Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

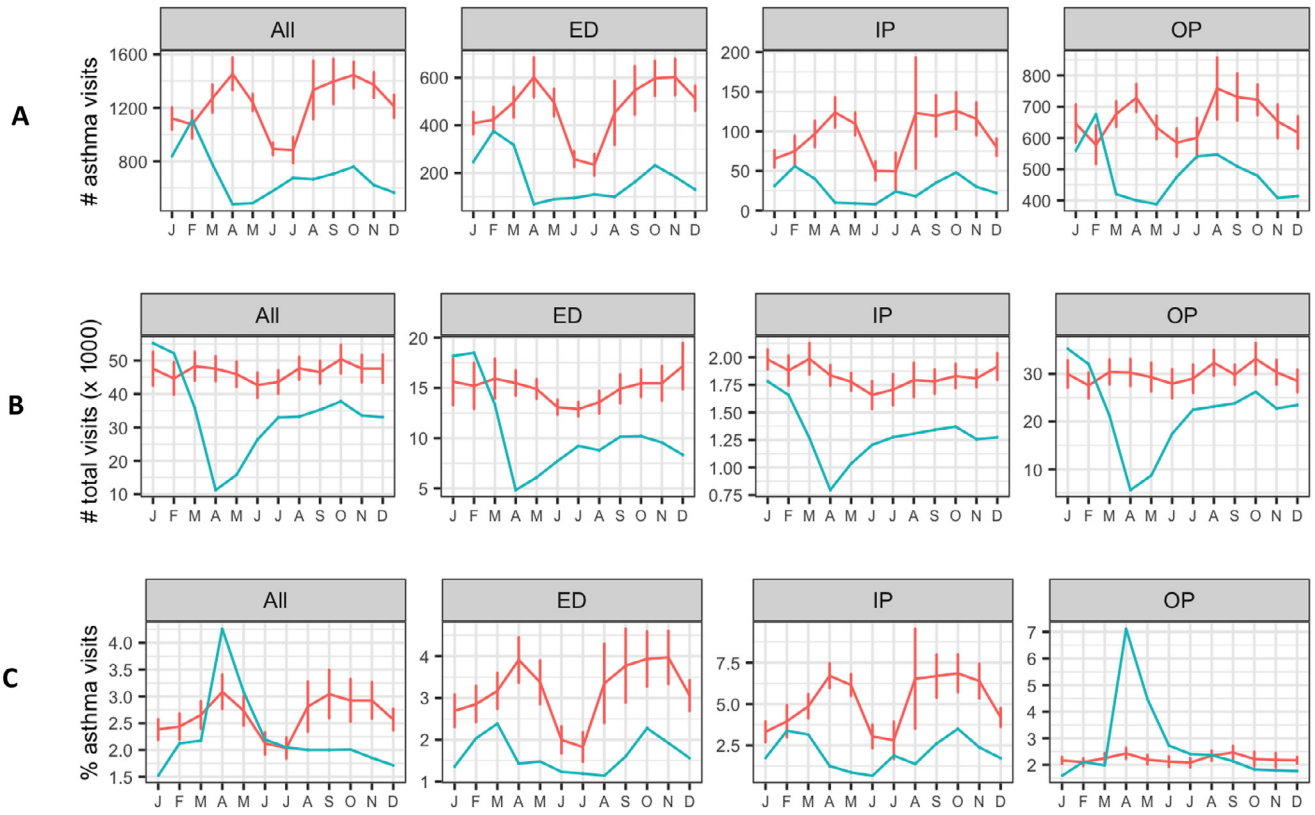

Figure 1. Unscheduled (ED and IP) and scheduled (OP) asthma (row A) and total visits (row B) to Children's Mercy Hospital during 2020 (green lines) compared with mean (95% CI) scheduled and unscheduled asthma and total visits (row C) from 2010 to 2019 (red lines). ALL, all visits; CI, confidence interval; ED, emergency department/urgent care; IP, inpatient; OP, outpatient.

suggesting the need for more research looking at this variable. Interestingly, the reduction in asthma visits at our facility was most pronounced in the youngest patients and tapers as age increases, suggesting a more predominant role for viruses as a trigger for asthma in patients aged less than 5 years old.

In conclusion, unscheduled asthma visits were statistically significantly reduced during COVID-19. This is most likely owing to reduced viral upper respiratory tract infections because other variables did not change during this same time.

