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SARS-COV-2 AND ITS IMPACT ON EMERGENCY MEDICINE

ABSTRACT

The SARS-CoV-2 (COVID-19) pandemic impacted hospitals and healthcare workers throughout the world. This research sought to determine how the pandemic affected the mental health of healthcare workers in critical care, primarily because of hospitals' focus on finances instead of healthcare workers' mental well-being. This research included extensive literature review as well as a semi-structured interview with an emergency medicine physician in Ashland, KY, who worked before the COVID-19 pandemic and during the COVID-19 pandemic. It was hypothesized that as hospitals attempted to focus primarily on recovering financial losses incurred from the pandemic, the mental health of clinicians fell through the cracks. Hospitals sustained many financial hardships as they experienced increased rates of emergency department Left Without Being Seen (LWBS), hospital Length of Stay (LOS), overcrowding, and increased rates of ED diversion. There were limitations in this research as the pandemic was relatively new. While these were avoided, there were still several limitations secondary to publication bias, researcher bias, and limited available data. With only one interviewee, opinions were limited, as well. Further research will be necessary to determine future repercussions of the pandemic on healthcare workers' mental well-being.

Keywords: Anxiety, Burnout, Depression, Emergency Department (ED), Left Without Being Seen (LWBS), Length of Stay (LOS), Post Traumatic Stress Disorder (PTSD). SARS-CoV-2 (COVID-19).

INTRODUCTION

SARS-CoV-2 has impacted Emergency Department (ED) volumes since its introduction to the world in late 2019. (Siegel, Reses, & Cool, 2021). During the initial onset of the SARS-CoV-2 (COVID-19) pandemic, ED visits decreased 49% compared to what visit rates were trending in the month that led up to the outbreak that occurred in the United States (Walker et al., 2020). Another study found that there was 35.2% decrease in ED visits with respect to all 2019 ED rates. (Westgard et al., 2020). While patients avoided the ED for things like strokes, heart attacks, and metabolic emergencies, EDs experienced a disproportionate increase in patients who presented to the ED for potential COVID-19 symptoms such as upper respiratory infections, shortness of breath, and chest pain (Westgard et al., 2020). Many patients deferred acute care during the early stages of the pandemic primarily due to fear of exposure to the virus (Walker et al., 2020). ED volumes shifted drastically just one year after the initial onset of the pandemic with the introduction of new coronavirus variants (Greene, 2021). One of the major variants of this disease was the B.1.617.2 (Delta) variant which correlated within the same time frame of an increased rate of presentation to the ED as well as increased hospital admissions across states of all vaccination status. Additionally, those states that had lower vaccination coverage experienced 3.4 times as many ED visits (Siegel, et al 2021).

One factor of ED financial viability has been due to crowding delays, boarding, and diversions which have increased over the years (Barish, McGauley & Arnold, 2012). For perspective, ED boarding has occurred even prior to the pandemic when critically ill patients who required admission have been held in their ED bed while they waited for a bed to become available upstairs in a unit like medical-surgical or intensive care (Al-Qahtani et al., 2017). Boarding patients in the ED contributed to increased morale amongst inpatient nursing staff

because inpatient nurses did not have to be physically present for those admissions as ED nurses often had to care for those who were roomed in the ED (Barish et al., 2012). However, this contributed to worse morale for ED nurses (Barish et al., 2012). Support towards ED nurses rather than inpatient nurses had been correlated with better profits for hospitals (Barish et al., 2012). Increased rates of boarded patients in the ED have resulted in prolonged length of stay (LOS) (Arefian et al., 2016). Prolonged hospitalization has been associated with substantial extra costs for hospitals (Arefian et al., 2016). As of April 2021, one hospital in Michigan noted that their emergency department boarded 40 patients who were waiting for inpatient beds on a regular basis (Greene, 2021).

