

The global impact of COVID-19 outbreak on the pediatric trauma volume and its causes – a systematic review

Bartłomiej Pala^{1,A}✉, Natalia Pasikowska^{1,B}, Tomasz Pala^{1,C}, Tomasz Klepinowski^{1,D}, Leszek Sagan^{2,E}

¹Pomeranian Medical University Hospital No. 1 in Szczecin, Department of Pediatric Neurosurgery and Neurosurgery, Unii Lubelskiej 1, 71-252 Szczecin, Poland

²Pomeranian Medical University in Szczecin, Department of Pediatric Neurosurgery and Neurosurgery, Unii Lubelskiej 1, 71-252 Szczecin, Poland

^AORCID: 0000-0002-4156-6604; ^BORCID: 0000-0002-2165-1182; ^CORCID: 0000-0002-3169-9905; ^DORCID: 0000-0003-4806-2094; ^EORCID: 0000-0001-5366-1070

✉ pala.b@edu.pum.edu.pl

ABSTRACT

Introduction: An outbreak of the COVID-19 disease in 2020 and resulting social restrictions forced many medical facilities to modify admission protocols and increased the use of health services. The stay-at-home orders also contributed to a change in the volume of the emergency admissions as well as their causes.

Materials and methods: The available electronic databases were searched for papers concerning pediatric trauma admissions, referrals, and visits during the coronavirus outbreak and in the previous year. The quality of included papers was assessed via National Institutes of Health National Heart, Lung, and Blood Institute (NIH NHLBI) Study Quality Assessment Toolbox.

Results: The overall workload in pediatric emergency medical care during the COVID-19 outbreak declined by 40.13% (95% CI 18.7–61.6) compared to the previous year. A massive decline in the pediatric trauma admissions was observed during the coronavirus outbreak. The sport-related accidents were supplanted mainly by those that occurred at home. The child abuse injuries arising during the outbreak seemed to remain undetected.

Keywords: COVID-19 pandemic; pediatric trauma volume; child maltreatment; child abuse injuries; SARS-CoV2.

INTRODUCTION

The COVID-19 pandemic forced all of the hospital departments to change the system of admitting pediatric patients, the formula and technique of the patient's physical examination as well as the surgery performance. Before being admitted to any emergency department, every parent of the patient was obliged to fill in a questionnaire about the presence of COVID-19 symptoms and possible contact with an infected person in the recent 2 weeks prior to entering the hospital. Furthermore, the negative result of the coronavirus swab test was also necessary for the child (and the legal guardian) to be admitted to the hospital ward. All precautions were taken to prevent medical staff from becoming infected. The path from an emergency department to the target ward appeared to be more convoluted and prolonged. Hence, most parents were unwilling to visit hospitals without a serious reason. The fear of the coronavirus infection might have been an additional cause of the reduced willingness to go to the hospital visits. All of these circumstances might have discouraged parents to seek medical advice for minor and negligible traumas. Moreover, social distancing, and isolation also played a vital role in the reducing rate of hospital admissions.

Due to the numerous inconsistent reports about workload at the hospital emergency wards during the pandemic, the purpose of this study was to assess a precise impact of COVID-19 pandemic on the prevalence of pediatric trauma volume in various departments all over the world as well as evaluate the change in the pattern of the injuries.

METHODOLOGY

Search strategy

Two researchers (N.P., B.P.) independently searched the following databases: PubMed MEDLINE, Google Scholar, Web of Science, and Embase. Criteria for the eligibility included studies from 2020 containing a comparison of pediatric trauma volume during the COVID-19 outbreak in 2020 and in the corresponding time of the previous year. The search strategy included a combination of MeSH terms and keywords relevant to the main subject of this study: "pediatric trauma" or "pediatric emergency" or "pediatric injury" and "COVID-19 outbreak" or "COVID outbreak" or "pandemic". These terms may have various meanings, therefore the goal of the search was to identify similar observational studies regarding admissions, referrals, and visits caused by the disparate injuries of the children. The search was conducted for papers in English. This systematic review was performed following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) [1]. References were imported to Mendeley Desktop 1.19.4., converted into the bibliographic data, and checked for duplicates.

