The impact of the COVID-19 pandemic on pediatric asthma-related emergency department visits and hospitalizations in Montreal, Quebec: a retrospective cohort study

Abstract

Background: Asthma-related pediatric emergency department (ED) visits decreased during the first wave of the COVID-19 pandemic, but trends during subsequent waves have not been documented. Additionally, possible effects of the pandemic on pre-existing inequalities in asthma-related ED visits across socio-demographic characteristics have not been explored. We aimed to compare socio-demographic and clinical characteristics of children presenting to the ED for asthma, as well as the incidence of asthma ED visits and hospitalizations between the pre-pandemic and pandemic periods.

Methods: We included children aged 0-17 years presenting with asthma to two pediatric EDs in Montreal, Quebec, between January 1, 2017 and June 30, 2021. We compared the socio-demographic characteristics based on the Canadian Index of Multiple Deprivation (CIMD) and clinical characteristics between the pre-pandemic (January 1, 2017- March 31, 2020) and pandemic (April 1, 2020-June 30, 2021) periods with Mann-Whitney and Chi-square tests. We conducted an interrupted time series analysis to evaluate the effect of the pandemic on asthma outcomes.

Results: We examined 22 746 asthma-related ED visits, (3 540 (15.6%) during the pandemic). During the pandemic, a greater proportion of patients presented a triage level 1 or 2 (19.3% vs 14.7%,p<0.001) and were admitted to the intensive care unit (2.5% vs 1.3%, p<0.001). The patients' CIMD did not differ between the two periods. We found a 47% (95% CI: -63 to -34%, p=0.002) and a 49% (95% CI 34-66%, p=0.002) decrease in ED visits and hospitalizations during the pandemic, respectively. An increasing number of ED visits/hospitalizations was noted in spring 2021 through June 2021.

Interpretation: The decrease in asthma-related ED visits was observed through the third wave of the pandemic. During the pandemic, children with asthma exacerbation presented with a higher acuity.

Introduction

Children and adolescents have been relatively spared from the direct manifestations of the SARS-CoV-2 virus with less severe manifestations of the disease (1,2). Asthma is a chronic respiratory condition that affects 10% of Canadian children and is often exacerbated by viral respiratory infections, prompting concerns about the severity of SARS-CoV-2 disease (COVID-19) in children with asthma. Despite initial concerns that children with asthma would be at risk of more severe COVID-19, several studies have since demonstrated that pediatric asthma is not a risk factor for COVID-19 morbidity and mortality (3–9).

Studies in the United States, Japan, and Slovenia have reported a decrease in pediatric asthma-related emergency department (ED) visits and hospitalizations of up to 85% during the first wave of the pandemic (10–15). Hypothesized drivers of this decrease include decreased asthma triggers during lockdowns, such as decreased circulation of non-SARS-CoV-2 respiratory viruses and outdoor air pollution (16–19). However, it is unknown if this lower incidence persisted in the months following the first wave, as in-person schooling resumed and some public health measures were lifted. Pediatric asthma exacerbations typically show biannual peaks in the fall (September) and spring thought to be due to increased transmission of respiratory viruses and pollen exposure (20,21). Yet, the effect of the pandemic on those peaks has not been studied.

Disparities in asthma-related morbidity are well established with patients from lower socio-economic status (SES) being more severely affected (22,23). The COVID-19 pandemic has magnified many health inequities in children (24–26). However, whether the pandemic has disparately affected subgroups of Canadian children with asthma (i.e. resulting in increased exacerbations) has not been studied. The identification of a subgroup of children who may be at higher risk for asthma exacerbations during the pandemic may inform policies, for instance prioritization of vaccination.

In this study, we analyzed the incidence of asthma-related ED visits and hospitalizations by comparing the pre-pandemic (January1, 2017 to March 31, 2020) and pandemic periods (April 1, 2020 to June 30, 2021, which encompasses the first three waves of the pandemic in Quebec (27)). Additionally, we compared the socio-demographic and clinical characteristics of children presenting to two pediatric tertiary care EDs for asthma during the pre-pandemic and pandemic periods, focusing specifically on an area-level index of deprivation and visit acuity at ED presentation and hospitalizations.

