ORIGINAL ARTICLE

Are Hong Kong doctors following the Global Initiative for Asthma guidelines: a questionnaire "Survey on Asthma Management"?

CME

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Objective To assess the standard of asthma management by doctors in Hong Kong.

Design Cross-sectional postal questionnaire survey.

Setting Hong Kong.

Participants Practising doctors registered with the Medical Council of Hong Kong were sent a questionnaire between August and December 2007.

Main outcome measures Respondents' responses to questions on demographic data, parameters routinely used to assess asthma control, the pattern of asthma medication prescribing, and seven different case scenarios assessing their ability to classify asthma control and management.

Results We received 410 completed questionnaires from general practitioners (55%), internists (22%), paediatricians (11%), and other specialists (12%). The majority (82%) explained the pathology of asthma to at least some of their patients and tried to identify aggravating factors of the asthma (91%). Fewer observed the inhalation technique of their patients (68%) and prescribed a written asthma management plan (33%). The main medications prescribed to adults and children with asthma were inhaled corticosteroids, inhaled short-acting beta-2 agonists, and combinations of an inhaled corticosteroid and a long-acting beta-2 agonist. In adults and children, long-acting beta-2 agonist alone (without inhaled corticosteroid) was being used to treat asthma by 45% and 36% of the doctors, respectively. Also, 94% of the respondents correctly classified the control status in four out of the seven case scenarios and 31% chose the correct medications when responding to seven of the 14 questions asked.

Conclusions Asthma management practice of Hong Kong doctors falls short of the standards recommended by international guidelines. More effort in improving their knowledge is urgently warranted.

Introduction

Asthma is an important disease worldwide. According to Phase Three of the International Study of Asthma and Allergies in Childhood (ISAAC) conducted between 2002 and 2003, the mean global prevalence of wheeze in the past 12 months was 14.1% in 13-to-14-year-old subjects and 11.5% in 6-to-7-year-olds.[1] In Hong Kong, the prevalence rates of physician-diagnosed asthma in 13-to-14-year-olds were 10.2% in 2002,[2] and 5.8% in the elderly (aged >70 years) in 2003.[3]

The Asthma Insights and Reality in Asia-Pacific study, a community-based survey of asthma patients and their carers, revealed that asthma control in the region fell short of the goals specified in international guidelines for asthma management.[4] Daytime asthma symptoms were reported by more than half of the respondents, and more than 40% reported that it had caused sleep disturbance in the preceding 4 weeks. Furthermore, at least two in every five respondents had been hospitalised, attended a hospital emergency department, or made unscheduled emergency visits to other health care facilities for treatment of asthma during the previous 12 months. Similar findings have been observed in other parts of the world, including affluent countries in North America and western Europe.[5] Identifying the causes of suboptimal control is necessary in order to improve asthma care in the region.

Suboptimal management by physicians was a likely cause of significant asthma morbidity worldwide. Yet, data on this aspect of asthma care are limited, especially in the

Key words
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Asia-Pacific region.[6,7] Thus, the current questionnaire "Survey on Asthma Management" aimed to assess the management practice of Hong Kong doctors for asthma patients, in relation to recommendations in the Global Initiative for Asthma (GINA)[8] and the British Thoracic Society (BTS)[9] guidelines. Questions included the way asthma control was assessed and the preferred medications for treating patients with asthma. We aimed to identify any inadequacies in asthma management practice in Hong Kong and plan for remedial actions to improve management skills of doctors for this common and important disease.

關於香港醫生是否按「全球哮喘防治創議」指引作哮喘護理的問卷調查

目的 探討香港醫生對哮喘護理的水平。

設計 橫斷面郵寄問卷研究。

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參與者 2007年8月至12月期間向所有於香港醫務委員會註冊的執業醫生發放問卷。

主要結果測量 受訪者的人口學資料、恆常用作檢測控制哮喘的工具、處方藥物的模式，並用七宗不同個案測試他們對控制和治理哮喘的能力。

結果 共收回問卷410份；受訪者分別為全科（55%）、內科（22%）、兒科（11%）及其他專科（12%）醫生。大部份醫生（82%）會對至少一部份病人解釋哮喘的病理，並嘗試為病人辨析哮喘的促進因素（91%）。部份醫生（68%）會觀察病人使用吸入劑的方法及為病人提供一份有關哮喘護理的書面計劃（33%）。處方給成人及小童的哮喘藥物主要有吸入性類固醇、吸入性短效乙二型交感神經作用劑，以及吸入性類固醇結合長效乙二型交感神經作用劑。有45%醫生為成年哮喘患者單一處方長效乙二型交感神經作用劑（即無吸入性類固醇），處方在兒童哮喘患者身上的則有36%。至於七個個案研究中，94%受訪者可以正確分辨其中四個個案的哮喘控制；另被問及有關處方藥物的14個問題中，31%受訪者選擇正確答案。

結論 按國際哮喘護理指引的標準，香港醫生並未達標，須迫切提高他們的知識水平。

Methods

All 6899 medical practitioners registered with the Medical Council of Hong Kong were surveyed between August and December 2007 with a postal questionnaire which did not require the respondents to disclose their identity. Two rounds of the questionnaire were posted. Each questionnaire consisted of 6 pages. Questions included the respondents' demographic data, the parameters they used routinely to assess asthma control, the patterns of asthma medication used, and the availability of lung function facilities at their workplace. In addition, seven different case scenarios (Appendix) were posed to assess the ability of respondents to classify the control and management of asthma. Respondents were instructed to answer according to their usual clinical practice. Answers were considered "correct" if they complied with the latest GINA guideline published in 2007[8] or the BTS guideline published in 2008.[9]

