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Learning and teaching inhaler technique by health care professionals: an interprofessional approach revealing needs and barriers

Prof. Iman Basheti, Prof. Salim Hammad, Dr. Noor Alsaraj, Prof. Helen Reddel

Abstract: Objective: To reveal needs and barriers identified by health care professionals (HCPs) in Jordan towards delivering needed correct inhaler technique training to asthma patients.

Methods: This cross-sectional study was conducted in Amman, Jordan. HCPs were invited to attend a 2-hour interprofessional educational workshop on asthma management. HCPs’ demographic characteristics, barriers preventing them from delivering inhaler technique education and from attending similar workshops were identified. Long-term benefits of the workshop were reported.

Results: 200 HCPs agreed to participate in the study (mean age 32.89±8.41, 52.5% females). 129 agreed to attend the workshop, but only 48 HCPs eventually attended the workshop. Barriers to educating patients on inhaler technique were identified, including lack of knowledge about the importance of the topic and lack of educational workshops on asthma. Non-attendees (n=81) identified their busy schedule as the main barrier to attending similar workshops (39.5%) while others perceived the topic as not important (22.2%). Benefits perceived by workshop attendees after four months included increased awareness on this topic (98%) and provision of inhaler technique education to their patients (98%).

Conclusion: This study identified important barriers perceived by HCPs in Jordan. Most of these barriers could potentially be overcome by delivering focused, short and regular interprofessional educational workshops on asthma management after appraising HCPs of their importance.

Keywords: Asthma, patient education, inhalers, health care professionals, workshops.

Introduction:

Asthma is a medical condition that continues to influence the health of millions of patients (Global Initiative for Asthma (GINA) - Global strategy for asthma management and prevention report 2016). With a prevalence of 5-10% worldwide (Global Initiative for Asthma (GINA) - Global strategy for asthma management and prevention report 2016) and 9% in Jordan (Abu-Ekteish et al., 2009), investigating measures to help asthmatics manage their health condition successfully is vital. Several inhaler devices have been developed; from the older pressurized metered dose inhalers (pMDIs) to the newer dry powder inhalers (DPI), with Accuhaler (ACC) [Diskus] and Turbuhaler (TH) the most DPIs currently prescribed for asthmatic patients (Global Initiative for Asthma (GINA)
Successful therapeutic guidelines and effective preventative inhaled asthma therapy have been established to support asthma patients in managing their health condition (Global Initiative for Asthma (GINA) - Global strategy for asthma management and prevention report 2016). Since good asthma management is said to be 10% medication and 90% education (Fink et al., 2005), any solution to the problem of incorrect inhaler technique must start with engaging health care professionals (HCPs) in the process (Basheti et al., 2009; Bosnic-Anticevich et al., 2010; McCarty et al., 2012; Lehr et al., 2013). Research in the primary health care setting indicates that training patients in correct use of their inhalers results in mastery of good inhaler technique and improved asthma control (Basheti et al., 2007; Giraud et al., 2011). The role of HCPs is acknowledged as critical in educating patients on correct inhaler technique and in maintaining their correct technique over time. However, HCPs are not delivering the patient care needed in this area; this is not surprising, because HCPs themselves have difficulty in demonstrating correct inhaler technique (Barthwal et al., 2013; Adnan et al., 2015; Giner et al., 2015) with both pMDIs (Barthwal et al., 2013) and DPIs (De Tratto et al., 2014).

Identifying barriers contributing to HCPs inability to demonstrate and teach patients on correct inhaler technique is the first step that can pave the way towards resolving this long standing problem. To identify such barriers and resolve them, continuous education for HCPs is needed (Basheti et al., 2009).

Continuous education for HCPs is a critical part of professional behavior and responsibility, particularly as medical knowledge expands and grows. What is more challenging is the need for continuous education in areas that might not be perceived as new medical knowledge, such as asthma management; and on identifying solutions that are feasible for implementation within a health system. Hence, many questions arise when the focus is on sustainability and effectiveness of continuous education. For example, How can HCPs be motivated to attend a workshop on asthma management, and how can we enhance the feasibility of their attendance within their busy professional life? How can we overcome challenges to continuous education, if the education topic is something that they feel is less important or that they know already?

These questions bring us to the aim of this study, which is to investigate barriers and needs identified by HCPs towards learning and teaching asthma patients on correct inhaler technique.

