

How to step down asthma preventer treatment in patients with well-controlled asthma – more is not always better

SUMMARY

Most of the benefit of asthma preventer inhalers is seen with low doses. However, many Australian patients are prescribed doses of inhaled corticosteroids that are higher than necessary to control their asthma.

Prescribing unnecessarily high preventer doses increases the patient's risk of adverse effects. They may also increase the patient's out-of-pocket costs.

Asthma guidelines recommend considering a step-down in preventer treatment after asthma has been well controlled for two to three months in adults and for six months in children. The step-down process should be individualised for each patient.

Preventive therapy should not be stopped completely.

Introduction

Asthma management is not a case of 'one size fits all'. A key goal is to customise treatment for the needs of each patient. This involves finding the lowest dose that will keep asthma symptoms well controlled and reduce the risk of severe attacks (also called severe flare-ups or exacerbations), while minimising the risk of adverse effects.

Inhaled corticosteroids

Australian asthma guidelines recommend that most adult and adolescent patients should be prescribed a low-dose inhaled corticosteroid (ICS) or an as-needed combination of low-dose ICS and low-dose formoterol.¹ Only some patients need daily treatment with a combination of low-dose ICS with a long-acting beta₂ agonist (LABA). Few patients require medium or high doses of the ICS-LABA combination, or add-on treatment (for ICS doses for adults and adolescents, see Table 1).² For children 6–11 years, regular ICS is recommended for those who have symptoms more than once weekly, or frequent or moderately severe exacerbations. Few children require high doses (for ICS doses for children, see Table 2).³ Guidelines recommend the consideration of stepping down the dose of therapy when asthma has been stable and well controlled for 2–3 months in adults, and six months in children.¹

Despite these guidelines, a recent study found that 71% of Australian adults and adolescents with asthma who were prescribed preventer inhalers had been dispensed a high-dose combination of ICS-

LABA.⁴ There are several possible explanations for this deviation from the recommendations. Some patients with frequent symptoms at diagnosis may have been prescribed a high-dose preventer, without the dose being reviewed after the symptoms improved. Many patients have their preventer dose increased during a flare-up, but few return for review after they have recovered, so they remain indefinitely on unnecessarily high doses.⁵ In some cases, clinicians, given the substantial pressures on their time, feel that switching asthma treatment may not be a worthwhile use of their time, especially if there is a risk that asthma control will be worse after the switch.⁶

Why consider stepping down asthma treatment?

Most of the benefits of ICSs are achieved with low doses which are associated with very little risk of adverse effects. Long-term treatment with high doses is associated with a small increase in the background risk of conditions such as cataract and osteoporosis.⁷

Some patients are concerned about any type of corticosteroid treatment,⁸ with some concerns mistakenly driven by information about anabolic steroids. Patients may not be aware that the risks described in Consumer Medicines Information are seen only with high ICS doses taken for a long period of time, or with oral corticosteroids. When starting treatment, prescribers should emphasise to the patient that one of the goals of asthma management is to first achieve good control and then find the lowest dose for them that will keep the asthma well controlled.

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Table 1 Inhaled corticosteroid dose levels for adults and adolescents²

Inhaled corticosteroid	Total daily metered dose (micrograms) for adults and adolescents 12 years and over with asthma		
	Low	Medium	High
Beclometasone dipropionate	100–200	250–400	>400
Budesonide	200–400	500–800	>800
Ciclesonide	80–160	240–320	>320
Fluticasone furoate	–	100	200
Fluticasone propionate	100–200	250–500	>500
Mometasone furoate* in combination with indacaterol	62.5	127.5	260
Mometasone furoate** in combination with indacaterol and glycopyrronium	–	68	136

This is not a table of equivalence, but instead it shows the doses of inhaled corticosteroid that are classified as low, medium or high for each drug.

* Delivered doses not metered doses

† Approved only for adults 18 years and over

Table 2 Inhaled corticosteroid dose levels for children 6–11 years³

Inhaled corticosteroid	Total daily metered dose (micrograms) for children 6–11 years with asthma	
	Low	High
Beclometasone dipropionate	100–200	>200 (maximum 400)
Budesonide	200–400	>400 (maximum 800)
Ciclesonide	80–160	>160 (maximum 320)
Fluticasone propionate	100–200	>200 (maximum 500)

This is not a table of equivalence, but instead it shows the doses of inhaled corticosteroids that are classified as low or high for each drug. The only dose of fluticasone furoate indicated for children (50 micrograms/day) is not available in Australia.

