



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



COVID-19 related admissions to a regional burn center: The impact of shelter-in-place mandate

Felicia N. Williams^{a,b,*}, Lori Chrisco^{a,b}, Rabia Nizamani^{a,b}, Booker T. King^{a,b}

^a Department of Surgery, University of North Carolina School of Medicine, Chapel Hill, NC, United States

^b North Carolina Jaycee Burn Center, Chapel Hill, NC, United States



ARTICLE INFO

Article history:

Received 18 June 2020

Received in revised form 20 July 2020

Accepted 24 July 2020

Available online 28 July 2020

Keywords:

Pediatric burns

COVID-19

Pandemic

School-age children

Shelter-in-place

ABSTRACT

The ramifications from the 2019 severe acute respiratory syndrome coronavirus 2 (COVID-19) pandemic caused by the novel corona virus will be felt globally for years to come. Mandates to shelter-in-place were called in nearly every state to limit viral exposure. The impact of the mandate on acute burn admissions was unknown. Our objective was to assess the impact of a shelter-in-place order on acute burn admissions at our burn center. All patients admitted to the burn center with burn injuries– including inhalation injury only– and desquamating skin disorders between March 10th to May 22nd, 2020 were eligible for inclusion. We compared all burn center admissions to a month-matched historical cohort from 2019, and summertime admissions for the last five years. Statistical significance was accepted as $p < 0.05$. There was a 9% increase in pediatric admissions after the shelter-in-place order. Compared to the 2019 cohort, there was a 28% increase in admissions of school aged children in 2020. This was not statistically significant. While the purpose of the “shelter-in-place” mandate was to reduce viral transmission of COVID-19, it consequently led to an increased percentage of admissions of school age children- comparable to our summertime numbers. More outreach and education are needed to provide safe resources for families during this pandemic.

© 2020 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The ramifications from the 2019 severe acute respiratory syndrome coronavirus 2 (COVID-19) pandemic caused by the novel corona virus, will be felt globally for years to come [1]. In the United States, unprecedented mandates to shelter-in-place were implemented in nearly every state. For many states, these mandates outlined social distancing, closures of public schools and non-essential businesses, and immediate ceasing of elective surgical procedures [2]. Without a cure in sight, the only option to control further outbreaks was to limit transmission through the population. A decrease in elective procedures would limit exposure to other patients and staff, while also freeing hospital beds for potential COVID-19 positive patients [2,3]. This would alleviate already available stressed resources from personnel to personal protective equipment (PPE) [3]. For Burn specialists, the mandate meant halting elective laser therapy and any cosmetic procedures for burn survivors. While North Carolina’s first documented case was March 3rd, 2020, our state’s mandates did not go into effect

until March 10th, 2020. The impact of the mandate on acute burn admissions was unknown. Our objective was to assess the impact of the shelter-in-place order on acute burn admissions at our burn center.

2. Materials and methods

All patients admitted to the burn center with burn injuries– including inhalation injury only– and desquamating skin disorders between March 10th and May 22nd, 2020 were eligible for inclusion. The North Carolina shelter-in-place mandate went into effect on March 10th, 2020. In order to slow the spread of COVID-19 while lifting restrictions, North Carolina eased restrictions in a three-phase approach with phase 1 remaining shelter-in-place. Phase 2 lifted the stay at home order and began on May 22nd, 2020. We compared all burn center admissions to a month-matched historical cohort from 2019. We also compared the percentage of school age admissions from 2020 from March 10th to May 22nd to summertime admissions from 2015 to 2019. Patients were identified using the Burn Center registry and were divided into two groups: pediatrics and adults. Patients younger than 18 years old were counted as pediatric patients and those 18 years and older were considered adults. Pediatric patients were further

* Corresponding author at: Department of Surgery, North Carolina Jaycee Burn Center, 101 Manning Drive CB 7600, Chapel Hill, NC 27599-7600, United States.

E-mail address: fnwmd@med.unc.edu (F.N. Williams).

classified as school age if between the ages of 6 and 17 years. Other variables of interest included sex, race/ethnicity, mortality and socioeconomic status. Statistical analysis was performed by using χ^2 test. Statistical significance was accepted as $p < 0.05$. The study was approved by our institutional review board.

