Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 3, pp: (155-163), Month: September - December 2019, Available at: www.noveltyjournals.com

Development training of trainers program about using of personal protective equipment at health care organizations

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Abstract: **Training about infection control standards is very important issue in health care organizationsand lead toimprovementin knowledge and practice resulting in controlling infection. Aim: The purpose of this study was to develop a training of trainers program about using personal protective equipment at health care organizations. Study Design: A cross sectional designwas used to accomplish this study. Data collection: The data was collected from October 2017 to April 2018. Setting: The study was conducted at different health care settings of Mansoura distract. Study sample: Convenient sample was used and about 59 members of infection control team participated as trainers at the present study. Tools: Three tools were used in this study includedself-administered demographic and occupational characteristics questionnaire,self-administered knowledgeassessment questionnaire, structured interview to assess knowledge related practice of trainers in designing and implementing a training program. Results: The result of this study showed that trainer's knowledge and practice were poor in pre program and improved in post training program. Conclusion: This study concluded that after implementation the trainingprogram there was aremarkable improvement of trainer's knowledge and practice; this was clear in post-test results. Recommendations: Continuous training of trainers program and refreshing courses should be conducted for trainers to update their knowledge and practice about training of personal protective equipment.**

Keywords: **personal protective equipment, infection control, training of trainers.**

1. INTRODUCTION

Training is an important element for being able to apply basic infection prevention and control practices. Training designed to improve knowledge, skills and abilities of trainees. Effective training has good benefits for organizations.**(Myrna L., 2009).**Training programs about standards of infection control are very important for health care providers. They need continuous training especially about personal protective equipment. Personal protective equipment defined as barriers that protect health care providers from contact with blood, body fluid or any other contaminated subjects. PPE includes gloves, gowns, masks, foot protectors, head covers and eye wear. The benefit of wearing PPE is two-fold, offering protection to both patients/clients and those caring for them. Training about PPE include types, way of wearing and doffing, indication of wearing and doffing and risk assessment of procedures. **(Pegram& Bloomfield, 2015).**

Standard of infection controlinclude hand hygiene, personal protective equipment, environmental hygiene, management of waste, safe injection practice and using a septic techniques. Wearing of personal protective equipments is an infection prevention and control measure to protect patients and health care workers from catching infection.**(Rider,2010)**. **(ACQUIRE Project/EngenderHealth,2008)** mentioned process to conduct training of trainers program is: assess training needs, plan or design, implement, monitor and evaluate training.More details on steps to develop a training program that are identify learners, determine content, determine an appropriate timeframe, determine learning needs

(knowledge, skills, and attitudes), set training goal and objectives, design evaluation and follow up tools/activities andprepare training materials.**As recommended by WHO,2013,** that continuous education and training of healthcare workers in order to improve their knowledge and practice resulting in controlling infection. Education and training requires teaching strategies to achieve goals.

Aim of the study

The aim of the study is to: Develop a training of trainers program about using personal protective equipment at health care organizations.

Research Questions:

1. What are the needs of trainers who are involved in infection control training programs?
2. What are the trainers' knowledge regarding training of trainers program about PPE?
3. What are the trainers' knowledge related practice regarding training of trainers program about PPE?

2. METHODS

Design: Cross sectional study was used to accomplish this study.

Setting:

The study was conducted at different health care settings of Mansoura distract.

Subjects and sample size:

When number of infection control team members= 150, (with an average of 3 members at each health care organization/ unit at Mansoura distract), desired precision= 10%, expected prevalence of correct knowledge and practice= 50% and design effect= 1 total minimum required sample size is 59 members of infection control team to participate as trainers at the present study. Actual sample taking was 60 members.

Tools for data collection:

Data was collected using the following three tools as the following:

Tool 1: Self-administered demographic and occupational characteristics questionnaire:-This tool designed in an English form, included:-

1. Demographic characteristics: (Age, sex, occupation, educational level)

2. Occupational data: (nature of work, duration of work, years of experience, qualification).

Tool 2:Self-administered knowledge assessment questionnaire:

This questionnaire used to assess trainers' knowledge about the training of trainers program. Knowledge items covered in this part were: definition, importance, steps to perform training program, estimating targeted group and time, choosing educational environment, choosing teaching strategy, assessment trainer's needs and evaluation process at the end of program. It consists of (eleven questions) and each question was scored one degree as the following:

- ✓ Preparation (it included 5 items = 5 marks).
- ✓ Implementation (it included 4 items = 4 marks).
- ✓ Evaluation (it included 2 items = 2 marks).

