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ORIGINAL RESEARCH

Changes in asthma management in Australian general practice

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Summary *Aims:* To investigate changes in national prevalence, severity and management rates of asthma in Australian general practice from 1990 to 2003.

Methods: A comparative study of general practitioner (GP) encounters with asthma patients, in cross sectional surveys from 1990–91 and 1998–2003. Main outcome measures were relative rates of asthma management, prevalence and severity of asthma.

Results: The prevalence of asthma remained constant between 1999 and 2002. Prevalence in children was significantly higher (18.4%) than in adults (13.2%) ($p < 0.0001$). The asthma management rate fell by 0.5 (from 3.7 to 3.2) per 100 encounters between 1990–91 and 1998 (8 years), and by a further 0.5 (from 3.2 to 2.7) per 100 encounters between 1998 and 2003 (5 years) suggesting an accelerating rate of decrease in the general practice asthma management rate over time.

Conclusions: These findings suggest that Australians attending general practice may be gaining better control of their asthma.

Introduction

Asthma places a significant personal and financial burden on many Australians. Increasing prevalence and severity of asthma over the past few decades led to its inclusion as a National Health Priority in August, 1999 [1]. Australian Government initiatives such as the National Asthma Action Plan 1999–2002 (NAAP) and the 3+ Visit Plan [1] aim to reduce mortality and morbidity for those with moderate to severe asthma. Improved understanding of the illness, the introduction of new asthma medications such as long-acting Beta 2 agonists and inhaled corticosteroids, and improvements in patient education materials have changed the nature of available asthma management over the past decade. Because over 80% of Australians visit a general practitioner (GP) in any given year [2], general practice is an excellent avenue for promoting and delivering these management innovations. How well the general practice patient population chooses to access and comply with the improved management strategies, and the resulting effects on prevalence and severity of asthma are currently undetermined.

A local study by Toelle et al. [3] of school children in New South Wales, found a decrease (7.0%) in prevalence of diagnosed asthma, recent wheeze (5.0%) and use of asthma medication (5.0%) between 1992 and 2002. The authors were uncertain

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how sustained or generalisable their findings might be. A similar localised study of Melbourne school children by Robertson et al. [4] found a 26.0% reduction in the 12 month period prevalence of asthma in 2002 from that reported in 1993.

The 2001 National Health Survey (a household survey) reported the population prevalence of asthma as 11.6% [5], very similar to the prevalence reported in the 1995 Survey (11.3%) and slightly higher than the 1989 Survey (8.5%). [6] In the Australian Morbidity and Treatment Survey of 1990—91 (AMTS), asthma was the third most common problem managed by Australian GPs, being managed at a rate of 3.7 per 100 encounters, accounting for 2.5% of all problems managed. Its management rate was almost three times higher than average in children, managed at a rate of 8.8 per 100 encounters and totalling 7.2% of all child problems [7]. This paper investigates national changes in prevalence and severity of asthma in patients reporting to Australian GPs between March 1999 and October 2002, and examines changes in relative rates of asthma management in general practice between April 1998 and March 2003.

Methods

This study is an independent secondary, comparative analysis of data from the Bettering the Evaluation and Care of Health (BEACH) study and from the Australian Morbidity and Treatment Survey (AMTS).

Data sources

BEACH is a paper-based collection of GP-patient encounter data, enrolling approximately 1,000 randomly sampled GPs per year. Since April 1998, around 20 GPs per week for 50 weeks of the year have recorded non patient-identifiable information from 100 consecutive consenting patients to provide national data for almost 600,000 encounters (complete methodology reported elsewhere, [8—10]). Data elements include patient age and problems managed. Problems are classified using the International Classification of Primary Care — Version 2 (ICPC-2) [11], and coded more specifically using ICPC-2 Plus [12], an extended vocabulary of terms used by Australian GPs. The focus of this study was those problems managed that were classified to the ICPC-2 rubric R96 and included terms such as 'Asthma'; 'Bronchitis; allergic'; 'Bronchitis; asthmatic'; 'Bronchitis; wheezy'; 'Disease; hyperactive airways'; 'Status asthmaticus'.

