

VERSION 2.0

CLINICAL ISSUES

Triggers

This PDF is a print-friendly reproduction of the content included in the *Clinical Issues - Triggers* section of the *Australian Asthma Handbook* at astmahandbook.org.au/clinical-issues/triggers

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ABBREVIATIONS

CFC	chlorofluorocarbon	LTRA	leukotriene receptor antagonist
COPD	chronic obstructive pulmonary disease	MBS	Medical Benefits Scheme
COX	cyclo-oxygenase	NHMRC	National Health and Medical Research Council
DXA	dual-energy X-ray absorptiometry	NIPPV	non-invasive positive pressure ventilation
ED	emergency department	NSAIDs	nonsteroidal anti-inflammatory drugs
EIB	exercise-induced bronchoconstriction	OCS	oral corticosteroids
FEV₁	forced expiratory volume over one second	OSA	obstructive sleep apnoea
FEV₆	forced expiratory volume over six seconds	PaCO	carbon dioxide partial pressure on blood gas analysis
FSANZ	Food Standards Australia and New Zealand	PaO	oxygen partial pressure on blood gas analysis
FVC	forced vital capacity	PBS	Pharmaceutical Benefits Scheme
GORD	gastro-oesophageal reflux disease	PEF	peak expiratory flow
HFA	formulated with hydrofluoroalkane propellant	pMDI	pressurised metered-dose inhaler or 'puffer'
ICS	inhaled corticosteroid	PPE	personal protective equipment
ICU	intensive care unit	SABA	short-acting beta ₂ -adrenergic receptor agonist
IgE	Immunoglobulin E	SAMA	short-acting muscarinic antagonist
IL	interleukin	SaO₂	oxygen saturation
IU	international units	SpO₂	peripheral capillary oxygen saturation measured by pulse oximetry
IV	intravenous	TGA	Therapeutic Goods Administration
LABA	long-acting beta ₂ -adrenergic receptor agonist		
LAMA	long-acting muscarinic antagonist		

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Asthma triggers

Overview

A wide range of factors can trigger asthma, and triggers differ between individuals.

Most of the evidence that certain exposures and physiological factors can trigger asthma comes from cross-sectional population studies and cohort studies. Because there is insufficient evidence to confirm without doubt whether some factors can or cannot act as triggers for an individual, triggers and avoidance strategies must be discussed with each patient.

Table. Summary of asthma triggers

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Assessing asthma triggers

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Unavoidable triggers

Managing unavoidable triggers (e.g. medicines that predictably trigger asthma, hormonal changes, emotional states)

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Assessing asthma triggers

Recommendations

Assess each patient's asthma triggers to identify those that are clinically relevant to the individual and whether they are potentially avoidable.

Table. Summary of asthma triggers


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 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

List important triggers on the person's written asthma action plan.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Interactions between triggers

Simultaneous exposure to some classes of triggers may have synergistic effects on asthma symptoms and flare-ups, e.g.:

- allergens plus industrial or traffic pollutants (e.g. diesel exhaust, ozone)^{1,2}
- allergens plus viruses.^{3,4}

Thunderstorm asthma

Certain types of thunderstorms in spring or early summer in regions with high grass pollen concentrations in the air can cause life-threatening allergic asthma flare-ups in individuals sensitised to rye grass, even if they have not had asthma before.^{3,5,6,8,9}

Sensitisation to rye grass allergen is almost universal in patients who have reported flare-ups consistent with thunderstorm asthma in Australia.

People with allergic rhinitis and allergy to ryegrass pollen (i.e. most people with springtime allergic rhinitis symptoms) are at risk of thunderstorm asthma if they live in, or are travelling to, a region with seasonal high grass pollen levels – even if they have never had asthma symptoms before. This includes people with undiagnosed asthma, no previous asthma, known asthma.^{3,5} Lack of inhaled corticosteroid preventer treatment has been identified as a risk factor.³

Epidemics of thunderstorm asthma can occur when such a storm travels across a region and triggers asthma in many susceptible individuals. Epidemic thunderstorm asthma events are uncommon, but when they occur can they make a high demand on ambulance and health services.^{1,9,10}

Data from thunderstorm asthma epidemics suggest that the risk of asthma flare-ups being triggered by a thunderstorm is highest in adults who are sensitised to grass pollen and have seasonal allergic rhinitis (with or without known asthma).³

The worst outcomes are seen in people with poorly controlled asthma.¹ Treatment with an inhaled corticosteroid asthma preventer was

significantly protective in a well-conducted Australian case-control study.⁵

There is insufficient evidence to determine whether intranasal corticosteroids help protect against thunderstorm asthma. Intranasal corticosteroids reduce symptoms of allergic rhinitis and limited indirect evidence suggests they may protect against asthma flare-ups in people not taking inhaled corticosteroids.¹¹

The effectiveness of specific allergen immunotherapy in protecting against thunderstorm asthma has not been evaluated in randomised clinical trials, but data from a small Australian open-label study suggest that short-term treatment with five-grass sublingual immunotherapy may have been protective in individuals.⁴

► Go to: National Asthma Council Australia's [Epidemic thunderstorm asthma](#) information paper

Go to: ASCIA's [Pollen calendar](#)

Go to: [Vic Emergency's Thunderstorm asthma forecast \(Victoria only\)](#)

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Managing avoidable triggers

Recommendations

If clinically relevant triggers are avoidable, discuss with the person to weigh up the feasibility, benefits and costs of trigger avoidance.

