

# Impact of the Singapore National Asthma Program (SNAP) on Preventor-Reliever Prescription Ratio in Polyclinics

Phui Nah Chong,<sup>1</sup>MBBS, MMed (Fam Med), FCFP (S), Ngiap Chuan Tan,<sup>2</sup>MBBS, MMed (Fam Med), FCFP (S), Tow Keang Lim,<sup>3</sup>MBBS, MMed (IM), FRCP

## Abstract

**Introduction:** The Singapore National Asthma Program (SNAP) was launched in 2001 to address the high burden of asthma in Singapore. One component of the SNAP was directed at improving asthma control in the community by promoting preventive treatment with inhaled corticosteroids. This paper describes the program on prescription patterns of preventor and reliever medication for asthma in the polyclinics. **Materials and Methods:** We monitored the prescription pattern for asthma as the preventor-reliever (PR) drug ratio. The PR ratio was employed both as a positive feedback tool and as a key performance indicator (KPI) for the program. Individual clinics were encouraged to implement locally relevant and effective initiatives to increase the KPI and facilitate this process. The different methods included chronic care models, multidisciplinary teams, enhanced primary care clinics, pre-counselling screening, decision support tools, self-management support, a patient information system and community education. **Results:** In the course of the program, the case load for asthma in the polyclinics increased by 31%. During the same period, the average PR ratio increased significantly from 0.68 to 1.80 ( $P < 0.001$ ). **Conclusions:** A simple audit and positive feedback program based on PR ratios, accompanied by sustained local quality improvement cycles has been associated with a significant shift in the drug treatment of asthma away from episodic quick relief medication towards long-term daily preventive treatment with inhaled steroids in polyclinics.

Ann Acad Med Singapore 2008;37:114-7

**Key words:** Education, Inhaled steroids

*“One person with belief is equal to a force of 99 who have only interests.”*

John Stuart Mill c1860s

## Introduction

According to the World Health Organization/Global Initiative on Asthma (WHO/GINA) report on the global burden of asthma, Singapore is an intermediate-risk country for asthma prevalence, which is about 5% of the population. But has one of the highest rates of asthma deaths in the world.<sup>1</sup> Since asthma deaths are, for the most part, preventable with appropriate treatment, this suggests that the management of asthma in Singapore may be improved. The Singapore National Asthma Program (SNAP) was launched in 2001 to address the high burden of asthma in Singapore. The main objective of the SNAP is to lessen the

burden of asthma to individuals and society. We hope to improve the control of asthma by promoting self-management and the use of anti-inflammatory medication.<sup>2</sup>

One component of the SNAP was directed at improving asthma control in the community by promoting better long-term preventive treatment with inhaled corticosteroids. This paper describes the methodology and the result of the program on drug prescription patterns for asthma in the polyclinics.

## Materials and Methods

### Rationale

The SNAP was primarily funded by a Health Services Development Program (HSDP) grant from the Ministry of Health which focused on the specialist outpatient clinics of government hospitals. Polyclinics in Singapore are managed

<sup>1</sup> Chairperson, NHGP Asthma Committee, National Healthcare Group Polyclinics, Singapore

<sup>2</sup> Chairperson, SHP Asthma Workgroup, Singapore

<sup>3</sup> Department of Respiratory & Critical Care Medicine, National University Hospital, Singapore and Chair Singapore National Asthma Program, Singapore  
Address for Correspondence: Dr Lim Tow Keang, Department of Medicine, National University Hospital, 5 Lower Kent Ridge Road, Singapore 119074.  
Email: mdclimtk@nus.edu.sg

separately by the National Healthcare Group and SingHealth Polyclinics. We only assigned one full-time case manager per polyclinic cluster. As a result of this resource constraint, we designed a low-intensity intervention program to promote the preventive treatment for asthma using a continuous audit of drug prescriptions for asthma.

### Methodology

We audited the prescription patterns for all patients with asthma at each clinic visit in the polyclinics. All patients who were diagnosed clinically as having asthma by the attending physician were enrolled.<sup>1</sup> We expressed the prescription pattern for asthma as the preventor-reliever (PR) drug ratio and calculated this index for each clinic on a monthly basis. We evaluated the prescription of inhaled medication for asthma as the number of units of metered dose inhalers prescribed with corticosteroids as preventors (e.g., beclomethasone budesonide, fluticasone) and short-acting beta agonist as relievers (e.g., salbutamol). The PR ratio was calculated per patient for each clinic visit, the average value each month was then collated for each clinic and for the whole program. Every month, the doctors and nurse educators of each clinic were updated via email of the average PR ratio for their own clinics and the average PR ratio of the whole cluster. The PR ratio was employed both as a positive feedback tool and as a key performance indicator (KPI) for each clinic and for the program as a whole. We did not indicate any target for the PR ratio since the method with which we calculated this index has not previously been validated to correlate with asthma outcomes.