**Methods**

In this study, which was conducted in 2009, a range of HCPs, including specialists, general practitioners, pharmacists, pharmacist assistants, nurses and respiratory therapists were recruited from public and private hospitals in Amman, Jordan. The convenient sample was identified using a random number generator and complete HCP lists provided by the relevant professional societies (Basheti et al., 2014). Inclusion criteria included HCPs currently practicing at a community pharmacy or hospital located within the Amman area, and not being involved in any other clinical study. The study was approved by the Ethics Committee at the Jordan University Hospital and Al-Petra University. The HCPs who agreed to participate signed informed consent, then were invited to attend an interprofessional educational workshop developed and validated by the authors (Basheti et al., 2009). After providing consent, data on HCPs’ demographic characteristics...
including age, gender, profession, years of experience and whether they had received any previous education on inhalers were collected via questionnaires (administered in English since English is the official language of education for all HCPs in Jordan). HCPs were then assessed on their inhaler technique demonstration skills (reported elsewhere), using placebo devices (Basheti et al., 2014). In summary, published and validated inhaler technique checklists (Appendix 1) were used (Basheti et al., 2014). The researcher assigned one point for each correct step and zero points for incorrect/missed step(s). HCPs were considered to have correct technique if all of the steps in the specific inhaler technique checklist was performed correctly (score of 9/9).

The workshop was held at a conference room in a private hospital in Amman (Ibn Al-Haitham hospital) during June 2009 from 6 to 8 pm. The workshop environment satisfied the requirements for a good learning environment (Caffarella, 2002). Costs of the workshop were sponsored by AstraZeneca Jordan. GlaxoSmithKline Jordan provided placebo inhalers and peak flow meters. HCPs were reminded about the workshop by a telephone call in the morning time on the day of the workshop.

During the workshop, after reassessment of inhaler technique, education was carried out using a specialized “Show and Tell” inhaler technique educational module (Figure 1) based on our previously published methods (Basheti et al., 2009), going through each step on the checklist to describe and demonstrate correct use. Participants were then asked to demonstrate back the use of each of the devices. Incorrect steps were corrected at this stage. This cycle of assessment and education was repeated up to three times if necessary, and HCPs were provided with checklists of the steps for correct inhaler technique.

**Figure 1.** The specialized “Show and Tell” inhaler technique educational module.

The remainder of the workshop involved a range of educational strategies including a formal lecture on the topic of the importance of inhaler technique training, skills practice and peer assessment exercises on placebo inhaler devices, practice of correct inhaler technique (Basheti et al., 2016). HCPs were also engaged in face-to-face group discussion (brainstorming/work-shopping) of barriers and solutions about inhaler technique education at the work place. For the latter discussion, HCPs were assigned to six groups, randomly
rather than by their profession. Identified barriers were written on a large cardboard sheet, and each group later presented their suggestions to all attendees. Barriers and solutions identified from the literature were used as prompts in this open discussion part of the workshop (Table 1).

An important aspect in delivering inhaler technique education to patients is facilitating the transfer of knowledge and skills from the HCPs to their patients. Possible strategies to enable the successful “Transfer of Learning” to patients were discussed during the workshop. As with the barriers above, HCPs were asked to suggest strategies that would maintain their motivation and reinforce the successful transfer of knowledge to their patients.

At the end of the workshop, HCPs were asked for their feedback regarding the effectiveness and feasibility of the workshop, using a questionnaire (used in previous workshops - Appendix 2).

Four months following the workshop, all HCPs who had originally consented were revisited at their workplace by the researcher at a mutually convenient time. Workshop attendees were asked to complete a questionnaire about whether they gained any benefits from attending the workshop and whether it impacted on their practice (Appendix 2 Part A). For workshop non-attendees, the questionnaire investigated their reasons for not attending the workshop. Factors that could improve attendance at future similar workshops were also investigated (Appendix 2 Part B).

Data Analysis

Participants’ responses were encoded and the data were analyzed using Statistical Package for the Social Sciences (SPSS, version 20, Chicago, IL, US). Data were analyzed by descriptive statistics, with proportional data analyzed using Pearson’s Chi-Square test (or Fisher’s exact test). For all statistical analyses, P-values of 0.05 or less were considered significant. No multiplicity adjustment was made.

