




Parental administration of inhaled short-acting beta agonists in the pediatric emergency department: a survey of family perspectives

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Abstract

Background The management of children with an asthma exacerbation includes timely systemic corticosteroids and frequent short-acting beta-agonist therapy. In selected patients, inhaled short-acting beta-agonist administration by parents may promote comfort, constitute an educational opportunity for the family, and safely reduce provider workload. Our objective was to evaluate parental satisfaction and perceived safety of this new approach.

Method This was a cross-sectional study, conducted in a tertiary pediatric ED. We investigated patient and parent perspectives on a newly implemented parental short-acting beta-agonist administration program. A convenience sample of families participating in this program was approached for study enrolment. The primary outcome was the proportion of parents and children who were satisfied with the program. We also evaluated the program's safety and impact on asthma education as reported by parents.

Results From February 2019 to March 2020, 72 of 74 (97%) families approached for enrolment participated in the survey. A vast majority (95%) of parents appreciated the program and 93% would participate again. Among children > 7 years, 86% preferred receiving inhaled short-acting beta-agonist by their parents rather than by a healthcare provider. Nearly all parents (96%) found the program to be “safe” or “very safe”. Some participants reported improvements in their inhaler administration technique (25%) and ability to recognize their child's respiratory distress (25%).

Conclusion A novel parental short-acting beta-agonist administration program in the pediatric ED was widely appreciated by participating families. Parents perceived it as being safe, educational, and contributing to their child's comfort.

Keywords Short-acting beta agonist · Medication administration · Parental administration · Pediatric · Asthma · Emergency department

Résumé

Contexte La prise en charge des enfants présentant une exacerbation d'asthme comprend des corticostéroïdes systémiques et un traitement avec des doses fréquentes de bêta-agonistes à courte durée d'action. Chez certains patients, l'administration de bêta-agonistes à courte durée d'action en inhalation par les parents pourrait favoriser le confort, représenter une opportunité

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éducative pour la famille et réduire en toute sécurité la charge de travail des professionnels de la santé. Notre objectif était d'évaluer la satisfaction parentale et la sécurité perçue d'une telle nouvelle approche.

Méthode Cette étude transversale a été menée dans un service d'urgence pédiatrique tertiaire. Nous avons étudié les points de vue des patients et des parents impliqués dans un programme d'administration parentale de bêta-agonistes à courte durée d'action récemment déployé. Un échantillonnage de convenance de familles participant à ce programme a été invité à participer à l'étude. L'issue primaire était la proportion de parents et d'enfants satisfaits par ce programme. La sécurité du programme et son impact sur l'éducation sur l'asthme, tels que rapportés par les parents, ont aussi été évalués.

Résultats De février 2019 à mars 2020, 72 des 74 familles (97 %) approchées ont participé à l'étude. Une grande majorité (95 %) des parents ont apprécié le programme et 93 % y participeraient à nouveau. Parmi les enfants de plus de 7 ans, 86 % ont préféré recevoir le bêta-agoniste à courte durée d'action par voie inhalée par leurs parents plutôt que par un professionnel de la santé. Presque tous les parents (96 %) ont trouvé le programme « sécuritaire » ou « très sécuritaire ». Certains participants ont signalé des améliorations dans leur technique d'administration d'inhalateur (25 %) et dans leur capacité à reconnaître la détresse respiratoire chez leur enfant (25 %).

Conclusion Un nouveau programme d'administration de bêta-agonistes à courte durée d'action par les parents dans un département d'urgence pédiatrique a été largement apprécié par les familles participantes. Les parents percevaient ce programme comme sécuritaire, éducatif et contribuant au confort de leur enfant.

Introduction

The emergency department (ED) management of acute asthma exacerbations includes timely systemic corticosteroids and frequent short-acting beta-agonist therapy [1, 2]. Among non-critically ill patients, parental short-acting beta-agonist administration with adequate supervision could safely reduce provider workload, while benefiting parents' knowledge about asthma management [3]. It may also contribute to a more comfortable care environment, as children face numerous sources of anxiety in the ED [4]. This report describes patient and parent perspectives on parental administration of inhaled short-acting beta-agonist in the pediatric ED.

