

Quality of acute asthma care in two tertiary hospitals in a state in South Western Nigeria: A report of clinical audit

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ABSTRACT

Background: To audit the quality of acute asthma care in two tertiary hospitals in a state in the southwestern region of Nigeria and to compare the clinical practice against the recommendations of the Global Initiative for Asthma (GINA) guideline. **Patients and Methods:** We carried out a retrospective analysis of 101 patients who presented with acute exacerbation of asthma to the hospital between November 2010 and October 2015. **Results:** Majority of the cases were females (66.3%), <45 years of age (60.4%), and admitted in the wet season (64.4%). The median duration of hospital stay was 2 days (interquartile range; 1–3 days) and the mortality was 1.0%. At admission, 73 (72.3%) patients had their triggering factors documented and 33 (32.7%) had their severity assessed. Smoking status, medication adherence, serial oxygen saturation, and peak expiratory flow rate measurement were documented in less than half of the cases, respectively. Seventy-six (75.2%) patients had nebulized salbutamol, 89 (88.1%) had systemic corticosteroid, and 78 (77.2%) had within 1 h. On discharge, 68 (67.3%) patients were given follow-up appointment and 32 (31.7%) were reviewed within 30 days after discharge. Less than half were prescribed an inhaled corticosteroid (ICS), a self-management plan, or had their inhaler technique reviewed or controller medications adjusted. Overall, adherence to the GINA guideline was not satisfactory and was very poor among the medical officers. **Conclusion:** The quality of acute asthma care in our setting is not satisfactory, and there is a low level of compliance with most recommendations of asthma guidelines. This audit has implicated the need to address the non-performing areas and organizational issues to improve the quality of care.

Key words: Asthma, audit, emergencies, guidelines, management

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INTRODUCTION

Asthma affects about 235 million people worldwide.¹ The incidence of asthma has been growing over the past 30 years due to changing environmental factors, greater awareness of this condition, and changes in diagnostic practice, particularly in the low- and middle-income countries that are least able to absorb its impact.^{1,2} Fifty years ago, asthma was uncommon in Nigeria; however, recent reports from different parts of Nigeria have shown a prevalence of adolescent and adult asthma in excess

of 10%.^{1,3,4} Data reported from phases 1 and 3 of the International Study of Asthma and Allergies in Childhood found a rising trend in the prevalence of asthma.¹ Asthma causes an estimated 250,000 deaths annually (1 in 250 deaths worldwide).² Asthma is also the second leading cause of respiratory disease-related morbidity and third leading cause of respiratory disease-related emergency room visit and mortality within 24 h of admission in Ekiti State, Southwestern Nigeria.^{5,6} Smith *et al.* reported that

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How to cite this article: Desalu OO, Adeoti AO, Ogunmola OJ, Fadare JO, Kolawole TF. Quality of acute asthma care in two tertiary hospitals in a state in South Western Nigeria: A report of clinical audit. *Niger Med J* 2016;57:339-46.

Access this article online

Quick Response Code:



Website:

www.nigeriamedj.com

DOI:

10.4103/0300-1652.193860

a substantial proportion of the direct costs of asthma in the USA are due to hospitalization and emergency department (ED) visits.⁷ Several national and international thoracic societies have produced the management guidelines to standardize asthma care and achieve the goals of therapy.^{8,9} In Nigeria, there is no national asthma treatment guideline^{10,11} and most asthma care providers rely on the Global Initiative for Asthma (GINA) guideline which is a Global Strategy for Asthma Management and Prevention, developed by the World Health Organization and the National Heart, Lung, and Blood Institute. The guideline was issued in 1995 and regularly revised to date.² Despite the effort to standardize asthma care using the GINA guideline, several Nigerian studies dating back to more than a decade have shown that there is under-treatment of asthma and poor adherence to the guideline by doctors.¹²⁻¹⁷ The reduction of burden and outcome of asthma depend largely on achieving asthma control, adequate prevention, and treatment of an acute attack. It is therefore important to assess the adequacy of such treatment in our practice and plan changes to improve care; hence, the need for a clinical audit. To the best of our knowledge, there is only one study on clinical audit of acute asthma in the emergency room in Nigeria, which was done in the pediatric age group¹⁴ and none in the adult population. Assessment of the quality of asthma care in developing countries is imperative because of its increasing prevalence, huge socioeconomic and psychosocial burden, and under-treatment, which leaves much room for improvement.² This study was carried out to audit the quality of acute asthma care in two tertiary hospitals in a state in the southwestern region of Nigeria and compare the clinical practice against the GINA guidelines.

