

Asthma Prescribing Practices of Government and Private Doctors in Malaysia - A Nationwide Questionnaire Survey

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SUMMARY A self-answered, anonymously completed questionnaire survey was performed between June 2002 and May 2003 where doctors from government and private sectors in Malaysia were invited to participate by post or during medical meetings. One hundred and sixteen government doctors and 110 private doctors provided satisfactorily completed questionnaires (effective respondent rate: 30.1%). The most preferred medications for 'first-line', 'second-line' and 'third-line' treatment were for government doctors: inhaled short-acting β_2 -agonist (SABA) (98%), inhaled corticosteroids (CS) (75%), and leukotriene antagonist (52%); and for private doctors: oral SABA (81%), inhaled CS (68%), and oral CS (58%). The first choice inhaler device for most government and private doctors were metered dose inhalers, with cost and personal preferences (for private doctors), and technical ability (for government doctors) as the key considerations when deciding on the choice of device. This benchmark data on the asthma prescribing practices of a healthcare delivery system fully dichotomized into government and private sector, provides evidence for practice differences affected by the nature of the healthcare system, and might have implications on healthcare systems of other countries that share similarities with that of Malaysia.

In recent years, the treatment of asthma has undergone a paradigm shift with increased emphasis in the early use of inhaled corticosteroids (ICS)^{1,2} and better recognition of the roles of long-acting β_2 -agonists (LABA)^{3,4} and leukotriene receptor antagonist (LTRA).^{5,6} These changes are regularly updated in international and national clinical practice guidelines (CPGs) to enable practicing clinicians and healthcare providers to keep abreast with the latest recommendations for asthma management.^{7,8} In Malaysia, the national CPGs for treating adult and children with asthma are produced since 1996 and are communicated to healthcare professionals in medical talks and conferences organized by the Ministry of Health Malaysia and societies such as the Malaysian Thoracic Society.

It is well known that factors influencing the prescribing practices are complex and information alone does not always produce change.⁹⁻¹¹ The issues affecting prescribing practices are even greater when comparing government with private medical healthcare professionals where the medical cost and the nature of practice vary substantially. Such differences are also obviously dependent on the type of policies that govern the practice of government and private healthcare in different countries or regions.

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Currently, the healthcare delivery in Malaysia is dichotomized into those of government and private sectors where government healthcare is being fully financed by the Ministry of Health Malaysia whilst cost of private healthcare is entirely borne by patients or private medical insurances. Currently, another important aspect of private medical healthcare in Malaysia is that doctors have dispensing rights and therefore profit from drug selling can influence prescribing practices.

While many studies have addressed the prescribing patterns in various doctor groups or doctors in general,¹²⁻¹⁵ none, to our knowledge, had compared the asthma prescribing practices between government and private doctors whether in Malaysia or in other countries. In the face of the current increasing trend in global asthma morbidity and mortality,⁷ attempts to understand the prescribing patterns among government and private doctors may shed light on the way asthma is being treated by healthcare professionals, on whether they are appropriate or showing lack in some aspects, and on factors that influences practices one way or the other. It is hoped that from here, relevant questions can be raised and important problems, if present, be appropriately addressed.

The objectives of our nationwide survey study were two-fold: First, to examine the prescribing patterns among government and private doctors in Malaysia; and second, to investigate, as encountered by doctors surveyed, patients' perception on the use of inhaler and inhaled corticosteroids (CS). The latter is pertinent for this study because of its possible influence on prescribing preferences.

SUBJECTS AND METHODS

The survey method

A self-completed questionnaire form was first validated with 10 clinicians who regularly treat asthmatic patients (5 hospital-based and 5 community-based) for clarity and the appropriateness of questions and answers provided. Copies were then sent (A) by post to individual doctors randomly selected from a list of doctor names (every first 10 names from every page) registered with the Malaysian Medical Association (n = 350) (For logistic reasons, no attempt was

made to pre-select physicians only) and to all doctors registered with the Malaysian Thoracic Society (n = 102); (B) by hand or post to heads or representatives of Respiratory Units in 8 government hospitals in Malaysia (Institute of Respiratory Medicine, Hospital Kuala Lumpur, University Malaya Medical Centre, Hospital University Kebangsaan Malaysia, Hospital Selayang, Hospital Kuala Terenggaru, Hospital Alor Setar, and Hospital Seremban) (n = 212), and (C) by hand to delegates in two pharmaceutical firm-sponsored asthma seminars for specialists and general practitioners (n = 86).

