

The Effects of the COVID-19 Pandemic on Burn Clinic

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Abstract

The COVID-19 pandemic has led to anxiety and fears for the general public. It is unclear how the behavior of people with acute burns and the services available to them has changed during the pandemic. The aim of our observational study was to evaluate our clinic's experience with patients presenting with burns during the first ten months of the COVID-19 pandemic and determine if delays in presentation and healthcare delivery exist within our burn population. Patients referred to our clinic from March 1, 2020 to Dec 15, 2020 were reviewed for time of presentation after injury. We defined a true delay in presentation of >5 days from date of injury to date of referral for patients who were not inpatients at our facility or received initial care elsewhere prior to referral. Of the 246 patients who were referred to our clinic, during this time period, 199 patients (80.89%) attended their appointments. Our in-person clinic volume from referrals increased in July 2020 with a sharp decrease in August 2020. Our total clinic volume decreased in 2020 from 2019 by about 14%. Referrals to our clinic decreased in 2020 from 2019 by about 34%. Video telehealth visits did not account for the decrease in visits. There was low incidence of delays in presentation to our clinic during the pandemic. Additional investigation is necessary to see if the incidence of burn injury decreased. Despite the pandemic, our clinic remained ready and open to serve the burn population.

Key words: COVID-19, pandemic, burns, burn clinic

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Introduction

The COVID-19 pandemic has produced unintended consequences on the healthcare system. COVID-19 has affected over 73 million individuals worldwide and over 1 million in the U.S. as of December 2020¹. The pandemic has not only affected the delivery of healthcare services, but has also led to anxiety and fears for the general public, impacting the behavior of patients². People may have been concerned about presenting to a medical facility where the virus may be transmitted. Furthermore, stay-at-home orders that were implemented during the pandemic did not apply to clinic visits, but contributed to people, especially the medically vulnerable, staying at home even for medical care. Moreover, on March 18, 2020, the Centers for Medicare & Medicaid Services (CMS) recommended that most elective surgeries and non-essential medical and surgical procedures be cancelled or delayed³. As of June 30, 2020, approximately 41% of adults in the United States reported having delayed or avoided medical care because of concerns about the virus, of which 12% reported having avoided urgent or emergency care⁴. The pandemic has also been associated with significant decreases in primary care delivery, despite large increases in the use of telemedicine⁵. Clinics have had to adjust to include alternate methods of delivery given these circumstances. Notably, the CMS allowed for a temporary expansion of telehealth services during COVID-19⁶.

According to the National Hospital Ambulatory Medical Care Survey, burns leading to a visit to the emergency department affected 489,000 individuals in the United States in 2017⁷. Considering the aforementioned circumstances including quarantine guidelines and more people remaining at home to avoid contracting the virus, it is unclear how the behavior of people with acute burns and the services accessible or available to them has changed in 2020. The impact of COVID-19 on the outcomes of burn patients who may be delaying presentation to receive care is consequential since early interventions are essential in burn management and long-term outcomes. Optimum treatment of burn wounds reduces morbidity and mortality and shortens the time for healing and return to normal function. When epithelialization and healing is delayed, the incidence of

hypertrophic scarring increases as well as the risk of scar contracture formation⁸. The aim of this observational study is to evaluate our institution's experience with patients presenting with burns during the first ten months of the COVID-19 pandemic and determine if delays in presentation and healthcare delivery exist within our burn population.

Methods

We performed a retrospective chart review to determine our in-person clinic volume from March 1, 2020 to Dec 15, 2020 compared to the same time period in 2019. We also queried our clinic data for number of patients referred to our burn clinic and how many of those patients ultimately were seen in our clinic. Patients referred to our burn clinic from March 1, 2020 to Dec 15, 2020 were retrospectively reviewed for time of presentation after injury. Days from injury date to clinic referral date and days from clinic referral date to appointment date were calculated overall and across each month.

An arbitrarily defined range of >5 days from date of injury to referral date was selected to identify delays in presentation. This arbitrary number was unanimously chosen by the authors based on a review of data from previous years that showed a time to presentation of 3-5 days from date of injury. We defined a true delay in presentation of >5 days from date of injury to date of referral for patients who were not inpatients at our facility or received initial care elsewhere prior to referral. Patients who were referred from an outside facility or emergency department and did not have a completed clinic visit appointment were excluded from our analysis because injury date could not be determined. Univariate analysis was performed.