METHODS

This study was a retrospective analysis of 101 patients who presented with acute exacerbation of asthma to the hospital between November 2010 and October 2015 carried out at two tertiary hospitals in Southwestern Nigeria. The hospitals serve as a referral hospital for the state and its adjoining states. These hospitals also provide an internship and postgraduate training programs in both internal and family medicine. The hospitals have consultant pulmonologist who runs the pulmonary clinic, resident doctors, and several other internists. In terms of infrastructure, both centers have desktop spirometers, pulse oximeters, peak flow meters, and intensive care units. In addition, they provide a combination of primary, secondary, and tertiary health-care services. This is because they have departments of family medicine and community medicine that provide primary health care (PHC).

Asthma patients presenting with attack were previously receiving their care in PHC/private hospital in the state,

some were known patients of the hospitals, while some were newly diagnosed cases presenting with acute asthma. They were seen on the first contact by casualty/medical officers, residents in family, and internal medicine undergoing emergency clerkship rotation. The attending doctor in the casualty evaluates, institutes therapy and discharges the patient when the condition has improved or referred to the internist for further treatment. The internists then referred the patient to the pulmonologist after discharge for follow-up or seek an urgent pulmonology consult depending on the severity of the disease, patients' preference, and associated comorbidity.

We retrieved and reviewed the medical case files of all the patients who had a clinical diagnosis of asthma in the two hospitals. The cases that had complete information and met the clinical criteria for diagnosis of acute exacerbation of asthma were studied. Nine cases of chronic obstructive pulmonary disease (COPD) and one case of asthma-COPD overlap syndrome (ACOS) were excluded from the chart review. An audit proforma was used to collect (1) sociodemographic information, (2) clinical profile: Clinical features, month and season of admission, comorbid conditions, emergent investigations and asthma medications, duration of hospitalization, outcome of management, (3) standard of care recommended by GINA.²

The GINA guidelines specify that the initial assessment on admission should (1) include functional assessments such as spirometry, peak expiratory flow (PEF) measurement, and oxygen saturation measurements with oximetry and (2) assess the severity of an asthma exacerbation using brief history and physical examination pertinent to the exacerbation and functional assessments. Such assessments are recommended to be repeated 1 h after the initial treatment and then at 1–2-h intervals until there is a clear response to the treatment and a decision is reached about the patient clinical state. The GINA guidelines also recommended the following treatments: (1) Supplemental oxygen therapy, (2) repeated administration of rapid-acting inhaled β_2 -agonists with or without an anticholinergic before the use of theophylline, (3) systemic glucocorticosteroids in all but the mildest exacerbations, and (4) discouraging the use of sedatives and anxiolytics. On discharge, the care of patients should include (1) a minimum 3–7-days course of oral corticosteroids (OCSs); (2) initial or continued use of controller therapy; (3) review of inhaler technique and use of peak flow meter; (4) identification of potential triggers of exacerbations; (5) provision of a written action plan for prevention of future exacerbations; (6) encouragement to contact a physician within 1 week after discharge for a follow-up appointment.

In medicolegal term, the absence of documentation implies the absence of process in data collection.

Asthma was defined by the history of variable respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough and airflow limitation that has an immediate response to bronchodilator (BD) or to inhaled corticosteroids (ICSs) over week. In addition, presence of family history of asthma, and other allergic conditions (allergic rhinitis or eczema)²

Exacerbations of asthma (asthma attacks or acute asthma) were defined as episodes of progressive increase in shortness of breath, cough, wheezing, or chest tightness, or some combination of these symptoms and decrease in lung function (PEF or forced expiratory volume in 1 second [FEV1]) from the patient's usual status.²

Asthma-chronic obstructive pulmonary disease overlap syndrome was defined as persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD.²

Data analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 17 (SPSS Inc., Chicago, IL, USA). Results were expressed for all cases in the audit, usually as percentages for the variables of interest. Chi-square test was used to test for statistical significance between categorical variables. A $P < 0.05$ was considered statistically significant.

