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Research paper

Changes in pediatric emergency department visits during a COVID-19 lockdown period: An exhaustive single-center analysis

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ABSTRACT

Background: In many countries, the restrictions related to the first period of lockdown during the coronavirus disease 2019 (COVID-19) pandemic led to widespread changes in health service usage in general and in emergency departments in particular. However, no comprehensive evaluation of changes has been published to date. The objective of the present study was to determine the precise impact of the 2020 lockdown on admissions to a pediatric emergency department (PED) compared to the same periods in 2018 and 2019.
Methods: This retrospective, observational study included all patients under the age of 183 months (15.25 years) admitted to our French university hospital's PED during the period from March 17 to May 11 in the years 2018, 2019, and 2020. The primary outcome was the change in PED admissions in 2020 compared to 2018 and 2019. The secondary outcomes were notably changes in the primary discharge diagnoses, the discharge destination, and unwarranted visits.
Results: A total of 10,479 PED visits were identified, of which 10,295 were analyzed. In 2020, the number of PED visits fell by 61% and 63% vs. 2018 and 2019, respectively. Although the number of discharges to other hospital departments decreased by 52% and 49%, the proportion of these discharges increased: 18% of 1579 in 2020 vs. 13% of 4232 in 2018 and of 4484 in 2019 ($p<0.01$). Discharge from the PED to the intensive care unit was significantly more frequent in 2020 ($p<0.05$). Unwarranted visits were significantly lower in 2020 (19%) as compared to 2018 (22%) and 2019 (24%). Surgical and injury-related discharge diagnoses increased by 6% in 2020 ($p<0.001$), with a significant rise in trauma and foreign-body injuries ($p<0.05$). With regard to disease-related discharge diagnoses, we observed a significant rise in mental, behavioral, and social issues ($p<0.01$). Conversely, there was a significant ($p<0.01$) drop in diagnoses of acute infectious diseases in 2020 compared with 2018 and 2019.
Conclusion: Lockdown was associated with a massive reduction in the number of PED visits, a significant change in primary discharge diagnoses, and a decrease in the proportion of unwarranted PED visits compared to the previous 2 years. This should encourage public health researchers to examine how to alleviate the burden of unnecessary PED visits.

1. Introduction

The outbreak of coronavirus disease 2019 (COVID-19) started in December 2019, spread rapidly around the world, and was designated as a global pandemic by the World Health Organization on March 11, 2020 [1]. The French government decreed a first national lockdown period that ran from March 17 to May 11, 2020. The lockdown-related restrictions led to marked changes in the French population's habits. National healthcare services and patterns of health resource usage were greatly affected, especially emergency departments (EDs): Visits to adult EDs dropped but visits to pediatric EDs (PEDs) decreased even more sharply [2].

On a general level, it has been shown that lockdown was associated with a dramatic decline in ED admission rates and with changes in triage levels [2–9]. School closures and social distancing appeared to have markedly reduced the transmission of viral infectious diseases among children [10–13]. Several studies have warned about the resurgence of mental health issues following stay-at-home orders [12,14,15]. Together, these data suggest that the pattern of PED discharge diagnoses during periods of lockdown differed from those during the same time frame in previous years. However, the few studies to have investigated this question were not very detailed: Up to 45% of the discharge diagnoses fell within a broad "catch-all" category, which might have led to misinterpretation of the data [12,16]. Here, we sought to avoid this pitfall by performing an exhaustive analysis of all the ED medical files and associated discharge diagnoses. The objective of the present study was to determine the precise

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impact of the COVID-19 lockdown on PED admissions in comparison with the same periods in 2018 and 2019.

2. Methods

2.1. Study design and inclusion criteria

A retrospective, observational study was conducted in the PED at Lille University Hospital (Lille, France). The electronic health records of all patients aged under 15 years and 3 months (183 months) having attended the PED during the first lockdown period in 2020 (between March 17 and May 11) were reviewed and compared with those of patients having attended during the corresponding time period in 2018 or 2019. We excluded patients aged over 15 years and 3 months (because they were usually admitted to the adult ED) and patients who were not treated in the PED (e.g., duplicate entries and patients who arrived in the ED by mistake when they were due to be admitted to another department).