The total scores of the knowledge of TOT ranged from 0 to 11. The knowledge level was categorized into three categories:-

- Poor = scores less than 50 % of total scores
- Fair = scores 50% to 80% of total scores
- Good = scores more than 80% of total scores

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Tool 3: Structured interview to assess knowledge related practice of trainers in designing and implementing a training program:

This interview used to assess knowledge related practice about the actual actions that they implement in conducting training programs such as teaching method they use, methods of designing a training plan, steps that they follow in implementing and evaluating the program. This tool consists of one part about TOT (which include 33 questions = 66 marks) and each question was scored two degree as the following:

The part of TOT consists of 3 categories included:-

1. Preparation (it included 14 items = 28 marks).
2. Implementation (it included 11 items = 22 marks).
3. Evaluation (it included 8 items = 16 marks).

The total scores of knowledge related practice of trainers in designing and implementing a training program ranged from 0 to 66. It is categorized into two categories:-

- Satisfactory = scores 80 % and more than 80% of total scores
- Unsatisfactory = scores less than 80% of total scores.

This study was accomplished through out two main phases:

Phase 1: Preparation Phase includes the following:

1. Administrative Process

Before conducting the study, an- official letter from faculty of nursing was submitted to director of these hospitals and obtain the approval to conduct the study.

Written informed consent was obtained from the trainers to participate in the study.

2. Literature Review:

Review of local and international literature on the various aspects of training of trainers program about personal protective equipment. This review was used as a guide for developing the study tools.

3. Developing of the study tools:

Tools of data collection were developed by researcher based on reviewing therelevant literature.

Validity of the developed tools was tested by a jury that involves five experts of community health nursing and their recommended modification has been done.

4. Pilot study:

A pilot study wasconducted on 10% of study sample who were selected randomly from different health care settings at Mansoura distract and not included in the study to evaluate the clarity, applicability and reliability of the research tools and estimate the approximate time required for data collection.

On the basis of collected information, the necessary modifications were done, some questions were added and others were clarified. Each questionnaire consumed about (20-25 minutes) to be filled.

Phase 2: Operational Phase:

Stage 1:- Pre- training of trainers program development

This stage conducted through distributing structured questionnaires among infection control members for exploration of their socio-demographic data, occupational data, their knowledge about the importance of personal protective equipment (PPE), the steps of designing and implementing training program by using tools (1&2&3).

Stage 2:- Statistical analyses

After data were collected, they were coded and transferred into especially design formats to be suitable computer feeding.

Stage 3:- Post – training of trainer's program development

Drafts of the developed training program was circulated among group of experts (n=6), targeted infection control members after illustration to obtain their feedback about content validity and applicability. Any specific instructions and comments from their evaluation were documented and considered in formulating of the present program.

Statistical Analysis

- Data were organized, coded, categorized, sorted and then transferred into especially designed formats.
- Data were analyzed using SPSS (Stands for Statistical Products and services solutions)) version 21.0.
- Data were presented by using descriptive statistics in the form of frequencies and percentages.

Ethical Considerations

- Ethical approval was obtained from the Research Ethics Committee of Faculty of Nursing, Mansoura University.
- The trainers' oral and written consent were taken before beginning the implementation of the program after reading of the detailed study information sheet.
- The trainer had the right to withdraw from the research at any time.
- Information was handled confidentially and anonymously in the study.

Limitations of the study: The difficulties encountered throughout this study were:-

- Difficulties in setting with trainers because of their huge responsibilities and they have no time.

3. RESULTS

Table (1) reflects that 68.3% of infection control team aged from 28 – 38.5 years and more than three quartiles (78.3%) were from females. Regarding to educational level, 85% of infection control team was from bachelor degree. More than half (58.3%) of them was working for 6hrs/day. Majority of ICT (88.3%) had experience less than 10 years. More ever, more than three quartiles (76.6%) of them implemented atraining program about PPE more than once and developed their performance through attending training programs. More than half of ICT (56.7%) evaluated themselves as a good tutor.

Table (1): Demographic and Occupational Characteristics of the Studied Trainers. (n=60)

Items	N	%
Age		
≤28	13	21.7
>28	47	78.3
X̄(SD)	0.916(0.645)	
Sex		
Male	13	21.7
Female	47	78.3
Educational level		
Diplome	9	15
Bachelor	51	85
Occupation		
Member of Infection control team	46	76.7
Head of infection control team	14	23.3
Working hour		
6 hr	35	58.3
≥ 8 hr	25	41.7

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ISSN 2394-7330

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Experience years		
<10	53	88.3
≥10	7	11.7
Previouslyimplement a training program about PPE		
Once	10	16.7
More than once	46	76.6
Evaluate yourself as a tutor		
Good	34	56.7
Very good	22	36.7
Excellent	4	6.7
Performance developing through		
Attend training program	46	76.6
Other sources	14	23.3

