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# Impact of structured education and self management on rural asthma outcomes

## Background

This study trialled the outcome for asthma patients of a brief, nurse led, patient education session with general practice review of an Asthma Action Plan.

## Methods

Prospective cohort with before-after measures conducted in six rural general practices. Outcome measures were changes over 12 months in self reported asthma control, quality of life, device use, and unscheduled general practice and emergency department visits for asthma exacerbation.

## Results

Eighty-three patients participated. Mean asthma control score decreased but did not reach statistical significance ( $p=0.124$ ). Quality of life improved for adults (Wilcoxon rank signed test for two related samples  $p<0.001$ ). The proportion of patients who had one or more unscheduled visits to their general practitioner over 12 months decreased from 23% to 13% ( $p=0.178$ ) and emergency department presentations decreased from 9% to 4% ( $p=0.102$ ).

## Discussion

Structured general practice based education appears to be an effective preventive health care program, with the potential to reduce expensive unscheduled use of health services.

**Keywords:** asthma; respiratory tract diseases, patient education as a topic; education, health (to lay people), office/practice nursing; nursing



Asthma is an important health priority affecting around 11% of the population.<sup>1</sup> The majority of patients with asthma seen in general practice are reported to have uncontrolled symptoms<sup>2</sup> and poor knowledge and skills in their asthma management, medication use and device technique.<sup>3</sup>

Current evidence is inadequate to identify which strategies are most effective in improving control over asthma symptoms. Systematic reviews demonstrate that education programs that provide only general information<sup>4</sup> or only a written Asthma Action Plan<sup>5</sup> are ineffective. Interventions shown to be effective include self management education that incorporates a symptom based Asthma Action Plan with or without regular medical review.<sup>6,7</sup> However, these reviews are based on studies that implement educational interventions which vary from several hours over 6–10 weeks to a single group session. A 2002 Cochrane review (updated in 2009) proposed that, 'the question remains then, how best to manage [asthma] patients in primary care, in organised asthma clinics, in normal surgery time with planned follow up, or opportunistically on an acute basis'.<sup>8</sup> A 2009 review on asthma education for children concluded: 'it remains unclear as to what type, duration and intensity of educational packages are the most effective in reducing acute care utilization'.<sup>9</sup>

In 2007, the authors formed a multidisciplinary team to design and trial a practical, comprehensive asthma education intervention which included Asthma Action Plans to be delivered by general practice teams as part of their regular care.

## Methods

The study design was a prospective cohort with before-after measures. This design is appropriate for evaluating the possible benefit of an intervention that has several components.<sup>10</sup> Although this design is biased in favour of finding a benefit, the results are meaningful because if no benefit is found a stronger study design is not warranted.

Six general practices were recruited with the assistance of the Midwest GP Network. Patients eligible for inclusion were males and females aged 7 years and older with a previous diagnosis of asthma made more than 12 months before recruitment and currently prescribed asthma medication (eg. reliever, preventer, symptom controller and/or combination medication). Patients were excluded if they had a severe respiratory comorbidity, or a mental disability or psychotic illness consistent with an inability to give informed consent. Other comorbidities were permitted as these were considered to have minimal impact on asthma education and measures.

Practices identified eligible patients through their medical records and contacted patients to invite them to participate. Bookings for the general practitioner visit, assessment and education session were made by the practice.

The intervention included a session delivered by practice nurses employed at the participating practices or an asthma educator who already had an arrangement with the GP to provide asthma education. All the nurses were accredited asthma educators. Before participating in the study they were given refresher training from a respiratory nurse educator and received

documentation to guide their delivery of the patient education sessions.

The intervention consisted of a single, nurse led, patient education session that lasted approximately 20 minutes and incorporated information on the pathophysiology of asthma; asthma signs and symptoms; trigger factors; education in the use of medications and importance of preventer adherence; assessment and training in correct device technique; the four step emergency plan; and advice on exercise induced asthma and smoking cessation when relevant. An Asthma Action Plan tailored to their medication and symptoms was completed in collaboration with each patient. This was reviewed by the GP in a consult following the education session.

The education sessions and the completion of Asthma Action Plans were conducted in spring 2007. Patients were invited back in spring 2008 for another education session, Asthma Action Plan review and to repeat a questionnaire. All patients gave informed consent for the questionnaire, educational sessions and access to medical records at their general practice and local hospital. General practitioners and practice nurses were interviewed about usual practice in providing asthma education and Asthma Action Plans.

Ethical approval was granted by the University of Western Australia Human Research Ethics Committee.

