Original Article

Importance of healthcare professional training on medication safety, medication error prevention, and reporting

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ABSTRACT

This study aims to explore healthcare professional (HCP) training on medication safety, medication error prevention, and reporting. A presentation was developed on the topic including medication use and management (MU&M) best practices and case studies. A joint HCP training session was held in the Kuwaiti MoH to deliver the training to the HCPs from all the hospitals. A SurveyMonkey™ link was then shared with the participants to collect training evaluation data for analyses that would target required improvements in training. In Cohort 1, the first training included 450 attendees, 44% males (n=200) and 56% (n=250) females. There were 22% (n=100) contracted overseas HCPs and the remainder (78%, n=350) were Kuwaiti nationals. While in Cohort 2, the second training also included 450 attendees, 54% males (n=247) and 46% (n=203) females. There were 25% (n=114) contracted overseas HCPs and the remainder (75%, n=336) were Kuwaiti nationals. The largest participants cohort was from Al Sabah Hospital (20%, n=90) in Cohort 1 and was from Al Sabah Hospital (24%, n=110) in Cohort 2. Most HCPs agreed on the importance of the training learning outcomes with an average of 71% agreeing in Cohort 1, whereas 37% agreed in Cohort 2. Overall, most HCPs agreed interactive sessions are more desirable. The most used words were prevention of medication errors through medication management, and case studies as the preferred learning medium. The researcher was able to assess their training delivery methods and enhance the content by using the training program and the feedback from the HCPs.

Keywords: Healthcare professional training, Medication safety, Medication error, Medication error preventing

Introduction

Training on medication safety including the prevention of medication errors and the appropriate investigation of medication safety incidents is critical to ensure that the healthcare industry effectively manages its medication safety risks. All HCP should be aware of the stages and areas of responsibility for their assigned MU&M processes and the information that is required to be shared with the relevant personnel. ASHP highlights that medication safety is defined as the elimination of accidental injury due to medical error during medication use. The process should receive the same prioritization as regular medical errors due to the potential for severe harm [1].

When medication error reporting programs are incorporated into the hospital, the error rate can be decreased by 50% especially if a clinical pharmacist is involved [2]. Medication safety and optimization is an overall program that all hospitals should have in order to provide the best possible care when patients are in their wards. This ensures that medication errors are prevented in a controlled setting and any adverse risks are avoided.

Not only is the development of training for HCPs on medication safety crucial, but it is also important to deliver this training effectively to ensure that the HCPs can retain the knowledge efficiently in a practical setting. Training that is delivered through audio-visual aids such as PowerPoint, paired with practical-based workshops and case discussions is the best method for delivering this training, which provides insight into the clinicians' decision-making and critical thinking as a team, rather than individually

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[3].

One-off training on joining institutions is not sufficient, ongoing refreshers and updates are always required to remind HCP of the standardized processes and new guidance and to correct bad practices they may develop when they became in their comfort zone, after years of practice. Collecting feedback on the quality of the training from the HCP perspective is essential for continuous improvement in its content, quality, and whether it met their expectation or if it is at the level where they can use it. The first iteration of any training program is never perfect, and the training content and delivery must be improved as time goes on and many training sessions are held.

The design of the training program delivered to the Kuwaiti HCPs from the MoH followed the process of setting the learning objectives and expected outcomes, developing the training presentation and workshop, delivering the training program as a pilot, and then analyzing the training feedback to highlight the strengths and weaknesses of the training from the perspective of the HCPs who attended the training, which then was used improve the training and re-pilot again and collect a second lot of feedback to be able to produce, the final first version of the training.

The aim of developing the interprofessional healthcare providers' training was to improve the level of shared understanding of medication safety, management of medication errors, and ways to develop a safe culture for incident reporting systems.

Materials and Methods

Training presentation development

A cross-sectional study design was used and the topic of the training presentation was 'Medication Error Reporting and Prevention.' The workshop was divided into small sections to provide an appropriate flow of information as well as opportunities for discussion and reflection on the topics as a group.