Hospitals have had to transfer patients to facilities who have required a higher-level-of-care when the patient had needs identified that could not have been managed in the hospital they originally presented to (Augustine, 2022). In 2019, 4000 patients were transferred to higher-level-of-care facilities (Augustine, 2022). EDs have classified their departments as this status secondary to COVID-19 cases with hospitalizations on the rise (Joanne, 2021). Diversion status has led to an uptick in the number of patients who Leave Without Being Seen (LWBS) and decreased patient satisfaction (Joanne, 2021). Patients who have been deemed those who leave without being seen, or the LWBS population, were those associated with poor access to timely clinic-based care rather than being a representative of intrinsic operational issues within the EDs themselves (Li et al., 2019). The most significant ED metrics that have been followed in history have been LOS and LWBS (Jenkins et al., 2020). LWBS has been used as an end point for ED operations studies of related endpoints like tMD, the time in which it took a physician to initially evaluate their patient (Jenkins et al., 2020). This LWBS has also been used as a metric by hospitals for physician performance (Li et al., 2019). LWBS has also been a metric of

importance because patients who have left the ED without being evaluated have been at a potential harm for adverse health events, particularly if they experienced symptoms that considered them an Emergency Severity Index (ESI) of 2 (Ioannides, Blome & Schreyer, 2018). Patients who have LWBS were found to be at higher risk of re-presenting to an ED when compared with patients who completed treatment and were discharged home (Tropea et al., 2012).

First responders and medical practitioners were considered at risk for higher rates of Post-Traumatic Stress Disorder (PTSD), depression, anxiety, moral distress, and burnout (Watson, 2022). Burnout has been a significant issue amongst healthcare workers for years; however, this intensified with the additional stressors associated with the COVID-19 pandemic (Chor et al., 2021). Healthcare providers, especially those who have been involved in the care of COVID-19 patients, have been deemed at-risk for mental health disorders and have considered poor patients as they have often failed to follow up to manage these disorders (Badrfam, Zandifar & Arbabi, 2020). Those individuals who have worked in the ED have had one of the largest incidences of burnout associated with healthcare workers prior to COVID-19, and those who have been based in the ED for extended periods of time have been shown to have moderate-to-severe burnout at 49.3% compared to other staff members as there have been pre-existing high levels of stress associated with ED cases (Chor et al., 2021). The difficulty of conditions for those who have worked during the pandemic included exposures to physical and mental trauma, high work responsibilities, enduring the loss of patients and colleagues, as well as the risk of infection (Badrfam, Zandifar & Arbabi, 2020).

The purpose of this research was to determine how SARS-CoV-2 has impacted the mental health of healthcare workers, particularly in the emergency department.

METHODOLOGY

Step 1: Research and Literature Identification

The working hypothesis was that SARS-CoV-2 led to a decrease in psychological well-being of healthcare workers through many factors, those included hospitals' focus upon financial viability, hospital overcrowding with increased LOS, increased rates of burnout, and increased LWBS.

The intended methodology for this qualitative study was two-fold: it included a review of all available literature from the past three years as well complemented with a partially structured interview with an expert in emergency medicine who has practiced prior to and during the SARS-CoV-2 pandemic. The partially structured interview was performed with a board-certified emergency medicine attending physician in-person at King's Daughters Medical Center in Ashland, Kentucky after Internal Review Board approval and informed consent were obtained prior to the conduction of the interview.

Research journals and peer-reviewed articles were reviewed utilizing Summon, PubMed, and ProQuest research databases. Utilization of a filter feature including "peer-reviewed" and "scholarly" articles between the years 2012 through 2022 with Open Access status was utilized on Summon. The Google Scholar search engine was utilized when researching further due to a lack of relevant sources within our preferred time frame on Marshall University's Summon. "Peer-reviewed" was removed later in the search as peer-reviewed studies would not have been able to exist for very recent data.

Step 2: Literature Analysis and Inclusion Criteria

Key words used in this search included: ‘SARS-CoV-2’ OR ‘COVID-19’ AND ‘ED LWBS’ AND ‘PTSD ’OR ‘Burnout’ AND Diversion’ OR ‘Boarding’ OR ‘LOS’. The articles reviewed were limited to the English language and were published from the years of 2012-2022. The information gained from these journal articles, blogs, and websites were used as the sources of primary and secondary materials. Following the review of relevant abstracts, appropriate articles and text were used for the reporting of data, as shown in the PRISMA diagram. The search identified 91 relevant citations and articles that were excluded (N=60) if they did not meet inclusion principles. Articles, journals, and books were included (N=31) if they included information relevant to ED statistics related to COVID-19. These 31 references were subject to full-text review, and these 31 citations were included in the data abstraction and analysis. 16 references were included within the results section.

