

Prevalence and barriers of providing written asthma action plan by primary care physicians in Saudi Arabia (2019); a multivariate regression analysisOmar Mousa Alshamrani¹, Sultan Musaed Albalawi¹, Ayman Afify², Mustafa Kofi³

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Type of article: Original**Abstract**

Background: Personalized written asthma action plans (WAAP) can assist self-management of asthma and improve management outcomes. In Saudi Arabia, data assessing the adherence with providing WAAP are decidedly lacking.

Objective: To determine the prevalence of providing WAAP and its perceived barriers by family physicians.

Methods: A cross-sectional study was conducted among family physicians working in family medicine clinics of Prince Sultan Military Medical City (Riyadh, Saudi Arabia) during November 2019. Physicians were asked to fill in a researcher-made study questionnaire that included potential WAAP barriers. IBM© SPSS© Statistics version 21 was used for statistical analyses.

Results: Out of 202 physicians included in the current study, only 34 (16.8%) were providing WAAP for their patients with asthma. Only 6.8% of the patients seen by the study physicians were receiving WAAP. In multivariate logistic regression analysis, larger number of patients encountered per month and non-adherence of patients to management plans were significantly associated with providing WAAP. Odds ratios (OR) were “OR: 1.02, 95% CI: 1.01-1.04, p=0.009” and “OR: 3.33, 95% CI: 1.40-7.87, p=0.006. On the other hand, lack of awareness with WAAP recommendations was significantly associated with not providing WAAP (OR: 0.19, 95% CI: 0.04-0.89, p=0.035).

Conclusions: The finding confirms the low utilization of WAAP at primary care setting in Saudi Arabia, which is probably reflecting a limited education and training rather than a negative attitude towards WAAP. The findings underscore the need to raise the awareness of family physicians with WAAP recommendations and the need to fix some workflow issues.

Keywords: Written asthma action plans, Physician, Bronchial asthma, Utilization management, Primary care, Saudi Arabia

Abbreviations / Acronyms:

PSMMC: Prince Sultan Military Medical City, **WAAP:** Personalized written asthma action plan

1. Introduction

Bronchial asthma is the most prevalent chronic respiratory disease worldwide (1). Its burden has been increasing globally in the last two decades (1). Asthma causes significant mortality, morbidity, disability, and financial burden for patients, families, and healthcare systems (1, 2). Proper asthma management is highly influenced by early and accurate diagnosis (3). Additionally, asthma management should be individualized based on age, underlying etiology, severity of symptoms, and response to medications (3, 4). The prevalence of asthma in Saudi Arabia is thought to be slightly higher than international rates and is considered one of the highest rates in the Middle East (5, 6). Additionally, the prevalence of uncontrolled asthma among asthmatic patients is still unacceptably high; 59.3%

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in children and 68% in adults (7-9). This may reflect the suboptimal adherence of both patients and physicians with asthma management guidelines (10-12). According to national and international guidelines, patients with asthma should be provided with an individualized written asthma action plan (WAAP) to improve self-management (3, 4). The use of WAAP has been associated with improved patients' knowledge about asthma and its management, improved quality of life, and reduction of asthma exacerbation and emergency visits (13-15). Nevertheless, the use of WAAP at primary care setting is still unacceptably low in many countries (16-19). Several factors have been put forward as to why physicians are discouraged from providing WAAP for their patients, such as pressure of time, lack of resources, and inadequate awareness of physicians (20, 21). In Saudi Arabia, there is an absolute lack of studies assessing the adherence of primary care physicians with providing WAAP and its influencing factors. In an effort to improve asthma management at primary care setting at the Prince Sultan Military Medical City (PSMMC) and to assess the adherence of primary care physicians with WAAP use, we thought to determine the prevalence of providing WAAP and its barriers as perceived by family physicians.

