



## Measuring front-liners' perceived risks, benefits, practice, and misinformation on COVID-19

Wasfi Al Hadid 

Ministry of Health, Amman, Jordan.

Email: [w.alhadid@outlook.com](mailto:w.alhadid@outlook.com)



### Abstract

The COVID-19 pandemic has hit hard on many countries around the world and the numbers of infected patients and deaths secondary to this condition are increasing every day. These numbers included the healthcare workers, who provide care to needy patients. The knowledge and experience of those workers about the virus and its characteristics are very important to maintain good practices and decrease the rate of cross-infection with the virus. Assessing elements influencing healthcare professionals' safe practice, including perceived risks-benefits, knowledge, and practice about COVID-19 of 187 healthcare workers from different Jordanian hospitals currently providing care to patients infected with the virus. The online questionnaire addressed perceived risk benefits, knowledge, and practices, which were endorsed by the Centre for Disease Control and Prevention and are necessary for safe practice among healthcare front liners. All participants were providing care to patients with COVID-19 and were at work during the data collection. The whole recruitment and filling of the study survey were completed using online services, including emails and WhatsApp. Front liners have ambiguity regarding the nature of the virus. Limitations were found in the knowledge of healthcare workers in virulence and biological characteristics of the virus, the personal safety spacing, and how to prevent cross-infections. Skills and practices also reflect some deficits, which might influence safety practices. Front liners should be provided with the needed training and knowledge before caring for a patient with COVID-19. More efforts are needed to ensure meeting these objectives.

**Keywords:** COVID-19, Front-liners, Knowledge misinformation, Practice, Safety.

**Citation** | Hadid, W. A. (2024). Measuring front-liners' perceived risks, benefits, practice, and misinformation on COVID-19. *Journal of Life Sciences Research*, 11(1), 1-6. 10.20448/lifsc.v11i1.6267

**History:**

Received: 30 October 2024

Revised: 25 November 2024

Accepted: 12 December 2024

Published: 30 December 2024

**Licensed:** This work is licensed under a [Creative Commons](https://creativecommons.org/licenses/by/4.0/)

Attribution 4.0 License 

**Publisher:** Asian Online Journal Publishing Group

**Funding:** This study received no specific financial support.

**Institutional Review Board Statement:** The Ethical Committee of the Ministry of Health, Jordan has granted approval for this study on 6 October 2020 (Ref. No. 03-166-2020-2021).

**Transparency:** The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

**Competing Interests:** The author declares that there are no conflicts of interests regarding the publication of this paper.

### Contribution of this paper to the literature

The perceived risks to healthcare front liners when providing care to COVID-19 patients were inadequate during the pandemic. Misinformation about the COVID-19 virus was evident, which could have been associated with higher mortality and morbidity rates among those professionals.

## 1. Introduction

The pandemic coronavirus disease 2019 (COVID-19) has spread across many countries. The World Health Organization recognized COVID-19 as a pandemic. Lessons learned from Severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 show the need for prompt implementation of infection control measures within hospital settings [1]. Now, the second or the third outbreak has happened, and international organizations are encouraging governments to take precautionary measures to improve control over future outbreaks [2] including activities that eliminate human-to-human cross-infection [3]. These efforts are particularly important for healthcare front liners working with patients. Among the orchestrated efforts to promote health among the public, the healthcare workers (HCWs) were still experiencing daily losses in their lines; many died in conditions associated with COVID-19. Therefore, to decrease the rate of contracting the virus among HCWs, they should be prepared with skills and knowledge to provide safe care while staying safe themselves. HCWs most at risk for contracting and spreading infections include those involved in direct care, such as nurses and doctors. It is then imperative that those front-liners be well-trained on the necessary precautions of COVID-19, which include risks and physiological qualities to ensure their safety, especially as the death toll among those professionals is increasing.

Reports show [4] that hospital-acquired infections are serious challenges within many health organizations increasing both mortality and morbidity. The reported infection rate associated with healthcare professionals was 10%, which could increase during the outbreaks [5]. Therefore, specialists suggested interventions aiming to improve infection prevention rates by providing training on standardized curricula templates [6]. This was during the flat times, but the current spread of COVID-19 is even more insistent. COVID-19 is posing further changes to the current overwhelmed healthcare systems in many countries [7]. All continents reported confirmed cases of COVID-19.

