Impact of Universal Infection Control Intervention Program for Nurses at Asser Hospital

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Abstract: Nosocomial infection is a hospital acquired infection. It is a major health problem all over the world. At least 5 to 10% of all people admitted to a hospital contract a nosocomial infection which is a direct cause to death. Infection control is the systems need to prevent health care workers from transferring, from acquiring infections themselves. Infection control ensures that patients are not exposed to the risk of cross – infection that staffs are protected from occupational risks, and that unnecessary costs to the health service are minimized. Strategy for protecting health care workers from occupational transmission of blood borne organisms is termed standard precautions**. This study was aimed to** evaluate of Universal Infection Control Intervention Program for Nurses in Asser Hospital. **The study was conducted at** surgical and medical department in Asser central hospital. **Collecting data from** thirty Nurses whom working in the female surgical and medical department at Asser central hospital. **The results of this study** illustrated that there was significant improvement in nurse's knowledge and nurses' practice after program implementation. **The study recommended that** develop orientation protective occupational health programs to help the nurses to protect their self against occupational health hazard.
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1.Introduction

Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin (including rashes), and mucous membranes. These measures are to be used when providing care to all individuals, whether or not they appear infectious or symptomatic. Infection, particularly hospital-acquired infection, concerned with a significant morbidity and mortality rate because it is the most serious problem not only due to a burden of illness and costs of prolonged admission on the patient, but also it increases the cost of investigation and treatment on the hospital as well as prevents the other patients from using the hospital beds. Hospital acquired infection carries the risk of spread of infection to other patients *(Graven & Hirnle, 2007).*

Approximately 3 million health care workers (HCWs) experience percutaneous exposure to blood borne viruses (BBVs) each year. This results in an estimated 16,000 hepatitis C, 66,000 hepatitis B, and 200 to 5000 human immunodeficiency virus (HIV) infections annually. More than 90% of these infections are occurring in low-income countries, and most are preventable. Several studies report the risks of occupational BBV infection for HCWs in high-income countries where a range of preventive interventions have been implemented. In contrast, the situation for HCWs in low-income countries is not well documented, and their health and safety remains a neglected issue.

The surgical department where the patient is treated has an important influence on acquiring infection and on the nature of such infection. A wide variety of microorganisms are likely to be found in hospitals. Staphylococci were the most common organisms found associated with wound infection *(Ayllife et al., 2004 and Sadek et al., 2005).*

Nurses have a professional and legal responsibility in preventing cross-infection from reaching to the patient by ensuring that such practice forms an integral part of their nursing care. *(Elkin et al., 2009 and Alien, et al., 2003).*

The well-trained nurse is the backbone of a well-organized department. Today's technical and scientific advances in surgery and increasing consumer demand for high quality health care urged the nurse to keep current in a field that is exploding with new information and this in turn increases the need for developing nursing staff education *(Derrick et al, 2007 in El Senousy & El-Flouly, 1995).*

Significance of the Study

Surgical and medical departments are considered to be a high-risk area for the spread of hospital acquired infection. In fact, without question the most effective, least expensive, and most desirable nursing measures of dealing with infection are to prevent it from ever occurring. Nurses represent the largest group of health care members in close contact with patients. So, the prevention of

infection among hospitalized patients requires training programs as teaching strategy designed to reduce the prevalence of this major cause of morbidity and mortality (*Hogston & Simpson, 2009; and Sherwood, 2005).*

Educational program should be developed with greater emphasis on the nurses' knowledge and skills to be gained through training to inform their infection control practices and reducing risk of hospital acquired infection (Youniss, 1997).

The present study was an attempt to develop an infection Universal Infection Control Intervention Program for nurses working in surgical and medical department as it considered being the cornerstone of an effective nursing practice outcome of prevention and control of hospital acquired infection.

2. Methodology:

1- Research settings:

This study will be conducted in Asser central hospital.

2- Subject:

The subjects will includes all the available nurses working in Asser central hospital.

3- Tools:

Data will be collected using 3 tools:

1- Questionnaire to assess knowledge of Saudi nurses before and after the programme.

2- Observation checklist to assess the Saudi nurses practices.

3-The developed educational program.

