

Mild asthma in adults and adolescents

Inhalers, adherence, and optimization

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Asthma is common in Canada, with a prevalence of 10.8%.¹ Unfortunately, asthma is poorly controlled in at least half of patients.¹ Since asthma is frequently encountered in primary care settings, family physicians are well positioned to optimize asthma management and improve outcomes.

Recent years have seen the publication of new landmark asthma trials and updated Canadian asthma guidelines, as well as the regulatory approval of new asthma drug products and devices. This article highlights some relevant updates for primary care.

Case presentation

Bobby is a 14-year-old boy (he and him pronouns) who has been your patient since he was born. You diagnosed him with asthma 18 months ago. Today he has come to see you with his parents for a checkup.

Bobby takes 125 µg of fluticasone propionate twice daily via metered-dose inhaler (MDI). He also uses a 100-µg salbutamol rescue MDI (2 puffs as needed up to 4 times a day). When you last saw him a year ago, you gave him 12 months of refills for his fluticasone propionate and 4 refills for his salbutamol. Bobby tells you that he is now out of refills for both medications. He states that he rarely misses a dose of his “orange controller.”

Bobby has no other medical conditions and has never been hospitalized for asthma. Overall, he feels his asthma is well controlled.

Assessing asthma control

In 2021 the Canadian Thoracic Society released new guidelines for asthma management. These guidelines redefined well-controlled asthma by tightening indicators of control. For example, a new target for well-controlled asthma is needing 2 or fewer doses of a reliever per week.² This includes doses used before exercise. (Guidelines have previously allowed 3 doses of a reliever per week and made an exception for pre-exercise doses.³) **Table 1** summarizes key indicators of well-controlled asthma.²

Canadian guidelines suggest a practical way to assess asthma control is to track how often reliever prescriptions are filled. In general, filling prescriptions for more than 2 reliever inhalers in a year indicates that asthma control should be reassessed.² In the recent SABINA (SABA Use in Asthma) cohort trial, patients who filled prescriptions for at most 2 short-acting β-agonist (SABA) canisters per year appeared less likely to experience an

asthma exacerbation or asthma-related hospitalization.⁴ Further, patients who filled prescriptions for 11 or more SABA canisters per year were at higher risk (more than 30-fold) of asthma mortality compared with patients who filled prescriptions for 2 or fewer SABA canisters per year.⁴ Some practitioners may choose to limit the number of refills of SABA prescriptions to help prompt early reassessment.

Back to Bobby

Bobby has filled his prescription for salbutamol 4 times in the past year. Each salbutamol canister contains 200 puffs, and he uses 2 puffs each time he has symptoms. This means that during the past year, Bobby has likely used about 400 doses of salbutamol, or an average of 1 dose per day. You ask Bobby if this is an accurate description of his salbutamol use, and he agrees that it is.

Bobby has uncontrolled asthma. However, before escalating therapy, you ask Bobby to demonstrate his inhaler technique using a placebo inhaler given to you by the local branch of the non-profit Canadian Lung Association. You notice that he takes a fast, sharp breath when inhaling from his MDI (rather than a slow, steady breath). You also notice that he triggers his inhaler before he breathes in.

Tailoring inhaler types to individuals

Individualizing asthma inhalers can be complex, as many new products have entered the Canadian market in recent years. **Table 2** summarizes some differences among inhaled corticosteroids (ICSs) currently available in Canada.⁵ There is no single perfect inhaler for all patients.

Table 1. Some indicators of well-controlled asthma

INDICATOR	FREQUENCY
Daytime symptoms	Maximum 2 days/wk
Need for reliever therapy	Maximum 2 doses/wk. Includes doses taken before exercise
Nighttime symptoms	<1 night/wk and mild
Physical activity	Normal
Exacerbations	Mild and infrequent
Absences from work or school	None due to asthma
FEV ₁ or PEF	≥90% of personal best

FEV₁—forced expiratory volume in the first second, PEF—peak expiratory flow rate.
Data from Yang et al.²

Table 2. Comparison of inhaled corticosteroids available in Canada

DRUG (BRAND)	DEVICE TYPE	DOSE COUNTER?	BREATH ACTIVATED?	CARBON FOOTPRINT	COST/MO AT LOW DOSE	SYSTEMIC BIOAVAILABILITY	SCHEDULE
Beclomethasone (QVAR HFA)	MDI	No	No (spacer recommended)	High	\$15	High	Twice daily
Budesonide (Pulmicort Turbuhaler)	DPI	Yes	Yes	Low	\$15	High	Twice daily
Ciclesonide (Alvesco)	MDI	No	No (spacer recommended)	High	\$17	Low	Daily (twice daily if high dose)
Fluticasone propionate (Flovent HFA and generics)	MDI	No	No (spacer recommended)	High	\$28	Low	Twice daily
Fluticasone propionate (Flovent Diskus)	DPI	Yes	Yes	Low	\$39	Low	Twice daily
Fluticasone propionate (Aermony RespiClick)	DPI	Yes	Yes	Low	\$29	Low	Twice daily
Fluticasone furoate (Arnuity Ellipta)	DPI	Yes	Yes	Low	\$55	Low	Daily
Mometasone (Asmanex Twisthaler)	DPI	Yes	Yes	Low	\$25	Low	At bedtime (twice daily if high dose)

DPI—dry-powder inhaler, HFA—hydrofluoroalkane propellant, MDI—metered-dose inhaler.
Data from Crawley and Zimmermann.⁵

Dose counters help patients know when to refill their inhalers. Many MDIs do not have dose counters, which is unfortunate because MDIs continue to produce actuations even after they are “empty.” This is known as the *tail-off phenomenon* and can result in patients receiving subtherapeutic doses. Of note, neither “listening” to an MDI while shaking it nor using the “float test” accurately predicts whether therapeutic doses remain.⁶⁻¹²

Dry-powder inhalers (DPIs) are breath activated. This can help patients who have difficulty timing the actuation of their inhaler (a common problem with MDI devices). Dry-powder inhalers require a fast, sharp intake of breath to aerosolize the powder; not all patients (eg, those who are very young or very old) are physically able to do this. For patients who require an MDI, spacers are usually recommended to help reduce timing errors.