Amid these serious conditions, the front liners appear as community heroes, whom every individual looked at with hope and admiration. However, not everyone is aware that those healthcare professionals were, and some are still, overwhelmed with this newly arriving and highly challenging situation [8]. Among the most insistent questions are the following: Were healthcare professionals prepared well for this pandemic, and were they safe when providing care to victims of this pandemic? We have seen many front-liners dying while caring for COVID-19 patients, but we have not addressed the reasons for this occurrence. Reports from the WHO showed that approximately 50,000 front liners worldwide were infected, and many have died secondary to COVID-19 [9]. This study aimed to measure elements of perceived risk and benefits, practice, and misinformation among healthcare front liners during the COVID-19 outbreak. Recommendations from this study were used by the Ministry of Health to develop necessary educational and training activities.

## 2. Methods

We conducted this cross-sectional study while adhering to the strengthening the reporting of observational studies in epidemiology (STROBE) guidelines for observational studies. The study questionnaire was structured based on online published resources by summarizing the most important, yet essential, information and practice items to healthcare professionals, including nurses and physicians, who cared for patients with or suspected to have COVID-19. The questionnaire was developed in an electronic form and the URL on the electronic mail to professionals.

### 2.1. Study Instrument

The COVID-19 perceived risks and benefits, knowledge, and practice questionnaire has been developed based on the evidence-based best practice guidelines published in March 2020 [10]. A tailored design method for Internet surveys was adopted in the development and distribution of the study questionnaire [11]. Four types of errors have been avoided in this study: Coverage, sampling, nonresponse, and measurement. Coverage error was avoided as only hospitals that receive and provide care to COVID-19 patients were included. A sample size of 187 participants was adequate to prevent a sampling error.

Finally, the force response was added to survey items so that participants could give a response to the item before moving to the next. The items were divided into four sections described as follows: (1) non-identifying questions about the personal and demographic characteristics, (2) ten questions about the perceived risks-benefits when caring for patients with COVID-19, five for each category, (3) twenty-one questions asking about the COVID-19 virulence (5 items), measures to prevent cross-infection (3 items), disease pathophysiology and possible complications (2 items), clinical biomarkers and methods of detection of the condition, including signs and symptoms (9 items), precautions and therapeutic regimens reported to minimize the virulence of COVID-19 (2 items), and (4) practices of participants reported to be necessary to minimize cross-infection and ensure personal safety (20 items). These items were reviewed by two nurses with doctoral degrees in clinical nursing and agreed on the items after two rounds of revision. Items were revised by a language specialist for clarity and the correct use of terms and meanings.

### 2.2. Ethical Considerations

We obtained an electronic ethics approval from the university (reference no. 03-166-2020-2021) after submitting an electronic form to the institutional review board. We contacted healthcare professionals via phone calls and short messages asking them to participate in this study. No names could be identified in the study questionnaire.

## 3. Results

### 3.1. Sample Characteristics

The total number of participants was 187, including nurses and physicians involved in providing care to patients either diagnosed or suspected to have COVID-19 (Table 1). The male participants were slightly more than the females (55.1%, and 44.9%, respectively), and many participants were nurses (n=171, 91.4%). Notably, most

participants were those who were in close contact with patients diagnosed or suspected to have COVID-19. Generally, participants had experience with general infection prevention and control guidelines, and only 9.1 (n=17) received training on how to deal with patients, who tested positive for COVID-19 or had symptoms indicating this condition.

**Table 1.** Participants' characteristics (n=187).

Factor	Mean (Standard deviation)	No.	%
Age (Years)	Mean 37.05 (SD: 6.65)	Range 23-57 years	
Sex	Male	103	55.1%
	Female	84	44.9%
Profession	Nurse	171	91.4%
	Medicine	16	8.6%
Area/Specialization	Emergency department	73	39.0%
	Critical care unit	91	48.7%
	Medical ward	12	6.4%
	Primary health practitioner	1	0.5%
	Physician	7	3.7%
	Gastroenterology	2	1.2%
	Radiography	1	0.5%
Years of experience	Mean 12.95 (SD: 1.21)	Range 2-36 years	
Trained on how to deal with COVID-19 patients	Yes	17	9.1%
	No	170	90.9%

### 3.2. Perceived Risks-Benefits of Front Liners Due to Exposure to COVID-19 Cases

The section asked about ten perceived risks and benefits, five for each category. The items for the perceived risks included a question about being susceptible to being infected with COVID-19 as they provide care to patients (Table 2). Most of the participants reported having a low sense of risk (n=97, 51.9%). Other questions were asked about the perceived impact of caring for patients with COVID-19 and possibly harming colleagues by cross-infecting other patients or even transferring this infection to family members.