2. Material and Methods

2.1. Research design and setting

It was a cross-sectional study conducted during November 2019. The study was conducted at 15 family medicine centers at PSMMC. These centers are distributed in all regions of Riyadh, Saudi Arabia. Both triage and booked clinics were included. Each primary health care center at PSMMC consists of several general clinics, pharmacy, laboratory, treatment room and radiology room. The centers provide free primary care services, including diagnosis and basic treatment of acute and chronic diseases, maternal and child health, immunization for communicable diseases, screening for several healthcare problems, and health education and promotion.

2.2. Study population

The study targeted family physicians working in family medicine clinics during November 2019, who were willing to participate in the study irrespective of their age, gender, nationality, and professional category. Non-clinical physicians such as administrators and those in specialties not likely to manage patients with asthma were excluded.

2.3. Sample size and sampling

Previous studies done internationally showed a wide variability of the prevalence of using WAAP by family physicians which ranged between 4% and 39% (16-19). It was then estimated that approximately 196 physicians would be required to detect a WAAP prevalence of 20% with two-sided confidence limits of 5%, using 80% power level and 95% two-sided significance level. Since the number of target family physicians was limited, all family physicians at PSMMC were approached using a convenience sampling technique. They were reached directly at their centers during clinic times. Included physicians were asked to sign informed consent after explaining the objectives of the study and before data collection.

2.4. Instrument, validity and reliability

The data were collected using a researcher-made structured study questionnaire (Table 1). This included data on socio-demographic characteristics, professional and clinical characteristics, and the barriers for providing WAAP for patients with asthma. The questionnaire was self-completed by the physicians. The face (how much questions cover the study objectives) and content validity (scientific merit of questions) of the questionnaire were evaluated by three experts in family medicine, asthma, and research. The questionnaire was slightly modified based on the expert suggestions. The barrier part of the questionnaire had high reliability with Cronbach's alpha of 0.809.

2.5. Statistical analysis

Categorical variables were presented as frequencies and percentage while continuous variables were presented as means and standard deviations (SD). Socio-demographic characteristics, professional and clinical characteristics, and the barriers for providing WAAP were compared between physicians who were and those who were not providing WAAP for asthma patients. Chi-square or Fisher's exact test, as appropriate, were used to detect significant differences in categorical variables while student t-test or Mann-Whitney test, as appropriate, were used to detect significant differences in continuous variables. To identify factors independently associated with providing WAAP, multivariate logistic regression analysis models were run after adjusting for the variables that were significantly associated with providing WAAP in univariate analysis. All P-values were two-tailed. P-value <0.05 was considered as significant. IBM® SPSS® Statistics version 21 (IBM® Corp., Armonk, NY, USA) was used for all statistical analyses.

2.6. Ethics of research

The study design obtained all required ethical approvals from the ethical committee of PSMMC.

Table 1. Questionnaire and data collection form

Demographic data	Age (years)								
	Nationality	Saudi	Non Saudi						
	Gender	Male	Female						
	Marital status	Married		Single		Divorced		Widowed	
	Job title	Consultant	Senior registrar	Registrar	SHO	R1	R2	R3	R4
	Experience (year)								
	Family history of asthma	Yes	No						
	Working clinic (most of the times)	Booked	Triage						
Practice	Do you usually manage patients with asthma?	Yes	No						
	How many patients with asthma have you seen in the last month?	Yes	No						
	Have you ever provided WAAP for your patients with asthma?	Yes	No						
	How often do you provide WAAP for your patients with asthma?	Always	Most of times	Sometimes			Never		
	How many patients have you given a WAAP in the last month?	Always	Most of times	Sometimes			Never		
	How often do you refer your patients with asthma to asthma educator?	Always	Most of times	Sometimes			Never		
Barriers (According to your experience, what are the barriers for providing WAAP for patients with asthma?)	There is no time to write it in the clinic	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	High workload	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	Materials (forms) are not available in the clinic	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	Arabic version of materials (forms) are not available in the clinic	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	I am not trained to use WAAP	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	I am not aware about the recommendations for providing WAAP	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	I think that verbal instructions is enough for my patients	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	This is the work of Asthma educator	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	This is the work of nurse	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	Majority of my patients have low level of education	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	Majority of my patients are not adhering to the plans	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	
	The WAAP is not beneficial for the patients with asthma	Strongly agree		Agree	Neutral	Disagree		Strongly disagree	

