BMJ Paediatrics Open

Impact of COVID-19 lockdown on children with asthma in Jordan: a parental questionnaire

Montaha Al-Iede ,[1,2] Karen Waters,[3] Shereen M Aleidi,[4] Basim Alqutawneh,[5] Hala Alnawaiseh,[2] Araek Alshraideh,[2] Sara Almaaitah,[2] Raghad Mahmoud,[2] Raya Abualsoud ,[2] Arwa Kiswani,[2] Enas Al-Zayadneh,[1,2] Al-Motassem Yousef[4]

To cite: Al-Iede M, Waters K, Aleidi SM, *et al*. Impact of COVID-19 lockdown on children with asthma in Jordan: a parental questionnaire. *BMJ Paediatrics Open* 2021;**5**:e001136. doi:10.1136/bmjpo-2021-001136

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjpo-2021-001136).

Received 20 April 2021
Accepted 3 June 2021

[1]Department of Pediatrics, Respiratory and Sleep Medicine Section, Jordan University Hospital, Amman, Jordan
[2]School of Medicine, The University of Jordan, Amman, Jordan
[3]Depatment of Sleep Medicine, The Children's Hospital at Westmead, Sydeny, New South Wales, Australia
[4]Department of Biopharmaceutics and Clinical Pharmacy, School of Pharmacy, The University of Jordan, Amman, Jordan
[5]Department of Radiology, Blacktown and Mount Druitt Hospital, Sydney, New South Wales, Australia

Correspondence to
Dr Montaha Al-Iede;
montaha95@yahoo.com

ABSTRACT

Objective To evaluate the impact of a 10-week lockdown on children with asthma aged 4–17 years in terms of presentations to the emergency department (ED), frequency of admissions, compliance with medications and changes in pulmonary function testing results.

Design and setting A questionnaire-based cross-sectional study using Google Forms to collect parents' and caregivers' responses after they consented to participation.

Results A total of 374 parents/caregivers were contacted and 297 (79%) responded. The majority of the children were male (188 or 63%) and 49.8% were aged 7–12 years. More than half of the participants (194 or 65%) reported improved compliance with medications and spacer use. There was a significant reduction in the number of presentations to the ED from 137 to 80 and admissions to hospital from 56 to 24 during the 10-week lockdown period compared with the same time period in the previous year (p≤0.0001). Around 25% of the participants used telemedicine by phone and social media applications for communication with their treating physician and 59 (80%) described it as easy and smooth.

Conclusion The national lockdown in Jordan due to the COVID-19 pandemic was associated with a fall in emergency presentations and hospital admissions for acute asthma exacerbations. Parental responses indicate that fears focused around COVID-19 were associated with enhanced compliance with use preventer medications during the lockdown.

What is known about the subject?

- The COVID-19 pandemic has impacted every part of our life.
- Governments imposed lockdowns to reduce the SARS-CoV-2 transmission rate, which affected the care delivery to the patients.

What this study adds?

- The national COVID-19 lockdown caused a significant drop in paediatric presentations to the emergency department and the hospitalisation rate.
- Adherence to asthma therapy appeared to increase during the pandemic.
- Telemedicine is not well established in Jordan. However, it was described by parents as smooth and easy.

BACKGROUND

COVID-19 is a pandemic infectious disease caused by SARS-CoV-2. On 30 January 2020, the WHO announced that the COVID-19 outbreak was a public health emergency of international concern.[1] Chronically diseased patients are particularly vulnerable to severe complications of this disease and so need special attention to help prevent increased morbidity and mortality.[2] Asthma is a common chronic disease, and patients may experience decreased access to healthcare due to restrictions on public movements, lockdowns and diversion of healthcare resources to the care of patients affected by COVID-19.[3] Patients with asthma are hypothesised to have high susceptibility to, and increased severity of, SARS-CoV-2 infection due to their impaired immune response and the likelihood of respiratory exacerbation when infected by respiratory viruses, but little evidence has supported this theoretical risk.[4] With insufficient data to say that asthma protects from or increases the risk or severity of SARS-CoV-2 infection, and lack of evidence to support strong recommendations for or against specific asthma management, physicians have been advised to resume treating patients with asthma according to existing guidelines and recommendations.[5]