As this questionnaire survey required no other intervention involving the participants, no ethical approval was deemed necessary. Data were analysed using the Statistical Package for the Social Sciences (Windows version 13.0; SPSS Inc, Chicago [IL], US). Descriptive data were presented as means and standard deviations (SDs), medians and interquartile ranges (IQRs), or numbers and percentages. The Kruskal-Wallis test was used for comparisons between the responses by doctors of different specialties followed by the Bonferroni correction for between-group comparisons. Relationships between the respondents' performance in classifying asthma control and treatment adjustments to the seven case scenarios and the time spent in medical consultations were assessed by Spearman's correlation. The same test was used to assess the relationship between the respondents' performance in classifying asthma control and treatment adjustments suggested in the seven case scenarios, and the frequency of prescribing asthma medications. P values of less than 0.05 were considered statistically significant.

Results

We sent out a total of 6899 questionnaires and received 1040 replies (response rate, 15%). Among these replies, 630 doctors opted not to fill in the questionnaire, 50 of whom wrote a note that they did not routinely take care of asthma patients. The demographics of the 410 respondents with completed questionnaires are summarised in Table 1.

Table 2 summarises the usual practice of these doctors when they managed asthma patients. The majority would explain the pathology of asthma; 82% to all, most or some of their patients, and 91% tried to identify asthma aggravating factors in all, most or some of them. Fewer doctors would observe the inhalation technique (68% in all, most or some of their patients), whilst 86% would explain the actions of anti-asthmatic drugs to at least some of their patients. A written crisis plan for an acute asthma attack was seldom offered (67% did not or did so for very few patients). The average (SD) amount of time these doctors claimed to have spent on the first and subsequent consultations for their asthma patients amounted to 17 (9) and 9 (4) minutes, respectively.

Table 3 illustrates the type of medications these doctors claimed they used for the management of asthma. The main therapies provided to both adults

TABLE 1. Summary of the characteristics of the respondents (n=410)

Characteristics	No. (%)
Specialties	
General practitioners	225 (55)
Internists	90 (22)
Paediatricians	44 (11)
Others*†	51 (12)
Sex	
Male	278 (68)
Female	132 (32)
Age-group (years)	
20-30	109 (27)
31-40	112 (27)
41-50	85 (21)
51-60	46 (11)
>60	58 (14)
Years of graduation from medical school	
0-5	100 (24)
6-10	85 (21)
11-15	41 (10)
16-20	48 (12)
>20	136 (33)
Type of practice	
Private	220 (54)
Public	190 (46)
Frequency of seeing asthma patients†	
Daily	92 (22)
Weekly	172 (42)
Monthly	75 (18)
Few times or less per year	70 (17)
Frequency of prescribing asthma medications†	
Daily	95 (23)
Weekly	165 (40)
Monthly	82 (20)
Few times or less per year	67 (16)

* 24 Surgeons, 8 accident and emergency doctors, 6 obstetricians and gynaecologists, 4 house officers, 3 anaesthetists, 2 pathologists, 1 radiologist, 1 psychiatrist, and 1 government primary screening doctor

† Data of one doctor were missing

and children were inhaled corticosteroids (ICS), short-acting beta-2 agonists, and combination of an ICS and a long-acting beta-2 agonist (LABA). In all, 45% and 36% of these doctors claimed to prescribe monotherapy with a LABA for at least a few of their adult and paediatric patients, respectively. Oral beta agonists, steroids, theophyllines, and mucolytic agents were commonly used to treat both adults and children with asthma. For the treatment of adult asthma patients, 51%, 34%, 46% and 45% of the respondents were prescribed oral beta agonists,

TABLE 2. Usual practice of doctors when dealing with asthma patients and availability of lung function facilities in their clinics (n=410)

Usual practice	No. (%)
Explain to the patient that the underlying pathology in asthma is chronic airway inflammation	
No patients	16 (4)
Few	61 (15)
Some	89 (22)
Most	134 (33)
All patients	109 (27)
Unanswered	1 (0.2)
Identify triggering and aggravating factors for the patient	
No patients	9 (2)
Few	29 (7)
Some	89 (22)
Most	154 (38)
All patients	128 (31)
Unanswered	1 (0.2)
Observe the patient's inhaler technique	
No patients	37 (9)
Few	95 (23)
Some	122 (30)
Most	89 (22)
All patients	64 (16)
Unanswered	3 (1)
Teach the patient about the actions of their asthma medication(s)	
No patients	16 (4)
Few	42 (10)
Some	85 (21)
Most	165 (40)
All patients	101 (25)
Unanswered	1 (0.2)
Develop a written crisis plan for acute attacks with the patient	
No patients	169 (41)
Few	102 (25)
Some	89 (22)
Most	30 (7)
All patients	16 (4)
Unanswered	4 (1)
Discuss asthma management with the patient's family (where available)	
No patients	38 (9)
Few	83 (20)
Some	136 (33)
Most	91 (22)
All patients	57 (14)
Unanswered	5 (1)
Spirometer available at the doctor's practice	
Yes	159 (39)
No	251 (61)
Peak flow meter available at the doctor's practice	
Yes	315 (77)
No	95 (23)

