BRIEF REPORT

Changes in Pediatric Emergency Department Visits During the COVID-19 Pandemic

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ABSTRACT

OBJECTIVES: Community mitigation measures were implemented to decrease the spread of severe acute respiratory syndrome coronavirus 2. In this study, we aimed to evaluate changes in pediatric emergency department (ED) visits, secondary to acute respiratory illnesses (ARIs) and trauma, before and during the pandemic. We hypothesized that the numbers of ED visits and ARIs would decrease, whereas the proportion of trauma visits would increase.

METHODS: A retrospective study from 2018 to 2020 was performed on children 18 years and younger presenting to the ED either for ARI or trauma at a high-volume comprehensive pediatric hospital between March and May each year. *International Classification of Diseases, 10th Revision, Clinical Modification* admission diagnosis codes were used to identify ARI, trauma, and injury mechanisms. Pearson's χ^2 test was used to compare proportions between categorical variables.

RESULTS: Overall, 6393 total ED visits occurred in 2020, compared with 11 758 and 12 138 in 2018 and 2019, respectively. In 2020, the total ARI number declined by 58%, and ARI frequency decreased significantly, whereas the total trauma number declined by 34%, and the proportion of trauma visits significantly increased. In addition, the number and proportion of recreational vehicle crashes increased, whereas the number and proportion decreased for all intentional and animal-related traumas.

CONCLUSIONS: The total number of pediatric ED visits dropped precipitously in 2020, but the proportion of trauma visits increased significantly in 2020, accounting for greater than one-quarter of all ED visits. Injury mechanism varied significantly compared to previous years. Future studies are needed to confirm these findings and evaluate the benefits of community mitigation to decrease ARIs and strategies directed to reduce mechanism-specific trauma.

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Dr Haddadin conceptualized and designed the study, designed the data collection instruments, collected data, conducted the initial data analyses, drafted the initial manuscript, and reviewed and revised the manuscript; Ms Blozinski conducted data analyses and reviewed and revised the manuscript; Ms Fernandez, Ms Vittetoe, and Ms Greeno collected data and reviewed and revised the manuscript; Dr Halasa conceptualized and designed the study and reviewed and revised the manuscript; Dr Lovvorn conceptualized and designed the study, coordinated and supervised data collection and analysis, and critically reviewed the manuscript for important intellectual content; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

To attenuate the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), community mitigation strategies, such as social distancing, stay-at-home orders, closures of schools and places of worship, and telemedicine, were implemented nationwide.[1] The safer-at-home order for our state was issued on March 30, 2020,[2] and recommended that state residents stay home unless necessary, that nonessential businesses close, and that learning in schools be remote, all to limit the exposure to and spread of SARS-CoV-2. Moreover, most schools were closed by March 16, 2020.[3] Pre–coronavirus disease 2019 (COVID-19) data reveal that non–SARS-CoV-2 acute respiratory illnesses (ARIs) and trauma were the 2 most common reasons for pediatric emergency department (ED) visits, with consistent opposing seasonal peaks.[4] After the statewide safer-at-home order and school closures were mandated, pediatric surgeons at our institution noticed an unusual increase in trauma visits related to recreational and outdoor activities for this time of the year. Conversely, pediatricians noted a decrease in ARI visits during what is normally considered still the school year and respiratory season.[4] Therefore, in this study, we aimed to assess changes in pediatric ED visits at a comprehensive regional children's hospital, secondary to ARIs and trauma, from March 2020 to May 2020, during the initial pandemic peak, compared to the 2 previous years. We hypothesized that the total number of ED and ARI visits would decrease during the safer-at-home period but that the proportion of trauma visits would increase, maintaining a typically reciprocal relationship.

METHODS

This study was a 3-year single-center retrospective study from 2018 to 2020 and included children 18 years and younger who presented to the ED for either ARI or trauma at a high-volume, 343-bed freestanding children's hospital that includes an American College of Surgeons–verified level I pediatric trauma center between March 1 and May 31 of each year. This 3-month time frame of each year was chosen to correspond with the initial pandemic peak and the safer-at-home mandate and to include months still in the respiratory season and the end of the school year for our state. The specific aim was to evaluate pediatric ED visit changes during community mitigation periods in 2020 compared to the same time periods in previous years. We did not include data from the summer months for the following reasons: (1) community mitigation measures were loosened during phased reopening, which began in June in our state; (2) schools normally close at the end of May, when the summer trauma season begins; and (3) ARIs generally peak from October to May of each year, with few cases encountered in the summer months.[4] During the study period, all children who presented to the ED were identified by a request submitted to the analytics team at our institution. *International Classification of Diseases, 10th Revision, Clinical Modification* admission diagnosis codes were used to identify ARI, trauma, and the mechanism of injury (Supplemental Information). We aimed to compare total numbers and proportions of ARIs, trauma visits, and injury mechanisms during community mitigation periods in 2020 (ie, safer-at-home mandate in 2020) compared to the same time periods in previous years. All these comparisons were selected a priori. Pearson's χ^2 test was used to compare proportions between categorical variables. The institutional review board approved the study.