Results

Burn Evaluations

A total of 1537 in-person visits were conducted from March 1st to December 15th, 2019, which included new referrals and follow-up visits. A total of 1321 in-person visits, which included new referrals and follow-up visits, were conducted from March 1st to December 15th, 2020, of which 1295 visits were in person and 26 were via telemedicine (Figure 1). Regarding new burn referrals specifically, 373 patients were referred in 2019 and 246 were referred in 2020.

Demographics

The chart review yielded 246 patients who were referred to our burn clinic from March 1, 2020 to Dec 15, 2020 (Table 1). Most were internal referrals, of which 62% were referred within University of California, Irvine (UCI) Health system, 28% were referred by an external provider or facility, and 10% were self-referred. The mean age was 32 years (standard deviation (SD) 22.82) and the median age was 29 years (interquartile range (IQR) 12-50). Of all patients, 148 (60%) were male and 98 (40%) were female. The median total body surface area (TBSA) was 1.25% (IQR 0.5-4). Notably, 30 patients were not included in this characterization because 28 TBSAs were not documented and 2 were not relevant due to degloving injury and bullous pemphigoid. The month with the greatest median TBSA was May 2020 with 1.75 (IQR 1-3; n=23) and the month with the lowest TBSA was April 2020 with 0.5 (IQR 0.5-2.5; n=19).

Of those patients who were referred to our burn clinic, 199 patients (80.89%) attended their appointments and were seen in our clinic (Figure 2). Of all patients who attended, 115 (57.59%) were male and 84 (42.21%) were female. Patients who attended were younger with an average age of 30 years old (SD 23.87) and had median TBSA of 1 (IQR 0.5-4). Of patients who did not attend their appointments, there were more males (70.21%) than females (29.79%) and they were older with a mean age of 40 years old (SD 15.68) and a median age of 39 years old (IQR 27.5-52). Although

the majority of these patients did not have a recorded TBSA, of those who had their TBSA recorded by a consulting burn service in the emergency department or while inpatient, the median TBSA was 2.25 (IQR 0.875-4.625). Only 12.7% of these patients were referred from a facility outside of UCI.

Delays in presentation

Our in-person clinic volume from referrals increased in July 2020 with a sharp decrease in August 2020 (Figure 2). The month with the greatest number of newly referred patients seen in our clinic was October 2020 (n=37). The month with the least number of new patients seen in our clinic was August 2020 (n=9).

The median date of injury (DOI) to date of referral was 4 (IQR 1-7; range 1-65). The greatest median DOI to date of referral occurred in May 2020 and September 2020 with 5 days (IQR 1-10; n=23) in May and 5 days (IQR 1-10.5; n=33) in September (Figure 3). The least median DOI to date of referral occurred in November 2020 with 0 days (IQR 0-1; n=17). We defined a true delay in presentation of >5 days from date of injury to date of referral for patients who had not been admitted inpatient or received initial care elsewhere prior to referral. The total percentage of true delays was 0.02% over the study period. There was a total of five true delays, including April, July and October with 1 true delay each, and December with 2 true delays. For patients with true delays, the mean age was 31 years old, 60% (3/5) were female, 40% (2/5) were male, and the median TBSA was 2.25% (IQR 1.375-3.25). Three were scald burns, one was a sunburn, and one was a contact burn. In three cases, the patients had self-medicated at home, and in two cases, the patients had a family member who was in the medical field and had prescribed treatment. One patient reported development of blistering as a result of delaying care, but there were no significant complications in the other cases. Patients who did not show up to their clinic appointments had earlier initial presentations to a referral site with a median DOI to date of referral of 2 days (IQR 1-6).

The median date of referral to appointment date was 5 days (IQR 1-9). The months with the greatest median date of referral to appointment date were August (median 7; IQR 1-8), October (median 7; IQR 3-10), November (median 7; IQR 3-9), and December (median 7; IQR 1-11.5). The month with the least median date of referral to appointment date was June 2020 with median of 1 (IQR 0-3).