3. Results

A total 202 physicians were included in this analysis. Out of 202 physicians, only 34 (16.8%) were providing WAAP for their patients with asthma. The socio-demographic characteristics of the included physicians by the status of providing WAAP are shown in Table 2. The average age was 37.2 ± 10.4 years, with almost half of the physicians being less than 35 years (48.3%). Males were slightly more represented than females (56.3% versus 43.7%, respectively). Almost two-thirds (63.9%) of the physicians were Saudi. The majority (78.1%) of the physicians were married, followed by single (21.4%), and finally divorced (0.5%). Only 36.1% of the physicians reported family history of asthma. Age and nationality were significantly associated with providing WAAP. For example, those who were providing WAAP had older age than those who did not provide WAAP (41.7 ± 10.4 versus 36.3 ± 10.2 , $p=0.006$). Non-Saudis represented 52.9% of those who were providing WAAP and 32.7% of those who did not provide WAAP ($p=0.025$).

Table 2. Demographic characteristics by the status of providing written asthma action plan (WAAP) for patients with asthma (n=202)

Variables		Ever providing WAAP		Total (n=202)	p-value
		No (n=168)	Yes (n=34)		
Age (years)	Mean \pm SD	36.3 \pm 10.2	41.7 \pm 10.4	37.2 \pm 10.4	0.006
	<35	88 (52.7%)	9 (26.5%)	97 (48.3%)	0.031
	35-45	47 (28.1%)	14 (41.2%)	61 (30.3%)	
	46-55	22 (13.2%)	9 (26.5%)	31 (15.4%)	
	>55	10 (6.0%)	2 (5.9%)	12 (6.0%)	
Gender	Male	93 (56.0%)	19 (57.6%)	112 (56.3%)	0.870
	Female	73 (44.0%)	14 (42.4%)	87 (43.7%)	
Nationality	Saudi	113 (67.3%)	16 (47.1%)	129 (63.9%)	0.025
	Non-Saudi	55 (32.7%)	18 (52.9%)	73 (36.1%)	
Marital status	Single	37 (22.8%)	5 (14.7%)	42 (21.4%)	0.473
	Married	124 (76.5%)	29 (85.3%)	153 (78.1%)	
	Divorced	1 (0.6%)	0 (0.0%)	1 (0.5%)	
Family history of asthma	No	109 (64.9%)	20 (58.8%)	129 (63.9%)	0.503
	Yes	59 (35.1%)	14 (41.2%)	73 (36.1%)	

Table 3 shows the professional characteristics of included physicians by the status of providing WAAP. All job titles were represented with residents and registrars (31.3% and 26.4%, respectively) more frequent than other job titles. The average duration of experience was 11.3 ± 9.3 years. The most frequent working clinics were booked clinics (58.4%), followed by triage clinics (32.7%), and finally both booked and triage clinics (8.9%). The average number of patients encountered per month was 15.5 patients (median 8 patients). Out of them, an average of 0.8 patients were provided with WAAP, which represent 6.8% of the patients encountered. The majority (86.6%) of the physicians were managing patients with asthma. Only 14.3% were always (2.9%) or often (11.4%) referring their patients with asthma to an asthma educator. Providing WAAP was significantly associated with longer years of experience (14.3 ± 9.7 versus 10.6 ± 9.1 , $p=0.024$), larger number of patients encountered per month (23.5 ± 24.1 versus 13.8 ± 18.6 , $p=0.001$), and managing patients with asthma (100.0% versus 83.9%, $p=0.010$).