Results

Participants

A convenient sample of 496 HCPs was invited to participate in the study, of which 200 (40% response rate) agreed to participate. The HCPs were respiratory specialists (n=10, 5%), general practitioners (46, 23%), pharmacists (79, 39%), pharmacists’ assistants (15, 8%), nurses (40, 20%) and respiratory therapists (10, 5%). Mean age of the HCPs was 32.89±8.41, with 52.5% (n=105) females. Average years of experience was 9.52±7.87 (range of 1 to 36 years), and 53.0% (n=106) of the HCPs reported ever receiving education on inhaler use.

For the HCPs who declined, reasons included high work pressure preventing involvement in the study (60%), lack of interest in the topic of the study (33%), and refusal to sign the written consent (7%).

As previously reported, only 129 out of 200 HCPs agreed to demonstrate their inhaler technique (respiratory specialists (n=10), general practitioners (n=33), pharmacists (n=42), pharmacists’ assistants (n=12), nurses (n=23) and respiratory therapists (n=9). Correct technique was demonstrated by 29 (22.5%) HCP for TH and ACC, and by 42 (32.6%) HCPs for pMDI. The 129 HCPs were invited to attend the workshop, however, only 48 (37%) actually attended (general practitioners n=11; pharmacists n=14; pharmacists’ assistants n=6; nurses n=11 and respiratory therapists n=6). None of the respiratory specialists attended the workshop. At the end of the workshop, 39/48 (81.3%) performed correct technique for pMDI, 34/48 (70.8%) for TH and 42/48 (87.5%) for ACC.
HCP-reported barriers to patient inhaler technique education

The face-to-face group discussion regarding barriers preventing implementation of inhaler technique education within the HCPs’ work places included all 48 workshop attendees. Reported barriers included lack of knowledge about the topic, lack of effectiveness of inhaler product information leaflets in teaching technique, lack of availability of educational workshops on asthma and inhaler technique, belief that it is the respiratory specialist’s duty to deliver this education to the patient, lack of motivation to deliver this counselling service, and lack of inhaler placebos needed for practice and patient education at their work place.

Strategies to enhance, facilitate and secure the success of transfer of knowledge to patients

The face-to-face group discussion regarding strategies that would help the HCPs to maintain their motivation and incorporate their knowledge into practice resulted in the agreement by all on three main strategies. These strategies were:

1. Have trained personnel visit the HCPs to assist them in making specific changes in their roles in inhaler technique education at their workplace through observing what they do, providing feedback, and sharing experience and knowledge in a non-judgmental manner.

2. Reinforcement of the importance of inhaler technique education and its effect on patients’ health by showing real clinical outcomes (information from related clinical studies and actual improvements in asthma control for their patients following inhaler technique education).

3. A follow-up meeting to reinforce the knowledge and skills they obtained during the workshop and to reflect on their performance. HCPs considered that this meeting could be conducted face to face, via video/audio conferences or online; the online conference option was preferred by the majority as being the most feasible process.

End-of workshop feedback

Of the HCPs who attended the workshop (n=48), 93.8% stated that the workshop definitely/very definitely increased their awareness of the importance of their patients’ need of inhaler technique assessment and education and increased their motivation to approach asthma patients about their inhaler technique. About ninety two percent (91.7%) believed that their ability to use and to demonstrate the correct use of inhaler devices improved definitely/very definitely as a result of their participation in the workshop (Table 2).

Ninety two percent felt confident/ very confident in reviewing and correcting their patients’ inhaler technique. The same proportion felt confident/very confident in putting the training they acquired in the workshop into their practice.

Almost all participants were very comfortable with the length of the workshop (2 hours) and the learning environment provided (98.0%). Two-thirds of the HCPs were happy with the workshop room setting, but the remainder noted that they would have preferred a meeting room in a hotel rather than a hospital. Ninety four percent felt that the amount of detail provided in the workshop was appropriate for their learning needs. All HCPs reported that the workshop either met or exceeded their expectations.
Four months post-workshop feedback from workshop attendees

Table 2 provides data obtained from HCPs four months following the workshop, repeating some of the same questions asked at workshop end regarding the perceived effect of the workshop. The majority of workshop attendees still believed that the workshop increased their awareness towards the importance of inhaler technique education, their motivation to approach asthma patients about their inhaler technique and their ability in demonstrating correct inhaler technique to their patients (Table 2). Less HCPs chose ‘definitely/very definitely’ when answering these questions at this stage of the study (mean percent of 59.3%) versus previously at the end of the workshop (mean percent of 93.3%).

