

**ORIGINAL RESEARCH ARTICLE****ASSESSMENT OF NURSES' KNOWLEDGE ON ROTAHALER DEVICE IN A TEACHING HOSPITAL OF CENTRAL NEPAL**RM Piryani^{1*}, RS Poudel², S Shrestha³, A Prajapati²¹ Department of Internal Medicine & Medical Education, Chitwan Medical College and Teaching Hospital, Bharatpur, Chitwan, Nepal.² Department of Pharmacy, Chitwan Medical College and Teaching Hospital, Bharatpur, Chitwan, Nepal.³ Department of Pharmacy, Shree Medical and Technical College, Bharatpur, Chitwan, Nepal.**Correspondence to: Prof. Dr. Rano Mal Piryani, Department of Internal Medicine and Medical Education, Chitwan Medical College and Teaching Hospital, Chitwan, Nepal. Email: r_piryani@hotmail.com***ABSTRACT**

Nurses are among the key personnel for educating patients on use of inhalers. This study aimed to assess the baseline knowledge of practitioner nurses on rotahaler technique and management. A descriptive study was conducted among the practitioner nurses (n=31) in a teaching hospital of Central Nepal. Knowledge on rotahaler technique and management were assessed using questionnaire by giving '1' for correct response and '0' for incorrect response. Descriptive statistics was calculated for statistical analysis using IBM-SPSS 20.0. The mean knowledge score of the participants was 4.74±1.56. Majority of the participants (76.7%) were unable to respond that dry powder inhalers (DPIs) allow maximum deposition of drugs in lung than pressurised metered dose inhalers (pMDIs) and only 2 (6.5%) of them was aware of instructions to clean the rotahaler. About 50% of participants were unaware that patient with asthma and chronic obstructive pulmonary disease (COPD) should hold their breath for around 10 seconds after taking inhaled medication. Similarly, two third participants knew that a quick, forceful and deep inspiration is necessary while using rotahaler. The participating nurses had inadequate knowledge on the technique of rotahaler and its management. Nurses in hospital setting need continued education and training on inhalation technique and the management of inhalation devices.

Key words: Knowledge, Nepal, Nurses, Rotahaler.**DOI:** <http://dx.doi.org/10.3126/jcmc.v5i4.16548>**INTRODUCTION**

Respiratory diseases like asthma and COPD have major impact on health affecting different population around globe.¹ Asthma affects 1 to 18% of the population in different countries.² A multicentre hospital based study reported that 12% of hospital admission cases were COPD.³ Asthma and COPD patients are mainly treated with inhaled medication using inhalation devices such as pressurised metered dose inhalers (pMDIs) and dry powder inhalers (DPIs).⁴

Education of patients is a critical component of the management of respiratory diseases⁵ and nurses are among the key health care providers

who provide health education to patients. Nurses have direct relation with patients throughout their stay in hospital.⁶ Studies demonstrated that health care professionals (HCPs) including nurses do not provide adequate information on inhalation devices as they lack elementary knowledge and basic skills on inhalation device use.⁷⁻⁹ However, educational intervention and training of HCPs on correct use of different inhalers have significantly improved the knowledge and skills of HCPs.^{9,10} DPIs are user friendly than pMDIs because they do not require hand to mouth coordination (coordination of inhalation and actuation)^{11,12} and DPIs are widely

used inhalation therapy in asthma and COPD patient in our setting. There are limited studies assessing nurse practitioners knowledge on rotahaler technique in Nepal. Assessing the baseline knowledge of practitioner nurses on rotahaler technique add value to develop educational intervention and training to update their knowledge and skills. Subsequently, it improves the quality of care of nurses together with outcomes and the quality of life of patients. This study aimed to assess the baseline knowledge of practitioner nurses on rotahaler technique and management, and accordingly update their knowledge and skills.

METHODS

A descriptive study was conducted among the practitioner nurses of various departments of Chitwan Medical College Teaching Hospital, Bharatpur, Nepal in order to assess their knowledge on rotahaler technique and management. Thirty one nurses participated in the study. They were given a questionnaire consisting of questions related to demography, knowledge on rotahaler technique and management. Information on age, working experience and working areas, knowledge on the rotahaler technique and management of rotahaler device were assessed. Question 1 to 5 had True/False response while remaining four questions, the participants had to write the answer. Each correct answer was given score '1' and incorrect answer was scored '0'. Question 1 to 5 assessed the knowledge on rotahaler technique whereas correct answer for question 1 and 3 was 'False' and for question 2, 4 and 5 was 'True'. Questions 6 to 9 assessed the management of the rotahaler device. After the assessment of baseline knowledge, the participating nurses were educated and trained on technique and management of rotahaler device through demonstration by hospital pharmacist.