TABLE 3. Pattern of asthma medication usage by doctors in Hong Kong to treat adult and childhood asthma (n=410)

Medication usage	No (%) of respondents					
	No patients	Few	Some	Most	All patients	Unanswered
Adult asthma						
ICS*	16 (4)	61 (15)	89 (22)	134 (33)	109 (27)	1 (0.2)
Inhaled short-acting ß$_2$ agonist	30 (7)	39 (10)	77 (19)	131 (32)	106 (26)	27 (7)
Inhaled long-acting ß$_2$ agonist alone	194 (47)	72 (18)	89 (22)	21 (5)	0 (0)	34 (8)
Inhaled long-acting ß$_2$ agonist and ICS	78 (19)	75 (18)	148 (36)	71 (17)	12 (3)	26 (6)
Inhaled anti-cholinergic agent	136 (33)	117 (29)	88 (21)	32 (8)	7 (2)	30 (7)
Oral ß agonist	78 (19)	98 (24)	124 (30)	61 (15)	24 (6)	25 (6)
Oral steroid	100 (24)	149 (36)	102 (25)	27 (7)	8 (2)	24 (6)
Oral theophylline	97 (24)	97 (24)	122 (30)	57 (14)	7 (2)	30 (7)
Leukotriene modifier	142 (35)	101 (25)	93 (23)	41 (10)	8 (2)	25 (6)
Mucolytic	86 (21)	103 (25)	101 (25)	57 (14)	24 (6)	39 (10)
Childhood asthma						
ICS	60 (15)	50 (12)	124 (30)	109 (27)	28 (7)	39 (10)
Inhaled short-acting ß$_2$ agonist	66 (16)	53 (13)	78 (19)	103 (25)	68 (17)	42 (10)
Inhaled long-acting ß$_2$ agonist alone	212 (52)	78 (19)	54 (13)	12 (3)	3 (1)	51 (12)
Inhaled long-acting ß$_2$ agonist and ICS	131 (32)	93 (23)	86 (21)	43 (10)	9 (2)	48 (12)
Inhaled anti-cholinergic agent	232 (57)	79 (19)	43 (10)	8 (2)	0 (0)	48 (12)
Oral ß agonist	117 (29)	89 (22)	95 (23)	51 (12)	19 (5)	39 (10)
Oral steroid	160 (39)	117 (29)	69 (17)	17 (4)	4 (1)	43 (10)
Oral theophylline	196 (48)	84 (20)	57 (14)	20 (5)	7 (2)	46 (11)
Leukotriene modifier	140 (34)	69 (17)	82 (20)	63 (15)	16 (4)	40 (10)
Mucolytic	135 (33)	71 (17)	76 (19)	61 (15)	21 (5)	46 (11)

* ICS denotes inhaled corticosteroid

steroids, theophyllines, and mucolytic drugs, respectively to at least some of them. A similar pattern was observed for the treatment of paediatric asthma patients, the corresponding percentages being 40%, 22%, 21%, and 39%. Leukotriene receptor antagonists (LTRAs), another class of oral anti-asthmatic drugs, were also commonly used for treating asthma by our respondents and were slightly more often prescribed for paediatric than adult patients (39 vs 35%). When questioned about whether the doctors preferred oral or inhaled therapy for treating asthma, 46 (11%) opted for the oral route and the remainder preferred inhaled therapy. Equipment for spirometry was available to only 39% of these respondents. For doctors with access to spirometric facilities, 16%, 23%, 52%, and 10% used them for most, some, very few, and none of their asthma patients' visits, respectively. In contrast, peak flow meters were available in 77% of the doctors' offices and correspondingly they were used for 36%, 32%, 28%, and 4% of respective patient visits for asthma. In all, 31% and 69% of these doctors worked in public and private sectors, respectively.

The majority of doctors considered the frequency of daytime symptoms (94%), night-time symptoms (96%), activity limitation (92%), frequency of rescue bronchodilator use (93%), and the frequency of unscheduled heath care utilisation (86%) as important parameters for assessing asthma control. Fewer would use the frequency of use of rescue oral steroids (54%) and lung function data (62%) for assessment.

Seven case scenarios were used to assess respondents' management practices. The questions and correct answers based on the GINA guideline are shown in the Appendix. Overall, 17% (71/410) and 99% (405/410) of the doctors were correct in classifying the control status in all, and at least one case scenario, respectively, whilst 94% (384/410) were correct in classifying four out of the seven case scenarios in accordance with these guidelines (Table 4). The median number of correct answers given by the respondents did not differ between specialties (medians [IQRs] for correct answers for general practitioners, internists, paediatricians, and other specialties were 6.0 [1.0], 5.5 [1.0], 6.0 [2.0] and 5.0 [2.0], respectively) [P=0.31]. Moreover, 61% (251/410) of the doctors overestimated the asthma control in at least one case scenario, but 0% did so in all seven cases. Among the doctors who replied in the first (n=256) and second rounds (n=154) of the postal questionnaires, there was no difference in the correct classification of asthma control in at least

TABLE 4. Doctors' correct responses in classifying the level of asthma control in the case scenarios

