



Asthma in adolescents

When to worry, how to navigate the challenges

GESHANI JAYASURIYA BMed, FRACP; SUSAN J. TOWNS MB BS, MMH, FRACP

Key points

- Clarity of diagnosis is important to inform appropriate management of adolescents with asthma.
- Exercise-related symptoms are common in the adolescent age group and may be caused by a variety of underlying factors not related to asthma.
- See the young person alone for at least part of the consultation, and provide reassurance regarding privacy and confidentiality.
- Provide and discuss an asthma action plan with every change of treatment.
- Red flags for high-risk asthma include poor asthma control, adherence issues, under recognition of illness, psychosocial stressors, risk-taking behaviour and communication barriers.

The management of adolescents with asthma is challenging and recognition of their developmental context and psychosocial factors plays an important role in appropriate diagnosis and treatment.

Adolescents with asthma are a high-risk group due to their unique developmental context, the changing epidemiology of asthma in this age group and the emergence of psychosocial factors that can impact on management. Adolescents may under recognise their symptoms or deny they exist, leading to poor adherence to medication and risk-taking behaviours such as smoking, which can adversely affect asthma control. Also, misdiagnosis can result in over or undertreatment of this group of patients.

Asthma remains one of the most common chronic conditions affecting young Australians, third after allergic rhinitis and short sightedness according to the Australian Institute of Health

and Welfare (AIHW) report, *Young Australians: Their Health and Wellbeing 2011*.¹ The report also revealed that only 28% of adolescents with asthma had discussed their Asthma Management Plan with a GP or specialist in the preceding 12 months and only 18% of adolescents with asthma had a written Asthma Management Plan.¹

A preformatted Asthma Action Plan from the National Asthma Council Australia only takes a few minutes to complete and discuss with patients (Figure).² The use of asthma action plans is time effective in the long term and has been shown to:

- improve adherence
- reduce school absences

Dr Jayasuriya is a Fellow in the Department of Respiratory Medicine and an Honorary Fellow in the Department of Adolescent Medicine, The Children's Hospital at Westmead, Sydney; and a Clinical Associate Lecturer in the Discipline of Paediatrics and Child Health, Faculty of Medicine, University of Sydney, Sydney.

Associate Professor Towns is Head of Adolescent Medicine for The Sydney Children's Hospitals Network; a Consultant Paediatrician in the Department of Respiratory Medicine, The Children's Hospital at Westmead, Sydney; and Clinical Associate Professor in the Discipline of Paediatrics and Child Health, Faculty of Medicine, University of Sydney, Sydney, NSW.

- reduce GP presentations
 - reduce visits to the emergency department and hospitalisation rates.
- GPs play a key role in the assessment and management of adolescents with asthma. Practical strategies to consider when managing adolescents with asthma within a developmental context include:
- identifying adolescents who are at high risk
 - addressing nonadherence
 - promoting self-management
 - referring patients for further assessment and/or management when necessary.

One of the most important roles for GPs is co-ordinating the care of adolescents with severe or labile asthma, particularly at times of change and with transition from paediatric to adult specialty care.

EPIDEMIOLOGY

Although the prevalence of asthma is higher in prepubertal boys than girls, a gender shift develops during adolescence with increased incidence and decreased remission rates of asthma among adolescent girls.³ The exact age and cause of this gender shift is unclear; however, hormonal changes throughout this period have been

implicated. Further research is providing evidence on the role of fluctuating levels of oestrogen, with some women experiencing increased asthma symptoms in the premenstrual luteal phase as hormone levels drop.⁴

DIAGNOSIS

It is important to be clear about what is asthma and what is not; an accurate diagnosis is required to inform ongoing management and avoid under or overtreatment. The *Australian Asthma Handbook* provides a very useful and interactive online resource for asthma management with a section specifically related to adolescents with asthma.⁵

Asthma is classified according to frequency and persistence of symptoms and is characterised by episodes of wheeze with shortness of breath, often precipitated by triggers such as viral infections or environmental factors (Table 1).⁵ Recurrent cough as the predominant or only symptom can be misleading.

A detailed patient history and physical examination, use of objective measures of airway function and assessment of atopic status are needed to confirm a diagnosis of asthma. Investigations to consider include:

- spirometry, including post-bronchodilator response
- allergen skin testing to common environmental and food allergens
- challenge testing or exercise testing to establish evidence of airway hyper-responsiveness or reveal the cause of exercise-related symptoms
- peak expiratory flow (PEF) monitoring, although not routinely recommended or used in adolescents with asthma, can be helpful in some circumstances to establish evidence of PEF variability and motivate adherence to treatment.