Methods

Design and subjects

We conducted a retrospective cohort study using the electronic databases of the two pediatric tertiary care EDs in Montreal (Sainte-Justine Hospital University Center (CHUSJ) and the Montreal Children's Hospital (MCH)). These EDs have a combined annual census of more than 150 000 patient visits and see the majority of children with asthma exacerbations in the Greater region of Montreal, the second most populous metropolitan area in Canada with 4.1 million inhabitants. We retrieved data from January 1, 2017 until June 30, 2021. We included children aged <17 years with an asthma-related ED visit, defined as an ED visit with a primary discharge diagnosis of asthma or bronchospasm or with an ICD-10-CA code J45 or ICD-9 code 493.XX. Children who left the ED before being assessed by a physician were excluded from this study as they did not have a discharge diagnosis. The institutional research ethic boards of the respective institutions approved this study (Sainte-Justine Hospital University Center #21-2021-3292, Montreal Children's Hospital #21-2021-7573) and waived the need for participant consent. This report follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement.

Outcomes and other measures

Our primary outcome was the weekly number of asthma-related ED visits during the study period, which was further divided into the pre-pandemic period (January 1, 2017 to March 31, 2020) and the pandemic period (April 1, 2020 to June 30, 2021). We chose these dates given the declaration of a public health emergency in Quebec on March 13, 2020, which mandated extensive school and daycare closures, and we assumed a lag time of 2 weeks for these measures to have an impact on asthma exacerbations. Our secondary outcome was the weekly number of asthma-related hospitalizations during the study period. Admission to the intensive care unit (ICU) was defined as an ICU stay at any time during a hospitalization.

We evaluated the characteristics related to the ED visit and/or hospitalization, including the length of stay in the ED, the length of stay of the hospitalization, if applicable, and the triage level at ED presentation. Triage level is assigned to each patient based on the Paediatric Canadian Triage and Acuity Scale (PaedCTAS) (28): level 1 (resuscitation), level 2 (emergent), level 3 (urgent), level 4 (less urgent), level 5 (non-urgent). While most of this data was extracted from the ED electronic databases, we complemented the database with a medical chart review when data was missing for selected patients and variables.

Patient-related characteristics that were collected included age, sex, and the patients' 6-character postal code, which was used to derive the Canadian Index of Multiple Deprivation (CIMD) (29). The CIMD is an index of deprivation and marginalization and provides a quintile based on the subject's postal code for each of the four dimensions of deprivation (residential instability, economic dependency, ethno-cultural composition, situational vulnerability). It allows the comparison of measures of social well-being between individuals' residency area. For each of the four dimensions, the first quintile represents the least deprived and the fifth quintile represents the most deprived. To derive the CIMD, the subject's residential 6-character postal code was converted through the Postal Code Conversion File (30) and then mapped to the CIMD.

Statistical analysis

We performed a descriptive analysis of the weekly number of asthma-related ED visits and hospitalizations and conducted an interrupted time series analysis to analyze the impact of the pandemic on asthma-related ED visits. Specifically, we compared the number of asthma-related ED visits between the pre-pandemic period and the pandemic period, assuming a level change model. Given the well-described biannually peak of asthma exacerbations in fall and spring, analyses were adjusted for seasonality through a Fourier term (31). In a sensitivity analysis, we compared the number of asthma-related ED visits in the second and third wave of the pandemic to the pre-pandemic period by excluding the first wave (April-July 2021) in the analysis. We performed a similar analysis for asthma-related hospitalizations. We described and compared the visit-related and patient-related characteristics using Mann-Whitney test for continuous data, Chi square goodness of fit test to compare the distribution of variables with >2 categories,

and calculated the differences in proportions for variables with ≤2 categories. Statistical significance was set at $p<0.05$. Analyses were performed with R software version 4.0.5 (www.r-project.org).

Results

Between January 1, 2017 and June 30, 2021, there were 22 746 asthma-related ED visits between the two centers, 19 408 during the pre-pandemic period and 3 338 during the pandemic. The median (interquartile range (IQR)) age of these children was 2.7 (1.7, 5.0) years and 62.7% were male (Table 1). The majority of children came from neighborhoods with high residential instability and more diverse ethno-cultural composition (Figure 1). The majority of these children presented with a triage level 3 (70.3%), representing a serious but non-life-threatening health problem. Throughout the study period, 8.5% of children presenting to the ED for asthma were hospitalized, with 17.3% of them requiring admission to the ICU.