2.2. Outcomes and data collected

The study's primary outcome was the number of PED admissions during the 2020 lockdown versus the same time frame in 2018 and 2019. The secondary outcomes were the primary discharge diagnoses, discharge destination, laboratory tests prescribed, and unwarranted PED visits. Since only discharge diagnoses were available, unwarranted visits were defined on the basis of discharge diagnoses that do not usually justify diagnostic or therapeutic procedures or specialized advice (i.e., that could have been managed by a general practitioner). The following data were extracted from the PED patient database (ResUrgences^{TM}, Berger Levrault, France): age, length of stay in the PED, laboratory tests performed, discharge destination (home vs. other hospital department), and the discharge diagnosis (according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), version 2019) [17].

2.3. Discharge diagnoses classification

In our university hospital, each discharge diagnosis is coded (using the ICD-10) within 48 h of closure of the PED medical file by a trained pediatric emergency medicine physician with experience in this field.

Each patient's primary ICD-10 discharge diagnosis was extracted from PED database. We used a keyword search to group together related discharge diagnoses (e.g.: "chest pain, unspecified" and "other chest pain") and designated the resulting groups (n=109) as "main discharge diagnoses" (MDDs). Next, three pediatricians classified each MDD by consensus as surgical and injury-related or disease-related and further allocated the MDDs to clinically relevant categories (CRCs). The CRCs were created by logical groupings made by the investigators. There were five surgical and injury-related CRCs (orthopedics, abdominal surgery, foreign body, surgical follow-up, and traumatic injury) and 15 disease-related CRCs (skin disease; acute infectious disease; neurologic disorders; ear, nose, and throat disorders; respiratory disorders; digestive tract disorders; eye and dental problems; urogenital, endocrine, and metabolic disorders; cardiovascular disease; hematologic disease; pain; malaise; swelling/masses/lumps; and mental, behavioral, and social issues). All communicable infectious MDDs were allocated to the "acute infectious disease" CRC, regardless of the infected organ (e.g.: gastroenteritis, respiratory tract infection, and otitis were attributed to the "acute infectious disease" CRC and not to the "digestive tract disorder," "respiratory disease," and "ear, nose, and throat disease" CRCs). Visits to the PED were classified as "unwarranted" after consensus of three PED investigators (CdJ, ML, FD).

In a second step, all the MDD ICD-10 codes were reviewed, in order to determine whether or not the CRCs were pertinent [17]. All codes starting with the same letter were pooled and analyzed. We also pooled ICD-10 codes beginning with the letters *A* and *B* because the corresponding ICD-10 chapter I "certain infectious and parasitic diseases" matched with our "acute infectious disease" CRC. Similarly, we pooled ICD-10 codes beginning with the letters *F, T*, and *Z* because they mainly corresponded to the "mental, behavioral, and social issues" CRC. All files ascribed with an MDD of suspected or confirmed COVID-19 were retrospectively reviewed. Patients with a negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) PCR test were allocated to a new MDD based on their symptoms.

2.4. Statistical analysis

Comparisons (2020 vs. 2018 or 2019, and 2018 vs. 2019) were performed with a chi-squared test or Student's t test. All 95% confidence intervals (CI) of proportions are provided when appropriate. The threshold for statistical significance was set at $p<0.05$. There were no missing diagnostic data except for patients who left without being seen by a physician (no diagnosis, n=108 visits; 1%). The study was registered with Lille University Hospital's Data Protection Officer (reference: DEC21-013). In line with the French legislation on retrospective studies of routine clinical practice, the study protocol was approved by a hospital committee with competency for research not requiring approval by an institutional review board. Parents/patients were informed of this type of research by the institutional written charter.

