

Original Article

Knowledge and Practice Assessment, and Self Reported Barriers to Guideline Based Asthma Management Among Doctors in Nigeria

OB Ozoh, CI Ndukwu¹, OO Desalu², OO Adeyeye³, B Adeniyi⁴

Department of Medicine,
College of Medicine,
University of Lagos, Lagos
State, Nigeria, ¹Department
of Paediatrics, Faculty
of Medicine, Nnamdi
Azikiwe University, Awka,
²Department of Medicine,
College of Medicine,
University of Ilorin,
Kwara State, ³Department
of Medicine, Lagos State
University College of
Medicine, Lagos State,
⁴Department of Medicine,
Federal Medical Center,
Owo, Osun State, Nigeria

ABSTRACT

Background and Objective: Doctors' knowledge contributes to practice and quality of care rendered to patients. To assess the knowledge and practice assessment and self reported barriers to guideline-based management among doctors. **Subjects and Methods:** This was a cross-sectional study among doctors from various part of the country attending a continuing medical education (CME) program in Lagos, Nigeria. We used a self-administered, pretested, semistructured, validated questionnaire based on the Global Initiative for Asthma (GINA) guideline.

Results: Of the 98 participants, 41 (42%) and 18 (18.4%) had good level of asthma knowledge and practice, respectively. There was no relationship between level of knowledge and practice and the level of knowledge was not associated with the practice ($X^2 = 6.56$, $P = 0.16$). The most reported barriers to good guideline-based practice were the unavailability of diagnostic and treatment facilities (44.3%), poor medication adherence (25.7%), and high cost of asthma medications (18.6%).

Conclusion: The level of asthma knowledge and practice, respectively, among doctors in Nigeria is low and there is no relationship between level of knowledge and practice. Unavailability of diagnostic and treatment facilities, poor medication adherence, and high cost of medications are important barriers to good practice. There is a need to improve asthma education among doctors in Nigeria. Addressing barriers to good practice is essential for the translation of knowledge into practice.

KEYWORDS: Asthma, continuing medical education, knowledge, management, practice

Date of Acceptance:
13-Feb-2019

INTRODUCTION

Good asthma control is partly dependent on the provision of adequate asthma care by healthcare providers who have good knowledge and practice, following recommended guidelines for asthma management.^[1,2] International guidelines such as the Global Initiative on Asthma (GINA) provide recommendations for asthma management based on high quality evidence.^[3] Adherence to these guidelines has been demonstrated to improve asthma care.^[4]

The global burden of disease (GBD) report estimated that asthma was the 14th most important disorder in terms of global years lived with disability.^[5] The prevalence of asthma is increasing worldwide and more so in low- and middle-income countries. The prevalence of asthma

in Africa is about 12% and the estimated prevalence among adults in Nigeria is about 10%.^[6,7] There is also a high frequency of poorly controlled asthma in this region, which implies a high disease burden.^[8-10] There is therefore a need for competent doctors with good level of asthma knowledge and practice for the management of asthma in the region.

Previous studies in Nigeria have demonstrated that doctors practicing at different levels of healthcare delivery have a low to modest level of asthma knowledge and practice.^[11-13] Adeniyi *et al.* further

Address for correspondence: Dr. OB Ozoh,
College of Medicine, University of Lagos, Lagos, Nigeria.
E-mail: ujuozoh@yahoo.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Ozoh OB, Ndukwu CI, Desalu OO, Adeyeye OO, Adeniyi B. Knowledge and practice assessment, and self reported barriers to guideline based asthma management among doctors in Nigeria. *Niger J Clin Pract* 2019;22:692-700.

Access this article online

Quick Response Code:



Website: www.njcponline.com

DOI: 10.4103/njcp.njcp_569_18

demonstrated that the level of practice in Nigeria was very poor even among those with modest levels of knowledge.^[13] This suggests the presence of other barriers that may limit good practice even with adequate knowledge. Evaluation of the relationship between level of asthma knowledge and practice as well as the identification of doctor-reported practice barriers has not been well elucidated. These are important in order to develop appropriate interventions to improve asthma care and control. The aims of this study were to evaluate the level of asthma knowledge and self-reported asthma management practice among doctors and explore the relationship between the level of knowledge and practice. We also aimed to identify self-reported barriers to guideline-based asthma management among these doctors.

SUBJECTS AND METHODS

This was a cross-sectional study conducted in Lagos, Nigeria, in June 2015 among doctors attending a 1 day asthma continuing medical education (CME) program. Ethical approval was obtained from the Lagos University Teaching Hospital Health Research Ethics Committee.