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Ultrarush immunotherapy with polymerized extracts during the coronavirus disease 2019 pandemic

Safety of restarting administrations without dose adjustments

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Allergen-specific immunotherapy (AIT) is the only therapy that can change the natural history of allergic diseases and it has been established as an effective treatment in immediate-type allergic reactions

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and associated diseases such as asthma and rhinoconjunctivitis. This applies to both subcutaneous immunotherapy (SCIT) and sublingual immunotherapy. The SCIT is safe and mostly well tolerated. However, patients are required to attend a medical facility with trained staff and proper equipment to manage potential reactions.[1]

In our department, nearly 4500 SCIT injections are carried out annually. Polymerized extracts are used in more than 99% of our patients. These extracts result from the polymerization of allergens into high molecular weight molecules using glutaraldehyde as a cross-linking agent, reducing allergenicity while retaining immunogenicity. The differences from unmodified extracts are detailed in Table 1.[2] An ultrarush protocol is routinely used in the buildup phase of the SCIT, which consists of the administration of 0.2- and 0.3-mL dosages in alternate arms with a 30-minute interval, reaching the maintenance dosage of 0.5 mL on the first day. Thereafter, this dose is administered monthly. In our experience, this is an effective, practical, and safe schedule to observe. Previous studies using ultrarush AIT with polymerized extracts described local and mild systemic reactions in 11% and 1% of patients, respectively.[3,4]

The severe acute respiratory syndrome coronavirus 2 pandemic had a substantial impact on our clinical practice. In Portugal, the national state of emergency was declared and lockdown measures were imposed in March 2020, soon after the World Health Organization declared coronavirus disease 2019 (COVID-19) as a pandemic. Consequently, our regular clinical activity was suspended until May 2020. Patients in the maintenance phase of aeroallergens SCIT were encouraged to keep the scheduled doses at their primary care facilities. However, because of an overload of COVID-19–related tasks, a significant percentage of patients were forced to delay SCIT administration.[5] With the re-establishment of regular clinical activity after the lockdown, these patients were invited to resume their treatments without dose adjustment after a 3-month interruption. The rationale was to reduce the time of surveillance after injections to avoid overcrowding the waiting room during the pandemic phase because government restrictions were still in place to limit patient flow in health care facilities. This also allowed for a higher number of SCIT restarts per day.

A retrospective analysis was performed using the demographic and clinical data of patients receiving maintenance SCIT with aeroallergens, who missed doses owing to COVID-19 restrictions and restarted their treatment at our center between May 2020 and July 2020, to assess the safety of reinitiating aeroallergen SCIT without dose adjustments. Patients with systemic reactions in previous administrations were not included in this analysis. They were submitted to an ultrarush protocol. The adverse reactions reported were classified as a local reaction, local large reaction (defined as pruritus and erythema >2.5 cm at the site of injection), and systemic reactions.[6]

A total of 273 patients were scheduled, but only 241 restarted SCIT. The mean age (SD) was 23 (± 14) years and 53.5% were men. The diagnosis of allergic rhinitis was present in 97.5% of patients, of which 45.1% and 12.9% had concomitant conjunctivitis and atopic dermatitis, respectively. Asthma was present in 36.8% of patients. Most patients were polysensitized (66%) with a mean of 3.6 (± 1.9) positive allergen test results per patient. All patients were under SCIT with polymerized aeroallergen extracts, 51.0% to house dust mite (HDM) (and 58.1% of these with more than 1 allergen), 24.1% to pollens (and of these, 26.2% also had more than 1), 24.1% to a mix of HDM and pollens, and 0.8% to a mix of HDM and cat. The mean number of days overdue was 65 (± 14) days, ranging from 23 to 146 days, and the mean duration of treatment before the missed dose was 98.9 (± 4.4) weeks.

There were 5 patients who had local reactions. None of the patients had large local or systemic reactions and all continued SCIT.

To be effective, SCIT should be continued for at least 3 years, requiring regular visits to a health care facility, given that systemic reactions may occur.[6] In early 2020, because of the COVID-19 pandemic, clinical practice adjustments were made in many allergy departments because most health care staff were redirected to COVID-19–related activities and also to ensure the safety of both patients and health care workers. In addition, patient adherence to SCIT decreased owing to caution and fears of public spaces and hospitals.[7] As a result, many patients interrupted their aeroallergen SCIT or increased the administration intervals with a potential decline in efficacy.[8] Therefore, whenever possible, treatment was restarted taking into consideration the risk-benefit analysis.[9]

Scientific literature is scarce and divergent regarding restarting SCIT after missed doses. Safety is a major concern when patients have gaps in immunotherapy administration, and most adjust the dose according to the time interval since the previous injection. Protocols from several centers were analyzed and in cases of longer than 35 days since the previous dose (ie, >7 days overdue), the dose was reduced.[8] Data from our center suggests that restarting SCIT with polymerized aeroallergen extracts in patients in the maintenance phase without previous systemic reactions is safe without the need for dose adjustment, including a wide interval, to a maximum of 146 days.

It is noteworthy that none of the patients treated with SCIT for pollens had adverse reactions during the pollen season, questioning the necessity for seasonal dose adjustment. However, the restarts were done between May 2020 and July 2020, and all adult and adolescent patients were compelled to use a face mask even outdoors during this period, which limits contact with pollen allergens.

In conclusion, there is no standard adjustment protocol for missed doses during aeroallergen SCIT, and most allergists adjust doses according to the time interval since the previous injection. Our results suggest that it is safe to restart SCIT with polymerized aeroallergen extracts during the maintenance phase without the need for dose adjustment in those patients without a previous systemic reaction. Randomized clinical trials and other prospective data are needed to support this hypothesis, as this is an empirical observation with modified extracts from a single center.

