Research Article

Community Pharmacists' Competence for Educating Asthmatic Patients on the Use of Inhalers and the Peak Flow Meter.

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ABSTRACT

Community pharmacists are readily accessible to patients for counselling services on their disease state, medications and medical devices. Previous studies have reported asthma patients' poor inhaler techniques. This study evaluated community pharmacists' competence for educating asthmatic patients on the use of asthma devices. The cross-sectional study was conducted with community pharmacists in Enugu State, Nigeria (May 2017 – July 2017). A 29-item structured self-administered questionnaire assessing information on stock, action plan for pharmacists, interventions with asthma patients and factors influencing these interventions was utilized. Validated checklists assessed inhaler techniques and peak flow meter use, from participants' demonstrations. Dummy inhalers and peak flow meters were used to teach correct techniques. Of the 116 registered community pharmacists, 62 completed and returned their questionnaires (53.4% participation rate). More than half of the participants were less than 40 years old (63%), male (71.0%), had community pharmacy experience less than 10 years (67.7%). Few of the community pharmacists (3.2%) stocked spacers or peak flow meters. More than half (71%) of the participants claimed to educate patients on correct inhaler techniques but a quarter (24.2%) agreed that they lacked competence to educate on inhaler techniques. Less than half of them (46.8%) were willing to intervene with asthma patients. Summarily, the demonstrated good techniques were: pMDI (35.5%), Accuhaler (29.0%), Turbuhaler (14.5%), pMDI plus spacer (9.7%), peak flow meter (4.8%). The community pharmacists demonstrated poor inhaler techniques and were deficient in the knowledge of peak flow meter use which limited their roles in asthma management.

Keywords: *Asthma, Community Pharmacist, Inhalers, Peak Flow Meter*

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INTRODUCTION

Asthma is a public health problem that is burdensome to patients and their caregivers (Bahadori *et al*., 2009; GINA, 2018). It impacts negatively on the quality of life and increases the costs of health care (Masoli *et al*., 2004; Melani *et al*., 2011, AL-Jahdali *et al*., 2013). Asthma affects around 339 million people globally (Global Asthma Report, 2018). In Nigeria, the management of asthma is hindered by poor standard of living (Global Asthma Report, 2018).
Most asthma drugs are administered by inhalation. There are checklists to assess proper inhaler techniques for respiratory diseases and the steps are ordered (Al-Wasil & Al-Mohaimeed, 2003; Hassan, 2009; Batterink *et al*., 2012; Bryant *et al*., 2013). If some of the key steps are missed or incorrectly executed, it could lead to insignificant or none of the inhaled drug getting to the airways and lungs with possible poorly controlled asthma (Masoli *et al*., 2004; Melani *et al*., 2011, AL-Jahdali *et al*., 2013). Asthma patients have

demonstrated poor inhaler techniques (Masoli *et al*., 2004; Souza et al., 2009; Batterink *et al*., 2012; Bryant *et al*., 2013; Price, 2014).
Poor asthma control has been caused by inefficient communication between the healthcare providers and asthma patients, lack of self-monitoring equipment (such as the peak flow meter), and educational materials (Greene *et al*., 1996). Community pharmacists can provide ongoing support and management services to asthma patients. They are conveniently located in the community to attend to patients, with many opening for long hours without the need for appointments before consultations (Fathima *et al*., 2013).
Health care professionals can educate patients about asthma and develop their self-management (Abdelhamid *et al*., 2008). Community pharmacists can help patients self-manage their asthma with the proper use of inhalers and the peak flow meter to ensure they have well-controlled asthma (NIH, 1995). The peak flow meter helps to measure day-to-day variation in

breathing which could show the effectiveness of the asthma medication and management plan (Adeniyi & Erhabor, 2011). Community pharmacists can refer patients with poorly controlled asthma to physicians or specialists for medical care. Patients from the hospital may fill their prescriptions in the hospital pharmacy or in their community pharmacy. Pharmacists cannot exempt themselves from the management of asthma, as they are custodians of drugs and can put patients through their management plan (Abdelhamid *et al*., 2008). They should view themselves as the last line of defense. For instance, if medical doctors are busy in the clinic to demonstrate proper inhaler techniques or how to use the peak flow meter device to asthma patients, the onus rests on the shoulders of the pharmacists to do adequate demonstrations at the point of dispensing. Research has revealed that some hospital pharmacists exempt themselves in the management of asthma because they feel the role of asthma management is solely the duty of medical doctors (Fink & Rubin, 2005).