Recently the high carbon footprint of MDIs has received national attention.¹³ The propellants in MDIs, including hydrofluoroalkanes, are potent greenhouse gases. One estimate is that using an MDI each month for 1 year has the equivalent environmental impact of driving a car 3200 km.¹⁴ Overall, MDIs have around 20 to 30 times the carbon footprint of DPIs.¹⁵

The cost per month of a low ICS dose ranges from \$15 to \$55.⁵ Inhaler cost increases with dose; the cost per month of a high ICS dose ranges from \$60 to \$100.⁵ Of note, 80% to 90% of the efficacy of an ICS is obtained from low doses.¹⁶

There is some evidence that ICSs with low bioavailability (and therefore less systemic absorption) are associated with fewer adverse events.^{6,7,9,17-20} For example, high-bioavailability agents, such as budesonide and

beclomethasone, appear to suppress height in children (eg, by about 1 cm) more than low-bioavailability agents, such as fluticasone.²¹

Finally, for some patients, choosing an ICS with a once-daily schedule could help improve adherence compared with an ICS requiring a twice-daily schedule.

Back to Bobby

Bobby's inhaler technique is suboptimal. Rather than escalating therapy, you decide to first try to obtain asthma control by correcting inhaler technique.

Bobby's parents are highly interested in reducing the environmental impact of his inhalers. They also like the idea of once-daily dosing. For these reasons you rotate him to mometasone (instead of fluticasone propionate) and terbutaline (instead of salbutamol). You are hopeful that changing to a DPI will also help improve Bobby's inhaler technique. His parents are also happy to hear that both of these inhalers have dose counters; previously they had been only “guessing when to get a refill.” On Bobby's new prescription, you write “Pharmacist to please teach inhaler technique to patient.”

Three months later Bobby returns for reassessment. You are pleased to learn that he now rarely needs to use his reliever. Bobby's parents tell you they happen to know one of Bobby's classmates has been prescribed as-needed budesonide-formoterol for asthma and it seems to be working well for that child. Bobby's parents are highly interested in limiting Bobby's steroid exposure since he “hasn't finished growing yet.” They wonder if as-needed budesonide-formoterol would be appropriate for Bobby.

Considerations for as-needed budesonide-formoterol

In 2019 Health Canada approved the use of as-needed budesonide-formoterol in patients 12 years and older with mild persistent asthma.²² This approval was based on the landmark SYGMA (Symbicort Given as Needed in Mild Asthma) trials.^{23,24} In these trials, as-needed budesonide-formoterol was just as effective as twice-daily budesonide in preventing asthma exacerbations. On average, patients in these trials used budesonide-formoterol around 3 to 4 times per week, resulting in less overall steroid exposure compared with twice-daily budesonide.

There are some important caveats to the SYGMA trials. The first is that as-needed budesonide-formoterol resulted in worse overall asthma control than twice-daily budesonide (eg, about 5 fewer weeks per year of well-controlled asthma).²³ The second is that rates of common ICS-related adverse effects, such as oral thrush and dysphonia, were not reported in the trials.^{23,24} The third is that the length of the trials (1 year) was too short to adequately assess potential differences in long-term adverse effects, airway remodeling, and inflammatory control between the groups.


Canadian guidelines recommend that the preferred choice for patients with mild asthma is a scheduled ICS (with a SABA as needed).² For patients 12 years of age and older with mild asthma who struggle to adhere to their ICS despite adequate education and support, as-needed budesonide-formoterol can be considered.

Case resolution

You explain to Bobby's parents that his asthma is currently well controlled, and that changing to as-needed budesonide-formoterol is likely to result in worse overall asthma control. You also note that Bobby is currently taking an ICS with low systemic absorption (mometasone) and that the budesonide in budesonide-formoterol would be systemically absorbed more readily than mometasone. Finally, you note that previously Bobby was using his reliever most days of the week; evidence suggests that he would thus also need to take budesonide-formoterol most days of the week.²³ Bobby's parents are reassured and agree with your recommendation to continue daily mometasone. They also note that Bobby seems to tolerate exercise better since changing inhalers and they do not want to lose this benefit.

Conclusion

Many patients with asthma believe their asthma is well controlled and are surprised to learn they are overusing their reliever inhalers. Flagging patients who fill prescriptions for their reliever inhalers more than twice per year is a way to help track asthma control. Choosing an asthma inhaler can be complex, but using a shared

decision-making approach to find which inhaler characteristics are most important and best suited to an individual (eg, dose counter, breath activation, carbon footprint, cost, bioavailability, schedule) can help. As-needed budesonide-formoterol is a useful option for patients 12 years and older with mild asthma who are nonadherent to their ICS; however, a scheduled ICS is preferred owing to superior asthma control. Free asthma patient education sheets and other clinical tools are available from <https://www.rxfiles.ca/asthma>. 

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