An additional reason for considering stepping down the dose is that it may substantially reduce out-of-pocket costs for patients. This may improve their adherence to therapy.^{9,10}

Which patients should be considered for a step-down?

Evidence shows that preventer treatment can be stepped down safely. Systematic reviews of studies in properly selected patients found no overall increase in the risk of exacerbations.¹¹ However, the dose of ICS

that will keep asthma well controlled varies between patients, so consider each step-down as a treatment trial and monitor the patient closely afterwards. There is much less evidence about stepping down treatment in children.¹¹

Consider stepping down therapy when asthma has been well controlled by a stable dose of ICS or ICS-LABA for at least 2–3 months in adults and adolescents and after six months in children, particularly if the ICS dose is medium or high by age group (see Tables 1 and 2).^{2,3} All patients should have a written asthma action plan before starting a step-down.

To assess symptom control, use a tool such as the Asthma Control Test. This evaluates symptoms, reliever use and perceived control over four weeks.¹² Also ask patients if they have had any flare-ups in the last 12 months, as these increase the risk of future exacerbations. A flare-up more than three months ago that was triggered by an isolated upper respiratory infection would not necessarily be a contraindication to stepping down the dose, provided symptoms had been well controlled since then.

Poor adherence is not necessarily a barrier to stepping down, provided the patient has well-controlled asthma and no exacerbations. A greater reduction in the prescribed dose may be considered if the patient has been using their preventer infrequently. However, if a patient notices more symptoms after missing only one or two doses of their current preventer, they are likely to need their current dose, so it should not be reduced.

During pregnancy, consider stepping down only if the woman has well-controlled asthma and is taking a high-dose preventer. Otherwise, postpone stepping down until after delivery.¹³

Stepping down in patients with severe asthma

For patients with severe asthma, careful step-down of inhaled therapy can be considered if symptom control and exacerbations respond to add-on biologic therapy such as benralizumab, dupilumab, mepolizumab or omalizumab. The highest priority is to gradually reduce and stop oral corticosteroids. Reducing the ICS dose can be considered after 3–6 months, but not to below a medium dose.¹⁴ In severe asthma, any dose reduction should be in consultation with a specialist.

A step-by-step guide to stepping down

Depending on the patient's current therapy, there are several step-down options (see Table 3). The step-down process is individualised for each patient.

Table 3 Step-down options for preventer therapy in adults and adolescents who have had well-controlled asthma for at least 2-3 months¹

Treatment level	Current preventer treatment	Suggested step-down options
5	High-dose combination ICS-LABA plus add-on therapy such as biologic therapy or oral corticosteroids for severe asthma	Discuss with the specialist who prescribed the add-on treatment. Once asthma is well controlled, the highest priority for stepping down is to gradually reduce and then cease oral corticosteroids (if prescribed); check for adrenal suppression. Advise patients not to stop their combination ICS-LABA treatment. Do not reduce ICS-LABA below a medium dose.
4	Medium- or high-dose ICS-LABA-LAMA maintenance, plus as-needed SABA	Consider ceasing the LAMA, and continuing the same dose of ICS-LABA. OR If the ICS dose is high, consider reducing to a medium dose (but not to low dose) while continuing LAMA.
4	Medium-dose MART, i.e. 2 inhalations twice daily of budesonide/formoterol 200/6 micrograms or beclomethasone/formoterol 100/6 micrograms, plus 1 inhalation taken as needed for symptom relief	Low-dose MART, i.e. 1 inhalation twice daily of budesonide/formoterol 200/6 micrograms or beclomethasone/formoterol 100/6 micrograms, plus 1 inhalation taken as needed for symptom relief.
4	Medium- or high-dose ICS-LABA maintenance, plus as-needed SABA	Continue ICS-LABA, reducing the ICS dose by 25-50% by: <ul style="list-style-type: none"> • prescribing a lower dose ICS-LABA formulation OR <ul style="list-style-type: none"> • for ICS-LABA combinations prescribed more than once daily, by reducing the number of inhalations per day.
3	Low-dose MART, 1 inhalation twice daily of budesonide/formoterol 200/6 micrograms or beclomethasone/formoterol 100/6 micrograms, plus 1 inhalation taken as needed for symptom relief	As-needed only low-dose budesonide/formoterol 200/6 micrograms. [Note: as-needed only treatment has not been studied with beclomethasone/formoterol]
3	Low-dose fluticasone furoate vilanterol (a once-daily ICS-LABA) plus as-needed SABA	Consider stepping down to once-daily fluticasone furoate (ICS alone) plus as-needed SABA.
3	Low-dose combination ICS-LABA maintenance (twice-daily formulations), plus as-needed SABA	Reduce ICS-LABA dose by 25-50% by: <ul style="list-style-type: none"> • reducing from twice-daily to once-daily OR <ul style="list-style-type: none"> • for patients prescribed 2 puffs per dose, reducing to 1 puff per dose.
2	Maintenance low-dose ICS plus as-needed SABA	Continue daily low-dose ICS (with a lower dose if available), plus as-needed SABA.
2	As-needed low-dose budesonide/formoterol 200/6 micrograms taken as needed for symptom relief	Reduce to as-needed low-dose budesonide/formoterol 100/6 micrograms per dose.
1	As-needed SABA alone (not a preventer)	SABA-only treatment is not recommended, except for the very few patients who have symptoms less than twice a month and no risk factors for exacerbations.