RESULTS

A total of 111 patients were admitted during the study period, of which only 101 patients met the GINA diagnostic criteria. The age of the patients ranged from 16 to 85 years, with a mean age of 43 ± 19 years. Sixty-one (60.4%) of the asthma patients were aged <45 years, and 67 (66.3%) were females with a male to female ratio of 1:2. Fifty-one (50.5%) patients were diagnosed to have asthma for a duration <5 years. Sixty-two (61.4%) patients were admitted at night and 65 (64.4%) were admitted in the rainy (cold) season. Only 8 (7.9%) patients were regularly using ICS and 69 (68.3%) were not on any medication before admission. Almost 60% of the patients were admitted and managed by the casualty officer while 16 (15.8%) were managed by the internist. The median duration of illness before the presentation was 3 days (interquartile range [IQR]; 2–6 days) and the median length of hospital stay was 2 days (IQR; 1–3 days) and the mortality was 1.0%. The other characteristics of the patients are shown in Table 1.

At admission, assessment of severity of attack was performed in 33 (32.7%) patients, smoking status recorded in 30 (29.7%), attack triggering factors documented in 73 (72.3%), and level of drug adherence recorded in 18 (17.8%). The oxygen saturation of the patients at admission was measured in 5 (5.0%) and continuous or serial oxygen saturation was measured in 5 (5.0%)

of the patients. Six (5.9%) patients had peak expiratory flow rate (PEFR) measured at admission, and none had their post-BD PEFR measured after nebulization or intravenous medication. Chest radiography was performed in 16 (15.8%) of the patients [Table 2].

Nebulized salbutamol was the initial BD used for attack in the 76 (75.2%) of patients and the remaining had intravenous theophylline. For airway inflammation, 89 (88.1%) patients were given a corticosteroid (CS), with

Table 1: General characteristics of asthma patients

Characteristics	n (%) / Median
Median duration before presentation	3 (2-6)
Median length of hospital stay (IQR)	2 (1-3)
Age group, n (%)	
15-24	17 (16.8)
25-34	28 (27.7)
35-44	16 (15.8)
45-54	8 (7.9)
55-64	10 (9.9)
65-74	13 (12.9)
≥ 75	9 (8.9)
Sex, n (%)	
Male	34 (33.7)
Females	66 (66.3)
Occupation, n (%)	
Trading	21 (20.8)
Teacher	8 (7.9)
Civil servant	8 (7.9)
Farming	9 (8.9)
Students	19 (19.8)
Others	36 (35.6)
Education, n (%)	
None	28 (27.7)
Primary	16 (15.8)
Secondary	26 (25.7)
Tertiary	31 (30.7)
Duration of asthmatic (years)*, n (%)	
<5	51 (50.5)
5-9	15 (14.9)
10-14	15 (14.9)
15-19	10 (9.9)
20-29	7 (6.9)
30+	3 (2.8)
Asthma attack requiring ER visit and admission in past 12 months, n (%)	45 (44.6)
Time of presentation, n (%)	
Daytime admission	35 (34.7)
Nighttime admission	66 (65.3)
Mortality	1 (1.0)

*Missing data. ER – Emergency room; IQR – Interquartile range

29 (28.7%) receiving optimal CSs dose, 75 (74.3%) had intravenous corticosteroid and within 1 h, respectively. OCS was given to 61 (60.4%) patients and 23 (22.8%) had it within 1 h of admission. Supplemental O₂ was given to 31 (30.7%) and out of the 31 given oxygen, none of the oxygen administration was based on measured SpO₂. Intravenous fluid was administered to 56 (55.4%) patients, 30 (29.7%) had antibiotics, while 4 (4.0%) had mucolytic agent [Table 3].

Twenty-five patients (24.8%) had their controller medication stepped/adjusted before the time of discharge, 37 (36.6%) were discharged on ICS/long-acting β 2-agonist combination inhaler, 10 (9.9%) were given written action, 36 (35.5%) had their inhaler technique reviewed, and 25 (24.8%) retrained on it. Specific follow-up appointment was documented in 68 (67.3%) of the discharge and 32 (31.7%) were reviewed within 30 days [Table 4].

To determine the level of adherence to the 15 major recommendations of the GINA guideline by their category, we stratified the doctors into three categories; these include (1) internist, (2) family physician, and (3) casualty/medical officers. In this study, we defined “medical officers” as doctors who have a basic medical degree, currently performing general medical duties and are not in specialist training. The pulmonologists were merged with the internists because they managed very few cases that did not allow for separate in-depth analysis. There was no significant difference among the internist, family physician, and casualty/medical officers in the level of compliance to 10 of 15 GINA recommendations. There were low levels of compliance by casualty/medical officers to 4 out of 5 remaining recommendations. We also observed that the internists were significantly giving follow-up appointment than other categories of doctors [Table 5].