Table. Summary of asthma triggers


Please view and print this figure separately: <http://www.astmahandbook.org.au/table/show/52>

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Recommend that patients always avoid tobacco smoke, and that parents ensure children are not exposed to tobacco smoke.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Osborne *et al.* 2007¹

For people with asthma who are at risk of thunderstorm asthma:


- prescribe regular inhaled corticosteroids for continuous use if indicated (most adults and older adolescents with asthma)
- for patients for whom preventer therapy is not otherwise indicated, prescribe regular inhaled corticosteroids for at least 2 weeks before and throughout the pollen season (e.g. in Victoria, ideally 1 September–31 December)
- provide training in correct inhaler technique, and check technique and adherence regularly
- advise patients to carry a reliever inhaler and replace it before the expiry date
- provide an up-to-date written asthma action plan that includes thunderstorm advice and instructs the person to increase doses of both inhaled preventer and reliever (as well as starting oral corticosteroids, if indicated) in response to flare-ups.

Notes: Most adults and older adolescents with asthma should be using a regular inhaled corticosteroid long term.

People with asthma are particularly at risk of thunderstorm asthma if they have seasonal (springtime) allergic rhinitis (i.e. allergic to ryegrass pollen), and live in or are travelling to an area with high grass pollen levels. People with allergy to ryegrass pollen without known asthma are also at risk of thunderstorm asthma.

For people with seasonal allergic rhinitis who do not use intranasal corticosteroid treatment all year, advise intranasal corticosteroid starting 6 weeks before the pollen season (or exposure) and continuing until pollen levels abate (e.g. in Victoria, ideally 1 September–31 December).

Refer to ASCIA's [Pollen calendar](#) for information on local high-risk periods.

 *How this recommendation was developed*

Adapted from existing guidance


Based on reliable clinical practice guideline(s) or position statement(s):

- NACA, 2017²

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Recommend that, where practical, patients avoid or reduce exposure to:

- allergens if person is sensitised (e.g. animal allergens, cockroaches, house dust mite, moulds, occupational allergens, pollens)
- airborne/environmental irritants (e.g. smoke from bushfires, vegetation reduction fires or indoor wood fires, smoke from cigarettes of any type including cannabis, unflued fuel combustion heating such as gas heaters, cold/dry air, airborne home renovation materials, household aerosols, occupational irritants, outdoor industrial and traffic pollution, perfumes or spray deodorants and incense)
- dietary triggers known to trigger symptoms in the individual (e.g. food chemicals or additives if person is intolerant, cold drinks).


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Global Initiative for Asthma, 2012³
- Jenerowicz *et al.* 2012⁴
- Jie *et al.* 2011⁵
- Nasser and Pulimood, 2009⁶
- National Asthma Council Australia, 2012⁷

For patients with aspirin-exacerbated respiratory disease, provide advice about alternative analgesia or anti-platelet therapy.


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Advise patients that some complementary medicines have caused serious allergic reactions in some patients. These include:

- Echinacea
- bee products (pollen, propolis, royal jelly)
- garlic supplements.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Bullock *et al.* 1994⁸
- Leung *et al.* 1995⁹
- Mullins and Heddle, 2002¹⁰
- Thien *et al.* 1993¹¹

More information

Indoor air quality

Epidemiological studies suggest that asthma symptoms are worsened by exposure to range of indoor pollutants, especially environmental tobacco smoke, fuel combustion, damp and moulds.⁵

Environmental tobacco smoke

Among adults with asthma, exposure to cigarette smoke (smoking or regular exposure to environmental tobacco smoke within the previous 12 months) has been associated with a significantly increased risk of needing acute asthma care within the next 2–3 years.¹

► See: [Smoking and asthma](#)

Fuel combustion

Indoor exposure to nitrogen dioxide (e.g. due to gas stoves or heaters in homes, schools or workplaces) increases the risk of asthma symptoms^{12, 13, 14} and may reduce lung function.¹³ Most evidence that nitrogen dioxide is an asthma trigger is from studies in children. Preventing exposure (e.g. replacing heaters with non-polluting heaters) improves symptoms of asthma and wheeze in children.^{15, 16, 17, 14}

Woodfire smoke can reduce lung function and increase airway inflammation in children with asthma.¹⁸ Inhaled corticosteroids may reduce the effects of wood smoke.