Eligibility

The inclusion criteria for this study were the exact number of pediatric trauma cases during the COVID-19 outbreak in 2020 compared to the previous year and data covering minimum 4 weeks. The exclusion criteria included insufficient data, letters to the editors, studies containing only 1 type of injury,

and an insufficient period of data collection. Variables like geographical location, period of data collection, type of ward, and the number of pediatric trauma cases were gathered after the evaluation of each study for inclusion and exclusion criteria. The age and gender of the children could not be collected and compared due to the inconsistent ways of presenting the data. It was not necessary to submit an informed consent form, because the present study is a systematic review.

Quality assessment

The risk of bias assessment was performed by 2 authors independently (N.P. and B.P.). National Institutes of Health National Heart, Lung, and Blood Institute (NIH NHLBI) Study Quality Assessment Toolbox was used to prove the sufficient quality of the articles included in the study [2].

RESULTS

Search results

Steps of the inclusion process are presented in the PRISMA flow diagram (Fig. 1). Databases provided 934 articles about pediatric trauma. After the de-duplication process, 326 studies were screened and 45 of them were assessed for eligibility; 24 studies were excluded from our systematic review due to compliance with the exclusion criteria. Eventually, 21 articles were assigned for the risk of bias assessment and statistical analysis. Six of the included studies contain data from the UK and 6 reports from Italy describe the situation of pediatric trauma in Southern Europe. Only 5 studies from the USA were found in the databases. Four trauma centers from New Zealand, Iran, France, and Ireland also decided to publish their data.

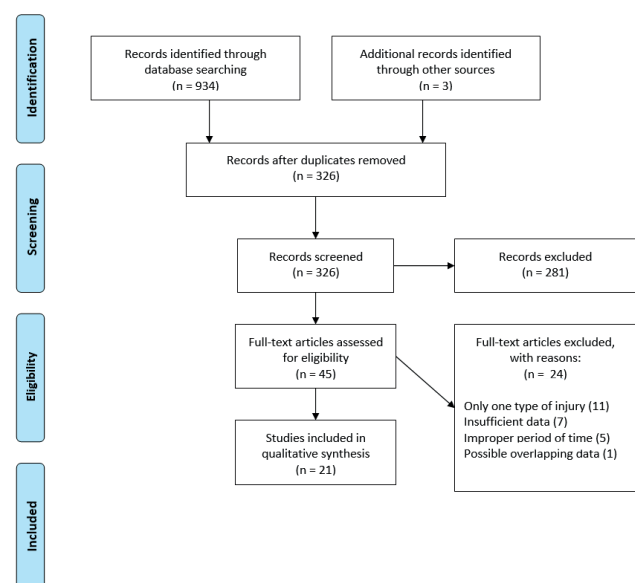


FIGURE 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram of the article selection process

Quality assessment

A detailed evaluation with NIH NHLBI Study Quality Assessment divided the articles into the 3 subgroups: 'Good', 'Fair', and

'Poor'. Twenty-one papers were finally included in the analysis as a 'Good' or 'Fair' designed studies [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]. Only 1 paper was deemed poorly designed and therefore excluded from our study due to the high risk of bias.

Pediatric trauma volume

The compiled data report a 40.13% (95% CI 18.7–61.6) decrease in the total number of pediatric trauma cases during COVID-19 era as compared to the previous year (Tab. 1). Significant amount of included papers (18) demonstrates that social isolation and restrictions imposed by the governments contributed to the reduced frequency of the pediatric trauma visits, referrals as well as admissions. The largest decrease (87.0%) was observed at the 2 emergency departments in Milan, Italy [14]. Only 2 papers, Dyson et al. and Iozzi et al. report an increase in pediatric injuries at their units, i.e. neurosurgical and emergency departments, respectively [9, 13]. It is noteworthy that these papers were considered "Fair" in terms of study design.