Since the beginning of the COVID-19 pandemic, studies have addressed the effects of the pandemic and imposed public health measures on multiple aspects of asthma care, including patients' adherence and compliance to their drugs, and obstacles to accessing usual healthcare including limited drug supplies. Since the beginning of the pandemic, increased hospital usage of drugs

such as salbutamol and other airway stabilisers to control COVID-19 symptoms has reduced their availability to patients with asthma in the community.[6] In addition, hospital services were reduced, including reduced numbers of in-person visits, reduced routine admissions and reduced clinic appointments with attempts to overcome these problems focused on improving virtual care resources.[7] Using telemedicine as a substitute has been linked to improvements in patient's quality of life and symptom control.[8]

A rise in the number of COVID-19 cases in Jordan in mid-March 2020 was linked to a wedding in the north of Jordan.[9] To support the health system's requirements, Jordan enforced strict public health infection control measures for 10 weeks from 17 March to 24 May 2020. The measures included social distancing, banning all national and international travel and enacting the Defence Law. The Jordanian government ordered a national curfew and started to isolate administrative governorates from each other.[10] People were prohibited from using their vehicles, and public transportation was stopped. All hospitals began to receive acute medical cases only and halted outpatient services, elective surgical procedures and non-urgent hospital admissions. In cases of medical emergency, people were instructed to contact the national emergency services and arrange ambulance transport to a medical centre.[10]

During the 10-week lockdown, face-to-face services lost to patients with asthma included six paediatric respiratory clinics run by two full-time physicians through the week, a comprehensive asthma education service and provision of spacers at the first clinic presentation with scheduled follow-up visits. The Jordan University Hospital (JUH) established a healthcare platform on its website and to help patients access their prescriptions, medical students and interns volunteered to deliver medications to patients. The media and internet were used to announce these measures and to guide caregivers on how to use the website. Asthma services were provided using WhatsApp and phone calls.

This study reports the results of a survey evaluating the effects of the lockdown on paediatric patients with asthma. Outcomes included the number of hospitalisations and presentations to the emergency department (ED), adherence to therapy and medication availability. It also describes the caregiver's perceptions of telemedicine and social media use as tools to communicate with healthcare services during the curfew period.

METHODS

Study design

This is a questionnaire-based cross-sectional study conducted from 5 to 12 September 2020. The targeted sample was patients with asthma aged 4–17 years, most of whom were referred to the paediatric respiratory unit at JUH for disease management. Children were eligible if they had physician-diagnosed asthma. Three hundred and seventy-four parents/caregivers were contacted over the phone by four independent researchers to assess COVID-19 occurrence and gather information about their children 's asthma control. Of the 374 parents/caregivers, 297 agreed to participate. Participants consenting to participate were asked to fill an online questionnaire prepared using Google Forms sent via the WhatsApp application.

Questionnaire

The questionnaire in online supplemental Appendix 1 consisted of 45 questions, and it took the parents approximately 7–10 min to complete. It assessed the effect of quarantine on patients with asthma and how stable their condition was during the lockdown as assessed by presentations to the ED and hospitalisations. In addition, we evaluated the perception of and accessibility to telemedicine services among the participants.

Study information was provided by sending a paragraph to the WhatsApp application, stating the study's aims, the optional nature of participation and parameters around use of the information provided including confidentiality, and its use for research purposes. Consent was confirmed when the participant replied back with a 'yes' and filled the questionnaire.

The questionnaire was written in easily understood Arabic language and included four major categories. The first category contained general questions about the patient's demographics, age at diagnosis, history of allergy and family history of atopies such as allergic rhinitis and hay fever. Allergic rhinitis was defined as recurrent rhinitis that is non-infectious and/or watery discharge with or without eye itching on allergen exposure or at pollen season. Hay fever was defined as recurrent non-infectious itching and watery eye discharge on aeroallergen exposure at pollen seasons. The second category comprised a group of questions to evaluate asthma management; controller inhalers used, use of spacers, adherence to therapy, which was defined as using controller inhaler ≥5 days a week, and asthma control in terms of the number of hospitalisation and presentations to the ED during the lockdown period, as well as availability of and access to asthma medications. In addition, our four independent researchers reviewed the electronic medical records to check the number of presentations to the ED and hospitalisations during the 10-week period of lock down and the same period in the year before. We specifically asked if patients were infected with COVID-19. The third category assessed the parents/caregivers' perception of and attitude towards telemedicine. The fourth category evaluated participant's concerns and fears regarding COVID-19 and their sources of information about COVID-19.