A total of 750 copies were distributed with the anticipated one-third response rate (250 returned questionnaires), resulting in a final analyzable sample consisting of at least 100 government and 100 private doctors. All questionnaires were distributed once with no formal follow-up reminders of any form and they were anonymously self-completed. Completed questionnaires were either posted back in provided stamped envelopes or collected back by hand in asthma talks. The questionnaire survey study was conducted over a one-year period from June 2002 to May 2003.

The questionnaire

The four-page questionnaire was divided into 6 sections: background information, asthma day-to-day treatment, doctors' choices and patients' perception on inhaler devices, patients' fears and side-effects encountered with inhaled corticosteroids, perception on cost of asthma treatment and, familiarity and perception towards asthma CPG. The findings of the latter two will be presented in a separate paper, although certain aspects of the last item are included in this paper. There were two types of questions in the questionnaire: (a) Questions requiring a four-point scale, e.g. 'In your practice, have you encountered patients who are reluctant to use inhalers?' Choose one answer: Frequently, Sometimes, Rarely, Never; (b) Questions whose answers are provided in categories, e.g. 'In your practice, what would influence your choice of inhaler device?' Tick only one primary concern. Cost incurred to patients, Ability to technically handle it, Personal preferences (non-technical), Others (ask to specify).

Data analysis

The details of the returned questionnaires were grouped according to government and private practices for analysis. In keeping with the primary objective of the study, no division was made according to whether practice was in hospital or community, level of seniority (e.g. specialist vs. general practitioner), locations (e.g. cities or outside major towns), burden of asthma patients seen in practice and the type of patients (children, adult, or both). These details are however described for the purpose of documenting the nature of the practices. For a fair comparison of the choices in anti-asthma medications and inhaler devices between government and private doctors, only those that were readily accessible to both groups were selected for analysis as listed in the tables and figures (e.g. a fixed combination inhaler, seretide, was available to private, but not government doctors at the time of survey). Differences between groups were analyzed using Chi-square tests. All computation was made using statistical package SPSS version 11.5 for Windows (Chicago, Illinois, USA). The significance was defined at the

1% level for all tests in order to avoid occurrence of significance by chance alone due to the large sample size being tested one at a time.

RESULTS

Respondent rate

The respondent rates were 21.7% from Malaysian Medical Association; 18.6% from Malaysian Thoracic Society; 48.6% from the eight government institutions, and 45.3% from delegates attending asthma seminars. The overall respondent rate was 31.6%. However, 11 questionnaires that were not correctly completed were excluded from the analysis. This resulted in a total number of 226 satisfactorily completely questionnaires (effective respondent rate of 30.1%) for analysis. One hundred and sixteen were from government and 110 were from private doctors.

General information on doctors

There are significant differences in the practices between the government and private doctors in

Table 1 General information on the government and private doctors

	No recorded	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p**
Patient load, n/week	223				
≤ 5		83.4	97.4	68.8	-
> 5		16.6	2.6	31.2	< 0.001
Patient type	200				
Adults		38.5	58.9	12.5	-
Children		11.0	18.8	1.0	-
Both		50.5	22.3	86.4	< 0.001
Practice location	223				
Cities or major towns		83.4	97.4	68.8	-
Outside major towns		16.6	2.6	31.2	< 0.001
Patient insurance cover	226				
< 50%		53.1	55.2	50.9	-
≥ 50%		46.9	44.8	49.1	0.521
Familiar with asthma CPGs*	226				
Yes		79.2	82.8	75.5	-
No		20.8	17.2	24.5	0.176

Figures are percentages unless otherwise stated

* CPGs= Clinical Practice Guidelines (examples quoted in the questionnaire are those of the Global Initiative, British Thoracic Society and Malaysian Thoracic Society)

**p value between government and private doctors

terms of patient load, type, and practice locations (Table 1). A comparable proportion of government and private doctors surveyed claimed familiarity with asthma CPGs.

Prescribing patterns

The preferred 'first-line' treatment (i.e. for mild asthma) among most government doctors was

inhaled short-acting β_2 -agonist (SABA) and among private doctors was oral SABA. Also statistically significantly different between government and private doctors were the choices in inhaled long-acting β_2 -agonist (LABA) and theophylline (Table 2).

