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Physicians' Preferences for Asthma Guidelines Implementation

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Purpose: Patient care based on asthma guidelines is cost-effective and leads to improved treatment outcomes. However, ineffective implementation strategies interfere with the use of these recommendations in clinical practice. This study investigated physicians' preferences for asthma guidelines, including content, supporting evidence, learning strategies, format, and placement in the clinical workplace. **Methods:** We obtained information through a questionnaire survey. The questionnaire was distributed to physicians attending continuing medical education courses and sent to other physicians by airmail, e-mail, and facsimile. **Results:** A total of 183 physicians responded (male to female ratio, 2.3:1; mean age, 40.4±9.9 years); 89.9% of respondents were internists or pediatricians, and 51.7% were primary care physicians. Physicians preferred information that described asthma medications, classified the disease according to severity and level of control, and provided methods of evaluation/treatment/monitoring and management of acute exacerbation. The most effective strategies for encouraging the use of the guidelines were through continuing medical education and discussions with colleagues. Physicians required supporting evidence in the form of randomized controlled trials and expert consensus. They preferred that the guidelines be presented as algorithms or flow charts/flow diagrams on plastic sheets, pocket cards, or in electronic medical records. **Conclusions:** This study identified the items of the asthma guidelines preferred by physicians in Korea. Asthma guidelines with physicians' preferences would encourage their implementation in clinical practice.

Key Words: Asthma; practice guideline; physician's practice patterns

INTRODUCTION

Bronchial asthma is an airway disease caused by allergic inflammation. It is characterized by bronchial hyperresponsiveness and reversible airway obstruction.[1,2] The prevalence of asthma has increased worldwide[3,4]; in Korea it is reported to be between 2% and 13%.[5,6] The total cost of the disease in Korea was estimated at US $200 million in 2004 according to National Health Insurance Corporation data. This was spent on direct health care costs, such as hospital admission and medications, and indirect health care costs, such as loss of work time and early death.[6,7]

As the prevalence and socioeconomic burden of asthma increased, the Global Initiative for Asthma (GINA) was created. In 1992, this network of experts published and disseminated evidence-based guidelines for asthma treatment. These were widely adopted and have been continuously revised on the basis of updated knowledge. In 2006, these revisions reflected the concept of asthma control.[1] The Korean Academy of Asthma, Allergy, and Clinical Immunology proposed asthma guidelines in 1994, and revised them in 1998 and 2003 on the basis of the results of international and domestic studies. In 2007, Korean adult asthmatic guidelines, which reflect the epidemiologic reality and regional characteristics of the disease, were developed.[8]

Asthma guidelines are developed to minimize the gap between scientific development and treatment methods and to provide a standard approach to the diagnosis and treatment of the disease. The guidelines decrease trial errors, facilitate standard treatment, save health care costs, and reduce resource utilization. Thus, they exert a positive effect on asthmatic patients and health care providers.[9-11]

Despite the usefulness of asthma guidelines, some physicians

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do not follow the recommendations, which leads to incorrect prescriptions and inappropriate patient management.[11,12] A study on the recognition and clinical use of asthma guidelines indicated that 57% of physicians understood the recommendations, but they prescribed inhaled corticosteroids to as few as 10% of patients and oral corticosteroids to as many as 28%.[13] It also reported that the asthma control rate was much improved when the guidelines were strictly followed.[13] For these reasons, it is important that physicians understand and adhere to the appropriate recommendations.[7,13-16]

The aim of the current study was to use a questionnaire survey to identify physicians' preferences for information content, type of evidence, learning strategies, guidelines format, and guidelines placement in the clinical workplace.

MATERIALS AND METHODS

Subjects

Questionnaires were distributed to physicians attending continuing medical education courses (the 2008 educational lecture program of the Korean Academy of Asthma, Allergy, and Clinical Immunology; the Seoul National University Hospital allergy lecture program; the Yonsei allergy lecture program for primary care physicians). They were also sent to other primary care physicians by airmail, email, and facsimile. The questionnaires were answered by the self-report method. A total of 116 questionnaires were collected from the physicians attending continuing medical education courses (response rate, 19%), and a total of 67 questionnaires were collected from other primary care physicians (response rate, 12%). Physicians' preferences for asthma guidelines were investigated in the 183 respondents.

