Research Article ISSN 2689-1085

Journal of Pediatrics & Neonatology

Assessment of Inhaler Technique of Healthcare Workers in Port Harcourt, Nigeria

Chukwuma A. Chidiebere[1], Onubogu C. Uchenna[2] and Longjohn N. Dabota[1]

[1]*Department of Paediatrics & Child Health, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria.*

[2]*Department of Paediatrics & Child Health, Rivers State University Teaching Hospital, 5-6 Harley Street, Old GRA, Port Harcourt, River State, Nigeria.*

***Correspondence:**
Dr. Chukwuma Chidiebere Adaku, Department of Paediatrics & Child Health, University of Port Harcourt Teaching Hospital, Rivers State, Nigeria, E-mail: adachukwuma1@gmail.com.

Received: 03 Oct 2023; **Accepted:** 09 Nov 2023; **Published:** 15 Nov 2023

Citation: Chukwuma AC, Onubogu UC, Longjohn DN. Assessment of Inhaler Technique of Healthcare Workers in Port Harcourt, Nigeria. J Pediatr Neonatal. 2023; 5(1): 1-5.

ABSTRACT

Introduction: *Pressurized metered dose inhalers (pMDIs) are important in asthma management, however, their therapeutic effectiveness is dependent on correct use, as a poor technique would result in suboptimal drug delivery to the lungs. It is, therefore, necessary for healthcare professionals to know and teach proper pMDI techniques, to improve the outcomes in asthma management.*

Aim: *The aim of the study was to assess pMDI technique instructions given by healthcare workers to patients with bronchial asthma.*

Method: *This was a cross-sectional study done amongst healthcare workers who attended the 2022 World Asthma Day Workshop in Port Harcourt. An interviewer-administered questionnaire was used to obtain information on the demographic characteristics of participants. A model station was set up for the healthcare workers to give simulated health instructions to patients on the use of the provided pMDI. The correct identification of a pMDI and the stepwise pMDI training instructions of each participant were observed and scored according to the National Heart, Lung and Blood Institute protocol.*

Result: *Sixty participants were recruited for the study.Ninety-eight per cent of the participants correctly identified a pMDI. However,88.3% gave less than 60% of the instructions required for proper demonstration of the inhaler technique.*

Conclusion: *The study demonstrated poor pMDI technique among Health workers in Port Harcourt, Rivers State, Nigeria.*

Keywords

Asthma, Health workers, Inhaler Technique Instructions, Pressurized metred dose inhaler.

Introduction

Asthma is the most common cause of chronic, non-communicable respiratory disorder affecting over 260 million children and adults globally, with prevalence varying between 1- 18% in different countries [1]. The World Health Organisation (WHO) estimated that asthma was responsible for about 455,000 deaths in 2019 [2], despite the availability of appropriate medications and guidelines for treatment. Although pressurized metered dose inhalers (pMDIs) have been proven to be the cornerstone of asthma management [1], its therapeutic effectiveness is hinged on correct use [3], as a poor technique would result in suboptimal drug delivery to the lungs.

Poor inhaler technique has been reported in 71 to 90% of patients with asthma [4,5]. Incorrect pMDI technique has been associated with frequent asthma exacerbations and poor control of asthma and chronic obstructive pulmonary disease (COPD) [6,7]. A plausible reason for the poor pMDI technique seen in patients may be due to a knowledge deficit and inadequate training among healthcare workers who ought to teach and assess patients' inhaler technique at every hospital visit [8].

The contributors to the successful management of longstanding airway disorders like asthma and COPD are 90% education and only 10% medication [9]. Since proper inhaler technique will invariably result in improved asthma outcomes, a better quality of life and cost-effective treatment [6], it is, therefore, necessary for healthcare professionals to know and teach proper pMDI technique, as a knowledge deficit can erode the gains made in asthma management. Therefore, this study was carried out to assess inhaler technique instructions given by healthcare workers to patients with bronchial asthma.