This search was completed by AF and validated by AC who acted as the second reviewer and determined if references met inclusion criteria. Figure 2 outlined the conceptual framework for this research: SARS-CoV-2 and its impact on hospital metrics had a decrease in the mental well-being of healthcare workers.

RESULTS

ED Volumes and Length of Stay

Reflection of ED volume depletion during the initial stages of the pandemic in the US were found at a hospital in Arizona from March 2020 to June 2020 as they had a reduction in ED volume by 25.33% (Lee, Santarelli & Ashurst, 2021). It was also reported that ED transfers requiring a higher level of care decreased 21.44% in the early stages as well (Lee et al , 2021). ED volumes increased through July 2020 and plateaued in August, approximately 15% below

times prior to the pandemic (Adjemian et al., 2021). These authors argued that wider access to health messages, triage helped lines, and virtual visits could have assisted those who were determining whether they required emergency care, i.e., when they may have wanted to avoid an unnecessary ED presentation (Adjemian et al., 2021).

Overcrowding in EDs has shown to have a detrimental effect on patient morbidity and mortality in multiple patient groups, and it has also been expensive (Lucero et al., 2021). LOS was found to be 10.3% higher during the COVID-19 pandemic (Lucero et al., 2021). Retrospective analyses were performed from 56 different EDs across the US during the COVID-19 period of March 1, 2020, and December 2020 and it was determined that the length of stay increased geometric mean of 28 minutes for admitted patients when compared to that of pre-pandemic years (Lucero et al., 2021).

LOS had been an important indicator of the efficiency of a hospital even before the COVID-19 pandemic (Baek et al., 2018). Shorter hospital stays have reduced the burden of medical procedures/care, increased bed turnover rate, decreased risks of hospital acquired infections, and increased the profit margin of hospitals which are all reasons why administrators have focused on this metric more than others (Baek et al., 2018). One literature review found that when hospitals decreased their average LOS, they had decreased costs per patient care, increased capacity with higher bed turnover, and reduced process defects and safety concerns (Hwang, Hwang & Hong, 2014). Across 45 studies, patients who contracted COVID-19 were found to have the longest LOS in China than anywhere else during the initial period of the COVID-19 pandemic: median LOS ranged from 4 days up to 53 days in China and 4 to 21 outside of China (Rees et al., 2020). In figure 3, a systematic review of hospital LOS based on discharge status of patients at the beginning of the pandemic was summarized in a table with data ranging from

December 2019 when the virus originated up to March 2020 (Rees et al., 2020). It was also reported by these researchers that ICU LOS median values ranged from 6 to 12 days within China as well as 4 to 19 days outside of China (Rees et al., 2020).

Data on hospitalization length was then investigated at the other major epicenters of the COVID-19 pandemic: Italy, Germany, and the United States (Jamshidi et al., 2021). The United States experienced longer LOS periods, 2 to 10, than that of Italy, 1 to 6, and more than that of Germany, 5 to 19 days (Jamshidi et al., 2021). There was a negative association between LOS and case fatality rates as Germany, the United States, and Italy were found to have case-fatality rates of 0.047, 0.057, and 0.143% respectively which indicated that the LOS was introduced as a measure that scaled the success of how countries fought the pandemic (Jamshidi et al., 2021).

Implications on Mental Health and COVID-19 for Healthcare Workers

Healthcare workers have been deemed to have an increased risk of adverse mental health outcomes during the COVID-19 pandemic (Hennein, Mew & Lowe, 2021). As of the start of the pandemic, nurses, and advanced practice providers such as Nurse Practitioners (NPs) and Physician Associates (PAs) have experienced COVID-19 related psychological distress over other healthcare workers (Shechter et al., 2020).