Table 1
Characteristics of Native and Modified Extracts.

Characteristics	Native extracts	Modified extracts (allergoids)
Molecular weight	Low	High
IgE-binding capacity	Reduced	Lower[a]
Allergenicity	High	Significantly Reduced[a]
Immunogenicity	Significant	Maintained[a]
Buildup period	Weeks	Day(s)
Safety	Risk of SR	Lower rate of SR[a]
Standardization	Difficult	Possible

Abbreviations: IgE, immunoglobulin E; SR, systemic reactions.
[a]Comparing to native extracts.

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A pediatric asthma camp experience during the coronavirus disease 2019 pandemic

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Every year, Camp Wheez is offered as a free summer day camp for children with asthma. Because of the ongoing coronavirus disease 2019 (COVID-19) pandemic, Camp Wheez 2020 was canceled. For 2021, we adapted Camp Wheez to the guidelines for summer camps put forth by the Centers for Disease Control and Prevention.[1]

The primary aim of this study was to describe our experience with having a 4-day educational asthma program for children during the COVID-19 pandemic. Secondary aims were to investigate the effect of our educational program on airway inflammation and expiratory air flow from the lungs as measured by fractional exhaled nitric oxide (FENO) and peak flow (PF), respectively.

Since 1978, Camp Wheez has been a free annual day camp every August for children with asthma. Camp Wheez 2021 was open to all children with asthma aged 6 to 10 years of age, a reduced age range as compared with previous years to decrease gathering size. Camp Wheez 2021 reduced its capacity by half and decreased duration from 5 to 4 days to further decrease exposure and infection risk for campers. Written informed consent was obtained for each camper. All counselors and staff were required to be vaccinated for COVID-19 before the camp. Camp Wheez 2021 was conducted in accordance with the guidance of the Centers for Disease Control and Prevention for day camps: all activities were conducted outdoors, all campers and staff masked and maintained a physical distance of at least 6 feet, campers were cohorted into groups of 3 to 4 children to avoid mixing, campers were curbside-dropped off by parents to reduce the possible number of contacts, hand-sanitizing was enforced at the beginning and end of each rotation activity, point persons were designated to respond to any COVID-19 concerns, and all participants were counseled by health care staff to stay home for any COVID-19 symptoms.[1] Follow-up screening questionnaires for COVID-19 symptoms were done 1 week after camp completion. The NIOX Vero was used to measure FENO on day 1 (pre-camp), day 4 (post-camp), and approximately 1 week after the camp (follow-up). PFs were measured daily at the camp.

Wilcoxon signed rank test was used to compare mean FENOs pre-camp and post-camp. A one-way analysis of variance was used to compare mean peak flows between days 1 and 4 of the camp. We took $P < 0.05$ to indicate statistical significance.

A total of 20 children aged 6 to 10 years old were enrolled in Camp Wheez 2021, and the average age of the campers was 8.5 ± 1.3 years.

None of the children developed COVID-19 symptoms for the entire duration of the camp. All follow-up screening questionnaires, done approximately 1 week after camp completion, were negative for COVID-19 symptoms. There were no statistically significant differences in mean FENO between pre- and post-camp ($P = 0.984$, Table 1). There was no statistically significant difference in mean peak flows among the days at the camp ($P = 0.744$, Table 1). Campers were not informed of their baseline FENO nor PF and none of the campers received targeted instruction.

The COVID-19 pandemic has required flexibility to adapt to the ever-changing environment. Social gatherings, including children's day camps, have been affected and require the development of safe procedures and protocols. Although a virtual platform was considered, the concern for screen fatigue was raised.[2] None of the campers developed COVID-19 symptoms throughout the camp duration nor at the 1 week follow-up questionnaire, though the community prevalence of COVID-19 during early August 2021 was a daily case rate of 18.6 per 100,000 people in Santa Barbara County, which may be lower as compared with other points during the ongoing pandemic.[3] Although we did not see a statistically significant difference in FENO nor PF before and after the camp, the feedback and gratitude we received from both parents and campers make continuing Camp Wheez a worthy annual effort.

This is one of the first studies looking at the feasibility of a pediatric asthma camp during the COVID-19 pandemic, with objective measures to evaluate the camp's effect on campers' airway status. FENO has been found to decrease in children who attend summer asthma camps.[4] The low mean baseline FENO could represent potentially improved asthma control, reduced triggers, and medication adherence during the COVID-19 pandemic.[5]

Table 1
Camper Demographics with Pre-Camp and Post-Camp FENO and Daily PF Measurements

Campers (n)	20
Mean age, y +/−SEM	8.5 +/−1.3
Mean pre-camp FENO, ppb +/−SEM	22.1 +/−4.8
Mean post-camp FENO, ppb +/−SEM	22.2 +/−5.3
Mean Day 1 mean PF, L/min +/−SEM	254 +/−15
Mean Day 2 mean PF, L/min +/−SEM	249 +/−16
Mean Day 3 mean PF, L/min +/−SEM	273 +/−18
Mean Day 4 mean PF, L/min +/−SEM	267 +/−18

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