Statistical analysis

Statistical analyses were performed using Statistical Package for the Social Sciences software V.25. In order for the readers to get a sense of precision around the point

Table 1 Demographics and characteristics of participants

Variables	n (% (95% CI))
Gender	
Male	188 (64 (57.6 to 68.8))
Female	109 (37 (31.2 to 42.5))
Age groups (years)	
4–6	93 (31 (26.1 to 36.9))
7–12	148 (50 (44.0 to 55.7))
13–17	56 (19 (14.6 to 23.8))
Age at diagnosis (years)	
2–5	101 (34 (28.6 to 39.7))
6–12	185 (62 (56.5 to 67.8))
More than 12	10 (3 (1.6—61))
Concomitant allergies	
Allergic rhinitis	147 (50 (43.7 to 55.3))
Eczema	54 (18 (14 to 23.1))
Hay fever	130 (44 (38.1 to 49.6))
All types	21 (7 (4.4 to 10.6))
Family history of allergies	192 (65 (58.9 to 70.1))
Asthma	53 (18 (13.7 to 22.7))
Allergic rhinitis	23 (8 (5 to 11.4))
Eczema	23 (8 (5 to 11.4))
Hay fever	36 (12 (8.6 to 14.4))
Multiple allergies	74 (25 (20.1 to 30.2))

estimates, the point estimates were reported along with 95% CI. Categorical data were represented as frequency (percentage (95% CI)).

Comparison between ED visits and hospitalisation of children with asthma during the COVID-19 lockdown due to asthma exacerbations, and the same period from the year before were assessed by χ^2 or Fisher exact test as appropriate. A p value of <0.05 was considered statistically significant.

Patient and public involvement

Patients and public members were not involved in the design or conduct of the study.

RESULTS

Patient's characteristics and demographics

A total of 297 parents/caregivers participated, giving a response rate of 79%. The majority of children (188 of 63%) were male. Three age groups were defined: 4–6, 7–12 and 13–17 years with 50% aged 7–12 years. The majority, 104 (35%), were diagnosed with asthma between the ages of 6 and 12 years. Concomitant symptoms of atopy included allergic rhinitis (147 (50%)), hay fever (130 (44%)) and eczema (54 (18%)). Among affected family members, 53 (18%) had asthma and 36 (12%) had hay fever; 192 (65%) reported affected siblings; and 25% of family members had multiple allergies (table 1).

Asthma therapy

The majority (241 or 81%) of the cohort reported regular use (at least three times per week) of at least a single asthma controller. Almost half, 126 (52%) of the patients use fluticasone metered dose inhaler (MDI), while 39 (16%) use eclomethasone MDI and 65 (27%) used the combined fluticasone/salmeterol (Seretide) Diskus. Only 11 (5%) of the patients were prescribed nebulised budesonide. Among 230 patients who used inhalers, 195 (66%) reported using a spacer. Daily use of medications with the spacer was reported by 117 (60%), while 29 (15%) reported use of their preventer at least 4 days a week. Less than half of the participants (102 (34%)) admitted no compliance, with reasons including fear of being dependent on inhalers (42 or 41%), fear of side effects (40 or 39%) and forgetfulness (20 or 20%).

Effect of COVID-19 pandemic on adherence and asthma control

Among respondents, 181 (61% (95% CI 55.1% to 66.5%)) reported improved compliance with medications during the lockdown, with the majority of respondents (194 or 65% (95% CI 59.6% to 70.7%)) reporting ongoing use of preventers at prescribed doses. More than 75% (227 or 76% (95% CI 71.2% to 81.1%)) of the children used their bronchodilator <2 days/week. Only 23 (8%) of the patients required a reliever inhaler ≥5 days/week (table 2). Around one-third (103 or 35%) of the parents/caregivers reported reduced controller dosing during the lockdown. The majority (81 or 79%) indicated this was due to their children's asthma stability. However, 22% rationed the dose of inhalers because of fear of drug shortages. A small number mentioned their inability to reach the hospital.