The 2 polyclinic clusters and individual clinics were encouraged to implement locally relevant and effective initiatives to increase their PR ratios. The asthma care initiatives for the program as a whole and individual actions undertaken by each polyclinic cluster are summarised in Tables 1 to 4.

Table 1. Asthma Program Initiatives in Both Polyclinic Clusters

Actions	Commencement
Recognising asthma as a chronic illness	last quarter 2001
Audit of PR ratios in asthmatics	last quarter 2001
Declaration of PR ratios as KPIs	last quarter 2001
Establishment of asthma care teams	early 2002
Differential labelling of preventor vs reliever drugs*	2003
Utilisation of physician, nurse and patient support tools†	late 2003

PR: preventor-reliever; KPI: key performance indicator

\* Preventors: "To be taken daily" vs "Relievers: "To be taken as needed only"  
Preventor drugs had an additional sticker "Daily use of preventors save lives"

† Asthma flip charts, Asthma video clips, Asthma Diary cards, Traffic Light style action plans

### Statistical Analysis

The average PR ratios were collated for each of the 18 polyclinics on a monthly basis. The results were expressed as mean  $\pm$  standard error (SE) values for each clinic, each cluster and for the program as a whole. Continuous variables were compared with unpaired Student's *t*-tests (SPSS version 13.0 for windows software; Chicago, IL). The increasing trend for the average monthly PR ratio for the whole program was tested using both the chi-square trend analysis and the Pearson's correlation. A *P* value of <0.05 was considered statistically significant. We were advised by our institutional review board that this was a quality improvement project which does not require formal ethical review.

Table 2. Asthma Program in National Healthcare Group Polyclinics

Actions	Commencement
Implementation of Enhanced Asthma Program	Late 2001
Establishment of Clinic Asthma Management Teams	2002
Deployment of Asthma Risk Stratification Stamp	2004

(see Table 4)

Table 3. Asthma Program in Singhealth Polyclinics

Actions	Commencement
Establishment of an Asthma Workgroup	Late 2001
Employment of a Chronic Care Model in asthma	Late 2001
Establishment of a care quality director for asthma	Late 2001
Deployment of "asthma champions"	2002
Implementation of Enhanced Primary Care Asthma Clinics	2003

Table 4. National Healthcare Group Polyclinics Asthma Risk Stratification

Category	Low-risk	High-risk
Day symptoms "Have you had your usual asthma symptoms in the day in the last month?" (Cough, chest tightness, breathlessness, wheezing or difficulty exercising)	No	Yes
Night symptoms "Have you had difficulty sleeping because of your asthma symptoms in the last month (including cough)?"	No	Yes
Physical activities affected "Has your asthma interfered with your usual activities in the last month (e.g. housework, work, school, etc)?"	No	Yes
Emergency room (ER) visit for asthma in the last 6 months	No	Yes
Hospital admission within past 1 year	No	Yes

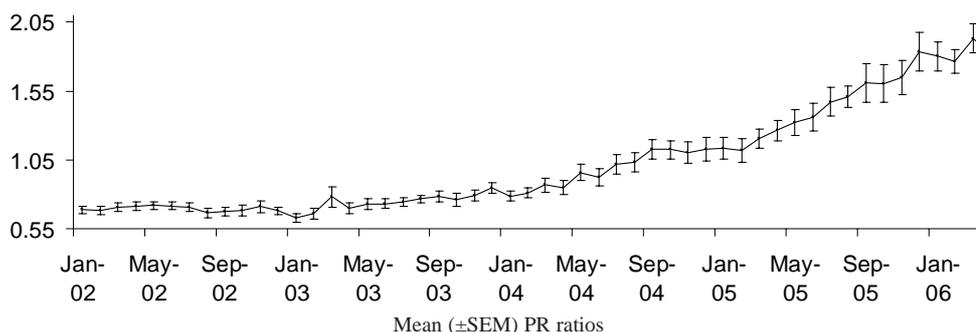


Fig. 1. Trend of preventor-reliever (PR) drug ratios for polyclinics.