Pharmaceutical care services can have significant impact in reducing health care costs (Abdelhamid *et al*., 2008). Continuous support is required in assisting asthma patients with self-management (Lemay *et al*., 2015). Community pharmacists are easily accessible to render these services. However, community pharmacists have also demonstrated poor handling of asthma devices (Osman *et al*., 2012). Most of these studies employed the mystery patient technique but did not go a step further in educating the pharmacists on the proper assessed community pharmacists' roles in promoting asthma self-management. Hence, this study was conducted not only to evaluate community pharmacists' competence for educating asthmatic patients on the use of asthma devices but also to educate these pharmacists on the use of these devices.

MATERIALS AND METHODS

Study Design and Sample population:
This was a cross-sectional study conducted among community pharmacists in Enugu State, South-East, Nigeria, over a period of three months (May 2017 – July 2017). Most of the community pharmacies in Enugu State are located in the capital. The eligibility criteria included community pharmacists who worked in Enugu State and gave their consent to participate. There were 116 registered community pharmacists in Enugu State when this study was conducted, as verified from the Pharmacist Council of Nigeria (PCN) Office, Enugu State.

Data Collection:
The 29-item questionnaire was structured and self-administered. It comprised: demographic information, information on stock, action plan for pharmacists, interventions with asthma patients and factors influencing these interventions. The questionnaire was adapted and modified from a previous report by the National Institutes of Health (NIH) and questionnaire on asthma management for community pharmacists developed by Buckley and Ryder (NIH, 1995; Buckley & Ryder, 2012). The checklist by Bryant and colleagues (2013) was used to assess the inhaler techniques demonstrated by the pharmacists. The checklist by Sleath *et al*. (2011) was used to assess the demonstration of peak flow meter use. The researcher introduced himself to the

community pharmacists who participated in the study and explained the objectives of the survey. Informed consent for participation was obtained before the questionnaires were administered. The community pharmacists were met individually. They filled the questionnaires in their pharmacies, without the consultation of any reference material. Confidentiality was maintained, as the names of the participants were not requested for. The filled questionnaires were retrieved before the participants were handed dummy inhalers and a peak flow meter for demonstration of use. The checklists were ticked, as appropriate, immediately after the demonstrations by the participants. The participating community pharmacists were educated by the researcher who demonstrated the correct techniques for the inhaler and peak flow meter devices. The community pharmacists were asked to make re-demonstrations to the researcher. It was ensured that all the steps were correctly demonstrated by the community pharmacists, before departure.

Ethical consideration: This study was conducted after obtaining ethical approval from the Health Research and Ethics Board of the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State on 23 May, 2017 (NHREC/05/01/2008B – FWA00002458 – IRB00002323). The study was conducted based on the approved protocol.

Data Analysis:
The IBM SPSS Version 21.0 (IBM Corp, Version 21.0, Armonk, NY, USA) was used for the data entry and analysis. Descriptive statistics summarized data.
For Table 5, Strongly Agree (SA) was coded as 5; Agree (A) was coded as 4; Neutral (N) was coded as 3; Strongly disagree (SD) was coded as 2; Disagree (D) was coded as 1. The code responses were reversed in a positive direction for items 1, 4, 5, 6 and 7 such that higher mean scores indicated positive responses i.e. are highly willing to intervene with asthma patients.

RESULTS

A total of sixty two-questionnaires were completed and returned, representing a participation rate of 54.3% (62/116). About 63% of the community pharmacists were less than 40 years old. Most of them (90.3%) had less than 10 years post-qualification experience (Table 1). Peak flow meters and spacers were stocked in few community pharmacies, Figure 1.

More than 90% of the community pharmacists claimed to educate patients about their asthma medications. However, less than 2% of them helped asthma patients use peak flow meters appropriately, Figure 2. Less than 5% of the community pharmacists claimed to always demonstrate peak flow meter use to asthma patients, Table 2.

More than half of the community pharmacists did not demonstrate exhalation to residual volume in preparation for the inhalation of the drug from a pressurized metered dose inhaler (pMDI) (67.7%) or Accuhaler devices (75%). Only about 13% of them rotated the grip of the Turbuhaler device as required. The community pharmacists poorly demonstrated all the eight steps for correct pMDI plus spacer use and exhibited deficient knowledge of correct peak flow meter use, Table 3.