Participant selection

The CME organizers invited participants from private and public health facilities across the country and all who met the inclusion criteria were eligible to participate. We consecutively recruited consenting participants as they arrived for the training.

Only healthcare providers who regularly attend to asthma patients were included in the study. We included general practitioners, resident doctors, or fellows in internal medicine, pediatrics, family medicine, and public health, who attended to asthma patients regularly.

Healthcare providers who did not regularly attend to asthma patients were excluded from the study. Pharmacists, nurses, and doctors in other specialties who did not attend to asthma patients regularly were excluded.

Questionnaire administration

We used a modified pretested semistructured validated questionnaire that had been used in an earlier study in Nigeria.^[13] The questions were based on the GINA guideline, the Canadian Asthma Consensus guideline 2003, and previous study on asthma knowledge among physicians.^[3,14,15] The participants self-administered the questionnaires before the commencement of the training and it took about 20 min to complete.

The questionnaire obtained sociodemographic information, position, type of practice, years in practice, location of practice, attendance at a CME program on

asthma in the preceding three 3, awareness and familiarity with the GINA guideline, and adherence to the guideline in practice. It also assessed asthma knowledge regarding the pathophysiology, diagnosis, and treatment of asthma using statements to which the doctors responded to as “true,” “false,” or “don’t know.” Each correct response was scored 1 point and an incorrect response or “don’t know” was scored 0. There were 42 questions and the maximum obtainable score was 42.

We assessed the self-reported asthma management practice using a modified version of the validated Asthma Physician Practice Assessment Questionnaire, which was developed by the Canadian Thoracic Society and which has been used in a previous study in Nigeria.^[13,16] It is in English language, which was well understood by all the participants and consists of 14 practice items regarding diagnostic testing, assessment, treatment, and follow-up. We included two additional questions on the use of the asthma control test (ACT) and familiarity with the use of the peak flow meter. The respondents were required to answer “yes” or “no” to the questions on practice. Each affirmative response scored 1 point and a negative response or unanswered question scored 0. There were 16 questions and the maximum obtainable score was 16.

Open-ended questioning was used to assess the barriers to practice. The participants were required to list most important barriers that limited guideline-based asthma management in their practice.

Data management and Statistical analysis

All missing data were documented and excluded in the final analysis.

We determined the proportion of participants that answered each knowledge question correctly and total knowledge scores. We calculated the measure of central tendencies for the scores and expressed as either mean $\pm$ SD or median + IQR depending on if the data was normally distributed or not and expressed the total scores for each participant as percentages. We set $\geq 75\%$ total score as good level of knowledge, 50 to $<75\%$ as moderate knowledge, and $<50\%$ as poor knowledge, based on a similar study in Egypt,^[17] and based on this determined the proportion of participants with good, moderate, or poor level of knowledge.

For the self-reported management practice, we determined the proportion of participants that affirmed to each of the practice questions and the total score. We calculated the median and interquartile range (IQR) scores and expressed total scores as percentages. On the basis of the previous similar study,^[17] we set the cutoff point for good practice at $\geq 75\%$, 50 to $<75\%$ as moderate practice, and $<50\%$ as poor practice.

We explored the relationship between level of knowledge and level of practice as well as between level of knowledge and practice, respectively, with sociodemographic variables using the Chi-square test for independence to test the null hypothesis. We set a P value <0.05 as significant for all associations.

Responses on the self-reported barriers were grouped into categories and the most frequent were reported.

RESULTS

Out of 120 questionnaires distributed, 98 were completed and returned (82% response rate). Mean age (standard deviation) was 34.2 (9.3) years. There were 47 (48%) male and 51 (52%) female. Eighty-two (83.7%) of the doctors practiced in urban areas, whereas 16 (16.3%) practiced in rural areas. Up to 51 (52%) worked in private hospitals [Table 1]. The median number of asthma patients seen each week by the doctors was 5 (2--10).

Level of asthma knowledge

Total knowledge scores ranged from 14--40 (33.3% to 95.2%), with median score (IQR) of 31 (26--34). On the basis of the defined criteria for scoring, 41 participants (41.8%) had good level of asthma knowledge, whereas 50 (51%) and 7 (7.1%) had moderate and poor knowledge scores, respectively.

When asked about asthma diagnosis based on the symptom of cough only, use of beta 2 agonist in exercise induced asthma and the use of theophylline in the management of asthma exacerbation [Tables 2 and 3], 35.7%, 24.5%, and 35.7% of participants, respectively, gave a correct answer to the questions.