Damp and moulds

Several mould species have been associated with asthma, including *Alternaria* (e.g. *Alternaria alternata*), *Cladosporium*, *Aspergillus* and *Penicillium*.¹⁹ Two mechanisms have been reported for airway disease due to moulds: allergic sensitisation and reaction to mould aeroirritants.²⁰

Sensitisation to *Alternaria* has been associated with an increased risk of hospitalisation in children with asthma.¹⁹ Epidemiological studies suggest that exposure to damp, mouldy buildings can worsen symptoms in adults and children with asthma^{19, 21, 22} and is associated with increased risk of asthma flare-ups.

Building repairs to reduce dampness in homes (e.g. leak repair, improvement of ventilation, removal of water-damaged materials) may reduce asthma symptoms and the use of asthma medicines.²³ A systematic review and meta-analysis found that damp remediation of houses reduced asthma-related symptoms including wheezing in adults, and reduced acute care visits in children.²³ In children living in mouldy houses, reducing damp in the home may reduce symptoms and flare-ups, compared with cleaning advice about moulds.²⁴

There are too few good-quality studies to conclude whether remediation of workplace buildings or schools reduces asthma symptoms.²³

Antifungal medication (oral itraconazole) may improve quality of life in people with severe asthma (requiring high-dose inhaled corticosteroid treatment or frequent/continuous courses of oral corticosteroids) who are sensitised to moulds.²⁵ However, antifungal treatment is associated with adverse effects.²⁵

Perfumes

Asthma symptoms can be triggered by strong scents including:

- incense²⁶
- perfumes.^{27, 28}

There have been anecdotal reports of asthma triggered by spray deodorants.

Work-exacerbated asthma due to perfumes has also been documented.²⁹

► See: [Work-related asthma](#)

Outdoor air quality

Industrial and traffic pollutants

Overall, epidemiological studies suggest that there is a strong relationship between air pollution and asthma symptoms or flare-ups, including severe acute asthma requiring hospital admission.⁴ Airborne pollutants associated with worsening of asthma symptoms include:^{30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40}

- coarse particulate matter (diameter ≤ 10 micrometre)
- fine particulate matter (diameter ≤ 2.5 micrometre)
- carbon monoxide
- ozone
- nitrogen dioxide
- sulphur dioxide
- diesel exhaust (multiple chemicals).

The mechanisms appear to involve airway inflammation and reduction in lung function.

Evidence from regional studies correlating recorded air pollution levels with hospital records show that pollutants from traffic sources are positively associated with emergency department visits for asthma or wheeze. Even low concentrations of ozone and traffic-related air pollutants may increase the risk of serious asthma flare-ups in children.

As little as 2 hours' exposure to air alongside busy city roads or freeways increases airway inflammation, reduces lung function, and can cause symptoms in people with asthma.^{41, 42}

Harmful effects of exposure to particulate matter are worse during warm weather.³⁴ There may be a delay of 3–5 days between

exposure to pollution and asthma flare-ups, particularly in children.³³

Simultaneous exposure to pollutants (e.g. diesel exhaust, ozone) and allergens may have synergistic effects.^{4, 43} Diesel may interact with proteins to cause deposition of allergens deep in respiratory tract.⁴

Airborne fungi

High levels of airborne fungi (e.g. *Basidiomycetes*, *Ascomycetes*, *Deuteromycetes*) in urban environments were associated with increased rates of hospitalisation for asthma in a population study.⁴³

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Allergens as asthma triggers

Allergens can trigger asthma if the person is sensitised.

Pet allergens

Contact with pets (e.g. cats, dogs and horses) can trigger asthma, mainly due to sensitisation to allergens in sebum or saliva. Exposure can trigger flare-ups or worsen symptoms.⁷

The amount of allergen excreted differs between breeds.⁷ Although some breeders claim that certain breeds of dogs that are less likely to trigger asthma ('hypoallergenic' breeds), allergen levels have not been shown to be lower in the animal's hair or coat,⁴⁴ or in owner's homes⁴⁵ with these breeds than other breeds.

Cat allergens easily spread on clothing and are found in places where cats have never been.⁷

Work-related asthma, triggered by animal urine or dander, is seen in animal workers such as breeders, jockeys, laboratory workers, pet shop workers, and people who work in veterinary surgeries.

House dust mite

Exposure to house dust mite antigens is a major asthma trigger in Australia.⁷

Pollens

Exposure to pollen can worsen asthma symptoms during the pollen seasons. Pollen counts are generally highest on calm, hot, sunny days in spring, early summer or during the dry season in tropical regions.

Thunderstorms are also associated with asthma flare-ups due to pollen in sensitised individuals (see: Weather events).