Subject and Methods

This was a cross-sectional study. Participants were healthcare workers who attended an asthma workshop in Port Harcourt, Rivers State, to celebrate the 2022 World Asthma Day, with the theme Closing the Gap in Asthma Care. The workshop was organized by specialists in Paediatric respiratory medicine from the 2 tertiary hospitals in Rivers State, Nigeria- Rivers State University Teaching Hospital (RSUTH) and University of Port Teaching Hospital. Ethical clearance for the study was obtained from RSUTH ethical committee. Non-pulmonology specialities in tertiary hospitals and some private hospitals were invited for the training. All healthcare providers who attended the training and gave written informed consent were recruited. A model station was set up for health workers to give a simulated patient instructions on how to use a pMDI which was provided. An interviewer-administered questionnaire was used to obtain information on the demographic characteristics of participants, their duration of practice, their ability to correctly identify a pMDI that was shown to them and whether or not they had instructed a patient on the use of a pMDI while the stepwise pMDI technique training instructions given by health worker was observed and scored. Steps for proper pMDI technique instructions were outlined according to the National Heart, Lung and Blood Institute protocol [6]. Participants were scored 1 point for correctly saying each step of the inhaler technique protocol. Data entry and analysis were done using SPSS software version 23.0 (IBM Corporation, Atlanta, GA, USA). Categorical data were expressed as proportions and presented as tables and graphs. The overall quality of instructions given by the participant was scored and expressed as a percentage.

Result

A total of 60 Participants were recruited and they were made up of doctors 43 (71.7%), nurses 14 (23.3%) and pharmacists 3 (5%). There were more female health workers with an F: M ratio of 1.7:1. Most health workers had been practicing for at least 10 years 40 (66.7%), knew what a pMDI was 59 (98.3%), and had instructed a patient on how to use a pMDI 38 (63.3%). Only 1 health worker did not know what a pMDI was; the person was a doctor who had been practicing for 10 - < 15 years. Table 1 gives information on the demographics of participants.

Health worker's instructions for teaching how to use an inhaler device (Table 2)

In assessing the overall instructions given to patients to demonstrate inhaler techniques only an average of 34.3 ± 20.1% of the instructions were correctly given. The majority 53 (88.3%) gave less than 60% of the instructions required for proper demonstration of inhaler technique training. Only 1 (1.6%) healthcare worker got all the 10 steps correctly.

Table 1: Demographics of health workers assessed.

Variable	Study population (n= 60) (%)	
Health workers	Doctors	43 (71.7)
	Nurses	14 (23.3)
	Pharmacist	3 (5.0)
Gender	Female	38 (63.3)
	Male	22 (36.7)
Years of practice	1 - <5	8 (13.3)
	5 - <10	12 (20.0
	10 - <15	16 (26.7)
	15 - < 20	11 (18.3)
	> 20	13 (21.7)
Do you know what a pMDI is?	Yes	59 (98.3)
	No	1 (1.7)
Have you ever instructed a patient on how to use a pMDI?	Yes	38 (63.3)
	No	22 (36.7)

Table 2: Quality score of instruction on inhaler use as given by healthcare workers.

The score of Quality of instructions given by health workers on inhaler technique training (%)	Study population (n= 60) (%)
> 80	3 (5.0)
80 - 60	4 (6.7)
< 60	53 (88.3)

Figure 1 depicts the individual instructions on the use of pMDIs as given by the study participants. Most of the health workers correctly demonstrated the first step which is taking off the cap and holding the canister upright 59 (98.3%), The least steps that were communicated during giving inhaler technique instructions were, "Tilt the head slightly backward" 8 (13.3%), exhale to empty lungs in preparation for next puff 9 (15.0%) and hold your breath for at least 5-10secs after removing the canister from your mouth 10 (16.7%). The majority of the health workers 43 (71.7%) were instructing patients to take the two puffs together at the same breath 43 (71.7%).