SAND (Supplementary Analysis of Nominated Data) is a separate section at the bottom of each BEACH encounter form. SAND allows investigation of aspects of the patient's health not managed at the encounter. Responses are recorded by the GP, about the patient, in conjunction with the patient. Of the 100 forms completed by each GP, the SAND section of 40 forms ask about patient risk factors. The other 60 are divided into two sets of 30 to investigate topics for supporting organisations. Each topic runs for five weeks giving an approximate sub-sample of around 3,000 patients.

The Australian Morbidity and Treatment Survey (AMTS) was a year-long national survey (1990—91) where a random sample of 495 GPs (stratified by state) each recorded details of surgery and home encounters for two periods of one week, six months apart [7]. ICPC was also used in this survey to classify the problems managed by the GPs [11].

Management rates

We used the GP/patient encounters to investigate changes in rates of asthma management between 1990 (AMTS) and 1998 (first year of BEACH), and across each year from 1998 to 2003 (fifth year of BEACH). Data from 98,796 GP/patient encounters were recorded by the 495 GPs in the AMTS. There were 502,100 GP/patient encounters recorded by 5,021 GPs nationally over the first five years of BEACH.

Prevalence rates

Four SAND sub-samples were used to estimate the prevalence and severity of asthma over time. The GPs in each of these SAND blocks provided an answer to the question ''does this patient suffer from asthma'' with 'yes/no' tick-boxed options. The prevalence rates are calculated from responses to this question (total 'yes' divided by total respondents). With their recording forms, GPs were sent printed cards containing criteria for assessing asthma severity (Figure 1). These criteria were adapted from the National Asthma Council's Asthma Management Handbook [13] and updated following publication of the most recent edition [14]. While different aspects of asthma were investigated in each of the four SAND blocks, the same two questions about asthma status and severity were repeated each time.

The four SAND sub-samples were surveyed over four different 5 week periods between March 1999 and October 2002 and together involved 15,536 patient encounters with 505 GPs. Patients for whom the GP had not answered the asthma questions were removed from the analysis, leaving a total SAND sub-sample of 15,127 patients.

Children

Severity*	Common features
Infrequent episodic	Episodes 6-8 weeks or more apart and from 1to 2 days up to 1-2 weeks duration; usually triggered by URTI or environmental allergen; attacks generally not severe; symptoms rare between attacks; normal examination and lung function except when symptomatic.
Frequent episodic	Attacks <6 weeks apart; attacks more troublesome; minimal symptoms such as exercise induces wheeze between attacks; normal examination and lung function except when symptomatic; commonly troubled through winter months only.
Persistent	Symptoms most days; nocturnal asthma > 1/wk with sleep disturbance; early morning chest tightness; exercise intolerance and spontaneous wheeze; daily use of beta2 antagonist; abnormal lung function; history of emergency room visits or hospital admissions.

Adults

Severity*	Common features
Very mild	Episodic
Mild	Occasional symptoms (up to 2/wk); exacerbations >6-8 weeks apart; normal FEV_1 when asymptomatic
Moderate	Symptoms most days; exacerbations <6-8 weeks apart which affect day-time activity and sleep; exacerbations last several days; occasional emergency room visit.
Severe	Persistent; limited activity level; nocturnal symptoms > 1/wk; frequent emergency room visits and hospital admission in past year; FEV_1 may be significantly reduced between exacerbations.

* The severity classes are adapted from the NAC Asthma Management Handbook 1998 edition, updated March 2002

Figure 1 Severity of asthma reference card.

Cluster sample design

A cluster sample design was used in both the AMTS and BEACH. The primary sampling unit was the GP, and the unit of analysis was the GP-patient encounter. All reported confidence intervals were adjusted for the design effect of the cluster sample using procedures in SAS 6.0 [15] and SAS 8.2 [16].