DIFFERENTIAL DIAGNOSIS

Exercise-related symptoms are common in the adolescent age group and may be caused by a variety of underlying factors not related to asthma. However, it is

TABLE 1. DEFINITIONS OF ASTHMA PATTERNS*†‡

Category	Pattern and intensity of symptoms (when not taking regular treatment)
Intermittent asthma	
Infrequent	Symptom-free for at least six weeks at a time (symptoms up to once every six weeks on average but no symptoms between flare-ups)
Frequent	Symptoms more than once every six weeks on average but no symptoms between flare-ups
Persistent asthma	
Mild	FEV ₁ ≥80% predicted and at least one of: <ul style="list-style-type: none"> • daytime symptoms more than once per week but not every day • night-time symptoms more than twice per month but not every week
Moderate	Any of: <ul style="list-style-type: none"> • FEV₁ <80% predicted • daytime symptoms daily • night-time symptoms more than once per week • symptoms sometimes restrict activity or sleep
Severe	Any of: <ul style="list-style-type: none"> • FEV₁ ≤60% predicted • daytime symptoms continual • night-time symptoms frequent • flare-ups frequent • symptoms frequently restrict activity or sleep

ABBREVIATION: FEV₁ = forced expiratory volume in one second.

* These definitions can be applied to children over the age of 6 years when not taking a regular preventer medication.

† Reproduced with permission from National Asthma Council Australia. *Australian Asthma Handbook*, Version 1.0. National Asthma Council Australia, Melbourne, 2014. Available online at: www.asthmahandbook.org.au⁵

ASTHMA ACTION PLAN

Take this ASTHMA ACTION PLAN with you when you visit your doctor

NAME	DOCTOR'S CONTACT DETAILS	EMERGENCY CONTACT DETAILS
DATE		Name
NEXT ASTHMA CHECK-UP DUE		Phone
		Relationship

WHEN WELL *Asthma under control (almost no symptoms)*
ALWAYS CARRY YOUR RELIEVER WITH YOU

Peak flow* (if used) above:

<p>Your preventer is: <small>(NAME & STRENGTH)</small></p> <p>Take puffs/tablets times every day <input type="checkbox"/> Use a spacer with your inhaler</p> <p>Your reliever is: <small>(NAME)</small></p> <p>Take puffs</p> <p>When: You have symptoms like wheezing, coughing or shortness of breath <input type="checkbox"/> Use a spacer with your inhaler</p>	<p>OTHER INSTRUCTIONS (e.g. other medicines, trigger avoidance, what to do before exercise)</p> <p>.....</p> <p>.....</p> <p>.....</p>
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WHEN NOT WELL *Asthma getting worse (needing more reliever e.g. more than 3 times per week, waking up with asthma, more symptoms than usual, asthma is interfering with usual activities)*

Peak flow* (if used) between and

<p>Keep taking preventer: <small>(NAME & STRENGTH)</small></p> <p>Take puffs/tablets times every day <input type="checkbox"/> Use a spacer with your inhaler</p> <p>Your reliever is: <small>(NAME)</small></p> <p>Take puffs</p> <p><input type="checkbox"/> Use a spacer with your inhaler</p>	<p>OTHER INSTRUCTIONS <input type="checkbox"/> Contact your doctor (e.g. other medicines, when to stop taking extra medicines)</p> <p>.....</p> <p>.....</p> <p>.....</p>
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IF SYMPTOMS GET WORSE *Asthma is severe (needing reliever again within 3 hours, increasing difficulty breathing, waking often at night with asthma symptoms)*

Peak flow* (if used) between and

<p>Keep taking preventer: <small>(NAME & STRENGTH)</small></p> <p>Take puffs/tablets times every day <input type="checkbox"/> Use a spacer with your inhaler</p> <p>Your reliever is: <small>(NAME)</small></p> <p>Take puffs</p> <p><input type="checkbox"/> Use a spacer with your inhaler</p>	<p>OTHER INSTRUCTIONS <input checked="" type="checkbox"/> Contact your doctor today (e.g. other medicines, when to stop taking extra medicines)</p> <p>Prednisolone/prednisone: Take each morning for days</p> <p>.....</p> <p>.....</p>
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DANGER SIGNS *Asthma emergency (severe breathing problems, symptoms get worse very quickly, reliever has little or no effect)*

Peak flow (if used) below:

DIAL 000 FOR AMBULANCE

Call an ambulance immediately
Say that this is an asthma emergency
Keep taking reliever as often as needed

National Asthma Council Australia
 leading the attack against asthma
www.nationalasthma.org.au

* Peak flow not recommended for children under 12 years.