► See: [Allergies and asthma](#)

See: [Work-related asthma](#)

Go to: National Asthma Council Australia's [Asthma and Allergy](#) information paper

Thunderstorm asthma

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The worst outcomes are seen in people with poorly controlled asthma.¹ Treatment with an inhaled corticosteroid asthma preventer was significantly protective in a well-conducted Australian case-control study.⁵

There is insufficient evidence to determine whether intranasal corticosteroids help protect against thunderstorm asthma. Intranasal corticosteroids reduce symptoms of allergic rhinitis and limited indirect evidence suggests they may protect against asthma flare-ups in people not taking inhaled corticosteroids.¹¹

The effectiveness of specific allergen immunotherapy in protecting against thunderstorm asthma has not been evaluated in randomised clinical trials, but data from a small Australian open-label study suggest that short-term treatment with five-grass sublingual immunotherapy may have been protective in individuals.⁴

- ▶ Go to: National Asthma Council Australia's [Epidemic thunderstorm asthma](#) information paper
- Go to: ASCIA's [Pollen calendar](#)
- Go to: [Vic Emergency's Thunderstorm asthma forecast \(Victoria only\)](#)

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Home renovation materials

Home renovation materials can trigger asthma either as sensitisers (in patients allergic to the airborne substance) or as irritants.

Home renovators may be exposed to allergens commonly responsible for work-related asthma such as wood dust (e.g. western red cedar, redwood, oak) or isocyanates in adhesives.

- ▶ See: [Work-related asthma](#)

Triggers in the workplace

A wide range of occupational allergens has been associated with work-related asthma. Investigation of work-related asthma is complex and typically requires specialist referral.

Table. Examples of common sensitising agents and occupations associated with exposure

Agent	Occupations
<i>Low molecular weight agents</i>	
Wood dust (e.g. western red cedar, redwood, oak)	<ul style="list-style-type: none">• Carpenters• Builders• Model builders• Sawmill workers• Sanders
Isocyanates	<ul style="list-style-type: none">• Automotive industry workers• Adhesive workers• Chemical industry• Mechanics• Painters• Polyurethane foam production workers
Formaldehyde	<ul style="list-style-type: none">• Cosmetics industry• Embalmers• Foundry workers• Hairdressers• Healthcare workers• Laboratory workers• Tanners• Paper, plastics and rubber industry workers

Agent	Occupations
<i>Low molecular weight agents</i>	
<i>Platinum salts</i>	<ul style="list-style-type: none"> • Chemists • Dentists • Electronics industry workers • Metallurgists • Photographers
<i>High molecular weight agents</i>	
<i>Latex</i>	<ul style="list-style-type: none"> • Food handlers • Healthcare workers • Textile industry workers • Toy manufacturers
<i>Flour and grain dust</i>	<ul style="list-style-type: none"> • Bakers • Combine harvester drivers • Cooks • Farmers • Grocers • Pizza makers
<i>Animal allergens (e.g. urine, dander)</i>	<ul style="list-style-type: none"> • Animal breeders • Animal care workers • Jockeys • Laboratory workers • Pet shop workers • Veterinary surgery workers

Source: Adapted from Hoy R, Abramson MJ, Sim MR. Work related asthma. *Aust Fam Physician* 2010; 39: 39-42. Available from: <http://www.racgp.org.au/afp/201001/35841>

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► See: [Work-related asthma](#)

Bushfire smoke

Exposure to smoke from vegetation fires (e.g. bushfires, back-burning) is associated with asthma symptoms and with increases in emergency department visits and hospital admissions due to asthma flare-ups.^{46, 47, 48, 49, 50, 51, 52, 53, 54, 55}

Cold/dry air as an asthma trigger

Cold air can trigger asthma symptoms due to two mechanisms:⁵⁶

- response to sudden cooling of the airways

- reflex-mediated lower-airway response to cooling of the skin or upper airways.

Repeated exposure to cold air (e.g. in athletes training in cold, dry air) can also contribute to the development of airway injury and exercise-induced bronchoconstriction.⁵⁶

Effects may depend on individual susceptibility and the level of ventilation during cold air exposure.

Warming homes by installing insulation or non-polluting heaters may reduce asthma symptoms in adults⁵⁷ and children.^{16, 57}

► See: [Exercise and asthma](#)

Dietary triggers

Foods are rarely a trigger for asthma.⁷

Food chemicals and additives

Sulphite additives (widely used as preservative and antioxidants in the food and pharmaceutical industries) have been associated with acute asthma.⁵⁸

An estimated 3–10% of people with asthma are sensitised to sulphites.⁵⁸

See also: Dietary salicylates

Wine

Wine has been documented to trigger asthma symptoms.⁵⁹ The mechanism appears to be complex and varies between individuals.^{59, 60} Components of wine implicated in asthma reactions include sulphite additives and histamines.⁵⁹

Although sensitivity to sulphites in wine has been demonstrated in individuals in clinical studies, this mechanism does not explain all asthmatic reactions to wine.^{59, 60, 61} The amount of sulphite in wine varies between brands. In general, there is more preservative in white wine than red wine, and more in cask wine than bottled wine.⁶²