Non-accidental injuries related to child abuse

Only 6 papers provide an update on children's non-accidental injuries (NAI). However, the compiled data indicate neither increase nor decrease in child abuse cases. Half of the studies emphasize that lockdown contributed to the rising load of NAI [2, 9, 11]. But meanwhile, the other half shows a decline in these cases [3, 7, 16]. The paucity of data is a main obstacle to unequivocally verify the correlation between child abuse and the lockdown imposed by the governments due to the COVID-19 outbreak.

DISCUSSION

The number of admissions to emergency departments in hospitals during the pandemic changed. The period of time in which schools were shut down resulted in a lower number of acute traumatic visits. It was due to the lack of use of hazardous equipment in schools, reduced peer contact, closed playgrounds, and cancellation of sport events [22, 23]. The injuries mostly occurred at home, gardens, and neighborhood – for example on the trampolines [24].

Verdoni et al. also reported an increase in home-related injuries (from 6.8% before the pandemic to 34.8% during the pandemic). However, the rise in the number of accidents was linked to children aged less than 12 years as the older ones were spending time in a safer manner, for example, playing video games, computer games, and board games while peer-to-peer contact was forbidden and schools and playing areas were closed. The increase in the injuries of smaller kids was related to their behavioral manner as they are less aware of the danger and risk of injury both indoors and outdoors. The pattern of the emergency visits showed that there was a lower number of minor trauma admissions (e.g. sprain of an ankle) and a greater number of admissions concerning fractures,

TABLE 1. Pediatric trauma cases in the times of COVID-19 outbreak compared to the pre-COVID era

