Original article:

Gillette C, Rockich-Winston N, Kuhn JA, et al. Inhaler technique in children with asthma: A systematic review. Acad Pediatr. 2016 Apr 26.

Summary by: Gregory Metz, MD, AE-C

Asthma educators spend a significant amount of time and effort educating children with asthma and their caregivers about correct inhaler use. According to current guidelines, assessment of inhaler use should be incorporated into each visit. There has been relatively little research directly evaluating inhaler technique with asthma outcomes. Consequently, this study was a systematic review of the literature evaluating children's inhaler technique. In particular, the objectives of the study were to determine the prevalence of correct inhaler technique in children with asthma, to evaluate whether educational interventions were associated with improved rates of correct inhaler technique and lastly, to explore whether improved inhaler technique was associated with improved asthma outcomes.

The authors searched numerous databases including PubMed and Cochrane Systematic Reviews for studies published between January 1, 2000 and July 7, 2015 that included children with asthma between the ages of 6 and 18 which evaluated inhaler technique as part of the study. Experimental and observational studies were also included. The specific data used from each study included the study design, number and age of subjects, the study's inclusion and exclusion criteria, information about the intervention studied, duration of intervention, how inhaler technique was assessed and recorded and the effect of the intervention on inhaler technique.

A total of 28 studies were identified that met criteria for inclusion. Because of the nature and heterogeneity of the data being evaluated, statistical analysis was not performed. Instead, qualitative descriptions of the salient findings were summarized.

A total of 21 studies evaluated children's inhaler technique using an MDI without a spacer. In the studies that reported correct inhaler use as a percent of total children studied, between 0 - 57% of children used their MDI inhalers correctly. Common mistakes included failure to inhale slowly for 3-4 seconds, not breath holding after inhalation and repeating additional doses too quickly. Thirteen studies evaluated the use of MDI inhalers with a spacer and found that only 0.6% - 55% of children in the studies demonstrated correct use. Similarly, frequent mistakes included not breath holding after inhaler use and repeating additional doses too quickly. Nine studies looked at DPI technique in children and found that their correct use ranged from 0 - 35%. Often, children forgot to breathe hold after using their DPI inhaler. Interestingly, one study suggested that after an educational intervention on proper DPI technique, children were more likely to use it correctly than MDIs[1.]

Seventeen studies evaluated the impact of educational interventions and not surprisingly, teaching children how to correctly use their inhaler was associated with improved inhaler technique. In particular, it did not seem to matter who did the teaching or whether it was done at school or at an office visit. Four studies investigated the use of telemedicine educational sessions and all studies found improved inhaler technique in children following these telemedicine interventions.

Eight studies looked at inhaler technique and objective measures of asthma control. Five of these studies showed that interventions with inhaler technique education as part of a comprehensive asthma treatment plan were associated with improved asthma control. Three other studies directly evaluated inhaler technique and asthma outcomes and found mixed results. Lastly, 7 studies explored how inhaler technique was associated with asthma self-management skills and all found an association of proper inhaler technique with increased asthma self-efficacy.

There are several limitations to this study. First, the articles were identified using a list of common databases which could have missed important studies from other sources. Second, there could have been publication bias favoring articles that demonstrated a positive effect of the studied intervention. Next, statistical analysis of the data was not performed. Despite these limitations, this study clearly shows that proper inhaler technique is alarmingly low in children with asthma and that interventions to improve inhaler technique is associated with positive asthma-related outcomes. The asthma educator should be keenly aware of the widespread misuse of inhaler devices so appropriate educational interventions can be provided.

1Kamps AWA, van Ewijk B, Roorda RJ, Brand PLP. Poor inhalation technique, even after inhalation instructions, in children with asthma. Pediatr Pulmonol. 2000; 29: 39-42