Data was entered in IBM-SPSS version 20.0 and

descriptive analysis was performed. The correlation between knowledge score and working experience was assessed using Spearman's correlation analysis.

RESULTS

The mean±SD age was 22.15±1.95 years. The median (IQR) working experience of the participants was 1(1-2) years (Table 1).

Table 1: Characteristics of participants.

| Characteristics | | n(%) |
|----------------------------|------------------|------------|
| Age(years) | | 22.15±1.95 |
| Working experience (years) | | 1(1-2) |
| Working areas | Medical ward | 9 (29) |
| | Orthopaedic ward | 2 (6.5) |
| | Gyno/Obs ward | 4(12.9) |
| | Paediatric ward | 3(9.7) |
| | Psychiatric ward | 3(9.7) |
| | Paying ward | 5(16.1) |
| | Emergency | 3(9.7) |
| | Surgical ward | 2(6.5) |

The correct response to the knowledge of inhaler technique and management of rotahaler device ranged from 1 to 8 out of total score of 9. The participants had better knowledge (26, 83.9%) on rinsing mouth or gargling after use of inhaled corticosteroid while they had least knowledge (10, 32.3%) on the concept that DPIs allow maximum deposition of drugs in lungs than pMDIs. The knowledge of the practitioner nurses on the management of rotahaler devices revealed that 17 (54.8%) participants would tell patients to clean their rotahaler twice a week but only 2 (6.5%) participants had correct knowledge on how to instruct patients for cleaning their rotahaler while only 10 (32.3%) of them tell patients to change their rotahaler every 6 months. About, 15 (48.4%) participants would tell patients to hold their breath for about 10 seconds after taking inhaled medication through rotahaler device (Table 2).

Table 2: Responses of Nurses on technique and management of rotahaler devices.

| Question | Responses | n(%) |
|---|-----------|----------|
| 1. Dry powder inhaler (rotahaler) allowed minimum deposition of drugs in lung than metered dose inhaler. | Correct | 10(32.3) |
| | Incorrect | 21(67.7) |
| 2. Before using rotahaler a gentle breathe out is recommended. | Correct | 25(80.6) |
| | Incorrect | 6(19.4) |
| 3. When using the rotahaler, a quick, forceful and deep inspiration is not recommended. | Correct | 20(64.5) |
| | Incorrect | 11(35.5) |
| 4. Keeping head upright or slightly tilted during inhalation may reduce the amount of powder that is deposited in the throat. | Correct | 22(71) |
| | Incorrect | 9(29) |
| 5. It is important to rinse mouth or gargle after inhaled corticosteroid use. | Correct | 26(83.9) |
| | Incorrect | 5(16.1) |
| 6. How long do you tell patients to hold their breath after taking inhaled medication through rotahaler? | Correct | 15(48.4) |
| | Incorrect | 16(51.6) |
| 7. How often do you tell patients to clean their rotahaler? | Correct | 17(54.8) |
| | Incorrect | 14(45.2) |
| 8. What instructions do you give patients to clean their rotahaler? | Correct | 2(6.5) |
| | Incorrect | 29(93.5) |
| 9. How often do you tell patients to change their rotahaler? | Correct | 10(32.3) |
| | Incorrect | 21(67.7) |

The mean knowledge score of the practitioner nurses was found to be 4.74 ± 1.56 . The Spearman's correlation showed that there is no significant correlation ($p=0.869$) between knowledge score and working experience with correlation coefficient of 0.033.

DISCUSSION

It was found in this study that practitioner nurses had inadequate knowledge on rotahaler technique and the management of rotahaler. None of the nurses gave correct answer to all the questions and score as low as one was also observed reflecting wide variation in the knowledge score. The mean score was 55.56% in our study. A study by Chopra et al in a community-based teaching hospital to evaluate skills and knowledge of medical professionals on inhalational devices showed that registered nurses performed three inhalation devices worst with a mean percentage score of 52 than other randomly selected medical personnel.¹³ Also some studies suggest that the knowledge of nurses in developed countries is still poor both theoretically¹⁴

and practically.^{6,14} However, experience level, appropriate certification, personal use of inhaler and nursing comfort level significantly influence the correct use of inhalation devices.⁸ In contrast to this, our study did not show any relationship between years of experience and total knowledge score. This might be due to the lack of training and educational intervention during their service in hospital. A study by Hananja et al mentioned that nurses do not receive regular formal training in the correct use of different inhalational devices.⁷

The practitioner nurses in our study had inadequate knowledge on type of device allowing maximum

deposition of drugs in lung, appropriate method of inspiration, duration of holding breath after taking inhaled medication through rotahaler and management of rotahaler device that includes cleaning and frequency of changing rotahaler.