1. Arabic questionnaire sheets:

The Arabic questionnaire was used as a pre and post test of program implementation. It was used to assess nurse's knowledge. It was developed by the researcher after reviewing the related literature *(Craven & Hirnle, 2007)* and consulting expertise in this area.

It composed of **two parts:**

The first part is concerned with the demographic characteristics of the nurses (age, position, qualifications, years of experiences, and training courses).

The second part questions concerned with nurses knowledge related to, definitions of infection, nosocomial infection, controlling of: human resources (nurses

Scoring System:

(1). The questionnaire items were analyzed regarding its weight in relation to infection control measures as suggested by experts opinions as well as the supervisors opinions and supported by the literature . The nurses' answers were calculated into:

- Satisfactory knowledge **60% and more**.
- Unsatisfactory knowledge **less than 60%**.

2. Observation checklists :-

The observation checklist was developed based on the nursing skills standards precautions required for nurses regarding infection control measures in surgical and medical departments. The observation checklist was constructed after reviewing related standards in the nursing literature *(Youniss, 1997; Mehtar, 2009).*

Scoring System:

Nurses' practice was calculated as the following:

- Satisfactory practice **60% and more**.
- Unsatisfactory practice **less than 60%**.

The categories for practice evaluation were (1) mark, for every nursing activities done correctly and (0) for not done or wrong nursing activities.

3. Educational program:

The program was designed to improve nurses' practice in relation to infection control measures in surgical and medical department. The program contents included; introduction, definitions of infection, nosocomial and standard precaution measures for human resources infection regarding infection control measures…etc.

The content of this program was adopted from *(El-Senousy, 2000; Graven & Hirnle, 2007).*

Content validity:

It was ascertained by a jury of 10 expertise from different departments ascertained it. Their opinions were elicited regarding the tool format layout, consistency and scoring system.

I. Pilot Study:

Before performing the actual study, a pilot study was performed on five nurses randomly chosen from surgical and medical departments. Based on the finding of the pilot study necessary modifications were made. The pilot study was conducted for the following purposes:

- Testing the clarity and applicability of the study tools and content validity.
- To determine the time needed for conducting the study.
- Based on the finding of the pilot study, and on the opinion of the expertise, some modifications were done.

II. Operational Design:

This study was conducted on four consecutive phases, assessment, planning (preparatory phase) followed by implementation and evaluation phase.

a) Assessment and data collection phase:

Assessment is the first phase in the program. Second, based on the assessment phase, the program content and media were prepared by the investigators.

b) ***Planning (preparatory phase):***

1. The planning phase includes the program strategy, timetable of session, teaching methods, media used, learners, activities). Also the teaching place and the program finances were detected for the

nurses. Detected needs were translated to aim and objective.

2. The developed educational program.

III. Administrative Design:

To carry out the study, the necessary approval was obtained from the hospital director of Asser Hospital. Official letters were issued to them from the scientific research in KKU explaining the aim of study to obtain permission for the collection of data. An oral consent was taken from patients for permission to participate in research process.

IV. Statistical Design:

The data was revised, coded, analyzed and tabulated. These include number, percentage, chi-square test at level of significance (descriptive statistics), the mean, rang and stander deviation and T test by using necessary statistical manipulation, to estimate statistical significant difference pre/post and follow up program implementation in relation to nurses knowledge and their practice about infection control measures, test of significance at the .05 level.

Limitation of the Study:

1. It was difficult to collect all the nurses together at the same time to attend the program sessions, due to work circumstances and shortage in their numbers. This was overcomes by dividing the nurses in the morning shift into two groups and repeats the session twice daily for each group. While only one nurse in each ward and sometimes for the two wards is responsible for the afternoon shift was coming early at one o'clock MD and was attending the program sessions with the nurses of the morning shift.
2. Lack in number of nurses involved in the present study was due to nurses were indulgent in many administrative roles rather than bedside nursing care.
3. Lack of nurses' motivation.

3. Result

Table (1): Demographic characteristics of the nurses under study (total no. = 30).