## Measurement and analysis

A combination of medical and self reported records verified the outcome measures. A self completed questionnaire administered before the education session and repeated after 12 months included information on medication use and internationally validated instruments of asthma control<sup>11</sup> and quality of life.<sup>12</sup> The medical records at general practices provided information on previous Asthma Action Plans and asthma related general practice visits (including reviews and exacerbation of symptoms). Hospital emergency department (ED) records were searched for presentations for asthma exacerbations. All measures were collected for 12 months before and after the education session.

The Asthma Control Questionnaire<sup>11</sup> has six items related to symptom severity; each item has

a range from 0 = no to 6 = severe symptom. The asthma control score is the sum of all six items. The Adult Asthma Quality of Life Questionnaire<sup>12</sup> has 15 items and the paediatric scale has 13 items. Each item refers to the past 2 weeks and has a severity scale ranging from 1 = severe to 7 = no symptom.

The means or portions of variables with 95% confidence intervals were calculated at baseline for the original sample and respondents retained at 12 months to show the effects of attrition. The level and significance of changes in the variables were measured using the nonparametric Wilcoxon signed rank test. All analysis was done using SPSS 17.0.

## Results

Of the six practices, three had a stated existing policy of annual referral for all patients with asthma to a practice nurse for asthma education. During the study one of these practices discovered their recall system was faulty. The other three practices reported ad hoc arrangements in which patients who were in need of education were referred to either a trained practice nurse or local asthma educator. Four practices reported that Asthma Action Plans were prepared 'most' of the time, the other two practices prepared these 'sometimes'.

Eighty-three patients were recruited in this prospective study, with ages ranging from 7–82 years. One-quarter of the patients were under 16 years of age, 63% were female and 14% had smoked in the last year. Self reported daily use of preventer medication was 58% and 11% used a home peak flow monitor. Thirty-three percent used metered dose inhalers (MDIs) or dry powder inhalers (DPIs) alone, while 55% used a spacer device with their inhaler. The remaining patients reported no inhaler use. All patients were taught the use of inhalers and spacers during the education session.

A medical record audit indicated that in the preceding 12 months only 11% of patients had an Asthma Action Plan created or reviewed, 19% had a general practice visit that included a review of their asthma (not for exacerbation or prescription renewal), 17% had documentation of asthma education provided by a nurse or asthma educator and only 4% had documentation of asthma education provided by the GP.

Six patients moved out of the region before follow up and were eliminated from comparisons.

Of those remaining, 55 patients (71%) attended the repeat education session and completed the follow up questionnaire approximately 1 year later. Paediatric patients were more likely to have left town (15 vs. 5% of adults).

*Table 1* shows the means and 95% confidence intervals before the education session for all patients and for those available for follow up. There were no differences in the mean values for any indicator, suggesting that loss to follow up was not associated with asthma severity or management, although there were trends for those who moved to have poorer asthma control and more unscheduled general practice visits.

*Table 2* shows the paired differences before and after the intervention. There was no change in the number of visits to a GP involving an asthma review (in absence of asthma exacerbation) but a statistically significant increase in self reported use of a spacer with an MDI. The mean asthma control score improved but was not statistically significant. Adults' perception of their asthma related quality of life improved markedly.

The proportion of patients with unscheduled health care presentations decreased but the changes were not statistically significant. The proportion of patients who had one or more unscheduled visits to their GP for exacerbated asthma over 12 months decreased from 23% to 13% and presentations to an ED for asthma exacerbations decreased from 9% to 4%.

Data from our pilot study indicates that the education session and Asthma Action Plan review may have reduced the number of asthma related hospital presentations from nine to four per 100 patients. The midwest region has an estimated 4500 people with asthma. Assuming half (2250 people) had uncontrolled asthma that could benefit from improved management and participate in this intervention, there may be 112 fewer ED presentations per year (90 compared to 202 at the reduced rate) or a saving of \$168 000 at an estimated \$1500 per presentation.

## Discussion

A strength of this intervention is that it has been designed to be implemented in general practice, drawing on existing teams of GPs and practice nurses. Most asthma education

interventions have been initiated by hospitals directed towards patients who present at EDs or are admitted. Targeting the larger population of people with asthma who do not necessarily have frequent exacerbations increases the potential

impact, as all of them are at risk of experiencing exacerbations in the future, albeit at lower rates.