The first part of the training presentation focused on medication safety. HCP attendees were provided with information on the ASHP guidelines used by the Kuwait MoH for the promotion of medication safety. The guidelines revolved around safe medication selection, /procurement, storage, ordering or prescribing, dispensing or supplying, administration, and monitoring. The next part focused on key FDA definitions for drug-related events; key terms included ADE, ADE, Side Effect (SE), Medication Errors, and Clinical Intervention. The HCPs were then provided with information on the impact of medication errors in Kuwaiti hospitals to increase their awareness about the need for improving medication safety. The next segment was directly focussed on the five objectives mentioned above in this part of the thesis. The final segment of the training presentation incorporated two case studies. Participants were divided into small groups, and they were given sufficient time to resolve the case. Group discussion was then taken place and recommendations were captured in the feedback forms. Participants were asked to identify the root cause of the medication errors and possible solutions to prevent their reoccurrence.

The training session was then ended with two links one to provide feedback on training and the other for sharing best practices and error management and prevention examples from the HCP's experiences, to provide content for future training.

Training presentation delivery

The training presentation was delivered to all HCPs at the six hospitals under the following categories: doctors, pharmacists, and nurses. The training presentation was delivered by the instructor in two sessions held in the training room of the MoH. Each HCP was provided with the opportunity to attend one of the two training sessions. The delivery of the training presentation focused on presenting all findings from chapters 3, 4, and 5 and encouraging maximum discussion on the findings, and ways to mitigate or prevent in the future. In the first round, two participants cohorts of 450 each were randomly selected using the HCP employee ID number, limited by the maximum room capacity (450 delegates) which was allocated to the researcher by the MoH. Once the participants were selected, the coordinator was then contacted who in turn communicated with the supervisors in order to issue the notification to the participants for the training invitation. A specific set of HCPs were invited for the first training session whereas a second specific set of participants were invited for the second training session.

The session was moderated by a local coordinator from MoH who facilitated the booking of the training space and helped introduce the session to the participants. A four and half-hour timeslot was booked to allow presenting time and engage in the discussion of the case, divided into three hours of training and 90 minutes breaks.

The session then continued from slides 15 to 25 that went on for one hour, during which the instructor invited the participants to ask questions, provide answers or provide feedback on any topic presented during the training. In the final segment of the training session (slides 26-33, 45 minutes), each case scenario was then introduced, and participants were given time to discuss them and suggest the required course of action to resolve the medication error reporting issue or the ethical dilemma in question.

At the end of the first training session, the participants were given a feedback form that could be accessed with a link and scanning barcode.

The feedback consists of four questions:

1. Is the training met the learning outcomes?
2. Training Case Studies Activities.
3. About the presentation and the presenter.
4. Please provide your recommendations on how we can improve this session.

An hour break was then given to allow the participants to complete the feedback survey. On their return to the room, the researcher downloaded the feedback answers and discussed the open comments in question 4 with the participants. The discussion was transcribed and used to further develop the

induction training. Before the second training session, the instructor used the feedback forms filled by the participants in the first training session to modify the training content. This modified training content was presented to the participants of the second training session, which followed the same structure as described above in training session one. The employee IDs for the HCPs who attended the first training session were removed from the attendee's list before randomization and the selection of the second 450 participants cohort.

After the two-training session was completed, the final training slides and a link to the experience sharing form and barcode were emailed to all participants by their supervisors in which they could share their experiences regarding the training and medication errors.

The second round commenced after the final induction training workshop slides were developed which incorporated all the changes requested by the 900 total participants. The slides were sent again to the 900 participants with the feedback questionnaire to ensure that they are satisfied with the corrections. All descriptive data were analyzed using SPSS (Version 22) software.

Results and Discussion

Findings from induction training delivery of Cohort 1

The first training included 450 attendees, 44% males (n=200) and 56% (n=250) females. There were 22% (n=100) contracted overseas HCPs and the remainder (78%, n=350) were Kuwaiti nationals. The sample was skewed towards pharmacists at 40% (n=180, 95 dispensary pharmacists, and 85 clinical ward pharmacists), followed by doctors at 37% (n=165) compared to nurses at 23% (n=105). The largest participants cohort was from Al Sabah Hospital (20%, n=90), followed by Jahra Hospitals (19%, n=85), Adan Hospital (17%, n=75), Farwaniya Hospital (16%, n=70), and 14% (n=65) from each of Amiri and Mubarak Al-Kabeer hospitals.

Participant's feedback during case studies in session discussion from Cohort 1

The main idea for the training was not only to create a medication safety culture but also to allow HCPs to feel safe when reporting on medication near misses or errors. **Table 1** illustrates the results of the cohort-1 case studies assessment, there were more incorrect answers for case-1 (question one 67%, and question two 40%), compared to case-2 (question one 27% only).