Items	No	%
Age in years:		
25-35	15	50
36-45	15	50
Position:		
Supervisor	4	13.3
Staff nurse	26	86.7
Qualification:		
B.S.C	10	33.3
Diploma	20	66.7
Years of experience:		
<5 years	30	100
5 and more	0	0
Training program:		
Yes	30	100
No	0	0

Table (2): Relation between nurses' regarding their satisfactory knowledge pre and post program implementation. (Total no. 30)

Items	Pre	post	*P*- value
	%	%	X^*
- Infection.	40.0	80	-3.2
- Hospital infection.	36.7	76.7	-4.7
- Human resources:			
• Health of personnel.	66.7	100.0	-3.5
• Universal precautions.	33.3	73.3	-3.1
• General precautions against inf.	20.0	83.3	-4.9
• Hand washing.	36.7	76.7	-4.7
• Wearing of the gloves.	53.3	80.0	-2.2
• Mask.	43.3	100.0	-4.9
• Gown or apron.	60.0	90.7	-3.5

Table (3): Relation between practicing precautions measures during providing patient care in the surgical and medical department pre and post program implementation (total no. = 30).

Precaution measures	Pre	Post	
	Done %	Done %	X^{2**}
Nurse (personal precautions):			
Wear apron or uniform.	53.7	80	-2.2
Keep on personal hygiene.	50.0	93.3	-3.7
Decontaminate hand watch.	30.0	63.3	-2.6
Hand washing.	60.0	96.7	-3.5
Using clean examination gloves.	66.7	100	-3.5
Using sterile gloves.	66.7	96.7	-3.0
Handle used needles carefully.	66.7	90	-2.2
Handle used sharp instruments carefully.	60.0	96.7	-3.5
Specimens' collection.	53.3	80	-2.2
Handle soiled linen's carefully.	50.0	83.3	-2.7
Handle soiled mattresses and pillows.	23.3	63.3	-3.1
Clean up a blood or body fluids spill.	43.3	90	-3.8

Table (4): Relation between total knowledge and practice gained by nurses' in pre and post program implementation.

Item	Satisfactory' knowledge		$\bar{X}$ ±S.D	t-test	*P* value
	Pre	Post			
	%	%			
* Satisfactory practice (135.6-226).	30.0	63.3	52.1±1.7	11.40	<0.001 (HS)
* Unsatisfactory practice >135.6	26.7	36.7	44.2±1.9		

Table (5): Percentage distribution of nurses' viewpoints on the implement universal precautions of infection control training program. (No. = 30 nurses)

Items	Yes	%
Learning strategy:		
Suitable.	23	76.67
Unsuitable	7	23.33
Researcher:		
Available most of time.	9	30
Need more time for guidance.	23	76.67
Content of the program:		
Covered the topic.	28	93.33
Useful information.	30	100
Need more details.	2	6.67
Presented in systemic order.	2	93.33
Contain unnecessary information.	4	13.33
Method of explanation:		
Simple	20	66.67
Clear.	25	83.33
Need to clarify some points.	5	16.67
Understandable.	27	90
Need audiovisual material for practice.	26	86.66
Method of evaluation:		
Direct.	25	83.33
Indirect.	5	16.67

Table (6): Number and percentage distribution of expertise degree of agreement based on their judgment regarding tools /characteristics of program.(Total no. = 10).

Pre-post test characteristics or (tools) characteristics	Agree		Disagree		Agree with modification	
	No.	%	No.	%	No.	%
Objective is clear	7	70	1	10	2	20
Appropriate	5	50	-	-	5	50
Accurate	6	60	1	10	3	30
Representative	7	70	-	-	3	30

Table (7): Number and percentage distribution of the expertise degree of agreement based on content validity index regarding educational characteristics of program. (Total no. = 10).

Program characteristics	Agree		Disagree		Agree with modification	
	No.	%	No.	%	No.	%
Content:						
Comprehensive.	7	70	1	10	2	20
Integrated.	7	70	-	-	3	30
Organized.	4	40	1	10	5	50
Objective is clear.	7	70	-	-	3	30
Suitability of teaching methods.	8	80	-	-	2	20
Media suitability of use.	8	80	1	10	1	10
Method of evaluation.	6	60	1	10	1	10
Time allotment.	4	40	-	-	6	60

4.Discussion

The present study was carried out on 30 nurses working in surgical and medical department at Asser hospital. It was found that the majority of nurses had diploma nursing while minority of them had bachelor degree in nursing. This result is nearly the same as ***Youniss (1997)*** who found that, 89% of nurses had a diploma certificate. Meanwhile it is contradicted with ***(Houang and Hurley 2007)*** who stressed on the nurses qualification because surgical and medical nurses have a complex role which requires not only competence in providing basic care but also a high level of theoretical knowledge and practical skills to understand and intervene proper quality of infection prevention practices during surgical and medical situation.

