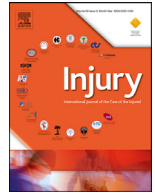




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Injuries and child abuse increase during the pandemic over 12942 emergency admissions



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ABSTRACT

Introduction: A strict lockdown was decided from 17/03/2020 to 11/05/2020 in France in order to tackle the first wave of the COVID19 pandemic. In the Great Paris region, several areas are severely affected by overcrowding, creating difficult conditions for children and their families during a period of nearly two months. The objective was to assess the effects of the 2020 spring lockdown on injuries, child abuse and neglect.

Material and methods: The central medical data warehouse was screened for all pediatric admissions at emergency and critical care departments of 20 hospitals, in a cohort of 12942 children. Specific keywords were used to screen for both injuries and child abuse and neglect.

Results: We found head and neck trauma (1.2% in 2020 vs. 0.7% in 2019, $p < 0.001$), burns (0.6% in 2020 vs. 0.1% in 2019, $p < 0.001$), lacerations (0.5% in 2020 vs. 0.3% in 2019, $p < 0.001$), fractures (0.5% in 2020 vs. 0.3% in 2019, $p < 0.017$), dog bites (0.1% in 2020 vs. 0.0% in 2019, $p < 0.001$), and child abuse and neglect (18 cases during the 2020 lockdown vs. 24 cases in 2019, $p = 0.005$) were significantly more prevalent during this period than during the same control period in 2019.

Conclusions: These results indicate that specific prevention measures are crucial if strict lockdowns are to be decided in the future.

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Introduction

Home injuries generally represent 5.6% of admissions in emergency and critical care departments in children [1]. Child physical abuse has a prevalence of 4 to 16% each year in the general population and one child in ten is neglected or psychologically abused [2].

During the SARS-CoV-2 pandemic, several studies have noted an increase in these two types of accidents [3–5].

We used the central data warehouse of the largest hospital trust in Europe in order to assess these prevalences in a large Western European capital with major social disparities, subjected to a strict lockdown during the first wave of the pandemic from 17/03/2020 to 11/05/2020.

Material and methods

The central medical data warehouse of the Greater Paris Trust of Academic Hospital was screened for all admissions of patients aged 0 to 17 years at emergency and critical care departments of 20 hospitals between 17th of March and 11th of May 2019 (control period) and 2020 (lockdown period). Inclusion as hospitalizations for injuries required International Classification of Diseases, 10th

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Table 1
Comparisons between the lockdown and control periods. SD = standard deviation.

		Lockdown	Control period	p-value
		12942	42113	
Mean age +/- SD	General	5.6 +/- 5.3	6.0 +/- 5.3	< 0.001
	Injuries	5.8 +/- 5.7	6.8 +/- 6.0	0.002
Age 0-5 yo	General	7 763 (60.0%)	23 671 (56.2%)	< 0.001
	Injuries	280 (2.2%)	461 (1.1%)	< 0.001
Age 6-11 yo	General	2 904 (22.4%)	10 227 (24.3%)	< 0.001
	Injuries	91 (0.7%)	190 (0.5%)	< 0.001
Age 12-17 yo	General	2 275 (17.6%)	8 215 (19.5%)	< 0.001
	Injuries	105 (0.8%)	272 (0.6%)	< 0.001
Female	General	5 834 (45.1%)	19 061 (45.3%)	0.721
	Injuries	226 (1.7%)	404 (1.0%)	0.721
Emergencies	General	12 931 (99.9%)	42 076 (99.9%)	0.941
	Injuries	474 (3.7%)	915 (2.2%)	1.000
Critical care		20 (0.2%)	64 (0.2%)	0.941
Injuries		476 (3.7%)	923 (2.2%)	< 0.001
	Head and neck	159 (1.2%)	301 (0.7%)	< 0.001
	Burns	72 (0.6%)	60 (0.1%)	< 0.001
	Wounds	63 (0.5%)	109 (0.3%)	< 0.001
	Fractures	65 (0.5%)	147 (0.3%)	0.017
	Bites	13 (0.1%)	5 (0.0%)	< 0.001
Child abuse		18 (0.1%)	24 (0.1%)	0.005

Revision, Clinical Modification (ICD-10-CM) codes specified in Supplementary Tables 1 and 2.

Specific keywords were used to screen for both injuries and child abuse and neglect (Supplementary Table 3). The codes for injuries encompassed all types of lesions including domestic injuries – we hypothesized that an increase in prevalence in specific subtypes of injuries in 2020 relative to 2019 would mainly correspond to an increase in the prevalence of domestic injuries, as the confinement imposed in France during the inclusion period was strict. Statistical analyses were performed using Student and χ^2 tests on R, version 3.6.2 and figures were computed using the *ggplot* package. This study was reviewed by the Central Medical Data Warehouse ethic committee.