Some challenge studies suggest that antihistamines may reduce the severity of asthma symptoms due to wine.⁶² In general there is more histamine in red than white wines and more in Shiraz than Cabernet.⁶²

► Go to: Australasian Society of Clinical Immunology and Allergy's patient information: [Alcohol allergy \(2010\)](#)

Thermal effects

Asthma symptoms provoked by cold drinks are commonly reported anecdotally. Asthma symptoms and a reduction in FEV₁ after drinking icy water have been observed in children with asthma.⁶³ Increased bronchial hyperresponsiveness has been observed approximately 90 minutes after ingestion of ice.⁶³

Dairy foods

Milk and other dairy foods do not increase mucus.⁶⁴

Table. Association between food chemicals and asthma

Food chemical	Sources	Association with asthma
<i>Benzoates (food additives 211, 213, 213, 216, 218)</i>	Common preservative in soft drinks and foods	Probably minimal
<i>Monosodium glutamate (food additive 621) and naturally occurring</i>	Natural sources in fresh foods include tomatoes, various vegetables, mushrooms, fish, cheese, milk Added as flavour enhancer	Probably minimal
<i>Sulphites (food additives 221, 222, 223, 224, 225, 228)</i>	Common preservative used in processed foods, dried fruits, medicines, beer, wine	May trigger acute asthma (uncommon)

Food chemical	Sources	Association with asthma
<i>Tartrazine (food additive 102)</i>	Colouring	Probably minimal
<i>Salicylates (naturally occurring)</i>	Stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea	Probably minimal risk for people with aspirin-exacerbated respiratory disease

Sources

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Dietary salicylates

Aspirin-exacerbated respiratory disease is a syndrome of airway inflammation that includes asthma, nasal polyposis, chronic rhinosinusitis, and reaction to NSAIDs. It can present with severe sudden-onset asthma. People with aspirin-exacerbated respiratory disease may react to one or more anti-inflammatory agent.

Salicylates are found in some foods (e.g. stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea).⁶⁵ Most foods that contain salicylates contain both salicylic acid and acetylsalicylic acid, and about one-third contain only acetylsalicylic acid.⁶⁶ Dietary salicylates are generally thought not to cause symptoms in people with aspirin-exacerbated respiratory disease.⁶⁷

Salicylate elimination should only be considered under specialist supervision.

► Go to: National Asthma Council Australia's quick reference guide, [Aspirin/NSAID-intolerant asthma: pharmacy notes](#)

Interactions between triggers

Simultaneous exposure to some classes of triggers may have synergistic effects on asthma symptoms and flare-ups, e.g.:

- allergens plus industrial or traffic pollutants (e.g. diesel exhaust, ozone)^{4, 43}
- allergens plus viruses.^{68, 69}

Elimination diets

Strict dietary elimination and spirometry measurement of FEV₁ after double-blind food chemical challenge is the most reliable method for detecting food chemical intolerance in people with asthma.⁷⁰ Positive responses (reduction in bronchial hyperresponsiveness) to placebo challenge are common during unmodified diets.⁷⁰

For people with asthma and food intolerances, elimination diets do not always improve bronchial hyperresponsiveness.⁷¹

Salicylate elimination diets are controversial.^{67, 66} Salicylate elimination diets may put children at risk of nutritional deficiencies and eating disorders.⁶⁷

Aspirin and nonsteroidal anti-inflammatory drugs as asthma triggers

Most people with asthma can tolerate aspirin (acetylsalicylic acid) and NSAIDs.

Aspirin-exacerbated respiratory disease is a syndrome of airway inflammation that includes asthma, nasal polyposis, chronic rhinosinusitis and reaction to NSAIDs. It can present with severe sudden-onset asthma.

Known aspirin sensitivity occurs in an estimated:^{72, 73}

- 0.5–2.5% of the general population
- 4–11% of adults with asthma
- 30% of patients with asthma and nasal polyposis.

In addition, a substantial proportion may be unaware that they are sensitive to aspirin. Aspirin challenge studies have identified aspirin sensitivity in approximately 5% of children with asthma, 21% of adults with asthma, and 30–42% of people with both asthma and nasal polyposis.

People with aspirin-exacerbated respiratory disease may react to one or more anti-inflammatory agents. In a study of 659 patients with skin or airway reactions to NSAIDs challenged with paracetamol, aspirin and a range of nonselective NSAIDs (COX-1 and COX-2 inhibitors) that included piroxicam, diclofenac, ibuprofen and indomethacin), 76% showed cross-reaction to chemically distinct or unrelated COX-1 inhibitors and 24% reacted only to a single cyclo-oxygenase inhibitor.⁷⁴ Nonselective NSAIDs available in Australia also include ketoprofen, naproxen and piroxicam. People with NSAID intolerance are unlikely to react to 'coxib'-type COX-2-selective NSAIDs (celecoxib, etoricoxib, parecoxib).⁷⁵ Meloxicam has been reported to cause bronchoconstriction at higher doses.⁷⁵

People with aspirin-exacerbated respiratory disease could be at risk if they use complementary medicines that contain salicylates (e.g. willowbark) or salicin (e.g. meadowsweet).