3. Results

3.1. Population

A total of 10,479 PED visits were identified over the 55 days of lockdown in 2020 and the same time periods in 2018 and 2019. In all, 184 visits (1.8%) were excluded (Fig. 1). We included 10,295 visits: 4232 visits in 2018, 4484 in 2019, and 1579 in 2020. In the 2020 period, the number of PED visits was, respectively, 61% and 63% lower than in the same period in 2018 and 2019. Surgical and injury-related diagnoses were more common in 2020 (38%; 95% CI: 35–40) than in 2018 and 2019 (31%; 95% CI: 30–32 in 2018 and 31%; 95% CI: 30–33 in 2019; Table 1). Compared with 2018 and 2019, patients visiting the PED in 2020 were significantly younger, with a greater proportion of children under 3 months of age ($p<0.05$) and a smaller proportion of patients over 12 years of age ($p<0.05$) (Table 2). The length of stay in the PED was significantly shorter in 2020 than in the two previous years (Table 2).

The number of discharges to another hospitalization unit was, respectively, 52% and 49% lower in 2020 than in 2018 and 2019. However, the proportion of discharges to another hospitalization unit was higher in 2020 (18% of 1579) than in 2018 and 2019 (13% of 4232 in 2018 and of 4484 in 2019). Similarly, the proportion of discharges from the PED to the intensive care unit (ICU) was higher in 2020 than in 2018 and 2019 (Table 2). Unwarranted visits were significantly lower in 2020 as compared to 2018 and 2019 (Table 2). The proportion of PED visits with prescribed laboratory tests was also higher in 2020 ($p<0.01$).

3.2. Discharge diagnoses

Among the 10,295 PED visits analyzed, 108 had missing data because patients left without being seen by a physician (40 in 2018, 65 in 2019, and 3 in 2020). All 10,187 MDDs were allocated to one of the 20 CRCs. The most common MDD was "wounds" in 2020 and "gastroenteritis" in 2018 and 2019. Thus, the most common CRC was

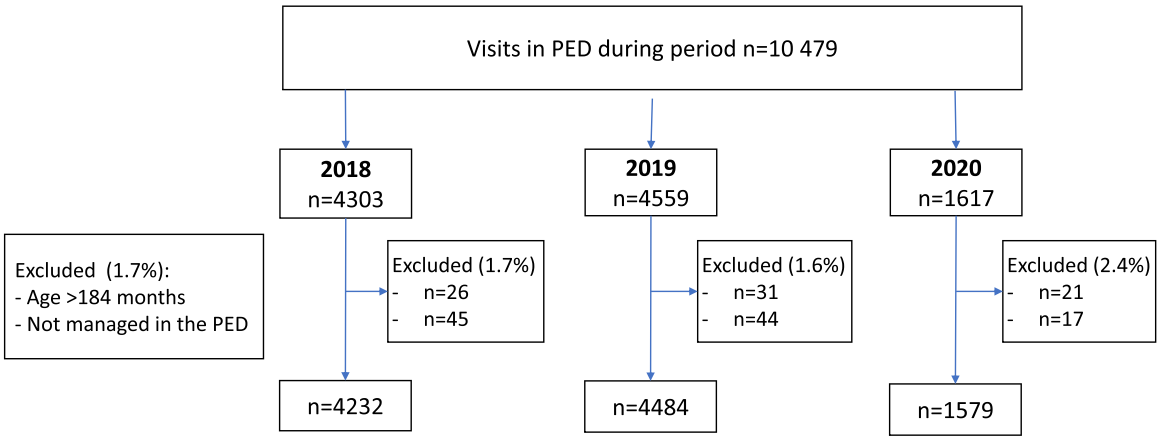

Fig. 1. Flow chart.
PED: pediatric emergency department.

"traumatic injuries" in 2020 and "acute infectious disease" in 2018 and 2019 (Table 1).

In the surgical and injury-related category, we observed a significant rise in trauma-related visits during the lockdown. Patients in 2020 were significantly more likely to be diagnosed with a wound, sprain, or fracture than patients seen in 2018 or 2019. This finding is agreement with the results for "injury" ICD-10 codes starting with "S" (Table 3). When considering the disease-related CRCs, there were significantly fewer cases of acute infectious disease in 2020 than in 2018 and 2019 (Fig. 2). This was also true for the ICD-10 Chapter I codes (i.e., infections). Conversely, there were significantly more visits for mental, behavioral, and social issues (according to the CRC or the pooled ICD-10 F, Z, and T codes) in 2020 compared to 2018 and 2019. There was no significant difference between 2018 and 2019 for these two pooled CRCs and ICD-10 groups.