For 'second-line' treatment was defined as treatment prescribed when the 'first-line' treatment was not enough to control symptoms (i.e. moderate

Table 2 Prescribing patterns among Malaysian doctors

	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p**
1st line treatment*				
Inhaled SABA	87.6	98.3	76.4	<0.001
Inhaled corticosteroids	29.2	29.3	29.1	0.971
Inhaled LABA	9.3	3.4	15.5	0.002
Inhaled anticholinergic	11.9	13.8	10.0	0.380
Inhaled Na cromoglycate	7.1	9.5	4.5	0.148
Oral SABA	54.0	27.6	81.8	<0.001
Oral corticosteroids	17.7	12.9	22.7	0.054
Oral theophylline	20.8	5.2	37.3	<0.001
Oral LTRA	4.9	6.0	3.6	0.402
2nd line treatment*				
Inhaled SABA	26.1	20.7	31.8	0.057
Inhaled corticosteroids	71.7	75.0	68.2	0.255
Inhaled LABA	42.5	50.9	33.6	0.009
Inhaled anticholinergic	24.8	29.3	20.0	0.105
Inhaled Na cromoglycate	14.2	19.0	9.1	0.033
Oral SABA	14.6	10.3	19.1	0.063
Oral corticosteroids	38.1	33.6	42.7	0.159
Oral theophylline	40.7	37.1	44.5	0.253
Oral LTRA	19.0	20.7	17.3	0.513
3rd line treatment*				
Inhaled SABA	17.3	14.7	20.0	0.288
Inhaled corticosteroids	30.5	27.6	33.6	0.324
Inhaled LABA	37.2	44.8	29.1	0.014
Inhaled anticholinergic	27.0	32.8	20.9	0.045
Inhaled Na cromoglycate	18.6	22.4	14.5	0.129
Oral SABA	15.5	15.5	15.5	0.990
Oral corticosteroids	53.5	49.1	58.1	0.173
Oral theophylline	34.5	36.2	32.7	0.582
Oral LTRA	45.6	52.6	38.2	0.030

Figures are percentages unless otherwise stated

*1st line treatment: defined for mild or newly diagnosed asthmatics

2nd line treatment: defined as when 1st line treatment is not enough to control symptoms

3rd line treatment: defined as when 2nd line treatment is not enough to control symptoms

**p value between government and private doctors

SABA, short-acting β_2 -agonist; LABA, long-acting β_2 -agonist; LTRA, leukotriene receptor antagonist; Na cromoglycate, sodium cromoglycate.

asthma). The preferred treatment for most government and private doctors were inhaled CS. There was significantly more government than private doctors who preferred inhaled LABA (Table 2).

For ‘third-line’ treatment defined in the context of a worsening condition in spite of the ‘second-line’ treatment (i.e. severe asthma), the choices of various treatments were closer to one another. In government doctors, most preferred leukotriene antagonist (LTRA) followed by oral CS. In private practice, most preferred oral CS, followed by LTRA (Table 2).

About inhaler devices

Over half the government and private doctors opted for Metered-dose inhalers (MDI) as their first choice device (Fig. 1A). MDI plus spacer ranked second in government doctors (24.1%) whilst among private doctors, three types of inhaler devices (MDI plus spacer, turbohaler, and nebulizer) ranked second (14.2% in each). Regarding the second choice inhaler device, government doctors ranked first the MDI plus spacer (39.8%), followed by turbohaler (27.3%), nebulizer (18.2%) and others (Fig. 1B). Among the private doctors, nebulizer ranked first as the second choice inhaler delivery device (34.4%), followed by turbohaler (18.8%), MDI plus spacer (17.7%) and others.

The primary concerns for choosing inhaler devices were significantly different between the two groups. The majority of government doctors quoted technical ability as their primary concern while cost and personal preferences ranked equally as main

primary concerns with the private doctors (Table 3).

