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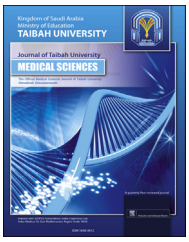

Original Article

Appropriateness of metered-dose inhaler use in the Yemeni community pharmacies

Yaser Mohammed Ali Al-Worafi, PhD

Pharmacy Practice Department, College of Pharmacy, Qassim University, Qassim, KSA

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الملخص

أهداف البحث: توصف أجهزة الاستنشاق بالجرعات المقننة على نطاق واسع لمرضى الربو ومرضى الانسداد الرئوي المزمن. تعتمد الاستجابة السريرية للأدوية المستنشقة على طريقة استنشاق المريض. تمنع الطريقة غير الصحيحة المرضى من الاستفادة القصوى من الأدوية. وقد تم توثيق عدم كفاية المهارة في استخدام أجهزة الاستنشاق من قبل الصيادلة جيدا. تهدف هذه الدراسة إلى التحقق من مدى الملائمة والاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة بين الصيادلة وفنيي الصيدلة في صيدليات المجتمع في صنعاء باليمن.

طرق البحث: تم عمل دراسة مقطعية بين العاملين في صيدليات المجتمع (صيادلة وفنيي صيدلة) في العاصمة صنعاء باليمن، في الفترة من ١ يوليو ٢٠١١م إلى ٢٦ أغسطس ٢٠١١م. باستخدام نهج محاكاة المريض للتحقق من الاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة.

النتائج: من أصل ٢٣٢ مشاركا في الدراسة، ٣٣(١٤،٢٪) كانوا من الصيادلة و ١٩٩(٨٥،٨٪) من فنيي الصيدلة. وكان هناك اختلاف كبير بين الصيادلة وفنيي الصيدلة من حيث المعرفة للاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة. كان فنيي الصيدلة بشكل عام قليلي المعرفة. من ناحية أخرى كان لدى نصف الصيادلة معلومات مقبولة للاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة. تلعب الخبرة والعمر دورا أساسيا في الاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة.

الاستنتاجات: لدى غالبية العاملين بصيدليات المجتمع مهارات ضعيفة للاستخدام الصحيح لأجهزة الاستنشاق بالجرعات المقننة. وتوصي هذه الدراسة بالحاجة إلى برامج تعليمية تداخلية بين صيادلة المجتمع لتحسين مهاراتهم الارشادية.

الكلمات المفتاحية: صيدليات المجتمع؛ أجهزة الاستنشاق بالجرعات المقننة؛ اليمن؛ الصيادلة؛ فنيي الصيدلة

Abstract

Objectives: Metered Dose Inhalers (MDI) are widely prescribed for patients with asthma and Chronic |Obstructive Pulmonary Disease (COPD). Clinical response to inhaled medication depends on the inhalation technique of the patient. Incorrect technique prevents patients from getting the maximal benefit from their medicines. Inadequate skill in the use of inhalation devices by pharmacists has been well documented. The current study aims to investigate the appropriateness and correct use of MDIs use among community pharmacists and pharmacy technicians in community pharmacies in Sana'a Yemen.

Methods: A cross-sectional study was done among the community pharmacies dispensers (pharmacists and pharmacy technicians) in the capital city of Sana'a Yemen, during the period from 1st July 2011 to 26th August 2011. A Simulated Patient (SM) approach was used to investigate the appropriate use of MDIs.

Results: Out of 232 participants included in the analysis, 33 (14.2%) were pharmacists and 199 (85.8%) were pharmacy technicians. There was significant difference between the pharmacists and pharmacy technicians in terms of their knowledge of MDI appropriate use (p-value = 0.000). Generally pharmacy technicians had a poor knowledge. On other hand half of pharmacists had a reasonable knowledge of appropriate use of MDI. Experience and age play major role in the appropriate use of MDI.

Conclusion: Majority of community pharmacies dispensers have a poor skills of MDI appropriate use. The results of this study recommend the need for interventional educational programs among community pharmacists to improve their counselling skills.