No. of correct responses	No. (%) of respondents				
	General practitioners (n=225)	Internists (n=90)	Paediatricians (n=44)	Others (n=51)	All doctors (n=410)
At least 1	223 (99)	90 (100)	42 (95)	50 (98)	405 (99)
At least 2	221 (98)	90 (100)	37 (84)	50 (98)	398 (97)
At least 3	220 (98)	90 (100)	37 (84)	48 (94)	395 (96)
At least 4	213 (95)	87 (97)	37 (84)	47 (92)	384 (94)
At least 5	171 (76)	71 (79)	32 (73)	35 (69)	309 (75)
At least 6	116 (52)	45 (50)	26 (59)	18 (35)	205 (50)
All 7	39 (17)	18 (20)	7 (16)	7 (14)	71 (17)

TABLE 5. Doctors' responses in choosing correct treatments for patients in the case scenarios

No. of correct responses*	No. (%) of respondents				
	General practitioners (n=225)	Internists (n=90)	Paediatricians (n=44)	Others (n=51)	All doctors (n=410)
At least 1	215 (96)	87 (97)	38 (86)	47 (92)	387 (94)
At least 2	198 (88)	82 (91)	35 (80)	45 (88)	360 (88)
At least 3	172 (76)	79 (88)	33 (75)	40 (78)	324 (79)
At least 4	144 (64)	72 (80)	29 (66)	30 (59)	275 (67)
At least 5	112 (50)	63 (70)	26 (59)	23 (45)	224 (55)
At least 6	93 (41)	54 (60)	25 (57)	15 (29)	187 (46)
At least 7	57 (25)	40 (44)	19 (43)	10 (20)	126 (31)
At least 8	42 (19)	21 (23)	13 (30)	9 (18)	85 (21)
At least 9	26 (12)	16 (18)	5 (11)	4 (8)	51 (12)
At least 10	13 (6)	10 (11)	3 (7)	2 (4)	28 (7)
At least 11	3 (1)	8 (9)	2 (5)	1 (2)	14 (3)
At least 12	1 (0.4)	4 (4)	1 (2)	0	6 (2)
At least 13	1 (0.4)	2 (2)	0	0	3 (1)
All 14	1 (0.4)	0	0	0	1 (0.2)

* If a doctor has chosen incorrect in addition to correct treatments in the same question, that question was not counted as a correct response; total number of correct responses=14

four of the seven case scenarios (95 vs 92%, P=0.75), as well as the correct medication in at least seven of the 14 questions (32 vs 28%, P=0.33). Concerning the adjustment of medications, 31% chose the correct medications in seven of the 14 questions asked, but only one (0.2%) doctor correctly answered all 14 questions (Table 5). The median number of correct answers by the respondents did not differ between specialties; the median (IQR) numbers of the correct answers among the general practitioners, internists, paediatricians and other specialties were 3.0 (3.0), 4.0 (3.3), 5.0 (4.8), and 3.0 (3.0), respectively (P=0.11). Doctors graduated for more than 20 years performed significantly worse than their younger counterparts for the correct classification and treatment of asthma (Fig). The average first consultation time spent was weakly correlated with the correct asthma therapy prescribed to the patients (r=0.11, P=0.04) but there was no correlation with the correct classification of the level of asthma control. The time spent in subsequent consultations did not correlate with the correct treatment (r=0.06, P=0.25) or classification of the level of asthma control by the respondents (r=–0.002, P=0.97). The frequency of prescribing asthma medications by the doctors correlated weakly with the performance of the doctors with the correct classification of asthma severity (r=0.15, P=0.003), but not the correct prescription of asthma medications (r=0.06, P=0.22).

Discussion

This study assessed the way doctors in Hong Kong managed asthma, especially in relation to its control and the appropriate use of medications. Over 90% of the respondents classified asthma control status correctly in over half of the case scenarios, and less than one third would choose the correct medications in response to seven out of the 14 questions asked. Of particular concern was that LABA monotherapy was used by 45% and 36% of the doctors in at least a few of their adult and paediatric asthma patients, respectively. Such practice is considered dangerous as it is associated with increased mortality.[10-12] Thus, there is room for improvement in the way Hong Kong doctors manage asthma.

