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Impact of hospital readiness on patient safety incidents during the COVID-19 pandemic in Indonesia: health worker perceptions

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ABSTRACT
Objectives This study examined the impact of hospital readiness on patient safety from the healthcare workers’ perspective.

Design The study employed a mixed-methods explanatory sequential design, with the quantitative phase taking precedence. We conducted an online survey of 235 healthcare workers at COVID-19 referral hospitals, followed by an interview with 11 participants from various hospital types.

Setting COVID-19 referral hospitals in Indonesia.

Participants Health workers working at COVID-19 referral hospitals.

Measures Hospital ownership; hospital accreditation status; hospital readiness including incident management system, surge capacity, infection control and prevention, and human resource management; patient safety incident.

Results According to the survey, 66.4% of the participants worked at a hospital owned by the provincial or district government, and 69.4% worked at a hospital which had received an excellent status accreditation. More than 80% of the hospitals scored well in the categories of the incident management system (86%), surge capacity (80.9%), infection control and prevention (97.9%), and human resource management (84.7%). However, only 50.6% of the hospitals scored well in managing patient safety incidents. Hospital ownership, accreditation status and hospital readiness all have an impact on patient safety incidents, which were reported in all types of hospitals by both studies.

Conclusions This study provides significant results for Indonesia in terms of hospital preparedness and patient safety for the COVID-19 pandemic. The accreditation and ownership status of the hospital have aided hospital readiness. Despite the fact that no hospital in the world was prepared for the COVID-19 pandemic, hospital readiness has improved a year later; however, patient safety has not improved. Patient safety incidents occurred regardless of hospital status, with the most common occurrence being delayed treatment. Administrative errors were also recorded in COVID-19 field hospitals that were not accredited. Future research should focus on improving pandemic care quality and implementing initiatives that are applicable to all types of hospitals.

STRENGTHS AND LIMITATIONS OF THIS STUDY
⇒ This was the first mixed-methods study in Indonesia to investigate the impact of hospital readiness on patient safety during the COVID-19 pandemic.
⇒ Due to the nature of the pandemic, we were unable to obtain a sufficient and representative sample size.
⇒ Because the questionnaire was self-reported and we only interviewed a small number of people, self-selection bias may have occurred.
⇒ We had small number of interview participants, each hospital’s accreditation status and ownership could not be represented.

INTRODUCTION
COVID-19, caused by the SARS-CoV2 virus, is a highly contagious respiratory disease that spreads easily through contact, droplets and airborne transmission.1 Given that the primary transmission mode is through droplets, the viral load becomes massive. As a result, the number of cases rapidly increased as COVID-19 spread around the world. In Indonesia, the new virus was first detected in March 2020 and has since spread rapidly.2 As of 15 December 2021, the Indonesian government reported 4 259 644 confirmed COVID-19 cases, 143 969 deaths and 4 110 811 recovered cases from 510 districts across 34 provinces.3

The severity of the disease in those infected has overwhelmed healthcare systems and front-line healthcare providers and depleted resources, revealing how ill equipped the world was to deal with this pandemic. However, a number of regions have successfully mitigated the pandemic, including South Korea, Vietnam, Australia, Hong Kong and New Zealand.4 Although Indonesia has striven to tackle the pandemic, its authorities’ slow initial response to the pandemic caused avoidable delays in COVID-19 control and prevention efforts, a situation that was
exacerbated by the lack of government enforcement of mobility restrictions, with most restrictions being implemented with the use of confusing jargon.

The Indonesian government designated 835 hospitals as referral centres for COVID-19 treatment, including the Ministry of Health’s national referral hospitals and the governor’s 703 provincial/regency/city referral hospitals. Given that hospitals need to be ready to respond to emergencies, its design must account for disaster readiness and disaster preparedness must be incorporated into the hospital’s service system. Hospitals need to establish a disaster-related information network, conduct simulations and monitor the effects of disasters on patients served by the hospital.

The current crisis has impacted all elements of the healthcare system. Healthcare workers are tired, afraid, and anxious and lack the necessary psychological support and medical equipment, particularly personal protective equipment (PPE), to manage such patients. This situation negatively affects decision making, accuracy, vigilance and information exchange, which has the potential to result in negative patient safety outcomes. According to recent data from hospitals worldwide, 1 of every 10 hospitalised patients received insufficient care, resulting in potential adverse events. Each year, 134 million adverse events occur in low-income and middle-income countries as a result of unsafe treatment and are responsible for more than 2.6 million deaths, with 80% of adverse events being avoidable. Diagnostic delays, prescription errors and drug-use errors all contribute to the occurrence of these adverse events.

In contrast, reports on patient safety incidents have shown a decreasing incidence of such events during the pandemic. The UK National Pharmacy Association reported a 14% decrease in the incidence of medication errors in the first quarter of 2020 compared with the same quarter the previous year. This decrease in the incidence could be attributed to healthcare workers’ inability to submit reports due to the surge in capacity overload, changes in error perception as a result of the pandemic situation or the result of workflow changes. A decrease in patient safety also indicates a loss of opportunity to generate learning for anticipating similar incidents in the midst of this uncertain pandemic situation.

Even before the pandemic, healthcare providers in Indonesia had challenges implementing patient safety initiatives. The healthcare system is fragmented since the Ministry of Health operated most tertiary hospitals and a few specialised hospitals, while the regional and district governments ran public hospitals. District health offices (DHOs) oversaw both the public and private sectors. A study identified numerous macrolevel, mesolevel and microlevel issues regarding patient safety and patient safety incident reporting, including inadequate government monitoring and assessment, DHOs and the provincial health office not being involved in incident reporting, a lack of government funding for hospitals, a lack of commitment and priority for patient safety, and a lack of systematic partnership and collaboration between patient safety agencies and DHOs or the provincial health office. Despite identical ownership and accreditation status, the authors discovered disparities in implementation of patient safety projects and activities.

