



Letter

Does inhaler technique align with confidence among African-American children and their parents?

Asthma prevalence and its related morbidity is 2 to 3 times higher among African-American children compared with white youth.¹ A key method for reducing asthma-related morbidity is quick-relief and controller medications delivered through respiratory inhaler devices. However, few children use inhalers correctly, which results in negative effects on asthma control, quality of life, and morbidity²; thus, inhaler education is critical.

Inhaler technique education should occur at every opportunity, according to national asthma guidelines; however, this education rarely occurs.³ Many barriers exist in clinical settings, including time-pressured schedules, limited staff training, inadequate knowledge, and lack of demonstration supplies.⁴ As a result, health care professionals may ask children or parents about technique, using confidence as a proxy to determine whether education is needed. Self-assessment has potential for inaccuracies because children and parents overestimate inhaler skills, as evidenced by studies of non-Hispanic white children⁵ and parents of African-American children.⁶ However, correlation between child and parent confidence has not been examined. Furthermore, because this overestimation of skills can result in poor self-management, examining inhaler technique relative to both child and parent confidence is important.

This observational study was conducted over 1 year (2016–2017) in 4 Chicago public charter schools with a predominately African-American (97%) and low-income (82%) student population. Students with physician-diagnosed asthma identified during school-based screening were recruited.⁷ Written consent and assent were obtained. University of Chicago's Institutional Review Board approved the study.

An asthma educator (community health worker) met for 1 hour with each child and parent at the school or community location. Children rated their comfort with independently using the metered dose inhaler (MDI) on a 4-point Likert scale (1 = very uncomfortable to 4 = very comfortable). Parents completed a questionnaire about confidence in their child's ability to use the inhaler properly, assessed on a 10-point Likert scale (1 = not at all confident to

10 = extremely confident, can teach others). Then, the educator assessed inhaler technique by asking the child to show how they use an inhaler using a placebo MDI and spacer with mouthpiece, as previously described.⁸ Technique was assessed with a validated 12-step checklist (reliability: kappa = 0.94), with 1 point given per step performed correctly.⁹

Child and parent confidence were dichotomized as “confident” or “not confident” (child: 1–2 vs 3–4; parent: 1–5 vs 6–10). Inhaler technique scores were analyzed as continuous variables. Misuse and mastery were analyzed as binary variables (misuse: <10 vs ≥10/12 steps correct; mastery: 12 vs <12 steps correct).⁹ The relationship between inhaler technique and confidence was assessed using Cohen's kappa; misuse was used for primary analysis and mastery for the sensitivity analysis. Significance was defined by 2-tailed *P* value < .05. Analysis was conducted using STATA version 14 (StataCorp).

Of 189 eligible children, 118 parents were reached and 65 (55%) enrolled in the study; 2 children did not complete both components. Participants had a mean age of 10.7 years (standard deviation = 1.7, range = 8–14), were 46% female, and were 90% African-American. Most parents were female (86%).

More than two thirds of children were confident that they could properly use inhalers independently (71%, *n* = 37/52). Most parents (92%, *n* = 57/62) reported confidence in their child's proper inhaler use. For inhaler technique, participants completed a mean of 3.65 steps (standard deviation = 2.5) correctly. Nearly all children (97%, *n* = 61/63) misused their inhaler. One child (2%) demonstrated mastery.

Neither child confidence nor parent confidence were good proxies for proper technique. In the primary analysis using inhaler misuse, slight agreement was found between child confidence and proper technique (kappa = 0.03), as well as parent confidence and technique (kappa = 0.006) (Table 1). Most children and parents overestimated the child's ability (children 67%, *n* = 35/52; parents 89%, *n* = 55/62), based on high confidence despite inhaler misuse. No children or parents underestimated the child's skills.

A small proportion of children and parents accurately matched their confidence to the child's technique. Five percent (*n* = 2/37) of children who were confident in their technique used their inhaler without misuse, and 3.5% (*n* = 2/57) of children whose parents were confident used the inhaler properly. Among children with misuse, 8.1% (*n* = 5/62) of parents accurately reported low confidence in their child's inhaler technique, whereas 29% (*n* = 15/52) of children described low confidence. Results were unchanged in the sensitivity analysis using mastery of inhaler technique.

In this study of African-American children, child and parent confidence proved to be poor proxies for proper inhaler technique.

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Table 1
Correlation between Inhaler Technique and Child and Parent Confidence in Skills

Confidence	Correlation between technique and confidence, based on inhaler misuse ^a	P value
Child	0.0319	.18
Parent	0.0058	.34

^aResults were unchanged in the sensitivity analysis using mastery.

Our results mirror the high confidence of children and parents described in prior studies and, importantly, extend them by concurrently examining child and parent confidence among African-American school-age youth.^{5,6} In fact, the data signals parents may be less accurate in predicting children's inhaler ability than the child, potentially because of children's lived experience with inhaler use, parents' lack of knowledge about proper use, or parents' limited supervision of care. Although children were more accurate vs parents, it remains insufficient to identify children at-risk of poor technique. A health care professional cannot simply ask children or parents whether the child knows how to use an inhaler, because this is not a reliable screening tool to distinguish who needs education. Rather, these findings reinforce that education about effective inhaler technique must be provided at every opportunity, and demonstration should be a fundamental part of an asthma evaluation, consistent with national guidelines.

Most of the children in our study were African-American from 4 schools, which may limit generalizability. Although findings may differ with other racial/ethnic groups, our results provide important insights about management in a vulnerable population with significant asthma disparities.¹⁰ Furthermore, this study looked at technique with MDIs, and results may not generalize to other inhaler devices. The small proportion of children with proper inhaler technique precluded more detailed investigation into the relationship between confidence and technique. In addition, children and parents may have displayed social desirability bias when reporting confidence in inhaler technique. Selection bias may be present given low enrollment and no randomization.

Overall, this study shows that child and parent confidence are poor proxies for identifying proper inhaler technique. Objective measures should be used in health care encounters to evaluate inhaler technique, because correcting inhaler misuse is critical to improve outcomes among African-American youth disproportionately affected by asthma.

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