Presentations to the ED were reduced: 80 (27% (95% CI 22% to 32.4%)) had a presentation during the 2020 lockdown compared with 137 (46% (95% CI 40.4% to 52.0%)) during the same time period in 2019 (p≤0.0001). Multiple presentations were also reduced (p≤0.0001).

Hospital admissions for acute asthma exacerbations were also reduced: only 24 (8% (95% CI 5.3% to 11.8%)) were hospitalised during the lockdown compared with 56 (19% (95% CI 14.6% to 23.8%)) during the same period in 2019 (p≤0.0001). Of the 56 children hospitalised in 2019, 13 (4% (95% CI 2.4% to 7.4%)) patients required at least two admissions compared with 4 (1% (95% CI 0.4% to 3.4%)) during the lockdown in 2020 (p≤0.0001) (table 3). None of the patients of this study was admitted to the paediatric intensive care unit nor infected with SARS-CoV-2 virus.

Use of media for COVID-19 information and parental concerns

While 212 (71% (95% CI 65.9% to 76.5%)) received information on how to deal with acute exacerbations caused by COVID-19 during the lockdown, only 60 (28%

Table 2 Adherence to therapy and spacer use during lockdown

Variables	n (% (95% CI))
Asthma controller use	
No	56 (19 (14.4 to 23.3))
Yes	241 (81 (76.2 to 85.4))
Fluticasone inhaler	126 (52 (45.8 to 58.7))
Fluticasone/salmeterol	65 (27 (21.5 to 33.5))
Beclomethasone inhaler	39 (16 (11.8 to 21.5))
Nebulised beclomethazone	11 (5 (2.3 to 8.0))
Use of inhaler with a spacer	
No	102 (34 (29 to 40))
Yes	195 (66 (60 to 71))
Daily	117 (60 (52.8 to 67.0))
Most of the time (4–6 days/week)	29 (15 (10.2 to 20.7))
Rarely (<3 days/weeks)	49 (25 (19.2 to 31.8))
Reasons for no compliance on controller	
Fear of dependency	42 (41 (31.5 to 51.4))
Forgetfulness	20 (20 (12.4 to 28.7))
Fear of side effects	40 (39 (29.7 to 49.4))
COVID-19 pandemic has increased adherence to medications	
Yes	181 (61 (55.1 to 66.5))
No	116 (39 (33.5 to 44.9))
Did child continue using preventers on prescribed dose during lockdown?	
Yes	194 (65 (59.6 to 70.7))
No	103 (35 (29.3 to 40.4))
Reasons for no using/reducing dose of medications	
Child was stable during lockdown.	81 (79 (69.5 to 86.1)
Complicated procedure to get medicine for hospital	16 (16 (9.2 to 24.0))
Inability to reach hospital during lockdown	6 (6 (2.2 to 12.3))
Days of SABA* use per week during the lockdown	
Less than 2 days	227 (76 (71.2 to 81.1))
2–4 days	47 (16 (11.9 to 20.5))
5 or more	23 (8 (5.0 to 11.4))

(95% CI 15.8% to 25.2%)) received their information from the patient's treating physician through WhatsApp. The majority (179 or 84% (95% CI 78.8% to 89.0%)) received their information about the effects of COVID-19 on asthma from media and social media such as Facebook and WhatsApp, while 135 (64% (95% CI 56.8% to 70.2%)) acquired information through personal internet searches.