DISCUSSION

This audit of the management of acute asthma cases admitted to the two tertiary hospitals in the southwestern region of Nigeria has demonstrated marked deficiencies in standards of care measured against the GINA management guidelines. At admission, less than one-third of patients had an assessment of severity, smoking status, inhaler technique, and medication adherence documented. Furthermore, the baseline and serial oxygen saturation, baseline PEFR, and post-BD PEFR were not documented in more than 90% of cases, respectively. Majority received nebulized salbutamol, systemic CS within 1 h, and follow-up appointment on discharge; however, only 35.7% came for follow-up within 30 days. A significant proportion of patients were not prescribed ICS and given the self management plan on discharge.

Table 2: Assessment at admission

Assessment at admission	n (%)
Assessment of severity	33 (32.7)
Assessment of control before attack	0
Oxygen saturation measured	6 (5.9)
Serial oxygen saturation measured	5 (5.0)
Arterial blood gases measured	0
Was the PEFR measured	5 (5.0)
Postbronchodilator PEFR measured	0
Spirometry	0
Smoking status recorded	30 (29.7)
Trigger factors recorded	73 (72.3)
Drug adherence recorded	18 (17.8)
Chest radiograph	16 (15.8)

PEFR – Peak expiratory flow rate

Table 3: Treatment practices in hospital

Treatment practices	n (%)
β 2-agonist by nebulizer was the first medication for attack	76 (75.2)
IV theophylline was the first medication for attack	26 (25.7)
Other therapy (IV MgSO ₄ and ipratropium)	3 (2.9)
IV fluid administration on admission	56 (55.4)
Serial monitoring physiologic and clinical parameter	4 (4.0)
CS given	89 (88.1)
CS given within 1 h	78 (77.2)
IV CS given within 1 h	75 (74.3)
Oral CS given	61 (60.4)
Oral CS used within 1 h of admission	23 (22.8)
Optimal CS dosage prescribed during admission	29 (28.7)
Supplemental O ₂ given at any time during admission	31 (30.7)
Supplemental oxygen given based SpO ₂	0
Antibiotics	30 (29.7)
Justified antibiotics given	20 (19.8)
Mucolytic given	4 (4.0)
Anxiolytics (lexotan) given	8 (7.9)
Had mechanical ventilation and intubation	0
Predischarged PEFR measured	0

IV – Intravenous; CS – Corticosteroid; PEFR – Peak expiratory flow rate

Table 4: Discharge/follow-up procedures

Discharge/follow-up procedures	n (%)
ICS/LABA combination inhaler given	37 (36.6)
Oral CS	32 (31.7)
Controller medication stepped/adjusted	25 (24.8)
Self-management planning or written action	10 (9.9)
Inhaler technique review	36 (35.5)
Re-training on the use of pMDI and spacer	25 (24.8)
Specific follow-up appointment	68 (67.3)
Patient reviewed within 30 days	32 (31.7)

CS – Corticosteroid; LABA – Long-acting β 2-agonist; pMDI – Pressurized metered-dose inhaler

Table 5: Adherence to GINA guideline recommendations by doctors category

GINA recommendations	Internist %	Family physician %	Medical / Casualty officer %	P
Assessment of severity by Hist. & PE	47.1	44.4	12.1	0.001
Triggers documented	61.8	77.8	75.9	0.172
Smoking status recorded	44.1	22.2	12.1	0.002
Medication adherence recorded	22.9	22.2	5.2	0.001
Serial monitoring physiologic and clinical parameter	11.8	0	0	0.070
Functional assessment of severity-PEFR on admission	8.8	0	1.7	0.197
Oxygen saturation measured	5.9	22.2	1.7	0.029
Supplemental oxygen administration	35.3	77.8	20.7	0.087
Nebulized salbutamol administration	82.4	77.8	70.7	0.209
Systemic(IV) Steroid given within 1 hour	82.4	88.9	67.2	0.095
Anxiolytics given	14.7	0	5.2	0.132
Self-management or asthma action plan	17.6	11.1	5.2	0.054
ICS/LABA on discharge	41.2	55.6	31.0	0.287
OCS on discharge	32.4	55.6	27.6	0.549
Inhaler technique review on discharge	38.2	55.6	31.0	0.427
Follow up appointment	82.4	66.7	58.6	0.020