During the study period, 131 patients were ascribed an MDD for suspected or confirmed COVID-19. After a retrospective review of the medical records of the cases, only 11 (8%) had a confirmed COVID-19 infection. Five of the cases were discharged to a hospital department. The remaining cases (with a negative PCR test for SARS-CoV-2) were allocated to an MDD as a function of their symptoms.

4. Discussion

Our results highlighted the profound impact of the first period of COVID-19 lockdown in 2020 on the number of PED visits that dropped by two thirds, compared to 2018 and 2019, and on the changes in the pattern of PED visits.

Table 1
Distribution of 10,187 primary discharge diagnoses (grouped into clinically relevant categories) in 2018, 2019, and 2020.

Diagnoses (*n*)	2018 (*N*=4192)		2019 (*N*=4419)		2020 (*N*=1576)		p^{*}	p^{**}	p^{***}
Disease-related	2890	69%	3034	69%	981	62%	**$<10^{-3}$**	**$<10^{-3}$**	0.78
Acute infectious disease	1081	26%	1220	28%	319	20%	**$<10^{-3}$**	**$<10^{-3}$**	0.06
Digestive tract disorders	440	10%	486	11%	136	9%	0.05	**0.01**	0.45
Respiratory disease	202	5%	153	3%	48	3%	**0.003**	0.43	**0.002**
Skin disease	199	5%	196	4%	55	3%	**0.038**	0.11	0.49
Mental, behavioral, and social issues	166	4%	172	4%	104	7%	**$<10^{-3}$**	**$<10^{-3}$**	0.87
Neurologic disorders	161	4%	182	4%	75	5%	0.12	0.30	0.48
Pain	160	4%	149	3%	52	3%	0.35	0.89	0,26
Eye and dental problems	122	3%	149	3%	36	2%	0.19	**0.03**	0.22
Urogenital disease	138	3%	108	2%	73	5%	**0.02**	**$<10^{-3}$**	**0.02**
Ear, nose, and throat disease	69	2%	69	2%	22	1%	0.50	0.50	0.75
Malaise	61	1%	52	1%	24	2%	0.85	0.29	0,25
Endocrine and metabolic diseases	19	<0.5%	21	<0.5%	6	<0.5%	0.71	0.63	0.88
Cardiovascular disease	10	<0.5%	9	<0.5%	6	<0.5%	0.36	0.27	0.73
Hematologic disease	21	1%	24	1%	9	1%	0.74	0.9	0.78
Swelling, masses and lumps	41	1%	44	1%	16	1%	0.90	0.95	0.93
Surgical and injury-related	1302	31%	1385	31%	595	38%	**$<10^{-3}$**	**$<10^{-3}$**	0.78
Traumatic injury	1075	26%	1109	25%	469	30%	**0.001**	**$<10^{-3}$**	0.55
Contusion	559	13%	550	12%	195	12%	0.33	0.94	0.22
Wound	239	6%	254	6%	165	10%	**$<10^{-3}$**	**$<10^{-3}$**	0.93
Sprain	113	3%	106	2%	16	1%	**$<10^{-3}$**	**$<10^{-3}$**	0.38
Fracture	164	4%	199	5%	93	6%	**0.001**	**0.03**	0.17
Abdominal surgery	64	2%	95	2%	35	2%	0.07	0.86	**0.03**
Foreign body	44	1%	59	1%	37	2%	**$<10^{-3}$**	**0.006**	0.22
Orthopedics	57	1%	63	1%	25	1%	0.79	0.65	0.52
Surgical follow-up	62	1%	59	1%	29	2%	0.32	0.15	0.57

p Values for Student's *t* test;
* 2018 vs. 2020;
** 2019 vs. 2020;
*** 2018 vs. 2019

Table 2
Demographic and clinical characteristics of 10,295 pediatric emergency department (PED) visits in 2018, 2019, and 2020.

