harapan, T., Theodora, L., & Anantama, N. A. (2023). From Archipelago to Pandemic Battleground: Unveiling Indonesia's COVID-19 Crisis. Journal of Epidemiology and Global Health, 13(4), 591–603. https://doi.org/10.1007/s44197-023-00148-7

Hijazi, J., & Attiah, D. (2021). Saudi residences' adaptability: How employees worked from home during covid-19 lockdowns. Civil Engineering and Architecture, 9(3), 915–931. https://doi.org/10.13189/CEA.2021.090334

Honda, A., Tamura, T., Baba, H., Kodoi, H., & Noda, S. (2022). How should support for hospital staff during health shocks be improved? A discussion from Japan's experience during the COVID-19 pandemic. Global Health & Medicine, 4(5), 285–288. https://doi.org/10.35772/ghm.2022.01020

Hughes, A. M., Gregory, M. E., Joseph, D. L., Sonesh, S. C., Marlow, S. L., Lacerenza, C. N., Benishek, L. E., King, H. B., & Salas, E. (2016). Saving lives: A meta-analysis of team training in healthcare. In Journal of Applied Psychology (Vol. 101, Issue 9, pp. 1266–1304). American Psychological Association. https://doi.org/10.1037/apl0000120

Kampf, G., Todt, D., Pfaender, S., & Steinmann, E. (2020). Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. Journal of Hospital Infection, 104(3), 246–251. https://doi.org/10.1016/j.jhin.2020.01.022

Kapoor, K. and. (2020). Covid-19 related deaths among doctors in India. September. https://doi.org/https://doi.org/10.1101/2020.09.28.20202796

Lee, D. W. (2019). Local government's disaster management capacity and disaster resilience. Local Government Studies, 45(6), 803–826. https://doi.org/10.1080/03003930.2019.1653284

Lee, K. J., Malinen, S. K., & Nilakant, V. (2023). The dynamics of cross-sector collaboration in disasters. Disaster Prevention and Management: An International Journal, 32(2), 337–351. https://doi.org/10.1108/DPM-09-2022-0184

Leinhos, M., Qari, S. H., & Williams-Johnson, M. (2014). Preparedness and Emergency Response Research Centers: Using a Public Health Systems Approach to Improve All-Hazards Preparedness and Response. Public Health Reports®, 129(6_suppl4), 8–18. https://doi.org/10.1177/00333549141296S403

Love, J. S., Karp, D., Delgado, M. K., Margolis, G., Wiebe, D. J., & Carr, B. G. (2016). National Differences in Regional Emergency Department Boarding Times: Are US Emergency Departments Prepared for a Public Health Emergency? Disaster Medicine and Public Health Preparedness, 10(4), 576–582. https://doi.org/DOI: 10.1017/dmp.2015.184

Mukherjee, K., & Walley, T. (2022). Assessing the value of healthcare innovations: a proposal for an integrated health technology assessment–responsible innovation in health approach in the "new normal." International Journal of Technology Assessment in Health Care, 38(1), e47. https://doi.org/DOI: 10.1017/S0266462322000319

Park, S., Hamadi, H. Y., Nguyen, A. T., Tran, V., Haley, D. R., & Zhao, M. (2021). Examining the Relationship Between Hospital-Community Partnerships and COVID-19 Case-Fatality Rates. Population Health Management, 25(1), 134–140. https://doi.org/10.1089/pop.2021.0136

Patients, L., Taylor, D., Lindsay, A. C., & Halcox, J. P. (2020). c or r e sp ondence Niacin Compared with Ezetimibe. The New England Journal of Medicine, 0–3.

Popov, O., Iatsyshyn, A., Molitor, N., Iatsyshyn, A., Romanenko, Y., Deinega, I., Sharov, P., & Mnayarji, G. (2021). Human factor in emergency occurrence at NPP during the pandemic COVID-19: new potential risks and recommendations to minimize them. E3S Web of Conferences, 280. https://doi.org/10.1051/e3sconf/202128009013

Pun, J. K. H., Matthiessen, C. M. I. M., Murray, K. A., & Slade, D. (2015). Factors affecting communication in emergency departments: doctors and nurses' perceptions of communication in a trilingual ED in Hong Kong. International Journal of Emergency Medicine, 8(1), 48. https://doi.org/10.1186/s12245-015-0095-y