Majority of HCPs (85.4%) felt confident/ very confident in reviewing and correcting their patients’ inhaler technique and in putting the training they acquired in the workshop into their practice.

Follow-up feedback from workshop non-attendees about barriers to attendance

All 81 participants who initially consented to attend the workshop but did not attend provided feedback about their reasons for non-attendance. Each HCP reported one barrier to attendance. Being too busy (n= 32, 39.5%) was the main reason. Others stated that the place (hospital setting) was not suitable for the event (n= 18, 22.2%), others perceived the topic as not important (n= 18, 22.2%), and to others, the time of the workshop was not suitable (n= 13, 16.1%). Being too busy was particularly nominated by specialists. The topic was perceived as not important mainly by the pharmacists and their assistants. The place was perceived not suitable mainly by the specialists, nurses and respiratory technicians: they reported that a hotel conference room would have been more appropriate for a weekend event than a hospital conference room.

Perceived solutions by workshop attendees and non-attendees to improve attendance at similar inhaler training workshops

Four months post-workshop, workshop attendees (n=48) and non-attendees (n=81) stated that making such continuous educational programs compulsory would improve attendance at similar workshops (39.5%), while others believed more information on the topic should be provided in the invitation letter (17.1%). When comparing answers of HCPs, a significantly higher proportion of specialists than other HCPs stated that continuous education programs for all HCPs should become compulsory in Jordan (P= 0.005) while a significantly higher proportion of pharmacists stated that provision of more information on the topic is needed (P= 0.002, Chi Squared Test). Some participants believed that the place of the workshop should be changed to a hotel (24.8%), and this was reported significantly more often by the specialists, nurses and respiratory therapists (P= 0.005). It was also suggested to change the time of the workshop, e.g. early in the day and outside of weekend days (18.6%).

Discussion

This study is the first to reveal barriers and needs identified by HCPs working in a low-resource country towards delivering inhaler technique education and training. Such barriers included mainly lack of knowledge about the importance of the topic and lack of continuous educational workshops on asthma and inhaler technique. Many of the barriers identified were resolved by the focused interprofessional educational workshop delivered in this study. Pharmacists, pharmacist assistants, nurses, and respiratory therapists attended the workshop and provided positive evaluation. HCPs’ needs assessment in this area
involved strategies to enhance, facilitate and secure the success of transfer of their inhaler technique knowledge and skills to patients. The interprofessional workshop reflected many other benefits; significant improvements in the proportion of HCPs with correct inhaler technique, increased awareness, increased confidence, and increased motivation, leading to increased willingness to provide inhaler technique education to patients.

When considering possible barriers preventing HCPs from attending educational workshops, it is informative to look at their point of view. In this study, a number of barriers affecting HCPs delivering asthma education to patients came to light, with HCPs reporting that they were constantly being required to balance multiple complex and sometimes competing factors across their range of duties. Lack of knowledge about the topic of inhaler technique, lack of effectiveness of inhaler product information leaflets in teaching technique, and lack of availability of educational workshops on asthma and inhaler technique were some of the reported barriers. This is similar to barriers identified in previous studies, including lack of motivation (Vainio et al., 2001), business pressures, time constraints, profit driven rather than patient-care oriented practice, lack of inhaler placebos (Basheti et al., 2009), not knowing whose role it is to perform this care practice (Bosnic-Anticevich et al., 2014), poor training techniques, poor training materials and lack of follow-up (Fink et al., 2005). Many previous studies have reported that the inhaler product information leaflets are not enough to teach patients correct inhaler technique (Basheti et al., 2005; Ronmark et al., 2005). Similarly, reading the print on the inhalers could also be an issue for many patients (Basheti et al., 2016).