Figure. The National Asthma Council Australia Asthma Action Plan (continued on next page). This is appropriate for use in adolescent patients and is available to download from the National Asthma Council Australia website (www.nationalasthma.org.au/asthma-tools/asthma-action-plans). Reproduced with permission from the National Asthma Council Australia. © National Asthma Council Australia.

ASTHMA ACTION PLAN

what to look out for

WHEN WELL



THIS MEANS:

- you have no night-time wheezing, coughing or chest tightness
- you only occasionally have wheezing, coughing or chest tightness during the day
- you need reliever medication only occasionally or before exercise
- you can do your usual activities without getting asthma symptoms

WHEN NOT WELL



THIS MEANS ANY ONE OF THESE:

- you have night-time wheezing, coughing or chest tightness
- you have morning asthma symptoms when you wake up
- you need to take your reliever more than usual eg. more than 3 times per week
- your asthma is interfering with your usual activities

IF SYMPTOMS GET WORSE



THIS MEANS:

- you have increasing wheezing, cough, chest tightness or shortness of breath
- you are waking often at night with asthma symptoms
- you need to use your reliever again within 3 hours

THIS IS AN ASTHMA ATTACK

DANGER SIGNS



THIS MEANS:

- your symptoms get worse very quickly
- you have severe shortness of breath, can't speak comfortably or lips look blue
- you get little or no relief from your reliever inhaler

**CALL AN AMBULANCE IMMEDIATELY: DIAL 000
SAY THIS IS AN ASTHMA EMERGENCY.**

**DIAL 000 FOR
AMBULANCE**

ASTHMA MEDICINES

PREVENTERS

Your preventer medicine reduces inflammation, swelling and mucus in the airways of your lungs. Preventers need to be taken **every day**, even when you are well.

Some preventer inhalers contain 2 medicines to help control your asthma (combination inhalers).

RELIEVERS

Your reliever medicine works quickly to make breathing easier by making the airways wider.

Always carry your reliever with you – it is essential for first aid. Do not use your preventer inhaler for quick relief of asthma symptoms unless your doctor has told you to do this.

To order more Asthma Action Plans visit the National Asthma Council website. A range of action plans are available on the website – please use the one that best suits your patient.

www.nationalasthma.org.au

National Asthma Council Australia
leading the attack against asthma

Developed by the National Asthma Council Australia and supported by GlaxoSmithKline Australia.
National Asthma Council Australia retained editorial control.

1. RED FLAGS FOR NONEXERCISE-INDUCED ASTHMA SYMPTOMS

- Onset of symptoms as soon as exercise commenced – consider reduced physical fitness
- Dizziness, light-headedness or peripheral tingling – consider hyperventilation
- Inspiratory noise – consider vocal cord dysfunction

important to note that adolescents may avoid exercise because of unrecognised asthma symptoms and therefore underappreciate the extent of their exercise limitations.

Patients with exercise-related symptoms require accurate assessment to differentiate exercise-induced asthma from reduced physical fitness, hyperventilation and vocal cord dysfunction (Box 1).⁶ Referral of patients for further specialist multidisciplinary assessment and investigations including lung function testing can be helpful to clarify and manage continued symptoms.

The obesity rate has escalated dramatically in the adolescent age group over the past few decades.⁷ Risk factors for obesity include increasingly sedentary behaviour (especially for females) and increased screen time, with the combination leading to reduced physical fitness, with breathlessness being perceived as an asthma symptom.⁸ Obesity itself can be associated with asthma, with a body mass index (BMI) of more than 30 kg/m² increasing this risk; however, precise mechanisms connecting the two are not yet clear.