Results

Management

While asthma was the third most frequently managed problem in the 1990—91 AMTS [7], it averaged sixth most frequently managed problem over the five years of BEACH, having dropped to fifth place by 1999—2000 and seventh place by 2001—02. The asthma management rate at the commencement of BEACH in 1998 (3.2 per 100 encounters) was already significantly lower than that recorded in the AMTS in 1990—91 (3.7 per 100 encounters) and again decreased significantly ($p = 0.007$) from 3.2 to 2.7 contacts per 100 encounters over the five BEACH years. Most of this decrease was recorded in the one year from April 2000 (3.2 per 100 encounters) to March 2001 (2.8).

However, we found that there was no significant change in the rate of asthma management for adults, the rate persisting around 2.4 contacts per 100 encounters each year. The entire difference was due to a significant decrease in the management rate for children, from 6.4 (95% CI: 5.8-7.0) to 4.9 (95% CI: 4.4-5.4) per 100 encounters over the 5 years (Figure 2).

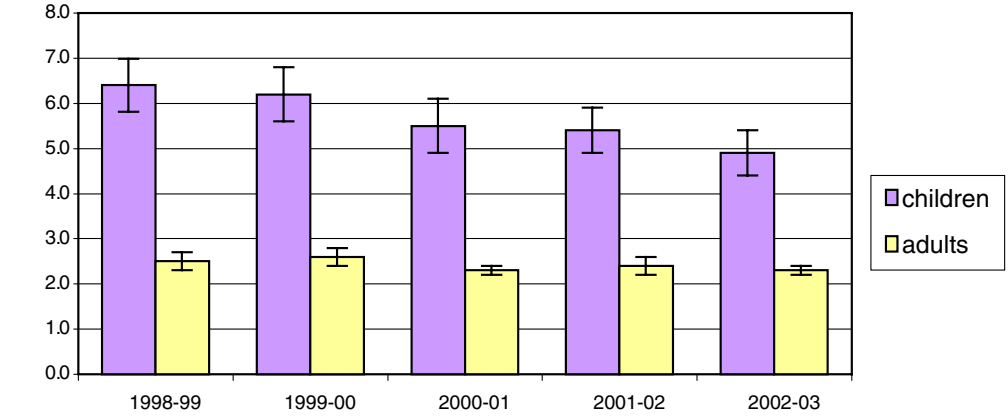
Prevalence

The results of the SAND analysis showed no significant difference in the prevalence of asthma in four separate patient sub-samples, the estimates being: 14.7%; 12.8%; 13.9% and 14.5% (Table 1).

While there was no significant change over time in prevalence within any individual age group, in all four surveys there was a trend for asthma to be more prevalent in children than in adults. The wide confidence intervals around the child prevalence rates for each survey (due to smaller numbers) rendered the results inconclusive. However, when the four sub-samples were combined, the prevalence rate was significantly higher in children (18.6%) than in adults (13.1%) (Table 1).

Severity

The severity levels were consistent over time. While there appeared to be an increasing trend in the least severe category for children (infrequent) and a decreasing trend in the frequent and



	1998-99	1999-00	2000-01	2001-02	2002-03
Children	6.4 (5.6-7.0)	6.2 (5.6-6.8)	5.4 (4.9-6.0)	5.4 (4.9-6.0)	4.9 (4.4-5.4)
Adults	2.5 (2.3-2.7)	2.6 (2.4-2.8)	2.3 (2.2-2.5)	2.4 (2.2-2.5)	2.3 (2.2-2.5)

Figure 2 Asthma management rates per 100 encounters (with 95% Confidence Intervals) — adults vs. children.

Table 1 Asthma prevalence.