Decrease in asthma-related ED visits and hospitalizations through the first three waves of the pandemic

The observed yearly trends for asthma-related ED visits between January 1, 2017 and March 31, 2020 were similar, with biannual peaks in the fall and spring and a decrease in visits from June to August (Figure 2A). Adjusting for seasonality, there was a 47% decrease (95% CI 34, 63%; p=0.001) in the number of asthma-related ED visits during the pandemic period compared to the pre-pandemic period. Two nadirs in ED visits were identified, the first from April to June 2020 and the second in January 2021. While the typical peak of asthma ED visits in September was nonetheless observed during the pandemic, it is attenuated compared to the peaks from 2017-2019 (448 visits in September 2020 vs. an average of 637 visits in September from 2017-2019). Interestingly, while asthma-related ED visits usually decrease after May and throughout the summer, we observed an increasing trend in ED visits through June 2021, with an average increase of 87 visits/month for the period of January to June 2021. In comparison, for the same period during 2017-2019, an average decrease of 19 visits/month was observed. The decrease in ED visits remained significant when we focused only on the second and third wave of the pandemic, with a 35% decrease (95% CI 13, 52%; p=0.004) compared to the pre-pandemic period.

Similar trends were observed for asthma-related hospitalizations (Figure 2B). Adjusting for seasonality, there was a 49% decrease (95% CI 34, 66%; p=0.002) in the number of asthma-related hospitalizations during the pandemic period, compared to the pre-pandemic period. An increasing trend in hospitalizations through June 2021 was also observed, with an average increase of 8 hospitalizations/month for the period of January to June 2021. In comparison, for the same period during 2017-2019, an average decrease of 3 hospitalizations/month is observed. The decrease in hospitalizations remained significant when we focused on the second and third wave of the pandemic, with a 39% decrease (95% CI 14, 57%; p=0.004) compared to the pre-pandemic period.

Comparison of the clinical and patient characteristics before and during the pandemic (Table 1)

There was no difference in the proportion of children requiring hospitalization between the pandemic and the pre-pandemic periods (difference in proportions of -0.4%, 95% CI -0.6, 1.4%). A higher proportion of children were admitted to the ICU during the pandemic (2.5% pandemic vs. 1.3% pre-pandemic of all children presenting to the ED or 29.7% pandemic vs 15.2% pre-pandemic of all hospitalized children). While statistically significant, the median length of stay in the ED was only slightly lower during the pandemic (by 0.1 hours).

Compared to the pre-pandemic period, a slightly higher proportion of males presented to the ED during the pandemic period (difference in proportions of 2.7%, 95% CI 1.0, 4.5%; p=0.002). There was no difference in the CIMD quintile distributions of children presenting before and during the pandemic (Figure 1). A higher proportion of children presented with triage level 1-2 (condition requiring immediate or rapid intervention) during the pandemic (19.7% pandemic vs 14.7% pre-pandemic, p<0.001).

Discussion

In this study, we documented an overall 47% decrease in asthma-related ED visits and a 49% decrease in asthma-related hospitalizations through the third wave of the pandemic compared to the pre-pandemic period. This decrease was most notable during the initial months of the pandemic and in January 2021, although a steep increase in the number of asthma-related ED visits and hospitalizations was observed from January to June 2021. Asthma-related visits during the pandemic were characterized by more severe clinical acuity and a higher proportion of ICU hospitalizations. The distribution of the index of deprivation among children presenting to the ED for asthma did not differ between the pre-pandemic and pandemic periods, suggesting that pre-pandemic socio-demographic inequalities did not widen during the COVID-19 pandemic.

The decrease in asthma-related ED visits and hospitalizations during the pandemic may be explained by several factors. Public health measures likely led to a decreased transmission of non-SARS-CoV-2 respiratory viruses, a common trigger of asthma exacerbations. Indeed, data from the Respiratory Virus Detection Surveillance System (16) reported a decrease in the percentage of positive tests for 7 common respiratory viruses in September 2020 compared to pre-pandemic years for Canada and Quebec. Furthermore, decreased exposures to air pollution, a trigger of asthma exacerbations, may have contributed to the decrease in adverse asthma event. In fact, the city of Montreal reported a 10% improvement in air quality from March to April 2020 compared to the same period in 2017-2019 with important decreases in $PM_{2.5}$ and NO_2 levels (17,18), corroborating with observations around the world (11,19). Finally, families may have an increased threshold for medical consultations during the pandemic and there may have been an increased adherence to asthma controller medication (32). This may be triggered by the fear associated with the potential impact of COVID-19 on children with asthma and a study suggesting that inhaled corticosteroids was associated with reduced ACE2

mRNA expression, the receptor of SARS-CoV-2 (33,34), although this association remains controversial (35).