All faculty, staff, and post-doctoral fellows of a university hospital in tandem with its medical school were invited to fill out a study on mental health outcomes associated with COVID-19 during April 2020 (Evanoff et al., 2020). Of the 5550 respondents to this survey, among all workers, anxiety, depression, and high exhaustion were independently correlated with community exposure or clinical exposure to COVID-19 (Evanoff et al., 2020). Those who were younger than the age of 40 and had a greater number of stressors in their home were associated

with much more adverse outcomes (Evanoff et al., 2020). This survey determined that the pandemic has had a negative impact on the mental health and general wellbeing of clinical employees and that increased support from supervisors as well as, if possible, decreased unnecessary exposure to COVID-19 could have been considered modifiable risk factors that protected healthcare workers (Evanoff et al., 2020). A Social Support Rating Scale (SSRS), Connor-Davidson Resilience scale (CD-RISC) and Symptom Checklist 90 (SCL-90) were deployed to 1,472 healthcare workers in China during the peak period of COVID-19 and found that individuals who were able to deal with significant adversity and recovered quickly were those who were younger (Hou et al., 2020).

A cross sectional study performed on 1,092 healthcare workers across the United States in May 2020 found a prevalence of probable or likelihood of development of the following mental health disorders, major depression, PTSD, generalized anxiety disorder, and alcohol use disorder to be 13.9%, 22.8%, 15.6%, and 42.8% respectively (Hennein, Mew & Lowe, 2021). Further, in just the United States, prevalence of disadvantageous psychological outcomes included moderate to high levels of depression and anxiety seen in a survey of 5,550 healthcare workers at 15.9% and 13.0% respectively (Hennein, Mew & Lowe, 2021). In another study conducted in Asia, those clinicians who have been directly on the frontlines handling high-risk patients as the first point-of-contact are most vulnerable to suffering the psychological ramifications of an outbreak as rates of depression, anxiety, stress, and PTSD symptoms were found to be 27.5%, 34.3%, 12.2%, and 16.2% respectively (Rao et al., 2021). This study found that those healthcare workers who were at an increased risk for poorer mental health outcomes included females, nursing aides, as well as those individuals who lived with elderly relatives (Rao et al., 2021). Those individuals who were Malay were found to be at higher risk for anxiety,

stress, and PTSD than those they were compared to in China and the Philippines (Rao et al., 2021).

At baseline, 50% of physicians were faced with burnout even before the pandemic (Santarone, McKenney & Elkbuli, 2020). A study of over 2000 healthcare workers found that, in turn, 40% have experienced burnout symptoms, and 78% of them have experienced anxiety during the COVID-19 surges associated with variants (Dopelt et al., 2021). Healthcare workers who have directly cared for COVID-19 patients have been shown to have double the risk of having experienced anxiety and depression symptoms than those who did not care for COVID-19 patients (Dopelt et al., 2021). In pre-pandemic times, physicians coped with difficult cases or the pressure of their career by having spent time with friends and family, but that was eliminated by the pandemic (Santarone et al., 2020).

DISCUSSION

Summary and Practical Implications

This research sought to determine the ways in which healthcare workers' psychological well-being decreased because of the COVID-19 pandemic. Mental health of healthcare employees had been at least concerning prior to the pandemic, but it was certainly exacerbated afterward. As hospitals faced great financial hardship secondary to increased LWBS and LOS, the focus seemed to be on financial viability as opposed to prioritizing the psychological states of clinicians. The hypothesis of this research was anecdotally supported in the interview and mostly supported through the data, but further research is necessary to determine exact correlations for ED healthcare workers specifically. In the future, it will be vital for administrators to prioritize the mental health of their employees.

Semi-Structured Interview Opinions

Opinions derived from the semi-structured interview include: all healthcare workers' mental health was not prioritized over metrics during the COVID-19 pandemic, and the pandemic exacerbated and brought-to-light the issues that were present in the healthcare system prior to the pandemic. Details of the interview are shown in figure 4.

Limitations

These data were limited as SARS-CoV-2 was not declared a pandemic until 2020. There were quite limited sources discussing both hospital financials in tandem with the psychological repercussions of the pandemic on healthcare workers. Elements of publication biases may have been present, as well as recall bias from the interviewee. Further, there was research bias present in being a healthcare worker during the pandemic, myself included. Finally, mental health has historically been qualitative unless surveys were employed, as some were in the results section.