Medicines Evidence Commentary

commentary on important new evidence from Medicines Awareness Weekly

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Inhaler use: has technique improved over time?

A systematic review found that around 30% of people using inhalers had 'poor' inhaler technique, and that no appreciable change in this has occurred over the last 40 years. The review had several limitations making it difficult to draw firm conclusions from the findings. However, national guidelines on chronic obstructive pulmonary disease and asthma make several recommendations on inhaler technique, in particular the need to ensure that people receive training and can demonstrate satisfactory technique before an inhaler device is prescribed. Assessment of inhaler technique during routine reviews is also recommended.

Overview and current advice

Problems with inhaler technique were recognised soon after metered dose inhalers (MDIs) were launched, and later reports suggest that problems persist despite initiatives to reduce them. A previous systematic review found that the proportion of patients making no mistakes with an inhaler was 23–43% for an MDI, 53–59% for a dry powder inhaler (DPI) and 55–57% for MDI used with a spacer. However, this improved after patients received a teaching intervention with the proportion of people making no mistakes with inhaler technique increasing to 63% for MDI, 65% for DPI, and 75% for breath-actuated MDI.

In 2014, the Royal College of Physicians' published Why asthma still kills: the national review of asthma deaths. This report was the first national investigation of asthma deaths in the UK and the largest study worldwide to date. Data were available for analysis on 195 people who were thought to have died from asthma between February 2012 and January 2013. Among the 135 cases where the last review was recorded in primary care only 96 people (71%) had an assessment of inhaler technique recorded. Technique was reported as good in 68% (65/96) of people. One of the recommendations of the report was that an assessment of inhaler technique should be routinely undertaken and formally documented at annual review, and also checked by the pharmacist when a new device is dispensed.

The British guideline on the management of asthma (SIGN guideline 141) recommends that inhalers should only be prescribed after people have received training in the use of the device and have demonstrated satisfactory technique. The person should have their ability to use the prescribed inhaler device (particularly for any change in device) assessed by a competent healthcare professional. The guideline recommends that adults and children receive a structured clinical review of their asthma at least annually, and that one of the components that the review should cover is assessing inhaler technique.
The NICE guideline on chronic obstructive pulmonary disease (COPD) recommends that inhalers should be prescribed only after people have received training in the use of the device and have demonstrated satisfactory technique. In addition, people should have their ability to use an inhaler device regularly assessed by a competent healthcare professional and, if necessary, should be re-taught the correct technique.

New evidence

A systematic review investigated the rate of errors in inhaler technique over the past 40 years, and analysed trends over time.

The review included 144 studies with a total of 54,354 people and reported a total of 59,584 tests of inhaler technique (some studies tested more than 1 type of device). Participants included adults and children with asthma, COPD and unspecified airway disease. Inhaler types included MDIs (23,720 tests, 5.7% children), breath actuated MDIs (10,833 tests, 5.0% children), MDIs plus spacer devices (2,432 tests, 44.7% children), and DPIs (21,497 tests, 6.8% children).

Inhaler technique was assessed by the authors of the included studies, and the person's technique classified as 'correct' (all steps performed correctly), 'acceptable' (about 80% of steps performed correctly and no critical errors) or 'poor' (less than 50% of steps performed correctly or 1 or more critical errors in technique). A critical error was defined as one that reduced or prevented the deposition of drug to the lungs (for example stopping breathing immediately after actuating the inhaler or inhaling through the nose).

The outcomes of the systematic review were:

- the type and prevalence of the 3 most frequent errors observed in patients using the various types of inhaler
- the percentage of patients demonstrating correct, acceptable, and poor technique; and
- changes in these 2 outcomes over time.

For MDIs the 3 most common errors were:

1. not fully breathing out before inhaling (mean frequency 48%, 95% confidence interval [CI] 43 to 53%),
2. not holding the breath sufficiently after inhaling (mean frequency 46%, 95% CI 42 to 49%) and
3. lack of co-ordination between actuating the inhaler and breathing in (mean frequency 45%, 95% CI 41 to 49%).

With DPIs the 3 most common errors were:

1. not fully breathing out before inhaling (mean frequency 46%, 95% CI 42 to 50%),
2. not holding the breath sufficiently after inhaling (mean frequency 37%, 95% CI 33 to 40%), and
3. not correctly loading or priming the inhaler prior to use (mean frequency 29%, 95% CI 26 to 33%).

