

Utilisation of Spirometry among Hospitalised Patients with Clinical Findings of COPD in A Tertiary Hospital in Nigeria

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Summary

Aims and objective: The aim of this study was to determine the rate of spirometry utilisation among hospitalised patients with clinical findings of chronic obstructive pulmonary disease (COPD) in a tertiary hospital in Nigeria.

Patients and Methods: A case record review of hospitalised patients with clinical findings of COPD from January 2002 to June 2009 from the record of the cardiopulmonary unit of the University of Ilorin Teaching Hospital Ilorin, Nigeria was carried out. Age and sex, hospital stay, admitting physician, and outcome of admission were obtained.

Results: A total of 228 patients were hospitalised with clinical findings of COPD, 185 (81.1%) were males and 43 (18.9%) were females. The rate of utilisation of spirometry in hospitalised patients (228) with clinical findings of COPD was 8.3%. More than half of those that had spirometry were aged ≥ 65 years. Majority (16; 84.2%) of those that underwent spirometry were under the care of the pulmonologist ($p < 0.001$). Age, sex, total days of hospitalisation of patients were not significantly associated with utilisation of spirometry.

Conclusions

The utilisation of spirometry among hospitalised patients with clinical findings of COPD in this study was very low when compared to the developed countries. Our study has highlighted the experience of a low income country and the need to increase the awareness of the role of spirometry in the evaluation of COPD among doctors.

Key words: COPD, spirometry, utilisation, Nigeria, respiratory, hospitalisation

Introduction

Chronic obstructive pulmonary disease (COPD) is a multi-component disease which is preventable and treatable, with inflammation at its core; it is characterised by progressive airflow limitation that is not fully reversible¹. The airflow limitation is usually due to an abnormal inflammatory response of the lungs to noxious particles or gases^{1,2}. Cigarette smoking is the major risk factor for the development of COPD worldwide, however, in many low and middle income countries air pollution from burning of wood and other forms of solid fuel has been identified as a risk factor for COPD¹⁻³. The disease is a major cause of morbidity and mortality and the fourth leading cause of death worldwide². Despite advances in management, mortality is expected to increase in the coming decades, in marked contrast to other chronic diseases, such as heart disease and stroke, where there have been considerable decreases in mortality⁴⁻⁵. Patients with COPD often live with exacerbation that is characterized by distressing

symptoms like cough with sputum expectoration and dyspnoea that require frequent hospital admission as the disease progresses. Majority of those affected are frequently unproductive, socially isolated and often depressed and their quality of life is impaired^{1,2,6}. In spite of the burden of COPD, it is often under diagnosed or misclassified⁷. Appropriate diagnosis of COPD using spirometry will go a long way in reducing unnecessary prescription of aminophylline, beta agonist bronchodilator, steroid and anti-cholinergics which are associated with significant side effects in the elderly population². In order to reduce the burden of this disease there is a need for early detection and proper monitoring. Spirometry is the widely accepted method for early screening, diagnosis and monitoring of COPD in patients with clinical findings and risk factors for COPD^{1,2,8}. There is widespread under-utilisation of spirometry for the diagnosis of COPD and this has been supported by studies in Italy and North America⁹⁻¹³. There is scanty data to our knowledge, on the use of spirometry for the diagnosis of COPD in clinical practice in

sub Saharan Africa. The aim of this study was to determine the rate of spirometry utilisation among hospitalised patients with clinical findings of COPD in a tertiary hospital in Nigeria.

Patients and Methods

This was a retrospective study of spirometry utilisation of hospitalised patients with clinical findings of COPD from January, 2002 to June 2009 at University of Ilorin Teaching Hospital (UIITH) Ilorin, Nigeria. The hospital is a 500-bed hospital which provides primary, secondary and tertiary care and is the main health care facility in Ilorin, Kwara State, Nigeria. Referrals were received from district and private hospitals in the area. There are currently three respiratory physicians in the department, assisted by resident doctors in postgraduate training. The cost of undergoing spirometry was 750 Nigerian Naira which was equivalent to 5 United States dollars.