RESULTS

During these 3-month periods, 6393 total pediatric ED visits occurred in 2020, compared with 11 758 and 12 138 in 2018 and 2019, respectively (Table 1). In 2020, the total number of ARI visits declined by 58%, and the frequency of ARI visits also decreased significantly (Fig 1A). In contrast, although the total number of trauma ED visits declined by 34% in 2020, the proportion of trauma ED visits significantly increased from 21% and 22% in 2018 and 2019, respectively, to 26% in 2020 ($P < .001$; Fig 1A). In addition, in 2020, the cumulative proportions of trauma visits relative to ARI visits increased significantly after the safer-at-home order compared to previous seasons ($P < .001$; Fig 1B), maintaining seasonal reciprocity between these 2 causes of pediatric ED visits. A significant increase in the number and proportion of trauma visits related to recreational vehicle activities (ie, all-terrain vehicles and motorcycles) was detected ($P < .001$; Fig 1C, Table 2). In contrast, the numbers and proportions of both intentional (nonaccidental trauma [NAT] or abuse, suicide, and assault or homicide) ($P = .009$) and animal-related injuries ($P = .039$) decreased in 2020 compared to previous years.

DISCUSSION

This study revealed a 50% drop in all pediatric ED visits at a comprehensive regional children's hospital during the COVID-19 pandemic and safer-at-home mandate period compared to the same time periods in the 2 preceding years. Social distancing countermeasures aimed at mitigating the spread of SARS-CoV-2 likely contributed to the decreased circulation of other common repository viruses that share similar transmission routes with SARS-CoV-2.[5,6] Alternatively, the decrease in the total number and proportion of ARIs could be associated with changes in health care–seeking behaviors and limited access to care during the pandemic.[7] Although our findings are consistent with reports revealing decreases in viral ARIs, including influenza, in different regions and populations during the COVID-19 pandemic,[8,9] authors of prospective studies are encouraged to elucidate the actual causes of these decreases in ARIs and further confirm the role of nonmedical interventions in containing future viral epidemics and pandemics.

TABLE 1 Total Numbers of ARI- and Trauma-Related Pediatric ED Visits, Stratified by Year

	2018 ($n = 11\,758$), *n* (%)	2019 ($n = 12\,138$), *n* (%)	2020 ($n = 6393$), *n* (%)	*P*
ARI	2900 (24.7)	2994 (24.7)	1246 (19.5)	<.001[a]
Trauma	2443 (20.8)	2618 (21.6)	1666 (26.1)	<.001[a]

[a] Pearson's χ^2 test.