	Overall		Children (< 18 years)		Adults (= 18 years)	
	Prevalence	95% CI	Prevalence	95% CI	Prevalence	95% CI
SAND 03/99 — 06/99 ($n = 4,039$)	14.7	13.3—16.1	19.6	13.6—25.6	13.7	12.2—15.1
SAND 11/00 — 01/01 ($n = 5,393$)	12.8	11.4—14.3	16.4	12.5—20.4	12.2	10.6—13.7
SAND 04/02 — 05/02 ($n = 3,027$)	13.9	12.0—15.7	19.2	12.2—26.2	12.8	10.8—14.8
SAND 09/02 — 10/02 ($n = 2,668$)	14.5	12.7—16.2	17.9	13.6—22.1	13.8	12.0—15.7
Total combined SAND sub-samples ($n = 15,127$)	14.1	13.2—14.9	18.4	16.8—20.1	13.2	12.4—14.0

persistent categories, linear trend analysis was inconclusive because of the relatively small numbers of responses to the severity section (Table 2). Therefore, no significant differences in severity levels over time were determined for either adults or children.

The severity assessment from the fourth SAND sub-study was not reported with the three earlier studies as the severity question for that SAND was applied only to patients who were taking a combination product of long-acting beta agonist and inhaled corticosteroid [17].

Table 2 Severity of asthma.

	SAND 03/99 — 06/99		SAND 11/00 — 01/01		SAND 04/02 — 05/02	
Children	($n = 143$)	95% CI	($n = 118$)	95% CI	($n = 97$)	95% CI
Infrequent	72.6	(66.2—79.0)	74.6	(66.1—83.1)	82.5	(74.2—90.7)
Frequent	22.2	(8.2—36.3)	20.3	(8.2—32.4)	15.5	(0.0—44.3)
Persistent	5.2	(0.0—49.9)	5.1	(0.0—22.1)	2.1	(0.0—45.8)
Adult	($n = 480$)	95% CI	($n = 543$)	95% CI	($n = 312$)	95% CI
Very mild	32.9	(27.7—38.2)	42.7	(37.7—47.8)	35.9	(30.5—41.3)
Mild	27.3	(21.9—32.7)	27.3	(22.8—31.7)	31.4	(27.0—35.8)
Moderate	27.7	(22.6—32.8)	24.5	(19.8—29.2)	27.2	(22.0—32.4)
Severe	7.9	(0.0—19.1)	5.5	(0.0—13.2)	5.4	(0.0—12.4)

Discussion

The overall prevalence of asthma in general practice patients remained fairly constant over the four SAND sub-studies between April 1999 and October 2002. The 2001 National Health Survey reported an estimated prevalence of 11.6% which is not significantly different to the SAND estimates [5]. However, the prevalence estimate for children reported in the 2001 National Health Survey of 13.9% was significantly lower than that of the SAND surveys. The higher SAND estimate is probably due to children in the general population having an equal chance of being surveyed regardless of their health state, while children with asthma have a higher chance of visiting their GP than children without asthma, and therefore have a higher chance of being sampled in BEACH. Severity levels have also remained constant over the SAND survey period.

The asthma management rate has decreased by 0.5 per 100 encounters. This may not seem a sizeable difference, but as there are approximately 100 million GP consultations per year across Australia, 0.5 contacts per 100 equates to around 110,000 fewer encounters per year (or over half a million fewer encounters in 2003 compared with 1998) where asthma was managed by a GP. Importantly, the rate of asthma management reported in the AMTS (3.7 per 100 encounters) [7] had decreased to 3.2 per 100 encounters by the time BEACH commenced in 1998. This is also a decrease of 0.5 per 100 contacts, the same amount of reduction in the asthma management rate over eight years (1991—1998) as occurred over the next five (1998—2003). This would suggest that the decrease in asthma management in general practice is accelerating over time.

