

THE EFFECTIVENESS OF SIMULATION OF USING PERSONAL PROTECTIVE EQUIPMENT (PPE) TO THE KNOWLEDGE AND COMPLIANCE OF USING PERSONAL PROTECTIVE EQUIPMENT IN NURSES IN HEMODIALYSIS UNITS

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Abstract: ***Background:** Health-care Associated Infections (HAIs) or Nosocomial Infection is infections obtained by patients or hospital workers. Some factors that cause HAIs are high-risk actions such as surgery, hemodialysis, lack of universal precaution like using PPE. **Aim:** to know the effectiveness of simulation use of PPE to knowledge and compliance of use PPE in nurses in hemodialysis units. **Method:** The type of research used was mixed methods. Population consisted of all nurse in hemodialysis units and used totally sampling. **Result:** Nurses' knowledge before simulation majority was categorized as sufficient (66,6%) and after the simulation, it was categorized as good (100%). Nurses' compliance before the simulation was categorized as non-compliant (100%) and after the simulation, it was categorized as compliant (66,6%). The effectiveness of the simulation was analyzed using Wilcoxon test, obtained the results for the knowledge of pre-post simulation value of Sig.0,046 and the compliance of pre-post simulation value of Sig. 0,046. The obstacles in the use of PPE include the lack of special PPE training, monitoring and evaluation that have not been carried out properly, and the availability of PPE that is not sufficient. **Conclusion:** The simulation of PPE use is effective in increasing knowledge and compliance of the PPE use.*

1 INTRODUCTION

Health-care Associated Infections (HAIs) or Nosocomial Infections or Hospital Infections affect patients or hospital workers, the infection incubates at the first time arrive at the hospital and appears after the patients or the workers return, most countries lack of a monitoring system for prevention and lack of standard criteria for diagnosing the infection (WHO, 2018).

The prevalence of HAIs still varies around 3,5%-12%. The European Centers for Controlling and Prevention reports the prevalence of HAIs averaging 7,1%, cumulative incidence in adult patients is at risk of 17 times per 1000 patients/day, the high frequency of HAIs incidence is associated with the use of invasive devices especially in central venous lines such as hemodialysis patients, urinary catheter and ventilator use (WHO, 2018).

According to Liana's Phey study (2015), chronic hemodialysis patients are more at risk of getting Blood Borne Virus (BBV) infections such as hepatitis B, hepatitis C, and HIV due to repeated use of venous access, the Bloodstream Infections (BSIs) are higher in hemodialysis patients with central venous catheter (CVCs) with permanent access giving worse

contribution such as increased mortality and hospitalization.

A study conducted by Sarani, H (2014) in the University of Zabol Education Hospital, found that 43% of nurses had poor knowledge of HAIs, 42% had sufficient practice and 37% had sufficient attitudes about HAIs so training was needed to increase knowledge, practice, and attitude.

A total of 601 surgical nurses in 18 hospitals randomly selected in the Polish region showed the result of compliance to varied PPE usage, high compliance to gloves use (83%), but very low for protective glasses (9%) and only 5% of respondents who regularly wear gloves, masks, protective goggles and gown when in contact with material that has potential to infect for reasons of lack of availability of PPE and training on PPE (Ganczak and Szych, 2007). These data show that there is still a low level of compliance in PPE usage which can be caused by a lack of knowledge and training on PPE.

Aim this research to know the effectiveness of simulation use of PPE to knowledge and compliance of use PPE in nurses in hemodialysis units.

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< 26	16,7	0	16,7	0	16,7	16,7	0	0	16,7
26 – 35	83,3	66,6	16,7	0	83,3	83,3	0	33,3	50
Total	100	66,6	33,4	0	100	100	0	33,3	66,7
Length of Work									
1-2 Years	16,7	0	16,7	0	16,7	16,7	0	0	16,7
3-4 Years	50	50	0	0	50	50	0	33,3	16,7
>4 Years	33,3	16,7	16,7	0	33,3	33,3	0	0	33,3
Total	100	66,7	33,3	0	100	100	0	33,3	66,7
Last level of education									
D III nursing	83,3	50	33,3	0	83,3	83,3	0	33,3	50
S1 Ners	16,7	16,7	0	0	16,7	16,7	0	0	16,7
Total	100	66,7	33,3	0	100	100	0	33,3	66,7

3.4 Effectiveness of simulation use of PPE

To determinethe effectiveness of simulation use of PPE to the knowledge and compliance, statistic test of different test were obtained from the two groups of data. Different test in this study used Wilcoxon test. The statistic test resul for the level of knowledge of pre-post simulation value sig 0,046 and for compliance pre-post simulation value sig 0,046.

3.5 Observation and FGD result

From the result of observations, it was obtained that not all PPE was provided sufficiently as well as eye protection equipment or glasses that only provided one for washing dialisers, boots were also not available, hats and aprons were also not provided. Existing PPE are dresses, masks, rubber shoes and gloves, but dresses that are provided every day are also less often stored after taking action and being used again when doing more actions.