Relationship between level of knowledge and sociodemographic variables

Lack of postgraduate qualification was associated with poor knowledge, 82.5% of participants with poor knowledge had no postgraduate qualification ($X^2 = 12.5$, $P < 0.001$). Working in a nontertiary hospital was associated with poor knowledge, 61.4% and 31.6% of participants with poor knowledge worked in private hospitals and General or District hospitals, respectively ($X^2 = 20.9$, $P < 0.001$). Lack of asthma CME in the preceding 3 years was associated with poor knowledge, 84.2% of participants with poor knowledge had no asthma CME in the preceding 3 years ($X^2 = 9.4$, $P = 0.002$). Lack of awareness of the GINA guideline was associated with poor knowledge, 59.6% of participants with poor knowledge were not aware of the GINA guideline ($X^2 = 6.7$, $P = 0.03$). Similarly, unfamiliarity with the GINA guideline was associated with poor knowledge, 72% of participants

Table 1: Characteristics of study participants

Characteristics	Description (n=98)
Age in years	
Mean (SD)	34.2 (9.3)
Range	24-65
Age group in years (%)	
20-29	43 (43.9)
30-39	35 (35.7)
40-49	11 (11.2)
50-59	6 (6.1)
60-69	3 (3.1)
Sex	
Male (%)	47 (48)
Duration of graduation from medical school in years	
Median (IQR)	4 (3-10)
Range	2-39
Additional medical qualification (%)	
Completed a fellowship	14 (14.3%)
In fellowship training	12 (12.2%)
Master's degree	5 (5.1%)
None	67 (68.4%)
Current position in hospital (%)	
Consultant/CMO/PMO	19 (19.4%)
Senior registrar/SMO	16 (16.3%)
Junior Registrar/MO	45 (45.9)
NYSC/House officer	17 (17.3)
	1 missing
Type of hospital (%)	
Teaching Hospital	19 (19.4%)
Federal/Specialist Medical Center	4 (4.1%)
District/General Hospital	24 (24.5%)
Private Hospital	51 (52%)
Location of hospital (%)	
Urban	82 (83.7%)
Rural	16 (16.3%)
Attended CME on asthma in the preceding 3 years (%)	27 (27.6%)
Source of medical information (%)	
Professional training	48 (49%)
Colleagues	5 (5.1%)
Medical journals	14 (14.3%)
Professional meetings	5 (5.1%)
Medical representatives	4 (4.1%)
Print and electronic media	22 (22.4%)
Aware of GINA guidelines (%)	49 (50)
Familiar with GINA guidelines (%)	41 (41.8)
Follow GINA guidelines in practice (%)	31 (31.6%)

SD=Standard deviation, IQR=Interquartile range, CMO=Chief Medical Officer, PMO=Senior Medical Officer, SMO=Senior Medical Officer, MO=Medical Officer, NYSC=National Youth Service Corp

Table 2: Participants with correct responses on knowledge of the pathophysiology and diagnosis of asthma

Question	Proportion with correct responses (%)
Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role	96.9
Asthma exacerbations may be caused by a variety of risk factors, sometimes referred to as “triggers,” including allergens, viral infections, pollutants, and drugs	100
The airways in asthma are unresponsive	79.6
Asthma is associated with variable, airflow obstruction within the lower airway mainly	71.4
Asthma symptoms are only reversible with treatment	65.3
Asthma is curable	84.7
Severe asthma may be contagious	99
A clinical diagnosis of asthma may be entertained with a complaint of only cough even in absence of breathlessness, wheezing, and chest tightness	35.7
Wheezing is always diagnostic of asthma	85.7
Family history of asthma is not usually important in considering a diagnosis of asthma	90.8
Measurement of lung function may provide confirmation of the diagnosis of asthma	90.8
Assessment of allergic status may be useful in the diagnosis of asthma	99
In patients with symptoms consistent with asthma but whose lung function is normal, no additional test is required to establish the diagnosis	80.6
A chest Xray is useful in establishing a diagnosis of asthma	57.1
A 16-year-old, with an FEV1 of 50% predicted, more than twice/week asthma symptoms requiring beta 2-agonists 3-4 times a week and once nocturnal symptoms. This patient would be classified as well controlled	70.4
In clinical management, a classification of asthma by level of severity (intermittent, mild, moderate & severe persistent) is presently recommended	64.3
In children 5 years and Younger the diagnosis of asthma in early childhood is based largely on clinical judgment and an assessment of symptoms and physical findings and lung function	73.5
FEV1- Forced expiratory volume in one second	

Table 3: Participants with correct responses on the knowledge of asthma treatment

