Occupational health risks among healthcare workers during the COVID-19 pandemic in Saudi Arabia: preparing for the future pandemics

Reham Suliman Al Kharyef1, Aisha Ali Al Harbi1, Mohammed Abdelhamied Genedy2, Mohamed K.M. Khalil3, Suliman Mohamed Al Eidi1

1Ministry of Health, Riyadh 13352, Saudi Arabia. 2Consultant Public Health and Research Development. Cairo 11728, Egypt.

*Corresponding to: Mohamed Khalil, Consultant Public Health and Research Development, No. 45, 9th Street, Cairo 11728, Egypt.
E-mail: statkhl@hotmail.com.

Author contributions
Suliman Al Eidi is responsible for validation and supervision, Aisha Al Harbi is responsible for data curation and communication procedure, Reham Suliman Al Kharyef is responsible for writing and data analyses, Mohammed Abdelhamied Genedy is responsible for review, Mohamed K.M. Khalil is responsible for data management and manuscript review. All authors contributed to the concept of the manuscript and identified relevant data which was critically revised and approved by all authors.

Competing interests
The authors declare no conflicts of interest.

Acknowledgments
The authors would like to thank all HCWs who participated in this study and collected data. We take this opportunity to express our sincere thanks to all members of the ethical research committee at King Fahad Medical City for their endorsement of the submitted proposal.

Peer review information
Nursing Communications thanks Gülbu Tanrıverdi and José Ramón for their contribution to the peer review of this paper.

Abstract

Background: This study aimed to assess the occupational risks encountered by Healthcare Workers (HCWs) in Saudi Arabia during the COVID-19 pandemic. Methods: A cross-sectional survey was carried out from May to October 2021. Using a multi-stage stratified random sampling technique, an online questionnaire was sent to the recruited HCWs, across Saudi Arabia. Results: Of the 768 HCWs recruited, 702 participated in the survey. A significant majority (over 80%) reported working beyond 8 hours daily. COVID-19 infection, confirmed via PCR, was identified in 25% of the participants. Notably, infection was significantly correlated with direct or close contact (p = 0.0007). Psychological distress was reported by 81%, with anxiety being the most prevalent (33%), followed by stress (19%), depression (17%), and insomnia (12%). Around 20% experienced headaches post-PPE use, while 14% reported adverse skin reactions, predominantly allergy and dermatitis. A concerning one-third of respondents reported exposure to violence. Conclusion: High infection rate, physical and psychological risks among HCWs especially those in direct contact with patients, reflect the need for enhancing the entirety of outbreak preparedness and response, specifically training. Active surveillance system, is crucial to adequately monitor and support HCWs during pandemic scenarios.

Keywords: COVID-19; pandemic; healthcare worker; risk; Saudi Arabia
**Introduction**

The COVID-19 pandemic that engulfed the globe in 2020 and onward presented significant trials and tribulations for the worldwide healthcare sector. Healthcare professionals across various nations were swiftly tasked with the critical responsibility of attending to patients afflicted with the virus. This scenario unfolded into prolonged work hours, restless nights, and an incessant apprehension of either contracting or transmitting the virus. The relentless efforts of healthcare workers were pivotal in delivering essential care and assistance to individuals impacted by COVID-19, albeit at the cost of their mental and emotional wellness. In Saudi Arabia, one of the nations hit by the pandemic, healthcare workers (HCWs) were indispensable in combating the virus, often putting their lives in jeopardy on the frontlines to protect others [1].

The prior encounter with the Middle East Respiratory Syndrome coronavirus (MERS-CoV) since 2012 furnished Saudi Arabia with valuable preparedness for the COVID-19 pandemic [2]. Nevertheless, the scale of the COVID-19 pandemic surpassed the capabilities of any healthcare infrastructure.

Infection posed as a paramount occupational hazard for HCWs during the COVID-19 pandemic. A dynamic systematic review unveiled that the projected prevalence of infection stood at 11% (95% CI: 4, 15), as determined by a reverse transcription-polymerase chain reaction test [3]. In Saudi Arabia, nearly half of the documented confirmed cases of MERS manifested within healthcare environments. HCWs constituted over a third of all secondary infections. Ensuring the safety of HCWs could mitigate secondary infection within healthcare premises, there bolstering patient care within both healthcare establishments and the broader community [4]. Factors conducive to infection included improper or inadequate usage of Personal Protective Equipment (PPE), deficient training, setting, the presence of clear directives, and workload. A study from Saudi Arabia revealed a correlation between infection risk and errors in donning or doffing PPE (8.8%), neglecting hand hygiene before and after engaging with COVID-19 patients (6.3%), and incidents involving biological material, such as splashes of biological fluid (in the eyes) (3.8%) [5].