The clinical profile of patients showed that most of them were females and below the age of 45 years. This is in keeping with findings in other studies.^{6,17-20} Female sex is a risk factor for severe asthma which is associated with increased hospital admissions. This association has been linked to several factors including menarche, menstrual cycle, pregnancy, hormone genetics, and obesity.²¹ Women have also been associated with high level of atopy, bronchial hyperresponsiveness, and exposure to indoor pollutant.²²

In the initial assessment of acute asthma admission, the GINA guideline recommended history and physical examination (auscultation, use of accessory muscles, heart rate, respiratory rate, PEF or FEV1, oxygen saturation, arterial blood gas if patient in extremis) for assessing asthma severity to determine the site of therapy, forms of treatment, and monitoring of treatment. The assessment of severity was poor as only 32.7% were documented; it is more than 3.3% in the audit of childhood asthma in Lagos,¹⁴ but it is less than 42.1–82.2% in other parts of the world.²³ Functional assessment components such as oxygen saturation and PEF were measured in 5.9% and 5.0% of the cases, respectively; these indices are comparatively <93.0% and 20% in Spain²⁴ and 96.1% and 81.0% in the UK,¹⁸ respectively. PEF is less commonly

assessed in Mexico and Italy and more commonly assessed in Australia and France.²³ None of the cases had their post-BD PEFR and this is in contrast to 38.0% reported in the UK which is also a disappointing result.¹⁸ The implication of not measuring post-BD PEFR is that most patients were treated and discharged without objective evaluation of airflow limitation and response to therapy. It is unimaginable that the hospitals have all the required facilities, but it was not optimally used. The reasons for nonutilization of available instruments are multifactorial. These include lack of knowledge and awareness of its usefulness²⁵ and systemic problems such as delay in replacing consumables such as battery of the oximeter and spirometry and PEF mouthpiece and repairing faulty components of the instruments.

Smoking status was recorded in 29.7% of cases and this finding is in contrast to 91.8% reported in the UK audit.¹⁸

This is a serious omission on the part of the admitting doctors. This observation may be ascribed to physicians' poor knowledge of smoking as risk factors for severe asthma and its blunting of the anti-inflammatory action of CSs.^{26,27} Other factor responsible for poor recording of smoking is the perception by doctors that the most women do not smoke and is not a cause of serious morbidity among women who are mostly affected by asthma.^{5,16,17,28}

Majority of the patients had their asthma triggering factors documented (72.3%) which is similar to 73.3% in a previous study.¹⁴ The level of drug adherence recorded was also disappointing as only 17.8% were documented to adhere to inhaled corticosteroids (ICSs). A study in Nigeria has shown that the lack of controller medication adherence is strongly associated with poor asthma control.²⁹ Proper assessment of adherence would have afforded the managing team to prescribe the optimal therapy and address the cause of poor medication compliance.

Majority (75.2%) of the patients received nebulized salbutamol as BD during asthma emergency; this result is an improvement on three other studies carried out in Nigeria about a decade ago where most patients were given theophylline.^{14,16,17} Rapid-acting β -agonists are more effective than theophylline in the management of acute asthma. Its use is associated with less severe and potentially fatal side effects.² We also found an encouraging result in the use of CSs as 88.1% of the patients were given systemic CS and 77.2% were given within 1 h of admission. The rate of steroids administration in our study is similar to other studies.^{14,16,17,24} In terms of time of steroid administration, our data are far better than the one in the UK where 95.0% were given systemic CS, but 40.0% were given within 1 h of admission.¹⁸ The similarities in the results of this study with the previous audit might likely be due to doctors' good knowledge and belief about the efficacy of CS in reversing and resolving chronic airway inflammation of

asthma. In addition, OCSs and intravenous corticosteroids are widely affordable and available in hospitals and private pharmacy during periods of hospital workers' strike and their prescription are rarely affected by systemic or organization problems.¹⁰ Systemic glucocorticosteroids speed resolution of exacerbations and should be utilized in the all, but the mildest exacerbations and the benefits are greatest in patients with life-threatening asthma and those not currently receiving steroids.² Significant benefit with systemic steroid therapy is observed within 4 h of administration.² Hence, systemic steroids take several hours to exert their anti-inflammatory effect, and therefore, prompt administration after presentation is important.