The goal of asthma treatment is to achieve a cure	86.7
In the management of stable asthma, oral medications are preferable to inhaled medications so as to limit side effects	70.4
Inhaled glucocorticosteroids medications act quickly to relieve bronchoconstriction and its accompanying acute symptoms	41.8
Long-acting inhaled β_2 -agonists should be used as monotherapy in asthma as these medications appear to influence the airway inflammation in asthma	72.4
As add-on therapy, theophylline is less effective than long-acting inhaled β_2 -agonists	50
Sodium cromoglycate and nedocromil sodium anti-inflammatory effect is weak and they are less effective than a low dose inhaled glucocorticosteroid	37.8
Inhaled long-acting beta 2-agonists are useful in exercise induced asthma	24.5
Prolonged oral glucocorticosteroid in children with asthma is recommended to control asthma	71.4
Prolonged oral glucocorticosteroid in children with asthma is recommended for acute exacerbation asthma	68.4
Dry Powder Inhalers (DPI) require higher inspiratory flow rates than metered dose inhalers (MDI)	37.8
Holding an inhaler 1 inch away from the lips and firing is a good inhaler technique	76.5
Allowing one minute to pass between puffs when using an inhaler is a good inhaler technique	51
The use of a spacer (holding chamber) improves drug delivery, increases lung deposition, and may reduce local and systemic side effects	84.7
Nebulized medications can only be used in children <5 years who have asthma	76.5
If asthma is not controlled on the current treatment regimen, treatment should be stepped down until control is achieved	80.6
Reliever medication should be provided for the control of asthma symptoms on as needed basis	75.5
Most patients with severe asthma exacerbations should be treated in an acute care facility and not routinely admitted to the ward	60.2
Routine chest x-rays are routinely recommended in acute severe asthma	65.3
Theophyllines have a significant role in the management of acute asthma	35.7
Sedation should be strictly avoided in asthma exacerbation because of asthma death	78.6
It is a good idea to give cough syrups during an asthma attack to treat asthma-related cough	70.4
Antibiotics are not routinely required unless there are signs of pneumonia suggesting bacterial infection	78.6
Patients managed for acute asthma with post-treatment lung function of 60% predicted can be discharged	51
Persons with asthma don't need a self-management plan at home	90.8
All asthma patients should own a peak flow meter for self-management	57.1

with poor knowledge were unfamiliar with the GINA guideline ($X^2 = 11.2$, $P = 0.004$). The relationship between level of knowledge and age group and gender, respectively, was not significant ($P = 0.009$ and 0.17 , respectively), although 89.4% of those with poor knowledge were less than 40 years of age.

Level of asthma practice

Total practice scores ranged from 0--16 (0--100%), with a median score (IQR) of 10 (4.8--12). The lowest proportion of affirmative responses were for Questions 11 on the use of ACT to assess asthma control, Question 10 on use of GINA guideline to assess control, and Question 2 on providing written referrals for asthma education (24.5%, 28.6%, and 28.6%), respectively [Table 4]. The proportion who confirmed the diagnosis of asthma using pulmonary function tests was also very low (30.6%). The highest proportion of affirmative responses were for Question 6 on providing smoking cessation advice, Question 5 on identifying environmental triggers, and Question 12 on addressing patients' concern on disease/treatment (70.4%, 75.5%, and 76.5%, respectively) [Table 4].

On the basis of the already defined criteria for good practice ($\geq 75\%$ total score), 18 (18.4%) of the participants had a good level of practice, 42 (42.9%) had a moderate practice, whereas 38 (38.8%) had a poor practice.

Relationship between level of practice and sociodemographic variables

Working in nontertiary hospitals was associated with poor practice, 61.3% and 23.8% of participants with poor practice worked in private hospitals or District/General

hospitals, respectively ($X^2 = 22.2$, $P < 0.001$). Lack of asthma CME in the preceding 3 years was associated with poor knowledge, 77.5% of participants with poor knowledge had not asthma CME in the preceding 3 years ($X^2 = 5.6$, $P = 0.02$). Nonaffirmation to following the GINA guideline was associated with poor practice, 73.8% of participants with poor practice did not follow the GINA guidelines ($X^2 = 5.8$, $P = 0.02$). Lack of additional postgraduate qualification was not significantly associated with poor practice ($P = 0.006$) but 72.5% of participants with poor practice did not have additional qualification. The relationship between level of practice and age group or gender, respectively, was not significant ($P = 0.007$ and 0.74 , respectively), although 87.3% of participants with poor practice were less than 40 years.

Relationship between knowledge and practice

Ten (24.4%) of the participants with good level of knowledge also had good level of practice and 4 (57.1%) of those with poor level of knowledge also had poor level of practice. Twenty-four (48%) of those with moderate knowledge had poor practice and 7 (14%) had good practice. Although there was a significant positive correlation between knowledge score and practice score ($r = 0.308$, $P = 0.002$), the relationship between the proportion of participants with good level of knowledge and good level of practice was not significant ($X^2 = 6.56$, $P = 0.16$).