In our study, about half of the participants preferred the necessity of quick and deep inspiration during rotahaler therapy. A national survey by Giner et al showed that just over half nurses working in Pneumology and Thorax Surgery and with respiratory patients using inhalers devices identified ‘‘inhale deeply and forcefully’’ as the most significant step using DPI.¹⁵ Holding of breath for about ten seconds has been recommended by the GINA guidelines for allowing maximum deposition of drugs in the lungs.¹⁶ However, in our study less than one quarter knew about the duration of holding breath after taking inhaled medication through rotahaler which might possibly affect the therapeutic efficacy, outcomes and patient satisfactions.

Majority of nurses in our study did not recognize that DPIs would allow maximum deposition of drugs in lungs than pMDIs. But a study on knowledge and attitude of nurses in Spain showed that majority of nurses preferred DPIs despite of their inadequate knowledge of inhaled therapy.¹⁵ DPIs are better devices than pMDIs due to their ease of usage.^{11,12} The poor inhalational technique by patients is the direct consequence of inappropriate instructions provided by the HCPs. Incorrect use of inhaler devices by patients is not only associated with poor disease control and more frequent emergency room visit^{17,18} but is also related with increased risk of hospitalization, courses of oral steroids and antimicrobials.¹⁷ But their correct use lowers the number of attack, emergency applications, hospitalizations¹⁹ and improves quality of life.^{19,20}

Only few nurses had adequate knowledge regarding management of rotahaler devices including cleaning and frequency of changing rotahaler. The recommended practice suggests that the rotahaler should be washed with clean running water twice a week and should be allowed to air dry. There is possibility of inadequate cleaning of the rotahaler with poor knowledge in this aspect. Moreover, misunderstanding on cleaning might lead to practice of cleaning with very hot water, fabrics, brushes or any other physical means leading to unexpected consequences.

Studies have reported than HCPs lack the demonstrating skill in the correct use of inhalational devices.^{8,10} Such skill can be significantly improved through educational intervention and adequate training on long term basis.^{10,21,22} The necessity of demonstration skills and appropriate knowledge of HCPs should be complemented with their ability to identify incorrect technique or identify patients who are physically unable (paediatrics, patients with rheumatoid arthritis and Parkinson’s disease) to use the technique correctly along with knowledge on option available to correct it²³ (eg. Patients who are unable to make hand to mouth coordination using pMDIs can be corrected with the use of spacers).

CONCLUSION

It is suggested that in hospital setting medical professionals including practitioner nurses need enough training on appropriate use of different inhaler devices in order to educate patients on their correct use. This can be a suitable, economic and applicable way to improve the quality of care and service provided to the patients with airway obstructive diseases.

ACKNOWLEDGEMENTS

We would like to thank all the participants, Mrs.

Mamata Neupane, Mr. Saroj Gyawali, and Mrs. Bina Adhikari for their invaluable support during this study.