Challenge testing is sometimes necessary to confirm the diagnosis in people who have not reported a clear association between aspirin and symptoms.

Management of aspirin-exacerbated respiratory disease involves avoidance of aspirin and NSAIDs.⁷⁶ Aspirin desensitisation is available.^{76, 77}

► Go to: National Asthma Council Australia's quick reference guide, [Aspirin/NSAID-intolerant asthma: pharmacy notes](#)

Other medicines that can trigger asthma

Beta blockers

Beta-adrenergic blocking agents (beta blockers) may cause bronchoconstriction and reduce lung function and should be used with caution in people with asthma.

Risk may be reduced with cardioselective systemic beta blockers (i.e. those that primarily block beta₁-adrenergic receptors in the heart rather than beta₂-receptors in the airways), such as atenolol, bisoprolol, metoprolol and nebivolol. However, selective beta blockers are not risk-free. A meta-analysis of randomised, blinded, placebo-controlled clinical trials evaluating acute beta blocker exposure in patients with asthma found that selective beta blockers caused a fall in FEV₁ of >20% in one in eight patients, and respiratory symptoms in one in 33 patients.⁷⁸

Nonselective systemic beta blockers (including carvedilol, labetalol, oxprenolol, pindolol and propranolol) should not be used in people with asthma.

Ocular beta blocker preparations (e.g. timolol) may also impair respiratory function,^{79, 80} and asthma deaths have been reported.^{81, 82} Changing from timolol (nonselective) to betaxolol (selective) might improve respiratory function.⁸⁰ Blocking the tear duct for 2–3 minutes after administering drops (punctal occlusion) may reduce risk of respiratory effects by minimising systemic absorption.⁸³

Prostaglandin analogues (e.g. bimatoprost, latanoprost, travoprost), alpha₂-agonists, carbonic acid inhibitors and cholinergic agents are alternative agents for managing intraocular pressure and have minimal effect on airways.⁷⁹ Note that some preparations are combined with a beta blocker.

Anticholinesterases and cholinergic agents

Cholinesterase inhibitors (e.g. pyridostigmine, neostigmine, donepezil, rivastigmine, galantamine) should be used with caution in people with asthma: they may reduce lung function and theoretically could cause bronchoconstriction.

Cholinergic agents (e.g. carbachol, pilocarpine) might also cause bronchoconstriction.

Complementary medicines

Some complementary and alternative medicines may trigger asthma:

- Echinacea¹⁰
- bee products (pollen, propolis, royal jelly).^{8, 9, 11}
- complementary medicines that contain salicylates (e.g. willowbark) or salicin (e.g. meadowsweet) – could present a risk to people

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Managing unavoidable triggers

Recommendations

If clinically relevant triggers cannot be avoided, manage medically or provide advice on self-management.

Table. Summary of asthma triggers

Please view and print this figure separately: <http://www.astmahandbook.org.au/table/show/52>


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Advise patients that viral respiratory infections are among the most common triggers for flare-ups, including potentially serious acute asthma, in adults and children.


When preparing written asthma action plans, include instructions about managing asthma at the onset of a cold, according to the patient's age and previous asthma control during respiratory infections.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).


Before prescribing medicines for comorbid conditions, consider potential effects on asthma.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).


If the patient needs to take medicines that may cause bronchoconstriction, provide advice and monitor closely. Consider performing spirometry before and after starting the new medicine.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

If a patient with asthma has a condition for which treatment with a beta blocker is advisable, choose a cardioselective agent if possible (e.g. atenolol, bisoprolol, metoprolol, nebivolol), but consider the risks, ensure supervision and monitoring of asthma, and warn patients (including those taking ocular preparations) about the risk of serious asthma flare-ups.


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Manage comorbid medical conditions that may affect asthma control, such as:

- allergic rhinitis/rhinosinusitis
- gastro-oesophageal reflux disease
- nasal polyposis
- obesity
- upper airway dysfunction.


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

In pharmacies, when providing or dispensing aspirin or NSAIDs to patients with asthma, ask about previous experience of side-effects.

Advise against aspirin and NSAIDs for anyone who has experienced runny nose or wheezing within 1–2 hours of taking aspirin or NSAIDs.


 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- National Asthma Council Australia, 2009¹


Provide self-management advice to patients whose asthma is affected by emotional or hormonal changes (e.g. menstrual cycle).

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

For pregnant women with asthma or a history of asthma, provide advice on the importance of good asthma control, and closely manage and monitor asthma control.