The reason for the significant decrease in the asthma management rate is unclear. In the primary care setting, even using spirometry and airway hyper-responsiveness testing will not guarantee that GPs always correctly diagnose asthma, especially on first contact with a new patient, and some patients with COPD may be incorrectly labelled [18]. However, in this study, the decrease in rate of management of asthma is in children and COPD is predominantly a disease of older people, often smokers. Unless a child has a coexisting illness such as cystic fibrosis, COPD is unlikely. If there are mistakes in original diagnosis, it is also reasonable to assume that the present level of error would not differ from that of five years previously, so this is an unlikely explanation for the decrease.

Since the mid 1990s bronchodilators have become increasingly available for over-the-counter purchase. At the same time, the number of GPs who bulk-bill for patients has declined and many have commenced up-front charges for consultations. There is room to speculate that patients, faced with finding the time to visit a GP and the expense of an up-front cash payment, may be simply buying their bronchodilators from the local pharmacy and relieving the symptoms as required rather than seeking long term preventive help from their GP. Both Robertson [4] and Teolle [3] reported a decrease in the rate of asthma medication use among school students in their respective studies. However, while the BEACH data supports the reduction in GP prescribed bronchodilators over the five years, from 3.7 (95% CI: 3.5-4.0) to 2.5 (2.2-2.7) per 100 encounters, there was no significant difference in the rate of prescribed preventive medications (2.2, 95% CI: 2.1-2.4 to 2.0, 95% CI: 1.9-2.2) [19].

The most hopeful reason for the decrease in asthma management by GPs is that patients are in better control of their asthma. Another SAND sub-study in early 2001 investigated the use of written asthma plans among general practice patients and found that only 39.4% of children and 27.1% of adults had an action or management plan. However, the majority of users were in the persistent (children) or severe (adults) asthma severity categories [20]. While these figures suggest that the written plans are underutilised, their use by those who most need them may still be having a positive effect on overall management rates. The management rate decrease has levelled off since the introduction of the 3+ visit plan. GPs attending the 2004 International Primary Care Respiratory Conference commented that it is difficult to get patients to return for the third (final) planned visit, because they are generally well by this stage. From other evidence we know that the mortality rate from asthma has decreased [21], and that there has been no increase in hospital admissions or in length of stay for asthma [21]. Asthma is also a major cause of emergency department attendance [1], and this is a little more difficult to assess. The Emergency Department (ED) database has less than 100% coverage. Currently only NSW and Victoria collect ED attendance data with a diagnosis attached and even in these states coverage is not complete so their results will be an under-estimate of the true ED attendance rate. However, the statistics that are available do not show any real changes — the rate of attendance for asthma seems to have remained constant between January 1998 and January 2003 [21].

The prevalence and severity of asthma seem to have remained steady over the past five years, but only time can confirm whether the reduction in the

attendance rate at general practices for asthma management is good news.

Statement(s) of conflict of interest

This article was researched, analysed and written as an independent analysis of data from the Bettering the Evaluation and Care of Health (BEACH) study and of the Australian Morbidity and Treatment Survey (AMTS). There was no conflict of interest for the authors in the preparation of this article.

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References

[1] Commonwealth Department of Health and Ageing (DoHA). National health priorities & quality: Asthma. 2002 [cited 2004 Feb 26]. Available from www.health.gov.au/pq/asthma/.

[2] Commonwealth Department of Health and Aged Care (DHAC) General practice in Australia: 1996, Introduction. Canberra: DHAC, 1996. P.xxviii.

[3] Toelle BG, Ng K, Belousova E, Salome CM, Peat JK, Marks GB. Prevalence of asthma and allergy in schoolchildren in Belmont, Australia: three cross sectional surveys over 20 years. BMJ 2004 Feb 14;328:386—7.

[4] Robertson CF, Roberts MF, Kappers JH. Asthma prevalence in Melbourne schoolchildren: have we reached the peak? Med J Aust (Rapid online publication) 2003 Dec 15 [cited 2004 Feb 11]. Available from http://www.mja.com.au/public/rop/robertson/rob10446_fm.html.