Variables	2018	2019	2020	*p	**p	***p
PED visits, *n*	4232	4484	1579			
Age, months (mean ± SD)	63 ± 54	64 ± 55	59 ± 52	**<10⁻³**	**<10⁻³**	**<10⁻³**
< 3 months: *n* (%) [95% CI]	252 (6.0%) [5.3–6.7]	277 (6.2%) [5.5–6.9]	122 (7.7%) [6.5–9.2]	**0.01**	**0.03**	0.66
3–36 months: *n* (%) [95% CI]	1583 (37.4%) [36.0–38.9]	1649 (36.8%) [35.4–38.2]	615 (39.0%) [36.6–41.4]	0.28	0.12	0.54
36–144 months: *n* (%) [95% CI]	1867 (44.1%) [42.6–45.6]	1997 (44.5%) [43.1–46.0]	683 (43.2%) [40.8–45.7]	0.55	0.37	0.69
>144 months (12 years): *n* (%) [95% CI]	530 (12.5%) [11.6–13.6]	561 (12.5%) [11.6–13.5]	159 (10.1%) [8.7–11.7]	**0.01**	**0.009**	0.98
Length of stay in the PED, min (median (IQR))	179 (113; 292)	228 (149; 350)	174 (102; 314)	**<10⁻³**	**<10⁻³**	**<10⁻³**
Status after the PED visit				**<10⁻³**	**<10⁻³**	0.65
Discharge, *n* (% [95% CI])	3625 (85.7%) [84.6–86.7]	3827 (85.4%) [84.3–86.4]	1286 (81.4%) [79.5–83.3]			
Admission, *n* (% [95% CI])	561 (13.3%) [12.3–14.3]	580 (12.9%) [12.0–14.0]	288 (18.2%) [16.4–20.2]			
Death, *n*	0	0	1			
Discharge without or against medical advice, *n* (% [95% CI])	46 (1.1%) [0.8–1.5]	77 (1.7%) [1.4–2.1]	4 (0.3%) [0.1–0.7]			
Unwarranted visits, *n* (% [95% CI])	910 (21.5%) [20.3–22.8]	1015 (22.6%) [21.4–23.9]	295 (18.7%) [16.8–20.7]	**0.01**	**<10⁻³**	0.16
Discharge to the intensive care unit, *n* (% [95% CI])	49 (1.2%) [0.9–1.5]	45 (1.0%) [0.8–1.4]	29 (1.8%) [1.3–2.6]	**0.04**	**<10⁻³**	0.48
Laboratory tests prescribed, *n* (% [95% CI])	712 (16.8%) [15.7–18.0]	802 (17.9%) [16.8–19.0]	361 (22.9%) [20.9–25]	**<10⁻³**	**<10⁻³**	0.26

SD: standard deviation; CI: confidence interval; IQR: interquartile range
p Values for Student's *t* test:
* 2018 vs. 2020;
** 2019 vs. 2020;
*** 2018 vs. 2019

Table 3
Distribution of the main discharge diagnoses (according to the ICD-10 codes) in 2018, 2019, and 2020.