The quality and safety of hospital drug prescriptions is also a major concern. A study in Indonesia discovered 1563 medication errors among the 7662 prescriptions reviewed, representing an error rate of 20.4%. Information on the impact of hospital readiness for patient safety during the pandemic is still limited, emphasising the need to investigate these factors. Healthcare facilities across Indonesia should prepare to implement measures for an efficient hospital-wide approach to managing the impending surge in COVID-19 hospitalised patients.

**METHODS**

**Research design**

To examine the impact of hospital readiness on patient safety from the perspective of healthcare workers, we employed a mixed-methods explanatory sequential design for this study. We chose this design because it is relevant for this research topic and provides comprehensive findings that elicit needed interventions. The quantitative phase was the dominant phase, while the interview supplemented the quantitative findings. The study population consisted of 940 COVID-19 referral hospitals’ health workers. The primary study included an online survey of 235 healthcare workers, followed by a qualitative phase in which 11 healthcare workers were interviewed to learn about their perceptions of hospital readiness and its impact on patient safety.

**Sampling and data collection**

**Quantitative phase**

This research was conducted between November and December 2020, using the WHO Hospital Readiness Checklist for COVID-19. The survey was developed based on previous research (a full copy of the survey can be found in online supplemental file 1). We used an online survey approach because it was the most appropriate method given the pandemic. The survey was distributed online via social media platforms such as Facebook, Instagram and WhatsApp and was also distributed to a number of hospital administrators and later disseminated via a WhatsApp group. The survey was completed by 235 healthcare workers.

**Qualitative phase**

In the first section of the questionnaire, we asked participants if they were ‘willing to participate in the follow-up interview.’ They were asked to provide their email address if they agreed to participate. We used that information to invite 23 participants selected at random (10% of the total number of survey participants) to a follow-up interview. The invitations were distributed via email and WhatsApp messages. Thirteen people responded to the
invitation; eight interviews were conducted via the Zoom application, one over the phone per the participant’s preference, two participants sent written responses and two people did not attend the Zoom meeting. The interviews lasted 15–45 min and were audiorecorded, transcribed and coded for the data analysis. We anonymised all personal and hospital information and assigned initials to the interviewed participants.

**Instruments**

**Quantitative phase**

The questionnaire included 45 questions divided into 3 categories: hospital details, hospital readiness (incident management system, surge capacity, infection prevention, and human resources management) and patient safety incidents. The options for each question in the ‘hospital readiness’ and ‘patient safety incidents’ categories were ‘yes’ (3 points), ‘no’ (2 points) and ‘don’t know’ (1 point). We did not collect the participants’ demographic information because we focused on hospital details.

The questionnaire was tested on a small group of healthcare workers in a hospital in Surabaya. The instrument passed the validity and reliability tests using Cronbach’s alpha and had good internal consistency, with a Cronbach’s alpha of 0.929–0.933. The participation in the survey was deemed to be implied consent.

**Qualitative phase**

During the qualitative phase, the participants were asked to respond to four questions regarding hospital readiness, patient safety incidents and recommendations for improving the hospital’s current situation. The interview questions are included in online supplemental file 2. We used semistructured questions because they allowed the interviewer to ask for additional explanation or clarification, as well as to explore and discuss various topics identified by the participants. All interview participants provided written consent.

**Data analysis and synthesis**

**Quantitative phase**

We used IBM SPSS AMOS for the statistical analysis and presented the hospital variables using descriptive statistics. We calculated the total scores for all questions and classified each variable as poor, average, or good to determine the level of hospital readiness and confirmatory factor analysis (CFA) was used to calculate the final score. The stages of the data analysis were (1) a CFA to form a latent variable (hospital readiness) (figure 1) given that hospital readiness consists of four variables (incident management system, surge capacity, infection prevention and control, and human resources) and (2) we used a path analysis to test the hypothesis whether hospital ownership and accreditation affect hospital readiness for COVID-19 and patient safety incidents. A path analysis is a type of structural equation modelling that measures the relationship between observed measurements or indicators and latent variables or factors.18 Last stage was to test whether the equation modelling considered appropriate for this study.

**Qualitative phase**

The interviews were transcribed, coded and categorised using NVivo V.12, a software application that aids researchers in searching for patterns in codes and identifies and visualises the links between codes across a variety of data sets.19 We used a thematic analysis approach that included familiarisation with the data, generation of initial codes, identification of themes, definition and naming of themes, and writing the data analysis section of the manuscript.20

The discussion included integrating and interpreting both phases in determining whether the findings were similar and consistent, whether the data broadened the understanding, and whether the results were inconsistent.21

**Figure 1** Standardised coefficient of hospital readiness. **P<0.001.**
Standardised reporting guidelines
We used the Good Reporting of a Mixed Methods Study\textsuperscript{22} to report the quality of mixed-methods study for health services research.

Patient and public involvement
This study did not include patients as participant.

RESULTS
Quantitative phase
We calculated descriptive statistics for each item based on the questionnaires. Table 1 shows the distribution of the participants based on hospital ownership, accreditation status and COVID-19-related services.

Approximately 66.4\% of the participants worked in provincial or district government-owned hospitals, 69.4\% worked in hospitals with excellent accreditation status and 69\% worked in medium-sized hospitals with 100–200 beds. In addition, 54\% of the hospitals had more than 10 ICU beds set aside for COVID-19 patients. Most of the participants (88.1\%) are currently or have previously worked in COVID-19-related units. The number of COVID-19 patients treated ranged from fewer than 5 to more than 10.

The hospital’s readiness was assessed using four criteria: incident management system, surge capacity, infection control and prevention, and human resource management. More than 80\% of the hospitals scored well in the categories of the incident management system (86\%), surge capacity (80.9\%), infection control and prevention (97.9\%), and human resource management (84.7\%). However, only 50.6\% of the hospitals scored well in terms of patient safety incidents.