Corresponding address: Pharmacy Practice Department, College of Pharmacy, Qassim University, Qassim, KSA.
E-mail: yworafi@yahoo.com (Y.M. Ali Al-Worafi)

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Keywords: Community pharmacy; MDI; Pharmacists; Pharmacy technicians; Yemen

Introduction

Inhalation medications are widely prescribed for patients with asthma and chronic obstructive pulmonary disease (COPD). The inhaled route allows therapeutic agents are delivered directly to the lungs which provide a more rapid onset of action, better efficacy and less adverse effects.[1,2] Clinical response to inhaled medication depends on the inhalation technique of the patient. Incorrect technique prevents patients from getting the maximal benefit from their medicines.[3–5] The most commonly prescribed inhaler devices are either the metered-dose inhalers (MDIs) and dry-powder inhalers (DPIs) and the selection should be based on the: availability, cost, patient preference, physician preference and clinical situation.[6]

To use inhalers correctly by the patients with asthma and COPD they should receive clear instructions and physical demonstration given by a health professional.[7] Patient education about inhaler technique is very important in the management of asthma and COPD and can be improved with education.[8,9] The role of the community pharmacist world wide changes and moved towards a focus on patient care. The community pharmacist's should focus more on patient-oriented services rather than the traditional focus on product and dispensing services.[10] Community pharmacists can provide effective training in correct inhaler technique.[11]

Respiratory diseases including asthma and COPD among the top 10 causes of morbidity and mortality in Yemen.[12]

Community pharmacies in Yemen are the most accessible healthcare facilities to the patients which provide a timely opportunity to instruct patients on the use and administration of inhaled medications.[13] Community pharmacists can make a significant contribution to improve the outcome of treating asthma and COPD patients due to their expertise on medication and their everyday contacts with the patients on dispensing and counseling. Pharmacists can help asthma, COPD patients to achieve the treatment outcomes by providing the patients with suitable information and counseling. One of the counseling issues is educate the patients how they can use their inhaler medications correctly.

Simulated patient methodology has been adapted and used to assess quality practice in the health sector as well as in pharmacy practice.[14,15] The use of simulated patients in pharmacy practice research has become increasingly worldwide over the past two decades.[16–19] There are different names of simulated patient such as: pseudo patient, pseudo patron, simulated patient, pseudo customer, shopper patient or mystery shopper). Simulated patient is a person who is trained to go to the pharmacy with determined scenarios to assess quality of certain services provided by pharmacy employees.[18–20]

Few studies conducting on the Arabic region to investigate the appropriateness of MDIs use among community pharmacies staff,[16] none of these studies conducted in Yemen. Therefore, the current study aims to compare the appropriateness (Correct use) of MDIs use among community pharmacy dispensers in community pharmacies in Sana'a, Yemen and to investigate factors affecting appropriateness of MDIs use.

Materials and Methods

A cross-sectional study was done among the community pharmacies dispensers (Pharmacists and Pharmacy Technicians) in the capital Sana'a, Yemen. The period of this study was from 1st July 2011 to 26th August 2011. A simulated patient approach was to investigate the appropriateness of MDIs use among community pharmacists and pharmacy technicians in community pharmacies in Sana'a, Yemen.

This study was approved from college of pharmacy, Qassim University and form the managers of community pharmacies. No personal data about pharmacies or pharmacists was obtained. All pharmacy mangers were informed before the study about the objectives and the confidentiality of the data. They informed that a simulated patient would visit their pharmacy for counseling. No details about the type of counseling were provided. Time of visit was not informed. Demographic data was collected from the pharmacy managers. The MDI used in this study was Ventolin® (Salbutamol) evohealer. The appropriateness of MDI use defined in this study as correct use of MDIs.

Sample size

According to the annual reports of the Ministry of Public Health and Population 2010 the numbers of pharmacies are 1138 community pharmacies in the capital Sana'a.[21] The sample size calculation was done by using Raosoft method Convenient sampling technique was used in this study. Based on this reports 300 community pharmacies were selected conveniently to have an estimate of precision at the 95% confidence interval (CI), with an $\alpha = 0.05$.

Simulated patient and scenario

Simulated patient methodology was used in this study as shown in Table 1.

A simulated patient team was consisted of three registered pharmacists. Furthermore theoretical and practical workshops about simulation scenario, evaluate MDI appropriate use and recording method were provided. All simulated patients underwent MDI use assessment after workshop. The simulated scenario was that a patient diagnosed with asthma and went to the community pharmacy with Ventolin® (Salbutamol) evohealer and told the pharmacy dispenser "My physician has prescribed this devise for me. Could you please educate me how can I use it?" The interaction between community pharmacists or pharmacy technicians and simulated patient was audio

Table 1: Simulated patient methodology.