As regard the age, it was found that half of the nurses ranged 25-35years old and the other half ranged from 36-45years old. This finding is inconsistent with ***El-Azize and El Beih (2008)*** who stated that ages as reported by the nurses under study, gave the nurses feeling and beliefs that they had enough experience which makes them efficient in their performance.

As regard to the years of experience, it was found that the majority of the nurses had 5 years of experience and more. This finding is contradictory with ***Mohamed (2009) and El-Sharkawy (1991)*** who clarified that It was believed that years of experience are important in acquiring more knowledge and gaining satisfactory performance.

Although, the learning process emphasized on the necessity of continuing education to update the nurses knowledge and practice but the current study figuring out that the majority of nurses were exposed to previous training programs in the area of infection control. This may be due to the presence of continuing education department, and increase of motivation for personal studying or training. These findings agree with ***Houang and Hurley (2007)*** who highlighted that ways to educate and motivate staff to comply with universal precaution of infection control measures are mandatory required**.**

In the present study the findings also in agreement with **Wagner et al., *(2008)*** who stated that more investment in research and in establishment of effective infection control programs will inevitably can result in better quality of health care and a consequent improvement in hospital and social costs. ***Taha (2000)*** stressed that attending infection control lectures or seminars will not only improve practice and assist in the appropriate use of resources but also contributes to professional profile.

It is obvious that year of experience without acquisition of updating knowledge and practice is critical if nurses and other health care professionals are to continue to perform competently in an age of rapid change and technological growth. So, effective continuing education for health care providers, specifically nurses (RNs) is an aim essential for changing and improving professional practice, meeting the expressed needs or interests of nurses within a given practice area, providing competency and ultimately lead to safe and effective patient care. This is consistent with (***Crow, 2006 and Abruzzese, 2009).***

The present study revealed a highly significance improvement in nurses knowledge after the program implementation. This could be proved that, the educational program was effective in improving the nurses, knowledge. This is consistent with ***(Crow, 2005 and Delbueno, 2007)*** who emphasized on that Learning is a vital educational process. If the nurses know what, when, why and how, the rate of errors will be significantly diminished. So, helping the surgical and medical nurses to update and correct their information will help in enhancing their knowledge and skills to continue in their profession, and develop sense of critical awareness to be able to deal with infection control problem in a positive way. In addition it will help nurses develop self-esteem and avoid destructive habits and behaviors. *This is consistent with* ***Gardiner (2005)*** who stressed on that, staff in surgical and medical department needs more knowledge. They feel that they would benefit from regular updates on infection control measures.

As regard to nurses knowledge related to infection, it was found that nurses had inadequate level of knowledge before the program implementation. This result was improved to the satisfactory level after the program implementation .It was emphasized by ***Sherwood (2008)*** who suggested that a solid background knowledge of epidemiology and micro-organisms would empower nurses with sufficient confidence to question practices and depend on their own ability to make informed decisions.

An improvement in the nurses knowledge was obvious regarding to Hospital infection, health personnel, general precautions against infection, wearing of gloves, gown, apron and mask, as evidenced by gaining the highest score after the program implementation in comparison with pretest scores. This may be due to the concise presentation of each session using a simple language and advanced their information in relation to the area under study. This result is consistent with ***(El-Senousy, 1998; del Bueno, 2007)*** who proved that such programs proves to have a positive effect on the quality of care patients receive.

The study results proved improvement of nurses' knowledge about universal precautions, this

result was supported by ***Meers et al., (2000)*** which leads to a suggestion that vital part of the program is staff education. Induction courses for different groups of health care workers on first employment should include instruction on how to avoid infecting themselves or the patients they serve. The importance of reporting all accidents should be stressed. Safety by proper handling of sharp instruments to avoid infections these messages should continually be reinforced by in-service education, as it will be a billiard for first attitude to be accepted at the beginning of the nurses' work.