We observed an increasing trend in the incidence of asthma-related ED visits following the nadir in January 2021, culminating with the highest incidence in June 2021 at the end of our study period. Typically, prior to the pandemic, asthma exacerbations start to decrease in June through the summer months. Interestingly, this surge of asthma exacerbations follows the general relaxation of public health measures in Quebec (re-opening of restaurants, indoor and outdoor gatherings allowed) at the end of May 2021 and removal of mandatory masking in school in May 2021. This also coincides with an increase in the number of positive tests for common respiratory viruses in Quebec, particularly for RSV and parainfluenza (16). Thus, we hypothesize that the relaxation of public health measures led to increased transmission of common respiratory viruses, which in turn led to increased asthma exacerbations.

Since the impact on asthma-related ED visits and hospitalizations is likely multifactorial, we chose not to analyze the impact of individual public health measures on the outcome. However, we identified the timing of the implementation and lifting of key public health measures pertaining to children based on the COVID-19 timeline in Quebec and denoted the dates in Figure 2 (27). We observed that changes in the trends in asthma-related ED visits and hospitalizations were related to the implementation and lifting of public health measures, particularly those affecting daycares and schools. The drastic decrease in asthma-related ED visits and hospitalizations observed between April and June 2020 follows school and daycare closures on March 13, 2020 and a generalized lockdown on March 24, 2020 in Quebec. Subsequently, in July 2020, the weekly incidence of ED visits rapidly went up to numbers similar to 2017-2019. This follows the reopening of daycares in June 2020, and reopening of restaurants, businesses and gatherings in early July 2020. Quebec schools subsequently reopened for full or partial in-person attendance as of August-September 2020. Interestingly, even during the pandemic, we observed the typical annual peak in asthma-related ED visits in September 2020. However, this peak was attenuated compared to same period pre-pandemic. Of note, a partial return to school (50% in-person) was instituted for children in grade 10 and 11 and mandatory masking in schools was implemented for all children ≥12 years. The second nadir in asthma-related ED visits and hospitalizations in January 2021 follows a prolonged closure of primary and secondary schools for the holidays. Although the impact of individual measure is hardly quantifiable, we note a temporal association between pandemic-related public health measures and the incidence of asthma exacerbations. While some of these measures such as school closures would not be implementable outside of the pandemic context, other measures such as masking to prevent viral transmission could be considered as a public health strategy for asthma management.

While characteristics of children presenting to the ED for asthma were relatively unchanged during the pandemic, we found that children presented with a higher level of acuity and a greater percentage were admitted to the ICU despite an unchanged rate of hospitalizations. The higher presenting acuity was also observed for all-cause ED visits (32). Decreased in-person outpatient visits, the temporary suspension of pulmonary

function testing, and increased parental thresholds for medical consultations, which may all lead to poorer acute and chronic management of asthma, may have contributed to the increased acuity in presentation (32).

Based on the multidimensional Canadian index of multiple deprivation, children presenting to the ED for asthma pre-pandemic were not different than those presenting during the pandemic. While previous studies did not examine the disparities in the incidence of asthma exacerbations during the pandemic in children with lower SES or in minority groups, studies have reported higher COVID-19-related morbidity in minorities (24–26,36–38). Suggested mechanisms for these inequalities included differential access to care, increased viral exposure, and lower income, which may put these subgroups of children at higher risk of adverse health outcomes (38). Our findings suggest that the pandemic did not widen existing disparity in children from more deprived neighborhoods in Montreal with regards to asthma-related ED visits and hospitalizations compared to the pre-pandemic period.

Our study has noteworthy limitations. First, due to the retrospective nature of our study, we did not have data on other potential confounding variables such as medication adherence. Second, although we did not have individual-level data perhaps on the race/ethnicity of the patient, the CIMD captures multiple dimensions of deprivation at a granular level. In fact, its calculation is based on the 6-digit postal code and in Quebec, there is on average 39 residents per postal code. Thus, the CIMD may be more representative of one's social well-being than race/ethnicity alone. Third, our data was restricted to two pediatric tertiary care centers in Montreal, Quebec. While the catchment area of our two centers is large, our findings may not be generalizable to children living in non-urban settings or other regions of Quebec and Canada, particularly given region- and province-specific public health measures during the pandemic.