Chapter heading	Chapter	Letter	2018		2019		2020		*p	**p	***p
Certain infectious and parasitic diseases	I	A	268	6%	294	7%	32	2%	**<10⁻³**	**<10⁻³**	0.63
		B	228	5%	215	5%	60	4%	**0.01**	0.08	0.23
Neoplasms, diseases of the blood-forming organs, and certain disorders involving the immune mechanism	II, III	C	4	0%	9	0%	0	0%	0.58	0.12	0.20
		D	31	1%	33	1%	18	1%	0.14	0.14	0.97
Endocrine, nutritional, and metabolic disease	IV	E	34	1%	32	1%	4	0%	**0.02**	**0.04**	0.65
Mental and behavioral disorders	V	F	23	1%	31	1%	9	1%	0.92	0.59	0.37
Diseases of the nervous system	VI	G	57	1%	85	2%	27	2%	0.32	0.60	**0.04**
Diseases of the eye and adnexa. Diseases of the ear and mastoid process	VII, VIII	H	120	3%	148	3%	27	2%	**0.01**	**<10⁻³**	0.19
Diseases of the circulatory system	IX	I	31	1%	31	1%	14	1%	0.57	0.46	0.84
Diseases of the respiratory system	X	J	528	13%	565	13%	131	8%	**<10⁻³**	**<10⁻³**	0.79
Diseases of the digestive system	XI	K	319	8%	390	9%	122	8%	0.82	0.21	**0.04**
Diseases of the skin and subcutaneous tissue	XII	L	116	3%	117	3%	31	2%	0.15	0.23	0.73
Diseases of the musculoskeletal system and connective tissue	XIII	M	113	3%	150	3%	36	2%	0.38	**0.03**	0.06
Diseases of the genitourinary system	XIV	N	136	3%	139	3%	80	5%	**0.001**	**<10⁻³**	0.79
Pregnancy, childbirth, and the puerperium	XV	O	0	0%	0	0%	0	0%	/	/	/
Certain conditions originating in the perinatal period	XVI	P	18	0%	20	0%	2	0%	0.13	0.09	0.87
Congenital malformations, deformations, and chromosomal abnormalities	XVII	Q	10	0%	14	0%	9	1%	**0.05**	0.16	0.49
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	XVIII	R	842	20%	791	18%	235	15%	**<10⁻³**	**0.007**	**0.01**
Injury, poisoning, and certain other consequences of external causes	XIX	S	1087	26%	1106	25%	466	30%	**0.006**	**<10⁻³**	0.34
		T	118	3%	125	3%	90	6%	**<10⁻³**	**<10⁻³**	0.97
Codes for special purposes	XXII	U	0	0%	0	0%	131	8%	**<10⁻³**	**<10⁻³**	x
External causes of morbidity and mortality	XX	V	0	0%	0	0%	0	0%	/	/	/
		W	0	0%	0	0%	0	0%	/	/	/
		X	0	0%	0	0%	0	0%	/	/	/
		Y	0	0%	1	0%	0	0%	/	/	/
Factors influencing health status and contact with health services	XXI	Z	109	3%	123	3%	52	3%	0.15	0.47	0.62
		A + B	496	11%	509	12%	92	6%	**<10⁻³**	**<10⁻³**	0.65
Groupings		F + T + Z	250	7%	279	7%	151	10%	**<10⁻³**	**<10⁻³**	0.49

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th Revision
* 2018 vs. 2020;
** 2019 vs. 2020;
*** 2018 vs. 2019