Table 1:
Demographic details of the community pharmacists, n = 62

Variables		n (%)
Age (in years)	20 -29	13 (21.0)
	30 -39	26 (41.9)
	40 – 49	17 (27.4)
	50 -59	5 (8.1)
	> 60	1 (1.6)
Gender	Male	44 (71.0)
	Female	18 (29.0)
Post-qualification experience (in years)	< 5	27 (43.5)
	5 -10	29 (46.8)
	11 – 20	6 (9.7)
	> 20	0 (0.0)
Community pharmacy experience (in years)	< 5	19 (30.6)
	5 -10	23 (37.1)
	11 – 20	17 (27.4)
	> 20	3 (4.8)
Highest qualification	MPharm	6 (9.7)
	MPH	1 (1.6)
	FPCPharm	1 (1.6)
	PhD	0 (0.0)
	None	54 (87.1)

MPharm = Master of Pharmacy; MPH = Master of Public Health; FPCPharm = Fellow of the West African Postgraduate College of Pharmacists; PhD = Doctor of Philosophy
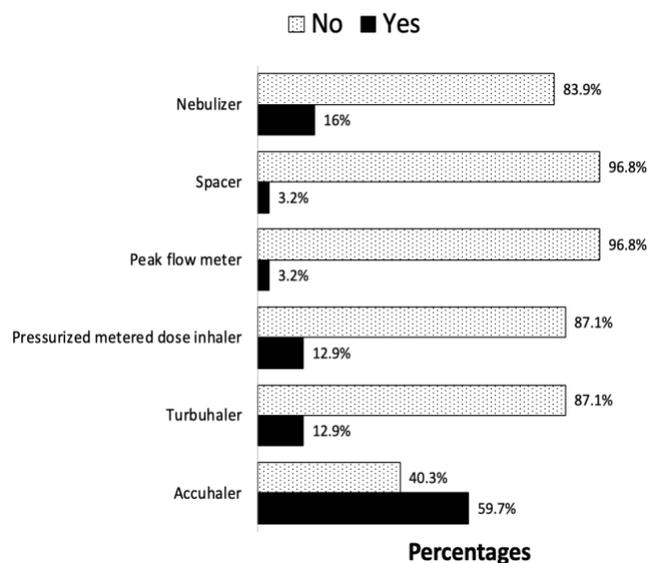
Figure 1:
Information on stock, n = 62

Overall, the community pharmacists demonstrated poor device techniques for all the inhaler devices and the peak flow meter, Table 4.

Only about 24% of the community pharmacists reported that they lack competence to educate asthma patients on inhaler techniques. About 60% of the participants reported that they lacked competence to educate asthma patients on peak flow meter use, Table 5. About half of the community pharmacists (46.8%) were willing to intervene with asthma patients.
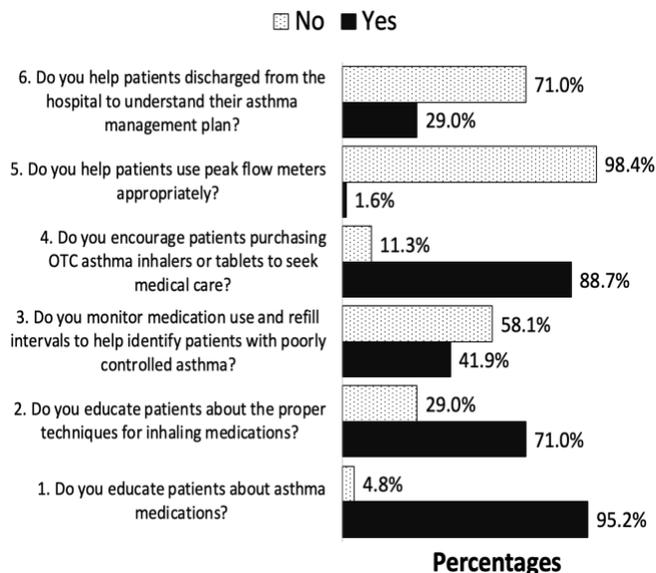
Figure 2:
Action plan for pharmacists, n = 62