Table 1. Case studies answer – cohort-1

Case 1	Cohort-1				Cohort-2			
	Correct	Partially Correct	Wrong	Total	Correct	Partially Correct	Wrong	Total
What could have happened?	3	2	10	15	2	5	8	15
What should be written in the medication error report?	4	5	6	15	10	3	2	15
Case 2								
What could have happened?	5	6	4	15	6	7	2	15
What should be written in the medication error report?	13	2	0	15	10	5	0	15

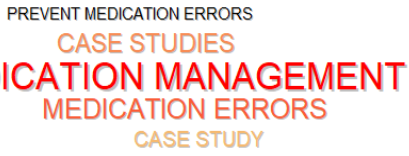
Most HCPs agreed on the importance of the training learning outcomes with an average of 17% strongly agreed and 71% agreed and only an average of 10% disagreed and 3% strongly disagreed. Overall, most HCPs agreed interactive sessions are more desirable. The strongly agree and agree for all options were 21% and 66% respectively. At the end of the survey, the HCPs were asked about their perception of the presentation and the presenter, 26% of participants strongly agreed and 66% agreed, which is very positive feedback **(Table 2)**. Only eight responses out of 65 received included additional information on the content. Using Wordstat™, Provalis Research, Montreal, Canada the following phrases were the most repeated phrases by the participants. The most used phrases and words were prevention of medication errors through medication management, and case studies as a preferred learning medium **(Table 3)**.

Table 2. Training learning outcome importance, the appropriateness of the use of case studies, and presentation style (Cohort 1 and Cohort 2)

Questions	Cohort 2				Cohort 2			
Is the training learning outcomes appropriate?								
Learning outcomes	**Strongly Agree (%)**	**Agree (%)**	**Disagree (%)**	**Strongly Disagree (%)**	**Strongly Agree (%)**	**Agree (%)**	**Disagree (%)**	**Strongly Disagree (%)**
Increase HCP's awareness about stages and areas of responsibility for the medication process and the information required	17	74	7	2	62	33	5	1
Increase HCP's awareness about medication errors prevention and reporting	14	76	9	2	54	40	4	2
Increase HCP's awareness about medication safety and optimization	18	70	10	3	58	36	5	1

Increase HCP's awareness about the importance of quality of data entry into patients' medical and nursing files and electronic records	18	67	12	4	57	36	4	2
Increase HCPs' awareness about medication about the importance of clinical audits	18	67	13	3	51	42	5	2
The appropriateness of including case studies and group activities								
The group activities encouraged my participation	20	66	12	3	58	36	6	0
The activities enhanced my learning	20	68	10	2	51	44	4	1
There were sufficient activities in the session	22	65	120	2	58	36	5	1
There should be more case studies	25	63	11	2	58	36	5	1
The training should be conducted annually	20	67	12	1	52	43	5	1
The training should be conducted during induction training for new employees	20	67	11	1	58	37	2	3
Participants' opinion on the presentation style								
The training was relevant to my needs	23	69	5	2	50	45	2	3
The length of training was sufficient	27	65	7	1	59	36	4	0
The training content was well-organized	27	66	6	1	61	34	4	1
The trainer encouraged asking questions	25	68	6	2	61	34	4	1
The case studies instructions were clear and understandable	26	65	5	3	58	36	5	0
The training met my expectations	29	62	7	2	53	42	4	0
The presenter was effective and engaging	28	64	6	2	52	43	4	0

Table 3. Participants' feedback on most repeated phrases and words



Phrases	Frequency
Medication management	9
Medication errors	7
Case studies	6
Case study	5
Prevent medication errors	4

Words	Frequency
Training	26
Medications	18
Case	11
Content	11
Errors	11
Management	10

Actions taken from cohort-1 feedback

The analysis of the training feedback focused on the constructive comments that allowed the opportunity for improvement of the training program, which will be used for round 2. The corrections made included:

Structure

- Developed agenda to outline the session preceding and provide a handout of the slides to allow participants to make notes during the session.
- Training slides that contain definitions were moved to the beginning of the talk to improve the presentation flow.
- In-depth trainer notes were made on each slide to allow the standardization of the training delivery.