Concerning the CFA results, hospital readiness for COVID-19 has been deemed a latent variable formed by observed variables (patient safety incidents, human resources, infection prevention, surge capacity and management system). The results of testing the empirical model’s null hypothesis in the population were the same as the estimation model (figure 1); the result was a p<0.095, or to accept the null hypothesis, which means that the empirical model stated that the observed variable as estimated compiled the patient’s hospital readiness safety (figure 1). The value of the loading factor coefficient will result in a linear combination of hospital readiness and its constituent variables. Figures 2 and 3 show the results of the path analysis of the factors influencing patient safety. A linear combination of hospital readiness and its constituent variables resulted in hospital readiness (figure 1). Model 2 was a better-fitting model with a pattern of relationships between the variables of influence (figure 3). Patient safety incidents are directly affected by hospital ownership, accreditation status and hospital readiness (p=0.05). With the fitness shown in table 2, model 2 was better suited than model 1. When viewed through the cut-off value for the model fit, all

| Variables | n (%) |
|-----------|-------|
| Hospital details | |
| Hospital ownership | |
| Government (provincial or district) | 156 (66.4) |
| Private | 50 (21.3) |
| University | 12 (5.1) |
| Social/religion-based organisation | 1 (0.4) |
| Military managed | 11 (4.7) |
| Ministry of Health | 1 (0.4) |
| Others | 4 (1.7) |
| Total | 235 (100) |
| Hospital accreditation status | |
| Not yet accredited | 9 (3.8) |
| Prime (Perdana) | 25 (10.6) |
| Basic (Dasar) | 6 (2.6) |
| Middle (Madya) | 18 (7.7) |
| Prime (Utama) | 14 (6.0) |
| Excellent (Paripurna) | 163 (69.4) |
| Total | 235 (100) |
| Hospital bed | |
| Less than 100 | 28 (11.9) |
| 100–200 | 143 (60.9) |
| More than 200 | 63 (26.8) |
| Hospital ICU bed allocated for COVID-19 patients | |
| Less than 10 | 108 (46.0) |
| More than 10 | 127 (54.0) |
| Working in COVID-19-related unit | |
| Yes | 207 (88.1) |
| No | 17 (7.2) |
| Average no of COVID-19 patients treated in a day | |
| Less than 5 people | 59 (25.1) |
| 5–10 people | 71 (30.2) |
| More than 10 people | 89 (37.9) |
| Missing | 16 (6.8) |
| Hospital readiness | |
| Incident management system | |
| Poor | 5 (2.1) |
| Average | 28 (11.9) |
| Good | 202 (86) |
| Surge capacity | |
| Poor | 4 (1.7) |
| Average | 41 (17.4) |
| Good | 190 (80.9) |
| Infection control and prevention | |
| Poor | 5 (2.1) |
| Good | 230 (97.9) |
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indicators in **Table 2** showed that model 2 was more fit than model 1.

**Qualitative phase**

The qualitative phase intended to explore the impact of hospital ownership and accreditation status, hospital readiness and patient safety. Of the 11 interviewed participants, 7 (64%) worked at hospitals with excellent accreditation status, 2 (18%) worked at COVID-19 temporary hospitals that had not yet been accredited, 1 (9%) worked at a first-time accredited hospital, and one (9%) worked at a hospital with prime-accreditation status. Online supplemental file 3 contains information about the participants. We further examined the results in the qualitative analysis because the CFA confirmed the significant impact of hospital ownership, accreditation status and hospital readiness on patient safety.

**Hospital readiness**

An incident management system is a healthcare facility’s ability to operate during an emergency event by activating a comprehensive set of protocols to resume normal operations. This system was critical at the start of the pandemic, given that hospitals experienced a shortage of healthcare personnel. The majority of participants stated that their hospitals had reconciled the hospital service flow, improved their infrastructure, performed screening in the emergency department, created zoning areas and cohorted COVID-19 patients. Each hospital had a unique approach for managing human resources during the pandemic. For example, the district government hospital, which received accreditation for the first time indicated that the hospital employed medical, nursing and midwifery apprentices to manage the surge. Other hospitals recruited volunteers from the Nusantara Sehat Team-based Deployment Programme, a programme by the Ministry of Health. Healthcare personnel in temporary COVID-19 hospitals in Jakarta and Surabaya were hired by the Ministry of Health or dispatched by organisations such as state-owned enterprises and the Indonesian police.

Typically, the healthcare workers treated either COVID-19 patients or non-COVID-19 patients. In a number of hospitals, however, the healthcare workers treated all types of patients, and therefore, had specific schedules. In terms of training, most of the hospitals either provided adequate pandemic preparedness training or sent DHO healthcare worker training to major cities throughout the regions for training. The training lasted anywhere from 3 days to 2 weeks. Participants in only one privately owned, prime-accreditation hospital reported that no training was provided to healthcare workers during the pandemic; however, the hospital established standard operating procedures and expected the healthcare workers to learn and understand these procedures.

Most of the hospitals have an effective infection prevention and control programme; however, the availability and quality of PPE has become a major issue in certain hospitals, particularly in the early stages of the pandemic. For the district government hospital that received accreditation for the first time reported using three-layer fabric masks and raincoats as a substitute for PPE. The hospitals with an excellent status have used various techniques.

**Table 1 Continued**

| Variables                      | n (%) |
|--------------------------------|-------|
| Human resources management    |       |
| Poor                          | 5 (2.1) |
| Average                       | 31 (13.2) |
| Good                          | 199 (84.7) |
| Patient safety incident       |       |
| Poor                          | 12 (5.1) |
| Average                       | 119 (50.6) |
| Good                          | 104 (44.3) |

ICU, Intensive Care Unit.

