Effects of COVID-19 lockdown on emergency paediatric plastic surgery admissions

Ahmad Sulaiman* BMed, MD 0000-0002-6186-449X 1 Claire Yinn Lim* BMed, MD 0000-0002-3694-9301 1,2 Marcio Brussius Coelho MBBS, MS 0000-0001-6254-8109 3 Peter Hayward MBBS, FRACS (Plast) 0000-0002-2170-5400 3 Sean Nicklin MBChB, FRACS (Plast), FRCS EdGlas 0000-0001-9732-1633 4 Mark Gianoutsos MBBS(Hons), MD, FRACS (Plast) 0000-0002-1563-1564 4
1 Department of Plastic Surgery, Sydney Children’s Hospital, Randwick, New South Wales, AUSTRALIA. 2 University of New South Wales, Kensington, New South Wales, AUSTRALIA. 3 Department of Plastic Surgery, The Children’s Hospital at Westmead, Westmead, New South Wales, AUSTRALIA. 4 Department of Plastic Surgery, Sydney Children’s Hospital, Randwick, New South Wales, AUSTRALIA.

Keywords: COVID-19, wounds and injuries, pediatrics, plastic surgery, reconstructive surgical procedures, epidemiology, Australia.

Background
On 23 March 2020, due to the COVID-19 pandemic, Australia went into a nationwide lockdown which led to school closures. As a result, children spent more time at home, increasing their hypothetical vulnerability to injuries sustained at home. This study aims to analyse the patterns of emergency paediatric plastic surgery admissions across two tertiary paediatric hospitals in New South Wales (NSW) during the COVID-19 lockdown period, and to raise awareness of the impacts of lockdown measures on the vulnerable paediatric population.

Methods
A retrospective analysis was conducted at two tertiary paediatric hospitals in NSW. Admissions to the Plastic and Reconstructive Surgery Department during the lockdown period 23 March–15 May 2020, and the same period in 2019, were included in the analysis. Ethics approval for the study was obtained from the Sydney Children’s Hospitals Network Human Research Ethics Committee [HREC Reference 2021/ETH00451]

Results
There were 231 and 181 admissions in 2019 and 2020 respectively. Injuries sustained at home increased from 121 to 130, consistent with increased time spent at home. There was a significant increase in cases of animal bites (11 versus 20, \(p = 0.016\)), burns (22 versus 32, \(p = 0.015\)) and a significant decrease in sports-related injuries (20 versus 5, \(p = 0.013\)) during the lockdown period.
Conclusion
During periods of lockdown, home injuries, burns and animal bites are more common in the paediatric population, while sports-related injuries are less common. With a greater understanding of patterns of paediatric injuries during lockdowns, the relevant authorities can develop targeted advisories for dissemination to the public on how to create a safe lockdown environment for children.

Introduction
On 11 March 2020, the World Health Organization declared the COVID-19 health crisis a global pandemic. Concerns over its rapid transmission rates and threats of an overwhelmed healthcare system prompted the Australian government to impose lockdown measures commencing 23 March 2020. These measures included the shutdown of non-essential businesses and activities such as gyms, eat-in restaurants and places of worships, as well as the introduction of social distancing guidelines. Many schools transitioned to online learning and parents were encouraged to keep their children at home. The lockdown persisted until 15 May 2020, when restrictions were eased. Schools reopened and students gradually returned to the classroom.

As a result of the lockdown, children spent more time at home with their family and pets. Injuries are the biggest contributors to surgical burden worldwide, producing significant healthcare costs, which are often preventable. Recent studies have shown that domestic violence-related injuries increased during COVID-19 lockdowns. Additionally, studies have shown that lockdowns have caused a rise in injuries resulting from animal bites. With this in mind, prioritising injury-reduction strategies can preserve limited healthcare resources.

With the possibility of future lockdowns, this study aims to analyse the patterns of emergency paediatric plastic surgery admissions during the COVID-19 lockdown period, and to raise awareness and therefore decrease the impacts of lockdown measures on the vulnerable paediatric population.

Methods
A retrospective analysis was performed by obtaining data from two tertiary paediatric hospitals, Sydney Children’s Hospital (SCH) and The Children’s Hospital at Westmead (CHW), capturing all patients who were admitted under the Plastic and Reconstructive Surgery Department during the lockdown period from 23 March to 15 May 2020 and the same period in 2019. Both hospitals are part of a specialty network in NSW and collectively receive patients from the Western Child Health Network, Greater Eastern and Southern Child Health Network, and the Australian Capital Territory.

Ethics approval for the study was obtained from the Sydney Children’s Hospitals Network Human Research Ethics Committee [HREC Reference 2021/ETH00451]. All patients who were admitted under the plastic and reconstructive surgery team for emergency treatment for injuries were included in the study. Patients who underwent elective operations or revision procedures for injuries sustained prior to the designated periods were excluded. Children < 1 year of age were excluded as they were likely to spend the majority of time at home regardless.