Content

- Improved and enhanced clinical audit training section as it is essential for medication errors prevention process improvement.
- Improved and enhanced patients' records data entry quality section as it is essential to reduce preventable medication errors.
- Included a diagrammatic explanation about medication error causes and prevention to allow participants to use it as a quick reference in the future.
- Case studies mapped the medication error problems or prevention and the training learning outcomes.
- Included section on medication error prevention.

Findings from induction training delivery of Cohort 2

The second training also included 450 attendees, 54% males (n=247) and 46% (n=203) females. There were 25% (n=114) contracted overseas HCPs and the remainder (75%, n=336) were Kuwaiti nationals. The sample was skewed towards nurses (47%, n=212) and pharmacists (39%, n=175, 101 dispensary pharmacists, and 64 clinical ward pharmacists) compared to doctors at 16% (n=74). The largest participants cohort was from Al Sabah Hospital (24%, n=110), followed by Farwaniya

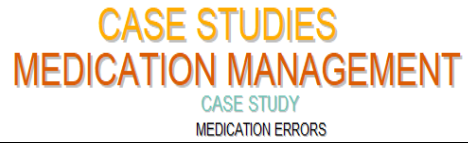
Hospitals (18%, n=81), Adan Hospital (17%, n=76), Mubarak Al-Kabeer and Jahra Hospitals (14.5%, n=64 and 63 respectively) and Amiri hospital (12%, n=56).

Participant's feedback during case studies in session discussion from Cohort 2

Table 1 illustrates the results of the cohort-2 case studies assessment, there were fewer incorrect answers compared to cohort 1 (case-1, question one 53%, question two 13%), compared to case-2 (question one 13% only).

The majority of HCPs agreed on the importance of the training learning outcomes with an average of 56% strongly agreed and 37% agreed and only an average of 4% disagreed and 2% strongly disagreed. Overall, most HCPs agreed interactive sessions are more desirable. The average of strongly agree and agree for all options were 55% and 46% respectively compared to disagree and strongly disagree (4% and 1% respectively). At the end of the survey, the HCPs were asked about their perception of the presentation and the presenter. **Table 2** are showing the average of strongly agree and agree, 56% and 38% respectively compared to disagree and strongly disagree (4% and 1% respectively). The most used phrases and words remained as the first cohort as prevention of medication errors through medication management, and case studies as the preferred learning medium **(Table 4)**.

Table 4. Participants' feedback on most repeated phrases and words



Phrases	Frequency
CASE STUDIES	8
MEDICATION MANAGEMENT	8
CASE STUDY	4
MEDICATION ERRORS	3

Words	Frequency
TRAINING	20
MEDICATION	13
CASE	12

Actions taken from cohort-2 feedback

The analysis of the training feedback focused on the constructive comments that allowed the opportunity for improvement of the final training program, which was then sent to participants for their final feedback. The corrections made included:

Structure

- Engage HCP from different professions in the conversation during the discussion.
- Divide HCPs into smaller teams of 10 people rather than 30.

Content

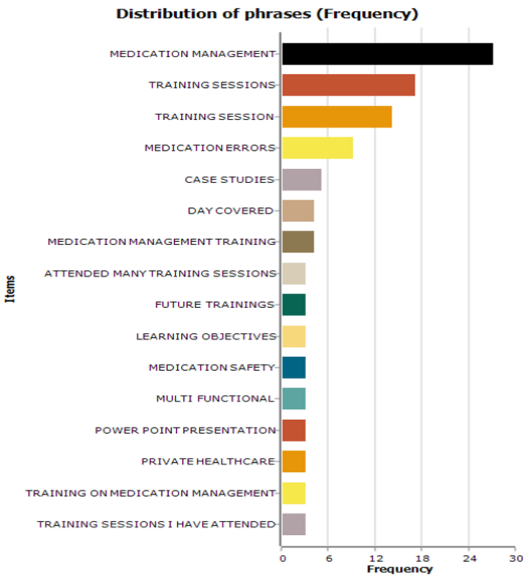
- Improve the order of topics, general information first, the outcome from the thesis, then application through case studies, and lastly, a quiz to ensure outcomes have been achieved and information about processes and definitions are retained.
- Add a section on clinical vigilance, medication error prevention, quality, and completion of data entry into patients' records and clinical audits.
- Add activities on the definitions and two more case studies to a total of 4, as one application per learning objective.
- Included a diagrammatic explanation about medication error causes and prevention to allow participants to use it as a quick reference in the future.