Treatment levels in the table correspond to [Australian asthma guidelines for adults and adolescents](#).¹

ICS inhaled corticosteroid

LABA long-acting beta₂ agonist

LAMA long-acting muscarinic antagonist, as separate inhaler or in triple ICS-LABA-LAMA combination

MART maintenance and reliever therapy with budesonide/formoterol or beclomethasone/formoterol. In this regimen, the patient takes ICS/formoterol combination as both their maintenance treatment and as their reliever (instead of a SABA)

SABA short-acting beta₂ agonist

Use shared decision making

Explain the rationale and the process for stepping down the dose, and understand the patient's or parent's willingness or concerns. Discuss how the dose required for the prevention of flare-ups will be individualised for them.

Timing

Choose an appropriate time to reduce the dose. For example, do not step down if the patient is developing a cold, or about to travel, or just before a holiday period. For patients who are allergic to rye grass and live in an area where thunderstorm asthma may occur, it would not be advisable to step down their treatment during the pollen season. Step down before the previous inhaler is completely empty, so the patient can resume their previous dose promptly if asthma worsens.

Assess the patient's risk factors

Risk factors include a history of previous exacerbations and allergen exposure in sensitised patients.

Record the patient's baseline asthma status

Use the Asthma Control Test or document how many days each week the patient has asthma symptoms, or needs to use their inhaler to relieve symptoms. Document lung function if available.

Make small dose adjustments gradually

The ICS dose can be reduced by 25–50%, by prescribing a lower dose formulation or reducing the frequency of use. Consider reducing in two steps of 25% rather than a single 50% reduction. For example, if the patient is taking two puffs twice a day, suggest they drop one of the evening puffs. If they remain stable after one month, drop the other evening dose so they would then be taking two puffs once a day.

Self-monitoring

Ask the patient to monitor symptoms and reliever use, and record the date of the step-down in their diary or calendar. Advise them that if, over a few weeks, they experience an overall increase in symptoms or reliever use, or start waking at night due to asthma, they should resume their previous dose. For patients who are anxious, or about whom one is concerned, consider asking for two weeks of peak expiratory flow monitoring as a baseline, then mark the step-down date and continue recording for another 3–4 weeks. The [Woolcock peak flow chart](#) makes it easy to detect exacerbations and gradual changes.¹⁵ Monitoring peak expiratory flow is particularly useful given reduced access to

spirometry during the COVID-19 pandemic. The [National Asthma Council](#) has information to assist with self-monitoring.

Action plan

Make sure the patient's [written asthma action plan](#) is up to date, so that they know what to do and who to contact if they have a flare-up.

Review

Book a follow-up visit for two or three months after stepping down (or earlier if there is concern) and prompt the patient to contact their GP sooner if their asthma worsens. At the follow-up visit, assess symptom control, adherence, reliever use and lung function (if test available). If the patient's asthma is still stable, consider stepping down by another 25–50%.

Do not completely stop inhaled corticosteroids

In adults or adolescents, completely stopping preventive therapy increases the risk of severe exacerbations.

New step-down options in mild asthma

For adults and adolescents with well-controlled asthma on a low-dose ICS or low-dose ICS-LABA, with an as-needed short-acting beta₂ agonist (SABA) reliever, one option is to continue daily treatment indefinitely.¹⁶ However, patients with few symptoms are often poorly adherent to therapy, increasing their risk of severe exacerbations.