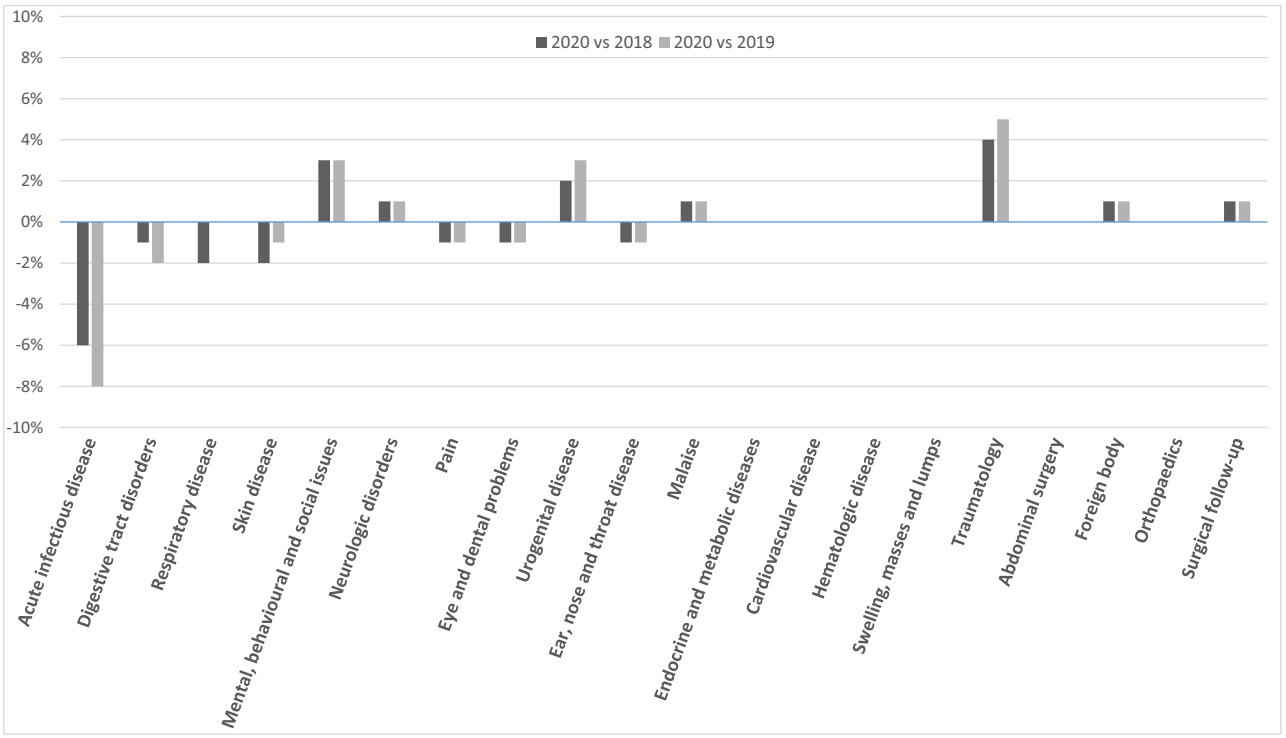

Fig. 2. Changes in the proportions of discharge diagnoses according to clinically relevant categories (CRCs) in 2020 versus 2018 and 2019.

The dramatic decrease in PED visits in 2020 was probably related to the lockdown itself. Stay-at-home orders, school closures, the prohibition of public gatherings, and social distancing appear to have substantially reduced or delayed the spread of infectious diseases [11–13, 16]. This massive reduction in health resource usage after a stay-at-home executive order is consistent with reports from other countries [3,4,13,14,16]. The unwarranted use of healthcare services by parents of children with minor illness is typically a major burden on PEDs [18]. In their survey, Macy et al. found that 23% of parents would hesitate to seek emergency care for their child during the COVID-19 pandemic [19].

In line with our present results, several other studies have observed a reduction in the proportion of low-acuity ED visits since the COVID-19 pandemic started [4,6,12,20]. Other studies have also shown a significant increase in the rate of hospital admission during lockdown, after stable rates in 2018 and 2019 [5,13,16]. An increase in resource use (such as laboratory test prescriptions and ICU admissions) testified to the greater acuity of PED visits during lockdown. Delaroche et al. reported that although resource use (laboratory testing, imaging, drug administration, etc.) increased during the pandemic period, total charges decreased by 20% [8]. With regard to the characteristics of the patients visiting the PED during lockdown, we observed an increase in the proportion of infants below the age of 3 months and a decrease in the proportion of children over 12 years of age in comparison with the same time periods in 2018 and 2019. According to O'Cathain et al., many different mechanisms make parents of young children more likely to seek emergency care: fear of the consequences when responsible for others, inability to cope (due to stressful lives), anxiety caused by uncertainty about the seriousness of symptoms, a need for risk minimization, etc. [21]. Hence, one can reasonably hypothesize that parents of very young infants are less likely to tolerate the presence of symptoms and thus to postpone medical care compared with parents of older children [18]. Our present results indicate that the proportion of unwarranted PED visits was lower during lockdown than during previous years. This finding should encourage public health researchers to look at how to alleviate the burden of unnecessary PED visits. Some researchers thought that patients might avoid medical care when required [22].

The changes in the pattern of PED visits were associated with a decrease in the proportion of patients diagnosed with a communicable disease and a rise in the proportion presenting with trauma or with mental, behavioral, and social issues. Only a few patients had a PCR-confirmed SARS-CoV-2 infection.