3. Results

Between March 10th and May 22nd of 2019, our burn center admitted 313 patients. Of those, 82 (26%) were pediatric patients, and 231 (74%) were adults. In 2019, 25 (8%) of patients admitted were school age. Between March 10th and May 22nd of 2020, our burn center admitted 291 patients – a 7% decrease. Of those patients admitted, 89 (31%) were pediatric and 199 (69%) were adults. In 2020, after the stay-at-home order, 32 (11%) of patients admitted were school age. There was a 9% increase in pediatric admissions in 2020 compared to 2019 during the shelter-in-place order time frame. There was a 13% decrease in adult admissions in 2020 compared to 2019 during the shelter-in-place order time frame. Compared to the historical cohort of 2019, there was a 28% increase in school aged children in 2020, and a 10% decrease in all other populations. When we compared the percentage of school age admissions in 2020 from March 10th to May 22nd (11%) to the percentage of school age admissions during the summer breaks from 2015 to 2019, the percentages were essentially equivalent (11%, 11%, 12%, 10%, 10%, respectively). None of these comparisons were statistically significant.

There were also no statistically significant differences in race, sex, burn etiology, type of insurance, or mortality. For school age children, there was a 36% increase in those with free or low cost federal and state health insurance in 2020 compared to 2019, though this did not reach statistical significance. None of the patients admitted during the study period in 2020 tested positive for COVID-19 during their hospitalization.

4. Discussion

During the shelter-in-place order, pediatric burn admissions increased by 9% between March 10th and May 22nd of 2020 compared to the prior year. Most importantly, there was a 28% increase in burn injuries for school-aged children – one of our most vulnerable patient populations. Total numbers of admissions were down, which is expected, and similar to what has been published [2,3]. This was secondary to the decrease in adult burn admissions compared to historical cohorts. Besides age, there was no other demographic difference between cohorts.

We have previously reported that, we have the greatest number of admissions during the summer season [4]. The shutdown of public schools, and non-essential businesses due to the shelter-in-place order led to a “summer break” effect, where the percentage of school age pediatric admissions were equivalent. Instead of being in school, children remained at home. We speculate that supervision was a major factor, and without school, teachers, friends, and counselors, children had fewer resources to help identify or protect against potential safety concerns, or violence in the home [5].

Scientists predict there will be a second wave “outbreak” of COVID-19 infections, that will force another “shelter-in-place” order [6]. There is further speculation that the second wave will be more ominous than the first wave. While the next “shelter-in-place” order may decrease viral transmission, and protect hospitals and healthcare providers from being overwhelmed with COVID-19

patients, it may also lead to significantly increased risk of burn injuries to children. Schools are essential at maintaining lifestyles that minimize danger, such as domestic violence and health risks to children [5,7]. “Shelter-in-place” orders remove common safety nets provided by school’s teachers, coaches, and counselors for at risk children [5]. Based upon our experience, at risk children may already have limited financial resources, as indicated by no health insurance, or free/low cost health insurance. The public health burden of the COVID-19 pandemic does not end with the number of cases or deaths of patients infected with the virus, but must include the unforeseen impact of “safety” restrictions on the health and well-being of one of the most vulnerable populations – children.

Our critical evaluation of admissions to our burn center during this time may not be generalizable to all burn centers. Burn injuries and admissions are unpredictable, but this analysis presents an opportunity to address needed educational and community resources for burn prevention, and an opportunity to discuss strategies to protect children during another “shelter-in-place” mandate when the potential protection offered by teachers, counselors and coaches may be lost.

5. Conclusion

While the purpose of the “shelter-in-place” mandate was to reduce viral transmission of COVID-19, it consequently led to an increased percentage of admissions of school age children– comparable to our summertime numbers. More outreach and education are needed to provide safe resources for families during this pandemic.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

None.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- [1] Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497–506.
- [2] Malay DS. COVID-19, pandemic, and social distancing. *J Foot Ankle Surg* 2020;59:447–8.
- [3] Forrester JD, Liou R, Knowlton LM, Jou RM, Spain DA. Impact of shelter-in-place order for COVID-19 on trauma activations: Santa Clara County, California, March 2020. *Trauma Surg Acute Care Open* 2020;5:e000505.
- [4] Williams FN, Slijovic S, Chrisco L, Nizamani R, Cairns BA, Jones SW. Acuity is seasonal in a tertiary care burn center. *J Burn Care Res* 2020;41:359–62.
- [5] Lloyd M. Domestic violence and education: examining the impact of domestic violence on young children, children, and young people and the potential role of schools. *Front Psychol* 2018;9:2094.
- [6] Xu S, Li Y. Beware of the second wave of COVID-19. *Lancet* 2020;395:1321–2.
- [7] Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. *Lancet* 2016;387:2423–78.