Charts were reviewed for patient demographics (age and sex), reason for admission, injury characteristics (mechanism and location of injury), management type (conservative versus surgical) and length of stay. The mechanisms of injury were divided into nine main categories—animal bites, contact with sharp objects, crush injuries, sports-related, falls, being struck by an object, motor vehicle accidents (MVAs), person-inflicted and burns.

All statistical analyses were undertaken in IBM SPSS version 26 (IBM SPSS, 1 New Orchard Road, Armonk, NY, 10504-1722, USA). Dichotomous data were compared using the chi-square test or Fisher’s exact test, as indicated. Continuous variables were assessed for normality using the Kolmogorov-Smirnov (K-S) test, with parametric data analysed by Student’s t-test, while non-parametric data was analysed using a Mann-Whitney U test. P < 0.05 is considered statistically significant in this study.

Analysis
A total of 181 patients were admitted under the plastic surgery department during the 2020 lockdown period, while 231 patients were admitted over the same period in 2019. Baseline demographic and treatment data were available for all 412 patients and are presented in Table 1.
Effects of COVID-19 lockdown on emergency paediatric plastic surgery admissions

There was a reduction in admissions into the plastic surgery department from 2019 to 2020, where a 21.6 per cent decrease was observed (231 versus 181). The mean age of patients in both groups is similar (5.07 versus 5.13), and the mean length of stay increased from 1.23 days in 2019 to 1.38 days in 2020. These were not found to be statistically significant.

However, there was a statistically significant increase in the number of injuries sustained at home, from 121 (52.4%) in 2019 to 130 (71.8%) in 2020 ($p < 0.001$). Similarly, more patients received conservative management in 2020 (29) compared to 2019 (15; $p = 0.003$).

There was a single episode of person-inflicted injury in both 2019 and 2020.

Overall, the number of injuries as a result of contact with a sharp object and MVAs remained relatively unchanged, while the number of falls and crush injuries decreased. These were not found to be statistically significant. Across both years, there was a total of five injuries that were unwitnessed, and thus no mechanism of injury could be identified (Figure 1; Table 2).

Table 1. Baseline demographic and treatment data

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of admissions</td>
<td>231</td>
<td>181</td>
<td>--</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>5.07</td>
<td>5.13</td>
<td>0.977</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>81 (35.1)</td>
<td>69 (38.1)</td>
<td>0.522</td>
</tr>
<tr>
<td>Female (%)</td>
<td>150 (64.9)</td>
<td>112 (61.9)</td>
<td></td>
</tr>
<tr>
<td>Number of injuries sustained at home (%)</td>
<td>121 (52.4)</td>
<td>130 (71.8)</td>
<td>$&lt; 0.001$</td>
</tr>
<tr>
<td>Conservative management (%)</td>
<td>15 (6.5)</td>
<td>29 (16.0)</td>
<td>0.003</td>
</tr>
<tr>
<td>Length of stay (days; mean)</td>
<td>1.14</td>
<td>1.08</td>
<td>0.439</td>
</tr>
</tbody>
</table>

Table 2. Distribution of mechanism of injury in 2019 and 2020

<table>
<thead>
<tr>
<th>Mechanism of injury</th>
<th>2019</th>
<th>2020</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal bite (%)</td>
<td>11 (4.8)</td>
<td>20 (11.0)</td>
<td>0.016</td>
</tr>
<tr>
<td>Burns (%)</td>
<td>22 (9.5)</td>
<td>32 (17.7)</td>
<td>0.015</td>
</tr>
<tr>
<td>Sports-related (%)</td>
<td>20 (8.7)</td>
<td>5 (2.8)</td>
<td>0.013</td>
</tr>
<tr>
<td>Person-inflicted (%)</td>
<td>1 (0.4)</td>
<td>1 (0.6)</td>
<td>1.00</td>
</tr>
<tr>
<td>Contact with sharp object (%)</td>
<td>22 (9.5)</td>
<td>23 (12.7)</td>
<td>0.304</td>
</tr>
<tr>
<td>Motor vehicle accident (%)</td>
<td>9 (3.9)</td>
<td>5 (2.8)</td>
<td>0.528</td>
</tr>
</tbody>
</table>

Fig 1. Distribution of injuries according to mechanism of injury, divided by year

The number of animal bite injuries nearly doubled, from 11 to 20, during the 2020 lockdown period compared to 2019 ($p = 0.016$). There was also a statistically significant increase in the incidence of burn injuries, from 22 to 32 ($p = 0.015$). Notably, there was significant reduction of 75 per cent in sports-related injuries (20 versus 5; $p = 0.013$).

There was also a single episode of person-inflicted injury in both 2019 and 2020.