In educating HCPs on correct inhaler technique, a variety of training methods have been trialed, including small group workshops, one on one training, and internet based tutorials (Toumas et al., 2009). In the education delivered to the HCPs in this study, we incorporated the element of ‘teach-back’ where the instructee is asked to re-demonstrate what they have just learned, in this case the technique for using a specific device. This element has increasingly been incorporated into inhaler technique education (Alhalaiqa et al., 2012). An alternative educational format, such as customized one-on-one sessions at a time suitable for the HCP, may be more effective, but may be less sustainable. Creating training programs using self-directed learning presented either as a portable USB or online has the advantage that it could be used at any convenient time. Follow-up assessment of inhaler technique occurred after training before the end of the present workshop. This has previously been found to be essential in ensuring the success of training. It is also advisable that inhaler technique checklist steps should be given to the HCPs after education (Burkhart et al., 2005).

One of the most challenging aspects of this research was recruitment of the HCPs, an acknowledged problem in clinical research (Davis et al., 2012). Only 40% of the approached HCPs in this study agreed to participate and only 10% ended up attending the workshop. Different strategies were followed to optimize the number of attendants. In a country with low economic situation such as Jordan, it is important for workshops to be free of charge to increase attendance. Informative invitation letters were also used. However, workshop non-attendees later claimed that receiving more information regarding the importance of the topic in the invitation letter would have increased their chances of attending. Reminder phone calls were also used, however, the majority of the participants did not answer their phones on the day of the workshop, perhaps due to both
workshops being on a weekend (Friday and Saturday - weekend days in Jordan). It would have been beneficial to conduct the reminder phone calls a day before the workshop, and not only on the workshop day.

The highest consent rate was by pharmacists (n= 79 out of 200 HCPs), perhaps due to the researcher being, and introducing herself as a pharmacist. This is one particularly challenging and under-recognized factor, which is the need for HCPs to be approached by a colleague from their own professional group, when issuing an invitation to similar interprofessional educational workshops.

We acknowledge several limitations in interpreting our findings. These include that the questions used in this workshop were based on HCP self-report, and there was no opportunity for direct observation of the interaction of HCPs in counselling their asthma patients. The small sample size for some of the HCP groups, such as the specialists, means that the results might not be representative. The low response rate may in part be due to the researcher being a pharmacist, but may also reflect the already heavy workload of the HCPs and lack of perceived importance of asthma management by them. Future confirmatory quantitative analysis of a larger sample size for all HCP groups can clarify if the findings in this study translate more widely.

**Conclusion**

In conclusion, this study reports important barriers identified by HCPs regarding learning and teaching correct inhaler technique demonstration skills. Most of these barriers appear able to be overcome by delivering suitable educational workshops and awareness campaigns aimed at highlighting the significance of inhaler technique education by all HCPs involved in a patient’s care. Designing interprofessional workshops in the area of inhaler technique education seems important and they have the potential to resolve many of the identified barriers. The scarcity of placebo inhalers at the work place is also a significant concern that could be resolved through the supplying manufacturing companies. Barriers to attending educational workshops in Jordan have also been unveiled. Approaching HCPs via colleagues in the same professional group, conducting workshops in a more relaxed atmosphere (hotel conference room versus a hospital conference room) and providing enough information about the workshop topic are three important points to take into account when planning for similar future workshops.

**Acknowledgements**

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References


Table 1. Barriers and false beliefs about educating patients on correct inhaler technique, and possible solutions.