Results

During lockdown, 12942 patients (including 476 injuries, 3.7%) were admitted vs 42113 patients (including 923 injuries, 2.2%) during the control period ($p < 0.001$) (Table 1). Children aged 0-5 years were predominantly affected by these injuries, with a significant increase in the proportion of younger patients during lockdown (280 children under 5, that is 2.2%, in 2020 vs 461 children under 5, representing 1.1% in 2019, $p < 0.001$), without predominance of boys. There was no increase in patients admitted into pediatric critical care units during lockdown.

Within injuries, head and neck trauma (159 children, that is 1.2% in 2020 vs. 301 children, that is 0.7% in 2019, $p < 0.001$), burns (72 children, that is 0.6% in 2020 vs 60 children, that is 0.1% in 2019, $p < 0.001$), lacerations (63 children, that is 0.5% in 2020 vs 109 children, that is 0.3% in 2019, $p < 0.001$), fractures (65 children, that is 0.5% in 2020 vs 147 children, that is 0.3% in 2019, $p < 0.017$) and dog bites (13 children, that is 0.1% in 2020 vs 5 children, that is 0.0% in 2019, $p < 0.001$) were significantly more prevalent during lockdown (Table 1, Figure 1).

Child abuse and neglect represented 18 cases during the 2020 lockdown (0.1%) vs. 24 cases in 2019 (0.1%) ($p = 0.005$).

Discussion

To our knowledge, we provide the first large-scale assessment of injuries including home injuries during lockdown in the Greater Paris region.

A decrease in the absolute number of admissions into pediatric emergency departments, and a decrease in the absolute number of domestic trauma, child abuse and neglect during the lockdown period has already been reported [6–7]. During this period, some authors have shown a 50% increase in the relative frequency of patients hospitalized for child abuse and neglect, despite a stagnation of the absolute frequency [8]. These figures may reflect a bias: only the most serious cases may have reached emergency departments during the pandemic, which leads to underestimation, and underline that the increase may have been even more critical.

The confinement led to major changes in the everyday life of French families [9], as many parents had to manage working from home and taking care of their children simultaneously. The average surface of private houses is 74.6 m² with 2.3 inhabitants per house, with several areas with overcrowded apartments – such as in Seine-Saint-Denis and north-east Paris, where overcrowding affected a third of private houses in 2017 [10]. Confinement in children furthermore induced a significant level of anxiety and frustration at home [8]. In addition, because social service centers were closed during the pandemic period, many cases of abuse could not be identified [11]. These geographical and behavioral factors were most probably risk factors for the occurrence of domestic injuries and child abuse and neglect.

The French coding system for medical activity, based on the *Programme de Médicalisation des Systèmes d'Information* (PMSI) database, is satisfactory in terms of consistency, accuracy and exhaustivity for hospitalized patients [8, 11]. The AP-HP central medical data warehouse (EDS) is reliable tool for screening diagnostic codes, as previously reported [12–14]. Regarding the identification of child abuse and neglect victims, one encouraging perspective is the exploration of the national French claims database (Système National des Données de Santé, SNDS) and its connection with clinical databases such as the EDS. The SNDS records all the drugs, medical acts and causes of casualties of social security beneficiaries, which represents nearly all the French population. Mining the SNDS and linking claims data with clinical data requires specific data science developments. These efforts are currently implemented at the national level via the Health Data Hub, a public entity created in 2019 and involved, among other projects, in designing open-source algorithms to identify child abuse and neglect cases using claims data. Significant improvement of our approach to the epidemiology of child abuse and neglect can only arise from such large scale projects, ideally extended secondarily at the European level via the European Health Data Space, which in the process of being designed.

In the context of the present study, one major limitation was that the diagnostic codes we used (ICD-10-CM) did not consider whether an accident occurred indoors or outdoors. We nevertheless only included injuries that were consistent with a house injury (excluding events such as drowning or thunderstrike). We can reasonably assume that most of the trauma that occurred during the 2020 inclusion period in France were domestic accidents, as the lockdown was strict. As we found that the proportion of trauma increased between 2019 and 2020, we provide arguments in favor of a specific increase in house injuries, even though this point has not been proven specifically. Further studies namely assessing home injuries may confirm our results.

A second limitation was that the study was limited to hospitalized cases – a non-negligible part of children with injuries and child abuse and neglect benefit from primary care in outpatient clinics [8]. This resulted in an underestimation of house injuries – and most probably of child abuse and neglect – especially during the epidemic period because emergency rooms prioritized patients suffering from COVID-19 [15].

Finally, all the hospitals of AP-HP were not considered in this study, as the process of data integration into the EDS has not yet