Discussion

Almost all the respondents correctly identified a pressurized metered dose inhaler (pMDI), probably because of their widespread use, as a result of an increasing prevalence of asthma globally [1]. The only health worker who did not identify an inhaler was a doctor who had practiced for about 10-15 years. This is surprising considering the length of practice because, doctors, as the head of the medical team, are solely responsible for coordinating patient care and are therefore required to have adequate knowledge of common medical conditions and their treatment. The inability to identify a pMDI may probably be

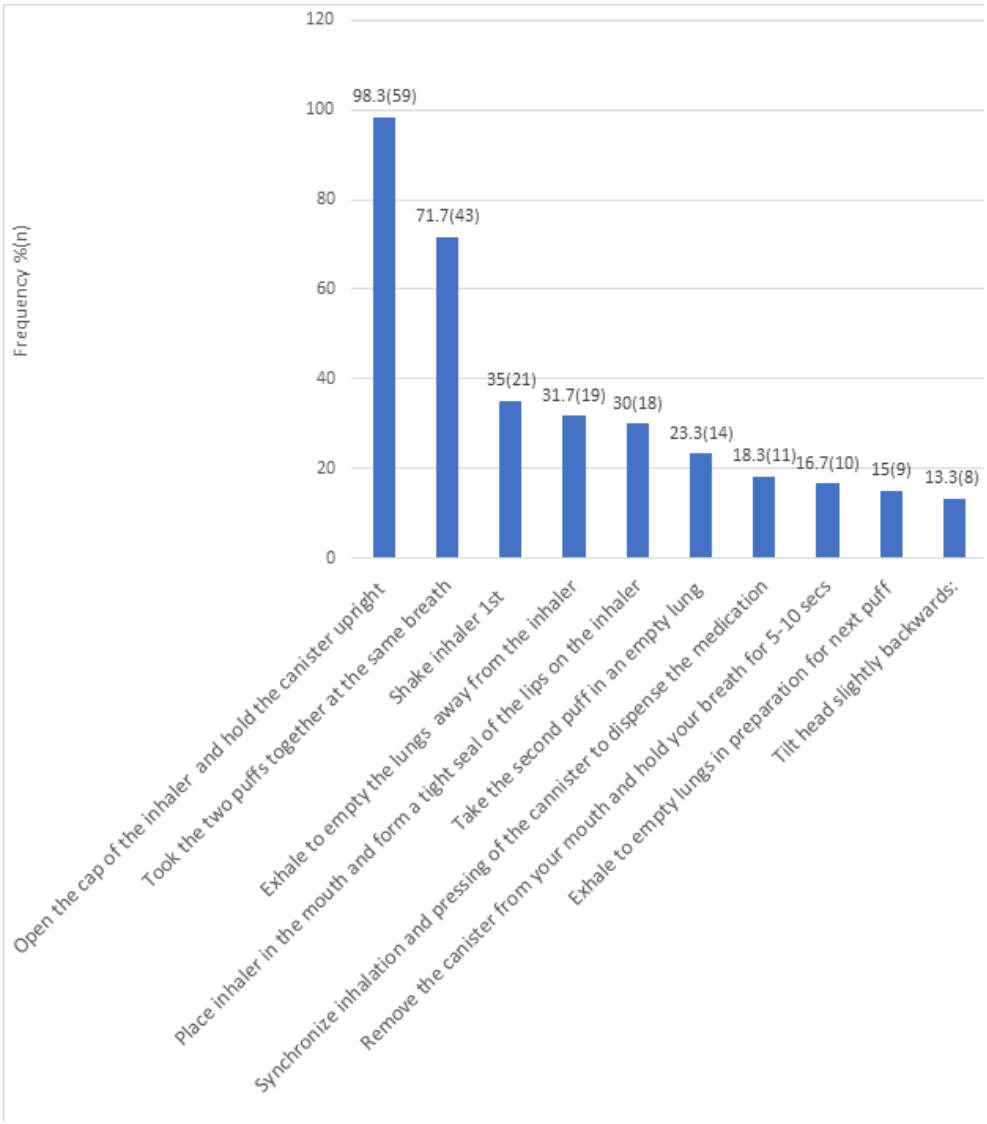

Figure 1: Instructions given by health workers when demonstrating how to use an inhaler device.