Primary care plays a major role in asthma education and there are many programs in Australia and elsewhere to encourage the use of

Asthma Actions Plans, asthma clinics and asthma reviews in general practice.<sup>13</sup> However, this study confirms other findings that GPs consistently overreport their use of Asthma Action Plans and patient education.<sup>2,14,15</sup> Documentation of these activities was less common than suggested by the GPs when they described their usual practice. General practice initiated asthma review and education processes are currently capturing only a small percentage of all patients with asthma. The international evidence is that only 30–40% of patients referred to asthma education sessions actually attend.<sup>8</sup> The former Asthma 3+ Visit Plan in Australian general practice was abandoned because three visits were found to be unrealistic.<sup>16,17</sup>

Several studies have reported the barriers to the optimal use of Asthma Action Plans that GPs identify.<sup>14,18–20</sup> This cohort study of a single asthma education session delivered in the patients' regular general practice and involving their GP and practice nurse suggests brief education sessions result in better use of devices, improved quality of life and possible reductions in general practice visits and ED presentations for exacerbations of asthma. This package of care is likely to be more acceptable to GPs and patients than more numerous visits.

The study may be affected by a number of biases. Practices may have invited patients with poorer asthma control or those who were more likely to benefit from an education session and these patients may have been more likely to agree to participate. These patients may have therefore been more likely to improve with any intervention. Environmental triggers for asthma may have decreased coincidentally following the intervention and the process of being involved in the study itself may have been therapeutic. These limitations would be addressed through a randomised control trial (RCT) and the positive findings of this study indicate that an RCT is warranted.

## Conclusion

Despite a large body of research on the importance of asthma self management, we still lack evidence to guide policy in terms of 'who, where and how' asthma patient education should be delivered to maximise benefits to those with asthma and to the health system.<sup>4–7,21</sup> The

**Table 1. Baseline measures of asthma management, asthma control, quality of life, and health care utilisation – all patients recruited and patients retained in the sample**

	All patients		Patients retained in study	
	N	Mean/proportion (95% CI)	N	Mean/proportion (95% CI)
General practice asthma review visits (range 0–2)*	83	0.30 (0.14–0.46)	77	0.32 (0.15–0.50)
Use of spacers (proportion)**	83	0.55 (0.44–0.66)	55	0.56 (0.43–0.69)
Asthma control questionnaire**	83	8.1 (6.9–9.4)	55	7.2 (5.7–8.6)
Asthma quality of life **				
Paediatric	21	6.1 (5.8–6.4)	12	6.1 (5.7–6.5)
Adult	62	4.7 (4.4–5.0)	43	4.8 (4.4–5.1)
At least one unscheduled general practice visit for asthma exacerbation (proportion)*	83	0.27 (0.17–0.37)	77	0.23 (0.14–0.33)
At least one emergency department presentation for asthma exacerbation (proportion)*	82	0.09 (0.03–0.16)	77	0.09 (0.03–0.16)

\* Retained samples include only patients not known to have moved from the area between the intervention and follow up period

\*\* Retained samples include only patients who attended the follow up session 12 months after the intervention and not known to have moved from the area

**Table 2. Before and after differences in asthma management, asthma control, quality of life, and health care utilisation – paired tests of difference**

	N	Difference in paired means/proportions (before-after)	Wilcoxon signed rank test Z score (p value)
General practice asthma review visits (range 0–2)	77	0.39	–0.401 (0.688)
Use of spacers (proportion)	55	–0.127	–2.111 (0.035)
Asthma control questionnaire	55	0.982	–1.530 (0.124)
Asthma quality of life			
Paediatric	12	–0.192	–0.401 (0.688)
Adult	43	–0.550	–2.664 (0.008)
Unscheduled GP visit for asthma exacerbation (proportion)	77	0.019	–1.347 (0.178)
Emergency department presentation for asthma exacerbation (proportion)	77	0.052	–1.633 (0.102)

number of general practice patient encounters related to asthma has been declining in Australia.<sup>13</sup> This may be due to a number of factors including over-the-counter availability of bronchodilators and the successful uptake of combination medications. However, it may also reflect a reluctance in patients and GPs to have regular reviews without a change in symptoms.

The Asthma Cycle of Care item on the Medicare Benefits Schedule requires two general practice visits a year for asthma management and review. Very few of our participants had an asthma related general practice visit other than for prescription renewal in the year preceding or following the intervention and would not have been eligible for an Asthma Cycle of Care payment. Our study suggests that two visits may be unnecessary.

Our intervention, consisting of a single session, brought significant advantages and suggests that optimal management of patients with previously diagnosed asthma could be one annual self management education session and Asthma Action Plan review plus other visits as required to manage worsening symptoms.

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