**Figure 2** Standardised coefficient of patient safety in path analysis model (1).
to increase PPE utilisation. For example, a shift might be divided into two periods, with healthcare workers required to wear full PPE during only one of those periods. In another hospital, healthcare workers wore PPE only when visiting patients in isolation rooms. The workers spent most of their time at the nurse station, where they monitored the patients’ condition via closed-circuit television.

Surge management techniques have been implemented in a number of hospitals. The key activities included the addition of facilities such as isolation rooms, COVID-19 emergency rooms, COVID-19 intensive care unit (ICUs) and ventilators. The hospitals use a variety of methods, including recruitment of new healthcare personnel, volunteers, new graduates and staff on loan from other hospitals.

**Patient safety incidents**

The participants were asked to categorise the most commonly observed events during the pandemic and to explain the various types of incidents, including administrative errors, delayed referrals, delayed treatment, medication errors, misdiagnoses and incorrect identification. Delayed treatment was more easily identified than other incidents. The participants indicated that numerous administrative errors had been made by field hospitals and temporary hospitals and several hospitals had delayed treatment. The participants’ comments are listed in the code book (see online supplemental file 4).

**DISCUSSION**

The study’s findings provide important insights into the significant impact of hospital ownership, accreditation status and hospital readiness on patient safety incidents. Previous research has found that hospital ownership has a direct impact on the ability to focus on strategic goals such as major hospital improvements, financial expenditures and management decisions such as the proper use of human resources and the conduct of clinical and non-clinical processes,

![Image](https://example.com/image.png)

**Figure 3** Standardised coefficient of patient safety in the path analysis model (2). ***P<0.001.

### Table 2  Goodness of fit index model

| Goodness of fit index | Value (Model 1) | Value (Model 2) | Cut-off value[^a] |
|-----------------------|-----------------|-----------------|-------------------|
| χ²                    | 16.720          | 0.000           | Less than chi-square critical value (chi-square table) ≤5.991 |
| P value               | 0.000           | 1.000           | ≥0.05             |
| RMSEA                 | 0.177           | 0.125           | ≤0.08             |
| GFI                   | 0.967           | 1.000           | ≥0.90             |
| AGFI                  | 0.833           | NA              | ≥0.90             |
| χ²/df                 | 8.360           | NA              | ≥2.00             |
| AIC                   | 32.720          | 20.000          | The lowest is better |
| BIC                   | 60.396          | 54.596          | The lowest is better |

[^a]: AGFI, Adjusted Goodness of Fit Index; AIC, Akaike’s information criterion; BIC, Bayesian information criterion; GFI, Goodness of Fit Index; NA, not available; RMSEA, root mean square error.
Another example was the military-run temporary hospital, where volunteers from the Nusantara Sehat Team-based Deployment Programme have been deployed. Their concerns included the need for standardised training for all healthcare workers. A study conducted in the first month of the pandemic discovered a lack of COVID-19-related training for healthcare workers in Indonesia.  

Through the Board for Development and Empowerment of Human Resources in Health, the Ministry of Health subsequently held several virtual training sessions for volunteers to be deployed in COVID-19 temporary hospitals across Indonesia.  

The DOH at the regional and district level also provided healthcare workers in the regions with the necessary training, but this support was limited to primary healthcare centres, leaving many hospitals to provide training for healthcare workers and other staff on their own. However, there were differences in the training. For example, one participant from a privately owned, prime-accreditation hospital reported that no training was provided at all in the hospital, whereas training of varying duration was provided at other types of hospitals.  

Regardless of accreditation or hospital ownership, the government should encourage the implementation of formal healthcare staff training. Unfortunately, the Ministry of Health has not developed standardised training for healthcare workers, nor has it provided access to and support for standard training for all healthcare workers in Indonesian hospitals. This is a critical issue because Indonesia is an archipelago nation, and access to training is problematic because a number of hospitals are in rural or remote areas. In contrast, the Australian Ministry of Health had implemented a web-based structured healthcare worker infection management training programme for healthcare workers in all settings since the early stages of the pandemic. Establishing accelerated training pathways, defining high-impact clinical approaches for rapid training, and implementing a web-based platform are critical support steps for healthcare workers to provide efficient and safe treatment with maximum worker protection.  

During the early stages of the pandemic, Indonesia faced a shortage of PPE. Appropriate PPE for specific risk areas was required for healthcare personnel. Due to incompatibility issues, however, staff are sometimes forced to wear inappropriate PPE. As a result, the hospital has received a large number of donations for the production of PPE, such as masks, hazmat suits, gloves and face shields from community movements involving domestic workers, disabled communities, students and villagers. Many home industries have developed PPE and donated it as a gift or sold it on the market to address the PPE shortage. However, these well-intentioned acts have resulted in product standardisation issues because some PPE does not meet the WHO’s mandatory standard and yet were provided directly to healthcare personnel. There was no central or regional quality management system in place at the time to regulate the quality of PPE. As a result, the comfort of the PPE was questionable, as was the effectiveness of the PPE in preventing the spread of disease. Another problem was the delay in decision making by task force teams, which resulted in delayed PPE supply. The healthcare workers reported that non-governmental organisations and healthcare volunteer associations responded more quickly to provide PPE. These organisations have a better communication system and are more experienced in dealing with a wide range of critical issues during the COVID-19 outbreak.  

Patient safety incidents have been reported in all hospitals, regardless of accreditation and ownership. There has been an ongoing debate as to whether hospital accreditation and ownership status affects the standard of care, owing to disparities in the results of previous studies. However, this study discovered that cases of administrative error were more prevalent in field and temporary non-accredited military hospitals. Administrative errors are defined as failures to take the intended action as part of the systems and processes involved in delivering care, including errors related to records, tests, patient identification, incorrect patient discharge information and inadequate patient follow-up after diagnostic tests. These types of errors are easily prevented by implementing standard operating procedures.  