Experience sharing combined cohorts

The HCPs were asked to share their experiences in medication management, medication error prevention, medication error reporting, and recording. The information provided by all the HCPs from the two training sessions was combined and codes were identified and used for improving the training session for the next round of evaluation. There were only 31 (3.5%) responses received in this survey out of 900 participants, which might not be representative of the participants who received the training. Using Wordstat™, there were 16 phrases repeated more than 3 times **(Table 5)** and eight words repeated more than 10 times **(Table 6)**. The comments were also used to improve the training slides.

Table 5. Phrases from the HCP's experience sharing feedback

Phrases	Frequency
Medication management	27
Training sessions	17
Training session	14
Medication errors	9
Case studies	5
Day covered	4



Medication management training	4
Attended many trainings sessions	3
Future training	3
Learning objectives	3
Medication safety	3
Multi-functional	3
PowerPoint presentation	3
Private healthcare	3
Training on medication management	3
Training sessions i have attended	3

Table 6. Words repeated more than 10 times

Words	Frequency	% Shown
Training	95	33.22%
Medication	44	15.38%
Management	27	9.44%
Attended	21	7.34%
Sessions	39	13.56%
Training	17	5.94%
Experience	12	4.20%
Errors	11	3.85%

The safety of consumers has long been impacted by medication errors. It has been determined that promoting patient safety requires healthcare professionals [4]. One of the biggest issues facing the healthcare systems of today is the need for improvement in reporting medication errors [5]. The interprofessional healthcare providers program was developed to raise shared awareness of drug safety, manage pharmaceutical errors, and create a culture of safety for event reporting systems. This part of the study was conducted over three stages, face-to-face presentations, feedback, and experience sharing online using SurveyMonkey™, followed by two rounds of corrections and feedback. There were 450 participants in the first training, with 44% (n=200) males and 56% (n=250) females. Whereas the second training also included 450 attendees, 54% males (n=247) and 46% (n=203) females. Most of the HCPs belonged to Kuwaiti nationals followed by those contracted overseas.

The main idea for the training was not only to create a medication safety culture but also to allow HCPs to feel safe when reporting on medication near misses or errors. However, as it can be seen from the words nurse, pharmacist, and doctors were used, where it should be administration error, prescribing error, or dispensing error, the names and the profession should be left to actual formal investigations [6]. In addition, medication errors are the leading cause of morbidity and death among patients in hospitals and, also decreased the health care quality [7]. The majority of pharmaceutical errors were discovered during the prescribing phase of the drug procedure, and the most frequent errors were prescription and inappropriate dose/quantity [7].

The training program improved the HCP's awareness about medication error prevention and reporting, medication safety and optimization, and electronic record keeping. Similar to training session 2, most of the HCPs agreed on the importance of the training learning outcomes. Pharmacists working in health systems are tasked with leading and taking part in multidisciplinary groups that look at and enhance existing systems [8].

Overall, most HCPs agreed interactive sessions are more desirable. This feedback confirmed that there is a need to provide a type of training on medication errors in an interactive problem-based design to allow in-depth learning compared to reading material or a lecture (passive and shallow learning). In both sessions, the frequently used phrases and words were prevention of medication errors through medication management, and case studies as the preferred learning medium.

The reduction of medical errors and enhancement of patient safety can be targeted using treatments, legislation, and practices that are informed by accurate measurement [9]. Some of the suggested feedback or changes involved the incorporation of

simulations, which cannot be achieved under this study due to cost and the technical skills required.

Conclusion

There were 900 HCPs participated in over 2 sessions of 450 each, consisting of doctors, nurses, and pharmacists at the Kuwaiti Ministry of Health. The overall focus of the training presentation was MU&M and medication error prevention. The training program and the HCP feedback allowed the researcher to evaluate their training delivery techniques and also to improve the content that the HCPs need and desire to be included. The training procedure involved the development of the training presentation, the collection of feedback through SurveyMonkey™, and then the updating of the training based on the HCP's feedback. Almost all (98%, n=884) of the HCPs agreed that the final training presentation captured their feedback and had the right flow and content. More training on medication safety and reporting of errors is required.

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Conflict of interest: None

Financial support: None

Ethics statement: The overall study ethical approval covered this part of the study. Consent forms that can identify participants were secured and not shared with any third party including the hospital site manager and the MoH.

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