Perceived barriers to guideline based asthma management

The most reported barrier to guideline-based asthma management was unavailability of diagnostic facilities and asthma medications as reported by 44 (44.3%) of

Table 4: Participants with positive responses to the practice questions

Question	Proportion with positive response
Confirm diagnosis by pulmonary function tests	30.6
Provide written referral for asthma education	28.6
Provide a written action plan for exacerbation management	35.7
Assess inhaler technique (or refer to asthma educator) at each visit	56.1
Identify environmental triggers/inducers	75.5
Provide smoking cessation counseling and/or recommend cessation measure	70.4
Prescribe an inhaled corticosteroid (ICS) as initial maintenance therapy	45.9
Prescribe an inhaled ICS and a long-acting beta2-agonist (LABA) when asthma is not controlled by ICS low dose alone	57.1
Check for treatment adherence at each visit	68.4
Use the Global Initiative for Asthma (GINA) guidelines to assess patients' asthma control	28.6
Use the Asthma Control Test (ACT) to assess the level of asthma control	24.5
Address patients' concerns about disease/treatment	76.5
Refer to a specialist because asthma is difficult to control	56.1
Refer to a specialist if the asthma diagnosis is uncertain	63.3
Schedule regular follow-up appointments	66.3
Are you familiar with using a peak flow meter	51

Table 5: Self-reported barriers to good asthma practice

Reported barriers	Proportion (%)
Unavailability of diagnostic and treatment facilities	44.3
Poor patient adherence to medications	25.7
High cost of medications to patients	18.6
Unavailability of guidelines	5.2
Limited number of asthma specialists	3.1
Busy clinics	3.1

Multiple barriers were reported by some participants

the participants [Table 5]. Poor patient adherence to asthma medication and high cost asthma medications were also reported as major barriers.

DISCUSSION

The main finding in this study is that the proportion of doctors who attended this CME program with good level of asthma knowledge and practice, respectively, was low. We also found a lack of association between the presence of good level of knowledge and good level of practice. The main reported barrier to guideline-based practice was the poor availability of diagnostic and treatment facilities.

The low level of knowledge and practice among these group of doctors is consistent with previous reports from Nigeria and other parts of Africa.^[11-13,17-21] In a recent study among doctors in Nigeria, asthma knowledge was very low and many doctors regarded aminophylline as a significant part of acute asthma management.^[18] Self-reported asthma practice among pediatric residents in a tertiary hospital in Nigeria was also poor across all aspects of asthma care, and this was consistent with the report from a tertiary hospital in Uganda.^[19,20] The low level of knowledge among our participants was not unexpected as less than 30% of them had attended educational programs on asthma in the preceding 3 years, despite being actively involved in the clinical care of asthma patients. We also demonstrated that nonattendance at an asthma CME was associated with poor knowledge and practice. Previous multistate surveys conducted about 5 years ago in Nigeria have shown that between 8.8--16.3% of doctors attended any form of asthma education course within the year preceding the surveys.^[22,23] These two studies were conducted prior to the commencement of compulsory CME attendance for renewal of practicing license. The implication is that most doctors treating patients with asthma rely on the previous knowledge gained during medical school training and are not likely to be abreast of nor utilize current information in patient care, which may result in poor outcome.^[22,23] Expectedly, participants with no additional qualification and those working in

private hospitals and nontertiary hospitals had poor knowledge and practice. This may be because of the nonacademic settings of these hospitals where updates of doctors' knowledge in informal settings such as grand rounds and clinical meetings may not be regular. Since most doctors obtain their medical information from professional meetings and less from self-study, they are more likely to be reliant on old knowledge obtained from medical school training. Doctors have a professional obligation to improve their knowledge and skills throughout their career and previous study in Nigeria and elsewhere have shown a correlation between attendance at CME programs and changes in physician behavior and professional practice.^[24-27]