Concurrently, 30.7% of the patients received supplemental oxygen; this statistic is lower than 60% reported in a Spanish study.²⁴ A multi-national study on acute asthma management, burden, and outcomes also revealed that <60% of the patients received guideline-recommended therapy with a BD, CS, and supplemental oxygen.²³ Oxygen administration is low in this study because there is a lack of assessment of the oximetry status and indication for acute oxygen administration during the initial assessment on admission. The poor assessment of oxygen level may be due to an unavailability of a regularly functioning pulse oximeter. There is a possibility of direct relation between knowing a patient's oxygen status and correction of hypoxemia. Furthermore, the poor administration may also be due to physician's lack of awareness of its usefulness in cases that were not life-threatening or presenting with central cyanosis. Hypoxemia in asthma emergency can be detected using clinical signs, blood gas analysis, or pulse oximetry.¹ Cyanosis has poor sensitivity because it is possible to have hypoxemia despite the lack of cyanosis.³⁰ Systemic problems such as delay in replacing empty oxygen cylinders and repairing faulty concentrator oxygen delivery components and electrical power failure may all have roles to play in a resource-limited setting. Although, we did not evaluate the knowledge of , perception and barrier to oxygen therapy among the doctors in this study, our findings may implicate future research on oxygen therapy among health-care workers and the general populace.

On discharge, nearly one out of three patients had a prescription of inhaled corticosteroid while most patients were not prescribed ICS; this result is in contrast to other studies on asthma audit.^{18,23} The use of intravenous corticosteroids is associated with good asthma control and reduced risk of asthma-related hospitalization and ED visit in Nigeria.^{29,31} Furthermore, majority of the patients did not have their inhaler technique reviewed, despite recent studies showing that most patients use their inhalers incorrectly.³² Also, in the UK, <50% of patients had their inhaler technique reviewed on discharge.¹⁸ The findings

in our study may be due to poor awareness of the clinical consequences of improper inhaler technique.

About 10% were given asthma action plan and this pattern has also been observed in other studies.^{18,33,34} In a multicenter study in Nigeria to determine the unmet needs in asthma treatment, 33% of patients received asthma action plan.¹⁵ This result study is a reflection of the poor partnership between asthma patient and health-care professional and poor knowledge of the asthma guidelines.

Most (67.3%) of the patients were given specific follow-up appointment; however, only 35.7% were reviewed within 30 days of discharge. This is similar to 66.8% reported in the UK asthma audit.¹⁸ Lack of follow-up is a common problem among asthma patients; other studies have reported low rates of follow-up visits in their patients after they were discharged from ED.^{35,36} The frequency of follow-up visits may help to build doctor and patients partnership, to predict medication adherence, and to ensure adequate monitoring of their lung function.

In assessing the doctors' adherence to the guidelines, our results showed that the level of adherence was not generally satisfactory among all the categories of doctors, with the medical/casualty officers having the lowest level adherence. We also observed that the performance of doctors increased with their level of training as specialists tended to perform better than nonspecialists. This finding is comparable to other previous studies in Nigeria.^{12,15}

This study has reflected the performance of two tertiary hospitals in Southwestern Nigeria, using the recommended standard of care, and not that of individuals, a group of professionals or specialties. This form of benchmarking has highlighted areas of deficiencies in acute asthma management that can be easily understood by medical and nonmedical staff. Poorly performing areas of the management would be examined and organizational issues as well as management protocols and clinical competence would be addressed. A second audit would be carried in 12–16 months after addressing the observed deficiencies and management challenges.

We are limited by some inaccuracies from the medical write-up of patients by doctors, missing medical record files, and periods of industrial unrest by health-care workers where instruments were locked up and some vital measurements could not be done. In view of the fact that this study was conducted in two tertiary hospitals, we are very cautious in generalizing result our findings to the whole country. However, this study may serve as template for future study on national asthma audit and reason for nonadherence to asthma guidelines before formulating the national asthma guideline.

CONCLUSION

The result from this first audit reveals that the acute management of asthma in our setting is suboptimal and there is a low level of compliance with most recommendations of the GINA guideline. This audit has implicated the need to address the nonperforming areas, knowledge gaps, clinical competence, and organizational issues before the second audit.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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