A new step-down option available in Australia since 2020 is to switch to an as-needed combination of low-dose budesonide with formoterol. The patient uses the low-dose budesonide/formoterol inhaler whenever needed for symptom relief, instead of a SABA. This option is supported by three large studies including step-down in mild asthma, that showed symptom control and lung function were similar, and the risk of severe exacerbations was the same or lower, compared with continuing regular daily ICS with as-needed SABA.^{17–20} Importantly, the risk of severe exacerbations was reduced by more than 60% compared with switching to SABA-only treatment.¹⁷ Patients took an average of three to four doses of budesonide/formoterol 200/6 micrograms per week, so in clinical practice, one inhaler would last an average of six months. Although the initial out-of-pocket cost to the patient would be higher, the average daily cost to the patient over the life of the inhaler would be much lower than with daily ICS or daily ICS-LABA, plus an as-needed SABA.

Smaller studies in adults and children have found that it is possible to step down from daily ICS to

taking low-dose ICS only when the patient takes their SABA for symptom relief. This is more effective than SABA alone at preventing exacerbations.^{21,22} This approach is not currently recommended in Australian asthma guidelines.

Conclusion

A key goal of asthma management is to customise the treatment to the patient's needs, by first achieving good asthma control and then finding the minimum effective dose that, together with an asthma action plan, will minimise the patient's risk of severe exacerbations. This approach optimises the benefit for patients, reduces the risk of adverse effects, and reduces costs for the patient and the healthcare system. With shared decision-making and a careful plan, many patients are keen to engage in the process of optimising their asthma management. ◀

Conflicts of interest:

In the last three years, Helen Reddel's institute has received independent research funding from AstraZeneca, GlaxoSmithKline and Novartis. She or her institute has received honoraria for participation in advisory boards for AstraZeneca, Chiesi, GlaxoSmithKline, Novartis and Sanofi-Genzyme; honoraria from AstraZeneca, Boehringer Ingelheim, Chiesi, GlaxoSmithKline, Sanofi-Genzyme and Teva for independent medical educational presentations; consulting fees from AstraZeneca and Novartis. Helen Reddel is Chair of the Global Initiative for Asthma (GINA) Science Committee, and a member of the Australian Asthma Handbook Guidelines Committee.