because it was not seen in the course of training as an undergraduate. This calls for a review of the medical curriculum as well as methods of formative and summative assessments of students. In a study by Adeniyi et al., [10] all the participants knew what an inhaler was. This may be because the study was conducted among doctors and nurses practicing in a teaching hospital who are likely to be more experienced, unlike the index study where participants included health workers from primary health centers, private hospitals, general hospitals, and teaching hospitals. On the other hand, all the pharmacists and nurses correctly identified a pMDI. This may be because pharmacists, in the course of dispensing drugs, are likely to be abreast with prescriptions that come from common medical illnesses such as asthma, while nurses administer and or supervise the intake of drugs among in-patients. In addition, it is also common practice for patients/caregivers to first visit patent medicine stores, manned mostly by pharmacists and nurses, when they fall ill, thus exposing them to a variety of medications, including pMDIs.

The index study demonstrated poor pMDI technique among health workers, as an average of 3 out of the 10 steps of inhaler technique instructions were correctly given. This poor demonstration of the pMDI technique has been reported by other studies and is not limited to low- and middle-income countries [11,12], as a study done in the United Kingdom showed that only seven per cent of health workers correctly demonstrated all the steps in pMDI use For effective asthma care [13], the correct inhaler technique is crucial [14]. Even with the best techniques, the amount of aerosolized medication that reaches the lungs is about 15–20% [15]. Since inhalers have been proven to be the cornerstone in asthma care and incorrect use is associated with frequent exacerbations and poor control [3,4,6,7,16-19], a knowledge deficit among health workers can erode gains made in treating asthmatics if not properly addressed. With studies estimating about 90% of asthmatics as having poor inhaler technique [4,20], it becomes necessary for healthcare professionals to know and teach proper pMDI technique as a key tool to improving morbidity and mortality from asthma.

Furthermore, this study showed that only 11.7% of health workers demonstrated at least 60% of the vital steps for inhaler technique training. This is comparable to the finding by Belachew et al., [11] where only 18.5% of the respondents demonstrated 64% of the vital steps. Possible reasons for these observations may be ignorance of the relevance of accurate device use as well as inadequate training and supervision of health workers. Training and re-training of health workers, with practical demonstrations, may improve their pMDI technique, with the potential to improve patient device use. In addition, all the participants who identified the pMDI in this study correctly demonstrated the first step of its use, which is 'taking off the cap and holding the canister upright.' This finding is reassuring, as no drug will be delivered to the lungs when this essential step is missed, making the exercise a futile one. Omitting the instruction that correctly positions the airway which is "tilt head slightly backward" does not enhance the efficient delivery of the aerosolized drug to the lungs, and has also been reported by Belachew et al. [11] in Ethiopia. Failure to instruct patients to exhale to empty the lungs in preparation for the next puff reduces the space in the lungs for the next inspiration resulting in suboptimal drug inhalation and has similarly been reported by Ali et al. [20] in Ethiopia and Kishore et al. [21] in Nepal. Instructing patients to take two puffs in one breath will likely result in drug wastage, as only about 15-20% of drugs inhaled in one puff getsto the lungs [15].

Only one respondent in the index study correctly communicated all the steps involved in using a pMDI, in contrast to the study by Sawsan et al., [22] where 15% of health workers did. This respondent works in a respiratory clinic and is tasked with the responsibility of assessing and teaching patients the correct techniques of a pMDI inhaler, buttressing the fact that constant training and practice improves health workers' pMDI technique.

Conclusion

The quality of instructions given by healthcare workers for pMDI use is suboptimal. This situation would lead to a self-predicting doom in asthma care as poor inhaler technique training given by healthcare workers would invariably lead to poor inhaler technique by patients and ultimately lead to poor outcomes for patients with asthma. There is therefore need to regularly train healthcare professionals on proper inhaler techniques, to enable them teach their patients, as a key tool to reducing morbidity and mortality from asthma

Recommendations

Hands-on demonstration of pMDI use should be taught at undergraduate and postgraduate levels. Training and re-training of health workers on pMDI use should be carried out continuously. Health workers should be encouraged to constantly assess the pMDI technique of asthmatic patients, to enhance mastery of the device and to improve patient outcomes.