PPE that is used like gloves when taking action is rarely replaced, so it is not replaced every time the nurses serve one patient to another, or sometimes washing hands without removing the gloves, sometimes writing notes still wearing gloves, the reason is because it saves time and gloves.

FGDs are carried out in hemodialysis unit to find obstacles or obstacles in using PPE. FGD is led by the researcher and attended by the Director of Hospital Medical Services, the head of hemodialysis unit, doctors in charge of hemodialysis, the PPI coordinator and all nurses who work in hemodialysis unit. The FGD results are compiled into verbatim transcripts relating to obstacles and obstacles in the use of PPE. The results of data analysis are then interpreted and categorized based on theory and refer to the specific objectives of the study.

Table 2 The obstacles in the use of PPE

Code	Theme	Interpretation	Category
P3	Training of the use of PPE	Special PPE training has never been carried out, basic PPI training has been done	Knowledge
KH	Training of the use of PPE	Not all workers got chance to follow the training	Knowledge
KP	Training of the use of PPE	The workers who were not chosen only got socialization from team PPI hospital	Knowledge
P1	Monitoring and evaluating the use of PPE	The review was not given	Knowledge
P4	Monitoring and evaluating the use of PPE	Most of the workers forgot the use of PPE	Knowledge
KH	Compliance of the use of PPE	There is already surveillance data about compliance of the use of PPE but it is assessed by the unit itself	Compliance

P2	Compliance of the use of PPE	Monitoring from the PPI team has not been done routinely	Compliance
DY	Monitoring and evaluating the use of PPE	The PPI team has never been evaluated about compliance of the use of PPE	Evaluation
P1	Compliance of the use of PPE	There have been no sanctions	Compliance
P3	The availability of PPE	The PPE provided is incomplete	PPE
P6	The availability of PPE	There is no difference in the use of PPE for high infectious patients and not	PPE
P4	Monitoring and evaluating the use of PPE	The complete procedure for the use of PPE is not all done	PPE SOP
P2	Monitoring and evaluating the use of PPE	The application of changing gloves every time a patient changes has not been done by all workers	PPE SOP

4. Discussion

4.1 The Level of knowledge in the use of PPE

The research of Sarani H (2014) in Zabol University Education Hospital shows that the majority of respondents have bad or low level of knowledge, sufficient practice and attitude and there is a relationship between knowledge and gender, it is different from the results of this study in table 1 shows that majority knowledge is in a sufficient category and changing into majority knowledge in a good category after a simulation or training and even a gender comparison in a sufficient and good category becomes the same. The results difference of this study can be caused by the small number of respondents in this study.

The age and years of work experience, which is believed to be a good practice excellence among nurses, are not significantly related to knowledge or practice (Health Attache (Embassy of Kuwait-Washington) et al., 2012), as well as this research which can be seen in table 1 that the most working age is in the age of 26-35 years old with the category of sufficient knowledge and the longest duration of working is 3-4 years with the category of sufficient knowledge before being given simulation.

Inadequate knowledge including environmental problem related to the lack of availability of PPE needed to ensure the safety of health workers is an important and urgent problem that must be immediately increased to prevent and control infections in hospitals (Amoran, 2014). From interviews and FGD results, it was also found that in the Hemodialysis Unit there was no complete PPE available, PPE available in the hemodialysis unit were gowns, masks, gloves and shoes while those that were not there were aprons, hats and glasses so

that procurement proposals were needed to support the prevention of HAIs.

The results of observation and FGD found that workers also did not routinely do hand hygiene due to forgetfulness or wanted to quickly complete the action being carried out, knowledge review or training had also not been done for a long time therefore so many workers had forgotten about universal precaution or the use of PPE.

That case is in line with the previous studies that forgetfulness is one aspect that is closely related to individuals that is widely reported, which is associated with a lack of knowledge about the importance of behavior in controlling HAIs, especially the risk of cross contamination, because many nurse profession manage large numbers of patients (Oliveira et al. , 2010).

This study shows that there are significant differences between before the use of PPE simulation and after the use of PPE simulation. The value change is based on the increasing knowledge of the use of PPE after being given simulation or training.

In the study of Suchitra JB (2007), shows the increasing number of subjects or respondents with good and very good categories in the questionnaires after being given training or education. Therefore it can be concluded that education or training give a positive impact on the change in knowledge, attitude and practice for all respondents.

4.2 Compliance level of the use of PPE

According to CDC (2018), health workers are people who are most at risk to be infected or spreading the disease through direct exposure to

patients. These diseases are caused by various microorganisms such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Ebola Virus, and Human Immunodeficiency Virus (HIV) which can cause a significant risk to life and health, therefore PPE is needed (gowns, aprons, masks, glasses/goggles, hats, shoes and gloves) to protect patients and health workers from the transfer of microorganisms by body fluids or blood. There is no significant difference between personnel compliance with the use of standard masks and eye or face protection/shield in high-risk and low-risk environments (Aarabi, et al., 2008).