The awareness and use of the GINA guidelines in clinical practice has been shown to improve care and outcome.^[3] Similar to a previous study in Nigeria, awareness of the GINA guideline by the doctors in our study was low (50%) and only a third of the doctors followed the GINA guideline in clinical practice.^[21] Factors such as practice barriers, clinical inertia, and time constraints, which have been attributed to poor adherence to guidelines are consistent with our findings.^[28] Patient factors such as poverty and limited access to medications, patient preferences, and poor adherence to recommendations from their doctors as corroborated in this study also influence adherence to guideline.^[29] The low rate of use of asthma control measurement tools (ACT and GINA) found in our study is also similar to previous reports among doctors in Nigeria and Egypt.^[17,24] Assessment of asthma control using standard methods is strongly recommended by the GINA guideline as it guides asthma management and promotes good outcome, for example, it may prompt optimization of treatment where needed or reduction in asthma medication if warranted.^[3] The proportion of doctors in our study with good practice is higher than in the earlier report that used similar criteria to determine good knowledge and practice.^[13] Reason may be because of the inclusion of doctors such as gynecologists and surgeons who may not treat asthma patients regularly. However, the lack of association between good knowledge and good practice was consistent with our findings as well as a report among doctors in Egypt.^[13,17] This supports the concept of the existence of barriers to good practice despite adequate level of knowledge and may be because of resource limitations and application obstacles that justify the call for knowledge translation that focuses on health outcomes, behavior change, and identification of pathways that make it easier to follow evidence.^[30] Furthermore, the doctors in our study stated that unavailability of facilities for asthma diagnosis and treatment, poor patient compliance,

and high cost of asthma medications were the major barriers to guideline-based asthma management. This was reflected in the low proportion of doctors that confirmed the diagnosis of asthma using pulmonary function tests (Question 1). A previous study in Nigeria has reported on the inadequacy of facilities for effective asthma management, limited availability of medications, and high cost of medications, which support the authenticity of these reported barriers.^[23] Most doctors in Nigeria who practice outside the tertiary institutions lack access to spirometry.^[31] In other parts of sub-Saharan Africa, inadequacy of facilities and medications and high cost of medications is also a challenge.^[32-34] For example, in Uganda, the availability of inhaled corticosteroid and spirometry was 47% and 24%, respectively, and the cost of a combination of an inhaled corticosteroid and a long acting beta 2 agonist was higher than half of an average monthly wage.^[35] Conversely, poor asthma practice has also been reported despite the availability of diagnostic and treatment facilities.^[21] This was illustrated in South Africa where Mash *et al.* in an audit of primary care facilities found that asthma was not objectively diagnosed using lung function tests, asthma control was not monitored, patients did not receive optimal controller medications and asthma education despite the availability of these facilities.^[21] In more developed climes, a disconnect has consistently been found between knowledge and practice, despite availability of diagnostic and treatment facilities.^[28,29,34] Cost of care has been largely implicated especially for those not on insurance cover.^[31] Barriers in these climes have also been found to be created by differences between physician and patient perception of the goal of asthma management.^[30] Patients have been found to stop therapy when asymptomatic and also when they have concerns about side effects and risk of becoming dependent.^[30] These indicate that improving asthma management goes beyond improving the availability and affordability of facilities and medication. It requires a holistic approach that also incorporates practice audits to ensure the utilization of available resources.

Poor patient compliance to asthma therapy is another reported barrier to good asthma management in our study, and may be because of poor understanding resulting from inadequate education offered by doctors. The limited number of asthma specialists as alluded to in this study may also lead to very busy clinics for these doctors which limits time for adequate asthma education. It is consistent with a previous report in which a majority of asthma patients were dissatisfied with the level of asthma education they received from their doctors.^[36] The training and incorporation of asthma educators such as nurses, pharmacists, or other healthcare workers

into the asthma management team as recommended by the GINA guideline is an important approach that has the potential to improve patient education and patient understanding of asthma.^[3]

The strengths of our study are the inclusion of participants from across Nigeria who practiced in private and public hospitals as well as doctors from rural areas. Also, the use of open-ended questions to assess the barriers to asthma practice made it possible to explore them more extensively. However, the relatively small sample size, convenience sampling, and recruitment of participants at an asthma CME program may have biased the results as these may be persons who already have interest in asthma and may have attended to update their asthma knowledge and practice and are likely to have a higher than average level of knowledge. The Asthma Physician Practice Assessment Questionnaire which was developed in Canada contains questions in English language, which all doctors in Nigeria are fluent in and these questions are also relevant to Nigerian setting as asthma pathophysiology, diagnosis, and management practices are consistent regardless of populations. Although, it was used in a previous study in Nigeria, it has not been formally validated in our setting and we recognize this limitation. The inability to verify self-reported practice by chart review or practice audit is another recognized limitation; however, the high level of poor practice may suggest that the real situation may be worse than we have reported as respondents are more likely to report good practice speciously rather than poor practice. Despite these limitations, we have provided data that lays credence to the low level of asthma knowledge and practice among doctors in Nigeria. We have highlighted the absence of an association between good asthma knowledge and good practice and brought to the fore the existence of barriers to good practice that are beyond the level of knowledge of doctors. These provide guidance to stakeholders for the development of interventions to improve asthma care and control in Nigeria.