Acute infectious diseases are usually a major reason for PED visits. Hasegawa et al. estimated that infectious diseases typically accounted for 28% of all ED visits by children in the United States [23]. This was consistent with our data from 2018 and 2019, showing decreases in discharge diagnoses of acute infectious diseases of, respectively, 25% and 27%. During the COVID-19 lockdown, this proportion fell to 20%. Furthermore, only 8% of these visits (0.7% of the total number of visits) were related to SARS-CoV-2 infection; as reported elsewhere, this proportion is strikingly low [9,13,16,24].

Our data suggest that the proportion of discharge diagnoses associated with a need for PED care (such as endocrine and metabolic disorders, neurological disorders, cardiovascular diseases, and hematologic disorders) did not differ from one year to another, which is reassuring.

The strength of our study lies in the exhaustive analysis of the distribution of discharge diagnoses for all 10,187 PED visits. The diagnoses were classified according to their clinical relevance, and we did not have a "catch-all" category. By contrast, Liguoro et al. classified 21% of the discharge diagnosis as "other illnesses," and Dopfer et al. classified 45.6% and 32.9% of the diagnosed as "unknown or unspecific diagnoses" in 2019 and 2020, respectively [12,16]. We also reviewed each set of medical records with a discharge diagnosis of suspected COVID-19 and checked whether the diagnosis was subsequently confirmed. Secondly, since our pragmatic creation of CRCs (in order to pool MDDs) was not a validated approach, we also analyzed our data according to the ICD-10 codes and found broadly the same results.

Rather than using the ICD-10 code alone to analyze discharge diagnoses (as performed in most studies), we decided to group MDDs into CRCs. For example, ICD-10 codes for acute infectious diseases are classified according to the affected organ (e.g., the code for influenza is found in Chapter X, diseases of the respiratory system). This classification is relevant for statistical purposes but less so for clinical

reasoning. Hence, we pooled all transmissible acute infectious diseases in the same CRC ("acute infectious diseases").

One limitation of our study is its single-center and retrospective design that could have led to uncertain diagnoses. This issue was controlled by the validation of diagnoses by several investigators. There were no missing data since only diagnoses of patients who left without being seen by a physician were missing (1%). Another limitation could be our logical distribution of diagnoses into CRCs, which may have been different to others. For example, burns were classified in the category of mental/behavioral and social issues and door-fingers in the category contusion or fracture or wound according to symptoms; it could have been pooled in a "domestic accident" CRC. The external validity of our study is thus questionable and probably limited to similar tertiary-care centers, with similar types of admissions.

The proportion of PED visits for surgical and injury-related problems (and especially for trauma and for foreign bodies in inappropriate locations) was higher during lockdown. Multiple traumas were not considered in the present study because the patients were admitted to our hospital's trauma center. Our findings agree with literature reports of an increase in domestic accidents during lockdown [12,25]. As a result of lockdown, schools, playing areas (except private gardens), and outdoor activities were closed. This necessarily increased the amount of time that children spent at home, where most domestic accidents occur [26]. The increase in domestic accidents and the greater proportion of visits for mental, behavioral, and social issues can be considered as a pediatric sign of "collateral damage" caused by the pandemic. This has also been reported in other studies [12,14] and raises the question of whether these indicators will remain high as the COVID-19 pandemic persists [27]. Given that access in France to mental health care for children is already difficult (lack of professionals, lack of admission units, etc.), public health services should be concerned about how PEDs will be able to provide adequate care for this new health burden [28].

5. Conclusion

Lockdown had markedly modified the epidemiological profile of patients visiting our PED, with an increase in the prevalence of trauma and of mental, behavioral, and social issues. Our results validate calls by pediatric societies to keep schools open as much as possible because school closures probably contributed to this new health burden [28]. Our results also highlighted a massive reduction in PED visits in general and in unwarranted visits in particular; this should encourage public health researchers to look at how to alleviate the burden of unnecessary PED visits.

Declaration of Competing Interest

Prof. Dubos was paid by Nestlé in May 2020 for a lecture on COVID-19 in children, during a webinar session; all of the other authors declare no conflict of interest.

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