Temporary hospitals were the solution to the shortage of hospital beds, thanks to their lower cost and easier construction and management and have significantly improved the diagnosis, hospitalisation, isolation and treatment of COVID-19 patients. Protocols and procedures need to be developed quickly within the temporary hospitals as soon as they are operational. Healthcare workers and auxiliary personnel need to be trained in infection control to ensure safe, high-quality and efficient service. This study, however, revealed a lack of policies and protocols for facilitating the transfer of patients from one bed to another during their hospital stay. The study also revealed mistakes in interpreting the results of swabs, resulting in patients with negative swabs being admitted to isolation rooms, indicating a lack of processing and organisation. In response to this pandemic, Indonesian hospitals, regardless of their accreditation and ownership status, have implemented numerous changes and strengthened their incident management systems; however, their readiness is still uneven.  

The study has a number of limitations. We were unable to obtain a sufficient and representative sample size due to the pandemic condition. Despite the fact that the study’s focus was on hospital accreditation and ownership, we were unable to interview every participant for each hospital accreditation status and ownership throughout data collection, especially during the qualitative phase. Furthermore, we had a small number of interview participants, which could have resulted in self-selection bias because the individuals’ viewpoints could not be presumed to reflect those of their particular organisations. Because other potential participants may have had
CONCLUSION
For the COVID-19 pandemic, this study provides significant results for Indonesia regarding hospital preparedness and patient safety. The hospital accreditation and ownership status have helped hospital readiness. Although no hospital in the world was prepared for the COVID-19 pandemic, hospital readiness has improved a year later; however, patient safety has not. Patient safety incidents occurred regardless of hospital status, with delayed treatment being the most common occurrence. Administrative errors were also recorded in non-accredited COVID-19 field hospitals. Future research should concentrate on improving the quality of care during the pandemic and implementing initiatives that are applicable to all types of hospitals. Policy-makers should prioritise the operationalisation of temporary field hospitals focusing on patient safety; otherwise, patient safety incidents will continue to occur.

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# Questionnaire

**THE IMPACT OF HOSPITAL READINESS ON PATIENT SAFETY INCIDENTS DURING THE COVID-19 PANDEMIC IN INDONESIA: HEALTH WORKER PERCEPTIONS**

## General Information of the Hospital

| Location | District | Province |
|----------|----------|----------|
|          |          |          |

| Administrative Status |          |          |
|-----------------------|----------|----------|
| a. General / Public   |          |          |
| b. Private            |          |          |
| c. University         |          |          |
| d. Social / Religious organization | | |
| e. Military / Police organization | | |
| f. Others (………………...) | | |

| Number of hospital beds |          |          |
|-------------------------|----------|----------|
| a. Fewer than 100       |          |          |
| b. 100 to 200           |          |          |
| c. More than 200        |          |          |

| Number of ICU beds for COVID-19 patients |          |          |
|------------------------------------------|----------|----------|
| a. Fewer than 10                         |          |          |
| b. More than 10                          |          |          |

| Hospital accreditation status |          |          |
|-------------------------------|----------|----------|
| a. Accredited                 |          |          |
| b. Not accredited              |          |          |

| Do you treat patients with COVID-19? |          |          |
|-------------------------------------|----------|----------|
| a. Yes (continue to the next question) |          |          |
| b. No                               |          |          |

| Does your work unit provide care to patients with COVID-19? |          |          |
|-------------------------------------------------------------|----------|----------|
| a. Yes (continue to the next question)                       |          |          |
| b. No                                                         |          |          |

| The average number of patients with COVID-19 treated in a day |          |          |
|---------------------------------------------------------------|----------|----------|
| a. Fewer than 5 patients                                     |          |          |
| b. 5–10 patients                                              |          |          |
| c. More than 10 patients                                     |          |          |

| Are you willing to be interviewed? (Notes: 1. The identities of the respondents and hospital are kept confidential and will not be published. 2. The interview will last approximately 30-45 minutes via the Zoom application) |          |          |
|----------------------------------------------------------------------------------------------------------------|----------|----------|
| a. Yes (continue to the next question)                                                                         |          |          |
| b. No                                                                                                         |          |          |

| Email address |          |
|---------------|----------|
|               |          |

Choose the answer that best fits the implementation in the hospital where you work

| No | Recommended action | Yes | No | I don’t know |
|----|-------------------|-----|----|--------------|
| 1. | Incident Management System | | | |
| 2. | Does your hospital have an emergency response plan? | | | |
| 3. | Does your hospital have an Emergency Operations Center to coordinate hospital emergency response activities? | | | |
| 4. | Does the hospital have someone responsible to ensure coordination and management of response activities against COVID-19? | | | |
| 5. | Surge capacity | | | |
| 6. | Does the hospital calculate the maximum hospitalization capacity during the COVID-19 pandemic? | | | |
| 7. | Does your hospital use planning assumptions and tools to estimate service demand or increase in hospital patients during the COVID-19 outbreak? | | | |
| 8. | Does the hospital identify ways to expand or develop inpatient capacity? | | | |
| 9. | Has the organization identified gaps in the provision of care, especially on critical care; for example by coordinating with the Department of Health or other neighboring hospitals? | | | |
|   | Question                                                                                                                                                                                                 |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8. | Does the hospital transfer care for non-critical patients to another suitable place?                                                                                                                   |
| 9. | Has the hospital, in collaboration with local authorities such as the Department of Health, identified additional sites for conversion to patient care units? For example, hotels and gymnasiums. |
| 10. | Did the hospital cancel the provision of non-essential services?                                                                                                                                         |
| 11. | Has the hospital made any adaptations or changes to the criteria for patients who will be hospitalized or who will be discharged?                                                                       |