As regard to nurses' knowledge related to Hand washing, it was found that, the inadequate knowledge before the program implementation. This may be due to lack of information about the importance of hand washing and this result was improved after the program implementation. This result was supported by ***Scott, 2000 and Moss & Arbogast (2003)*** it is clear that health care workers fail to understand the importance of hand washing. Hand Washing is at the heart of efforts to prevent cross-infection in the hospital.

As regard to nurses' knowledge related to gown or apron, it was found that, more than half of nurses had adequate knowledge before the program implementation. This could be due to lack of their knowledge regarding to the importance of wearing gown or apron as a barrier protection, a low perception of the importance of infection control measures, lack of motivation. These results were congruent with ***Amin (1994)*** who found that lacking of motivation and inability of some nurses for training were the main causes for lacking their knowledge. Also, ***Lori et al(2006)*** emphasized that educating large groups of health care workers about precautions is labor intensive and costly.

The present study revealed that there was highly statistical significant differences between nurses practice pre and posts the program implementation. This result consistent with ***Conrtenany's (2008) and Risk and El-Molla (1994)*** who found that, application of the principles of infection control is a vital part of effective day to day nursing practice. An important consideration for nurses is practices that can affect health and illness. The infection control practices of nurses and other health care professionals are therefore of paramount importance. The rapidly changing in infection control systems requires nurses to possess increasing knowledge, clinical competency, greater independence, and autonomy in clinical judgment. Also, ***White and Ewan (2009)*** stated that, the nurses' role is a complex performance implies a specific set of knowledge that must proceed the clinical practice in order to apply its principles and concepts for providing specific nursing measures.

Regarding to hand washing technique, it was found that more than half of the nurses reported satisfactory level after the program implementation. This could be attributed to increase of perception regarding infection control measures, availability of some resources such as soap solution after the program implementation. This result inconsistent with ***Fitzro et al, 2005)*** who stressed on observation of hand washing practices and techniques by nursing personnel in all services show that staff do not adhere strictly to hand washing practices. Inadequate supplies of paper towels, delays in obtaining hand washing soaps, often frustrate staff. All of these factors contribute to the spread of infection. Furthermore ***Rees (2006)*** found that nurses and other health care professionals are still reluctant to wash their hands.

As regard to clean gloves technique for clean nursing procedures, the majority of the nurses were done clean glove technique correctly in post program implementation. This believes comes in accordance with ***Worsley (2007)*** that emphasized on attempts should be made to train all nurses in the basic principles and practice of the prevention and control of nosocomial infection. Meanwhile ***Risk and El-Molla (1994)*** who found that wearing gloves were found to be the main action conducted by nurses when dealing with blood or body fluids.

As regard to sterile glove technique, minority of nurses showed unsatisfactory level of practice with the same score in the pretests. This could be attributed to the lack of information regarding the importance of using sterile gloves in aseptic technique and lack of motivation. This result was congruent with ***Rabussay and Korniewicz (2006)*** who pointed that By giving conscious thought to standardized gloving practices, infection control can be improved, thereby enhancing the safety of workers and patients.

The present study showed that using protective clothing when providing care to patients was very poor, majority of the nurses didn't wear mask and gown as a universal precaution before the program implementation. There is adequate of information available to staff concerning the importance of protective clothing, though they know that this approach could lead them and their patients to a risk of infection. They may prefer to follow what they used to do and refuse to change their attitude because it is the quicker and easier way to perform the work, health care works are already hurried and under stress and busy ward. In the same time, ***Selim and Ibrahim (1999)*** concluded that protective clothing are necessary to reduce the risk for transmission of infections agent among patients from patients to personnel and from personnel to patients. Protective

clothing includes the use of gloves, mask, aprons, gowns for contact with patients blood, any moist substance, mucous or non-intact skin.

On the other hand, regarding to using gown and apron and using mask techniques, it was found that more than half of nurses were neglected using gown and mask before and after training program. Although, availability of equipment and supplies but there is inadequate information regarding the importance of using gown and mask as a barrier precaution. This result supported by ***Lori, Finkelstein and Mendelsen (2006)*** who reported that staff members sometimes don't adhere to universal precautions. Reasons given for non-compliance include lack of time and staff.