Methods

Setting

This was a cross-sectional study, conducted in the rapid assessment zone of a tertiary pediatric ED (> 80,000 annual visits). Among the 10,000 annual visits managed in the rapid assessment zone, 20% relate to respiratory conditions. It is staffed from 9 am to midnight by one auxiliary nurse and one physician per shift. Through a quality improvement program introduced in 2018, children with mild-moderate asthma exacerbation could receive short-acting beta-agonist therapy from their parent, using an age-appropriate mask, spacer, and metered-dose inhaler. Eligibility criteria for the parental short-acting beta-agonist administration program were as follows: (1) prior diagnosis of asthma, otherwise healthy; (2) a Pediatric Respiratory Assessment Measure [5] score ≤ 5 (3) oxygen saturation $\geq 94\%$; (4) heart rate < 180 beats per

minute. Families who met these criteria were identified and recruited at the discretion of ED staff. Following a physician's assessment, written explanations detailing technique, signs of clinical deterioration, doses, and administration frequency were provided to each family. An auxiliary nurse demonstrated proper administration technique and supervised the first treatment. Patients were then re-evaluated following a planned set of parentally administered treatments (typically 1–3 additional treatments). We studied the experience of families participating in this program. The CHU Sainte-Justine Research Ethics Board approved this project.

Participants

Study participants consisted of: (1) French or English-speaking parents whose children were enrolled in the parental short-acting beta-agonist administration program; and (2) children aged 7 years or older.

Survey

This survey was administered to a convenience sample of parents and children enrolled in the parental short-acting beta-agonist administration program, between February 2019 and March 2020. Families eligible for our study were approached during their ED stay by trained research staff. Parental informed consent and child assent were obtained. Answers were then collected on a tablet and stored on REDCap (<https://www.project-redcap.org>).

Questionnaires were developed by the investigators, then refined through cognitive interviewing with five volunteer families seen in the ED. The final questionnaire included 21 items for parents, and two for children (Supplementary file).

Sample size

The primary outcome was the proportion of parents who were satisfied with the program. We aimed to recruit 100 families, for confidence intervals (CI) of at most $\pm 10\%$. A total of 72 families were enrolled by the start of the COVID-19 pandemic (March 2020). Given the ensuing disruption in research operations and small marginal gain of a larger sample size on measurement precision, we ended recruitment prior to reaching the planned sample size.

Data analysis

Patient characteristics were analyzed descriptively. Categorical variables were expressed as proportions, with corresponding Wilson's 95% CI for binomial distributions. Continuous variables were expressed as medians with corresponding interquartile range (IQR). Open-ended questions generated short text answers which were coded thematically. Statistical analyses were performed with R (Version 3.6.1, The R Foundation for Statistical Computing) and R Studio (Version 1.2.1335, RStudio, Inc.).

Results

Of the 74 eligible families approached for enrolment, 72 participated (97% recruitment rate). In one family, each parent filled a separate questionnaire, for a total of 73 parent responders. All responses had a completion rate greater than 75% and were included in the analysis. The median age (IQR) of participating children was 4 [2, 6] years. Patients had a median of 1 [1, 3] asthma exacerbation in the preceding 12 months. Healthcare providers were the most frequently cited source of asthma education (86.1%). Many parents (45.8%) reported no prior review of their inhaler administration technique by a provider. Additional information on baseline asthma care is presented in Table 1.

Most parents (95.9%, CI: 88.2, 99.0) appreciated the short-acting beta-agonist administration program, and 93.0% (CI: 84.1, 97.3) would participate again for a similar presentation. Open-ended responses about their willingness to re-participate highlighted the following themes: improved parental autonomy with asthma care; quality of the program (simplicity, timeliness, effectiveness); benefits to the child's comfort (though one parent reported increased anxiety in their child) (Table 1).

Among 16 children ≥ 7 years, 12/14 (85.7%) preferred receiving inhaled short-acting beta-agonist from their parent rather than a healthcare provider. Nonetheless, 15/15 (100%) felt "good"/"very good" when the inhaler was administered by a nurse.

