Beta agonist use during asthma exacerbations: how much is too much?

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Abstract

Overuse of inhaled beta agonist therapy is associated with risk in adult asthmatics. We report on a case of excessive short-acting and long-acting beta agonist use in the setting of a severe exacerbation of asthma, which highlights some important good practice points.

There is ongoing debate regarding the safety of long-acting beta agonist (LABA) therapy in asthma. Combination inhaled corticosteroid (ICS)/LABA therapy is considered the preferred therapeutic approach, as it ensures that LABAs cannot be taken as monotherapy.

Currently, patients on combination ICS/LABA therapy have a variety of options for reliever medication use in the setting of worsening asthma, including the “as-required” use of short-acting beta agonists (SABA) such as salbutamol, or further doses of their combination ICS/LABA inhaler, in accordance with the SMART (single maintenance and reliever therapy) regime.

We present a case of excessive use of inhaled short- and long-acting beta agonist therapy in the setting of worsening asthma, highlighting the potential risks for patients and the need for written self-management plans.

Case report

A 37-year-old woman was admitted to hospital with severe asthma following 3 days of worsening symptoms at home. She had been diagnosed with asthma in childhood, with the requirement for frequent hospital admissions and at least one Intensive Care Unit (ICU) admission. Eight months prior to the admission, in response to poor asthma control, she was changed from fluticasone propionate and salmeterol as separate inhalers to a combination ICS/LABA inhaler (Vannair® – 200 mcg budesonide/6 mcg eformoterol per actuation, 120 puffs per inhaler).

She was instructed to take the Vannair 2 actuations twice a day and as required for the relief of symptoms, “like a Ventolin inhaler”, in accordance with the SMART regime. She also had access to a nebuliser at home; she did not have a written self-management plan.

In the month prior to the onset of the severe asthma exacerbation she used three Vannair inhalers. Three days prior to admission (in response to worsening asthma symptoms) she obtained a new Vannair inhaler from her pharmacy and used it frequently over the next 24 hours such that it was empty the following day. She also used her nebuliser to administer salbutamol and ipratropium bromide on three occasions during this 24-hour period.
Two days prior to hospital admission, she attended an after-hours centre where she received a medical assessment, two salbutamol/ipratropium bromide nebulisers, a prescription for fluticasone, salmeterol and salbutamol inhalers in place of her Vannair and course of prednisone and antibiotics.

She was instructed to use her nebuliser at home every 4 hours and as a result she continued to use her nebuliser frequently during the next 2 days, initially salbutamol and ipratropium bromide and then salbutamol alone when the supply of ipratropium bromide ran out. She also took 10 actuations of her salbutamol inhaler via a spacer three times on the morning of her admission.

The patient’s total exposure to beta agonist in the 3 days prior to admission was 120 doses of eformoterol (720 mcg), 14 doses of salbutamol via nebuliser (70 mg), and 30 doses of salbutamol via spacer (3 mg) (Figure 1).

**Figure 1. Beta agonist use prior to hospital admission**

![](image)

* Prednisone commenced

**Discussion**

This case highlights at least three important points. Firstly, it illustrates the potential for overuse of combination ICS/LABA therapy when taken in accordance with the SMART regime. The patient took 120 actuations of her Vannair inhaler within a 24-hour period, resulting in the self-administration of 720 mcg of formoterol and 24,000 mcg of budesonide. These doses are untested and potentially associated with significant risk. Formoterol is a potent beta agonist with high intrinsic activity resulting in greater adverse effects than salbutamol when used repeatedly in high doses.

Secondly, this case illustrates the potential for excessive beta agonist use by various methods of delivery, when self-administered by the patient both independently and following advice from health professionals.
There needs to be a greater awareness of the potential risks of excessive beta agonist use, and both patients and health professionals need to recognise that frequent beta agonist use is a marker of risk of a life threatening attack. Other markers of risk of mortality in her case included a hospital admission in the previous 12 months and the prior ICU admission.4

Thirdly, the case illustrates the importance of an asthma self-management plan in which the patient can be guided when to start prednisone and to seek medical help in the situation of a severe attack of asthma.

Asthma management plans based on ICS and SABA therapy have been shown to reduce morbidity and risk of mortality,5 and are well established in clinical practice. For ICS/LABA therapy, AstraZeneca has recently promoted a novel self-management plan incorporating the SMART regime, in which it is recommended that the patient seeks review by a doctor on the same day if >12 actuations of Symbicort® are taken on any one day, or if >6 reliever actuations per day are taken over several days.6,7 A recent review of the SMART regime has generated active debate about its role in asthma therapy.8

We suggest that healthcare professionals advise patients of the risks of overuse of short and long acting beta agonist therapy and provide written guidelines in the form of an asthma self-management plan on when to seek medical review in severe exacerbations.

Competing interests: The authors are undertaking clinical research investigating single inhaler therapy in adult asthma.

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