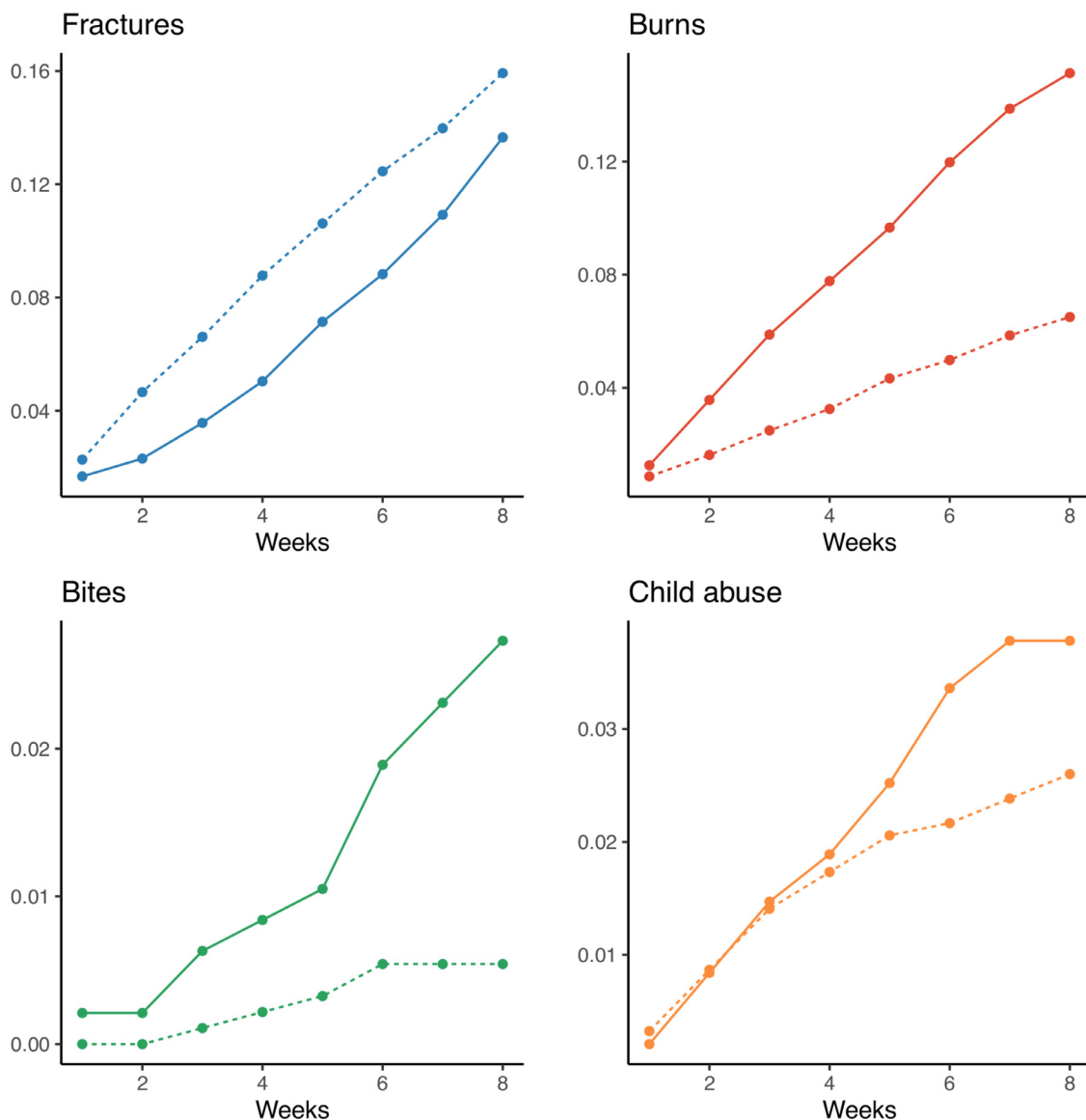


Fig. 1. Evolution of the incidence rate per weeks during lockdown (full line) and control periods (dotted line) for fractures, burns, bites and child abuse.

been completed. For now, 20 out of the 39 AP-HP hospitals have joined the EDS project – notably, one out of three of the pediatric university hospitals of AP-HP has not joined the data warehouse to date. This point may have led to an underestimation of the prevalence of injuries and child abuse and neglect, as the recruitment of each of the three AP-HP pediatric hospitals is regionalized, with the hospital that has not been included welcoming patients from the North and East of Paris, where many areas with social issues are concentrated.

In brief, two of the main limitations of this study (focus on hospitalized patients and lack of data from one out of three AP-HP pediatric academic hospitals) most probably led to a bias characterized by an underestimation of the prevalences of injuries and child abuse and neglect.

Conclusion

We showed that injuries and child neglect and abuse were clearly favored by lockdown. Our results support the need for specific prevention measures in lockdown situations, especially regarding burns and dog bites [16,17], that are known to be controlled based on educational measures [9–10]. Within injuries, we

provide arguments supporting the fact that most cases were home injuries in 2020, relative to the situation in 2019. Furthermore, the major biases of this study most probably led to an underestimation of injuries and child abuse and neglect, so that the consequences of lockdown may have been more severe than suggested by the metrics provided here. Finally, our study underlines the dramatic need for specific indicators for child abuse and neglect, including an assessment of cases recorded in outpatient clinics, as the current methods for screening for this condition are non-satisfactory.

Supplementary Table 1. International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) codes associated to injuries.

Supplementary Table 2. International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) codes associated to child abuse and neglect.

Supplementary Table 3. Specific keywords used to screen for both injuries and child abuse and neglect.

Declarations of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.injury.2022.08.013](https://doi.org/10.1016/j.injury.2022.08.013).

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