Table 4 shows potential barriers for providing WAAP by the actual status of providing WAAP. Both those who provided and those who did not provided WAAP perceived a similar number of barriers (4.8 ± 2.6 versus 5.0 ± 2.1 , $p=0.615$). Important barriers for providing WAAP as perceived by family physicians included lack of materials (forms) in the clinic (81.3%), lack of an Arabic version of materials (forms) in the clinic (78.9%), high workload (74.6%), and lack of time to write WAAP in the clinic (70.9%). On the other hand, less important barriers for providing WAAP as perceived by family physicians included the belief that WAAP is the nurses responsibility (6.6%), the belief that WAAP is not beneficial for the patients with asthma (7.0%), lack of physician awareness about the recommendations for providing WAAP (21.2%), and the belief that verbal instruction is enough for advising patients with asthma (26.5%). Lack of physician training to use WAAP (33.1% versus 15.6%, $p=0.049$) and lack of physician awareness with WAAP recommendations (24.2% versus 6.1%, $p=0.020$) were significantly higher among those who did not provide WAAP while non-adherence of patients to the plans was significantly higher among those who were providing WAAP (58.8% versus 38.8%, $p=0.031$).

Table 3. Professional characteristics by the status of providing written asthma action plan (WAAP) for patients with asthma (n=202)

Variables		Ever providing WAAP		Total (n=202)	p-value
		No (n=168)	Yes (n=34)		
Job title	Senior house officer (SHO)	11 (6.6%)	4 (11.8%)	15 (7.5%)	0.155
	Resident	58 (34.7%)	5 (14.7%)	63 (31.3%)	
	Registrar	42 (25.1%)	11 (32.4%)	53 (26.4%)	
	Senior registrar	22 (13.2%)	5 (14.7%)	27 (13.4%)	
	Consultant	34 (20.4%)	9 (26.5%)	43 (21.4%)	
Duration of experience (years)	Mean \pm SD	10.6 \pm 9.1	14.3 \pm 9.7	11.3 \pm 9.3	0.024
	<5	49 (31.6%)	6 (17.6%)	55 (29.1%)	0.003
	5-10	54 (34.8%)	7 (20.6%)	61 (32.3%)	
	11-20	25 (16.1%)	15 (44.1%)	40 (21.2%)	
	>20	27 (17.4%)	6 (17.6%)	33 (17.5%)	
Working clinic	Booked	103 (61.3%)	15 (44.1%)	118 (58.4%)	0.070
	Triage	53 (31.5%)	13 (38.2%)	66 (32.7%)	
	Both	12 (7.1%)	6 (17.6%)	18 (8.9%)	
Monthly patients with asthma	Number encountered	13.8 \pm 18.6	23.5 \pm 24.1	15.5 \pm 20.0	0.001
	Number provided WAAP	0.0 \pm 0.0	4.8 \pm 4.8	0.8 \pm 2.7	<0.001
	Percentage provided WAAP	0.0% \pm 0.0%	39.4% \pm 32.8%	6.8% \pm 20.1%	<0.001
Managing patients with asthma	No	27 (16.1%)	0 (0.0%)	27 (13.4%)	0.010
	Yes	141 (83.9%)	34 (100.0%)	175 (86.6%)	
Referring patients with asthma to asthma educator	Never	58 (41.1%)	12 (35.3%)	70 (40.0%)	0.441
	Sometimes	65 (46.1%)	15 (44.1%)	80 (45.7%)	
	Often	15 (10.6%)	5 (14.7%)	20 (11.4%)	
	Always	3 (2.1%)	2 (5.9%)	5 (2.9%)	

Table 4. Barriers for providing written asthma action plan (WAAP) for patients with asthma by the status of actual providing WAAP among included physicians (n=202)