N		Notes
1	Select the simulated patients (SM)	Invite and interview registered pharmacists with minimum 3 years experience. Select 3 registered pharmacists.
2	Train the SM about MDI use, scenario, how to evaluate community pharmacy dispensers and record the interaction with pharmacy staff	Workshops and educational materials (Videos, notes and pictures)
3	Examine the ability of SM (MDI use, scenario, how to evaluate community pharmacy dispensers and audio visually record the interaction with pharmacy dispensers)	Author and invited external examiners.
4	Conduct study and report results to author	
5	Analyze results.	Check the reliability of the result by comparing the SM evaluation checklist with the recorded video.
6	Sent feedback to community pharmacies	A 30 min meeting with community pharmacists and pharmacy technicians to increase the awareness of the new roles of pharmacists and pharmaceutical care services was done. Educational materials (Video and brochures) about MDI appropriate use was given.

visually recorded using hidden micro camera and reported the evaluation using evaluation checklist after leaving the pharmacy. Furthermore the reliability of the results was done by comparing the SM evaluation checklist with the recorded video.

Evaluation of the pharmacy staff knowledge about appropriate use of MDIs

The evaluation was done by using MDI evaluation checklist as shown in Table 2.

The checklist was adapted from the latest Guidelines for the Diagnosis and Management of Asthma, National Asthma Education and Prevention Program.[22] Scoring system was used in this study as each performed step was given a value of one and unperformed or wrong step was given a value of zero. A good appropriateness of Ventolin® (Salbutamol) evohealer use is awarded to pharmacists or pharmacy technician completing successfully seven steps or more including the critical steps. A moderate appropriateness of Ventolin® (Salbutamol) evohealer use is awarded to pharmacists or pharmacy technician completing successfully five or six steps including the critical steps. A poor appropriateness of Ventolin® (Salbutamol) evohealer use is awarded to pharmacists or pharmacy technician completing less than or equal to four steps.

Statistical analysis

The data were descriptively analyzed using Statistical Package for the Social Sciences® (SPSS) version 15 for Windows. Differences in proportional were tested with Chi-square test or Fisher's Exact test. All reported *p*-values are two tailed, and the result is significant if p-value is ≤ 0.05.

Results

Among 300 community pharmacies approached, 68 pharmacies were excluded from the study because of: the unclear video recorded or asked the simulation patient (SP) to read leaflet or refer SP to hospital to see the physician. Out

Table 2: Recommended checklist of metered-dose inhaler (MDI).[22]

	Step	Score
1	**Shake the inhaler well**[a]	
2	**Remove the dust cap**[a]	
3	Exhale slowly through pursed lips	
4	If using the "closed-mouth" technique, hold the inhaler upright and place the mouthpiece between your lips. Be careful not to block the opening with your tongue or teeth If using the "open-mouth" technique, open your mouth wide and hold the inhaler upright 1–2 inches from your mouth, making sure the inhaler is properly aimed	
5	**Press down on the inhaler once as you start a slow, deep inhalation**[a]	
6	Continue to inhale slowly and deeply through your mouth. Try to inhale for at least 5 s.	
7	Hold your breath for 10 s (use your fingers to count to 10 slowly). If 10 s makes you feel uncomfortable, try to hold your breath for at least 4 s.	
8	Exhale slowly.	
9	Wait at least 30–60 s before inhaling the next puff of medicine.	

[a] Critical step.

Table 3: Metered-dose inhaler (MDI) appropriate use.

	Step	Pharmacists. 33 (100%)	Pharmacy technicians. 199 (100%)	*p*-Value[a]
1	**Shake the inhaler well**[b]	17 (51.5)	23 (11.6)	0.000
2	**Remove the dust cap**[b]	33 (100)	154 (77.4)	0.001
3	Exhale slowly through pursed lips.	17 (51.5)	3 (1.5)	0.000
4	If using the "closed-mouth" technique, hold the inhaler upright and place the mouthpiece between your lips. Be careful not to block the opening with your tongue or teeth. If using the "open-mouth" technique, open your mouth wide and hold the inhaler upright 1–2 inches from your mouth, making sure the inhaler is properly aimed.	17 (51.5)	56 (28.1)	0.014
5	**Press down on the inhaler once as you start a slow, deep inhalation**[b]	17 (51.5)	0 (0)	0.000
6	Continue to inhale slowly and deeply through your mouth. Try to inhale for at least 5 s.	15 (45.5)	0 (0)	0.000
7	Hold your breath for 10 s (use your fingers to count to 10 slowly). If 10 s makes you feel uncomfortable, try to hold your breath for at least 4 s.	9 (27.3)	0.000	0.000
8	Exhale slowly.	15 (45.5)	0 (0)	0.000
9	Wait at least 30–60 s before inhaling the next puff of medicine.	9 (27.3)	0.000	0.000

[a] Chi-square test or Fisher's Exact test.
[b] Critical step.

of 232 pharmacies, 33 (14.2%) were pharmacists and 199 (85.8%) were pharmacy technicians. 225 (97%) were male and 7 (3%) were females. The mean age of the respondents was found to be 25.60 ± 3.278 years. 69.4% of the respondents age were ≤25 years old. Among the respondents 89 (38.4%) had an experience more than three years and the rest had a 3 year experience or less.