[5] Australian Bureau of Statistics. 2001 National Health Survey: summary of results. Canberra: Australian Bureau of Statistics; 2002 [cited 2004 Feb 26]. Available from http://ww.abs.gov.au/Ausstats/abs@.nsf/0/cac1a34167e36be3ca2568a900139364?OpenDocument.

[6] Australian Bureau of Statistics. National Health Survey: Asthma and other respiratory conditions, Australia. Summary of results. 1998 [cited 2004 Feb 27]. Available from http://www.abs.gov.au/Ausstats/abs@nsf/0/d3ffec910919f2b5ca2568a9001393b1?OpenDocument.

[7] Bridges-Webb C, Britt H, Miles DA, Neary S, Charles J, Traynor V. Morbidity and treatment in general practice in Australia 1990—91. Med J Aust 1992;157:S1—S56.

[8] Britt H, Sayer GP, Miller GC, Charles J, Scahill S, Horn F. et al. BEACH Bettering the Evaluation and Care of Health: A study of general practice activity, six-month interim report. AIHW Cat. No. GEP 1. Canberra: Australian Institute of Health and Welfare. 1999. p.7—10. Also available at http://www.aihw.gov.au/publications/health/beach-sgpa/index.html

[9] Britt H, Miller GC, Charles J, Knox S, Sayer GP, Valenti L. et al. General practice activity in Australia 1999—2000. AIHW Cat. No. GEP 5. Canberra: Australian Institute of Health and Welfare. 2000. p. 4—10.

[10] Britt H, Miller GC, Knox S, Charles J, Valenti L, Henderson J. et al. General practice activity in Australia 2000—2001. AIHW Cat. No. GEP 8 Canberra: Australian Institute of Health and Welfare. 2001. p. 2—7.

[11] Classification Committee of the World Health Organization of Family Doctors (WICC) ICPC-2: International Classification of Primary Care. 2nd ed. Oxford: Oxford University Press; 1998.

[12] Britt H. A new coding tool for computerised clinical systems in primary care — ICPC Plus [see comments]. Aust Fam Physician 1997;23(Suppl 2):S79—82.

[13] National Asthma Council. Asthma management handbook. 1998 ed. Melbourne: National Asthma Council; 1998. [cited 8/2/99]. Available at http://www.nationalasthma.org.au/publications/amh/map.htm

[14] National Asthma Council. Asthma management handbook. 2002 ed. Melbourne: National Asthma Council; 2002. [cited 21/1/02]. Available at http://www.nationalasthma.org.au/publications/amh/map.htm

[15] SAS Institute Inc 1996. SAS Proprietary Software Release 6.12. Cary: SAS Institute.

[16] SAS Institute Inc 2001. SAS Proprietary Software Release 8.2. Cary: SAS Institute.

[17] AIHW GP Statistics and Classification Unit, University of Sydney. Asthma prevalence and management. Bayram C, editor. Sand abstracts from the BEACH program No. 48. 2003. URL: http://pandora.nla.gov.au/tep/14007.

[18] Sutherland ER, Martin RJ. Airway inflammation in chronic obstructive pulmonary disease: comparisons with asthma. J Allergy Clin Immunol 2003;112(5):819—27.

[19] Britt H, Miller GC, Knox S, Charles J, Valenti L, Henderson J. et al. General practice activity in Australia 2002—03. AIHW Cat. No. GEP 14. Canberra: Australian Institute of Health and Welfare; 2003. p. 191.

[20] AIHW GP Statistics and Classification Unit. Asthma — prevalence, severity and management. 2001. Pay Y, (ed). Sydney: University of Sydney, SAND abstracts form the BEACH program No.22. URL: http:pandora.nla.gov.au/tep/14007.

[21] Australian Centre for Asthma Monitoring 2003. Asthma in Australia. AIHW Cat. No. ACM 1. Canberra: AIHW; 2003. p. 87—105.