All the spirometry tests were conducted by the respiratory physicians and senior residents using the Spirolite spirometer version 303 manufactured by Medical System International Corporation in USA 2001. The spirometer was calibrated with a 3 liter syringe at regular intervals to ensure accuracy of the tests. The procedure was conducted and the result interpreted in accordance with standardization requirement of the American thoracic society (ATS)¹⁴. Those hospitalised patients with clinical findings of COPD who had spirometry while on admission or within 30 days after discharge from the hospital were considered to have undergone spirometry¹³.

The records of spirometry performed from January 2002 to July 2009 were retrieved from the records of the cardiopulmonary unit of the hospital. In addition; the total number of hospitalised patients with clinical findings of COPD admitted by all the units in the department of medicine during this period was obtained from the record of admissions. Information in relation to patients' age, sex, specialty of the physician referring for the test, type of spirometry (routine /post bronchodilator test) and outcome of the spirometry results were obtained.

The outcome of spirometry was classified as (1) normal if FEV1/FVC percent was >70%, (2) obstructive ventilatory defect: if the FEV1/FVC percent was <70%, (3) restrictive ventilatory defect if the FVC was less than 80% of the predicted and the FEV1/FVC was greater than 80%, and (4) mixed ventilatory defects if the FVC was less than 80% of predicted and the FEV1/FVC was <70%¹⁴.

The data analysis was done using a computer software package SPSS version 15 (SPSS, Chicago IL, USA). Descriptive and frequency statistics of general characteristics of patients were performed; Chi square was used to determine the significance of the variables associated with utilisation of spirometry. A p value < 0.05 was accepted as statistically significant.

Results

A total of 228 patients with clinical findings of COPD were admitted from January 2002 to June 2009. The mean age of the patients was 66.6±11.5years (range 35-100years). Of the 228 patients, 185 (81.1%) were males and 43 (18.9%) were females. Age group 65-74 had the highest number of admissions, the frequency of admissions increased with the age of patients'. Of the 228 hospitalized patients, 145 (63.6%) were discharged from

the hospital, 50 (21.9%) died, 31 (13.6%) discharged against medical advice and 2(0.9%) referred to other specialties because of their co-morbidity. In this study, 19 (8.3%) had spirometry while 209 (91.7%) did not. The indication in the 19 patients with clinical findings of COPD for spirometry was diagnosis of COPD. These are shown in table i. More than half of those that had spirometry were aged ≥ 65 years. Approximately 90% of those that underwent spirometry were males. Fourteen patients (73.7%) had reversibility test or post-bronchodilatory test, while 5(26.3%) had baseline spirometry. Our study also revealed that majority of patients 16(84.2%) that underwent spirometry were managed by the pulmonologist (p<0.001) (**Figure**). Although age group 65-74, males and those patients hospitalised for more than 7 days had more spirometry ($P>0.05$), these factors were not significantly associated with utilisation of spirometry. These are shown in table ii.

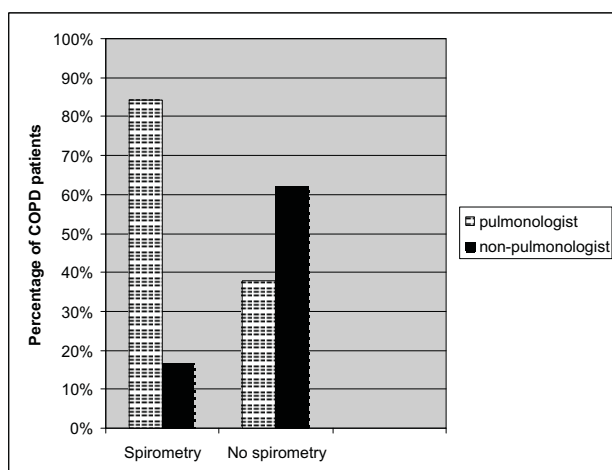
Table i
Characteristic of patients with clinical findings of COPD