Three steps were assessed for using an MDI with a spacer. The 3 most common errors were:

1. not actuating the inhaler or not breathing correctly after inhaling (mean frequency 38%, 95% CI 30 to 45%),
2. not breathing out fully before inhaling or not making a seal with the lips around the chamber mouthpiece (mean frequency 34%, 95% CI 20 to 50), and
3. not shaking the inhaler or not connecting it to the chamber (mean frequency 33%, 95% CI 25 to 41%).
The mean frequency of errors for breath actuated MDIs was 39% (95% CI 35 to 43%) for not holding the breath after inhalation, 33% (95% CI 27 to 39%) for not breathing in slowly and deeply and 32% (95% CI 27 to 38%) for not fully breathing out before inhalation.

The review also reported the mean percentage of people that demonstrated correct (31%), acceptable (41%) and poor technique (31%) pooled for all inhaler types across the time period of 1975 to 2014. When the earlier (1975 to 1995) and later (1996 to 2014) 20-year time periods were compared, there was little difference between the proportion of people demonstrating correct, acceptable or poor technique.

**Commentary**

*Commentary provided by NICE*

People with asthma or COPD who are unable to use their inhalers correctly are at increased risk of poor control of their symptoms. This systematic review found that the frequency of ‘poor’ inhaler technique was high for all inhaler types. MDIs showed higher rates of ‘poor’ technique than other types of inhaler with the most frequent errors associated with not fully breathing out before inhaling, not holding the breath sufficiently after inhaling and lack of co-ordination between actuating the inhaler and breathing in. DPIs appeared to have lower rates of ‘poor’ technique with their use than MDIs but the rates were still high (23% with DPIs, 38% with MDIs). The most frequent errors were not preparing the device, not fully breathing out before inhaling and not sufficiently holding the breath after inhaling.

The review also suggested that inhaler technique has not improved over time. The authors concluded that incorrect inhaler use in patients with asthma and COPD is unacceptably high outside of clinical trials and does not seem to have improved over the last 40 years.

This review had several limitations. There were differences between the included populations in the studies, methodology, types of errors measured and the data presented meaning that extensive meta-analysis was not possible, and statistical significance of the findings was not reported. Relatively few studies using MDIs plus spacers were included, and there were difficulties in recommending a set of instructions for use of these to assess against. Therefore no firm conclusions about the rate of errors with MDIs and spacers can be made. The reasons for errors in inhaler technique could not be determined from the review. For example, it was not clear how long people had been using their inhaler, and whether they had received initial training and ongoing assessment of inhaler technique by a competent healthcare professional. This makes it difficult to make recommendations based on the findings.

The study did not investigate the effect of inhaler technique on clinical outcomes such as asthma control, and so it was not possible to say if this had changed over time. The National review of asthma deaths identified 195 asthma deaths (with sufficient data for analysis) that occurred over a 12-month period from February 2012 to January 2013. Out of 135 cases where the last review was recorded in primary care only 96 people (71%) had an assessment of inhaler technique recorded and technique was reported as good in only 68% of these people. One of the recommendations of the report was that an assessment of inhaler technique should be routinely undertaken and formally documented at annual review, and also checked by the pharmacist when a new device is dispensed.

No standardised scoring systems are available for assessing inhaler technique. Methods used are often arbitrary meaning comparison between studies is difficult. In addition although technique may have some bearing on asthma control, it does not necessarily relate to clinical effectiveness. Standardised scoring systems are needed, and research needs to be completed which investigates the effect of inhaler technique on clinically meaningful outcomes.
Despite the limitations, this study highlights that inhaler technique errors are common among all inhaler devices. Clinicians should be reminded to follow recommendations in national guidelines on asthma and COPD and only prescribe inhalers after people have received training in the use of the device and have demonstrated satisfactory technique. Clinicians should also ensure that routine reviews for people with asthma and COPD include assessment of inhaler technique in accordance with recommendations in the British guideline on the management of asthma, the National review of asthma deaths and the NICE guideline on COPD. If after adequate training and assessment of inhaler technique, a person still cannot use their inhaler effectively then clinicians may wish to explore the optimal use of other delivery devices.

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**References**


**About this Medicines Evidence Commentary**

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