| Study, country | Period of time 1) pre-COVID 2) COVID | Type of injury | Pre-COVID period trauma cases (n) | COVID period trauma cases (n) | Tendency (%) | NIH NHLBI Study Quality Assessment |
|-------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------|-----------------|------------------------------------------|
| Rougereau et al., France [17] | 1) Mar. 17–May 11 2019 2) Mar. 17–May 11 2020 | burns, fractures, traumatic wounds, or sprain/bruise contusions | 2625 | 1106 | ↓ 57.9% | good |
| Nabian et al., Iran [4] | 1) Mar. 1–Apr. 15 2019 2) Mar. 1–Apr. 15 2020 | orthopaedic | 589 | 288 | ↓ 51.1% | good |
| Sheridan et al., Ireland [3] | 1) Mar. 13–Apr. 13 2019 2) Mar. 13–Apr. 13 2020 | N/S | 42 | 28 | ↓ 33.3% | good |
| Memeo et al., Italy [10] | 1) Feb. 23–Apr. 15 2019 2) Feb. 23–Apr. 15 2020 | N/S | 1124 | 256 | ↓ 77.2% | good |
| Raffaldi et al., Italy [19] | 1) Mar. 9–May 3 2019 2) Mar. 9–May. 3 2020 | N/S | 5753 | 1340 | ↓ 76.7% | good |
| Liguoro et al., Italy [21] | 1) Jan. 1–Feb. 29 2019 2) Jan. 1–Feb. 29 2020 | N/S | 740 | 318 | ↓ 57.0% | good |
| Verdoni et al., Italy [14] | 1) Mar. 12–May 5 2019 2) Mar. 12–May 5 2020 | orthopaedic | 790 | 103 | ↓ 87.0% | good |
| Ruzzini et al., Italy [16] | 1) Mar. 4–May 10 2019 2) Mar. 4–May 10 2020 | orthopaedic | 909 | 173 | ↓ 81.0% | good |
| Iozzi et al., Italy [13] | 1) Mar. 1–May 27 2019 2) Mar. 1–May 27 2020 | N/S | 77 | 124 | ↑ 61.0% | fair |
| Baxter et al., UK [11] | 1) Mar. 24–May 10 2019 2) Mar. 24–May 10 2020 | orthopaedic | 197 | 132 | ↓ 33.0% | good |
| Karia et al., UK [12] | 1) Apr. 1–Apr. 30 2019 2) Apr. 1–Apr. 30 2020 | orthopaedic | 32 | 9 | ↓ 71.9% | good |
| Park et al., UK [5] | 1) Mar. 17–Apr. 15 2019 2) Mar. 17–Apr. 15 2020 | orthopaedic | 27 | 12 | ↓ 55.6% | good |
| Greenhalgh et al., UK [8] | 1) Mar.16–Apr. 22 2019 2) Mar. 16–Apr. 22 2020 | orthopaedic | 56 | 26 | ↓ 53.6% | good |
| Dyson et al., UK [9] | 1) Mar. 25–Jun. 30 2019 2) Mar. 23–Jun. 30 2020 | neurosurgery | 17 | 27 | ↑ 58.8% | fair |
| Sugand et al., UK [6] | 1) Mar. 17–Apr. 28 2019 2) Mar. 17–Apr. 28 2020 | orthopaedic | 302 | 97 | ↓ 67.9% | good |
| Sanford et al., USA [15] | 1) Mar. 15–May 15 2019 2) Mar. 15–May. 15 2020 | burns, penetrating and bunt injuries | 432 | 392 | ↓ 9.3% | good |
| Kovler et al., USA [2] | 1) Mar. 28–Apr. 27 2019 2) Mar. 28–Apr. 27 2020 | N/S | 111 | 60 | ↓ 46.0% | good |
| Levene et al., USA [18] | 1) Mar. 15–Jul. 6 2019 2) Mar. 15–Jul. 6 2020 | falls, fractures, sprains, strains, eye injuries, dental trauma, bite-related injuries | 2000 | 671 | ↓ 61.5% | good |
| Qasim et al., USA [7] | 1) Mar. 9–Apr. 19 2019 2) Mar. 9–Apr. 19 2020 | N/S | 217 | 119 | ↓ 45.2% | good |
| Zhang et al., USA [20] | 1) Mar. 16–Apr. 15 2019 2) Mar. 16–Apr. 15 2020 | neurosurgical | 26 | 8 | ↓ 69.2% | good |
| Overall average | | | | | ↓ 40.13% | |

NIH NHLBI – National Institutes of Health National Heart, Lung, and Blood Institute; N/S – not specified

which confirms that parents were seeking help particularly when the injuries of the kids were rather severe [14].

Other changes in the causes of children injuries have also been noticed. Park et al. report about an 89% reduction in acute referrals due to sporting injuries [5]. It might have been related to the government-imposed restrictions such as the prohibition of all

kinds of contact sports. This effect may be taken as an advantage of the lockdown, however lack of physical activity among kids has a detrimental impact on their physical as well as mental health. The mandatory stay-at-home orders provoked worse lifestyle behaviors such as overeating and a sedentary lifestyle. All the above and the easy access to high-calorie snacks and

disturbance with the timing of the meals yielded an increasing percentage of obesity among children [25]. The pandemic also left its marks on the location of the acquired injury. In the pre-COVID era, pediatric trauma mostly occurred during physical activities at the playgrounds, followed by school, whereas during the pandemic most of these incidents took place at home [14]. Consequently, a rise in pediatric injuries can be expected after the abolition of social restrictions and the restoration of normal education as well as sports events.

Dyson et al. reported that there was a small increase in the number of neurosurgical referrals during the pandemic of COVID-19. The study showed a rise in trampoline and bicycle accidents, while the accidents due to falls from height showed similar values for both COVID and pre-COVID times [9].