Table 2:
Interventions with asthma patients, n = 62

Statements	Always n (%)	Often n (%)	Sometimes n (%)	Never n (%)
How often do you:				
demonstrate new inhalation device?	5 (8.1)	9 (14.5)	45 (72.6)	3 (4.8)
provide verbal information on new medications?	9 (14.5)	16 (25.8)	34 (54.8)	3 (4.8)
demonstrate peak flow meter usage?	3 (4.8)	1 (1.6)	2 (3.2)	56 (90.3)
advise on importance of peak flow meter?	3 (4.8)	1 (1.6)	1 (1.6)	57 (91.9)
check inhaler technique every 6 – 12 months?	1 (1.6)	6 (9.7)	9 (14.5)	46 (74.2)
advise to ask doctor for action plan?	4 (6.5)	9 (14.5)	30 (48.4)	19 (30.6)

DISCUSSION

From the results obtained, about half of the participating community pharmacists were between 30 – 39 years old while over half were males. About a tenth of the participants had additional qualification after their Bachelor of Pharmacy (B.Pharm) degree. Peak flow meters and spacer devices were rarely stocked in the community pharmacies. Most of the participating community pharmacists claimed to educate patients about their asthma medications but few actually helped these patients use peak flow meters appropriately. Less than half of them were willing to intervene with asthma patients. Overall, the community pharmacists demonstrated poor techniques for all the inhaler devices and the peak flow meter.

Table 3:
Community pharmacists' demonstration of asthma devices assessed against the eight steps for correct use in the checklists, n = 62

Steps for asthma devices	Yes (%)
pMDI	
1. Remove the cap from the inhaler	59 (95.2)
2.* Shake the inhaler	33 (53.2)
3. Hold inhaler upright	33 (53.2)
4. Exhale to residual volume	20 (32.3)
5. Place mouthpiece between lips and teeth to seal the mouthpiece	52 (83.9)
6.* Inhale slowly and simultaneously and activate the canister	31 (50.0)
7.* Continue slow and deep inhalation	23 (37.1)
8. Take inhaler out of mouth and hold breath for 5-10 seconds	25 (40.3)
Accuhaler	
1. * Hold Accuhaler horizontally	36 (58.1)
2.* Push the lever away from the mouthpiece until you hear the 'click'	32 (51.6)
3. Exhale as much as you can	15 (24.2)
4. Exhale away from the mouthpiece	15 (24.2)
5. Place mouthpiece between lips and teeth to seal the mouthpiece	42 (67.7)
6.* Inhale forcefully and deeply	28 (45.2)
7. Remove Accuhaler from the mouth	27 (43.5)
8. Hold breath for 5-10 seconds	20 (32.3)
Turbuhaler	
1. Remove the cap from inhaler	49 (79.0)
2.* Keep inhaler upright	27 (43.5)
3.* Rotate grip anti-clockwise then back until a click is heard	8 (12.9)
4. Exhale to residual volume	12 (19.4)
5. Exhale away from mouthpiece	14 (22.6)
6. Place mouthpiece between teeth and lips	42 (67.7)
7. * Inhale forcefully and deeply	28 (45.2)
8. Hold breath for 5-10 seconds	16 (25.8)
pMDI + Spacer	
1. * Shake the inhaler well	25 (40.3)
2. Fit the inhaler into the opening at the end of the spacer	9 (14.5)
3. Place mouthpiece between lips and teeth to seal mouthpiece	10 (16.1)
4. Breathe out gently	7 (11.3)
5.* Press the inhaler once only	6 (9.7)
6. Take 5 – 10 slow breaths in and out through the mouth	6 (9.7)
7. * Do not remove the spacer from the mouth between breaths	7 (11.3)
8. Remove spacer from the mouth	6 (9.7)
Peak Flow Meter	
1. * Set marker to zero	4 (6.5)
2. Hold meter upright	4 (6.5)
3. Do not block marker movement	3 (4.8)
4. * Take a deep breath with mouth open	3 (4.8)
5. Place meter in mouth and close lips tightly around meter	4 (6.5)
6. * Exhale hard and fast into meter	3 (4.8)
7. Check the result	3 (4.8)
8. Repeat the step 1 – 7 two more times	1 (1.6)

pMDI = pressurized metered dose inhaler; * Essential steps

Table 4:
Device technique scores for different inhaler devices and peak flow meter, n = 62