Table (2) shows that 35% of trainers had information about definition of training program before implementing the program and they became 88.3% after implementing it. In relation to steps of implementing the program 43.3% of trainers knew about it before the program. However, post program, the percentage became 90% and the same percentages related to setting objectives in a program. It was observed that 38.3% of trainers showed good score level of knowledge related to detecting target group and the percentage became 88.3% after the program.One third (31.7%) of trainers had information about selecting appropriate educational environment before the program compared to (86.7%) after the program. (18.3%) of trainers knew about selecting appropriate teaching strategies for TOT program compared to83.3% after the program. About one third (28.3 %) assessing trainers needs before implementing the program and became (85.0%) after it.Moreover, more than half (53.3%) of trainers evaluating the trainees performance before implementing the program and became (93.3%) after it.

Table (2): knowledge of the studied trainers about Training of Trainers Program. (n=60)

Items	Pre		Post	
	N	%	N	%
Definition of training program	21	35	53	88.3
Importance of training of trainers program	34	56.7	58	96.7
Steps of implementing a training program	26	43.3	54	90
Setting objectives of a training program	26	43.3	54	90
Select target group	23	38.3	53	88.3
Setting time of training program	22	36.7	53	88.3
Organization of time between practical and theoretical training	16	26.7	51	85.0
Selecting appropriate educational environment	19	31.7	52	86.7
Selecting appropriate teaching strategies for TOT program	11	18.3	50	83.3
Assessing Trainees needs	17	28.3	51	85.0
Evaluation of Trainees performance at the end of the program	32	53.3	56	93.3

Table (3) reveals that there was an improvement in trainers' knowledge after implanting the training program than before implanting as regards 78.3% of the trainers updating their information about training before the program and after it became 96.7%.Regarding to detecting overall goal and specific objectives, the percentage before the program was 88.3% &81.7% and after the program was 98.3%. More than two thirds(66.7%) were setting specific objectives include knowledge, skill and attitude before implementing the program, which became96.7% for all domainsafter implementing the program.86.7% was the percentage of trainers assessing needs of trainers before the program and after it the percentage became 98.3%.

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According to, selecting suitable presentation materials fortraining the percentage was 45.0% before the program and after it the percentage became 90.0%.More than half (56.7%) knew about providing setting for practicing PPE trainingproperly before the program and after it the percentage was 95.0%.61.7% knew about providing learning materials for training before the program and after it the percentage was 96.7%. 56.7% knew about setting appropriate time for PPE training before the program and after it the percentage became 95.0%.51.7% used more than one educational strategy and after the program the percentage became 93.3. Regarding evaluating performance about PPE training the percentage was 80.0% before the program and became 98.3% after the program. 70.0% of trainers assessing trainee feedback before the program and after it the percentage was 96.7%.

Table (3): Knowledge related Practice of the studied trainers about the actual actions taking in conducting Training Programs. (n=60)

Items	Pre		Post	
	N	%	N	%
Updating information about PPEtraining	47	78.3	58	96.7
Detecting overall goal of PPE training program	53	88.3	59	98.3
Detecting specific objectivesof PPEtraining program	49	81.7	59	98.3
Specific objectives include				
knowledge domain	47	78.3	58	96.7
skill domain	39	65.0	58	96.7
Attitude domain	40	66.7	58	96.7
Assessing needs of trainers	52	86.7	59	98.3
Using suitable presentation of PPE training	27	45.0	54	90.0
Providing site for practical PPE training	34	56.7	57	95.0
Providing learning materials for training	37	61.7	58	96.7
Setting appropriate time for PPE training	34	56.7	57	95.0
Using appropriate educational strategies for trainee number	51	85.0	59	98.3
Using more than one educational strategies	31	51.7	56	93.3
Evaluating performance about PPE training	48	80.0	59	98.3
Assessing trainee feedback	42	70.0	58	96.7

* PPE:Personal protective equipment

Table (4) indicates that there was highly statistically significance in knowledge levels of infection control team about TOT after implementing of the training program with p <.002&.000. The difference was significant between pre and post test regarding total score level of knowledge.

Table (4): Total Scorelevel of Knowledge of Infection Control Team regarding to Training ofTrainersprogram.

Items	Pre						Post						T	P
	Poor		Fair		Good		Poor		Fair		Good			
	N	%	N	%	N	%	N	%	N	%	N	%		
Total score knowledge TOT	38	63.3	8	13.3	14	23.3	0	0	8	13.3	52	86.7	11.956	.000
— X(SD)	1.60(0.847)						2.86(0.342)							

Poor=scores less than 50%of total scores

Fair=scores 50% to 80% of total scores

Good=scores more than 80%of total scores

T: paired t-test

P (highly significance)

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Table (5) indicates that there was highly statistically significance in practice levels of infection control team about TOT after implementing of the training program with p <.000.The difference was significant between pre and post test regarding total score level of practice.