In conclusion, we did not find a difference in the existing over-representation of children from more deprived neighborhoods presenting with asthma exacerbations during the pandemic. We observed an approximately 50% decrease in pediatric asthma-related ED visits and hospitalizations over the first 15 months of the pandemic, although the incidence varies with the implementation and relaxation of public health measures. While some measures are exceptional (e.g. school closures), others may be more easily implemented and socially acceptable after the pandemic, such as masking in public spaces when one is symptomatic to limit the transmission of respiratory viruses. This in turn could lead to decreased asthma exacerbations. Further studies should focus on individual behaviours and how these affect the risk of asthma exacerbations.

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Table 1. **Socio-demographic and clinical data of patients presenting to the emergency department for an asthma-related visit for the study period and comparing the pre-pandemic and pandemic periods.**
Abbreviations. ED: emergency department; ICU: intensive care unit; IQR: interquartile range

	Total January 1, 2017-June 30, 2021 n=22 746	**Pre-pandemic** January 1, 2017-March 31, 2020 n=19 408	**Pandemic** April 1, 2020-June 30, 2021 n=3 338	***P***	***Difference in proportions (95% confidence interval)***
Age median, years, (IQR)	2.7 (1.7, 5.0)	2.6 (1.6, 5.0)	3.1 (1.8, 5.7)	<0.001	-
Male, n (%)	14 256 (62.7)	12085 (62.3)	2 171 (65.0)	0.002	2.7 (1.0, 4.5)
Emergency triage level, n (%)					
1 or 2	3 513 (15.4)	2 855 (14.7)	658 (19.7)	<0.001	-
3, 4 or 5	19 233 (84.6)	16 553 (85.3)	2 680 (80.3)		
Length of stay in ED, hours, median (IQR)	4.8 (3.5, 6.7)	4.8 (3.5, 6.8)	4.7 (3.4, 6.5)	<0.001	-
Hospitalizations, n (%)	1 939 (8.5)	1 667 (8.6)	275 (8.2)	0.52	-0.4 (-0.6, 1.4)
Length of stay of hospitalization, days, median (IQR)	2.0 (1.0, 3.0)	2.0 (1.0, 3.0)	2.0 (1.0, 3.0)	0.74	-
Admission to ICU, n (%)	334 (1.5)	253 (1.3)	84 (2.5)	<0.001	1.2 (0.6, 1.8)