<table>
<thead>
<tr>
<th>Barriers / false beliefs</th>
<th>Possible solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business pressure and time constraint can make it hard to deliver this education.</td>
<td>Advise that it only takes an average of 2.5 minutes to counsel a patient on correct inhaler technique.</td>
</tr>
<tr>
<td>Implementation cost of this service can be a problem in community pharmacies.</td>
<td>Advise that it will not cost anything to implement this service at your practice.</td>
</tr>
<tr>
<td>Patients’ unawareness prevents them from approaching the HCPs for counselling.</td>
<td>Approach your patients yourself, introduce the education you have to offer.</td>
</tr>
<tr>
<td>Patients may prefer a fast ‘service’/short counselling.</td>
<td>This feasible education (2.5 minutes) will reflect positively on patients’ health and hence will raise their satisfaction.</td>
</tr>
<tr>
<td>Demonstrating the inhaler technique to the patients can be embarrassing to them in front of others.</td>
<td>Deliver the education in a private counseling area</td>
</tr>
<tr>
<td>Many patients already know how to use their inhalers, hence they might refuse the ongoing review of their technique.</td>
<td>Use facts to clarify to your patients the importance of the ongoing review process of their inhaler technique. ‘More than 80% of patients believe they can use their inhalers correctly, and less than 20% of them can actually use it correctly’.</td>
</tr>
<tr>
<td>For pharmacists: we should respect the interprofessional relationship between us and the doctors, and not to interfere with the doctor-patient relationship</td>
<td>Educating patients on correct inhaler technique does not interfere in any way with the role of the doctor. It is your ethical responsibility to ensure your patients know how to use their inhaler devices before they leave your pharmacy.</td>
</tr>
<tr>
<td>Patients may not welcome this type of education and counselling.</td>
<td>This education has been extensively researched and patients were shown to appreciate what their health care professionals have to offer.</td>
</tr>
<tr>
<td>Patients may prefer to use the Product Information Leaflets to learn correct inhaler technique at their own time.</td>
<td>Many studies have shown that written information is not sufficient for patients to learn correct inhaler technique.</td>
</tr>
<tr>
<td>Many patients would need the inhaler technique education only when they are first prescribed an inhaler.</td>
<td>Studies have shown that inhaler technique deteriorates by 2-6 weeks even after education, so it has to be an ongoing process of review.</td>
</tr>
</tbody>
</table>
Table 2. Feedback from workshop attendees (n= 48) end of workshop (short term effect) and four months following workshop (long term effect), regarding effect of workshop.

<table>
<thead>
<tr>
<th>Perspectives of workshop attendees</th>
<th>Proportion %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Definitely / Very definitely</td>
</tr>
<tr>
<td></td>
<td>End-workshop</td>
</tr>
<tr>
<td>The workshop increased my awareness towards patients’ need for inhaler technique assessment and education?*</td>
<td>94%</td>
</tr>
<tr>
<td>The workshop increased my motivation to approach asthma patients about their inhaler technique.*</td>
<td>94%</td>
</tr>
<tr>
<td>The workshop improved my ability in demonstrating the correct inhaler technique to my patients.*</td>
<td>92%</td>
</tr>
<tr>
<td>Since the workshop, I approached asthma patients about their inhaler technique</td>
<td>-</td>
</tr>
<tr>
<td>The workshop enriched my relationship with my asthma patients</td>
<td>-</td>
</tr>
</tbody>
</table>

* No significant difference between the HCPs attendees was found (P ≥ .05, Chi Squared Test).
Appendix 1.

Inhaler technique checklists

Accuhaler [Diskus] Technique Checklist

<table>
<thead>
<tr>
<th>Step.</th>
<th>Description/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Open Inhaler</td>
</tr>
<tr>
<td>2.</td>
<td>Push lever back completely</td>
</tr>
<tr>
<td>3.</td>
<td>Exhale to residual volume</td>
</tr>
<tr>
<td>4.</td>
<td>Exhale away from mouthpiece</td>
</tr>
<tr>
<td>5.</td>
<td>Place Mouthpiece between teeth and lips</td>
</tr>
<tr>
<td>6.</td>
<td>Inhale forcefully and deeply</td>
</tr>
<tr>
<td>7.</td>
<td>Hold breath for 5 seconds</td>
</tr>
<tr>
<td>8.</td>
<td>Exhale away from mouthpiece</td>
</tr>
<tr>
<td>9.</td>
<td>Close inhaler</td>
</tr>
</tbody>
</table>

Turbuhaler Technique Checklist

<table>
<thead>
<tr>
<th>Step.</th>
<th>Description/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remove the cap from the Inhaler</td>
</tr>
<tr>
<td>2.</td>
<td>Keep inhaler upright</td>
</tr>
<tr>
<td>3.</td>
<td>Rotate grip until a click is heard</td>
</tr>
<tr>
<td>4.</td>
<td>Exhale to residual volume</td>
</tr>
<tr>
<td>5.</td>
<td>Exhale away from mouthpiece</td>
</tr>
<tr>
<td>6.</td>
<td>Place mouthpiece between teeth and lips</td>
</tr>
<tr>
<td>7.</td>
<td>Inhale forcefully and deeply</td>
</tr>
<tr>
<td>8.</td>
<td>Hold breath for 5 seconds</td>
</tr>
<tr>
<td>9.</td>
<td>Exhale away from mouthpiece</td>
</tr>
</tbody>
</table>