Variables		Ever providing WAAP		Total (n=202)	p-value
		No (n=168)	Yes (n=34)		
Number of barriers perceived		5.0 \pm 2.1	4.8 \pm 2.6	4.9 \pm 2.2	0.615
Specific barriers perceived	There is no time to write it in the clinic	120 (72.7%)	21 (61.8%)	141 (70.9%)	0.200
	High workload	125 (76.7%)	22 (64.7%)	147 (74.6%)	0.144
	Materials (forms) are not available in the clinic	135 (82.3%)	26 (76.5%)	161 (81.3%)	0.426
	Arabic version of materials (forms) are not available in the clinic	132 (79.5%)	25 (75.8%)	157 (78.9%)	0.629
	I am not trained to use WAAP	54 (33.1%)	5 (15.6%)	59 (30.3%)	0.049
	I am not aware about the recommendations for providing WAAP	40 (24.2%)	2 (6.1%)	42 (21.2%)	0.020
	I think that verbal instructions is enough for my patients	43 (25.9%)	10 (29.4%)	53 (26.5%)	0.673
	This is the work of Asthma educator	49 (29.5%)	12 (35.3%)	61 (30.5%)	0.505
	This is the work of nurse	9 (5.5%)	4 (11.8%)	13 (6.6%)	0.245
	Majority of my patients have low level of education	48 (29.4%)	12 (37.5%)	60 (30.8%)	0.367
	Majority of my patients are not adhering to the plans	64 (38.8%)	20 (58.8%)	84 (42.2%)	0.031
	The WAAP is not beneficial for the patients with asthma	10 (6.1%)	4 (11.8%)	14 (7.0%)	0.266

Table 5 shows the results of univariate and multivariate logistic regression analysis of potential predictors of providing WAAP. In univariate analysis, older age, non-Saudi nationality, combined working in booked and triage

clinics, longer years of experience, larger number of patients encountered per month, managing patients with asthma, and non-adherence of patients to the plans were significantly associated with providing WAAP while lack of physician training to use WAAP and lack of physician awareness with WAAP recommendations were significantly associated with not providing WAAP. In multivariate logistic regression analysis, larger number of patients encountered per month and non-adherence of patients to the plans were significantly associated with providing WAAP. The odds ratios (ORs) were 1.02 (95% C 1.01-1.04, $p=0.009$) and 3.33 (95% C 1.40-7.87, $p=0.006$). On the other hand, lack of awareness with WAAP recommendations was significantly associated with not providing WAAP (OR=0.19, 95% CI 0.04-0.89, $p=0.035$).

Table 5. Univariate and multivariate* logistic regression analysis of potential predictors of providing written asthma action plan (WAAP) for patients with asthma (n=202)

Variables		Univariate analysis				Multivariate analysis**			
		Odds ratio (OR)	95% confidence interval of OR		p-value	Odds ratio (OR)	95% confidence interval of OR		p-value
			Lower	Upper			Lower	Upper	
Age					0.025				
	35 - 45 vs. <35	2.91	1.17	7.23	0.021				
	>45 vs. <35	3.36	1.28	8.86	0.014				
Nationality	Non-Saudi vs. Saudi	2.31	1.10	4.88	0.028				
Working clinic					0.082				
	Triage versus booked	1.68	0.75	3.80	0.209				
	Both triage and booked versus booked alone	3.43	1.12	10.52	0.031				
Duration of experience (years)		1.04	1.00	1.08	0.040				
Number of patients encountered per month		1.02	1.00	1.04	0.017	1.02	1.01	1.04	0.009
Managing patients with asthma		2.95	0.67	13.07	0.154				
Lack of training to use WAAP		0.37	0.14	1.03	0.056				
Lack of awareness with WAAP recommendations		0.20	0.05	0.88	0.033	0.19	0.04	0.89	0.035
Non-adherence of patients to the plans		2.25	1.06	4.78	0.034	3.33	1.40	7.87	0.006

* Multivariate logistic regression was done using backward elimination ** Multivariate logistic regression was adjusted for age, nationality, working clinic, duration of experience, number of patients encountered per month, managing patients with asthma, lack of training to use WAAP, lack of awareness with WAAP recommendations, and non-adherence of patients to the plans