According to the British authors, a decrease in the road traffic accidents was one of the components that contributed to such a drastic decline in pediatric trauma admissions [5, 6]. The overall number of minor road accidents declined during the lockdown, although reduced traffic on streets and hence more frequent opportunities for speeding led to the same amount of serious or fatal injuries [26]. The second major consequence of the reduced vehicle concentration was lower air pollution levels [27]. This may have helped to reduce the incidence of asthma among children and other diseases caused by nitrogen dioxide and fine particulate matter.

The data on child abuse appeared to be ambiguous due to the paucity of evidence in the literature. The variability in defining these cases and inconsistent ways of collecting the data disabled obtaining an accurate number of cases of child maltreatment during the COVID-19 pandemic [28]. It is thought that imposed restrictions led to large-scale business closures, and hence many people lost their employment and income. The inability to provide essential goods for the family as well as the inability to socialize with the relatives were the major stressors which may have contributed to the deterioration of the relationships, therefore the stay-at-home restrictions provided an opportunity to draw various conclusions about factors related to the child maltreatment potential among parents [29]. Mandatory social isolation also contributed to the reduced number of supervision orders by the child protection services, hence some NAI cases could go unnoticed. However, for this reason, additional child abuse helplines such as the information campaign on domestic violence in the newspapers and on social media was launched [30]. The most important assignment for child protection services currently is to capture all unnoticed NAI cases that occurred during the COVID-19 pandemic.

Limitations

The study has several following limitations. The pediatric trauma admissions data were mainly published by the medical centers of the areas most affected by the coronavirus outbreak. Based on these data, it can only be assumed that the situation was similar in other countries. Therefore, the authors highly suggest that more data from other centers should be published to confirm our conclusions. Secondly, it was impossible

to compile the causes of those injuries statistically, due to the different ways of reporting them. Only basic conclusions could be drawn. Additionally, not all authors disclosed the types of injuries among the admitted children. In the included papers, the data concerning the mechanism of injuries related to the children's age was not presented so that the conclusion about the most and the least common injuries for every age group cannot be stated. Future studies concerning pediatric trauma admissions during the outbreak should take into account the type of injury and accurately report the data.

CONCLUSIONS

The coronavirus outbreak resulted in a massive decline in the pediatric trauma admissions as well as the emergency medical care workload. The pattern of the most common causes of these injuries also changed. The contact sport and children playing area related accidents were supplanted mainly by those which occurred at home and the surrounding environment. The correlation between the pandemic and child abuse appeared to be ambiguous due to the paucity of the conclusive evidence. However, because of the constricted conditions to disclose the NAI during the outbreak, physicians should be more attentive to those undetected child abuse cases.

REFERENCES

- Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009;7716(339):b2535. doi: 10.1136/bmj.b2535.
- Kovler ML, Ziegfeld S, Ryan LM, Goldstein MA, Gardner R, Garcia AV, et al. Increased proportion of physical child abuse injuries at a level I pediatric trauma center during the Covid-19 pandemic. *Child Abuse Negl* 2021;116(Pt 2):104756. doi: 10.1016/j.chiabu.2020.104756.
- Sheridan GA, Nagle M, Russell S, Varghese S, O'Loughlin PF, Boran S, et al. Pediatric trauma and the COVID-19 pandemic: a 12-year comparison in a level-1 trauma center. *HSS J* 2020;16(Suppl 1):92-6. doi: 10.1007/s11420-020-09807-y.
- Nabian MH, Vosoughi F, Najafi F, Khabiri SS, Nafisi M, Veisi J, et al. Epidemiological pattern of pediatric trauma in COVID-19 outbreak: data from a tertiary trauma center in Iran. *Injury* 2020;51(12):2811-5. doi: 10.1016/j.injury.2020.09.015.
- Park C, Sugand K, Nathwani D, Bhattacharya R, Sarraf KM. Impact of the COVID-19 pandemic on orthopedic trauma workload in a London level 1 trauma center: the "golden month". *Acta Orthop* 2020;91(5):556-61. doi: 10.1080/17453674.2020.1783621.
- Sugand K, Park C, Morgan C, Dyke R, Aframian A, Hulme A, et al. Impact of the COVID-19 pandemic on paediatric orthopaedic trauma workload in central London: a multi-centre longitudinal observational study over the "golden weeks". *Acta Orthop* 2020;91(6):633-8. doi: 10.1080/17453674.2020.1807092.
- Qasim Z, Sjöholm LO, Volgraf J, Sailes S, Nance ML, Perks DH, et al. Trauma center activity and surge response during the early phase of the COVID-19 pandemic – the Philadelphia story. *J Trauma Acute Care Surg* 2020;89(4):821-8. doi: 10.1097/ta.0000000000002859.
- Greenhalgh M, Dupley L, Unsworth R, Boden R. Where did all the trauma go? A rapid review of the demands on orthopaedic services at a UK Major Trauma Centre during the COVID-19 pandemic. *Int J Clin Pract* 2021;75(3):e13690. doi: 10.1111/ijcp.13690.
- Dyson EW, Craven CL, Tisdall MM, James GA. The impact of social distancing on pediatric neurosurgical emergency referrals during the COVID-19