Type of inhaler/device	*Good technique n (%)	*Poor technique n (%)
1. pMDI	22 (35.5)	40 (64.5)
2. Accuhaler	18 (29.0)	44 (71.0)
3. Turbuhaler	9 (14.5)	53 (85.5)
4. pMDI plus Spacer	6 (9.7)	56 (90.3)
5. Peak flow meter	3 (4.8)	59 (95.2)

Good technique was defined as having at least five out of eight steps correct, including all three essential steps on the checklist for inhaler techniques and peak flow meter (Sleath et al., 2011; Bryant et al., 2013).
Poor technique was defined as not reaching the standard defined as good technique.
pMDI = pressurized metered dose inhaler

Table 5:
Factors influencing interventions with asthma patients, n = 62

Variables	SA n (%)	A n (%)	N n (%)	D n (%)	SD n (%)	Mean (SDv)
What factors influence your interventions with asthma patients?						
* Time is a major limitation	5 (8.1)	18 (29.0)	22 (35.5)	16 (25.8)	1 (1.6)	3.16 (0.96)
Patients are receptive to counseling	6 (9.7)	41 (66.1)	14 (22.6)	1 (1.6)	0 (0.0)	3.84 (0.61)
I have sufficient knowledge to counsel effectively	5 (8.1)	36 (58.1)	18 (29.0)	3 (4.8)	0 (0.0)	3.69 (0.69)
* I am not competent to educate on inhaler techniques	1 (1.6)	14 (22.6)	8 (12.9)	17 (27.4)	22 (35.5)	2.27 (1.22)
* I am not competent to educate on peak flow meter usage	1 (1.6)	37 (59.7)	6 (9.7)	8 (12.9)	10 (16.1)	3.18 (1.19)
* Not my role to counsel to improve asthma control	1 (1.6)	0 (0.0)	3 (4.8)	25 (40.3)	33 (53.2)	1.56 (0.74)
* I do not counsel. I am underpaid to do so	1 (1.6)	0 (0.0)	2 (3.2)	25 (40.3)	34 (54.8)	1.53 (0.72)

SA – Strongly Agree (coded as 5); A – Agree (coded as 4); N – Neutral (coded as 3); SD – Strongly disagree (coded as 2); D – Disagree (coded as 1); SDv – Standard Deviation
The code responses were reversed in a positive direction such that higher mean scores indicated positive responses i.e. are highly willing to intervene with asthma patients

This study had some strengths and limitations. Some pharmacists were not on duty during data collection, despite several visits by the researcher. This reduced the sample size. Although, the Pharmacists Council of Nigeria stipulates that registered community pharmacists should always be available to attend to patients whenever their premises are open, this is not followed to the letter (PCN, 1992). This is worrisome since

community pharmacists are considered the most accessible healthcare professionals (Osman *et al.*, 2012). In addition, this study was cross-sectional by design and conducted in a Nigerian state. The results obtained might not be generalized to other study settings. Some pharmacists declined from participation due to their perceived lack of adequate knowledge to demonstrate the proper inhaler techniques or peak flow meter use. The previous studies that assessed pharmacists' inhaler technique demonstrations employed the mystery patient technique. They did not go steps further in educating the pharmacists on the proper inhaler techniques. Although with the mystery patient technique, the pharmacist is less likely going to be self-conscious and produce results closer to reality, it was not necessary in this study. The researcher introduced himself as a pharmacist who was enthusiastic about improving inhaler techniques of pharmacists and patients; stated what poor inhaler techniques could cause and included that he would teach the proper inhaler techniques after their demonstrations. Demonstrating proper inhaler techniques to all the community pharmacists who participated is a highlight of this research.

Few of the community pharmacists stocked peak flow meters and spacer devices in their pharmacies. This is similar to a study in Alberta, Canada, where most of the community pharmacies had no peak flow meter in stock (Banh *et al.*, 2016). Few prescriptions for peak flow meters or spacer devices could be a reason for the low stock and might contribute to the poor knowledge of the use of these devices (Onyedum *et al.*, 2013). This is further buttressed by the findings of this study that less than a tenth of the community pharmacists regularly demonstrate peak flow meter use to asthma patients. Few of the participants also reported advising asthmatic patients on the importance of regular peak expiratory flow rate checks. A large proportion of the community pharmacists reported lack of competence to educate asthmatic patients on peak flow meter use.