Format of the questionnaire

The questionnaire consisted of two parts: one covering basic characteristics of the respondent, and the other evaluating the physicians' preferences for asthma guidelines. Basic characteristics included age, sex, kind of hospital the physicians worked at (primary care clinic, secondary/tertiary care medical center), duration of medical practice, and primary specialty. Physicians' preferences included questions on 48 items in five sections including information content, type of evidence, learning strategies, format of the guidelines, and placement of the guidelines. Each item was rated on a 4-point Likert scale: 1=no preference; 2=slight preference; 3=moderate preference; and 4=strong preference. The list of items was based on those identified by Stone et al.[17], but modified due to the specificity of the asthma guidelines and the epidemiologic reality of the disease in Korea. The detailed items in each section were as follows: (1) Section I, guidelines content: questions about definitions, mechanisms, epidemiology/socioeconomic burden, diagnosis, classification according to severity and level of control, asthma medications, patient-physician relationships, causative and aggravating risk factors, assessment/treatment/monitoring, management of acute exacerbation, special situations (pregnancy, surgery, etc.), and dissemination of guidelines; (2) Section II, types of evidence: questions about randomized controlled trials, expert consensus, independent original research, meta-analysis, national representative studies, locally conducted studies, and case studies; (3) Section III, learning strategies: questions about discussions with colleagues, continuing medical education, reminder notes or stickers on the front of medical charts, use of clinical pathway reminders, verbal reminders from the nurse or patient, departmental memos, and electronic newsletters directed at the physician; (4) Section IV, guidelines format: questions about flow charts/flow diagrams, algorithms, preprinted orders, check sheets, decision trees, order sets/templates, clinical pathways, electronic medical records, interactive computerized aids, expert systems, pamphlets, and comprehensive med-

Table 1. Baseline characteristics of subjects

Characteristics	Number (%)
Sex	
Male	127/183 (69.4)
Female	56/183 (30.6)
Age (yr)*	
≤30	30/178 (16.9)
31-40	73/178 (41.0)
41-50	45/178 (25.2)
≥51	30/178 (16.9)
Type of hospital where the physician was working*	
Primary	91/176 (51.7)
Secondary	30/176 (17.0)
Tertiary	55/176 (31.3)
Duration of medical practice (yr)*	
≤5	68/180 (37.6)
6-10	38/180 (21.0)
11-15	22/180 (12.2)
16-20	20/180 (11.0)
≥21	32/180 (17.7)
Primary specialty*	
Internal medicine	119/178 (66.9)
Pediatrics	41/178 (23.0)
Family medicine	10/178 (5.6)
Others†	8/178 (4.5)
Experience of asthma patient care	
Yes	174/183 (95.1)
No	9/183 (4.9)
Implementation of the asthma guideline*	
Yes	120/181 (66.3)
No	61/181 (33.7)

*Questions with some missing responses. †Others: otorhinolaryngology, emergency medicine, surgery.

ical books; (5) Section V, the placement of guidelines in the clinical workplace: questions about the front of the patients' charts, electronic pocket books/PDAs, progress notes, electronic medical records, nurses' stations, pocket cards, plastic sheets, patients' bedsides, and hospital/clinic Web sites.

Statistical analysis

The scores of the 48 items were expressed as means±SD, and the physicians' preferences were ranked. Comparisons of mean values were made with repeated-measures ANOVA and the Tukey's method of multiple comparisons. Chi-square test was used for comparisons of preferences between two groups, which were separated according to the subject's characteristics. All statistical analyses were performed using SPSS version 12.0 (SPSS Inc., Chicago, IL, USA). A *P*-value of <0.05 was considered statistically significant.

RESULTS

Basic characteristics of subjects

Males accounted for 69.4% of all respondents; the mean age of the respondents was 40.4±9.9 years (range, 26–68 years). Patients' physicians included 91 physicians working at primary care clinics (group A) and 85 at secondary or tertiary care medical centers (group B); 89.9% were internists (physicians who specialized in internal medicine) and pediatricians. Of these physicians, 95.1% had experience with asthma patient care, but only 66.3% used the asthma guidelines (group A, 62.2%; group B, 71.8%) (Table 1).