On preference to prescribe oral SABA to inhaled SABA, there was a significant trend towards prescribing oral preparation in private doctors, as

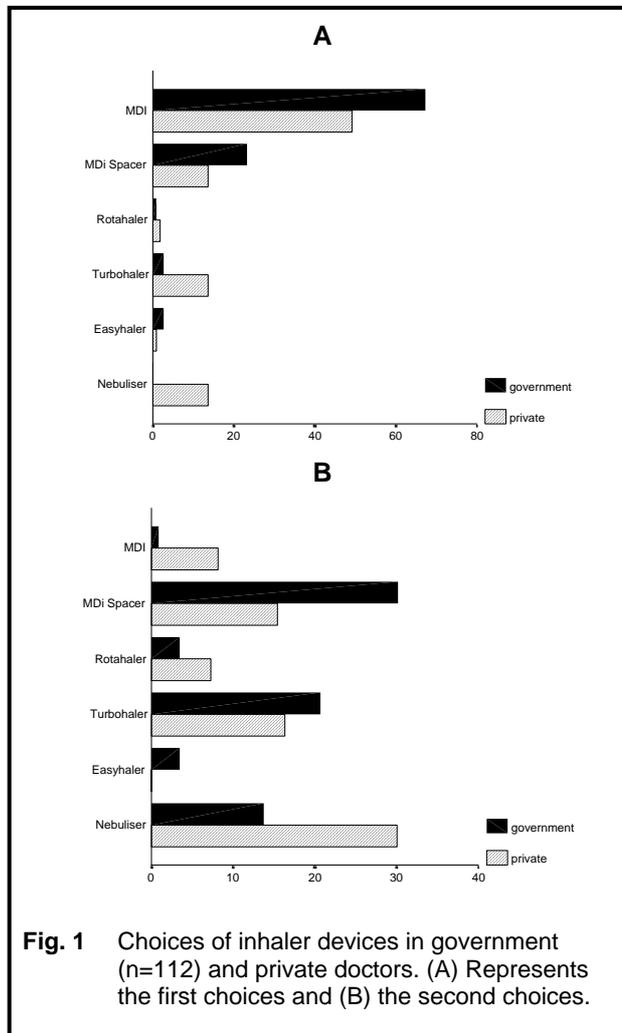


Fig. 1 Choices of inhaler devices in government (n=112) and private doctors. (A) Represents the first choices and (B) the second choices.

Table 3 Primary concerns in choosing the type of inhaler devices by doctors*

	Entire group (n = 159)	Government (n = 84)	Private (n = 75)	p
Cost	25.2	13.1	38.7	-
Technical ability	52.8	82.1	20.0	-
Personal preferences	19.5	2.4	38.7	-
Others**	2.5	2.4	2.7	< 0.001

Figures are percentages unless otherwise stated

*This section was filled only if doctor's answers to the earlier question regarding the frequency of encountering patients reluctant to use inhalers were either 'always' or 'sometimes'.

**Included: whether the type of inhalers was easily available; unclear on efficacy of some devices. In some, they were unspecified.

reflected by proportionately more private than government doctors would 'always' prescribe oral SABA (Table 4). The commonest causes for private doctors to prescribe oral preparation were cost and patient reluctance to use inhaler device. In contrast, inability to correctly handle inhaler device was the most quoted reason for government doctors. However, these differences were not statistically significant (Table 5).

There was clearly a significant trend that doctors in private practice encountered more patients who were reluctant to use inhaler devices (Table 6) as reflected by proportionately more private than government doctors 'always' encountering such patients. As to the main reasons why patients were reluctant to use inhaler, the commonest reason quoted to government doctors was that they considered inhalers difficult to use or troublesome (43.6%), while

Table 4 Preference by doctors on prescribing oral SABA to inhaled SABA*

	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p
Always	11.5	1.7	21.8	-
Sometimes	35.4	25.0	46.4	-
Rarely	32.3	41.4	22.7	-
Never	20.8	31.9	9.1	< 0.001

Figures are percentages unless otherwise stated

*SABA= short-acting β_2 -agonist

Table 5 Main reasons of doctors preferring oral SABA to inhaled SABA*

	Entire group (n = 105)	Government (n = 30)	Private (n = 75)	p
Cost	31.4	13.3	38.7	-
Inability to handle	26.7	43.3	20.0	-
Patients' reluctance	38.1	36.7	38.7	-
Others**	3.8	6.7	2.7	0.022

Figures are percentages unless otherwise stated

*This section was filled only if a doctor's answer to the earlier question of preferring oral SABA to inhaled SABA was either 'always' or 'sometimes'.

**Included: 'asthma episodes too infrequent'; 'pregnancy'; 'too poorly controlled'; 'patient already well controlled on oral SABA'; 'symptoms nocturnal only'.

