Presentation of COVID-19 on staff working in a General Hospital

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Abstract

Introduction: The COVID-19 pandemic directly affected morbidity and mortality rates among healthcare workers, which had an impact on medical care.

Objective: To determine the incidence of COVID-19 in staff working at the General Hospital of the Zone.

Materials and methods: An observational, descriptive, retrospective, and cross-sectional study was conducted. Participants included staff members of General Hospital Zone 14 who contracted COVID-19. Surveys were carried out to staff to verify data and investigate other factors of interest that could provide new segmentation for the analysis. Absolute frequencies were described. A chi-square test was performed. The study was conducted in strict adherence to ethical standards and the principles stipulated in the Federal Regulations Code of the United Mexican States and the Regulations of the General Health Law Regarding Research.

Results: Of the affected staff, 61.2% were female and 38.8% were male; nursing staff were the most affected at 26.5%. A frequency of 6.4 per 10 workers was calculated, and the case fatality rate was 0.26% for the period studied.

Conclusions: Being a healthcare worker increased the risk of COVID-19 infection, and among the staff, the most affected department was nursing.

Keywords: COVID-19, SARS-CoV-2, health personnel.

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared the most recent pandemic, which began with the novel coronavirus, named SARS-CoV-2.

The origin of this pandemic is described as in Asia, in the Chinese province of Hubei, in the city of Wuhan. The combination of various factors that had been developing for some time, such as climate change resulting in ecosystem

modification and loss of biodiversity, and globalization, which brings with it travel and international trade, may have influenced the emergence of this pandemic, allowing the virus to jump from the bat reservoir to the human species.

Coronaviruses, composed of RNA, have a high capacity to mutate and recombine, which facilitates their ability to change from their reservoir to another type of host. Based on these characteristics of the virus, theories have emerged that the COVID-19 epidemic could also have occurred from human to human without the intervention of another species. The SARS-CoV-2 virus has characteristics like bat coronaviruses, beginning with the way it initiates an infection (using the angiotensin-converting enzyme of the cell receptor).[10]

By March 11, 2021, one year after the start of the declared COVID-19 pandemic, there were a total of 117,983,661 cases and 2,620,207 deaths globally, affecting a total of 236 countries by that date11. The situation as of March 11, 2022, was a total of 56 countries, territories, or areas affected, with a total of 148,781,050 confirmed cases and 2,660,300 deaths. By then, with vaccination campaigns already in place, the following data was collected on doses administered: 1,713,622,14212. After March 13, 2020, infections began to be reported among medical personnel. By then, confirmed local cases had increased, surpassing imported cases.[13]

From the beginning of the pandemic, uncertainty gripped people worldwide, especially those directly dealing with the disease, such as healthcare workers. In fulfilling their duty to provide medical care to COVID-19 patients, they had no option to stay home and quarantine. This led to fear among healthcare workers of becoming infected by themselves or their families. Coupled with a lack of supplies and hospital beds, this had repercussions on both the physical and mental health of active healthcare personnel, as well as a steadily increasing number of infections.[14] By May 8, 2020, 152,888 healthcare workers worldwide had been reported to have contracted COVID-19, with a total of 1,413 deaths reported by that date. Women were the most affected, accounting for 71.6% of infections, while most deaths were among men, at 70.8%. Among healthcare workers, nurses were the most frequently infected (38.6%), and physicians accounted for the highest percentage of deaths (51.4%).[15,16]

A study of healthcare workers in the United Kingdom found that the main risk factor for COVID-19 infection was treating patients without adequate personal protective equipment, whether suspected or confirmed cases. To a

lesser extent, comorbidities and the specific roles of physicians were also contributing factors. [17]

By August 23, 2020, 97,632 cases of COVID-19 had been reported among healthcare workers in Mexico, with nurses accounting for 42% and physicians for 27%. These figures increased as the pandemic progressed. [19,20,21]