Discussion

Burn injuries are considered trauma and nearly 500,000 patients seek medical care for burns every year in the United States with approximately 92% treated in the outpatient setting⁹. All burn patients, regardless of care received within the inpatient or outpatient setting, should be evaluated for concomitant injuries¹⁰. Burns are a time-sensitive condition with delay in treatment leading to increased rates of complications¹¹. In the general population, even minor burns can worsen with time and progress or convert to more severe burns, and may need to be reassessed in 24 to 72 hours^{12,13}. Depth can also increase because of inadequate treatment or superinfection¹². During the COVID-19 pandemic, a study at the United Kingdom (UK) Burn Center demonstrated that infection rates were higher following delayed presentation (21% vs 6%)¹⁴. Additionally, burns can develop hypertrophic scarring if left untreated¹². Prompt assessment is especially crucial in populations with other comorbidities. Notably, individuals with diabetes mellitus are more likely to present for medical care more than 24 hours after a burn injury due to preexisting neuropathy¹⁵. A 10-year retrospective analysis in this diabetic population has demonstrated an overall complication rate of 90%¹⁶. Thus, early and appropriate treatment prevents detrimental sequelae and promotes rapid healing.

The purpose of our study was to observe how the COVID-19 pandemic affected patients requiring outpatient burn care, and in particular at the UCI Health Regional Burn Center.

Regarding California's timeline of the COVID-19 pandemic, California Governor Gavin Newsom initially issued a stay-at-home order on March 19, 2020. On March 29th, this order was extended for an additional 30 days, and on March 31st, the California Department of Education advised students not to return for in-person learning for the remainder of the school year. On May 27th, many counties across California started to see a spike in cases following Memorial Day. On November 12th, it was reported that the United States crossed 150,000 new COVID-19 cases for the first time. Due to this spike, on November 16th, California's governor imposed new restrictions on businesses. On December 3rd, Governor Newsom announced a new conditional stay at home order as California faced rising hospitalizations and Intensive Care Unit (ICU) admissions¹⁷.

In this observational study of 246 burn patients, we found an extraordinarily low incidence of delays in presentation for burn patients during the pandemic. However, clinic visits were delayed early in the pandemic and time to presentation did increase from March to May 2020. Additionally, certain months did show increased time to presentation, but these were consistent with peak times during the pandemic. There are multiple possible reasons for increased time to presentation during the onset of the pandemic and during peak months. Fear of contracting COVID-19 in a medical setting may have played a role in increased time from injury to presentation at a primary care physician (PCP), an urgent care clinic, or the emergency department (ED), especially since we saw an increase during the first few months of the pandemic. Several studies have established this fear and its relation to delays in seeking medical attention^{4,18}. A study at the UK Burn Center found that 36% of adults and 8% of children reported delay in seeking medical attention following burn injury due to concern of catching the virus¹⁴. In a survey of more than 1,300 patients at Vanderbilt University Medical Center, more than half of survey respondents admitted to delaying routine health care during the pandemic, but although the primary motivator was anxiety about becoming infected, other commonly cited reasons were complying with government mandated stay-at-home restrictions and following advice from their health care team¹⁹.

Only 199 out of 246 newly referred patients (80.89%) who were referred presented to their clinic appointment. However, it is possible that additional care may have been informally given via telephone but not well captured. The median amount of time from date of injury to the date of clinic appointment was greatest in the month of August at twelve days. The median amount of time from injury to referral date was greatest in the month of September at five days and the median amount of time from referral to clinic appointment in our study was greatest in the last few months of the year at 1 week at (Figure 3). Patients may have received self-care instructions from their referral site or by phone when making an appointment with our burn clinic during this initial week. This early part of burn care was not measured; although, it is important to note that the quality and extent of early expertly guided care may have an impact on the outcomes. Aside for the above presented hypotheses for delayed time to presentation, other factors unrelated to the pandemic or exacerbated by the pandemic such as socioeconomic factors including financial and non-financial barriers, such as loss of social support, loss of employment, lack of transportation, and temporary closure of primary care and urgent care clinics to prevent spread of the virus may have contributed to the lack of presentation of the remaining 20% of referred patients²⁰⁻²².

Interestingly, the months with the greatest time in between referral and appointment date appeared to be towards the end of the year (October, November, December). October was the month with the greatest amount of in-person referral visits, this could be in part due to the fact that more people were scheduling appointments and “catching up” with their routine burn care thus delays may have been due to availability of clinic appointments. This increased time from referral to appointment date in November and December could be in part due to the holiday season and holiday related closures in our clinic. Patients could have also delayed scheduling an appointment following referral due to pandemic-related stay at home orders which were again implemented in California on December 3rd. Aside from delaying treatment, other potential impacts of the pandemic on burn care include the ability to teach wound care to family members or caregivers due to visitor restrictions or the number of patients that can be seen in a single clinic day due to waiting room

space limitations related to social distancing efforts. Although we do not have the data to capture these aspects, these are important topics for further investigation.