Table 6 Frequency of encounters with patients who are reluctant to use inhalers as reported by doctors

	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p
Always	30.1	12.9	48.2	-
Sometimes	47.8	55.2	40.0	-
Rarely	19.0	26.7	10.9	-
Never	3.1	5.2	0.9	< 0.001

Figures are percentages unless otherwise stated

to private doctors, was that their asthma was thought to be more serious by taking inhaler, than if they were to take oral treatment (51%) (Fig. 2). Regarding the compliance with inhaler devices by the patients, both groups of doctors responded similar in that the majority considered this as being average only (Table 7).

About inhaled CS

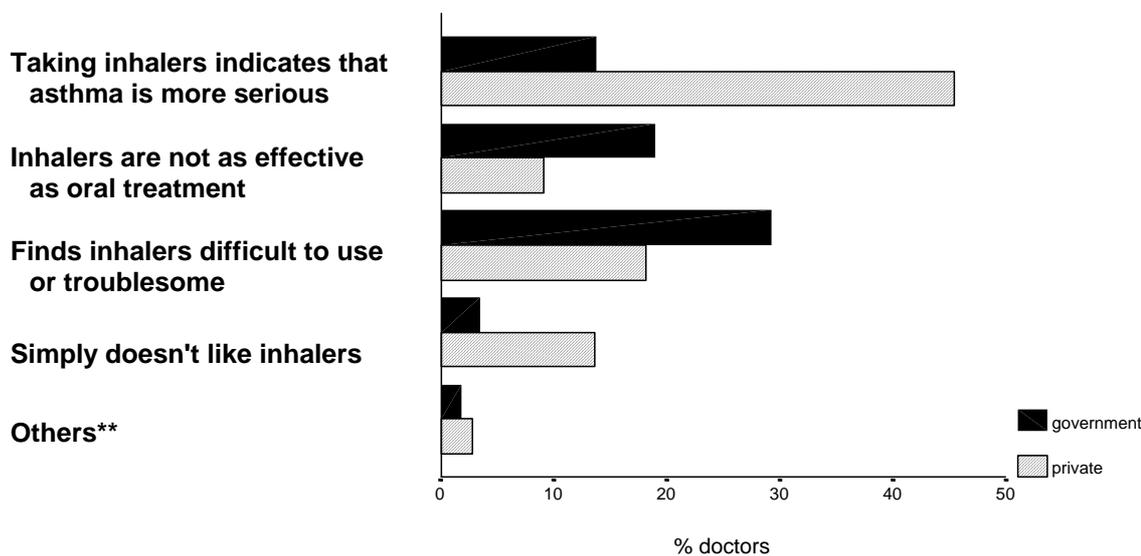
Although the majority of doctors ‘rarely’ en-

countered side-effects from inhaled CS as reported by the patients to them, there was a significant trend in that government compared to private doctors faced more of this problem (Table 8). A similar significant trend was obvious in encountering patients who expressed fear of using inhaled CS in that proportionately more private than government doctors ‘always’ encountered this problem. With regards to the nature of fear, both groups were similar.

Table 7 Degree of compliance with the prescribing of inhaler devices, as reported by doctors

	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p
Always (i.e. excellent compliance)	17.3	14.7	20.0	-
Sometimes (i.e. average compliance)	73.0	77.6	68.2	-
Rarely (i.e. poor compliance)	9.7	7.8	11.8	-
Never (i.e. total non-compliance)	0	0	0	0.276

Figures are percentages unless otherwise stated



*Answers provided only by doctors who always or sometimes encounter such patients
 **Others included: cost issue, 'inhalers cause addiction', 'risks of being discontinued by company'.

Fig. 2 Main reasons for patients' reluctance to use inhaler, as quoted to government (n = 78) and private doctors (n = 98).

Table 8 Doctors' experiences with the use of inhaled corticosteroids (ICS) as reported by patients

	Entire group (n = 226)	Government (n = 116)	Private (n = 110)	p
Encounters with patients who reported side-effects from ICS				
Always	0.4	0	0.9	-
Sometimes	22.6	29.3	15.5	-
Rarely	51.3	54.3	48.2	-
Never	25.7	16.4	35.5	0.003
Encounters with patients who express fear of using ICS				
Always	15.9	5.2	27.3	-
Sometimes	38.9	38.8	39.1	-
Rarely	30.5	41.4	19.1	-
Never	14.6	14.7	14.5	< 0.001
Nature of fear				
Real	19.7	21.2	18.1	-
Unfounded	80.3	78.8	81.9	0.585

DISCUSSION

This was the first study, to our knowledge, that compared the prescribing practices among the government and private doctors in Malaysia. This fact-finding study provided benchmark data of prescribing practices and highlighted the wide differences in prescribing between the two groups of doctors in some aspects.