CONCLUSION

The level of good asthma knowledge and practice among these doctors attending a CME program in Nigeria was very low with no association between good asthma knowledge and good practice. The major barriers to good asthma practice were unavailability of diagnostic and treatment facilities, high cost of medications, and poor patient adherence to medications. There is need to improve asthma education for doctors and also imperative is the need for increased advocacy for the provision of enabling environments for good practice

with improved access to affordable asthma diagnostic and therapeutic facilities.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Author contribution

OBO, CIN and OOD: conceptualization, data acquisition and analysis, drafting of manuscript and review of final version of manuscript.

OOA and BA: Conceptualization and review of manuscript and approval of final version.

The manuscript has been read and approved by all the authors, the requirements for authorship as stated earlier in this document have been met, and each author believes that the manuscript represents honest work.

REFERENCES

- Feder G, Griffiths C, Highton C, Eldridge S, Spence M, Southgate L. Do clinical guidelines introduced with practice based education improve care of asthmatic and diabetic patients? A randomized controlled trial in general practices in east London. *BMJ* 1995;311:1473-8.
- Leung JM, Bhutani M, Leigh R, Pelletier D, Good C, Sin DD. Empowering family physicians to impart proper inhaler teaching to patients with chronic obstructive pulmonary disease and asthma. *Can Respir J* 2015;22:266-70.
- Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2018. Available from: www.ginasthma.org. [Last accessed on 2018 Dec 13].
- Institute for Health Metrics and Evaluation (IHME). Global Burden of Disease (GBD) Cause Patterns. Seattle, WA: University of Washington; 2013. Available from: <http://www.healthmetricsandevaluation.org/gbd/visualizations/gbd-cause-patterns>. [Last accessed on 2018 Oct 12].
- Adeloye D, Chan KY, Rudan I, Campbell H. An estimate of asthma prevalence in Africa: A systematic analysis. *Croat Med J* 2013;54:519-31.
- Musa BM, Aliyu MD. Asthma prevalence in Nigerian adolescents and adults: Systematic review and meta-analysis. *Afr J Respir Med* 2014;10:4-9.
- Ozoh OB, Okubadejo NU, Chukwu CC, Bandele EO, Irusen EM. The ACT and the ATAQ are useful surrogates for asthma control in resource-poor countries with inadequate spirometry facilities. *J Asthma* 2012;10:1086-91.
- Desalu OO, Fawibe AE, Salami AK. Assessment of the level of asthma control among adults in two tertiary care centers in Nigeria. *J Asthma* 2012;49:765-72.
- Umoh VA, Ekott JU, Ekwere M, Ekpo O. Asthma control among patients in Uyo, South Eastern Nigeria. *Indian J Allergy Asthma Immunol* 2013;27:27-32.
- Umoh VA, Ukpe IE. Knowledge of the asthma guidelines among doctors in a tertiary hospital in Nigeria. *Ind J Allergy Asthma Immunol* 2012;26:77-82.
- Obumneme-Anyim IN, Oguonu T, Ayuk AC, Iloh KK, Ndu IK. Knowledge of asthma among doctors practicing in three south eastern states of Nigeria. *Ann Med Health Sci Res* 2014;4:S253-8.
- Adeniyi B, Ilesanmi O, Obaseki D, Desalu O, Betiku B, Erhabor G. Relationship between knowledge and quality of asthma care among physicians in South-West Nigeria. *Niger J ClinPract* 2017;20:566-72.
- Becker A, Lemièrè C, Bérubé D, Boulet L-P, Ducharme FM, FitzGerald M, *et al.* Summary of recommendations from the Canadian Asthma Consensus Guidelines, 2003. *CMAJ* 2005;173:S3-11.
- Rovithis E, Lionis C, Schiza SE, Bouros D, Karokis A, Vlachonikolis I, Sifakas NM. Assessing the knowledge of bronchial asthma among primary health care physicians in Crete: A pre- and post-test following an educational course. *BMC Med Educ* 2001;1:1-5.
- Boulet LP, Devlin H, O'Donnell DE. The physicians' practice assessment questionnaire on asthma and COPD. *Respir Med* 2011;105:8-14.
- Salama AA, Mohammed AA, El Sayed E, Sand RM. Quality of care of Egyptian asthmatic children: Clinician's adherence to asthma guidelines. *Ital J Pediatr* 2010;36:33.
- Chima EI, Iroezindu MO, Uchenna NR, Mbata GO, Okwuonu CG. A survey of asthma management practices and implementation of Global Initiative for Asthma guidelines among doctors in a resource-limited setting in Nigeria. *Niger J Clin Pract* 2017;20:984-91.
- Ayuk AC, Ubesie A, Odimegwu CL, Iloh K. Use of Global initiative for asthma (GINA) guidelines in asthma management among pediatric residents in a Sub Saharan African country: A cross-sectional descriptive study. *Pan Afr Med J* 2017;27:120.
- Kirenga JB, Okot-Nwang M. The proportion of asthma and patterns of asthma medications prescriptions among adult patients in the chest, accident and emergency units of a tertiary health care facility in Uganda. *Afr Health Sci* 2012;12:48-53.
- Mash B, Rhode H, Pather M, Ainslie G, Irusen E, Bheekie A, *et al.* Quality of asthma care: Western Cape Province, South Africa. *S Afr Med J* 2009;99:892-6.
- Fawibe AE, Onyedum CC, Sogaolu OM, Ajayi AO, Fasae AJ. Drug prescription pattern for asthma among Nigerian doctors in general practice: A cross-sectional survey. *Ann Thorac Med* 2012;7:78-83.
- Desalu OO, Onyedum CC, Salawu FK, Iseh KR, Salami AK. Asthma in Nigeria: Are the facilities and resources available to support internationally endorsed standards of care? *Health Policy* 2011;99:250-4.
- Desalu OO, Onyedum CC, Adeoti AO, Ozoh OB, Fadare JO. Knowledge and use of asthma control measurement tools in the management of asthma: A survey of doctors working in family and internal medicine practice in Nigeria. *Afr Health Sci* 2016;16:480-9.
- Goulet F, Hudone E, Gagnon R, Gawin E, Lemire F, Arsénault I. Effects of continuing professional development on clinical performance. *Can Fam Physician* 2013;59:518-25.
- Bucklin BA, Gibbs RS, Wieber C, Myers L. The influence of a continuing medical education campaign on new strategies to improve appropriate use of antibiotics. *J Biomed Edu* 2015. doi: 10.1155/2015/579726.
- Thomson O'Brien MA, Freemantle N, Oxman AD, Wolf F, Davis DA, Herrin J. Continuing education meetings and workshops: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2001;CD003030. doi: 10.1002/14651858.CD003030.
- Blaiss MS, Kalina MA, Baena C, Dahl R, Valovirta EJ,