Our total clinic volume decreased in 2020 from 2019 by about 14% (1321 visits in 2020 compared to 1537 visits in 2019). Referrals to our clinic also decreased in 2020 from 2019 by about 34% (373 patients referred in 2019, 246 referred in 2020) This was consistent with trends seen in other medical settings during the pandemic worldwide. During the early pandemic period, the total number of U.S. ED visits was 42% lower than during the same period a year earlier²³. Hospital admissions and the number of ED visits for heart attack and stroke also declined⁴. Data is not yet available to know if burn injury nationally decreased as a result of the pandemic. Data from Italy in March demonstrated significant decreases ranging from 73% to 88% in pediatric ED visits compared with the prior year. Aside from pandemic-related factors, there may have been other minor burns during this time period that did not warrant referral to a burn clinic and may have been managed by an urgent care or PCP. Additional investigation is necessary to see if the incidence of burn injury decreased in 2020. Some hypothesized that there might in fact be an increase in the incidence of burn injuries from children staying at home and an increase of home cooking during the pandemic.

While our clinic did offer telemedicine visits during the pandemic, this only accounted for a small number of visits. This may be due to low enrollment in the electronic medical record encrypted communication platform and/or limited knowledge, limited access to the technology, or lack of comfort with this technology by patients or providers. Telemedicine has been utilized during the pandemic across various institutions, including UCI Health as a means for providing healthcare while limiting exposure to places where the virus may spread. One study at New York University (NYU) Langone Health demonstrated an increase in video-enabled telemedicine visits in March and April 2020 and patient satisfaction ratings remained unchanged²⁴. Other studies have demonstrated the feasibility of telehealth and telemedicine in burn care. Specifically, regarding burn assessment, telemedicine has been shown to improve accuracy of triage and determining the need for transfer to a specialized burn center. For follow-up burn consultations, the quality of information collected

during a video visit has been shown to be comparable to that collected during an in-person visit²⁵. However, limitations do exist, and methods to better utilize this technology should be further explored as virtual patient care continues to evolve post pandemic. Strategies for ways in which we can leverage technology and modify our practices for safer administration of care during the pandemic have been suggested and should be considered^{26,27}.

Our study has several limitations. Limitations include those inherent to an observational retrospective study. There is no consensus on the ideal minimum delay in burn treatment, and we therefore made an arbitrary selection of >5 days as a delay in care. In addition, since delays in presentations are likely multifactorial, many factors which could have contributed to increased time to presentation were not well-captured or quantified. These include socioeconomic factors, availability and access to medical care, and individual patient behaviors and perceptions surrounding the pandemic. As there have been significant differences in COVID cases and healthcare delivery in different regions in the country at different points in time, our study may not be generalizable to other centers and is only a representation of the burn clinic in our region. Although we were able to compare the number of referrals and clinic appointments in 2020 and 2019, we were not able to compare delays in presentations to the prior year due to missing data points. Additionally, 28 TBSAs were not documented and therefore our characterization of that aspect is limited. Nevertheless, our study has demonstrated that there were no significant delays or difficulties in the functioning of our institution's burn clinic during the pandemic.

Conclusion

Our burn clinic remained open to see patients with burn injury throughout the pandemic; however, clinic visits were delayed early in the pandemic. While we had video telemedicine visits, it did not account for the decrease in clinic visits in 2020 compared to 2019. Additional care may have been informally given via telephone but not well captured. It is important to emphasize to the public the importance of prompt medical assessment, even during a pandemic, along with modifying our practices to observe safety guidelines and also provide alternative options such as telehealth.

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Tables

Table 1: Demographics of burn referrals from March 1st to December 15th, 2020

Characteristics		Referred (n=246)	Seen in Clinic (n=199)
Sex			
Female	n (%)	98 (39.84%)	84 (42.21%)
Male	n (%)	148 (60.16%)	115 (57.79%)
Age	Mean	32.08±22.82	30.25±23.87
TBSA	Median (IQR)	1.25 (0.5-4)	1 (0.5-4)
Referred by	UCI Health Outside Facility Self	153 (62%) 70 (28%) 23 (10%)	

TBSA: Total body surface area

Figure Legends

Figure 1: Burn referrals who presented to their appointment from March 1st to December 15th in 2020 compared to the same time period in 2019