Almost all parents (293 or 99% (95% CI 96.6% to 99.6%)) felt they needed to strictly follow safety measures to keep their children safe, and the majority (255 or 86% (95% CI 81.4% to 89.6%)) thought patients with asthma had higher risk of severe COVID-19 than patients without asthma. Consequently, 219 (74% (95% CI 68.3% to 78.7%)) of parents felt stressed and insecure regarding their children's asthma. The fears identified included difficulty reaching hospitals if required (122 (41% (95% CI 35.4% to 46.9%))), running out of inhalers (106 (36% (95% CI 30.2% to 41.4%))) and expired insurance (33 (15% (95% CI 10.6% to 20.4%))), with more than one option possible. On the other hand, 78 (95% CI 26% (21.4% to 31.7%)) of parents did not feel worried about their children's asthma with the main reasons being that their children's asthma was controlled (56 (72% (95% CI 60.5% to 81.4%))), and that inhalers were available at home (22 (29% (95% CI 18.6% to 39.5%))).

Use of telemedicine during the COVID-19 lockdown

The child's medical team was contacted by 76 (26%) at least once. Methods were most commonly WhatsApp (45 (152%)) and phone (45 (15%)), with more than one option possible. Among those who contacted their child's medical team, 64 (87%) described the availability and the accessibility as easy and smooth.

DISCUSSION

This questionnaire study provides important feedback about the impact of a 10-week lockdown on parents' management of children's asthma and disease outcomes. Consistent with other reports, we saw a decrease in presentations to the ED and hospital admissions for paediatric asthma compared with the same period 1 year before. New information from this study is the information from parental reports regarding children's compliance with medication use and reports of reduced need for acute bronchodilator therapy. Finally, parental feedback was generally positive on use of telemedicine for their interactions with health services to manage their children's asthma.

The pattern of reduced emergency presentations and hospitalisations with asthma has now been seen in reports from Slovenia,[11] Japan[12] and the USA.[13] Krivec *et al* from Slovenia reported a 7% reduction in paediatric asthma hospitalisations compared with the same time period in the last 3 years.[11] Abe *et al* found a significant reduction in asthma hospitalisations during the COVID-19 outbreak in Japan compared with asthma-related hospitalisation in years 2017–2019.[12] Taquechel *et al* reported an 84% drop in asthma emergency and inpatient-related visits.[13] In the Northeastern USA, there was a decrease in ED visits and hospitalisations during a spring lockdown rather than the anticipated increase in acute asthma exacerbations normally seen with increased exposure to pollens and respiratory viruses.[14] Furthermore, in their retrospective study from Scotland, Williams *et al* have shown a reduction in paediatric emergency presentations and emergency paediatric intensive care unit admissions during

Table 3 ED visits and hospitalisation of children with asthma during the COVID-19 lockdown due to asthma exacerbations

Hospitalisations during COVID-19 lockdown (March–May 2020)		Hospitalisations during the same time period last year (March–May 2019)		
	n (% (95% CI))		n (% (95% CI))	P value
None	273 (92 (88.2 to 94.8))	None	241 (81 (76.2 to 85.4))	<0.0001
Less than	2 20 (7 (4.2 to 10.2))	Less than	2 43 (15 (10.7 to 19.0))	
≥2	4 (1 (0.4 to 3.4))	≥2	13 (4 (2.4 to 7.4))	
ED presentations during COVID-19 lockdown (March–May 2020)		ED presentations during the same time period last year (March– May 2019)		
None	217 (73 (67.6 to 78.0))	None	160 (54 (48 to 59.7))	<0.0001
Less than	2 51 (17 (13.1 to 22.0))	Less than	2 91 (31 (25.5 to 36.2))	
≥2	29 (10 (6.6 to 13.7))	≥2	46 (16 (11.6 to 20.1))	

ED, emergency department.

the lockdown compared with the same period in previous years (2016–2019).[15]

Our survey suggests that parental concerns about the susceptibility of individuals with chronic lung disease to severe COVID-19 led to improved adherence to preventer therapies. Among carers in this survey, 219 (74%) felt stressed regarding their children's asthma, and 241 (81%) used a preventer (inhaled corticosteroids) at least three times weekly and stated that their compliance was better during the national lockdown, which we suggest was because of their fear of COVID-19 disease, although other factors may have contributed, such as parents' proximity to their children for increased hours when the family are all in lockdown. Kaye *et al* evaluated patients with asthma and chronic obstructive pulmonary disease from January to March 2020 and found a 15% increase in mean daily medication adherence.[16] Possible causes of this improvement included patients responding to national COVID-19 guidelines[17] and heightened awareness of the need to control their primary respiratory disease.[15]