 *How this recommendation was developed*


Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Murphy *et al.* 2011²
- Namazy *et al.* 2012³

For patients who experience exercise-induced bronchoconstriction, provide treatment and explicit instructions in their written asthma action plan.

Reassure patients that exercise-induced bronchoconstriction can be managed effectively and should not be a reason to avoid physical activity.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Respiratory infections

Viral infections

Viral infections are the most common trigger for asthma flare-ups, including serious acute asthma requiring hospital admission.^{4, 5} Reliever medicines may not be as effective during colds.^{6, 7}

Atopic children with asthma have more severe and persistent virus-induced symptoms (both cold symptoms and asthma symptoms), than those who have asthma but who do not have any allergies.^{8, 9}

Interaction between viral infection and allergens

Viral infections and allergens interact synergistically to increase risk of asthma flare-ups in adults and children.

Atopic people with asthma are at higher risk of hospitalisation due to asthma than those without allergies.¹⁰ In atopic children with asthma, the combination of virus detection and sensitisation with high allergen exposure substantially increases the risk of hospitalisation for asthma.¹¹

Advice to patients

Colds and influenza are more common at some times of the year and in different age groups. The rate of asthma flare-ups in young school-age children peaks in late February approximately 2 weeks after the beginning of the school year, and higher rates of flare-ups continues into early winter. In adults, the peak period of severe viral-associated flare-ups occurs in the winter. Preschool children have about 6–8 colds per year, while school-aged children have about 3–4 colds per year.

In practice, it is not feasible to avoid colds or influenza. Colds and influenza are spread by multiple routes, including airborne transmission of small and large droplets generated by talking and coughing, and transfer by fingers from contaminated items to the nose or eyes.

People with asthma should avoid crowded and enclosed spaces, particularly where there are people with colds. Regular hand washing or using alcohol hand rubs after contact with people or items may reduce risk of transmission, but is unlikely to be effective in practice.

Immunisation

Influenza vaccination reduces the risk of influenza and pneumococcal vaccination reduces the risk of pneumococcal pneumonia. However, the extent to which influenza vaccination and pneumococcal vaccination protect against asthma flare-ups due to respiratory tract infections is uncertain.^{12, 13, 14}

► See: [Maintaining appropriate immunisation according to risk group](#)

Aspirin and nonsteroidal anti-inflammatory drugs as asthma triggers

Most people with asthma can tolerate aspirin (acetylsalicylic acid) and NSAIDs.

Aspirin-exacerbated respiratory disease is a syndrome of airway inflammation that includes asthma, nasal polyposis, chronic rhinosinusitis and reaction to NSAIDs. It can present with severe sudden-onset asthma.

Known aspirin sensitivity occurs in an estimated:^{15, 16}

- 0.5–2.5% of the general population
- 4–11% of adults with asthma
- 30% of patients with asthma and nasal polyposis.

In addition, a substantial proportion may be unaware that they are sensitive to aspirin. Aspirin challenge studies have identified aspirin sensitivity in approximately 5% of children with asthma, 21% of adults with asthma, and 30–42% of people with both asthma and nasal polyposis.

People with aspirin-exacerbated respiratory disease may react to one or more anti-inflammatory agents. In a study of 659 patients with skin or airway reactions to NSAIDs challenged with paracetamol, aspirin and a range of nonselective NSAIDs (COX-1 and COX-2 inhibitors) that included piroxicam, diclofenac, ibuprofen and indomethacin), 76% showed cross-reaction to chemically distinct or unrelated COX-1 inhibitors and 24% reacted only to a single cyclo-oxygenase inhibitor.¹⁷ Nonselective NSAIDs available in Australia also include ketoprofen, naproxen and piroxicam. People with NSAID intolerance are unlikely to react to 'coxib'-type COX-2-selective NSAIDs (celecoxib, etoricoxib, parecoxib).¹⁸ Meloxicam has been reported to cause bronchoconstriction at higher doses.¹⁸

People with aspirin-exacerbated respiratory disease could be at risk if they use complementary medicines that contain salicylates (e.g. willowbark) or salicin (e.g. meadowsweet).

Challenge testing is sometimes necessary to confirm the diagnosis in people who have not reported a clear association between aspirin and symptoms.

Management of aspirin-exacerbated respiratory disease involves avoidance of aspirin and NSAIDs.¹⁹ Aspirin desensitisation is available.^{19, 20}

► Go to: National Asthma Council Australia's quick reference guide, [Aspirin/NSAID-intolerant asthma: pharmacy notes](#)

Other medicines that can trigger asthma

Beta blockers

Beta-adrenergic blocking agents (beta blockers) may cause bronchoconstriction and reduce lung function and should be used with caution in people with asthma.