Physicians' preferences for the asthma guidelines

Results pertaining to the content of the guidelines showed that the respondents preferred, in descending order of frequency, information about medications, a classification of the disease according to severity and level of control, recommendations for management during acute exacerbation, diagnoses, and evaluation/treatment/monitoring. Definitions, information about patient–physician relationships, mechanisms, and epidemiology/socioeconomic burden were less preferred. The physicians preferred randomized controlled trials, expert consensus, and meta-analyses as evidence on which the recommendations were based; they were not interested in locally conducted studies and case studies. The preferred strategy for learning about the guidelines was through continuing medical education, followed by

Table 2. Rating of physicians' preferences for implementation of the asthma guideline

Section I Guideline content	Mean±SD	Not at all useful n (%)	Not very useful n (%)	Somewhat useful n (%)	Extremely useful n (%)
Asthma medications	3.58±0.68	4 (2.2)	7 (3.9)	49 (27.2)	120 (66.7)
Classification according to severity and level of control	3.51±0.74	6 (3.3)	9 (5.0)	53 (29.4)	112 (62.2)
Management of acute exacerbation	3.46±0.70	4 (2.2)	9 (5.0)	67 (37.0)	101 (55.8)
Diagnosis	3.39±0.68	3 (1.7)	11 (6.1)	79 (43.9)	87 (48.3)
Assessment, treatment, monitoring	3.36±0.69	2 (1.1)	16 (8.9)	77 (43.0)	84 (46.9)
Causative and aggravating factors	3.25±0.74	4 (2.2)	20 (11.2)	83 (46.4)	72 (40.2)
Guideline dissemination	3.21±0.83	9 (5.0)	20 (11.1)	75 (41.7)	76 (42.2)
Special considerations (pregnancy, surgery, etc.)	3.16±0.81	5 (2.8)	31 (17.4)	72 (40.4)	70 (39.3)
Definition	2.88±0.95	16 (9.0)	44 (24.7)	63 (35.4)	55 (30.9)
Patient-physician relationship	2.85±0.86	11 (6.2)	47 (26.4)	77 (43.3)	43 (24.2)
Mechanism	2.60±0.94	21 (11.8)	65 (36.5)	56 (31.5)	36 (20.2)
Epidemiology/socio-economic burden	2.44±0.87	25 (14.0)	69 (38.8)	64 (36.0)	20 (11.2)

1=not at all useful, 2=not very useful, 3=somewhat useful, 4=extremely useful.

Section II Type of evidence	Mean±SD	Not at all useful n (%)	Not very useful n (%)	Somewhat useful n (%)	Extremely useful n (%)
Randomized controlled trials	3.31±0.77	4 (2.3)	21 (11.9)	68 (38.6)	83 (47.2)
Expert consensus	3.28±0.64	0 (0.0)	18 (10.1)	92 (51.4)	69 (38.5)
Meta-analysis	2.99±0.74	4 (2.3)	35 (20.2)	92 (53.2)	42 (24.3)
National representative studies	2.87±0.66	4 (2.3)	39 (22.3)	108 (61.7)	24 (13.7)
Independent original research	2.84±0.66	2 (1.1)	49 (27.5)	103 (57.9)	24 (13.5)
Locally conducted studies	2.64±0.71	11 (6.4)	52 (30.1)	98 (56.6)	12 (6.9)
Case studies	2.61±0.82	16 (9.2)	56 (32.2)	81 (46.6)	21 (12.1)

1=not at all useful, 2=not very useful, 3=somewhat useful, 4=extremely useful.

(continued to the next page)

Table 2. *(continued from the previous page)* Rating of physicians' preferences for implementation of the asthma guideline

Section III Learning strategies	Mean±SD	No preference n (%)	Slightly preference n (%)	Moderate preference n (%)	Strong preference n (%)
Continuing medical education	3.38±0.65	3 (1.7)	8 (4.4)	87 (48.1)	83 (45.9)
Discussions with colleagues	2.74±0.88	17 (9.7)	45 (25.6)	80 (45.5)	34 (19.3)
Reminder notes/stickers on the front of chart	2.28±0.86	32 (18.7)	73 (42.7)	52 (30.4)	14 (8.2)
Clinical pathway reminder	2.18±0.90	41 (24.3)	72 (42.6)	41 (24.3)	15 (8.9)
Electronic physician newsletter	1.96±0.92	66 (38.6)	56 (32.7)	39 (22.8)	10 (5.8)
Departmental memos	1.79±0.81	74 (44.0)	58 (34.5)	34 (20.2)	2 (1.2)
Verbal reminder from patient	1.71±0.79	80 (47.1)	63 (37.1)	23 (13.5)	4 (2.4)
Verbal reminder from nurse	1.59±0.71	90 (52.9)	62 (36.5)	16 (9.4)	2 (1.2)

1=no preference, 2=slightly preference, 3=moderate preference, 4=strong preference.