**Infection Prevention and Control**

|   | Question                                                                                                                                                                                                 |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. | Does the hospital provide hand washing stations and trash cans in strategic locations in the hospital?                                                                                                  |
| 13. | Does the organization ensure that healthcare workers apply standard precautions for all patients?                                                                                                        |
| 14. | Has the hospital been implementing prevention measures for the transmission of COVID-19 to suspected or confirmed patients?                                                                          |
| 15. | Are patients placed in a ventilated single room for hospitalization or, when single rooms are not available, are patients suspected of having COVID-19 grouped together? |
| 16. | Have the patient beds been set 1 m apart, regardless of whether patients are suspected of having Covid-19?                                                                                               |
| 17. | Has the hospital confirmed the use of single-use and disposable tools or made sure that these tools are disinfected every time the patient changes (if the equipment needs to be shared among patients)? |
| 18. | Does the hospital routinely clean and disinfect surfaces that patients touch frequently?                                                                                                                 |
| 19. | Do healthcare workers take precautions before entering the COVID-19 service room?                                                                                                                        |
| 20. | Have healthcare workers implemented airborne precautions for procedures that generate aerosols?                                                                                                         |
| 21. | Have each of the healthcare workers assigned to directly interact with COVID-19 patients been given the most standardized training?                                                                  |
| 22. | Does the organization ensure that adequate personal protective equipment (PPE) is easily accessible by staff? If PPE is limited, is PPE prioritized for the staff caring for COVID-19 patients? |
| 23. | Does the hospital have a procedure for moving or transporting COVID-19 patients?                                                                                                                          |
| 24. | Does the hospital limit the patient’s visitors/families and engage them to comply with COVID-19 transmission precautions?                                                                              |
| 25. | Does the organization record everyone entering the patient’s rooms, including all staff and visitors?                                                                                                    |
| 26. | Has the organization established safe procedures according to standard infection control and guidelines for the management and processing of laboratory specimens, laundry, service utensils, and medical waste? |

**Human Resources**

|   | Question                                                                                                                                                                                                 |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27. | Does the hospital always update the contact list for healthcare workers (e.g., those on leave, those who have resigned, those who have died) or are there additional officers? |
| 28. | Does the hospital estimate the number of healthcare workers who are absent from work and monitor it continuously?                                                                                       |
| 29. | Does the hospital have a clear policy for monitoring and managing staff suspected or confirmed of having COVID-19 or who have been exposed to a confirmed, probable, or suspected COVID-19 patient? |
| 30. | Has the hospital identified the minimum number of healthcare workers needed to ensure the sufficient operation of the unit or service?                                                             |
| 31. | Does the hospital prioritize staffing needs by unit or service and distribute personnel accordingly?                                                                                                      |
| 32. | Has the organization been recruiting and training additional staff according to the anticipated needs?                                                                                                   |
| 33. | Does the hospital familiarize healthcare staff to work in high-demand areas, such as the ER and ICU, to provide support when there is a surge?                                                               |
| 34. | Does the organization provide training in the needed areas, including infection prevention and control and clinical management?                                                                         |
| 35. | Has the organization identified internal efforts to support healthcare staff in working more flexibly or working longer hours?                                                                       |
|   | Question                                                                                                                                  |
|---|------------------------------------------------------------------------------------------------------------------------------------------|
| 36 | Does the organization ensure the availability of psycho-social support services for healthcare workers and patients?                        |
| 37 | Does the organization ensure liability, insurance, and temporary licensing issues for personnel who might work outside their area of expertise? |
| 38 | Does the hospital have a policy for regulating volunteer workers, e.g., recruitment, hiring, and training?                                 |
| 39 | Has the hospital considered reassigning staff who are at high risk of developing complications related to COVID-19?                         |
|   | **Incident of Patient Safety**                                                                                                           |
| 40 | Have you ever witnessed or known a COVID-19 patient who you thought was incorrectly treated, causing the patient to suffer a loss?         |
| 41 | Have you ever witnessed or known a COVID-19 patient who had an incident because they were incorrectly diagnosed while undergoing treatment in the hospital? |
| 42 | Have you ever witnessed or known a COVID-19 patient who experienced an incident because of delayed treatment, resulting in the patient suffering a loss? |
| 43 | Have you observed a Covid-19 patient being administered or taking the wrong medication?                                                    |
| 44 | Have you witnessed a Covid-19 patient who experienced administrative errors while undergoing treatment (e.g., not receiving test results, receiving mixed test results, having been scheduled to take certain tests that were then not performed)? |
| 45 | Have you ever witnessed other healthcare workers forgetting to correctly identify COVID-19 patients?                                      |
| 46 | Have you ever witnessed a COVID-19 patient who experienced a nosocomial infection while undergoing treatment?                               |
INTERVIEW QUESTIONS GUIDE

Hospital accreditation status:
Hospital ownership status:
Gender:
Age:
Profession:

1. In your opinion, rate how the hospital you worked at managed the following:
   a. emergency response plan
   b. patient surge
   c. human resources
   d. infection control

2. In your opinion, how did your hospital manage patient safety incidents?
   a. Has the rate of such incidents decreased, remained the same, or increased compared with the period before the pandemic?
   b. What types of incidents have you encountered most frequently with COVID-19 patients?

3. In your opinion, does the way the hospital manages the emergency response, human resources, spikes in the number of patients, and infection control affect the occurrence of such incidents? Is this related to an incident you have witnessed?