The pandemic did not solely expose HCWs to infection risks; other physical and psychological hazards were also unveiled in published findings [6]. The employment of PPE was linked to headaches [7] and adverse skin reactions [8].

COVID-19 introduced a new facet to Burnout Syndrome (BOS). A study from Egypt indicated a BOS prevalence exceeding 36% among physicians attending to COVID-19 patients [9].

Amid the pandemic in Saudi Arabia, a significant 75% of HCWs perceived a risk of COVID-19 infection at their workplaces, and 27.7% did not feel secure [10]. The incidents of violence and the psychological strain of stress, anxiety, and depression among HCWs emerged as notable occupational hazards during the pandemic[11, 12].

This study endeavors to scrutinize the occupational risks and contributory factors encountered by HCWs amidst the COVID-19 pandemic, aiming to provide informed insights for decision-making in anticipation of future pandemics.

**Methodology**

An online cross-sectional descriptive survey study, was executed between May and October 2021, utilizing a questionnaire partially grounded on the World Health Organization's provisional guidelines for risk assessment concerning healthcare workers (HCWs) [13].

All participants provided their informed consent, and the study protocol received approval from the Institutional Review Board of King Fahad Medical City, Riyadh (Approval date: May 19, 2021; Approval number: A21–21E).

**Sampling and sample size**

Employing a multi-stage stratified random sampling approach, 768 HCWs were enlisted in this study to represent the workforce across the twenty administrative regions in Saudi Arabia. The sample size was determined using Epi Info for epidemiological calculations. The hypothesized frequency of the outcome factor among HCWs (p) was set at 50% ± 5, with confidence limits at 5% of 100, and a design effect of 2 accounted for the clustered sampling approach.

**Statistical analysis**

Data analysis was carried out using JMP Pro (a statistical software from SAS) version 14.1. The data were organized and depicted in frequency and percentage tables. To evaluate the differences, post hoc tests following chi-square ($\chi^2$) tests were employed.

**Results**

Of the 768 participants recruited, 702 responded to the survey questionnaire. The sociodemographic and occupational attributes of the respondents are illustrated in Table 1. Males constituted 48% of the respondents, with the largest age group (47%) being in their fourth decade. Physicians, nurses, technicians, and health assistants made up 43.4%, 33.4%, and 19% of the respondents, respectively. A significant portion (81%) worked for 8 or more hours daily. A total of 564 HCWs underwent testing for COVID-19 infection, with 143 (25%) testing positive via PCR. Direct contact showcased a higher association with infection (OR 1.5527, 95% CI: 0.96–2.5, P = 0.071). Close contact (less than one meter) was also significantly correlated with COVID-19 infection (OR 2.14, 95 CI: 1.37–3.34, P = 0.0007) as depicted in Table 2. However, the risk of infection demonstrated no association with the frequency of exposure, or the duration spent with patients.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>336</td>
<td>48%</td>
</tr>
<tr>
<td>Female</td>
<td>366</td>
<td>52%</td>
</tr>
<tr>
<td>Age (By Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>21–30</td>
<td>142</td>
<td>20%</td>
</tr>
<tr>
<td>31–40</td>
<td>327</td>
<td>47%</td>
</tr>
<tr>
<td>41–50</td>
<td>150</td>
<td>21%</td>
</tr>
<tr>
<td>51–60</td>
<td>67</td>
<td>10%</td>
</tr>
<tr>
<td>≥ 61</td>
<td>16</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>702</td>
<td>100%</td>
</tr>
<tr>
<td>Marital state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>14</td>
<td>2%</td>
</tr>
<tr>
<td>Married</td>
<td>519</td>
<td>74.5%</td>
</tr>
</tbody>
</table>
Out of 668 respondents, 18% reported headaches following PPE use. Among 670 respondents, 94 (14%) reported adverse skin reactions due to continuous PPE usage, with allergies, dermatitis, eczema, acne, redness, rashes, and itching being the common types. The hands (50%) and face (31%) were the predominant sites of skin reactions.

Violence exposure was reported by one-third of the respondents, with verbal violence being the most prevalent (25%), succeeded by both verbal and physical violence (7%). Out of 670 respondents, 544 (81%) reported experiencing a psychological condition related to their work, with anxiety (33%), stress (19%), depression (17%), and insomnia (12%) being the most common. Anxiety was significantly associated with female gender ($p = 0.0042$) and non-Saudis ($p = 0.0001$).