Being overweight can affect lung mechanics with reduced functional residual capacity, expiratory reserve volume and, to a lesser extent, total lung capacity. The effects of bronchoconstriction can be magnified by changes in lung mechanics in obese patients (greater hyperinflation and greater airway closure), which results in an increased sensation of dyspnoea when

compared with patients who are not obese.⁹ The possibility that the mechanism connecting obesity and asthma may be related to inflammatory cytokines is being studied further.¹⁰ In addition, genetic studies are proceeding to further explore the relation between high BMI and asthma.¹¹

Habit cough, sometimes also termed psychogenic cough, is often misdiagnosed as asthma and patients are treated inappropriately with asthma medication.⁶ Anxiety and psychosocial factors may mimic or trigger acute ‘asthma’; however, these symptoms are usually associated with normal spirometry and oximetry results and rapid improvement.

ASSESSMENT

Additional patient assessments are of use in both clarifying an asthma diagnosis and informing asthma management in the adolescent population. This includes assessing a patient’s sleep and obesity issues, taking a menstrual history and performing a psychosocial review.

Sleep assessment

Obesity, atopy and allergic rhinitis may be associated with snoring and obstructive sleep symptoms. Improving the underlying control of these conditions can then impact on asthma control.

Obesity assessment

BMI, onset of obesity and associated management issues that can impact on asthma (such as early menarche and disordered sleep) should be assessed.

Menstrual history

Exacerbations of asthma symptoms occurring in the luteal phase should be assessed and hormonal management considered. Also, early menarche is associated with obesity and increased asthma prevalence.

Psychosocial review

HEEADSSS 3.0 (Home environment, Education and employment, Eating, peer-related Activities, Drugs, Sexuality, Suicide/ depression and Safety) assessment is

2. RESOURCES FOR THE MANAGEMENT OF ASTHMA AND ADOLESCENT ISSUES

- *Australian Asthma Handbook* (National Asthma Council Australia) – best-practice, evidence-based recommendations for primary care physicians, with a section on adolescents and young people: www.astmahandbook.org.au/populations/adolescents
- National Asthma Council of Australia inhaler use videos: www.nationalasthma.org.au/how-to-videos
- NSW Centre for the Advancement of Adolescent Health – Adolescent Health GP Resource Kit: www.caah.chw.edu.au/resources/#03
- Headspace – Australia’s National Youth Mental Health Foundation: www.headspace.org.au
- Reachout.com by Inspire Foundation: <http://inspire.org.au>
- NSW Agency for Clinical Innovation – Transition Care Network: www.aci.health.nsw.gov.au/networks/transition-care
- Chronic Illness Peer Support (ChIPS) at the Royal Children’s Hospital Melbourne: www.rch.org.au/chips
- Relationships Australia: www.relationships.org.au
- Smarter than Smoking – adolescent smoking cessation: www.smarterthansmoking.org.au
- ‘Kids Quit’ Smoking Cessation Brief Interventions – for health professionals: <http://kidshealth.schn.health.nsw.gov.au/projects/smoking/kids-quit-smoking-cessation-brief-interventions>

3. APPROACH TO DEVELOPING A TREATMENT PLAN FOR AN ADOLESCENT WITH ASTHMA

- See the young person alone for at least part of the consultation, and provide reassurance regarding privacy and confidentiality with standard exclusions (refer to the Adolescent Health GP Resource Kit listed in Box 2).
- Consider cultural perspectives and health beliefs that may potentially impact on a young person and their family.
- Explore and encourage the adolescent's self-management capacity and provide re-education about medications, side effects and concerns as needed.
- Negotiate the treatment plan with the adolescent patient to engage them in their own health and provide an opportunity for decision making about what will work for them. Specialised asthma nurses are an invaluable resource for providing instruction, training and support for adolescents with asthma and their families.
- Recognise and address medication nonadherence, and explore barriers and motivating factors.^{13,14} A home visit, particularly if the asthma is severe, can be most informative to overcome any barriers or difficulties, e.g. environmental triggers such as animal allergens, house dust mites, cockroaches and moulds as well as the impact of environmental tobacco smoke. In one paediatric asthma study, treatment-related problems (such as incorrect use of devices, nonadherence and out-of-date medications) contributed to poor asthma control in approximately half the cohort.¹⁵ Routinely check and reinforce correct inhaler technique; a visit to the GP or specialist or any change in treatment is an opportunity to check technique. Instructional videos on inhaler technique are available online at: www.nationalasthma.org.au/how-to-videos.
- Assess smoking behaviour for the adolescent and their family/household members and peers. Provide a brief intervention or referral for smoking cessation support.
- Assess and address risky behaviours such as the use of recreational drugs.
- Assess and address family dysfunction and affective disorders.
- Coordinate and support smooth transition from paediatric to adult care (www.aci.health.nsw.gov.au/networks/transition-care).
- When selecting initial preventer medications consider the patient's pattern of asthma and their age and stage as outlined in Table 2 (see also www.astmahandbook.org.au/populations/adolescents). Combination therapy medications (inhaled corticosteroids plus long-acting beta agonists [LABA]) are not first-line initial preventer medications and should be reserved for use as a step up in patients who do not improve on low-dose inhaled corticosteroids.¹⁶ The regular use of a LABA can lead to tolerance to short-acting beta agonists as well as loss of protection against exercise-induced bronchospasm.¹⁷ Other options for step up therapy include optimising the dose of inhaled corticosteroids or a combination of inhaled corticosteroids and leukotriene receptor antagonists.
- Simplify treatment plans by choosing medications that need to be given less frequently (e.g. using ciclesonide, a once-daily inhaled corticosteroid).
- Perform ongoing reviews with adjustment of the treatment plan, including back titration of medication doses where possible. Changes should only be considered after reviewing inhaler technique and adherence, and should ideally be based on both reported symptom control and spirometry results.