Risk may be reduced with cardioselective systemic beta blockers (i.e. those that primarily block beta₁-adrenergic receptors in the heart rather than beta₂-receptors in the airways), such as atenolol, bisoprolol, metoprolol and nebivolol. However, selective beta blockers are not risk-free. A meta-analysis of randomised, blinded, placebo-controlled clinical trials evaluating acute beta blocker exposure in patients with asthma found that selective beta blockers caused a fall in FEV₁ of >20% in one in eight patients, and respiratory symptoms in one in 33 patients.²¹

Nonselective systemic beta blockers (including carvedilol, labetalol, oxprenolol, pindolol and propranolol) should not be used in people with asthma.

Ocular beta blocker preparations (e.g. timolol) may also impair respiratory function,^{22, 23} and asthma deaths have been reported.^{24, 25} Changing from timolol (nonselective) to betaxolol (selective) might improve respiratory function.²³ Blocking the tear duct for 2–3 minutes after administering drops (punctal occlusion) may reduce risk of respiratory effects by minimising systemic absorption.²⁶

Prostaglandin analogues (e.g. bimatoprost, latanoprost, travoprost), alpha₂-agonists, carbonic acid inhibitors and cholinergic agents are alternative agents for managing intraocular pressure and have minimal effect on airways.²² Note that some preparations are combined with a beta blocker.

Anticholinesterases and cholinergic agents

Cholinesterase inhibitors (e.g. pyridostigmine, neostigmine, donepezil, rivastigmine, galantamine) should be used with caution in people with asthma: they may reduce lung function and theoretically could cause bronchoconstriction.

Cholinergic agents (e.g. carbachol, pilocarpine) might also cause bronchoconstriction.

Complementary medicines

Some complementary and alternative medicines may trigger asthma:

- Echinacea²⁷
- bee products (pollen, propolis, royal jelly).^{28, 29, 30}
- complementary medicines that contain salicylates (e.g. willowbark) or salicin (e.g. meadowsweet) – could present a risk to people with aspirin-exacerbated respiratory disease

Dietary salicylates

Aspirin-exacerbated respiratory disease is a syndrome of airway inflammation that includes asthma, nasal polyposis, chronic rhinosinusitis, and reaction to NSAIDs. It can present with severe sudden-onset asthma. People with aspirin-exacerbated respiratory disease may react to one or more anti-inflammatory agent.

Salicylates are found in some foods (e.g. stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea).³¹ Most foods that contain salicylates contain both salicylic acid and acetylsalicylic acid, and about one-third contain only acetylsalicylic acid.³² Dietary salicylates are generally thought not to cause symptoms in people with aspirin-exacerbated respiratory disease.³³

Salicylate elimination should only be considered under specialist supervision.

► Go to: National Asthma Council Australia's quick reference guide, [Aspirin/NSAID-intolerant asthma: pharmacy notes](#)

Physiological and psychological changes

Stress, anxiety and extreme emotions

Some patients report asthma flare-ups and asthma symptoms in response to stress and extreme emotions.^{34, 35}

Adolescents with asthma may experience breathlessness in response to stress (without changes in lung function or other asthma symptoms).³⁶

► See: [Investigating asthma-like symptoms in adolescents and young adults](#)

Laughter

Laughing is a common trigger for wheeze in infants. In children, the presence of respiratory symptoms that are triggered by laughter increases the probability of symptoms being due to asthma.

► See: [Diagnosing asthma in children](#)

Hormonal changes

Asthma may worsen during the premenstrual phase in up to 40% of women, possibly due to a reduced response to corticosteroids and bronchodilators.³⁷ However, this rarely causes severe flare-ups.³⁷

Perimenstrual worsening asthma may be relatively common among women with severe or poorly controlled asthma, and may share risk factors with aspirin-exacerbated respiratory disease.³⁸

Asthma control worsens during pregnancy in about one third of women with asthma.³⁹ During pregnancy, approximately 6% of women with asthma are hospitalised with a severe asthma flare-up.^{40, 41}

► See: [Managing asthma during pregnancy](#)

Sexual activity

Sexual activity may trigger asthma symptoms possibly due to physical exertion (exercise-induced bronchoconstriction), heightened emotion, or a combination of these factors. Exposure to dust mite allergens in bedding may also be a trigger for people who are sensitised.

People with asthma may experience limitation to sexual activity due to asthma or be concerned about the effect of their asthma on their sex life.^{42, 43} However, patients are unlikely to mention concerns about sexual activity to their doctor.⁴³

Practical information for patients about sex and asthma is available from Asthma Australia.

► Go to: Asthma Australia's [Triggers](#) webpage

See: [Investigation and management of exercise-induced bronchoconstriction](#)

Interactions between triggers

Simultaneous exposure to some classes of triggers may have synergistic effects on asthma symptoms and flare-ups, e.g.:

- allergens plus industrial or traffic pollutants (e.g. diesel exhaust, ozone)^{44, 45}
- allergens plus viruses.^{10, 11}

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