About three out of five respondents over-

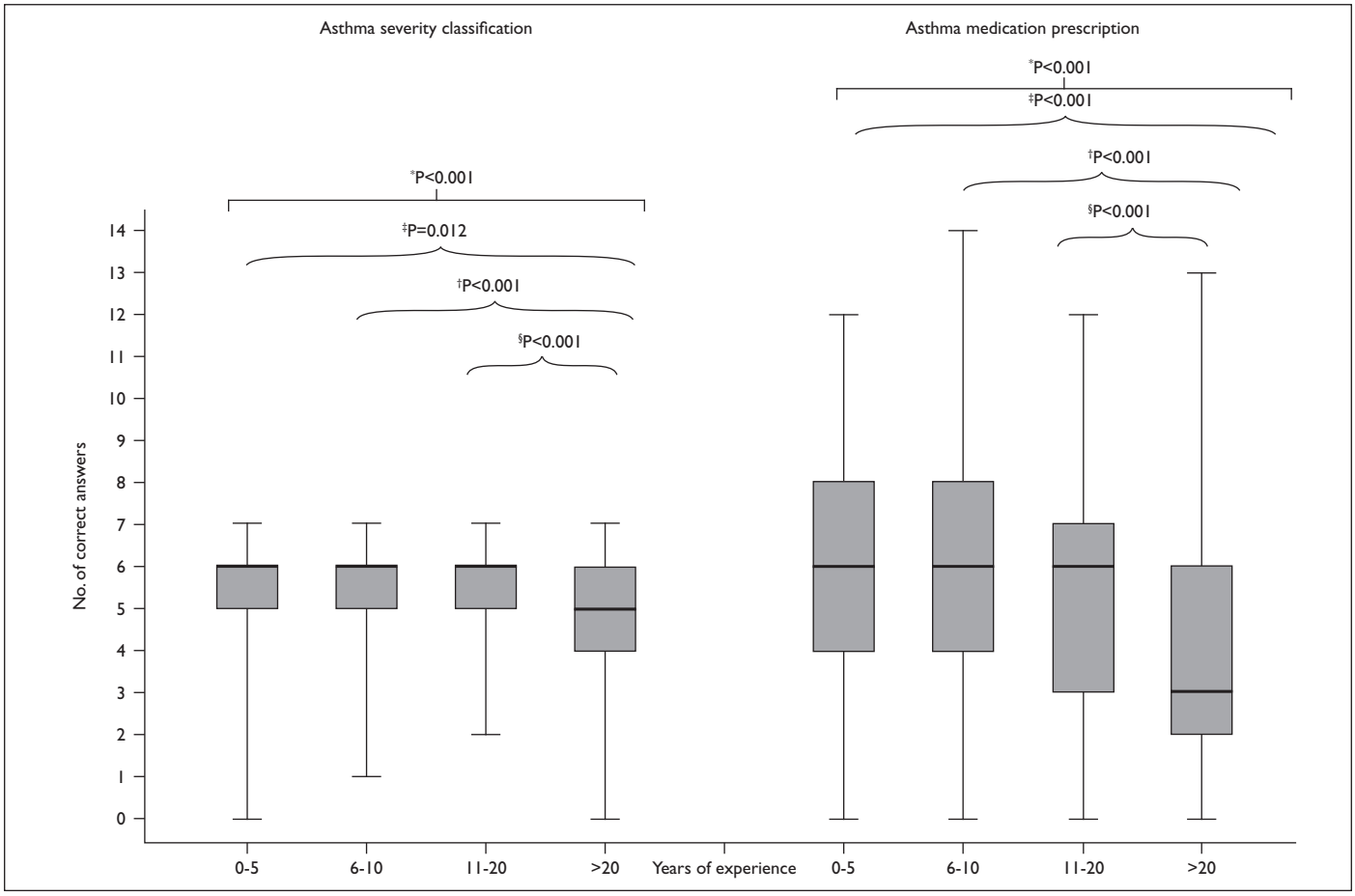

FIG. Box and Whisker plot of the relationship between years of experience of the doctors and responses to the case scenarios

The centre lines denote the medians, boxes the lower and upper quartiles, and the bars the upper and lower extremes

* Overall P value for the four different groups of years of experience

† P value between the group of 6-10 years and >20 years with Bonferroni correction

‡ P value between the group of 0-5 years and >20 years with Bonferroni correction

§ P value between the group of 11-20 years and >20 years with Bonferroni correction

estimated asthma control in at least one out of seven case scenarios in our study, which was similar to findings from a recent survey of Canadian primary care doctors.[13] Another European study found that while general practitioners were good at excluding persons not having asthma (specificity, 99%), they often under-diagnosed those who had current asthma (sensitivity, 59%),[14] whatever the reason. Patients also tended to overestimate asthma control, which possibly accounts for its significant morbidity worldwide.[4,5] Like doctors in Singapore, the majority of these Hong Kong doctors (>90%) reviewed asthma control status based on symptoms. However, far fewer (about 65%) would consider lung function data in the assessment.[15] Spirometry was under-utilised by primary care doctors, which was similar to observations in other countries.[16,17] A global survey revealed that only one in three asthma patients was deemed likely to have had a lung function test during the preceding year.[5] Despite continuous debate about the appropriateness, value, and barriers related to in-office spirometry in asthma management, one study found that spirometry in primary care settings could reach acceptable levels of technical quality and concordant interpretation.[17] Spirometry findings have also been shown to affect the clinical decision-making in managing asthma patients.[17-19]

Inhaled corticosteroids were frequently prescribed drugs for both adults and children (82 and 64%, respectively). A previous study in Hong Kong showed that the sale of ICS had increased over time and that this was associated with declining asthma mortality.[20] This accords with findings in a US study showing that prescribing of ICS treatment for asthma management had increased over time.[21] On the other hand, oral drugs for asthma also appeared to be popular among Hong Kong doctors. Our study noted that oral beta-2 agonists and oral theophyllines were used by about 50% of the doctors for all or some of their adult patients. About half and one fifth of the doctors respectively prescribed oral beta-2 agonists and oral theophyllines for at least some of their paediatric patients. Similarly oral LTRAs were prescribed by more than a third of our respondents for at least some of their asthma patients. Our

previous report (part of the ISAAC study[22]) had shown a very different pattern of drug prescribing among doctors in Hong Kong and Guangzhou, a province in southern China. In this community-based study on children aged 10 years, among those taking asthma medications in Hong Kong, inhaled beta-2 agonist was the commonest drug treatment (73%), followed by ICS (23%). Oral bronchodilators including theophyllines were infrequently used (<10%). In Guangzhou, inhaled beta-2 agonists were used by 75% of children, but use of ICS (26%), oral beta-2 agonists (26%), oral theophyllines (46%), oral ketotifen (37%), and oral steroids (35%) were not uncommon.[22] Another study in Taiwan found an alarmingly low level of ICS use by paediatricians (only 8%) and at the same time oral beta-2 agonist prescribing was very popular; 70% used it as a monotherapy for asthma management.[23] Thus, it is important to conduct local studies to identify patterns of prescribing as they differ substantially from place to place, probably as a result of differences in culture, doctor and patient expectations, medical resources, and availability of drugs.