recommended in adolescents with asthma as a useful psychosocial screening assessment to highlight areas of concern.¹² Anxiety, depression and other mental health problems often emerge during the adolescent years and affected patients require appropriate psychosocial assessment and support because recognising and addressing mental health problems is important to achieve optimal asthma management. Resources are listed in Box 2.

MANAGEMENT PLANS

Consideration of the strategies outlined in Box 3 can be helpful when developing a treatment plan for an adolescent with asthma.¹³⁻¹⁷ An initial preventer treatment plan is provided in Table 2.

Adolescent high-risk indicators

Many factors place adolescents with asthma at high risk for poor health outcomes (Box 4).

Severe or poorly controlled asthma

Frequent hospitalisation or emergency department attendance, taking numerous courses of corticosteroids, missing school and exercise avoidance are all indicators of poor asthma control.

Nonadherence to treatment

The degree to which the adolescent is participating with the agreed treatment plan should be assessed. This is often best achieved by asking open-ended questions that enable the young person to weigh up what is working well and what is more challenging in achieving improved treatment adherence (Box 5). Routines around treatment plans have been demonstrated to be helpful. Therefore, encouraging ease of access to treatment and linking taking medications to existing activities or set times of the day can be helpful (e.g. before brushing teeth, using electronic reminders or 'asthma apps' on mobile phones).

Attitude to their asthma

A disregard of symptoms and an avoidance of regular review appointments is

TABLE 2. INITIAL PREVENTER TREATMENT*5

Asthma category	Pattern of symptoms
Intermittent asthma	
Infrequent	Regular preventer treatment is not recommended
Frequent	Consider a treatment trial with montelukast [†] once daily; assess response after two to four weeks Note: a cromone (sodium cromoglycate or nedocromil) can be trialled as an alternative
Persistent asthma	
Mild	Consider a treatment trial with montelukast [†] once daily; assess response after two to four weeks If inadequate response after checking adherence, consider treatment trial with inhaled corticosteroid (low dose) Note: a cromone (sodium cromoglycate or nedocromil) can be trialled as an alternative to montelukast
Moderate to severe	Consider a treatment trial with regular inhaled corticosteroid (low dose); assess response after four weeks

* Reproduced with permission from National Asthma Council Australia. Australian Asthma Handbook, Version 1.0. National Asthma Council Australia, Melbourne, 2014. Available online at: www.astmahandbook.org.au⁵
[†] Available on the PBS for children 2 to 14 years of age.

4. RED FLAGS IN ADOLESCENTS WITH HIGH-RISK ASTHMA

- Poor asthma control: recurrent asthma flare-ups and visits to the GP or emergency department, and multiple courses of corticosteroid
- Adherence issues
- Lack of understanding of illness and attitude to illness
- Psychosocial stressors
- Risk-taking behaviour (e.g. cigarette smoking and marijuana use)

- increase asthma self-management knowledge (compared with adolescents at schools not involved in this type of program or with baseline data)^{15,18,19}
- be particularly beneficial for boys from low socioeconomic backgrounds.¹⁷

The Triple A (Adolescent Asthma Action) program is a school-based peer-led adolescent asthma self-management education program developed in Australia.²¹ The program is also targeting schools in high-risk areas of need and including peer-led smoking cessation intervention and smoking cessation training for school teachers, counsellors and Indigenous health workers.