Also, the present study showed that majority of nurses reported satisfactory level regarding handle the used needles carefully and safely after the program implementation. The adequacy of nurse's practice could be linked to increase perception of the importance of universal precaution infection control measures and increase of motivation rather than increase of knowledge and increase of supplies needed to dispose the used needle. This result contradictory to ***Lymers et al.(2007)*** who showed that needle stick injuries were the most frequently reported incident. Nurses were the most exposed group, which has also been shown in other studies. The high rate of needle stick injuries among assistant nurses can be explained by their frequent contact with patient blood, because upon delegation from the nurse, they also administer injections, perform venipuncture. The most accidents occurred in the wards. In the same line, ***Risk and El-Molla, (1994)*** reported that there is a majority of Egyptian nurses recapped the needle after using it, this result reflected the lack of the updated knowledge among these nurses as the Egyptian nurses were adherent to the old theory of recapping the needle after use with lower perception for occupational risk.

The result of the present study showed that a highly significant relation between the total knowledge and practice scores among the studied sample in relation to universal precautions of infection control pre and post the program implementation this could be overlapping of nurses activities with administrative activities and lack of motivation. This result was congruent with ***Gould (2004) & Rogers (2005) and Gorbachet (2008);*** who stated that nurses need training about general and specific hazards of the work site and processes, safety rules, procedures related to the particular work assignment, and prevention and control strategies including work practice behaviors. Most clinical nurses should be given recognition for awareness of infection control problems specific to their work place. Nurses' educators have the necessary skills to help develop and implement an effective occupational health and hazard control education program.

As regard to assessment of the environmental design, the present study showed that, the most point of environmental design were not accepted in the tow wards of Asser hospital. This may be due to the most old hospital buildings were with a bad structural design, poor maintenance and lack of advanced modern and technology with lack of information regarding the importance of architecture consideration of hospital environment in infection control, the bacteriology laboratory is understaffed and the previous absence of a microbiologist compounded an already poor situation.

The present study showed that, environmental design were not accepted in the tow wards with available place for storing sterilized instruments, designate and provided with storage areas for cleaning equipment. This result congruent with ***Mehtar (1992)*** who confirmed that dirty and clean ward areas should be well demarcated and there should be a separate treatment room for the storage of clean and sterile equipment, and a sluice room for the dirty equipment and the disposal of ward waste and body fluids.

Regarding over crowded with extra beds, the result of this study clearly indicated that, the majority of these wards were seen over crowded with extra beds. This result in consistent with ***Mehtar (1992)*** who mentioned that close proximity of beds, overcrowding will result in an increase in cross-infection. For moreover, ***Ayliffe et al. (2003)*** reported that, spread of infection is more likely to occur in large open wards. Wards should, therefore, be subdivided in units, four to six beds with complete separation and with adequate single rooms for isolation of infected patients (depending on whether a hospital isolation unit is available). A day room for walking patients will also reduce the number of patients in the clinical area.

The result of this study clearly indicated that, all of these wards were provided with air filters. While the majority of its were not provided with improves ventilation and airflow. This result was supported by ***El-Senousy (1998)*** who stated that most old hospital buildings are crowded and little consideration has been given to effective ventilation. While, it was disagree with ***Ayliffe et al. (2003)*** who emphasized that routine checking of airflow in a ventilated area is a more reliable guide to the efficiency of a ventilation system than bacteriological tests. Filters must be regularly checked and occasionally bacteriological tests may be required. Testing of airflow's and patency of filters are more accurate criteria. Also,

Khalil et al. (1993) stated that the air conditioning system was found to be a good system for ventilation without contamination.

The result of this study clearly indicated that, the majority of these wards were provided with sinks at the entrance of each cubical of patients room/or ward with minimize aerosol formation and splash back, designate special. This result was congruent with ***Fitzroy et al. (2006)*** who found that strict adherence to proper infection control practices, such as hand washing techniques, and improvement of facilities are crucial steps in preventing cross-infections in the hospital environment. The saved revenue could go toward improvement of ward facilities thus further reducing of cross-infection.

To sum up, the result of the presented study supported the research questions which is implementation of the universal infection control training program significantly help in improving the nurses knowledge and practice in relation to universal infection control measures in surgical and medical department.

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