We achieved our target analyzable samples although the overall respondent rate was slightly lower than anticipated. The low return rates from the members of the two Medical Societies were balanced by the high respondent rates of the government institutions and from asthma talks. This was understandable since in the latter, there was support from individuals including departmental heads and speakers. This is likely to introduce some bias to how well the study sample represented the population of doctors at large. This is somewhat unavoidable and inherent with any questionnaire survey study that 'selects' out some section of the target population. Nevertheless

the findings reported here were consistent with many anecdotal reports of prescribing practices we know of, thus lending confidence that the findings were not too distant away from the reality.

Another important methodology consideration is our decision not to discriminate between specialist and generalist (e.g. family doctors) and between adult physician, pediatrician and family doctors, in the analysis. This was mainly due to problems with definitions on specialist and generalist, and inequality in their distributions among the surveyed population. As such, subgroup analysis of these groupings can be misleading. We also appreciate that some interpretation of our findings may be inappropriate because of not making a distinction between those treating adults and those treating children since some aspects of prescribing between these two groups of patients can be very different. This is somewhat avoidable since we anticipated that a substantial number of doctors surveyed would be treating both adult and pediatric patients and that having a questionnaire with separate questions on adult and

children patients might prove too much for some prospective respondents.

We have shown that for mild asthmatic patients, oral salbutamol was still a popular choice among doctors from both groups, although private doctors contributed more in this aspect. Another important finding was that theophylline was still preferred by many private doctors as 'first-line' treatment. This is interesting because two studies, an audit of a Malaysian district hospital outpatient clinic¹⁶ and another questionnaire survey among all doctors in Singapore,¹³ showed the same preference for oral SABA over 10 years ago. More recently, another questionnaire survey study focusing on childhood asthma¹² also showed a preference of oral therapy for relief medication among private general practitioners in Malaysia. Consistent with our findings, it is likely that lower cost of oral preparations and patients' reluctance to use inhaler device are important factors in the persistence in such prescribing practices in private settings.

On 'second-line' treatment, inhaled CS became the choice therapy for the majority from both groups of doctors. This preference is highly appropriate in keeping with the current emphasis to treat the underlying inflammation in asthma¹ and that low-dose inhaled CS can prevent asthma death.² By far, the most effective anti-inflammatory therapy is CS delivered by inhaling, as recommended by the asthma CPGs.^{7,8} This represents a marked improvement from over 10 years ago in Malaysia where Lim *et al.*¹⁶ showed that none of their asthmatic patients from hospital medical outpatient clinics were on inhaled or oral CS.

With regards to the 'third-line' treatment, the preferred treatments were closer to one another in that most doctors, whether government or private, favored oral CS, LTRA and inhaled LABA. Currently asthma CPGs^{7,8} discourage the chronic use of oral CS until all other options of treatment have been properly explored. Clearly, inhaled LABA⁴ and more recently LTRA⁶ have emerged to be highly effective treatments when combined with inhaled CS. As such, they should be preferred to oral CS when asthma control has worsened. Such a prescribing practice was not reflected in a significant number of government and private doctors. While cost should

not be an issue among the government doctors, it may be the reason why oral CS is preferred to inhaled LABA and LTRA in private practices.

MDI remained the first choice inhaler device among all doctors. MDI plus spacer and other breath-actuated dry-powder devices such as turbobhaler were the logical follow-on choices. This still holds true today in most countries.¹⁷ We recently showed that despite MDI being present in Malaysia for over 20 years, nearly half of our adult patients treated in our teaching hospital did not handle the device correctly.¹⁸ It seems sensible that the many newer, more efficient delivery devices, such as dry-powder device, can be considered as first choice inhalers, as long as cost is not prohibitive. In fact, there is evidence to show that in terms of cost-effectiveness, MDI and breath-actuated devices for SABA were not different from each other.¹⁹ When having the younger children in mind, the obvious choice is MDI plus spacer, since all others except nebulizer, are not technically friendly for them. However, the finding of nebulizer as an important choice for private doctors was surprising. Although they are efficient, they are cumbersome to carry, unfriendly to use and potentially hazardous in that they can cause delay in receiving hospital care during a life-threatening attack.^{20,21} The reason for this is open to speculations. It is possible that many doctors consider that a nebulizer is the obvious choice for a patient who could not correctly handle the MDI.