Family support

A supportive, cohesive family environment with open communication is one of the most important factors enabling an adolescent to cope with chronic illness.²² This is important not only to reinforce treatment routines but also to facilitate school, social and peer interactions. Exploring the family history, including asthma, atopy, occupations, mental health, smoking status and environmental factors, helps inform management and the providing of optimal support.

Media and technology

Asthma resources for patients are now available in the form of mobile phone apps.

problematic and is often associated with poor adherence.

Psychosocial changes

Changing school, moving house or family disruptions impacting on family support may interfere with an adolescent's ongoing treatment.

Significant changes in affect or behaviour

Any feelings of hopelessness or depression the adolescent may show and any changes in personality should be assessed. Also, be aware of any bereavement or recent loss the adolescent may have experienced. Inappropriate use of drugs and alcohol and denying or disregarding symptoms can mask other issues or mood disorders as well as impact on asthma control itself.

Communication problems

A lack of communication may interfere with the doctor-patient relationship and affect the interaction needed to negotiate

the adolescent's treatment plan. Adolescent patients from non-English speaking backgrounds may be capable of interpreting for their non-English speaking parents in a busy clinical setting; however, directly addressing parents through a health interpreter (either in the room or via phone) is very helpful in engaging the family in the adolescent's care.

Peer-led programs

Several studies have shown that adolescents can be trained to teach their peers about asthma self-management and to motivate them to avoid smoking.¹⁸⁻²⁰ Peer-led asthma self-management programs for adolescents can:

- significantly influence self-management behaviour, compared with adult-led programs²⁰
- achieve clinically important improvements in health-related quality of life^{18,19}
- increase adolescents' belief in their ability (self-efficacy) to resist smoking¹⁸

5. QUESTIONS FOR ASSESSING TREATMENT NONADHERENCE IN AN ADOLESCENT PATIENT WITH ASTHMA

- ‘Some teenagers tell me that it is difficult to remember their treatments all the time. Is that something you find?’
- ‘Some teenagers tell me they often forget to use their asthma puffer. How often does this happen to you in a week?’
- ‘What things make it difficult for you to use your puffers more often?’
- ‘What are the most common reasons that get in the way of you taking your medications?’
- Use other questions to further explore barriers to adherence, including:
 - forgetting to take medications
 - difficulty using devices
 - cost of medications
 - concerns about side effects
 - no perceived short-term benefits
 - need for medications differentiating patient from peers
 - sociocultural health beliefs

One of these is the Asthma Buddy (www.nationalasthma.org.au/asthma-tools/asthma-action-plans/asthmabuddy). This app reminds patients when medications are due, stores an electronic asthma action plan and allows patients to record symptoms.

In addition, text messaging of reminders about adolescent patients’ appointment times improves follow-up rates.

Exploring ways with the young person to use technology to improve adherence and management will become increasingly useful with the emergence and evaluation of these tools.

TRANSITION TO ADULT CARE

Transition refers to the ‘purposeful planned movement of adolescents and young adults with chronic physical and medical conditions from a child-centred to adult-orientated healthcare system.’²³

Transition planning involves the following steps:

- a preparation phase in the early adolescent years incorporating re-education, self-management promotion and self-advocacy
- an active phase (at age 16 to 18 years) discussing and establishing an individualised transition plan

involving the GP and appropriate adult services

- evaluation after the transition ensuring engagement with adult services into the future.

GPs play a vital role in co-ordinating care at this time, ensuring young people do not fall through the gaps in the health-care system.

CONCLUSION

The role of the GP is crucial in supporting and establishing an effective asthma management strategy during adolescence, to improve current asthma control and decrease comorbidity in adulthood.

Although this article focuses on asthma, many of these principles can be

helpful in managing young people living with other chronic conditions. Adolescence, despite its physical and psychosocial complexity, is a time of opportunity and adolescents with asthma can benefit from a comprehensive and developmentally focused approach to management. **MT**

REFERENCES

A list of references is included in the website version (www.medicinetoday.com.au) and the iPad app version of this article.

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Associate Professor Towns: None.

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GESHANI JAYASURIYA BMed, FRACP; **SUSAN J. TOWNS** MB BS, MMH, FRACP

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