Monotherapy with a LABA is not recommended for the management of asthma as it is associated with increased mortality.[10-12] In our survey, 45 and 36% of the doctors would use LABAs to treat at least a few of their adult and paediatric patients, respectively. It is also well known that combined use of ICS and LABAs is more effective than ICS alone for managing asthma[24,25] and safe.[26] Such combined therapy is recommended by international guidelines as the preferred therapy for asthma control, when the patient is not controlled on low-dose ICS alone.[8,9] Although most inhaled LABAs on the market are now formulated in combination with an ICS, salmeterol and formoterol preparations without ICS are still available. More education should be directed at doctors to avoid the potentially dangerous practice of prescribing long-term LABA monotherapy.

According to several studies, the availability of a written action plan was associated with better asthma control.[13,27] There is also evidence that self-management education together with effective drug therapy reduces morbidity and mortality.[28] Symptom-based action plans were also superior to those based on peak flow rates for preventing exacerbations in children with asthma.[29] As in other studies, we found that a written action plan for asthma was not provided by the majority of the doctors.[30,31] More education and promotion of an asthma action plan are needed to improve asthma care in our region.

One of the limitations of our study was its low response rate that was related to its design, to a certain extent. We surveyed all doctors in Hong Kong rather than targeting family physicians, paediatricians, and internists who were more likely to care for asthma patients. The length of the questionnaire employed might have deterred some doctors from spending their precious time in answering the questions. Some investigators provided an incentive for doctors to participate in this type of survey by accrediting points as part of the continuing medical education programme,[13] but we provided no such incentive. Even with the low response rate, we could identify inadequacies in asthma management in this group of enthusiastic doctors (willing to complete the lengthy questionnaire). Conceivably, the overall situation may be even worse, as the majority of the non-respondents may well have been less competent in managing this common disease.

Asthma management by doctors in Hong Kong still falls short of standards recommended in international guidelines. Suboptimal asthma control is attained in the Asia-Pacific and other parts of the world.[4,5,32] Relevant guidelines are readily available, and so more studies are needed to assess the barriers to adherence. Lack of education, training, or awareness of such guidelines may be contributing factors. Previous studies suggest that small-group education and dissemination of locally adapted guidelines were associated with some benefits, in terms of improving the asthma care provided by doctors,[33] whilst interactive workshops could also result in moderate changes in professional practice.[34] It is unclear as to whether medical practitioners in Hong Kong find these guidelines impractical, expensive, difficult to implement, or not in line with their clinical experience. Furthermore, patient factors, such as preferences for treatment, may influence decision on the management plan for asthma, especially in the private sector. More research and work are needed to develop local management guidelines that will be embraced, and provide a continuing education programme to improve asthma management for Hong Kong doctors in all specialties, especially those who graduated more than 20 years ago.

Appendix

Additional material related to this article can be found on the HKMJ website. Please go to <http://www.hkmj.org>, search for the appropriate article, and click on Full Article in PDF following the title.

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APPENDIX. Questions and responses to the clinical scenarios*

Questions and responses†	No. (%)
2A. A 38-year-old male non-smoker, with a peak flow of 85% predicted, uses an inhaled SABA daily for symptoms, and has no nocturnal symptoms or restriction to social or physical activities. This patient would be classified as:	
a) Controlled	151 (37)
b) Partly controlled or uncontrolled	249 (61)
c) Unanswered	10 (2)
2B. If the above patient has been taking no other medication than his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	126 (31)
b) Change as-needed inhaled SABA to scheduled use	27 (7)
c) Add oral $ß_2$ agonist	9 (2)
d) Add theophylline	8 (2)
e) Add leukotriene modifier	58 (14)
f) Add oral steroid	5 (1)
g) Add low-dose ICS	224 (55)
h) Add medium- to high-dose ICS	25 (6)
i) Add combination therapy of ICS and LABA	71 (17)
j) Add injection of anti-IgE once every 2 to 4 weeks	0 (0)
k) Add inhaled anti-cholinergic agent	5 (1)
l) Others	11 (3)
m) Unanswered	11 (3)
2C. If the above patient has already been taking low-dose ICS, in addition to his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	111 (27)
b) Change as-needed inhaled SABA to scheduled use	26 (6)
c) Add oral $ß_2$ agonist	11 (3)
d) Add theophylline	23 (6)
e) Add leukotriene modifier	90 (22)
f) Add oral steroid	8 (2)
g) Double the dose of ICS	136 (33)
h) Change ICS alone to combination therapy of ICS and LABA	178 (43)
i) Add injection of anti-IgE once every 2 to 4 weeks	5 (1)
j) Add inhaled anti-cholinergic agent	19 (5)
k) Others	16 (4)
l) Unanswered	10 (2)
3A. A 46-year-old smoker, with a peak flow of 85% predicted, has symptoms at least thrice a week which require SABA and often require her to stop her activities, and has nocturnal symptoms at least once a week. This patient would be classified as:	
a) Controlled asthma	2 (0.5)
b) Partly controlled asthma or uncontrolled asthma	397 (97)
c) Unanswered	11 (3)
3B. If the above patient has been taking no other medication than her as-needed inhaled SABA, what treatment adjustment will you consider for her?	
a) No change in treatment	1 (0.2)
b) Change as-needed inhaled SABA to scheduled use	84 (20)
c) Add oral agonist	31 (8)
d) Add theophylline	52 (13)
e) Add leukotriene modifier	74 (18)
f) Add oral steroid	27 (7)
g) Add low-dose ICS	197 (48)