Telehealth options were well received during the lockdown. Closure of outpatient medical services led to their replacement with telehealth options for education and provision of medical advice, and almost 25% of our cohort contacted their treating physicians at least once. Easy accessibility to the treating physician through telemedicine has been expedited during COVID-19 19 with multiple studies reporting on the efficiency of telemedicine use as a tool for ongoing management of patients with chronic disease such as asthma[16 18] and diabetes mellitus.[12 19] Furthermore, recent studies report equivalence of patient health outcomes between in-person and remote care provision.[18 20 21]

The limitations of this study include the fact that all data were obtained by parental report. Reliance on retrospective parental reports can be problematic due to potential failures of memory; for this reason, four researchers checked the medical records to make sure that the parental reports about the number of hospitalisations and presentations to the EDs were correct. In fact, reports of reduced numbers of hospital presentations and admissions are consistent with other studies. Supportive evidence from parents indicated that compliance with medications was improved, although lockdown measures designed to reduce exposure to viral illnesses could also have contributed by reducing children's normal exposure to respiratory viruses and exposure to airborne pollens and pollutants.

CONCLUSION

The extreme lockdown due to COVID-19 pandemic was associated with a significant decrease in ED presentations and hospitalisations among children with asthma in Jordan. Factors that likely contributed included adherence to therapy such that the need for frequent bronchodilator use dropped, and reduced exposure to outside allergens and respiratory viruses. Parents' perception of telemedicine use during the lockdown was positive, emphasising the role of telemedicine in supporting patients and providing remote healthcare.

Contributors MMA conceived the study idea, collected the data, did the primary data analysis and wrote the first draft of the manuscript. KW critically reviewed the final manuscript. SMA, BSA, HZN, AA, SA, RI, RA and AK contributed to the data collection and obtained consent from the parents. EA-Z, BSA and YA-M reviewed the final manuscript and helped in the statistical methods. All authors made a significant contribution to the final manuscript.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The study design and questionnaire were approved by the institutional review board (IRB) committee of the University of Jordan and Jordan University Hospital (IRB number 2020/286).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. This study is questionnaire-based and all data are available through the first author.

ORCID iDs
Montaha Al-lede http://orcid.org/0000-0002-7554-7604
Raya Abualsoud http://orcid.org/0000-0002-2736-8759