The COVID-19 pandemic in Mexico brought about changes in the actions of healthcare personnel and the healthcare systems needed to confront this new emerging situation. Therefore, it is crucial to understand that one of the pillars of healthcare most affected during the pandemic was healthcare personnel, who were directly impacted by the type of activities they performed and their direct contact with people suspected of or already infected with COVID-19. They also witnessed firsthand the devastation that arose during the pandemic, from morbidity and mortality to shortages of supplies and long working hours.[22] Due to the way SARS-CoV-2 is transmitted, healthcare personnel were directly exposed through their daily duties, with serious consequences. From January 2020 to May 2021, it was estimated that between 80,000 and 180,000 healthcare personnel died worldwide.[25] In Mexico, 542,986 confirmed cases of COVID-19 were registered among healthcare personnel. Cases as of December 31, 2022 26. The figures in the state of Sonora of confirmed COVID-19 cases in healthcare personnel as of January 31, 2022 totaled 12,648 cases, increasing to 15,946 by December 2022 [27].

Therefore, the objective of the study was to determine the incidence of COVID-19 in personnel working in a General Hospital.

MATERIALS AND METHODS

The study was conducted at General Hospital No. 14 with a Burn Unit, a secondary care facility of the Mexican Social Security Institute (IMSS), located in Hermosillo, Sonora. This medical unit has 326 beds available; 200 are registered beds and 126 are unregistered beds, in addition to 41 consultation rooms, 2 emergency rooms, 3 information desks, 5 inpatient wards, 1 administrative area, and 1 physical medicine and rehabilitation service. The staff is classified into 5 areas: (1) administrative, with a total of 223 employees; (2) Delegation, with 11 employees; (3) finance and systems, with 9 employees; (4) medical, with 1,505 employees; and (5) economic and social benefits, with 3 employees.

An observational, descriptive, retrospective, and cross-sectional study was conducted among healthcare personnel of various categories. From March 23, 2020, to January 31, 2022.

Information was collected from the various databases available at the unit for the study of cases of viral respiratory diseases (SINOLAVE), as well as the SPPSTIMSS database (Workers' Health Prevention and Promotion Services of the Mexican Social Security Institute).

The collected information was integrated into an Excel database of healthcare personnel infected during the COVID-19 pandemic in the previously determined period. The dependent variable was COVID-19 infection, and the independent variables were age, sex, blood type, comorbidity, systemic hypertension, diabetes, chronic inflammatory lung disease, obesity, smoking, job category, work shift, and exposure in other workplaces. The sample size was calculated to estimate a proportion with a 95% confidence level, resulting in a sample size of 826. Participants included IMSS (Mexican Social Security Institute) personnel assigned to General Zone Hospital No. 14 with a Burn Unit, regardless of sex or age. Participants had to have a positive rapid antigen test and/or RT-PCR test for SARS-CoV-2 and be registered on the SINOLAVE platform as a confirmed case.

Those who did not work at General Zone Hospital No. 14 with a Burn Unit during the period from March 23, 2020, to January 31, 2022, were excluded.

Healthcare personnel who refused to participate in the survey, either in writing or by telephone, or who could not be located, were also excluded.

Measures of disease frequency, specifically rates (prevalence and case fatality rate), were calculated. Measures of central tendency were also calculated for the quantitative variables. Nominal qualitative variables were measured using proportions to determine the percentage of SARS-CoV-2 infections across different hospital categories and work shifts, as well as the percentage of healthcare workers according to sex, blood type, and comorbidities. Prevalence odds ratios were calculated to estimate risk. The chi-square test was used for independent variables. Data analysis was performed using SPSS Statistics 29.

To comply with the principles that ensure moral, ethical, and legal requirements for health research, we adhered to the Declaration of Helsinki, the Nuremberg Code, the General Health Law, the Regulations of the General Health Law Regarding Health Research, the Belmont Report, the Federal Regulations Code of the United Mexican States, and any other applicable regulations.