h) Add medium- to high-dose ICS	127 (31)
i) Add combination therapy with ICS and LABA	154 (38)
j) Add injection of anti-IgE once every 2 to 4 weeks	3 (1)
k) Add inhaled anti-cholinergic agent	45 (11)
l) Others	68 (17)
m) Unanswered	11 (3)
3C. If the above patient has already been taking low-dose ICS, in addition to her as-needed inhaled SABA, what treatment adjustment will you consider for her?	
a) No change in treatment	7 (2)
b) Change as-needed inhaled SABA agonist to scheduled use	63 (15)
c) Add oral $ß_2$ agonist	32 (8)
d) Add theophylline	64 (16)
e) Add leukotriene modifier	108 (26)
f) Add oral steroid	28 (7)
g) Double the dose of ICS	182 (44)
h) Change inhaled steroid alone to combination therapy of ICS and LABA	262 (64)
i) Add injection of anti-IgE once every 2 to 4 weeks	8 (2)
j) Add inhaled anti-cholinergic agent	56 (14)
k) Others	39 (10)
l) Unanswered	13 (3)
3D. If the above patient has already been taking combination therapy with ICS and LABA, in addition to her as-needed inhaled short-acting $ß_2$ agonist, what treatment adjustment will you consider for her?	
a) No change in treatment	19 (5)
b) Change as-needed inhaled SABA to scheduled use	44 (11)
c) Add oral $ß_2$ agonist	49 (12)
d) Add theophylline	123 (30)
e) Add leukotriene modifier	173 (42)
f) Add oral steroid	73 (18)
g) Increase the strength/dose of her existing combination therapy	217 (53)
h) Add injection of anti-IgE once every 2 to 4 weeks	15 (4)
i) Add inhaled anti-cholinergic agent	76 (19)
j) Others	43 (10)
k) Unanswered	13 (3)
4A. A 54-year-old smoker, with a peak flow of 85% predicted, has symptoms only while running but never at rest. He was hospitalised for an exacerbation last year requiring nebulised SABA and a steroid burst and taper. This patient would be classified as:	
a) Controlled asthma	84 (20)
b) Partly controlled asthma or uncontrolled asthma	313 (76)
c) Unanswered	13 (3)
4B. If the above patient has been taking no other medication than his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	104 (25)
b) Change as-needed inhaled SABA to scheduled use	34 (8)
c) Add oral $ß_2$ agonist	17 (4)
d) Add theophylline	33 (8)
e) Add leukotriene modifier	71 (17)
f) Add oral steroid	14 (3)
g) Add low-dose ICS	185 (45)
h) Add medium- to high-dose ICS	41 (10)
i) Add combination therapy	63 (15)

j) Add injection of anti-IgE once every 2 to 4 weeks	4 (1)
k) Add inhaled anti-cholinergic agent	30 (7)
l) Others	72 (18)
m) Unanswered	13 (3)
4C. If the above patient has already been taking low-dose ICS, in addition to his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	98 (24)
b) Change as-needed inhaled SABA to scheduled use	28 (7)
c) Add oral $ß_2$ agonist	17 (4)
d) Add theophylline	52 (13)
e) Add leukotriene modifier	90 (22)
f) Add oral steroid	14 (3)
g) Double the dose of ICS	131 (32)
h) Change inhaled steroid alone to combination therapy	159 (39)
i) Add injection of anti-IgE once every 2 to 4 weeks	9 (2)
j) Add inhaled anti-cholinergic agent	45 (11)
k) Others	45 (11)
j) Unanswered	13 (3)
5A. A 36-year-old non-smoker, with an peak flow of 65% predicted, has symptoms requiring SABA 3 to 4 times a week and rare nocturnal symptoms. This patient would be classified as:	
a) Controlled asthma	5 (1)
b) Partly controlled asthma or uncontrolled asthma	388 (95)
c) Unanswered	17 (4)
5B. If the above patient has been taking no other medication than his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	6 (1)
b) Change as-needed inhaled SABA to scheduled use	87 (21)
c) Add oral $ß_2$ agonist	39 (10)
d) Add theophylline	55 (13)
e) Add leukotriene modifier	84 (20)
f) Add oral steroid	47 (11)
g) Add low-dose ICS	169 (41)
h) Add medium- to high-dose ICS	164 (40)
i) Add combination therapy	165 (40)
j) Add injection of anti-IgE once every 2 to 4 weeks	9 (2)
k) Add inhaled anti-cholinergic agent	33 (8)
l) Others	11 (3)
m) Unanswered	15 (4)
5C. If the above patient has already been taking low-dose ICS, in addition to his as-needed SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	8 (2)
b) Change as-needed inhaled SABA to scheduled use	58 (14)
c) Add oral $ß_2$ agonist	42 (10)
d) Add theophylline	70 (17)
e) Add leukotriene modifier	115 (28)
f) Add oral steroid	56 (14)
g) Double the dose of ICS	190 (46)
h) Change inhaled steroid alone to combination therapy	262 (64)
i) Add injection of anti-IgE once every 2 to 4 weeks	5 (1)
j) Add inhaled anti-cholinergic agent	42 (10)