Overall, the number of injuries as a result of contact with a sharp object and MVAs remained relatively unchanged, while the number of falls and crush injuries decreased. These were not found to be statistically significant. Across both years, there was a total of five injuries that were unwitnessed, and thus no mechanism of injury could be identified (Figure 1; Table 2).

Discussion

The COVID-19 lockdown resulted in a large decrease in paediatric plastic surgery admissions in 2020 compared to the same period in 2019, possibly due to fears of contracting COVID-19 from hospital encounters, less outdoor play or fewer injuries as a result of increased parental supervision. Centres in Melbourne, Italy and the United States also experienced a similar reduction in plastic surgery admissions.
This study has shown that the patterns of injuries also changed during the lockdown period, most notably, an increase in proportion of domestic accidents.

As hypothesised, injuries as a result of animal bites during the lockdown period was almost double those in 2019. While most domesticated animals provided emotional support for their owners during this lockdown period, the increased emotional dependence on pets may cause the pets to become stressed and lead to behavioural changes, including increased aggression. In addition, younger children are at greater risk of sustaining animal bites, particularly dog bites, as they are physically disadvantaged in size, strength and motor skills, and often do not understand animal boundaries.

Crucially, there was a statistically significant increase in the number of burn injuries ($p = 0.015$) during the lockdown period as the proportion of all injuries involving burns in 2019 increased from 9% to 18%. This is supported by various reports in literature. Worryingly, the paediatric population has seen the largest spike in the incidence of burns among all age groups and the severity of burns has also increased. Plausible explanations for this trend include an increase in use of steam inhalation, a hazard for younger children, as a home remedy for respiratory infections in a bid to avoid healthcare facilities. Parental education is essential in preventing these injuries.

Sports-related injuries decreased drastically, and this was expected given the state-wide bans on organised sporting activities. There was a single case of person-inflicted injury in both 2019 and 2020, although these were found to be a result of an assault at school and rough play between siblings respectively, thus they are not considered domestic violence. Unexpectedly, there was no increase in person-inflicted injuries over the 2020 lockdown period. However, it is important to recognise that there is an increased risk of person-inflicted violence during lockdowns, as reflected in the increased number of domestic violence cases in various other countries during the COVID-19 lockdown periods. Although the number of injuries resulting from sharp objects remained relatively unchanged, the proportion of injuries increased from 9.5% to 12.7%. An increase in kitchen injuries was also reported by another study and was expected given that government agencies recommended preparing food as a family to keep children engaged and promote family bonding during the lockdown period.

Increased exposure of children to sharp kitchen tools, coupled with less developed fine motor skills, leads to an increased risk of injuries. Motor vehicle accident injuries decreased marginally from 2019 to 2020, which is unsurprising as the lockdown period resulted in a reduction in overall road traffic. However, research has shown that drivers may have exhibited poorer behaviour during the pandemic, such as drink driving or speeding due to emptier roads. Therefore, it would be pertinent to remind parents to always remain vigilant on the roads both as drivers and pedestrians. Falls, crush injuries and injuries from getting struck by objects decreased in both absolute and relative numbers, likely due to movement restrictions, hence limiting running and dynamic movement in general.

In the 2020 lockdown period, conservative management was adopted in 29 cases (16.0%), almost double the number in 2019 (15; 6.5%). This was found to be statistically significant ($p = 0.003$). There are various possibilities for this observation, including less severe injuries, parental preference for conservative management to avoid prolonged hospital stays or surgeon discretion to avoid non-urgent surgery to avoid overloading hospitals.

**Limitations**

This study has a few limitations. Due to the retrospective nature of the study, data collected were not always complete. In particular, data on mechanism of injury or location of injury may be missing. Where possible, this was mitigated by retrieving patient notes via electronic medical records or documents from other hospitals where the patient initially presented. Another limitation is that the data may not reflect the actual patterns of presentations or admissions due to geographical restrictions, especially since patients from neighbouring states could not cross borders. The study also has a small sample size, which made it difficult to identify any significant relationships between the mechanisms of injury between 2019 and 2020. Lastly, this study does not take into account other external factors that could influence the risk of injuries in the paediatric population, which includes riskier physical and social behaviour or worsening mental health leading to self-harm.

**Conclusion**

This study has shown that during times of a pandemic lockdown, home injuries requiring
plastic surgical admissions are more common, fewer emergency plastic surgery admissions are noted and conservative management of injuries is more common. With a greater understanding of changes in the mechanisms and locations of paediatric injuries during lockdowns, the relevant authorities can develop targeted advisories for dissemination to the public on how to create a safe home environment for children to reduce the risk of injuries.

Conflicts of interest
The authors have no conflicts of interest to disclose.

Funding declaration
The authors received no financial support for the research, authorship and/or publication of this article.

References