4. In your opinion, what are the issues that need improving to raise the level of patient safety in your hospital?
## Interview Participant Details

| Participant code | Interview channel | Age, years | Profession     | Hospital accreditation status          | Hospital ownership status |
|------------------|-------------------|------------|----------------|----------------------------------------|--------------------------|
| P01              | Phone             | 31         | Resident       | Excellent (Paripurna)                  | Provincial government    |
| P02              | Zoom              | 25         | Pharmacist     | Excellent (Paripurna)                  | Army and police dept     |
| P03              | Zoom              | 50         | Risk manager  | Excellent (Paripurna)                  | Private                  |
| P04              | Zoom              | 29         | Nurse          | Excellent (Paripurna)                  | University               |
| P05              | Zoom              | 25         | Nurse          | Not accredited yet                     | Military                 |
| P06              | Zoom              | 26         | Nurse          | First timer (Perdana)                  | District government      |
| P07              | Zoom              | 27         | Nurse          | Not accredited yet                     | Military                 |
| P08              | Written           | 41         | Medical doctor | Excellent (Paripurna)                  | Provincial government    |
| P09              | Zoom              | 36         | Medical doctor | Excellent (Paripurna)                  | Army and police dept     |
| P10              | Zoom              | 31         | Nurse          | Excellent (Paripurna)                  | Ministry of Health       |
| P11              | Written           | 25         | Nurse          | Prime (Utama)                          | Private                  |
| Category                        | Hospital accreditation status and ownership | Findings                                                                                                                                                                                                 |
|--------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hospital readiness system      | First-time accredited (Perdana); District government | Basically, COVID-19 patients are prioritized. We created a special room, an emergency room, just for COVID-19 patients. Non-COVID patients are still treated, but if we determine that there is no emergency, we limit the number of patients. [P06, nurse, first-timer] |
|                                | Prime (Utama); Private                      | To improve quality and patient safety, the hospital has an emergency response plan that includes the provision of infrastructure and facilities, as well as changes to service flows. During this pandemic, we implemented innovations in the flow of services to reduce the occurrence of infections in healthcare facilities. [P11, nurse, prime status hospital] |
|                                | Excellent (Pariurna); Provincial government  | We are implementing a pandemic disaster plan, which includes patient screening, triaging, and cohorting. [P08, specialist, Excellent status hospital]                                                                                                     |
|                                | Excellent (Pariurna); Private Ministry of Health | For zoning, there were special areas for COVID-19 and non-COVID-19 patients; the buildings are therefore separate. [P10, nurse, Excellent status hospital]                                                                                                          |
| Human resources management     | Not yet accredited [Temporary COVID-19 hospital]; Military | Our hospital’s human resources are still being coordinated by the Military Health Center, which sent us many of its healthcare workers. The Ministry of Health enlisted the help of volunteers from all over Indonesia. There are also resources from the Indonesian National Police and from state-owned enterprises who sent cleaning service personnel, porters, and the decontamination team. [P05, nurse, not accredited] |
|                                | First-time accredited (Perdana); District government | We recruited staff from other hospitals and public health centers, as well as students still completing internships in nursing, medicine, and midwifery, to work as healthcare staff. [P06, nurse, first-timer] |
|                                | Prime (Utama); Private                      | We did not provide training on how to handle COVID-19, but we did develop standard operating procedures (SOPs) and reached out to each unit. We expected each employee to read and follow the SOPs. [P11, nurse, prime status hospital] |
|                                | Excellent (Pariurna); Private Ministry of Health | We borrowed staff from our hospital groups due to the increased number of patients and therefore did not hire contract workers. Fortunately for us, all of the staff had undergone standardized training, and there were therefore few differences when the staff worked in another hospital group. [P03, risk manager, excellent status hospital] |
| Infection prevention and control | First-time accredited (Perdana); District government | It was a little difficult to obtain personal protective equipment (PPE), particularly masks. We used raincoats to prevent COVID-19 transmission at the time, which was around four to six months before the pandemic. Given that surgical masks are very expensive and difficult to distribute in the hospital, we were forced to wear double or triple cloth masks. [P06, nurse, first-timer] |
|                                | Not yet accredited; Military                | We sometimes expressed dissatisfaction with the materials used in the hazmat suits. We were already sweating after only one hour in [the isolation room] because it was an open room and the temperature was high. If there was a blackout and the standing AC didn’t work, some [healthcare workers] were already saturated with 93%, 90%, and even 87% after half an hour. [P07, nurse, not yet accredited] |
| Surge capacity                 | Prime (Utama); Private                      | Faced with an increase in the number of patients and the opening of new isolation rooms... the number of healthcare workers who perform treatment is indeed insufficient, requiring the recruitment of healthcare workers... namely doctors, health analysts, and nurses. [P11, nurse, prime status hospital] |
|                                | Excellent (Pariurna); Private Ministry of Health | When the number of cases increased, we added a floor and a new building in the hospital’s front area. Around April, the emergency room was separated. In March, there was only one isolation room in one unit and only two locations, but we were so impressed that we immediately dedicated one
### Table: Hospital Accreditation Status and Ownership

| Category | Hospital Accreditation Status and Ownership | Findings |
|----------|--------------------------------------------|----------|
|          | floor to the Red Zone. [P03, risk manager, excellent status hospital] |          |
| Excellent (Paripurna); Army and police department | So far, we have been able to meet the human clinical and non-clinical resource needs, although this has been hampered at times due to friends telling us that they must isolate. We must therefore be creative in how we manage the situation. Fortunately, unlike some other hospitals, we never locked down the emergency room. [P09, medical doctor, excellent status hospital] |          |
### Patient Safety Code Book – Example