REFERENCES

1. Brocklebank D, Ram F, Wright J, Barry P, Cates C, Davies L, Douglas G, Muers M, Smith D, White J. Comparison of the effectiveness of inhaler devices in asthma and chronic obstructive airways disease: A systematic review of the literature. *Health Technol Assess* 2001;5(926):1-149.
2. Global Initiative for Asthma (GINA). The global strategy for asthma management and prevention. Update 2015. Available from: <http://www.gin-asthma.org> (Assessed on 10 August 2015).
3. Bhandari GP, Anagdembe MR, Dhimal M, Neupane S, Bhusal C. State of non-communicable disease in Nepal. *BMC Public Health* 2014;14(1):23.
4. Lavorini F, Corrigan CJ, Barnes PJ, Dekhuijzen PR, Levy MI, Pedersen S, Roche N, Vincken W, Crompton GK; Aerosol Drug Management Improvement Team. Retail sales of inhalation devices in European countries: so much for a global policy. *Respir Med* 2011;105(7):1099-103.
5. Flink JB, Rubin BK. Problems with inhaler use: a call for improved clinician and patient education. *Respir care* 2005;50(10):1360-74.
6. De Tratto K, Gomez C, Ryan CJ, Bracken N, Steffen A, Corbridge SJ. Nurses knowledge of inhaler technique in inpatient setting. *Clin Nurse Spec* 2014;28(3):156-60.
7. Hanania NA, Wittman R, Kesten S, Chapman KR. Medical personnels knowledge of and ability to use inhaling devices. *Chest* 1994;105(1):111-6.
8. Scarpaci LT, Tsoukleris MG, McPherson ML. Assessment of hospice nurses' technique in the use of inhalers and nebulizers, *J Palliat Med* 2007;10(3):665-76.
9. Nadi E, Zerrati F. Evaluation of the metered dose inhaler technique among health care providers. *Actamedicairania* 2005;43(1):1-5.
10. Basheti IA, Qunaibi EA, Hamadi SA, Reddel HK. Inhaler technique training and health-care professionals: effective long-term solution for a current problem. *Respir Care* 2014;59(11):1716-25.
11. Newman SP, Busse WW. Evolution of dry powder inhaler design, formulation, and performance. *Respir Med* 2002;96(5):293-304.
12. Crompton G. Problems patients have using pressurized aerosol inhalers. *Eur Respir Dis Suppl* 1982;119:101-4.
13. Chopra N, Oprescu N, Fask A, Oppenheimer J. Does introduction of new "easy to use" inhalational devices improve medical personnel's knowledge of their proper use?. *Ann Allergy Asthma Immunol* 2002;88(4):395-400.
14. Plaza V, Giner J, Gomez J, Casan P, Sanchis J. Health workers' knowledge and skills regarding the use of the Turbuhaler inhaler. *Arch Bronconeumol* 1997;33(3):113-7.
15. Giner J, Roura P, Hernandez C, Torrejon M, Peiro M, Fernandez MJ, Lopez de Santa Maria E, Gimeno MA, Macian V, Tarragona E, Plaza V. Knowledge and Attitudes of Nurses in Spain about Inhaled Therapy: Results of a National Survey. *J Aerosol Med Pulm Drug Deliv J* 2015 Jul (Abstract) <http://www.ncbi.nlm.nih.gov/pubmed/?term=knowledge+and+attitude+of+nur>

- ses+in+Spain+about+inhaled+therapy%3A+result+of+national+survey. (Accessed 15 August 2015)
16. Global initiative for asthma (GINA). Instruction for inhaler and Spacer use. Available at: http://www.ginasthma.org/local/uploads/content/files/inhaler_charts_2011.pdf (Accesses 13 June 2014).
 17. Melani AS, Bonavia M, Cilenti V, Cinti C, Lodi M, Martucci P, Serra M, Scichilone N, Sestini P, Aliani M, Neri M; Gruppo Educazionale Associazione Italiana Pneumologi Ospedalieri. Inhaler mishandling remains common in real life and is associated with reduces disease control. *Respir Med* 2011;105(6):930-8.
 18. Al-Jahdali H, Ahmed A, Al-Harbi A, Khan M, Baharoon S, Bin Salih S, Halwani R, Al-Muhsen S. Improper inhaler technique is associated with poor asthma control and frequent emergency department visit. *Allergy Asthma Clin Immunol* 2013;9(1):8.
 19. Goriş S, Taşci S, Elmali F. The effects of training on inhaler technique and quality of life in patients with COPD. *J Aerosol Med Pulm Drug Deliv* 2013;26(6):336-44.
 20. Hashmi A, Soomro JA, Memon A, Soomro TK. Incorrect inhaler technique compromising quality of life of asthmatic patients. *J Medicine* 2012;13(1):16-21.
 21. Kim SH, Kwak HJ, Kim TB, Chang YS, Jeong JW, Kim CW, Yoon HJ, Jee YK. Inappropriate techniques used by internal medicine residents with three kinds of inhalers (a metered dose inhaler, Diskus, and Turbuhaler): changes after a single teaching session. *J Asthma* 2009;46(9):944-50.
 22. Basheti IA, Armour CL, Reddel HK, Bosnic-Anticevich SZ. Long-term maintenance of pharmacists' inhaler technique demonstration skills. *Am J Pharm Education* 2009;73(2):32.
 23. Coakley AL. Helping patients to master correct inhaler techniques: nursing role. *Br J Nurs* 2001;10(7):424-8.