Section IV Guideline format	Mean±SD	Not at all effective n (%)	Not very effective n (%)	Somewhat effective n (%)	Extremely effective n (%)
Algorithm	3.21±0.75	2 (1.2)	28 (16.3)	74 (43.0)	68 (39.5)
Flow chart/flow diagram	3.16±0.73	2 (1.2)	27 (15.8)	83 (48.5)	59 (34.5)
Decision tree	2.86±0.75	4 (2.4)	48 (28.6)	83 (49.4)	33 (19.6)
Preprinted orders	2.82±0.67	4 (2.4)	44 (25.9)	101 (59.4)	21 (12.4)
Check sheet	2.79±0.70	3 (1.8)	53 (31.5)	88 (52.3)	24 (14.3)
Order sets/templates	2.66±0.72	6 (3.6)	63 (37.7)	79 (47.3)	19 (11.4)
Electronic medical record	2.64±0.78	9 (5.4)	65 (38.7)	71 (42.3)	23 (13.7)
Comprehensive medical book	2.62±0.84	15 (8.9)	59 (34.9)	71 (42.0)	24 (14.2)
Clinical pathway	2.56±0.72	10 (6.1)	65 (39.4)	78 (47.3)	12 (7.3)
Expert system	2.49±0.81	17 (10.2)	67 (40.4)	66 (39.8)	16 (9.6)
Pamphlet	2.45±0.83	20 (12.0)	69 (41.3)	61 (36.5)	17 (10.2)
Interactive computerized aid	2.39±0.79	18 (10.8)	80 (48.2)	54 (32.5)	14 (8.4)

1=not at all effective, 2=not very effective, 3=somewhat effective, 4=extremely effective.

Section V Guideline placement	Mean±SD	No preference n (%)	Slightly preference n (%)	Moderate preference n (%)	Strong preference n (%)
Plastic sheet	2.86±0.94	17 (10.0)	37 (21.8)	69 (40.6)	47 (27.6)
Electronic medical record	2.74±1.02	27 (15.7)	35 (20.3)	65 (37.8)	45 (26.2)
Pocket card	2.50±0.96	33 (19.5)	42 (24.9)	70 (41.4)	24 (14.2)
In progress notes	2.34±0.99	43 (25.4)	46 (27.2)	59 (34.9)	21 (12.4)
On hospital/clinic Web site	2.29±1.03	46 (27.5)	51 (30.5)	45 (26.9)	25 (15.0)
On the front of patient chart	2.29±1.09	55 (32.5)	37 (21.9)	50 (29.6)	27 (16.0)
At nurses' station	1.98±0.95	65 (39.6)	47 (28.7)	42 (25.6)	10 (6.1)
Palm pilot/PDA	1.88±0.91	70 (42.2)	55 (33.1)	32 (19.3)	9 (5.4)
At patient bedside	1.83±0.92	77 (46.4)	51 (30.7)	28 (16.9)	10 (6.0)

1=no preference, 2=slightly preference, 3=moderate preference, 4=strong preference.

discussions with colleagues and reminder notes/stickers on the front of medical charts. Departmental memos and verbal reminders from nurses were not favored. In decreasing order of frequency, algorithms, flow charts/flow diagrams, and decision trees were preferable as guidelines formats, but expert systems, pamphlets, and interactive computerized aid were not favored. Physicians preferred that guidelines be placed on plastic sheets or presented as electronic medical records or pocket cards. However, placement at the nurses' stations or patients' bedsides was not preferable. The differences in physicians' preferences for the items in the five sections were statistically significant (P<0.05) (Table 2).

Differences in preferences for asthma guidelines implementation between physician groups A and B

The top three highest scored items in each section were similar

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Table 3. Comparison of the top 3 preferred items for the implementation of the asthma guideline between primary care physicians (Group A) and physicians working at a secondary or tertiary hospital (Group B)

	Group A	Group B
Guideline content	1. Asthma medications	1. Asthma medications
	2. Classification according to severity and level of control	2. Classification according to severity and level of control
	3. Management of acute exacerbation	3. Management of acute exacerbation
Type of evidence	1. Expert consensus	1. Randomized controlled trials
	2. Randomized controlled trials	2. Expert consensus
	3. Meta-analysis	3. Meta-analysis
Learning strategies	1. Continuing medical education	1. Continuing medical education
	2. Discussions with colleagues	2. Discussions with colleagues
	3. Reminder notes/stickers on the front of chart	3. Reminder notes/stickers on the front of chart
Guideline format	1. Algorithm	1. Algorithm
	2. Flow chart/flow diagram	2. Flow chart/flow diagram
	3. Check sheet	3. Decision tree
Placement	1. Plastic sheet	1. Plastic sheet
	2. Electronic medical record	2. Electronic medical record
	3. Pocket card	3. Pocket card

in groups A and B. However, group A's greater preference for an expert consensus as the type of evidence was not significant, but group B's preference for randomized controlled trials was (P=0.009). Algorithms and flow charts/flow diagrams were the most preferred guidelines formats for groups A and B, followed by check sheets in group A and decision trees in group B. No significant differences in physicians' preferences for check sheets and decision trees between groups A and B were found (Table 3).

