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Research Article

Prevalence of Coronavirus Disease-2019 among Healthcare Workers in Imam Khomeini Hospital Complex in Tehran, Iran

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Abstract

Background: The novel coronavirus disease-2019 (COVID-19) has become a significant worldwide problem since January 2019. Hospitals have spent most of their time and logistics on patients with COVID-19. During this crisis, many healthcare providers have been infected with the disease, and occasionally, some wards and operating rooms were shut down as a result. Here, we explain our experience with the healthcare staff involvement with COVID-19 in our hospital.
Methods: As a referral tertiary center, Imam Khomeini Hospital (Tehran, Iran) has 4,200 health-care workers (HCWs). From February 20, 2020 to August 21, 2020, we investigated the hospital database for COVID-19 involvement among the staff.
Results: During the study period, 973 (23%) hospital HCWs were detected with COVID-19, 378 (9%) of whom were involved between June 21 and July 21, 2020. In the orthopedic department, 20 of 43 (46%) HCWs were infected with COVID-19.
Conclusion: We believe that the increase in the incidence of the disease and higher risk of exposure is a highly noticeable factor which should be addressed by the administrative health officials.

Keywords: Coronavirus Disease-2019; Health Personnel; Hospital Administration

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Background

The novel coronavirus disease (COVID-19) has become a new world crisis and a sad tragedy. According to the World Health Organization (WHO), until September 2020, over 28,000,000 COVID-19 cases were detected worldwide, with more than 917,000 deaths (1).

Since the rapid spreading is one of the main characteristics of this virus, preventing intra-hospital transmission is a top priority. In 2003, Singapore experienced a tragedy with 238 cases of the severe acute respiratory syndrome (SARS), 41% of whom were healthcare workers (HCWs). This experience made them ready for COVID-19, as there were no positive cases in the first month of the Covid-19 epidemic in this country (2). In China, over 3000 HCWs tested positive for COVID-19 in February 2020 (3). As the HCWs are in the first line of fighting COVID-19, the negligence of their safety can compromise the whole healthcare system.

The orthopedics department of Imam Khomeini Hospital Tehran, Iran has experienced a high rate of COVID-19 involvement among its staff, which nearly resulted in a department shut down. The focus of this paper is to investigate the disease prevalence and safety of health personnel in the orthopedic department.

Methods

As a referral tertiary center, Imam Khomeini Hospital has 4,200 HCWs. From February 20, 2020 to August 21, 2020, we investigated the hospital database for COVID-19 involvement among the staff. We included both symptomatic and asymptomatic COVID-19 cases. The study protocol was approved by the institutional review board.

Results

During the study period, 973 (23%) hospital HCWs were detected with COVID-19, 378 (9%) of whom were involved between June 21 and July 21, 2020. In the orthopedic department, 20 of 43 (46%) HCWs were infected with COVID-19. Out of the 19 orthopedic residents, 16 (84%) were detected with COVID-19, which caused their hospitalization for one week. The high rate of involvement led to the almost total closure of the department for more than one week.

Comparing the staff involvement in the hospital and orthopedic department showed a similar pattern (Figures 1-4).

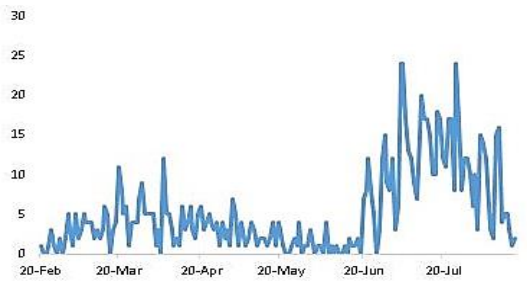

Figure 1. Prevalence of coronavirus disease-2019 (COVID-19) among the staff of Imam Khomeini Hospital, Tehran, Iran

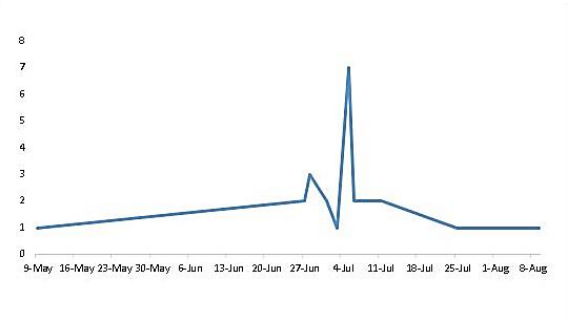

Figure 2. Prevalence of coronavirus disease-2019 (COVID-19) among operating room staff of orthopedic department of Imam Khomeini Hospital, Tehran, Iran

All diagrams have a peak around June to July 2020, indicating a major systemic problem rather than being an issue limited to the orthopedic department.