Metered Dose Inhaler Technique Checklist

<table>
<thead>
<tr>
<th>Step.</th>
<th>Description/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remove mouthpiece cover and shake</td>
</tr>
<tr>
<td>2.</td>
<td>Hold inhaler upright</td>
</tr>
<tr>
<td>3.</td>
<td>Exhale to residual volume</td>
</tr>
<tr>
<td>4.</td>
<td>Keep head upright or slightly tilted</td>
</tr>
<tr>
<td>5.</td>
<td>Place mouthpiece between teeth and lips</td>
</tr>
<tr>
<td>6.</td>
<td>Inhale slowly and press canister</td>
</tr>
<tr>
<td>7.</td>
<td>Continue slow and deep inhalation</td>
</tr>
<tr>
<td>8.</td>
<td>Hold breath for 5 seconds</td>
</tr>
<tr>
<td>9.</td>
<td>Close the inhaler</td>
</tr>
</tbody>
</table>

These checklists are in accordance to the literature (van der Palen et al., 1998; Bosnic-Anticevich et al., 2010; Basheti et al., 2014)
Appendix 2 Part A. End-of-Workshop evaluation

Please complete the following evaluation form. For each question, circle the answer which is most appropriate for you. Your completed questionnaire will not be seen by the asthma educators’ team, but only by the workshop evaluators. Your responses will remain strictly anonymous.

1. Did the workshop increase your awareness of your patients’ need for inhaler technique assessment and education?
   Not at all  Slightly  Moderately  Definitely  Very Definitely

2. Did the workshop increase your motivation to approach asthma patients about their inhaler technique?
   Not at all  Slightly  Moderately  Definitely  Very Definitely

3. Did the workshop improve your ability to demonstrate inhaler technique to patients?
   Not at all  Slightly  Moderately  Definitely  Very Definitely

4. How confident do you feel now in reviewing and correcting your patients’ inhaler technique?
   Very confident  Confident  Slightly confident  not confident  Not at all confident

5. How confident do you feel in putting the training you acquired in the workshop into practice?
   Very confident  Confident  Slightly confident  Not confident  Not at all confident

6. How comfortable are you with the length of the workshop?
   Very comfortable  Comfortable  slightly comfortable  Not comfortable  Not comfortable at all

7. How comfortable are you with the room settings of the workshop?
   Very comfortable  Comfortable  slightly comfortable  Not comfortable  Not comfortable at all

8. Was the amount of detail provided appropriate for your learning needs?
   Not at all  Slightly  Moderately  Appropriate  Very appropriate

9. To what extent did the workshop meet your expectations?
   Exceed expectations  Meet expectations  Somewhat meet expectations  Did not meet expectations

From your point of view, how could the attendance to educational workshops be improved in Jordan? (Choose one answer)

a. Continuous Education Program should become compulsory in Jordan
b. More information on the importance of the topic in the invitation letter should be provided
c. Change the place of the workshop
d. Change the time of the workshop
e. Other ____________________________
Appendix 2 Part B. Follow-up questionnaire (Four months following workshop)

Did you attend the workshop? YES / NO
If YES answer Part A If NO Answer part B

PART A:
1. Did the workshop increase your awareness of your patients’ need for inhaler technique assessment and education?
   Not at all Slightly Moderately Definitely Very Definitely

2. Did the workshop increase your motivation to approach asthma patients about their inhaler technique?
   Not at all Slightly Moderately Definitely Very Definitely

3. Did the workshop improve your ability to demonstrate inhaler technique to patients?
   Not at all Slightly Moderately Definitely Very Definitely

4. Since the workshop, have you approached asthma patients about their inhaler technique?
   Not at all Slightly Moderately Definitely Very Definitely

5. Did the workshop enrich your relationship with your asthma patients?
   Not at all Slightly Moderately Definitely Very Definitely

PART B

A. Reason for not attending the workshop? (Choose one answer)
   1. Too busy
   2. The place was not suitable (Hospital vs. Hotel)
   3. Did not feel it is important
   4. The time was not suitable (Fri and Sat afternoon)
   5. Other__________________________________________________________

B. From your point of view, how could the attendance to educational workshops be improved in Jordan? (Choose one answer)
   1. Continuous Education Program should become compulsory in Jordan
   2. More information on the importance of the topic in the invitation letter should be provided
   3. Change the place of the workshop
   4. Change the time of the workshop
   5. Other__________________________________________________________