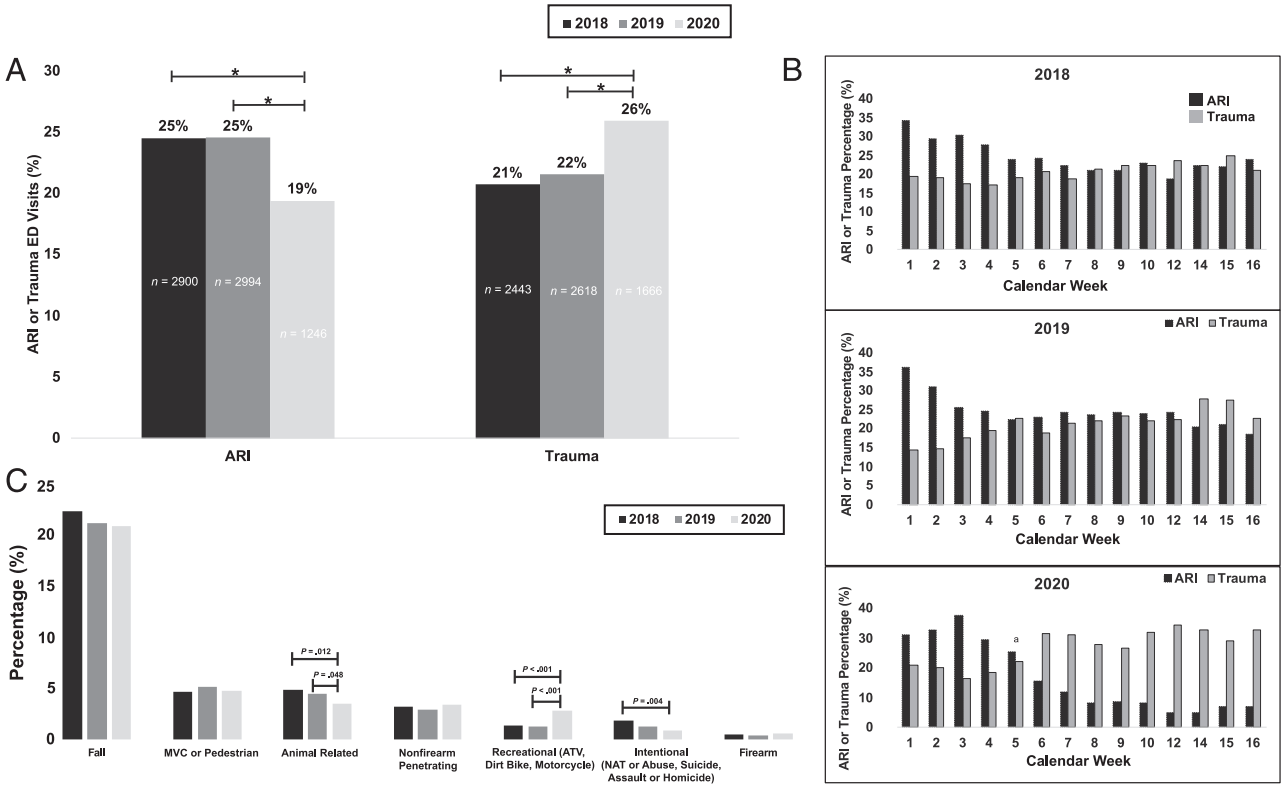

FIGURE 1 A and B, Proportions of ARI and trauma ED visits by study year (A) and calendar week (stratified by study year) (B). C, Proportions of mechanisms of trauma out of all trauma ED visits by study year. [a] Safer-at-home mandate was implemented during calendar week 5. * $P < .001$. ATV, all-terrain vehicle; MVC, motor vehicle collision.

The total number of pediatric trauma visits declined in 2020 during the safer-at-home mandate, possibly because of a reduction in driving, traffic, and organized after-school activities. However, this study revealed that trauma contributed to more than one-third of the total pediatric ED visits in April and May 2020, a significant increase compared to the previous 2 years. Moreover, mechanisms of injury seemed to vary from previous years too. Specifically, the total number and percentage of recreational vehicle injuries increased during 2020 during normal school months. In addition, as an American College of Surgeons–verified level I pediatric trauma center, we usually manage a large number of intentional traumas (NAT or abuse, suicide, assault or homicide),[10] but this season, our data revealed, intriguingly, that the numbers of these injuries declined significantly, likely resulting from the presence of multiple caregivers in the home with increased supervision, which also plausibly explains the decreases in animal-related injuries (eg, animal bites) in our study. Contrarily, data have revealed decreases in health care and ED visits among children during the pandemic,[7,11] and the decreases in NAT- or abuse-related visits

TABLE 2 Total Numbers of ED Visits According to Mechanism of Injury, Stratified by Year

	2018 (n = 3757), n (%)	2019 (n = 3924), n (%)	2020 (n = 2534), n (%)	P
Fall	848 (22.6)	842 (21.5)	535 (21.1)	.320[a]
MVC or pedestrian	178 (4.7)	204 (5.2)	122 (4.8)	.615[a]
Animal related	183 (4.9)	179 (4.6)	90 (3.6)	.039[a]
Nonfirearm penetrating	121 (3.2)	115 (2.9)	87 (3.4)	.512[a]
Recreational (ATV, dirt bike, motorcycle)	53 (1.4)	50 (1.3)	73 (2.9)	<.001[a]
Intentional (NAT or abuse, suicide, assault or homicide)	70 (1.9)	52 (1.3)	24 (0.95)	.009[a]
Firearm	18 (0.5)	15 (0.4)	15 (0.6)	.482[a]

Overall, 6727 unique trauma-related ED visits with 10 215 unique trauma-related admission diagnosis codes occurred. ATV, all-terrain vehicle; MVC, motor vehicle collision.

[a] Pearson's χ^2 test.

might be a reflection of decreased presentation rather than true declines, given that teachers and other school staff are often instrumental in bringing these concerns to attention in a timely manner and that closure of schools may have contributed to reduced detection and delayed presentation of NAT or abuse, which our study would not have captured given the time window chosen. Nevertheless, we do believe that multiple adults mandated to be home at the same time has contributed to a reduction in overall intentional and animal-related injuries through better supervision of young children. Although trauma negatively impacts children and their families directly, the health care system is also adversely affected during a pandemic, given the use of limited medical resources, such as protective attire and life-sustaining medical equipment. Furthermore, injury-related hospitalizations could potentially increase the risk of SARS-CoV-2 exposure to patients, families, and health care workers. Future studies are needed to confirm these findings (because such changes might require resource reallocation in pediatric ED settings) and to evaluate the need for strategies to avert mechanism-specific trauma during community mitigation periods and times of limited medical recourses during a pandemic. Because the COVID-19 pandemic is ongoing with intermittent school closures, increased parental supervision and adherence to practicing safe activities would be strongly encouraged.

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