The responses that considered these issues as highly alerting represented 29 (15.5%), 44 (23.5%), and 53 (28.3%), respectively. The last question addressed the risks of dealing with a virus, whose characteristics are still not well identified, and participants who responded as highly alerted by this condition were 45 (24.1%).

**Table 2.** Perceived risks and benefits (n=187).

Factor	Descriptor	Did not affect my behavior	I took it into consideration	Highly alerted
Perceived risks	Self-harm	57 (30.5%)	97 (51.9%)	33 (17.6%)
	Harming colleague	54 (28.9%)	104 (55.6%)	29 (15.5%)
	Harming other patients	47 (25.1%)	87 (46.5%)	53 (28.3%)
	Harming family member	54 (28.9%)	89 (47.6%)	44 (23.5%)
	Impact of unknown characteristics of COVID-19	37 (18.2%)	108 (57.7%)	45 (24.1%)
		I did not see that coming	I think I learned something	I learned this very well
Perceived benefits	Learning about new risks	57 (30.5%)	96 (51.3%)	34 (18.2%)
	Reminders about forgotten risks	38 (20.3%)	127 (67.9%)	22 (11.8%)
	Abandoned infection control actions	48 (25.7%)	82 (43.9%)	57 (30.5%)
	Caution regardless of COVID-19 status	56 (30%)	110 (58.8%)	21 (11.2%)
	Extra personal care when caring for other patients	44 (23.5%)	95 (50.8%)	48 (25.7%)

As shown in Table 2, the first point asked whether healthcare professionals learned how to deal with new risks encountered when caring for COVID-19 patients. While more than half of them reported that they would consider this (n=97, 51.9%), 57 (30.5%) indicated that the COVID-19 pandemic did not add to them the possible risks. When asked whether this pandemic influenced their infection prevention and control practices, the majority (n=127, 67.9%) responded by indicating that due to this pandemic, more emphasis should be considered in that respect. However, 48 (25.7%) reported not changing any practice.

Just above one-quarter of the participants (n=48, 25.7%) reported not changing their behavior, the majority reported that they would either take infection prevention and control practices into consideration (n=82, 43.9%) or that they were highly alerted by this condition (n=57, 30.5%).

### 3.3. Front-Liners' Knowledge about COVID-19

The second section of the study questionnaire (Table 3) addressed virulence. The majority (n= 125, 66.8%) responded correctly on how the World Health Organization (WHO) classified COVID-19, in terms of knowledge about the virus as an infective organism, 80 (42.8%) responded correctly and 107 (57.2%) had inaccurate assumptions. Some participants (n=62, 33.2%) did not have information about the biological classification of the virus, and 54 (31.9%) did not know the biological characteristics of the virus, including how it infects. Many participants (n=121, 64.7%) answered incorrectly or did not know (n=28, 15%) how the virus could be spread. Similarly, participants either responded incorrectly (n=134, 71.7%) or did not know (n=9, 4.8%) how to protect the public from spreading the virus. While the cross-infection was a major concern to many participants, only some (n=55, 29.4%) knew the pathophysiology, which is associated with where and how the virus can attack the host.