Furthermore, a large fraction of the community pharmacists claimed to educate patients about their asthma medications. In asthma management, patient education is vital. In a Serbian study, pharmacists positively influenced health outcomes by educating asthma patients (Kovacevic *et al.*, 2017. Only about a quarter of the participants claimed to help asthma patients understand their asthma management plan. Although physicians in Nigeria might not frequently use a written action plan for asthma patients, it may present an opportunity for pharmacists to collaborate with physicians in this regard (Banh *et al.*, 2016).

Many factors could be responsible for poor knowledge of proper inhaler techniques by patients. These include pharmacists' deficient knowledge of asthma management and patients' unawareness that pharmacists can assist (Osman *et al.*, 2012). In addition, social barriers may impede the use of inhalers (Alrasbi & Sheikh, 2008). Health professionals, especially community pharmacists who are readily accessible to patients should do well in educating asthma patients on proper inhaler techniques (Kumar *et al.*, 2009). Few community pharmacists were willing to intervene with asthma patients. Pharmacists' involvement in asthma management may improve outcomes. In a study conducted by Kovacevic *et al.* (2017), community pharmacists'

interventions improved adherence and asthma control, minimizing costs and need for referrals. In this study, only about a quarter of the community pharmacists, often or always provide verbal information on new drugs with less than a quarter checking inhalation technique every 6 - 12 months or advising to ask doctors on action plan. Pharmacy interventions have been impactful (Alrasbi & Sheikh, 2008).

Overall, the community pharmacists demonstrated poor techniques for all the inhaler devices and the peak flow meter. They fared worse with the peak flow meter and pMDI plus spacer. Other studies have also reported more than half of the participants having poor inhaler technique (Thompson *et al.*, 1994; Alotaibi *et al.*, 2016; Garcia-Cardenas *et al.*, 2016). In a study conducted in Sudan, many pharmacists missed the steps for correct inhaler techniques (Osman et al., 2012). Another study conducted in Anambra State, Nigeria indicated that community pharmacists were not versed in the use of the metered dose inhaler (Nduka *et al.*, 2016).

The most common error by participants in our study, for all devices, was failure to demonstrate exhalation to residual volume, away from the mouthpiece (for the dry powder inhalers) (Hassan, 2009; Melani et al., 2011; Bryant *et al.*, 2013). If there is no exhalation to residual volume in preparation for the inhalation of the drug, it may lead to poor inspiratory rate and reduce the medication that gets to the lungs. The rescue inhalers usually come as pMDIs. Using inhalers appropriately may be life-saving.

In another Nigerian study, the scores of the respondents were not influenced by certifications or number of years in practice. The engagement of health care providers in frequent training and updates on asthma management can improve their skills and by extension, that of their patients. The routine training and retraining of health care providers through continued professional development could improve the inhaler skills of both the health care providers and the patients (Nduka *et al.*, 2016). Pharmacists need to continually update themselves. In our study, the community pharmacists were most unfamiliar with the peak flow meter and spacer devices. In another study, pharmacists were majorly unfamiliar with the use of spacers and the dry powder inhalers (Alrasbi & Sheikh, 2008).

There is dire need for pharmacists to understand that they are relevant in asthma management. Community pharmacists should be well-grounded in educating asthma patients on the optimum use of inhalers, spacers and peak flow meters. Pharmaceutical companies that manufacture or market asthma devices should be encouraged to provide dummies for community pharmacists, as it would aid demonstrations to asthmatic patients or their caregivers. More studies should be conducted that do not only reveal deficiencies in the knowledge of inhaler techniques among health professionals but also educate these health professionals on the proper techniques. Monitoring of symptoms and peak expiratory flow rate are important for self-management. Lung function could be objectively measured with the peak flow meter. Physicians who attend to asthmatic patients should encourage these patients to utilize peak flow meters. This would also encourage community pharmacists to stock peak flow meters for the benefit of the patients.

Continuous educational programmes for community pharmacists regarding the proper use of asthma-related devices such as inhalers, spacers, peak flow meters and nebulizers should be initiated.

This study concludes that community pharmacists demonstrated poor inhaler techniques and were deficient in the knowledge of peak flow meter use which limited their roles in asthma management.

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