RESULTS

A total of 1,149 workers were identified as having contracted COVID-19, out of 1,785 registered on the payroll and 1,617 on disability leave issued by the occupational health physician at SPPSTIMSS. This information was cross-referenced with the SINOLAVE database to define the study group. The incidence rate was 6.4 per 10 workers during the study period. Three staff deaths occurred, representing a case fatality rate of 0.26% among those diagnosed with COVID-19.

The study population included healthcare personnel from all categories, departments, and shifts who were on duty during the study period. An analysis was conducted to identify the relationship between the staff's work characteristics and their susceptibility to COVID-19 infection. The results indicate that the nursing department was the most affected, with 26.5% of cases, followed by physicians at 5.9%, social work at 3.5%, and conservation at 3.4%. Regarding the risk assessment of working overtime for nurses, it can be observed that the greatest risk was found when working a normal shift. Regarding the variable "works in other workplaces (medical unit, hospital, clinic, etc.)," 25.5% responded yes, with an odds ratio (OR) of 0.3, indicating a higher risk without traveling to other workplaces. When analyzing overtime hours worked in the physician category, 27.3% reported working overtime, while 14.7% did not. Working overtime was found to be riskier, with an OR of 2. When analyzing work in other workplaces within the same category, 52.9% reported doing so, and 7.4% reported not. With an OR of 6.0, traveling to other workplaces was interpreted as a higher risk. The use of personal protective equipment (PPE) was also reviewed in this category, where 15.9% of the total participants reported using it, with an OR of 1.0, indicating that it neither poses a risk nor protects against illness. In the Cleaning category... Regarding hygiene, only 9.1% of respondents reported working overtime. The risk estimate for the overtime cohort is interpreted as a higher risk with an odds ratio (OR) of 1.5. For those working at other workplaces, with an OR of 0.3, we interpret commuting to other workplaces as a protective factor, perhaps due to the different activities performed at their other jobs. Analyzing the use of personal protective equipment (PPE), 6.3% reported using it. Although no one reported not using PPE, the OR of 1.0 can be interpreted as a duality between the protection and the risk associated with its use.

The analysis showed that the highest percentage of infections was in the female group at 61.2%, compared to 38.8% for males. Furthermore, the measures of central tendency for the age variable yielded an average of 37.2 years, with 50% of infected workers being 37 years old and the most frequent age being 35 years.

Regarding the blood type findings, it was found that infected participants with blood type O were the most affected at 56.6%, followed by those with blood type A at 32%. An interesting finding from the analysis related to comorbidities in the workers is that only 18.5% reported having any type of comorbidity or chronic illness. And only 14.2% reported smokers during the study period.

Regarding the course of the illness, 272 workers (96.8%) experienced outpatient treatment, and only 9 workers (3.2%) were hospitalized. Additionally, only 5.3% reported requiring oxygen.

Within the study group, the morning shift (45.2%) had the highest rate of infection, followed by the afternoon shift (28.1%). Regarding overtime, although there was a staff shortage due to infections and an increased workload resulting from the pandemic-related surge in cases, very few (7.8%) were working overtime.

Regarding the use of personal protective equipment (PPE), 3.6% of staff responded that they did not use it while caring for COVID-19 patients. When asked about having had an infected family member before developing symptoms, 22.8% reported having had such a family member, and 10% of those family members were healthcare workers. Regarding the workers who mentioned working at other workplaces (medical unit, hospital, clinic, etc.), only 18.1% responded affirmatively. Finally, 87.5% reported having contracted COVID-19 at least once or twice, and 35 participants, or 12.5%, reported having been infected three or four times.

DISCUSSION.

The findings from this study, resulting from cross-referencing information between databases and surveys, revealed a total of 1,149 workers infected with COVID-19. As mentioned by Gómez-Ochoa SA. et al. (2021), healthcare workers, being the first responders for COVID-19 patients, are more exposed to contracting the disease and, in turn, to infecting other patients or individuals.