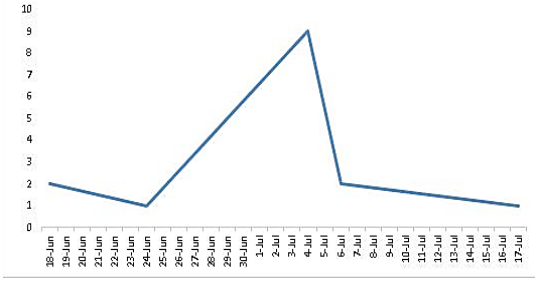

Figure 3. Prevalence of coronavirus disease-2019 (COVID-19) among orthopedic residents of Imam Khomeini Hospital, Tehran, Iran

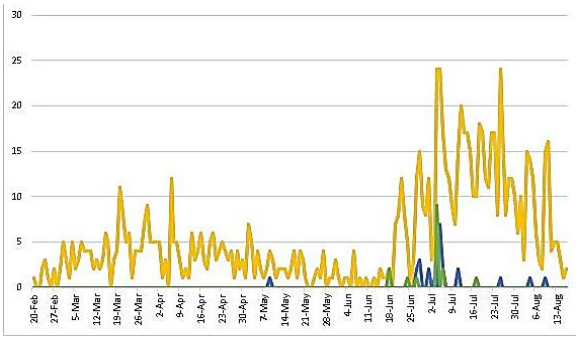

Figure 4. Comparison of the prevalence of coronavirus disease-2019 (COVID-19) between the hospital staff and orthopedic ward staff of Imam Khomeini Hospital, Tehran, Iran

Discussion

HCWs are highly exposed to the COVID-19 virus. In the study by Iversen et al. on the prevalence of infection among the medical workers in Denmark, 1,163 out of 29,295 screened personnel were detected with COVID-19. They found that front-line HCWs in hospitals are significantly more involved than other settings (4). In studies by Rivett et al. (5) and Jones et al. (6) in a large British teaching hospital, of 1,032 asymptomatic HCWs tested for COVID-19, 3% were positive. They noted that people could have transmitted viruses among others. Kluytmans-van den Bergh et al. assessed the prevalence of COVID-19 among the HCWs of 52 different Dutch hospitals. Of 9,705 HCWs with fever and respiratory symptoms, 6% were positive, accounting for 1% of all staff (7).

In our hospital, we screened both symptomatic and asymptomatic HCWs and found that 973 of the 4,200 staff were positive for COVID-19. Compared to other countries, this is a large number that may disclose a systemic problem, which must be addressed.

In the following, we review some probable reasons.

Personal Protective Equipment (PPE)

One of the most critical ways of fighting such a rapidly spreading virus is personal protection. There are several protocols from different hospitals for personal protection. For example, according to a study by Holland et al., all emergency physicians should wear N-95 masks, disposable gloves, isolation gowns, and face shields. Hand hygiene and avoiding hand-to-face contact are essential as well (8). With a focus on orthopedics and trauma surgeons, Hirschmann et al. suggested level-4 surgical gowns, face shields or goggles, double gloves, and level-3 filtering facepiece or N95/99 respirator masks during surgeries. They believe that orthopedic and trauma surgeries are aerosol-generating procedures because they contain power tools, pulsatile lavage, and electrocautery. Therefore, surgeons are highly exposed to the virus (9).

One of the main reasons for the high rate of virus spread among our staff could be the lack of attention to the PPE rules. Because of exhaustion, high workload, and lack of equipment, our residents failed to follow hospital protocols for PPE use.

Negative pressure airflow in the operating rooms is recommended (10). In our hospital, surgery rooms lack appropriate air conditions. Being in contact with probable positive patients or colleagues for several hours can easily transmit the virus.

Another place for spreading the virus is the doctors' mess, in which the personnel rest and eat while no appropriate separation is possible. These places have limited space and using PPE is not applicable in these areas.

Pandemic Pattern

Iran had two peaks of COVID-19 in March and May 2020. According to the diagram of COVID-19 in Iran (Figure 5), the number of new cases remains about 3000 after the second peak in June and July (1). In our hospital, we experienced the staff involvement in the same period. It is justifiable to conclude that the high incidence of the disease in the region has increased the risk of infection among the HCWs.

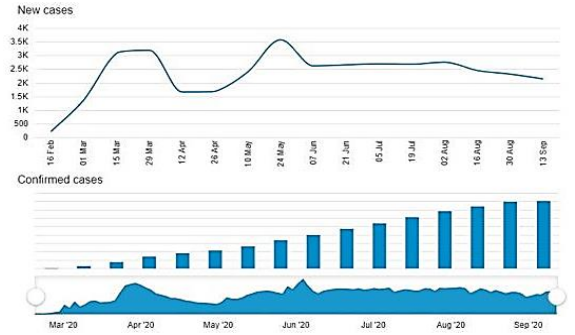

Figure 5. Prevalence of coronavirus disease-2019 (COVID-19) in IRAN, permitted to all researchers using the figures and data from World Health Organization (WHO) website (Copyright)

Conclusion

Our hospital had a high number of COVID-19 infection

cases among its HCWs. The hospital and orthopedic department experienced an epidemic in June and July 2020. Although failing to follow the PPE protocols could be a contributing factor, we believe that the increase in the incidence of the disease and higher risk of exposure are major factors which should be addressed by the administrative health officials.

Conflict of Interest

The authors declare no conflict of interest in this study.

Acknowledgments

None.

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