References

1. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. 2021.
2. https://www.who.int/news-room/fact-sheets/detail/asthma.
3. Usmani OS, Lavorini F, Marshall J, et al. Critical inhaler errors in asthma and COPD: a systematic review of impact on health outcomes. Respir Res. 2018; 19: 10.
4. Melani AS, Bonavia M, Cilenti V, et al. Inhaler mishandling remains common in real life and is associated with reduced disease control. Respir Med. 2011; 105: 930-938.
5. Rau JL. Determinants of patient adherence to aerosol regimen. Respir Care. 2005; 50: 1346-1356.
6. Roche N, Aggarwal B, Boucot I, et al. The impact of inhaler technique on clinical outcomes in adolescents and adults with asthma: A systematic review. Respir Med. 2022; 202: 106949.
7. Giraud V, Roche N. Misuse of corticosteroid metered-dose inhaler is associated with decreased asthma stability. Eur Respir J. 2002; 19: 246-251.
8. Plaza V, Giner J, Rodrigo GJ, et al. Errors in the Use of Inhalers by Health Care Professionals: A Systematic Review. J Allergy Clin Immunol Pract. 2018; 6: 987-995.
9. Fink JB. Inhalers in asthma management: is demonstration the key to compliance? Respir Care. 2005; 50: 598-600.
10. Adeniyi BO, Adebayo AM, Ilesanmi OS, et al. Knowledge of spacer device, peak flow meter and inhaler technique (MDIs) among health care providers: an evaluation of doctors and nurses. Ghana Med J. 2018; 52: 15-21.
11. Belachew SA, Tilahun F, Ketsela T, et al. Competence in metered dose inhaler technique among community pharmacy professionals in Gondar town, Northwest Ethiopia: Knowledge and skill gap analysis. PLoS ONE. 2017; 12: 0188360.
12. Chrystyn H, van der Palen J, Sharma R, et al. Device errors in asthma and COPD: systematic literature review and meta-analysis. NPJ Prim Care Respir Med. 2017; 27: 22.
13. Baverstock M, Woodhall N, Maarman V. Do healthcare professionals have sufficient knowledge of inhaler techniques in order to educate their patients effectively in their use? Thorax. 2010; 65: 117.
14. Usmani OS. Choosing the right inhaler for your asthma or COPD patient. Therapeut Clin Risk Manag. 2019; 15: 461-472.
15. Barthwal MS, Deoskar RB, Rajan KE. Status of inhalation therapy in bronchial asthma in adults above twelve years of age in armed forces. J Assoc Physicians India. 2005; 53: 681-684.
16. Westerik JA, Carter V, Chrystyn H, et al. Characteristics of patients making serious inhaler errors with a dry powder inhaler and association with asthma-related events in a primary care setting. J Asthma. 2016; 53: 321-329.
17. Giraud V, Allaert FA, Roche N. Inhaler technique and asthma: feasibility and acceptability of training by pharmacists. Respir Med. 2011; 105: 1815-1822.
18. Price DB, Roman-Rodríguez M, McQueen RB, et al. Inhaler errors in the CRITIKAL study: type, frequency, and association with asthma outcomes. J Allergy Clin Immunol Pract. 2017; 5: 1071-1081.

19. Kocks JWH, Chrystyn H, van der Palen J, et al. Systematic review of association between critical errors in inhalation and health outcomes in asthma and COPD. NPJ Prim Care Respir Med. 2018; 28: 43.
20. Ali HD, Worku GS, Alemayehu AA, et al. Competence in metered dose inhaler technique among dispensers in Mekelle. Allergy Asthma Clin Immunol. 2014; 10: 18.
21. Kishore PV, Palaian S, Alam K, et al. Correct use of a Metered Dose Inhaler: A Prospective Interventional Study among Healthcare Professionals in a Nepalese teaching Hospital. J Clin Diag Res. 2008; 2: 720-726.
22. Sawsan AB, Kassim AA, Elizabet A, et al. Metered-dose inhaler technique among healthcare providers practicing in Oman. J Sci Res Med Sci. 2001; 1: 39-43.