Table (5): Total Score level practice of Infection Control Team regarding to Training ofTrainersprogram. n=60

Items	Pre				Post				T	P
	Satisfactory		Un Satisfactory		Satisfactory		Un Satisfactory			
Total score practice TOT	25	41.7	35	58.3	60	100.0	0	0.0	9.088	.000
X(SD)	1.58(0.497)				1.00(0.00)					

Satisfactory= ≥80% of total scores P (highly significance)

Unsatisfactory= <80% of total scores T: paired t-test

4. DISCUSSION

Infection prevention and control (IPC) is a term used to describe practices that used to protect individuals from infections. Infection prevention and control can be demonstrated through cleaning hands, wearing personal protective equipment, keeping working environments clean and tidy, getting immunized for vaccine preventable diseases and by following a septic techniques. **(Alberta Health Infection Prevention and Control Strategy, 2015).**

Personal protective equipment (PPE) refers to a range of barriers and respirators used alone or in combination to protect mucous membranes, airways, skin, and clothing from contact with infectious agents. The selection of protective equipment required depends on an assessment of the risk of transmission of microorganisms to the patient, and the risk of contamination of the healthcare practitioner's clothing and skin by patients' blood, body fluids, secretions or excretions**(Healthcare Associated Infections and Antimicrobial Resistance, 2013)**.

The essential element of being able to apply basic IPC practices is education and training. We should all have the knowledge and skills necessary to carry out effective IPC practices. One of the important aspects of IPC education is defining what core knowledge and skills are required for different groups of healthcare staff. **(Core Infection Prevention and Control Knowledge and Skills, 2015).**

In relation to socio-demographic status, the present study present that more than three quartiles of the studied trainers were female and three quartiles of them were members of infection control team. This result is consistent with **Jameel T. 2018** who stated that67% of his sample was female and 33% male and 52 were physicians, 112 nurses.

Regarding attending training program, the findings of the present study illustrated that more than three quartiles developed their training about PPE through attending training program about infection control. This result is matched with **ElToukhy, (2011),** who stated that most of the studied health care workers in Egypt attended training courses about infection control.

The current study illustrated that, there was improvement in trainers' knowledgeand practice in post program compared to the pre-program of training about steps of training of trainers program. This finding is with the same line with **Zeinab, (2014)** who stated that significant improvements in nurses' knowledge after a training program. This proves the effect of education and training on improving health care workers knowledge about personal protective equipment.

The components of the designed program and the selected educational methods were aimed to improve trainer's knowledge regarding training on personal protective equipment. This finding is with the same line with the study conducted by **Moussa M, ShahinE ,2015** on trainers working at El Amery general hospitals , and El Azhar university hospital in Damietta and Port Said general hospitals, Egypt. This finding also agreed with the study done by **Ebrahim G. (2012)** on trainers working at Mansoura University Child Hospital Egypt. They revealed that developing training programs using different educational methods were effective in improvement of knowledge and practices regarding universal precautions and personal protective equipments.

This study shows that steps of designing a training program contain needs assessment, design the program, and deliver the program and finally evaluating the training program. These findings are consistent with **suhonghu, 2004** who stated that the first step in a training program is identification training needs, designing and developing a training program, conducting the program and the last step is evaluating.If the information is of individuals relevance and relates to what they find important, the information may be better recalled**(McPherson *et al.* 2001, Meulen*et al.* 2002, Mintz 2010, Centers for Disease Control and Prevention 2010).**This is in a line with the developed training program as the objectives of this program were determined based on preliminary assessment of the trainers to determine their needs and problems. Furthermore, after application of this program**,** all trainers mentioned the steps of training program at the end of sessions.

5. CONCLUSION

Based on the findings of the present study, it can be concluded that trainers (infection control team members) who included in this study showed a poor level of knowledge regarding training of trainers program. However, practice was unsatisfactory about TOT program regarding personal protective equipment before implanting the training program which showed an improvement after implementing the program.

6. RECOMMENDATION

- Conduct a continuous training of healthcare workers in order to improve their knowledge and practice resulting in controlling infection.
- There is a need to arrange for training of trainers program for infection control team to enable them to deliver information and skills about infection control standards in a good way.
- Continuous supervision and evaluation of infection control team members to determine any defect related to knowledge and practice regarding training aboutpersonal protective equipment anduniversal precautions.
- Availability of all facilities required for applying TOT regarding training about personal protective equipmentanduniversal precautions in health care organizations.

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