4. Discussion

The current study examined the prevalence of providing WAAP and its perceived barriers by family physicians at primary care setting in Saudi Arabia. Only 16.8% of physicians were providing WAAP for their patients with asthma and only 6.8% of the total number of patients seen by the study physicians was receiving WAAP. We could not compare the findings of the current study with the rates of utilization of WAAP in Saudi Arabia due to absolute lack of similar studies. Nevertheless, the current utilization of WAAP by primary care physicians is generally comparable to the rates reported in similar international studies (16-18). For example, 16.8% of family physicians in the current study were providing WAAP for their patients with asthma compared with 16.4% of primary care physicians in the USA (16), 25.7% of general practitioners in Italy (17), and 4% of primary care physicians in Canada (18). Moreover, the current rate of utilization of WAAP by the patients with asthma managed in this study (6.8%) was similar or lower than similar international studies; which ranged between 5.2% and 39% in different settings (19, 22, 23). The suboptimal utilization of WAAP observed in the current and international studies continued to happen despite the fact that national and international guidelines strongly recommend the use of WAAP as an effective tool to facilitate self-management in patients with asthma (3, 4). The suboptimal utilization of WAAP observed in the current study is consistent with the high prevalence of uncontrolled asthma among asthmatic

patients in Saudi Arabia (7-9) and the high rates of recurrent asthma attacks which require emergency and hospital admission in Saudi Arabia (24, 25).

The barriers that were highly recognized by family physicians in the current study included lack of forms in the clinic including forms in Arabic, high workload, lack of time to write WAAP in the clinic, and non-adherence of the majority of patients to management plans. Likewise, a number of similar barriers have been described in different studies to discourage physicians from providing WAAP for patients with asthma (20, 21, 26, 27). For example, the time pressure, the lack of resources, poor clinic attendance of patients, and poor demarcation of professional roles were considered barriers to using WAAP at a primary care setting in the United Kingdom (20). Additionally, lack of patient interest and motivation in engagement, poor electronic resources, and lack of engagement and training of pharmacists and nurses were considered barriers to using WAAP in the primary care setting in Australia (21). Lack of forms in the clinic including forms in Arabic was the highest recognized barrier for WAAP utilization by family physicians. This may highlight the importance of electronic integration of patient charts which has been shown to improve the utilization of WAAP and outcomes of asthma management (21, 26, 28).

Lack of physician awareness and training concerning WAAP recommendations were significantly associated with not providing WAAP for patients with asthma in the current study. Similarly, it has been suggested that limited awareness of physicians with asthma management guidelines and unfamiliarity with new medications can lead to inadequate implementation of the national protocol for management of asthma (12, 29). More than a quarter of the family physicians in the current study believed that verbal instructions are enough for advising patients with asthma in regard to their management plans. The same belief was expressed by general practitioners in Singapore who preferred verbal instructions over WAAP as a personalized form of asthma management strategy (27).

Interestingly, more than 90% of family physicians in the current study believed that WAAP is beneficial for patients with asthma. In the same time, lack of awareness and training regarding WAAP recommendations was associated with lower utilization of WAAP among family physicians in the current study. Both findings may indicate that the observed underutilization of WAAP is a reflection of limited education and training rather than negative attitude of physicians about the benefits of WAAP. Therefore, the findings underscore the importance of providing education and training for family physicians in Saudi Arabia regarding the use of WAAP as a tool for improving asthma self-management. Several local studies pointed to the inadequate awareness of primary care physicians in Saudi Arabia with asthma management guidelines (12, 29, 30). Additionally, providing training for primary care physicians has been suggested to improve adherence to national asthma management guidelines in Saudi Arabia (11, 12, 30).

This study is considered the first study to examine the prevalence of providing WAAP and its perceived barriers among family physicians at primary care setting in Saudi Arabia. Nevertheless, we acknowledge few limitations. For example, as the study used a cross-sectional design, recall bias cannot be excluded and causal association cannot be determined. Being a single institution experience may limit the generalizability of the findings to Saudi primary care services. However, we believe that these limitations have minor impact on the study findings (if any) and are almost always present in similar studies.

5. Conclusions

In conclusion, consistent with previous reports, the current findings confirm the low utilization of WAAP at primary care setting in Saudi Arabia. The observed underutilization of WAAP is a reflection of limited education and training rather than negative attitude about the benefits of WAAP. The findings underscore the need to raise the awareness of family physicians with WAAP recommendations and the need to rectify some of its work flow issues.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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