Regarding safety, 95.8% of parents found the program to be "safe"/"very safe". Open-ended statements referred to the following themes: positive impact on asthma management knowledge; adequate supervision (one responder found the supervision to be inadequate); the program being in the hospital setting; reassuring contact with healthcare providers; timeliness of care. As for the educational impact of the program, several parents felt it improved their inhaler administration technique (25.4%) and their ability to recognize respiratory distress (25.0%).

Discussion

This is the first study examining the perspectives of families on a parental short-acting beta-agonist administration program in the pediatric ED. A vast majority of parents were satisfied with the program and perceived it as a safe educational opportunity. Similarly, children preferred receiving inhaled short-acting beta-agonist from their parents rather than from a provider.

Healthcare providers represented the most frequent source of asthma education in our cohort. Yet, nearly half of the respondents reported no prior formal review of their inhaler technique. Pediatric ED visits thus constitute an opportunity to address this gap, particularly among families with limited access to primary care. Although our study did not assess the retention of self-reported improvements in knowledge and technique, prior evidence suggests that parental short-acting beta-agonist administration in the pediatric ED can improve short-term adherence with asthma care at home [6].

Methodological limitations related to convenience sampling limit the generalizability of these findings. Indeed, in addition to meeting a set of objective clinical criteria, parents included in the program may have demonstrated greater willingness and interest for parental short-acting beta-agonist administration. The high study recruitment rate may be partly explained by the inclusion of motivated parents in the program. Nonetheless, the study population is representative of families motivated to participate in a medication self-administration program. Barriers to participant recruitment were mainly due to a relatively slow uptake of the program when initially introduced in the ED, and limited research assistant time. Finally, it is worthwhile noting that despite multiple family-reported benefits, our study does not provide objective clinical or system outcomes of this program. While it seems plausible that parental short-acting beta-agonist administration may help alleviate the mismatch between patient needs and provider availability [7], this requires further investigation. Interventions that are shown to safely reduce the number of physical encounters during an ED visit bear particular relevance to the current pandemic context.

Table 1 Parent and children perspectives on the parental short-acting beta-agonist administration program in the pediatric ED

Theme	Question ¹ (<i>n</i> = total responses)	Answer categories	Count	Percentage [95% CI] ²	
Baseline asthma care at home	Most frequently used resources for asthma education (<i>n</i> = 72, more than one answer allowed)	Healthcare provider	62	86.1 [76.0, 92.4] %	
		Search engine	26	36.1 [26.0, 47.7] %	
		Family member	24	33.3 [23.5, 44.9] %	
		Information pamphlet	15	20.8 [13.0, 31.7] %	
		Social media	4	5.6 [1.8, 14.0] %	
		Traditional media (newspaper, television)	2	2.8 [0.2, 10.3] %	
		Parent support group	1	1.4 [0, 8.3] %	
	Number of asthma attacks in preceding 12 months (<i>n</i> = 73)	Median = 1; 1st quartile = 1, 3			
		Prior review of inhaler administration technique by healthcare provider (<i>n</i> = 72)	Yes	39	54.2 [42.7, 65.2] %
	Frequency of asthma inhaler administration at home (<i>n</i> = 72)	No	33	45.8 [34.8, 57.3] %	
		Never	4	5.6 [2.2, 13.4] %	
		During respiratory infections only	35	48.6 [37.4, 59.9] %	
	Frequency of asthma inhaler administration recommended by physician (<i>n</i> = 72)	Everyday	33	45.8 [34.8, 57.3] %	
		Never	1	1.4 [0.2, 7.5] %	
		During respiratory infections only	33	45.8 [34.8, 57.3] %	
	Frequency of forgotten inhaler doses (<i>n</i> = 73)	Everyday	38	52.8 [41.4, 63.9] %	
Almost never		41	56.2 [44.8, 67.0] %		
< Half of the time		29	39.7 [29.3, 51.2] %		
Quality of the program	Overall appreciation of program (<i>n</i> = 73)	> Half of the time	3	4.1 [1.4, 11.4] %	
		Yes	70	95.9 [88.6, 98.6] %	
		No	3	4.1 [1.4, 11.4] %	
	Perceived benefit(s) of the program (<i>n</i> = 73, more than one answer allowed)	None	3	4.1 [1.4, 11.4] %	
		Child's comfort	40	54.8 [43.4, 65.7] %	
		Opportunity to learn more about asthma	25	34.2 [24.4, 45.7] %	
		Opportunity to be supervised	28	38.3 [28.1, 49.8] %	
		Safe care environment	23	31.5 [22.0, 42.9] %	
		Other	3	4.1 [1.4, 11.4] %	
	Perceived level of safety (<i>n</i> = 72)	Very unsafe	1	1.4 [0.2, 7.5] %	
		Unsafe	2	2.8 [0.8, 9.6] %	
		Safe	40	55.6 [44.1, 66.5] %	
		Very safe	29	40.2 [29.7, 51.8] %	
	Level of supervision by healthcare team (<i>n</i> = 70)	Insufficient	2	2.9 [0.8, 9.8] %	
		Adequate	27	38.6 [28.0, 50.3] %	
		Excellent	41	58.5 [46.9, 69.4] %	
Willingness to participate again, if back in ED for a similar reason (<i>n</i> = 71)	Yes	66	93.0 [84.6, 97.0] %		
	No	5	7.0 [3.0, 15.4] %		
Impact on child's anxiety (as perceived by parent) (<i>n</i> = 72)	Decreases anxiety	32	44.4 [33.5, 55.9] %		
	No difference	39	54.2 [42.7, 65.2] %		
	Increases anxiety	1	1.4 [0.2, 7.5] %		
Impact on parent's anxiety (<i>n</i> = 72)	Decreases anxiety	16	22.3 [14.2, 33.1] %		
	No difference	51	70.8 [59.5, 80.1] %		
	Increases anxiety	5	6.9 [3.0, 15.2] %		