k) Others	9 (2)
l) Unanswered	15 (4)
5D. If the above patient has already been taking combination therapy of ICS and LABA, in addition to his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	17 (4)
b) Change as-needed inhaled SABA to scheduled use	39 (10)
c) Add oral $ß_2$ agonist	48 (12)
d) Add theophylline	141 (34)
e) Add leukotriene modifier	186 (45)
f) Add oral steroid	92 (22)
g) Increase the strength/dose of his existing combination therapy	192 (47)
h) Add injection of anti-IgE once every 2 to 4 weeks	28 (7)
i) Add inhaled anti-cholinergic agent	60 (15)
j) Others	16 (4)
k) Unanswered	18 (4)
6A. A 40-year-old non-smoker experienced twice or less of daytime asthma symptoms per week in the past 3 months. He also had no nocturnal symptoms and limitations of activities. He used the as-needed inhaled SABA for less than 2 times a week and his peak flow was 85% predicted normal. This patient would be classified as:	
a) Controlled asthma	194 (47)
b) Partly controlled or uncontrolled asthma	200 (49)
c) Unanswered	16 (4)
6B. If the above patient has already been taking low-dose ICS, in addition to his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
a) No change in treatment	195 (48)
b) Stop his ICS	40 (10)
c) Halve the dose of his ICS	51 (12)
d) Add theophylline	25 (6)
e) Add leukotriene modifier	50 (12)
f) Double the dose of inhaled steroid	58 (14)
g) Change inhaled steroid alone to combination therapy	94 (23)
h) Add injection of anti-IgE once every 2 to 4 weeks	8 (2)
i) Others	7 (2)
j) Unanswered	15 (4)
6C. If the above patient has already been taking combination therapy of a medium dose of ICS and LABA, in addition to his as-needed inhaled SABA what treatment adjustment will you consider for him?	
a) No change in treatment	115 (28)
b) Stop the combination ICS and LABA	13 (3)
c) Stop the ICS and keep the LABA	14 (3)
d) Stop the LABA and keep the ICS	83 (20)
e) Half the dose of ICS and keep LABA	71 (17)
f) Add leukotriene modifier	80 (20)
g) Increase the strength/dose of his existing combination therapy	88 (21)
h) Add injection of anti-IgE once every 2 to 4 weeks	9 (2)
i) Others	12 (3)
j) Unanswered	16 (4)
7A. A 28-year-old pregnant lady at 20 weeks of gestation, with a peak flow of 85% predicted, uses an inhaled SABA daily for symptoms, and has no nocturnal symptoms or restriction to social or physical activities. This patient would be classified as:	
a) Controlled asthma	163 (40)
b) Partly controlled asthma or uncontrolled	232 (57)
c) Unanswered	15 (4)

7B.	If the above patient has been taking no other medication than her as-needed inhaled SABA, what treatment adjustment will you consider for her?	
	a) No change in treatment	183 (45)
	b) Change as-needed inhaled SABA to scheduled use	33 (8)
	c) Add oral $ß_2$ agonist	7 (2)
	d) Add theophylline	7 (2)
	e) Add leukotriene modifier	19 (5)
	f) Add oral steroid	1 (0.2)
	g) Add low-dose ICS	148 (36)
	h) Add medium- to high-dose ICS	16 (4)
	i) Add combination therapy	30 (7)
	j) Add injection of anti-IgE once every 2 to 4 weeks	3 (1)
	k) Add inhaled anti-cholinergic agent	2 (0.5)
	l) Others	7 (2)
	m) Unanswered	16 (4)
8A.	A 6-year-old boy, with a peak flow of 85% predicted, has symptoms at least thrice a week. He often requires stopping his physical activities (like running) due to asthma symptoms. He also has nocturnal symptoms at least once a week. This patient would be classified as:	
	a) Controlled asthma	3 (1)
	b) Partly controlled asthma or uncontrolled	394 (96)
	c) Unanswered	13 (3)
8B.	If the above patient has been taking no other medication than his as-needed inhaled SABA, what treatment adjustment will you consider for him?	
	a) No change in treatment	6 (1)
	b) Change as-needed inhaled SABA to scheduled use	65 (16)
	c) Add oral $ß_2$ agonist	18 (4)
	d) Add theophylline	23 (6)
	e) Add leukotriene modifier	154 (38)
	f) Add oral steroid	16 (4)
	g) Add low-dose ICS	264 (64)
	h) Add medium- to high-dose ICS	41 (10)
	i) Add combination therapy	108 (26)
	j) Add injection of anti-IgE once every 2 to 4 weeks	9 (2)
	k) Add inhaled anti-cholinergic agent	18 (4)
	l) Others	13 (3)
	m) Unanswered	16 (4)

* ICS denotes inhaled corticosteroid, IgE immunoglobulin E, LABA long-acting $ß_2$ agonist, and SABA short-acting $ß_2$ agonist

† Highlighted boxes denotes correct or preferred answers