**Table 3.** Findings of the knowledge component of the study questionnaire (n=187).

No.	Item descriptor	Correct no. (%)	Incorrect no. (%)	I do not know no. (%)
1	The WHO risk assessment declaration.	125 (66.8%)	49 (26.2%)	13 (7%)
2	Person-to-person spread.	80 (42.8%)	101 (54%)	6 (3.2%)
3	What is COVID-19?	19 (10.2%)	163 (87.2%)	5 (2.7%)
4	Where does COVID19 belong?	125 (66.8%)	17 (9.1%)	45 (24.1%)
5	COVID-19 biological characteristics.	133 (71.1%)	40 (24.4%)	14 (7.5%)
6	COVID-19 host and carrier.	38 (20.3%)	121 (64.7%)	28 (15%)
7	Spread within community and healthcare settings.	44 (23.5%)	134 (71.7%)	9 (4.8%)
8	COVID-19 development and infectivity.	55 (29.4%)	125 (66.8%)	7 (3.7%)
9	Where can we detect COVID-19 in the body?	97 (51.9%)	34 (18.2%)	56 (29.9%)
10	Pathophysiology of COVID-19.	40 (21.4%)	144 (77%)	3 (1.6%)
11	How to dress when dealing with a patient with COVID-19?	75 (40.1%)	91 (48.7%)	21 (11.2%)
12	What has been suggested for treatment COVID-19?	50 (26.7%)	90 (48.1%)	47 (25.1%)
13	Symptoms of COVID-19.	78 (41.7%)	81 (43.3%)	28 (15%)
14	Serology to detect COVID19.	84 (44.9%)	60 (32%)	43 (23%)
15	Biomarker clues to COVID-19.	26 (13.9%)	152 (81.3%)	9 (4.8%)
16	Blood tests for COVID-19.	59 (31.6%)	52 (27.8%)	76 (40.6%)
17	Blood clues to COVID-19.	24 (12.8%)	80 (42.8%)	83 (44.4%)
18	Imaging to detect COVID-19.	34 (18.2%)	145 (40.6%)	8 (4.3%)
19	Serology detection of COVID-19.	76 (40.6%)	108 (57.8%)	3 (1.6%)
20	CT scan specific findings to detect COVID-19.	5 (2.7%)	118 (63.1%)	69 (34.2%)
21	The serious condition caused by COVID-19 that is the source of concern to healthcare workers (n, %): <ul style="list-style-type: none"> <li>➤ Acute respiratory distress syndrome (n=95, 50.8%)</li> <li>➤ Viral pneumonia (n=164, 87.7%)</li> <li>➤ Secondary infection (n=74, 39.6%)</li> <li>➤ Sepsis (n=35, 18.7%)</li> <li>➤ Acute kidney injury (n=31, 16.6%)</li> </ul>			

Recognizing the symptoms associated with COVID-19 infection is an important point, where more than many participants (n=109, 58.3%) responded incorrectly or did not know the answer.

The final item in this section of the questionnaire asked about the type of infection that COVID-19 causes (Table 3). Many participants (n=95, 50.8%) indicated that acute respiratory distress syndrome is the most serious condition if infected with the virus. However, 164 (87.7%) said that the main concern that causes a serious challenge due to this virus was viral pneumonia.

As seen above, there have been variations in the level of knowledge among healthcare workers. Therefore, it was necessary to measure the practices reported by the Center for Disease Control and Prevention (CDC) (4) as essential for safe and high-quality care.

### 3.4. Practices of Front-Liners as they Care for Patients with COVID-19

This section comprises 20 items asking questions about practices (Table 4). These practices include items for the general community practices, while others address practices specific to the healthcare organizations. All participants were ensured that these practices were concerned mainly with the current outbreak of COVID-19 and did not necessarily reflect the usual infection prevention and control practices.