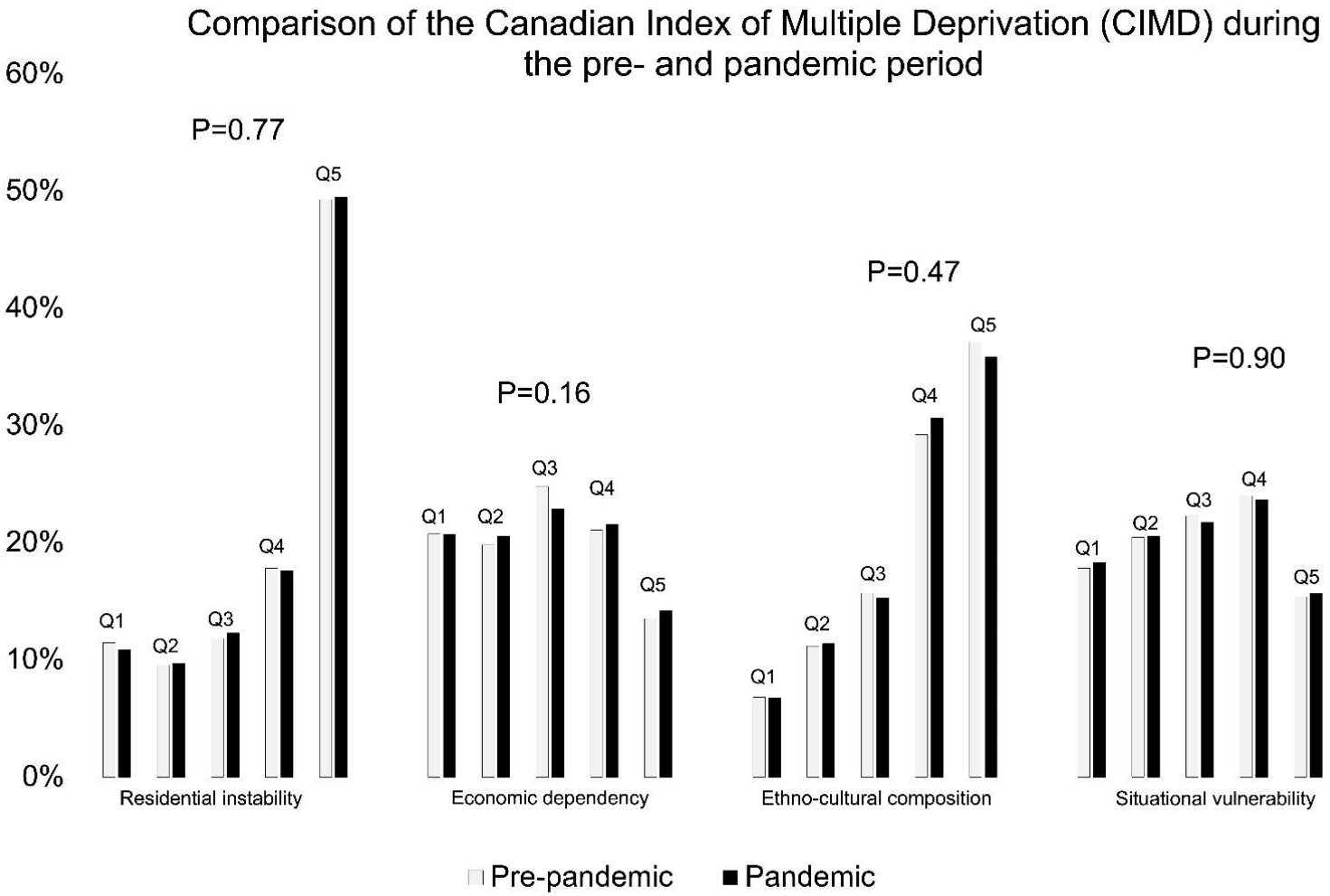

Figure 1. **Comparison of the Canadian Index of Multiple Deprivation (CIMD) during the pre- and pandemic period of COVID-19.** The distribution of the 4 dimensions of the CIMD did not significantly differ between the pre-pandemic and the pandemic periods.

Abbreviations. CIMD: Canadian Index of Multiple Deprivation; Q1: quintile 1; Q2: quintile 2; Q3: quintile 3; Q4: quintile 4; Q5: quintile 5