REFERENCES

1 Talevi D, Socci V, Carai M, *et al*. Mental health outcomes of the CoViD-19 pandemic. *Riv Psichiatr* 2020;55:137–44.
2 Saqib MAN, Siddiqui S, Qasim M, *et al*. Effect of COVID-19 lockdown on patients with chronic diseases. *Diabetes Metab Syndr* 2020;14:1621–3.
3 Chudasama YV, Gillies CL, Zaccardi F, *et al*. Impact of COVID-19 on routine care for chronic diseases: a global survey of views from healthcare professionals. *Diabetes Metab Syndr* 2020;14:965–7.
4 Liu S, Zhi Y, Ying S. COVID-19 and asthma: reflection during the pandemic. *Clin Rev Allergy Immunol* 2020;59:78–88.
5 Ong KY, Tan TL, Chan AKW. Managing asthma in the COVID-19 pandemic and current recommendations from professional bodies: a review. *J Asthma* 2020:1–8.
6 Elbeddini A, Tayefehchamani Y, Yang L. Strategies to conserve salbutamol pressurized metered-dose inhaler stock levels amid COVID-19 drug shortage. *Drugs Ther Perspect* 2020:1–4.
7 Papadopoulos NG, Custovic A, Deschildre A, *et al*. Impact of COVID-19 on pediatric asthma: practice adjustments and disease burden. *J Allergy Clin Immunol Pract* 2020;8:2592–9.
8 Chongmelaxme B, Lee S, Dhippayom T, *et al*. The effects of telemedicine on asthma control and patients' quality of life in adults: a systematic review and meta-analysis. *J Allergy Clin Immunol Pract* 2019;7:e11:199–216.
9 Yusef D, Hayajneh W, Awad S, *et al*. Large outbreak of coronavirus disease among Wedding attendees, Jordan. *Emerg Infect Dis* 2020;2610.3201/eid2609.201469. [Epub ahead of print: 20 05 2020].
10 Odeh R, Gharaibeh L, Daher A, *et al*. Caring for a child with type 1 diabetes during COVID-19 lockdown in a developing country: Challenges and parents' perspectives on the use of telemedicine. *Diabetes Res Clin Pract* 2020;168:108393. doi:10.1016/j.diabres.2020.108393
11 Krivec U, Kofol Seliger A, Tursic J. COVID-19 lockdown dropped the rate of paediatric asthma admissions. *Arch Dis Child* 2020;105:809–10.
12 Abe K, Miyawaki A, Nakamura M, *et al*. Trends in hospitalizations for asthma during the COVID-19 outbreak in Japan. *J Allergy Clin Immunol Pract* 2021;9:494–6.
13 Taquechel K, Diwadkar AR, Sayed S, *et al*. Pediatric asthma health care utilization, viral testing, and air pollution changes during the COVID-19 pandemic. *J Allergy Clin Immunol Pract* 2020;8:e11:3378–87.
14 Kenyon CC, Hill DA, Henrickson SE, *et al*. Initial effects of the COVID-19 pandemic on pediatric asthma emergency department utilization. *J Allergy Clin Immunol Pract* 2020;8:2774–6.
15 Williams TC, MacRae C, Swann OV, *et al*. Indirect effects of the COVID-19 pandemic on paediatric healthcare use and severe disease: a retrospective national cohort study. *Arch Dis Child* 2021. doi:10.1136/archdischild-2020-321008. [Epub ahead of print: 15 Jan 2021].
16 Kaye L, Theye B, Smeenk I, *et al*. Changes in medication adherence among patients with asthma and COPD during the COVID-19 pandemic. *J Allergy Clin Immunol Pract* 2020;8:2384–5.
17 Disease C. 2019 (COVID-19) situation summary, 2020. Available: https://www.dia.mil/News/Articles/Article-View/Article/2112274/coronavirus-disease-2019-covid- 19-situation-summary/ [Accessed 11 Mar 2021].
18 Portnoy JM, Waller M, De Lurgio S, *et al*. Telemedicine is as effective as in-person visits for patients with asthma. *Ann Allergy Asthma Immunol* 2016;117:241–5.
19 Renard E. Personal experience with COVID-19 and diabetes in the South of France: technology facilitates the management of diabetes in disruptive times. *J Diabetes Sci Technol* 2020;14:772–3.
20 Portnoy J, Waller M, Elliott T. Telemedicine in the era of COVID-19. *J Allergy Clin Immunol Pract* 2020;8:1489–91.
21 Flodgren G, Rachas A, Farmer AJ, *et al*. Interactive telemedicine: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2015:CD002098.

1. Child's name:

2. Gender:

   - Male
   - female

3. Age:

   - 4-6 years
   - 7-12 year
   - 13-17 year

4. Age of diagnosis:

   - 2-5 years old
   - 6-12 years old
   - More than 12 years old

5. Does your child have other types of allergy? (You can choose more than one answer)

   - Allergic rhinitis
   - Hay fever
   - Eczema
   - All types

6. Does any family member have any type of allergy?

   - Yes
   - No

7. How is he/she related to the child? (You can choose more than one answer)

   - Mother/father
   - Sister/brother
   - Cousins
   - Others

8. What type of allergy is running in the family? (You can choose more than one answer)

   - Asthma
   - Allergic rhinitis
   - Hay fever
   - Eczema
   - Multiple Allergies