Mean age (yrs)	66.6(11.5)
Mean hospital stay	13.8(9.2)
Age range	
35-44	9(3.9)
45-54	23(10.1)
55-64	49(21.5)
65-74	88(38.6)
≥ 75	59(25.9)
Sex	
Male	185(81.1)
Female	43(18.9)
Outcome	
Discharged	145(63.6)
Death	50(21.9)
DAMA	31(13.6)
Referred	2(0.9)
Spirometry	
Yes	19(8.3)
No	209(91.7)

DAMA=Discharge Against Medical Advice

Table ii
Factors associated with spirometry utilisation among hospitalised patients with clinical findings of COPD (n=228)

Factors	Spirometry Done (%) n=19	Spirometry Not done (%) n=209	P values
Age range(yrs)			
35-44	0	4.3	
45-54	21.1	9.1	
55-64	26.3	21.1	
65-74	36.8	38.8	
	15.8	26.8	0.36
Sex			
Male	89.5	80.4	
Females	10.5	19.6	0.33
Referring unit			
Pulmonology	84.2	37.8	
Other units	15.8	62.2	<0.001
No of day hospital stay			
≤ 7days	40.0	43.2	
>7days	60.0	56.8	0.89



Specialty of physician referring patients for spirometry

Discussion

Chronic obstructive pulmonary disease (COPD) is a disease that presents with chronic cough and expectoration and progressive dyspnoea with fixed airflow limitation. The respiratory symptoms may precede fixed airflow limitation; similarly air flow limitation may also precede respiratory symptoms². The gold standard for diagnosis of COPD is spirometry².

The rate of utilisation of spirometry among hospitalised patients with clinical findings of COPD in this study was 8.3%. Our finding is lower than 31–34 % reported from USA^{7, 11, 12, 15, 16}. Similarly our data is also lower than 19.3% in an audit study in the province of Reggio Emilia (Italy)¹⁷. However, other investigators have reported different findings^{9, 18}. The lower rate of utilisation in our study is not surprising to us considering the fact that, even in developed countries that have high accessibility to spirometer and awareness of the test the utilisation was reported to be low¹⁹.

Our findings underscore the fact that spirometry is not accorded its rightful place in clinical practice unlike other tests like, blood glucose estimation, electrocardiography (ECG) and electroencephalography (EEG)¹⁹.

There are geographical variations in barrier to the use of spirometry, and in Nigeria a study among hospital based doctors has reported that unavailability of spirometer and lack of awareness of its importance in clinical practice were the common barriers to spirometry utilisation²⁰. In this study, we also found that from age 35 to 74 years, spirometry utilisation among hospitalised patients with clinical findings of COPD increased with age. Our finding is in contrast to previous studies where the frequency of spirometry decreased with age^{7, 12} and this difference may be attributed to high accessibility to medical care at the early stage of diseases in the developed countries.

Majority of the patients that had spirometry (89.5% vs. 10.5%) and those that did not (80.4% vs. 19.6%) were males, and this might have accounted for the lack of significance of the effect of gender. We are of the opinion that the male predominance could be due to the increased occurrence of disease in men². This result is similar to reports by other investigators^{7, 12, 21}.

A very large proportion of those patients that underwent spirometry were referred and managed by the

pulmonologist, which is in agreement with was reported by other studies^{12, 18}. Therefore being in the care of a pulmonologist was significantly associated with likelihood of having spirometry.

Age, sex, total days of hospitalisation of patients were not significantly associated with utilisation of spirometry.

Furthermore, the result of this study shows that majority of the non pulmonary internists were not utilising this test and this phenomenon has been reported by a previous study¹⁹. In this study, 73.7% of the patients had reversibility test or post-bronchodilator test, while 26.3% had only baseline spirometry. This result is higher than 46% reported by a study in USA. The high frequency of post bronchodilator testing in our study may be because most of the spirometry requests were from the pulmonologist.

The limitations of this study were small sample size and specialist study setting. Despite these limitations, we have tried to share our experience regarding the utilisation of spirometry in hospitalised patients with clinical findings of COPD in our setting which is an example of low income country.

Conclusion,

The rate of utilisation of spirometry in hospitalised patients with clinical findings of COPD in this study was low. The result of our study suggests the need to increase the awareness of the test among doctors, increase spirometry education in the medical school and encourage the acquisition of spirometers in Nigerian hospitals.

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