Differences in preferences for learning strategies

Questionnaires were collected from physicians attending continuing medical educational courses and lecture programs (n=116) and from other physicians who received them by airmail, email, and facsimile (n=67). Physicians attending continuing medical education courses preferred continuing medical education as a learning strategy (3.42±0.72) compared with physicians receiving questionnaires by airmail, email, and facsimile (3.31±0.56), but the difference was not statistically significant (P=0.285).

DISCUSSION

Physicians lack knowledge about the mechanisms of asthma, but treatment guidelines that facilitate the implementation of standard case management are readily available. These reduce resource utilization, increase patient satisfaction, and promote health.[8–10] However, the volume of the guidelines means that physicians do not have time to read and memorize the full details.[17,18] Furthermore, the recommended objective diagnostic methods such as pulmonary function tests and skin testing are difficult to perform, so primary care physicians do not successfully evaluate, treat, and monitor asthmatic patients due to a lack of confidence in diagnosis and assessment.[18–20] Ting[21] found that 95% of 69 primary care physicians were aware of the existence of the asthma guidelines. Although he educated 70% of these physicians in the use of the guidelines, 3–6 months later, Ting[21] found that 90% of the physicians incorrectly classified their patients according to severity, 75% used inhaled corticosteroids inappropriately, and 60% failed to apply the guidelines in clinical settings. These data indicate that the factors influencing physicians' attitudes toward the guidelines and the success of their implementation must be investigated. The objective of such studies should be to encourage dissemination of the recommendations and their application in clinical practice and to provide guidance for the government health care agencies and academic societies responsible for their development.

In the present study, respondents preferred immediately available information that described asthma medications, classified the disease according to severity and level of control, and provided methods of evaluation/treatment/monitoring and management of acute exacerbation. These preferences reflect the need to facilitate rapid decision making in the clinical setting. Physicians required the guidelines format to be practical and presented as algorithms and flow charts/flow diagrams on plastic sheets, pocket cards, and electronic medical records. These data indicate that the contents of the asthma guidelines that interest physicians should be summarized and disseminated as convenient and easily accessible tools.

The dissemination of the guidelines to physicians through continuing medical education such as lecture programs provides a valuable opportunity to promote an understanding of the recommendations. The results of the present study imply that continuing medical education provided by expert physicians and discussions with colleagues are extremely important in the im-

plementation of the guidelines. Expert physicians should be involved in the development of the guidelines for their successful dissemination and implementation, and expert consensus and randomized controlled trials should be presented as evidence for the recommendations.

Few reports have described physicians' preferences for the implementation of asthma guidelines. Stone et al.[17] investigated physicians' preferences for pediatric asthma guidelines. According to their study, physicians preferred algorithms and flow sheets presented as electronic pocket books or on the front of patients' charts and progress notes; the most important learning strategy was through discussions with colleagues. In a previous study on the guidelines for acute pancreatitis, Stone et al.[22] demonstrated that physicians preferred short notes or stickers on the front of patients' charts. Although it is not easy to compare our results directly with other studies conducted with different populations, physicians seems to prefer more concise and immediately available guidelines which are practical to use.

The current study had some limitations. Only a small number of physicians responded to the questionnaire. It was difficult to generalize our results, as they were based on comparisons of respondents, and we did not have detailed information on nonrespondents. In addition, the current study did not reflect differences in opinions that may have been influenced by regional characteristics or hospital training. Further studies with a larger sample size and a more comprehensive range of variables are needed to confirm our results. However, our study is the first in Korea to investigate physicians' preferences for implementation of asthma guidelines. It provides information that can be used to direct future asthma guidelines development and implementation.

In conclusion, our study demonstrated the information content, type of evidence, learning strategies, format, and placement preferred by physicians for asthma guidelines. These should include immediately available and practical items such as information pertaining to medications, classifications according to severity of disease and levels of control, management of acute exacerbation, and evaluation/treatment/monitoring strategies. Randomized controlled trials and expert consensus should be emphasized when describing the evidence on which the recommendations are based. Continuing medical education through academic societies and government health care agencies is necessary for learning the guidelines. Information should be summarized as algorithms or flow sheets on plastic sheets, pocket cards, or electronic medical records that are convenient for physicians to use in the clinical setting.

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