Analyzing the study results, specifically regarding the variable of sex, it was observed that the highest percentage of infections was among women (61.2%), representing a total of 172 women. In contrast, the total number of male workers who contracted COVID-19 was 109, representing 38.8% of the participants. The average age at presentation for both sexes was 37.2. It is important to mention that at the beginning of the pandemic, healthcare personnel with certain risk factors, in this case advanced age, were allowed to

stay home to protect themselves from infection. This aligns with Padrón HS, 2022, who described an average age of 37 years due to allowing workers over 60 to retire.

The results of this study also found that the nursing department had the highest number of infected workers. This could be due to the specific nature of their work, as mentioned by Gómez-Ochoa SA. et al, 2021[18], when alluding in their study to a greater contagion of SARS-CoV-2 by the nursing team, this is explained by the greater amount of time that said personnel spends in close contact with the patient, for their part Bandyopadhyay S. et al, 2020 16 mentions that the category with the highest rate of contagion was nursing at 38%, it is also mentioned that the risk of doctors of certain specialties is greater when they are specialties that are in more direct contact with nasal secretions, but that the risk of the rest of the specialties should not be minimized.

An interesting finding is that it was previously believed that workers at higher risk were those with comorbidities, as Camacho-Servín BA. et al. (2021) noted in their study, which concluded that a higher risk of death and severe illness were associated with being a healthcare worker who contracted COVID-19 and having comorbidities as a risk factor. In contrast to this study, the number of infected workers (participants) with comorbidities was low (18.5%), compared to 81.5% who denied having comorbidities or chronic diseases. Among the comorbidities reported by participants in this study, the main ones were "other" comorbidities (42%), systemic hypertension (23%), and diabetes (17%).

The incidence of smoking among infected staff was low, with only 14.2% reporting smokers during their COVID-19 infection within the study period. This, combined with the low incidence of comorbidities and the low smoking rate among affected staff, may have contributed to the 96.8% outpatient course observed in the workers in this study. This aligns with the findings of Garrote A and Bonet R. (2022), who reported direct damage from tobacco to the respiratory system. This would explain why many participants in this study did not require oxygen (only 5.3%), and why the outpatient course is associated with a mild case of the disease.

It is important to note that, given that most workers had an outpatient course, 69.4% of them implemented the following combinations of techniques to prevent infection in the hospital: handwashing, sanitizing with gel, use of PPE, and physical distancing. It is important to mention that due to the number of patients during the peak of the pandemic, maintaining social distancing and avoiding crowds became a difficult task to accomplish.

In addition to identifying workers who had to travel to other work centers as a potential source of infection, the study also investigated whether any family members had contracted COVID-19 before the onset of their symptoms. This was considered because quarantine guidelines were still in place during the study period, making it common for family members to infect each other, especially if they lived in the same household. The results showed that the risk of infection from family members was greater than 20%, meaning that 1 in 5 workers infected at least one family member (or other individuals) outside of their workplace.

During the study period, 87.5% of workers reported having been infected 1 to 2 times, and 12.5% reported 3 to 4 times. This explains why the number of work absences exceeds the total number of workers infected with COVID-19, as previously mentioned. Furthermore, the multiple infections are reasonable considering the variants that the SARS-CoV-2 virus presented during the pandemic.

Analyzing the above in general, we found that the nursing department was the most affected, with 26.5% of infections. Breaking down the job categories, the highest percentage was for general nurses at 12.5%, followed by non-family physicians at 8.4%, general nursing assistants at 6.5%, specialist nurses at 3.8%, and nursing assistants at 3.8%. Cleaning and hygiene (2.1%) showed the highest rate of infection, as previously mentioned, among job categories with the most direct contact with patients and/or in patient areas, such as cleaning and hygiene staff.

The job characteristics that increase the risk of COVID-19 infection are those involving direct contact with patients. This means that departments with the most patient contact are at the highest risk. On the other hand, it's important to remember that contrary to initial beliefs, having comorbidities or being a smoker is not a risk factor that should prevent someone from continuing their work duties. The fact that many workers recovered on an outpatient basis and did not require oxygen is correlated with the low mortality rate, indicating adaptation to the virus.

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