| Category | Hospital accreditation status and ownership | Findings |
|----------|-------------------------------------------|----------|
| Most common incident | Excellent (Paripurna); University | The most common incident appears to be the risk of patients falling, given that almost [all] patients had comorbidities, were elderly, and, as we know with COVID-19 patients, were not accompanied by family members during the hospital stay. [P04, nurse] |
| | Excellent (Paripurna); Provincial government | The most common incident I encountered was a mistake or delay in diagnosing the disease, because the results of the swab test (PCR) took days to arrive during the early days of the pandemic. As a result, patients were not treated in accordance with COVID-19 standards and some died while undergoing treatment before being confirmed positive for COVID-19. [P08, specialist] |
| | Excellent (Paripurna); Provincial government | The patients’ treatment was frequently delayed. As a result, patients were forced to wait in the emergency room because the room was full, resulting in subpar service. [P01, resident] |
| | Excellent (Paripurna); Army and police department | Failure of communication among healthcare workers as a result of hierarchies and communication systems that, to improve, must adjust to a constantly changing system. [P08, specialist] |
| | Not yet accredited (Field Hospital); Military | I believe it was misdiagnoses. [P02, pharmacist] |
| | Prime (Utama); Private | The most common was most likely administrative errors. [P07, nurse] |
| | Prime (Utama); Private | There have been no incidents involving COVID-19 patients reported to the Hospital Patient Safety Team thus far. Healthcare workers were more focused on providing services, presumably due to a lack of willingness to report incidents. [P11, nurse] |
| | Excellent (Paripurna); Army and police department | In terms of incidents, I haven’t seen any numbers, and I don’t know what the official numbers are at the hospital; based on my observations, it appears that there are more, but they might be underreported. [P09, medical doctor] |
| | Not yet accredited (temporary hospital); Military | So far, I have not encountered any patient safety incidents in the hospital, such as work accidents, misdiagnoses, and patient falls, because we always check on the patients. [P05, nurse] |
| Patient safety incident | Administrative errors | Another administrative issue was related to the room arrangement; typically, the patient will move to a different room at their discretion. Meanwhile, because the swab schedule did not match the patient’s name with the name of the room, the swab schedules were frequently switched. The treatment was also ineffective after the drug was administered. [P07, nurse] |
| | Not yet accredited (Field Hospital); Military | That was possible because the front-desk staff was overburdened and unable to screen some documents, which might have resulted in some being missed... it was human error. Then, despite the fact that the swab results were negative, [the patient was] still admitted to the isolation room, even though [the patient] should have gone straight home. [P07, nurse] |
| | Excellent (Paripurna); Private | As reported by friends, a near miss occurred when the label sticker used for the blood test was mixed up. [P03, risk manager] |
| | Prime (Utama); Private | When a patient requires more comprehensive medical care but the referral hospital does not respond, the patient might receive delayed assistance. [P11, nurse] |
| Delayed referral | Excellent (Paripurna); University | The duration of the referral response might also be one of the obstacles; the referral response was also not very fast; perhaps too many patients are referred to the hospital, resulting in unexpected outcomes such as in-hospital death. [P04, nurse] |
| Delayed treatment | Prime (Utama); Private | Delays in service might occur due to a lack of screening and isolation rooms, as well as the difficulty in locating COVID-19 referral hospitals via the National Integrated Reference Information System. [P11, nurse] |
| Category | Hospital accreditation status and ownership | Findings |
|----------|--------------------------------------------|----------|
| Excellent (Paripurna); University | The number of available beds was limited, and patients were stuck in the emergency room while waiting for a room. In terms of patient care, the patient should have been transferred to the ward; for example, if the patient requires a ventilator or other specialized treatment, it should not be performed in the emergency room. [P04, nurse] |
| Excellent (Paripurna); University | In fact, given that the patient is already in critical condition and unconscious, they should have been intubated as soon as possible. As nurses, we would like to perform the intubation, but we are not authorized to do so by the anesthetist. Then, in relation to the intubation, the patient was scheduled to be referred because the hospital lacked a ventilator. [P04, nurse] |
| Excellent (Paripurna) | The most common incident I encountered was a mistake or delay in diagnosing the disease, because the results of the swab test (PCR) took days to arrive in the early days of the pandemic. As a result, patients did not receive treatment in accordance with COVID-19 standards, and some died while undergoing treatment before being confirmed positive for COVID-19. [P08, specialist] |
| Excellent (Paripurna); Provincial government | Because the room was full, patients were forced to wait in the emergency room, resulting in substandard service. The patients who required surgery couldn’t then be sent immediately because the room was full. We were therefore forced to...... yes, it was substandard when compared to services in the ICU. [P01, resident] |
| Excellent (Paripurna); Ministry of Health | We monitored our patients via CCTV; for example, if a patient suddenly became ill, they only had to wait about 15 minutes for us to be able to handle it, because we had to wear full PPE before entering. [P10, nurse] |
| Excellent (Paripurna); Private | If the patient was confirmed positive, the specialist did not want to perform the catheterization lab, so it was rescheduled. [P03, risk manager] |
| Not accredited yet [temporary COVID-19 hospital]; Military | Because there were only a few doctors, the service was a little slow, so the patient was not immediately transferred to the room, so they had to wait for a while. [P07, nurse] |
| Medication errors | Prime (Utama); Private | Errors in drug administration might be motivated by an incorrect diagnosis, which has resulted in a series of domino effects. [P11, nurse] |
| Misdiagnosed | Excellent (Paripurna); Army and Police Department | There were times when a patient was misdiagnosed. [The patient] was initially diagnosed with typhus, which did not improve after two weeks; however, [the patient] was treated and re-assessed. COVID-19 was discovered to be the culprit. We immediately isolated the room and checked all close contacts. Two healthcare workers tested positive, according to what I've heard. [P02, pharmacist] |
| | Prime (Utama); Private | Incorrect treatment might also occur as a result of misdiagnosis due to non-specific COVID-19 symptoms. [P11, nurse] |
| False identification | Excellent (Paripurna); Ministry of Health | One time, the patient’s name was mixed up due to a misunderstanding about the patient’s diet. If it was mixed up like that, it was usually taken care of right away by the person in charge. There were also laboratory workers who mixed up names, but they quickly recognized and dealt with it. [P10, nurse] |