We have shown that more private than government doctors, encountered patients who were reluctant to use inhalers. They are likely to influence the prescribing of inhalers since cost and personal preferences are listed as the primary concerns of the doctors. The main reasons for reluctance among patients revealed some serious misconceptions in the community like thinking that inhaler therapy represents a more serious disease and that oral therapy is a more effective treatment than inhaling. It is possible that many of these misconceptions may have arisen from conflicts with the traditional medical beliefs that still have strong influences in the community.^{22,23} Our findings also showed that more private doctors, than government, encountered patients who feared the use of inhaled CS, while more government doctors, than private, observed genuine side effects of inhaled CS. This may be a reflection of the differ-

ent patient groups that are treated in government and private settings. Private patients are perhaps more inquisitive because of the medical cost they bear. The overall frequency of encounters reiterates the safe tolerance of CS when administered via inhalation.¹

Our findings highlighted some obviously different prescribing practices from the clinical guidelines recommendations. Some of these practices are clearly inappropriate. Two major factors that have been previously identified as contributing to inappropriate prescribing were the clinicians' level of knowledge and their practice settings.¹¹ Since over 70% of surveyed doctors whether in government or private settings claimed familiarity with asthma CPGs, practice settings- for example, affordability of drugs by the patients, individual and cultural preferences among patients- were probably more important in determining the prescribing practices of our cohort of surveyed doctors. According to the results of our study, financial incentives in prescribing certain drugs in private practices did not seem to be an important influence since more government than private doctors preferred expensive drugs such as LTRA and inhaled LABA.

Another important consideration is whether some clinicians found it difficult to change prescribing habits despite knowledge of a better approach. Changing prescribing habits or behavior is complex. Passive dissemination of information such as distribution of education materials and didactic lectures has been shown to have the least effect on changing prescribing behaviors,^{9,24} while approaches such as academic detailing where local opinion leaders identified as their peers disseminate information;^{25,26} multi-facet interventions involving audit and feedback, reminders, local consensus processes, or marketing²⁷⁻²⁹ are the more efficient means. It is clear that from our findings, the prescribing practices in some Malaysian doctors need to change. More research on this is required in order to clearly define the ways of improving appropriateness in prescribing in terms of maximizing treatment effectiveness, minimizing drug side-effects and cost, while respecting patients' preferences. The national asthma treatment CPG of Malaysia, endorsed by the Academy of Medicine and the Ministry of Health Malaysia, has recently been updated⁸ and is easily accessible from the Acad-

emy's website. In addition, there is the international guideline published by the Global Initiative for Asthma (GINA) that is well recognized and disseminated among doctors. There is therefore very little excuse for Malaysian doctors not to follow more closely the modern-day treatment recommendations.

Our survey findings provide benchmark data on asthma prescribing practices of a healthcare delivery system fully dichotomized into government and private sectors. To the best of our knowledge, there are no published studies comparing the prescribing patterns in a fully subsidized healthcare setting and a setting where private patients completely bear the burden of their medical cost. This is perhaps due to the difficulty of getting reliable information because of the sensitive nature in some aspects of such a study. Despite the shortcomings of a self-completed questionnaire study, our attempt at a nationwide survey yielded some important information for the purposes of defining problems related to prescribing practices in our own country and planning of future healthcare policies and strategies. It provides evidence for what was intuitively known or not known, and its implications extend to healthcare systems of other countries that share similarities to ours.