One study evaluates on the non-compliance of precautionary measure or universal precaution caused by worker forgetfulness and lack of knowledge as a barrier to compliance (Sax et al., 2005). The study is in line with the results of FGD in this study which states that obstacles in the use of PPE include the forgetfulness of workers in carrying out procedures of PPE use, not always carrying out hand hygiene procedures before or after the use of PPE.

From the results of research observations found that gowns are not routinely used as PPE when doing every action in the hemodialysis unit due to insufficient availability usually only 6 gowns are given in a day even though each shift there are 8 patients, consequently the gowns are often kept or being stored to be used again for further action, the storage has not been provided a special place, it is usually hung or placed on a chair, another reason is less comfortable because of feeling hot or stiflingly hot in line with the results of previous studies that gowns are the most difficult PPE to be used due to inconvenience because of heat, workers do not find gowns in the closet, then improper storage that causes the risk of spreading microorganisms to patients or workers (Oliveira et al., 2010).

In Pavlic D and Mersch J's study (2014), the comparison of observation data before and after the intervention showed a significant increase of compliance in the four categories analyzed, namely hand hygiene, PPE selection, PPE installation

behavior contract has a positive impact on compliance with isolation precautions actions. Education or knowledge is very important to build the foundation of officer compliance in isolation precautions (Allen and Cronin, 2012).

The use of PPE throughout the body can reduce the risk of infection for health workers, but the risk of contamination depends on the procedures that have been carried out by the workers. Training using simulation techniques in

sequence and PPE release sequence. The use of a variety of interventions, including behavior interventions and educational strategies, succeeded in increasing compliance with isolation precautions (Allen and Cronin, 2012).

Observations show that some behaviors are still inappropriate in the use of PPE such as compliance with hand washing before or after using PPE, gloves that are not replaced when changing patients, incomplete use of PPE such as gowns, masks or shoes that are sometimes forgotten. A pair of gloves must be used for each patient, in an effort to avoid cross contamination. The use of the same pair of gloves or washing hands that are still gloved, when moving from one patient to another or when handling or caring patient's dirty body parts then moving to clean body parts, is not a safe practice (CDC, 2011).

There are several situations when health workers must regularly wear gloves during patient care, and the number of situations is likely to increase the resistance of Gram-negative bacteria become more common. Most research shows that health workers wearing gloves do not do adequate hand hygiene (doffing gloves, hand disinfection, wearing new gloves) when indications occur (Kampf and Lemmen, 2017).

Disinfection of gloved hands requires less time and less resource than changing gloves. Although health workers are trained to disinfect their hands every time 1 of 5 moments occur, doffing gloves, followed by hand disinfection, and then wearing a new pair of gloves is complicated and time consuming. The reality is that health care workers do not often eradicate their hands in such circumstances (Kampf and Lemmen, 2017).

4.3 The use of PPE simulation effectiveness

In table 2 it can be concluded that the use of PPE simulation is effective in increasing knowledge and compliance of the use of PPE among nurses in hemodialysis units, it is supported by previous research that the intervention of education to workers about isolation precautions and signing of

the form of oral instruction can reduce the risk of infection compared to passive training or not giving instructions. Simulation studies are a good and relatively simple way to find out the use of PPE to protect themselves or patients from contamination (Verbeek et al., 2016).

Before being done a simulation, a nurse compliance are still low due to lack of knowledge, awareness and training on the use of PPE, as in the study (Efsthathiou et al., 2011) where changing the

behavior of nurses needed knowledge of factors which can affect nurse compliance with the Standard Precautions.

This knowledge will facilitate the implementation of programs and preventive actions that contribute to avoiding occupational exposure. Supporting research is that nurses are more willing to change their behavior if there is a senior nurse or management who can be a good role model (Efsthathiou et al 2011; Lymer et al 2003).

In conclusion, simulation-based medical training offers useful opportunities to reduce risks to patients and participants, increase competency and trust in participants, improve patient safety, and reduce long term health care costs (Al-Elq, 2010).

We identified a number of disruptive obstacles in the use of PPE, such as inadequate availability of PPE, training that was rarely provided and aspects of organization and management such as the lack of monitoring and evaluation in the use of PPE, so self-awareness was also needed. Compliance toward PPE is determined by factors at working place, as well as by individual values and beliefs, but the decision to use PPE is individual (Neves et al., 2011).

However, the short duration of the post intervention limits the ability to see whether the level of compliance will remain high during the extended period. Subsequent studies should examine the correlation between high levels of compliance and universal precaution and a decrease in the incidence of HAIs. It will also be interesting to determine the reasons for staff disobedience for further research.

5. Research Limitations

The researcher limitation both in observing and assessing the compliance of officers in a short period of time therefore it can lead to bias in the research.

6. Conclusion

The use of PPE simulation is effective in increasing knowledge and compliance of the use of PPE among nurses in hemodialysis units. For future research can conduct research on the effectiveness of the use of PPE simulation associated with the incidence of HAIs in hospitals.

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