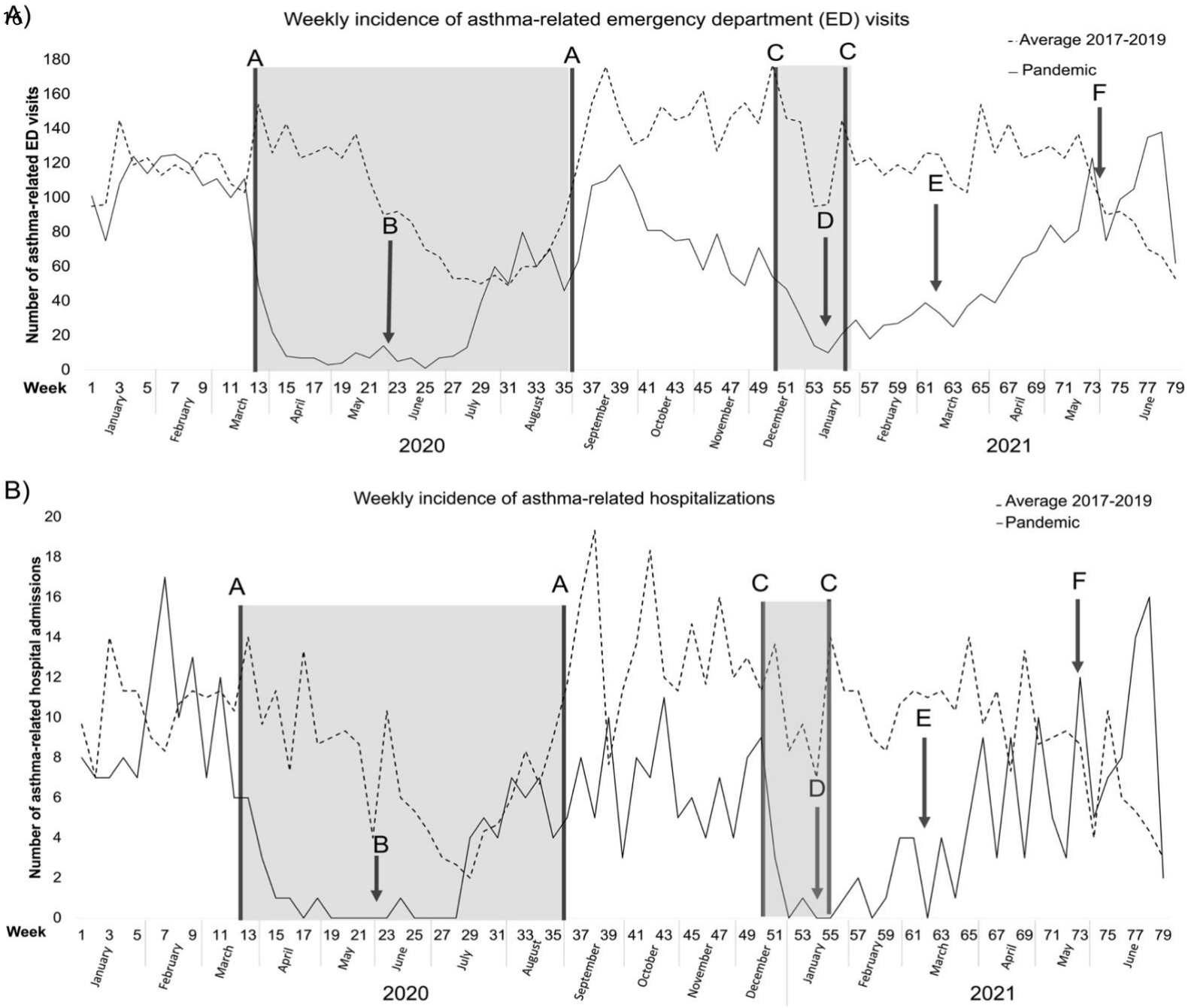

Figure 2. **Weekly incidence of asthma-related emergency department visits (graph A) and of asthma-related hospitalizations (graph B) during the COVID-19 pandemic (solid line) compared to the average of 2017-2019 (dotted line).**

A: Closure of primary schools and high schools (March 13, 2020-September 1, 2020)

B: Opening of daycare services (June 1, 2020)

C: Closure of primary schools and high schools (December 20, 2020-January 18, 2021) and implementation of mandatory procedural mask at all times in high schools

D: Procedural mask in primary schools (at all times for grade 5 and 6 and in shared spaces for grade 1-4) (January 11, 2021)

E: Procedural mask in primary schools at all times for grade 1-6 (March 8, 2021)

F: Beginning of sanitary measures relaxation in Quebec (May 28, 2021)

Supplementary Table 1. **Socio-demographic and clinical data of patients presenting to the emergency department for an asthma-related visit by study site and for the pre-pandemic and pandemic periods.**

Abbreviations. CHUSJ = Centre Hospitalier Universitaire Sainte-Justine; MCH = Montreal Children's Hospital; IQR: interquartile range; ED: emergency department