Table 1 (continued)

Theme	Question ¹ (<i>n</i> = total responses)	Answer categories	Count	Percentage [95% CI] ²
Impact of the program on asthma care	Impact on inhaler administration technique (<i>n</i> = 71)	Worse technique	0	0 [0, 5.1] %
		Unchanged	53	74.6 [63.4, 83.3] %
		Better technique	18	25.4 [16.7, 36.6] %
	Impact on ability to recognize child's breathing difficulty (<i>n</i> = 72)	Worse ability	1	1.4 [0.2, 7.5] %
		Unchanged	53	73.6 [62.4, 82.4] %
		Better ability	18	25.0 [16.4, 36.1] %
	Level of comfort for asthma inhaler administration in the future (<i>n</i> = 72)	Not at all comfortable	0	0 [0, 5.1] %
		Not comfortable	0	0 [0, 5.1] %
		Comfortable	13	18.1 [10.9, 28.5] %
	Ability to recognize child's breathing difficulty in the future (<i>n</i> = 72)	Very comfortable	59	81.9 [71.5, 89.1] %
		Not able at all	0	0 [0, 5.1] %
		Not able	4	5.5 [2.2, 13.4] %
Able		30	41.7 [31.0, 53.2] %	
Child preferences	Preferred pump administrator (<i>n</i> = 14)	Very able	38	52.8 [41.4, 63.9] %
		Parent	12	85.7 [58.6, 97.0] %
		Nurse	2	14.3 [3.0, 41.4] %

¹Questions were synthesized for the purpose of this table. The full, bilingual questionnaire is available in the Annex section

²Wilson's 95% CI for binomial distributions (or multinomial where > 2 answer categories)

Conclusion

A novel parental short-acting beta-agonist administration program in the pediatric ED was widely appreciated by participating families. Parents perceived it as being safe and contributing to their child's comfort. A quarter of respondents reported subjective benefits in their ability to administer inhalers and recognize respiratory distress.

Supplementary Information The online version of this article (<https://doi.org/10.1007/s43678-021-00087-x>) contains supplementary material, which is available to authorized users.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare. Dre Gaucher and Dr Drouin are supported by grants from the Fonds de Recherche du Québec-Santé.

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