**Table 4.** Healthcare workers' practices during the COVID-19 outbreak (n=187).

No.	The practice	I practice no. (%)	I do not practice no. (%)
1	I wear a face mask, gloves, the appropriate gown, and an eye shield or goggles.	112 (59.9%)	75 (40.1%)
2	I use single-use disposable equipment.	180 (96.3%)	7 (3.7%)
3	I wash my hands often with soap and water or an alcohol-based hand sanitizer and avoid touching my face, eyes, nose, or mouth with my hands before washing.	182 (97.3%)	5 (2.7%)
4	I always wear personal protective equipment while at the hospital.	180 (96.3%)	7 (3.7%)
5	I implement airborne precautions when performing aerosol-generating procedures.	177 (94.7%)	10 (5.3%)
6	I practice safe waste management, environmental cleansing, and disinfection of all patient care equipment.	126 (67.4%)	61 (32.6%)
7	I avoid needlesticks and sharp injury by following infection prevention measures	184 (98.4%)	3 (1.6%)
8	I consider all collected specimens collected as potentially infectious.	158 (84.5%)	29 (15.5%)
9	We limit the number of healthcare workers and visitors in contact with the patient.	168 (89.8%)	19 (10.2%)
10	I place the patient in an adequately ventilated room (If presenting with respiratory symptoms).	184 (98.4%)	3 (1.6%)
11	I ensure optimal patient care and psychosocial support for the patient.	185 (98.9%)	2 (1.1%)
12	I place patients in negative pressure rooms, whenever available.	163 (87.2 %)	24 (12.8%)
13	I place all suspected cases together in the same ward if single rooms are not available.	114 (61%)	73 (39%)
14	I offer a face mask to patients, who can tolerate one.	181 (96.8%)	14 (3.2%)
15	I avoid direct unprotected contact with live animals and surfaces in contact with live animals when visiting live markets in affected areas.	178 (95.2%)	9 (4.8%)
16	I practice hand and respiratory hygiene.	137 (73.3%)	50 (26.7%)
17	I avoid close contact with people (i.e., maintain a distance of at least 3 ft or 1 meter), particularly those with fever or who are coughing or sneezing.	181 (96.8%)	6 (3.2%)
18	I practice respiratory hygiene by covering my mouth and nose when coughing/ Sneezing with a tissue, discarding this soiled tissue, and washing hands.	148 (79.1%)	39 (20.9%)
19	I seek medical care early if I have a fever, cough, and difficulty breathing, and share their previous travel and contact history with any healthcare worker.	171 (91.4%)	16 (8.6%)
20	Everyone should wear a mask in community settings even without having respiratory symptoms.	184 (96.4%)	3 (3.6%)

Notably, many participants (n=75, 40.1%) did not report wearing masks and personal protective equipment (PPE) while at the hospital and when caring for patients. The availability of negative pressure-supported rooms might not be always available. Many participants indicated wearing PPEs (n=180, 96.3%), and 158 (84.5%) followed infection prevention protocol when collecting specimens. Furthermore, the majority (n=168, 89.8%) considered that limiting visitation and the number of healthcare professionals is essential. When asked about the need for everyone in the community to wear a mask, 184 (96.4%) of the participants reported that this is a necessary practice. They reported that keeping a safe distance of three feet is adequate.

#### 4. Discussion

This study measured the perceived risks, benefits, level of knowledge, and practice of a group of healthcare front-liners as they were in contact with COVID-19 patients. We found variations among the participants and misinformation was widely noticed. Misinformation included the nature of the virus, its pathophysiology, how does it spread, how and where it can be detected, and which diagnostic tests and clinical presentation. Misinformation among professionals can have a serious impact on public and patient health [12]. It has been described as a claim of fact, which is either invalid, inaccurate, or did not have adequate scientific evidence [13]. Misinformation can lead to improper assumptions and incorrect practices. It has been argued that having inaccurate information among individuals is a rich medium to spread improper information that would then be amplified leading to further deception of the public [14]. Scientists have made certain speculations, which were based on previous knowledge of SARS-CoV but learned over time to deal with COVID-19 [15]. However, this knowledge has not been disclosed fully to healthcare front liners. We found that healthcare professionals although missing some knowledge about COVID-19 but were still aware of certain safe practices. Healthcare professionals should receive extensive training, which involves information about the most recent discoveries about the virus and how to avoid cross-carrying it to themselves and others. The current understanding of the virus behavior is based on previous experiences with SARS-CoV but in the form of COVID-19, the full understanding is yet to be uncovered [16]. Hence, healthcare professionals should be both aware and raise awareness in the public concerning this virus.

The serious challenge caused by COVID-19 seems to be closely associated with the different epidemiological nature and characteristics of SARS-CoV [17]. This virus replicates efficiently in the upper respiratory tract and appears to cause a less abrupt onset of symptoms, like conventional human coronaviruses that cause the common cold during winter [18]. Infected individuals produce a large quantity of virus in the upper respiratory tract during a prodromal period, are mobile, and carry on with their lives. This further complicates the situation and contributes to the spread of infection unknowingly.<sup>19</sup> The number of participants, who interestingly denied the need for using PPEs in the community, should be addressed, and informed of the need for the use of these protective measures among even asymptomatic individuals. Therefore, responses in this study reflect the need for more effort to raise awareness of healthcare professionals toward the significant virulence of patients during the asymptomatic or prodromal phase of the infection [19]. COVID-19, which has been proven until now to spread even with asymptomatic infected individuals [19]. Although the earlier reports indicated the incubation period of 2-14 days, WHO [20] we have seen cases that tested positive and stayed asymptomatic for more than 4 weeks.