9. Does the child use any kind of preventer inhalers? (Orange/red/violet diskus/pulmicort nebulizer)

   - Yes
   - No

10. If your child uses the orange inhaler (flixotide), select the dose

    - 1 puff twice a day
    - 2 puff twice a day

11. If your child uses the red inhaler (Clenil), select the dose

    - 1 puff once a day

- 1 puff twice a day

12. If your child uses the violet diskus (Seretide), select the dose

- 100 twice daily
- 250 twice daily

13. Does your child use pulmicort nebulizer twice daily?

- Yes
- No

14. Does your child use ventolin?

- Yes
- No

15. How many times does your child use ventolin daily?

- Less than 2
- 2-4 times
- more than 5

16. How many days in a week does your child use ventolin during the lockdown?

- Less than 2 days
- 2-4 days
- 5 or more

17. Does your child use the spacer with inhalers?

- Daily
- Most of the times (4-6 days/week)
- Rarely (<3days/weeks)
- No

18. Does your child use the inhalers continuously?

- Always (daily)
- Most of the times (4-6 times weekly)
- Sometimes
- Rarely (<3days/weeks)

19. Reasons for not being compliant on medications (controllers)

- I forget to give my child the inhalers daily
- I am afraid of the drug side effects
- I am afraid that my child will become dependent on the inhalers

20. Do you think that your child is using the spacer and inhaler correctly?

- Yes
- No

21. Does your child's adherence to inhalers increased due to COVID-19 pandemic?

- Yes
- No

22. Do you think it is easier for your child to take Singulair medicine one-time pills rather than the twice-daily inhaler?

- Yes
- No

23. How many hospital admissions did your child need last year during the period (March-May / 2019)?

- None
- Less than 2
- ≥2

24. How many hospital admissions did your child need this year during the COVID-19 pandemic (March-May / 2020)?

- None
- Less than 2
- ≥2

25. How many emergency visits did your child need last year during the period (March-May / 2019)?

- None
- Less than 2
- ≥2

26. How many emergency visits did your child need during the COVID-19 pandemic (March-May / 2020)?

- None
- Less than 2
- ≥2

27. Did your child continue to take the necessary and preventive medicines at the necessary dose during curfew?

- Yes
- No

28. What is the reason for stopping / reducing the dose of the necessary medicines? (You can choose more than one answer)

- Inability to reach the hospital to get the drug
- It was difficult to get the drug from the hospital (complicated procedure)
- My child was stable and did not need any treatment during curfew

29. What is your source or your information about COVID19 and its effect on asthma patients? (You can choose more than one answer)

- Physician
- Media (e.g TV)
- Social media (facebook/whatsapp)
- Searching the internet

30. Have you tried to contact your child's Doctor during curfew?

- Yes
- No

31. What was your contact tool with your child's physician? (You can choose more than one answer)

- WhatsApp
- E-mail
- Phone calls

- Text messages

32. Do you think contacting your child's doctor was easy and smooth?

- Yes
- No

33. Have you found an answer to your questions when you contacted your child's doctor?

- Yes
- No

34. Did your child need to use (ventolin/asthalin) during curfew?

- Yes
- No

35. If your answer for the previous question was (No), do you think that your child didn't need ventolin and he was stable because he performed less activities and sports during curfew?

- Yes
- No

36. Did you face any problem with finding (ventolin/asthalin) when needed?

- Yes
- No

37. Was your child's pulmonary function test done during the curfew?

- Yes
- No

38. If your answer to the previous question was (No), what is the reason?

- The curfew/ Closed laboraotry
- Fear of getting infected in case of reaching the hospital
- It was not ordered by the physician
- Lack of transportation

39. Did you think that asthma patients are more likely than others to have problems with Coronavirus (covid-19)?

- Yes
- No

40. If your answer to the previous question was (yes), did you feel the need to follow safety measure to keep your child safe?

- Yes
- No

41. Did you feel worried about your child during the curfew (covid-19 pandemic)?

- Yes
- No

42. Why did you feel worried about your child during the curfew (covid-19 pandemic)? (You can choose more than one answer)

- The hospitals were closed and transportation was not permitted
- Running out of inhalers and drugs
- The pharmacies were closed
- The insurance was expired and it was difficult to be renewed during the curfew
- Others

43. Why didn't you feel worried about your child during the curfew (covid-19 pandemic)? (You can choose more than one answer)

- Asthma symptoms were under control
- Inhalers were available in adequate amounts
- Others

44. Has your child been infected with the Coronavirus (covid-19)?

- Yes
- No

45. How did your child spend most of his time during curfew? (You can choose more than one answer)

- Watching TV
- Reading
- Sports
- Others