Figure 2: New burn evaluations including patients referred and patient seen in our burn clinic from March 1st, 2020 to December 15th, 2020

Figure 3: Median # of Days from Date of Injury to Referral, Referral to Appointment, and Injury to Appointment from March 1st, 2020 to December 15th, 2020

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Figure 1

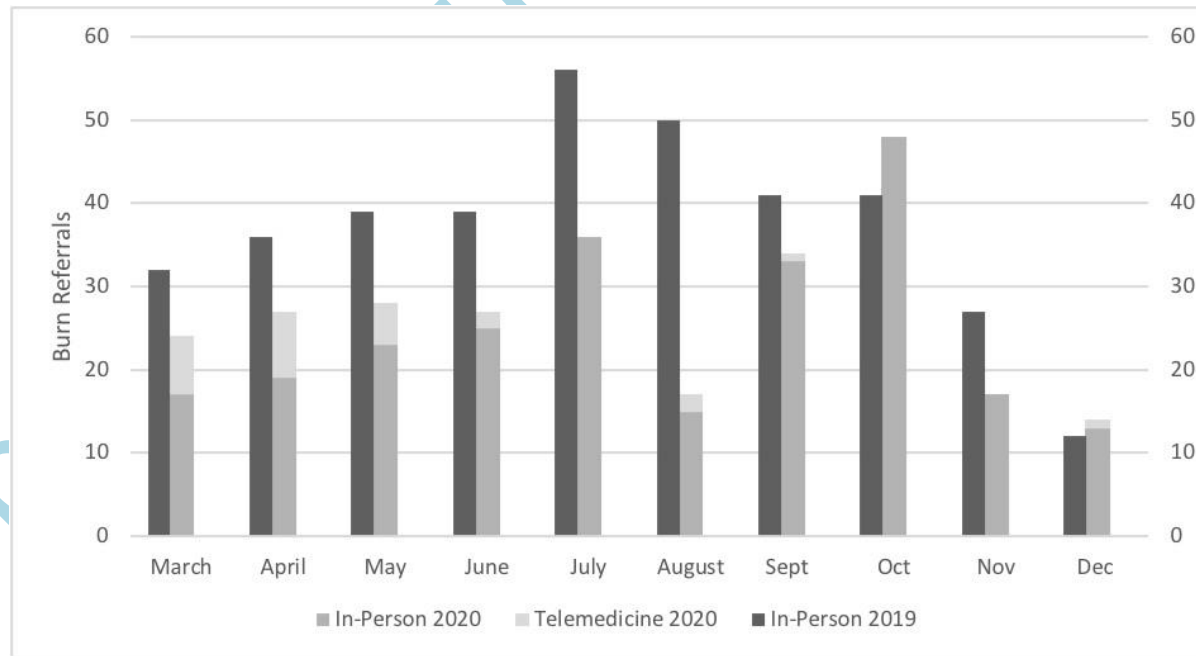


Figure 2

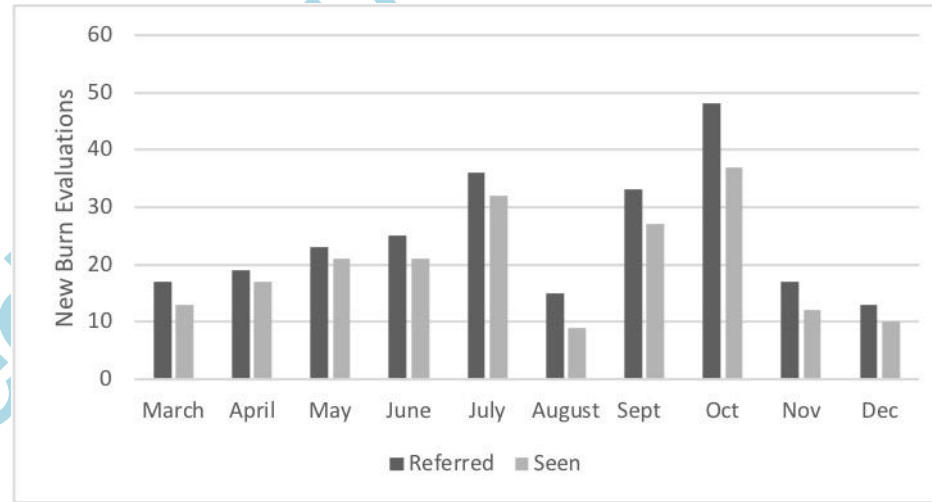


Figure 3