	All January 1, 2017-June 30, 2021		**Pre-pandemic** January 1, 2017-March 31, 2020		**Pandemic** April 1, 2020-June 30, 2021	
	CHUSJ N=17 598	MCH N=5 148	CHUSJ N=15 313	MCH N=4 095	CHUSJ N=2 285	MCH N=1 053
Age, years, median (IQR)	2.6 (1.6, 4.7)	2.0 (2.0, 7.0)	2.5 (1.6, 4.6)	3.0 (2.0, 7.0)	2.9 (1.8, 5.3)	4.0 (2.0, 7.0)
Male, n (%)	11 015 (62.6)	3241 (63.0)	9529 (62.2)	2556 (62.4)	1486 (65.0)	685 (65.1)
ED triage level, n (%)						
1	157 (0.9)	4 (0.1)	138 (0.9)	1 (0.0)	19 (0.8)	3 (0.3)
2	2 901 (16.5)	451 (8.8)	2 428 (15.9)	288 (7.0)	473 (20.7)	163 (15.5)
3	12 098 (68.7)	3 903 (75.8)	10 695 (69.8)	3 210 (78.4)	1 403 (61.4)	693 (65.8)
4	2 335 (13.3)	557 (10.8)	1 965 (12.8)	428 (10.5)	370 (16.2)	129 (12.3)
5	107 (0.6)	233 (4.5)	87 (0.6)	168 (4.1)	20 (0.9)	65 (6.2)
Length of stay in ED, median (IQR)	4.9 (3.5, 6.8)	4.6 (3.2, 6.5)	4.9 (3.5, 6.8)	4.6 (3.3, 6.6)	4.8 (3.5, 6.6)	4.5 (3.1, 6.3)
Hospitalizations, n (%)	1 824 (10.4)	118 (2.3)	1 588 (10.4)	79 (1.9)	236 (10.3)	39 (3.7)
Length of stay of hospitalization, median (IQR)	2.0 (1.0, 3.0)	2.5 (2.0, 4.0)	2.0 (1.0, 3.0)	3.0 (2.0, 4.0)	2.0 (1.0, 3.0)	2.0 (2.0, 3.0)
Admission to ICU, n (%)	295 (1.7)	42 (0.8)	244 (1.6)	9 (0.2)	51 (2.2)	33 (3.1)
Canadian Index of Multiple Deprivation	missing n=144	missing n=110	missing n=118	missing n=84	missing n=26	missing n=26
Residential instability quintiles, n (%)						
Quintile 1	1850 (10.6)	709 (14.1)	1629 (10.6)	572 (14.0)	221 (9.7)	137 (13.0)
Quintile 2	1625 (9.3)	532 (10.6)	1423 (9.3)	415 (10.1)	202 (8.8)	117 (11.1)
Quintile 3	2088 (12.0)	589 (11.7)	1822 (11.9)	453 (11.1)	266 (11.6)	136 (12.9)
Quintile 4	3032 (17.4)	974 (19.3)	2645 (17.3)	777 (19.0)	387 (16.9)	197 (18.7)
Quintile 5	8859 (50.8)	2234 (44.3)	7676 (50.1)	1795 (43.8)	1183 (51.8)	440 (41.8)
Economic dependency quintiles, n (%)						
Quintile 1	3684 (21.1)	986 (19.6)	3197 (20.9)	799 (19.5)	487 (21.3)	187 (17.8)
Quintile 2	3486 (20.0)	1001 (19.9)	3034 (19.8)	783 (19.1)	452 (19.8)	218 (20.7)
Quintile 3	4295 (24.6)	1216 (24.1)	3765 (24.6)	989 (24.2)	530 (23.2)	227 (21.6)
Quintile 4	3614 (20.7)	1146 (22.7)	3144 (20.5)	903 (22.1)	470 (20.6)	243 (23.1)
Quintile 5	2375 (13.6)	689 (13.7)	2055 (13.4)	537 (13.1)	320 (14.0)	152 (14.4)
Ethno-cultural composition quintiles, n (%)						
Quintile 1	1295 (7.4)	235 (4.7)	1130 (7.4)	179 (4.4)	165 (7.2)	56 (5.3)
Quintile 2	2108 (12.1)	413 (8.2)	1821 (11.9)	329 (8.0)	287 (12.6)	84 (8.0)
Quintile 3	2640 (15.1)	877 (17.4)	2332 (15.2)	685 (16.7)	308 (13.5)	192 (18.2)
Quintile 4	4811 (27.6)	1812 (36.0)	4166 (27.2)	1448 (35.4)	645 (28.2)	364 (34.6)
Quintile 5	6600 (37.8)	1701 (33.8)	5746 (37.5)	1370 (33.5)	857 (31.4)	331 (31.4)
Situational vulnerability quintiles, n (%)						
Quintile 1	2920 (16.7)	1107 (22.0)	2533 (16.5)	888 (21.7)	387 (16.9)	219 (20.8)
Quintile 2	3614 (20.7)	994 (19.7)	3148 (20.6)	793 (19.4)	466 (20.4)	201 (19.1)
Quintile 3	3888 (22.3)	1111 (22.1)	3402 (22.2)	886 (21.6)	486 (21.3(	225 (21.4)
Quintile 4	4277 (24.5)	1111 (22.1)	3729 (24.4)	876 (21.4)	548 (24.0)	235 (22.3)
Quintile 5	2755 (15.8)	715 (14.2)	2383 (15.6)	568 (13.9)	372 (16.3)	147 (14.0)