Table 3 shows the comparison between pharmacists and pharmacy technicians in terms of MDI appropriate use.

Table 4 shows the factors affecting MDI appropriate use.

Discussion

The findings of this study shows that the majority of respondents were pharmacy technicians (85.8%), this is consistent with the previous report that majority of the pharmacy dispensers in Yemen were non pharmacist.[13] Hire a qualified pharmacists is needed to improve the counseling provided in the community pharmacies in Yemen.

Table 4: Factors affecting MDI appropriate use.

Characteristics	Total	Good knowledge (Appropriate use)	*p*-Value[a]
n (%)	232 (100%)	15 (6.5%)	
Education			
Pharmacist	33 (14.2)	15 (100)	0.000
Pharmacy technician	199 (85.8)	0 (0)	
Experience			
>3 years	89 (38.4.)	10 (66.7)	0.021
≤3 years	143 (61.6)	5 (33.3)	
Gender			
Male	225 (97)	15 (100)	1.000
Female	7 (3.0)	0 (0)	
Age			
>25 years old	71 (30.6)	10 (66.7)	0.003
≤25 years old	161 (69.4)	5 (33.3)	

[a] Chi-square test or Fisher's Exact test.

The findings of this study shows that the males percentage were (97%), this is similar to the previous reports.[23–25] This study showed that there was significant difference (*p*-value = 0.000) between the pharmacists and pharmacy technicians in terms of their knowledge of MDI appropriate use. Pharmacy technicians have a poor knowledge. The most common problems among pharmacy technicians with MDI use were step 5, 6, 7, 8 and 9. On other hand half of pharmacists had a good knowledge of MDI appropriate use.

The findings of this study shows that experience and age play a major role on MDI appropriate use. There was significant difference between pharmacists with experience more than three years and pharmacists with three year experience or less (*p*-value = 0.021).

Generally this study has found that majority of community pharmacy dispensers (93.5%) had poor knowledge and unfamiliar with MDI appropriate use. This findings is consistent with studies in Arabic countries.[16] MDIs are usually prescribed to patients with asthma and COPD and the success of the therapy depends on correct inhaler technique use.[1–5] The improper inhaler technique use will lead to uncontrolled diseases, worsening treating outcomes, increase emergency departments visits and decrease quality of life. Educate the patients on the correct MDI technique improve their device use and control the disease. Pharmacist counselling can significantly improve MDI technique. Community pharmacies in Yemen are considered a valuable and easy resource for patients for treatment and counselling.[13]

Development in Pharmacy practice since last decades especially after the introduction of clinical pharmacy concepts in the late 1960s, followed by the philosophy of pharmaceutical care in the early 1990s has contributed very much in the public health, improve treatment outcomes and improve quality of life. Pharmaceutical care changed the approach of Pharmacy practice from product oriented to Patient oriented.[26,27]

Community pharmacists in Yemen can be trained easily for providing pharmaceutical care to patients. Training

provided to community pharmacists has a positive effect on their knowledge and skills and can improve patient drug knowledge, inhaler technique, and level of compliance. According to the conducted international studies about the impact of providing pharmaceutical care by pharmacists for patients with asthma and COPD, pharmacists not only improved patients' inhalers technique use but medications knowledge, and adherence therapy. Which leads to improve treating outcomes, control their diseases and improve patient quality of life.[28–31] The feedback was given to community pharmacists and pharmacy technicians. Educational materials (Videos and brochures) about MDI appropriate use was given to community pharmacists and pharmacy technicians. A 30 min meeting with community pharmacists and pharmacy technicians to increase the awareness of the new roles of pharmacists and pharmaceutical care services was done.

Conclusion

Majority (85.8%) of Pharmacy dispensers in this study were pharmacy technicians and they were not aware of MDI appropriate use. Half of the community pharmacists in community pharmacies had a poor knowledge of MDI. Experience play important role on MDI appropriate use among community pharmacists. Educational materials was given to community pharmacists and pharmacy technicians. It may contribute to improve their skills on MDI technique and educate patients correctly on their MDIs.

This study was done only on the capital Sana'a. We can't generalize the result of this study. Studies on other cities are highly recommended. Increase the awareness towards the important of counselling and move towards provide a good pharmaceutical care are highly recommended. Study of the impact of different interventions to improve inhaler technique are highly recommended.

Conflict of interest

The author have no conflict of interest to declare.

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