As we sought in this study to analyze the magnitude of misinformation among healthcare professionals, we discovered that front-liners needed more knowledge and training on skills that would provide safe practice while caring for patients with COVID-19. Although participants in this study reported performing several protective practices against COVID-19, there are still areas concerning community practices, patient isolation, and personal safety that should be addressed. At the time of the absence of a licensed vaccine or an approved treatment against COVID-19, non-pharmaceutical interventions remain central to preventing the spread of this pandemic. These

interventions include raising awareness among healthcare professionals about the seriousness of this virus and how they can diagnose, perform proper and timely surveillance manage and assist infected patients, and limit its spread to COVID-19-free patients [21]. Although guidelines to deal with COVID-19 suspected patients are developed by many healthcare institutes around the world, different points within these guidelines are continuously modified as new facts about the virus evolve. However, this knowledge should be displayed and highlighted to healthcare professionals as they are published. Such knowledge, which inevitably influences clinical decisions and practice, should be provided to healthcare professionals, who would then transfer it to the public. Educational activities should focus on infection prevention and control issues, like hand hygiene, the use of face masks, personal spacing, housekeeping, aseptic technique, procedures for the preparation of medication and intravenous fluids, and the types, effects, and use of antiseptic solutions.

Furthermore, many individuals assume that healthcare professionals account for verifiable information that could be good sources about the pandemic for the community. They represent a good source of information that would improve community understanding of the virus and could lead to better protection of the public. Therefore, they must be prepared to carry out this role in the public. We suggest that healthcare authorities prepare online educational material that addresses healthcare professionals and contributes to correcting misinformation about COVID-19. This material should also inform those professionals about the best methods to educate individuals from the community about the virus, its impact, virulence, and other important aspects to keep them safe and healthy.

## 5. Conclusion

Misinformation and improper practices among front liners might lead to unsafe practices, jeopardizing their safety. Front-liners must be competent and knowledgeable when facing pandemics like COVID19. Therefore, findings in this study have been sent to the local authorities, and plans are made to conduct educative sessions and workshops, especially among nurses. Our findings were used by policymakers and workshops have been conducted (until the time of writing the study report) that emphasize safe and effective practice.