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REFERENCES

- Barnes PJ, Pedersen S, Busse WW. Efficacy and safety of inhaled corticosteroids. New developments. *Am J Respir Crit Care Med* 1998; 157: S1-53.
- Suissa S, Ernst P, Benayoun S, Baltzan M, Cai B. Low-dose inhaled corticosteroids and the prevention of death from asthma. *N Engl J Med* 2000; 343: 332-6.
- Stoloff S, Poinsett-Holmes K, Dorinsky PM. Combination therapy with inhaled long-acting beta2-agonists and inhaled corticosteroids: a paradigm shift in asthma management. *Pharmacotherapy* 2002; 22: 212-26.
- Shrewsbury S, Pyke S, Britton M. Meta-analysis of increased dose of inhaled steroid or addition of salmeterol in symptomatic asthma (MIASMA). *BMJ* 2000; 320: 1368-73.
- Riccioni G, Santilli F, D'Orazio N, *et al.* The role of antileukotrienes in the treatment of asthma. *Int J Immunopathol Pharmacol* 2002; 15: 171-82.
- Wilson AM, Dempsey OJ, Sims EJ, Lipworth BJ. Evaluation of salmeterol or montelukast as second-line therapy for asthma not controlled with inhaled corticosteroids. *Chest* 2001; 119: 1021-6.
- Global Initiative for Asthma (GINA). Global strategy of asthma management and prevention. National Institutes of Health: National Heart, Lung, and Blood Institute. Bethesda, MD; 2002 (Publication No. NIH-NHLI 02-3659).
- Clinical practice guidelines for management of adult asthma. Malaysian Thoracic Society, Academy of Medicine of Malaysia, Ministry of Health Malaysia, 2nd Edition. 2003.
- Lomas J, Anderson GM, Domnick-Pierre K, Vayda E, Enkin MW, Hannah WJ. Do practice guidelines guide practice? The effect of a consensus statement on the practice of physicians. *N Engl J Med* 1989; 321: 1306-11.
- Greco PJ, Eisenberg JM. Changing physicians' practices. *N Engl J Med* 1993; 329: 1271-3.
- Lexchin J. Improving the appropriateness of physician prescribing. *Int J Health Serv* 1998; 28: 253-67.
- Chan PWK, Norzila MZ. Prescribing patterns for childhood asthma treatment in general practice. *Med J Malaysia* 2003; 58: 475-81.
- Tan WC, Chia KS, Goh LG. Choices and preferences in asthma management. *Singapore Med J* 1992; 33: 590-4.
- Jepson G, Butler T, Gregory D, Jones K. Prescribing patterns for asthma by general practitioners in six European countries. *Respir Med* 2000; 94: 578-83.
- Naish J, Sturdy P, Toon P. Appropriate prescribing in asthma and its related cost in east London. *BMJ* 1995; 310: 97-100.
- Lim TO, Suppiah A, Ismail F, Selvan T, Khan NK, Ngah BA. Morbidity associated with asthma and audit of asthma treatment in out-patient clinics. *Singapore Med J* 1992; 33: 174-6.
- Boyd G. The continued need for metered dose inhalers. *J Aerosol Med* 1995; 8 Suppl 1: S9-12.
- Loh LC, Teng CL, Teh PN, Koh CN, Vijayasingham P, Thayaparan T. Metered-dose inhaler technique in asthmatic patients- a revisit of the Malaysian scene. *Med J Malaysia* 2004; 59: 319-25.
- Kelloway JS, Wyatt R. A cost-effectiveness analysis of breath-actuated metered-dose inhalers. *Manag Care Interface* 1997; 10: 99-107.
- Campbell DA, Luke CG, McLennan G, *et al.* Near-fatal asthma in South Australia: descriptive features and medication use. *Aust N Z J Med* 1996; 26: 356-62.
- Fernandes AK, Mallmann F, Steinhorst AM, *et al.* Characteristics of acute asthma patients attended frequently compared with those attended only occasionally in an emergency department. *J Asthma* 2003; 40: 683-90.
- Heggenhougen HK. Bomohs, doctors and sinsehs--medical pluralism in Malaysia. *Soc Sci Med [Med Anthropol]* 1980; 14B: 235-44.
- Chen PC. Traditional and modern medicine in Malaysia. *Am J Chin Med* 1979; 7: 259-75.
- Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. *CMAJ* 1995; 153: 1423-31.
- Soumerai SB, Avorn J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA* 1990; 263: 549-56.
- Schaffner W, Ray WA, Federspiel CF, Miller WO. Improving antibiotic prescribing in office practice. A controlled trial of three educational methods. *JAMA* 1983; 250: 1728-32.
- Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA* 1995; 274: 700-5.
- Wensing M, Grol R. Single and combined strategies for implementing changes in primary care: a literature review. *Int J Qual Health Care* 1994; 6: 115-32.
- Bero LA, Grilli R, Grimshaw JM, Harvey E, Oxman AD, Thomson MA. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ* 1998; 317: 465-8.