Ramdani, W. F., Alim, S., & Hapsari, E. D. (2023). Guardians of Safety: Indonesian Nurses and COVID-19 PPE Practices. Journal of Radiology Nursing, 42(4), 515–520. https://doi.org/10.1016/j.jradnu.2023.09.007

Risavi, B. L., Salen, P. N., Heller, M. B., & Arcona, S. (2001). A T WO - HOUR I NTERVENTION U SING START I MPROVES P REHOSPITAL T RIAGE OF M ASS C ASUALTY I NCIDENTS. Prehospital Emergency Care, 5(2), 197–199. https://doi.org/10.1080/10903120190940128

Rubashkin, M., Purzycki, T., Coolahan, K., Lee, C., Lurie, D. J., Batorsky, B., Chen, A., Calderón, J., & He, S. (2023). PPE needs in the United States during the COVID-19 pandemic: An analysis using the GetUsPPE online platform. Public Health Challenges, 2(1), 1–8. https://doi.org/10.1002/puh2.65

Sakr, C. J., Assaf, S. A., Fakih, L., Dakroub, S., Rahme, D., Musharrafieh, U., Khater, B., Naous, J., Romani, M., Tannous, J., Zahreddine, N., Fakhreddine, M., Itani, M., Zalaquett, N., & Honein, G. (2024). Hospitals' Collaborations Strengthen Pandemic Preparedness: Lessons Learnt from COVID-19. Healthcare (Switzerland), 12(3), 1–19. https://doi.org/10.3390/healthcare12030321

Saleem, S. M., Pasquale, L. R., Sidoti, P. A., & Tsai, J. C. (2020). Virtual Ophthalmology: Telemedicine in a COVID-19 Era. American Journal of Ophthalmology, 216, 237–242. https://doi.org/10.1016/j.ajo.2020.04.029

Shrestha, N., Mishra, S. R., Ghimire, S., Gyawali, B., Marahatta, S. B., Maskey, S., Baral, S., Shrestha, N., Yadav, R., Pokharel, S., & Adhikari, B. (2022). Health System Preparedness for COVID-19 and Its Impacts on Frontline Health-Care Workers in Nepal: A Qualitative Study Among Frontline Health-Care Workers and Policy-Makers. Disaster Medicine and Public Health Preparedness, 16(6), 2560–2568. https://doi.org/DOI: 10.1017/dmp.2021.204

Tang, R., Fitzgerald, G., Hou, X.-Y., & Wu, Y.-P. (2014). Building an Evaluation Instrument for China's Hospital Emergency Preparedness: A Systematic Review of Preparedness Instruments. Disaster Medicine and Public Health Preparedness, 8(1), 101–109. https://doi.org/DOI: 10.1017/dmp.2014.10

Tjahjono, B., Suryono, A., Riyanto, & Amin, F. (2021). Collaborative Governance Response to COVID-19 Pandemic in Indonesia. Proceedings of the 12th Annual Scientific Meeting, Medical Faculty, Universitas Jenderal Achmad Yani, International Symposium on "Emergency Preparedness and Disaster Response during COVID 19 Pandemic" (ASMC 2021), 37 (Asmc), 132–136. https://doi.org/10.2991/ahsr.k.210723.033

Witczak-Błoszyk, K., Krysińska, K., Andriessen, K., Stańdo, J., & Czabański, A. (2022). Work-Related Suicide Exposure, Occupational Burnout, and Coping in Emergency Medical Services Personnel in Poland. International Journal of Environmental Research and Public Health, 19(3). https://doi.org/10.3390/ijerph19031156

Wojtysiak, K., & Zielińska-Więczkowska, H. (2022). Work in stressful conditions in medical emergency system during the COVID-19 pandemic. Medycyna Pracy. Workers' Health and Safety, 73(3), 241–250. https://doi.org/10.13075/mp.5893.01178

Zhang, X., Zhao, K., Zhang, G., Feng, R., Chen, J., Xu, D., Liu, X., Ngoubene-Atioky, A. J., Huang, H., Liu, Y., Chen, L., & Wang, W. (2020). Occupational Stress and Mental Health: A Comparison Between Frontline Medical Staff and Non-frontline Medical Staff During the 2019 Novel Coronavirus Disease Outbreak. Frontiers in Psychiatry, 11(December), 1–9. https://doi.org/10.3389/fpsyt.2020.555703