- pandemic: a prospective observational cohort study. *Childs Nerv Syst* 2020;36(9):1821-3. doi: 10.1007/s00381-020-04783-4.
10. Memeo A, Priano D, Caldarini C, Trezza P, Laquidara M, Montanari L, et al. How the pandemic spread of COVID-19 affected children's traumatology in Italy: changes of numbers, anatomical locations, and severity. *Minerva Pediatr* 2020. doi: 10.23736/s0026-4946.20.05910-1.
11. Baxter I, Hancock G, Clark M, Hampton M, Fishlock A, Widnall J, et al. Paediatric orthopaedics in lockdown: a study on the effect of the SARS-Cov-2 pandemic on acute paediatric orthopaedics and trauma. *Bone Jt Open* 2020;1(7):424-30. doi: 10.1302/2633-1462.17.BJO-2020-0086.R1.
12. Karia M, Gupta V, Zahra W, Dixon J, Tayton E. The effect of COVID-19 on the trauma burden, theatre efficiency and training opportunities in a district general hospital: planning for a future outbreak. *Bone Jt Open* 2020;1(8):494-9. doi: 10.1302/2633-1462.18.BJO-2020-0074.R1.
13. Iozzi L, Brambilla I, Fioadelli T, Marseglia GL, Ciprandi G. Paediatric emergency department visits fell by more than 70% during the COVID-19 lockdown in Northern Italy. *Acta Paediatr* 2020;109(10):2137-8. doi: 10.1111/apa.15458.
14. Verdoni F, Ricci M, Di Grigoli C, Rossi N, Lombardo MDM, Curci D, et al. Effect of the COVID-19 Outbreak on Pediatric Patients' Admissions to the Emergency Department in an Italian Orthopedic Trauma Hub. *Children (Basel)* 2021;8(8):645. doi: 10.3390/children8080645.
15. Sanford EL, Zagory J, Blackwell JM, Szmuk P, Ryan M, Ambardekar A. Changes in pediatric trauma during COVID-19 stay-at-home epoch at a tertiary pediatric hospital. *J Pediatr Surg* 2021;56(5):918-22. doi: 10.1016/j.jpedsurg.2021.01.020.
16. Ruzzini L, De Salvatore S, Lamberti D, Maglione P, Piergentili I, Crea F, et al. COVID-19 changed the incidence and the pattern of pediatric traumas: a single-centre study in a Pediatric Emergency Department. *Int J Environ Res Public Health* 2021;18(12):6573. doi: 10.3390/ijerph18126573.
17. Rougier G, Guedj R, Irtan S, Qassem Q, Vialle R, Langlais T. Emergency department visits for pediatric traumatic injuries during general confinement: a single-center study in an urban setting. *Arch Pediatr* 2021;28(3):249-51. doi: 10.1016/j.arcped.2021.02.012.
18. Levene R, Fein DM, Silver EJ, Joels JR, Khine H. The ongoing impact of COVID-19 on asthma and pediatric emergency health-seeking behavior in the Bronx, an epicenter. *Am J Emerg Med* 2021;43:109-14. doi: 10.1016/j.ajem.2021.01.072.