## References

- [1] K. Oberholtzer, L. Sivitz, A. Mack, S. Lemon, A. Mahmoud, and S. Knobler, *Learning from SARS: Preparing for the next disease outbreak: Workshop summary*. Washington: National Academies Press, 2004.
- [2] D. L. Heymann and N. Shindo, "COVID-19: What is next for public health?," *The Lancet*, vol. 395, no. 10224, pp. 542-545, 2020. [https://doi.org/10.1016/s0140-6736\(20\)30374-3](https://doi.org/10.1016/s0140-6736(20)30374-3)
- [3] Centers for Disease Control and Prevention, "Interim infection prevention and control recommendations for patients with suspected or confirmed coronavirus disease 2019 (COVID-19) in healthcare settings," Retrieved: [https://www.cdc.gov/covid/?CDC\\_AAref\\_Val=https://www.cdc.gov/coronavirus/2019-ncov/infection-control/controlrecommendations.html](https://www.cdc.gov/covid/?CDC_AAref_Val=https://www.cdc.gov/coronavirus/2019-ncov/infection-control/controlrecommendations.html).
- [4] WHO, "Report on the burden of health care-associated infection worldwide. Clean care is safe care," Retrieved: [https://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507\\_eng.pdf;jsessionid=4F5710AC473A2EE7B3A62B863C056B66?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507_eng.pdf;jsessionid=4F5710AC473A2EE7B3A62B863C056B66?sequence=1). [Accessed 2021].
- [5] E. T. Curran and C. E. Dalziel, "Outbreak column 18: The undervalued work of outbreak: Prevention, preparedness, detection and management," *Journal of Infection Prevention*, vol. 16, no. 6, pp. 266-272, 2015. <https://doi.org/10.1177/1757177415599592>
- [6] B. Allegranzi, C. Kilpatrick, J. Storr, E. Kelley, B. J. Park, and L. Donaldson, "Global infection prevention and control priorities 2018-22: A call for action," *The Lancet Global Health*, vol. 5, no. 12, pp. e1178-e1180, 2017. [https://doi.org/10.1016/s2214-109x\(17\)30427-8](https://doi.org/10.1016/s2214-109x(17)30427-8)
- [7] C. Wang, P. W. Horby, F. G. Hayden, and G. F. Gao, "A novel coronavirus outbreak of global health concern," *The Lancet*, vol. 395, no. 10223, pp. 470-473, 2020. [https://doi.org/10.1016/s0140-6736\(20\)30185-9](https://doi.org/10.1016/s0140-6736(20)30185-9)
- [8] R. M. Burke, "Active monitoring of persons exposed to patients with confirmed COVID-19—United States, January–February 2020," *MMWR. Morbidity and Mortality Weekly Report*, vol. 69, no. 9, pp. 245-251, 2020. <https://doi.org/10.15585/mmwr.mm6909e1>
- [9] WHO, "Coronavirus disease 2021 situation reports," Retrieved: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>. [Accessed 8 August 2021], 2021.
- [10] Center for Disease Control and Prevention, "BMJ best practice COVID-19," Retrieved: <https://bestpractice.bmj.com/topics/en-gb/3000168>. [Accessed 29 March 2021], 2021.
- [11] D. Dillman, J. Smyth, and L. Christian, *Internet, mail, and mixed-mode surveys: The tailored design method*, 2017. New York: Wiley, 2017.
- [12] M. Sharma, K. Yadav, N. Yadav, and K. C. Ferdinand, "Zika virus pandemic—analysis of Facebook as a social media health information platform," *American Journal of Infection Control*, vol. 45, no. 3, pp. 301-302, 2017. <https://doi.org/10.1016/j.ajic.2016.08.022>
- [13] W. Chou, A. Oh, and W. Klein, "Addressing health-related misinformation on social media," *JAMA* vol. 320, pp. 2417-2424, 2018.
- [14] J. Zarocostas, "What next for the coronavirus response?," *Lancet*, vol. 395, no. 10222, p. 401, 2020. [https://doi.org/10.1016/s0140-6736\(20\)30292-0](https://doi.org/10.1016/s0140-6736(20)30292-0)
- [15] L.-L. Ren *et al.*, "Identification of a novel coronavirus causing severe pneumonia in human: A descriptive study," *Chinese Medical Journal*, vol. 133, no. 09, pp. 1015-1024, 2020. <https://doi.org/10.1097/cm9.0000000000000722>
- [16] R. Lu *et al.*, "Genomic characterisation and epidemiology of 2019 novel coronavirus: Implications for virus origins and receptor binding," *The Lancet*, vol. 395, no. 10224, pp. 565-574, 2020. [https://doi.org/10.1016/s0140-6736\(20\)30251-8](https://doi.org/10.1016/s0140-6736(20)30251-8)
- [17] N. Zhu *et al.*, "A novel coronavirus from patients with pneumonia in China, 2019," *New England Journal of Medicine*, vol. 382, no. 8, pp. 727-733, 2020.
- [18] J. F.-W. Chan *et al.*, "A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster," *The Lancet*, vol. 395, no. 10223, pp. 514-523, 2020. <https://doi.org/10.1093/infdis/jiaa077>
- [19] X. Pan *et al.*, "Asymptomatic cases in a family cluster with SARS-CoV-2 infection," *The Lancet Infectious Diseases*, vol. 20, no. 4, pp. 410-411, 2020. [https://doi.org/10.1016/s1473-3099\(20\)30114-6](https://doi.org/10.1016/s1473-3099(20)30114-6)
- [20] WHO, "Coronavirus disease 2019. Situation Report—73," Retrieved: [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_2). [Accessed 26 March 2021], 2019.
- [21] L. A. Sharour *et al.*, "Nurses' self-efficacy, confidence and interaction with patients with COVID-19: A cross-sectional study," *Disaster Medicine and Public Health Preparedness*, vol. 16, no. 4, pp. 1393-1397, 2022. <https://doi.org/10.1017/dmp.2021.96>