Lastly, 80 HCWs reported physical complaints during the pandemic, with fatigue and back pain being the most frequent physical ailments encountered during the study period.

Out of 670 respondents, 94 (14%) reported adverse skin reactions due to continuous PPE usage, with allergies, dermatitis, eczema, acne, redness, rashes, and itching being the common types. The hands (50%) and face (31%) were the predominant sites of skin reactions.

Violence exposure was reported by one-third of the respondents, with verbal violence being the most prevalent (25%), succeeded by both verbal and physical violence (7%). Out of 670 respondents, 544 (81%) reported experiencing a psychological condition related to their work, with anxiety (33%), stress (19%), depression (17%), and insomnia (12%) being the most common. Anxiety was significantly associated with female gender ($p = 0.0042$) and non-Saudis ($p = 0.0001$).

Lastly, 80 HCWs reported physical complaints during the pandemic, with fatigue and back pain being the most frequent physical ailments encountered during the study period.

Submit a manuscript: https://www.tmrjournals.com/in
Discussion

With the rapid proliferation of COVID-19 across the globe, healthcare workers (HCWs) found themselves notably unprepared for the ensuing patient influx. This study aimed to explore not only the infection risk but also the contributing factors and other socio-psychological adversities induced by the pandemic.

In our cohort, 25% tested positive for COVID-19, demonstrating a significant association with direct or close contact (within one meter). Systematic reviews portrayed a varied infection rate among HCWs, ranging from 11% (95% CI: 7–16) [14] to 51% (95% CI: 34.7–68.2) [15]. Comparative analysis should consider variables such as setting, study duration, testing modality, and the pandemic’s timeline. Fluctuations in pandemic waves or infection clusters were deemed noteworthy contributors [16]. In Saudi Arabia, infection rates among HCWs oscillated between 10% [17] and 19.6% [18], with our study exhibiting a higher rate, potentially due to the hospital-centric scope.

Headaches were common, associated with prolonged PPE usage, reported by 18% of our participants, albeit other studies illustrated higher prevalence (24%–55%) [19–21]. Continuous peri-cranial pressure from tight headgear can trigger headaches, yet stress and anxiety might also play a part [19].

Adverse skin reactions trailed headaches in prevalence, with 14% affected in our study, while other studies reported a broader range (20% to 80%) [8, 20]. Discrepancies in reporting could emanate from variances in case definitions, working conditions, or PPE quality. Numerous studies highlighted skin reactions as a recurrent issue due to the disruption of the natural skin barrier [8].

The psychological toll on HCWs was palpable, attributed to infection fears, workload, extended work hours, limited social support, and the rising patient count. Over 80% reported psychological distress, with anxiety (33%), stress (19%), depression (17%), and insomnia (12%) being predominant. Local studies might depict heightened depression and anxiety rates, potentially due to the utilization of specialized mental health questionnaires [22]. Systematic reviews underscored a varying mental health impact based on case definitions and settings [23, 24].

Workplace violence emerged as a grave concern, with nearly one-third of HCWs facing violence in various forms [25, 26]. Enhancing security measures and augmenting patient-HCW communication training could mitigate violence levels.

This study’s limitations encompass the online survey method, which might impede capturing intricate contributing factors. Employing standardized definitions and international questionnaires could bolster data validation, particularly concerning mental health impacts [27]. While the Saudi Health Electronic Surveillance Network System (HESN) could streamline data collection [17], delving into detailed contributing factors or conducting ad-hoc surveys remains challenging.

Conclusion

The high reported infection rate, in addition to other physical and psychological consequences among HCWs during COVID-19 outbreak in Saudi Arabia underscored numerous longstanding healthcare system issues, while furnishing vital lessons for future pandemic preparedness and response. A paramount takeaway lesson is the imperative of continuous training on emerging technologies, protocols, and pandemic management guidelines.

Enhancing the integrity between global and national outbreak response chain is vital for future pandemic readiness. This entails a robust infrastructure, ample resources for HCWs [28, 29], and the development of research tools to monitor stress, workload, and other risk factors. Transitioning from ad-hoc surveys to an active surveillance system during pandemics could offer a more accurate risk assessment. The formulation of an international electronic questionnaire and software could facilitate risk monitoring on both national and international scales, thereby fostering a more resilient healthcare system ready to tackle upcoming pandemics.

References