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REFERENCES

- National Asthma Council Australia. Figure – Selecting and adjusting medication for adults and adolescents. In: Australian asthma handbook. Version 2.2. Melbourne: National Asthma Council Australia; 2022. <https://www.asthmahandbook.org.au/management/adults> [cited 2022 Jul 1]
- National Asthma Council Australia. Table - Definitions of ICS dose levels in adults. In: Australian asthma handbook. Version 2.2. Melbourne: National Asthma Council Australia; 2022. <https://www.asthmahandbook.org.au/management/adults/initial-treatment/preventers/ics-based-preventers> [cited 2022 Jul 1]
- National Asthma Council Australia. Table - Definitions of ICS dose levels in children. In: Australian asthma handbook. Version 2.2. Melbourne: National Asthma Council Australia; 2022. <https://www.asthmahandbook.org.au/management/children/6-years-and-over/reliever-and-preventer> [cited 2022 Jul 1]
- Hew M, McDonald VM, Bardin PG, Chung LP, Farah CS, Barnard A, et al. Cumulative dispensing of high oral corticosteroid doses for treating asthma in Australia. *Med J Aust* 2020;213:316-20. <https://doi.org/10.5694/mja2.50758>
- Yawn BP, Wollan PC, Bertram SL, Lowe D, Butterfield JH, Bonde D, et al. Asthma treatment in a population-based cohort: putting step-up and step-down treatment changes in context. *Mayo Clin Proc* 2007;82:414-21. <https://doi.org/10.4065/82.4.414>
- Tudball J, Reddel HK, Laba TL, Jan S, Flynn A, Goldman M, et al. General practitioners' views on the influence of cost on the prescribing of asthma preventer medicines: a qualitative study. *Aust Health Rev* 2019;43:246-53. <https://doi.org/10.1071/AH17030>
- Leone FT, Fish JE, Szefer SJ, West SL; Expert Panel on Corticosteroid Use. Systematic review of the evidence regarding potential complications of inhaled corticosteroid use in asthma: collaboration of American College of Chest Physicians, American Academy of Allergy, Asthma, and Immunology, and American College of Allergy, Asthma, and Immunology. *Chest* 2003;124:2329-40. <https://doi.org/10.1378/chest.124.6.2329>
- Horne R, Chapman SC, Parham R, Freemantle N, Forbes A, Cooper V. Understanding patients' adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *PLoS One* 2013;8:e80633. <https://doi.org/10.1371/journal.pone.0080633>
- Davis SR, Tudball J, Flynn A, Lembke K, Zwar N, Reddel HK. "You've got to breathe, you know" - asthma patients and carers' perceptions around purchase and use of asthma preventer medicines. *Aust N Z J Public Health* 2019;43:207-13. <https://doi.org/10.1111/1753-6405.12865>
- Laba TL, Jan S, Zwar NA, Roughead E, Marks GB, Flynn AW, et al. Cost-related underuse of medicines for asthma-opportunities for improving adherence. *J Allergy Clin Immunol Pract* 2019;7:2298-2306.e12. <https://doi.org/10.1016/j.jaip.2019.03.024>
- Gionfriddo MR, Hagan JB, Rank MA. Why and how to step down chronic asthma drugs. *BMJ* 2017;359:j4438. <https://doi.org/10.1136/bmj.j4438>
- Ko FW, Hui DS, Leung TF, Chu HY, Wong GW, Tung AH, et al. Evaluation of the asthma control test: a reliable determinant of disease stability and a predictor of future exacerbations. *Respirology* 2012;17:370-8. <https://doi.org/10.1111/j.1440-1843.2011.02105.x>
- National Asthma Council Australia. Managing asthma actively during pregnancy. In: Australian asthma handbook. Version 2.2. Melbourne: National Asthma Council Australia; 2022. <https://www.asthmahandbook.org.au/populations/pregnant-women/pregnancy/asthma-care> [cited 2022 Jul 1]
- Global Initiative for Asthma. Difficult-to-treat and severe asthma in adults and adolescents. In: Global strategy for asthma management and prevention. Fontana, WI, USA: GINA; 2022. <https://ginasthma.org/reports> [cited 2022 Jul 1]
- Jansen J, McCaffery KJ, Hayen A, Ma D, Reddel HK. Impact of graphic format on perception of change in biological data: implications for health monitoring in conditions such as asthma. *Prim Care Respir J* 2012;21:94-100. <https://doi.org/10.4104/pcrj.2012.00004>
- Reddel HK. Updated Australian guidelines for mild asthma: what's changed and why? *Aust Prescr* 2020;43:220-4. <https://doi.org/10.18773/austprescr.2020.076>
- Bateman ED, O'Byrne PM, FitzGerald JM, Barnes PJ, Zheng J, Lamarca R, et al. Positioning as-needed budesonide-formoterol for mild asthma: effect of prestudy treatment in pooled analysis of SYGMA 1 and 2. *Ann Am Thorac Soc* 2021;18:2007-17. <https://doi.org/10.1513/AnnalsATS.202011-1386OC>
- Bateman ED, Reddel HK, O'Byrne PM, Barnes PJ, Zhong N, Keen C, et al. As-needed budesonide-formoterol versus maintenance budesonide in mild asthma. *N Engl J Med* 2018;378:1877-87. <https://doi.org/10.1056/NEJMoa1715275>
- Hardy J, Baggott C, Fingleton J, Reddel HK, Hancox RJ, Harwood M, et al.; PRACTICAL study team. Budesonide-formoterol reliever therapy versus maintenance budesonide plus terbutaline reliever therapy in adults with mild to moderate asthma (PRACTICAL): a 52-week, open-label, multicentre, superiority, randomised controlled trial. *Lancet* 2019;394:919-28. [https://doi.org/10.1016/S0140-6736\(19\)31948-8](https://doi.org/10.1016/S0140-6736(19)31948-8)
- O'Byrne PM, FitzGerald JM, Bateman ED, Barnes PJ, Zhong N, Keen C, et al. Inhaled combined budesonide-formoterol as needed in mild asthma. *N Engl J Med* 2018;378:1865-76. <https://doi.org/10.1056/NEJMoa1715274>
- Martinez FD, Chinchilli VM, Morgan WJ, Boehmer SJ, Lemanske RF Jr, Mager DT, et al. Use of beclomethasone dipropionate as rescue treatment for children with mild persistent asthma (TREXA): a randomised, double-blind, placebo-controlled trial. *Lancet* 2011;377:650-7. [https://doi.org/10.1016/S0140-6736\(10\)62145-9](https://doi.org/10.1016/S0140-6736(10)62145-9)
- Papi A, Canonica GW, Maestrelli P, Paggiaro P, Olivieri D, Pozzi E, et al.; BEST Study Group. Rescue use of beclomethasone and albuterol in a single inhaler for mild asthma. *N Engl J Med* 2007;356:2040-52. <https://doi.org/10.1056/NEJMoa063861>