19. Raffaldi I, Castagno E, Fumi I, Bondone C, Ricceri F, Besenon L, et al. Pediatric admissions to emergency departments of North-Western Italy during COVID-19 pandemic: a retrospective observational study. *Lancet Reg Heal Eur* 2021;5:100081. doi: 10.1016/j.lanepe.2021.100081.
20. Zhang M, Zhou J, Dirlikov B, Cage T, Lee M, Singh H. Impact on neurosurgical management in Level 1 trauma centers during COVID-19 shelter-in-place restrictions: The Santa Clara County experience. *J Clin Neurosci* 2021;88:128-34. doi: 10.1016/j.jocn.2021.03.017.
21. Liguoro I, Pilotto C, Vergine M, Pusioli A, Vidal E, Cogo P. The impact of COVID-19 on a tertiary care pediatric emergency department. *Eur J Pediatr* 2021;180(5):1497-504. doi: 10.1007/s00431-020-03909-9.
22. Karuc J, Sorić M, Radman I, Mišigoj-Duraković M. Moderators of Change in Physical Activity Levels during Restrictions Due to COVID-19 Pandemic in Young Urban Adults. *Sustainability* 2020;12(16):6392. doi: 10.3390/su12166392.
23. Economou P, Glascock T, Louie M. The impact of COVID-19 and the NCAA's (National Collegiate Athletic Association) season cancellation on sport support professionals. *F1000Research* 2021;10:775. doi: 10.12688/f1000research.54625.1.
24. Ibrahim Y, Huq S, Shanmuganathan K, Gille H, Buddhdev P. Trampolines injuries are bouncing back: the effect of the COVID-19 UK lockdown on the paediatric trauma burden. *Bone Jt Open* 2021;2(2):86-92. doi: 10.1302/2633-1462.22.bjo-2020-0152.R1.
25. Jenssen BP, Kelly MK, Powell M, Bouchelle Z, Mayne SL, Fiks AG. COVID-19 and changes in child obesity. *Pediatrics* 2021;147(5):e2021050123. doi: 10.1542/peds.2021-050123.
26. Qureshi AI, Huang W, Khan S, Lobanova I, Siddiq F, Gomez CR, et al. Mandated societal lockdown and road traffic accidents. *Accid Anal Prev* 2020;146:105747. doi: 10.1016/j.aap.2020.105747.
27. Venter ZS, Anun K, Chowdhury S, Lelieveld J. COVID-19 lockdowns cause global air pollution declines. *Proc Natl Acad Sci USA* 2020;117(32):18984-90. doi: 10.1073/pnas.2006853117.
28. Rapp A, Fall G, Radomsky AC, Santarossa S. Child maltreatment during the COVID-19 pandemic: a systematic rapid review. *Pediatr Clin North Am* 2021;68(5):991-1009. doi: 10.1016/j.pcl.2021.05.006.
29. Brown SM, Doom JR, Lechuga-Peña S, Watamura SE, Koppels T. Stress and parenting during the global COVID-19 pandemic. *Child Abuse Negl* 2020;110(Pt 2):104699. doi: 10.1016/j.chiabu.2020.104699.
30. Caron F, Plancq MC, Tourneux P, Gouron R, Klein C. Was child abuse under-detected during the COVID-19 lockdown? *Arch Pediatr* 2020;27(7):399-400. doi: 10.1016/j.arcped.2020.07.010.