- Canonica GW. Barriers to asthma treatment in the US: Results from the global asthma physician and patient survey. *World allergy Organ J* 2009;2:303-13.
28. Wisnivesky JP, Lorenzo J, Lyn-Cook R, Newman T, Aponte A, Kiefer E, *et al.* Barriers to adherence to asthma management guidelines among inner-city primary care providers. *Ann Allergy Asthma Immunol* 2008;101:264-70.
29. Brown RW, Cappelletti CS. Reaching beyond disparity: Safely improving asthma control in the at-risk African-American population. *J Natl Med Assoc* 2013;105:138-49.
30. Goeman D, Hogan CD, Aroni RA, Abramson MJ, Sawyer SM, Stewart K, *et al.* Barriers to delivering asthma care: A qualitative study of general practitioners. *Med J Aust* 2005;183:457-60.
31. Ozoh OB, Awokola T, Buist SA. A survey of the knowledge of general practitioners, family physicians and pulmonologists in Nigeria regarding the diagnosis and treatment of chronic obstructive pulmonary disease. *West Afr J Med* 2014;33:100-6.
32. Beran D, Zar HJ, Perrin C, Menezes AM, Burney P; Forum of International Respiratory Societies working group collaboration. Burden of asthma and chronic obstructive pulmonary disease and access to essential medicines in low-income and middle-income countries. *Lancet Respir Med* 2015;3:159-70.
33. Bazargani YT, de Boer A, Leufkens HG, Mantel-Teeuwisse AK. Essential medicines for COPD and asthma in low and middle-income countries. *Thorax* 2014;69:1149-51.
34. Davis D, Evans M, Jadad A, Perrier L, Rath D, Ryan D, *et al.* The case for knowledge translation: Shortening the journey from evidence to effect. *BMJ* 2003;327:33-5.
35. Kibirige D, Kampiire L, Atuhe D, Mwebaze R, Katagira W, Muttamba W, *et al.* Access to affordable medicines and diagnostic tests for asthma and COPD in sub Saharan Africa: The Ugandan perspective. *BMC Pulm Med* 2017;17:179.
36. Desalu OO, Onyedum CC, Adeoti AO, Ozoh OB, Fadare JO, Salawu FK, *et al.* Unmet needs in asthma treatment in a resource-limited setting: Findings from the survey of adult asthma patients and their physicians in Nigeria. *Pan Afr Med J* 2013;16:20.