## Results

In the course of the program, from the first quarter of 2002 to the first quarter of 2006, the case load for asthma in the polyclinics increased by 31% (from an average of 4692 patients per month to 6170 patients per month). During the same period there was a clear change in the prescription pattern for asthma (Fig. 1). This is reflected in the mean PR ratio which increased significantly from 0.68 ( $\pm$  SEM 0.03) to 1.80 ( $\pm$  SEM 0.09). While there were variations between individual clinics in the absolute values and trends, by early 2006, all clinics showed increase of the PR ratios to above 1.50.

As the program proceeded, we note an increase in the variation of PR ratios between clinics, this is reflected in the wider SEM values after 2004 (Fig. 1). This is related to varying intensities with which different clinics implemented their asthma programs. In general clinics with more proactive and enthusiastic asthma champions recorded faster and bigger rise in PR ratios.

## Discussion

We have described the successful implementation of a low-cost intervention program on the prescribing habits of doctors in asthma care in polyclinics. It was characterised by low-intensity but sustained education of healthcare workers and employment of small-scale, local continuous quality improvement projects. The key elements were visible support from senior management, simple explicit goals, growth of core groups of asthma teams, local ownership of solutions, personal efforts of individual asthma champions, long-term and sustained efforts for change of prescribing habits and changes in the mind set among healthcare workers and patients about how asthma is best managed.

Following implementation of this program, observed visible changes in asthma care in the polyclinics include: management of asthma as a chronic illness which require daily preventive medication, regular physician reviews, focus on education and skills to achieve control and

prevention of attacks with inhaled steroids rather than managing asthma as an episodic illness needing occasional quick relieve medication. There was also more widespread implemented of self management plans especially asthma action plans.

One notable feature of this program is its long time frame. This was partly by design since we did not have not adequate resources for a high-intensity program and thus had to resort to a low-intensity, long-term project. This was further complicated, in the first half of 2003, by the outbreak of the severe acute respiratory syndrome (SARS) which severely disrupted our healthcare services and educational programs. However, it is a challenge to try and effect real change in doctors' practising habits. This is an endeavour in which effective action is not firmly based upon clinical evidence, and thus, may take considerable time and effort.<sup>3-5</sup>

This report has several limitations. It is a descriptive study of the results of implementing an asthma program on a process of care. There is no control group; thus, the authors cannot be certain that the changes observed were not secular trends which would have occurred anyway. We think this is unlikely for the following reasons: in early 2003 there was a decline in the PR ratio (Fig. 1), this occurred during the SARS outbreak when our program was suspended for about 6 months. The PR ratios increased more rapidly whenever local teams were more proactive and introduced specific improvement projects. We also noted individual asthma champions who were able to elevate the PR ratios at the different clinics to which they were posted.

A number of different interventions and action steps were undertaken in parallel and/or in series. Without a control group and experimental design, we were unable to determine which, if any, were the most effective. Thus, we cannot give any specific recommendations beyond the application of the PR ratio as a KPI. It is likely that most locally relevant, focused, team based interventions with clear short- and long-term targets will have some cumulative impact.

The PR ratio is an indicator of prescribing habits and has no direct implication on the burden of asthma in our patients. However, a very similar index has been shown, in the primary care setting, to be associated with both healthcare utilisation and patient specific outcomes in American health management groups.<sup>6-8</sup> Furthermore, we have shown temporal association between increased sales of inhaled steroids with reduction in asthma burden in Singapore over the past decade.<sup>9</sup> And our results are also consistent with those reported by Dr Haahtela in Finland and in other large scale audits in primary care in the UK and among children in the US.<sup>10-12</sup> Nevertheless, in the next phases of the SNAP, we will be evaluating the control of asthma in individual patients to ensure that the improved prescribing habits have been translated into better patient outcomes.

We conclude that a simple audit and positive feedback program based on PR ratios and accompanied by sustained local quality improvement cycles may be associated with a significant shift in the treatment of asthma away from episodic quick relief medication towards long-term daily preventive treatment with inhaled steroids in polyclinics. Further studies are indicated to identify the more effective intervention steps and the impact on asthma control and burden of disease in individual patients.

#### **Acknowledgements**

*We would like to express our appreciation for the support rendered by the senior management of both NHGP and SHP, in particular, the CEOs and for the efforts of all the asthma teams and advocates in both polyclinic clusters and our colleagues in the SNAP who contributed to the various initiatives with their own ideas, time and efforts. The program was funded by the Ministry of Health's HSDP 01 X05 Optimizing High Risk Asthma Management.*

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