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# TRAINING TO IMPROVE KNOWLEDGE, SKILLS AND BEHAVIORS OF HEALTHCARE ASSOCIATED INFECTIONS PREVENTIONS IN NURSES

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#### **ABSTRACT**

Hospitals can be a source of transmission of microorganisms to patients during treatment. Infections acquired by patients while being hospitalized are called Healthcare Associated Infections (HAIs), so HAIs are an indicator of the quality of care provided by the hospital. The purpose of this study is to know the effectiveness of training on the knowledge, skills, and behavior of prevention of HAIs in nurses in the hospital. A quasi-experimental research design with a pre-test and post-test design with a control group design on 140 nurses through purposive sampling was used. Data collection used questionnaires (r value 0.412-0.716> r table 0.294; Cronbach Alpha 0.753) and observation sheets. The Wilcoxon test was used to analyze the mean difference between groups because the data were not normally distributed. The mean difference between the control and intervention groups was analyzed using the Mann-Whitney test. The results of the study obtained shows the effect of training on knowledge (p value <0.001), skills (p value <0.001), and behavior (p value = 0.041) on HAI prevention in the intervention group. In fact, in the control group, it was found that there was no effect of training on knowledge, skills and behavior of prevention of HAIs (p value> 0.005). There were differences in knowledge, skills, and behavior of HAI prevention between the intervention group and the control group (p value <0.001).

Keywords: behavior; health care-associated infections; knowledge; nurse; skills; training

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# **INTRODUCTION**

Modern medicine in health care facilities places emphasis on a wide variety of invasive tools and procedures to treat patients and aid recovery. Infection can occur as a result of using medical instruments and procedures, such as catheters or ventilators (CDC, 2014). The quality of nursing services in hospitals is assessed based on various indicators. One of them is the control of nosocomial infections which is also the standard for hospital accreditation assessments (Atmadja, 2012).

Nosocomial infections or what is currently known as Healthcare-associated infections (HAIs) are infections that occur when a patient receives treatment, in a hospital or other health facility that appears after 48 hours of receiving treatment (Haque, Sartelli, McKimm, & Bakar, 2018). HAIs are a serious problem for hospitals because they not

only cause socio-economic losses, but can also prolong patient hospitalization, which may even result in death (World Health Organization, 2015).

HAIs include central line-associated bloodstream infections, catheter-associated urinary tract infections, and ventilator-associated pneumonia. Infections also may occur in the operating area, known as surgical site infections (CDC, 2014). The risk of patients getting HAIs is high in the intensive care unit. Nearly 30% of patients experience at least one episode of HAIs with a high risk of morbidity and mortality (World Health Organization, 2011). In low- and middle-income countries, the frequency of HAIs in the ICU is at least 2-3 times higher than in high-income countries, whereas infection due to use of tools is up to 13 times than in the United States. Although global estimates of HAIs are not yet available, integrating the data collected by WHO, it can be concluded that hundreds of millions of patients experience HAIs every year worldwide, with a tendency to occur more in low and middle income countries (World Health Organization, 2015).

HAIs must be treated as a priority problem of patient safety in a comprehensive approach to be handled effectively including by improving the quality of reporting and learning mechanisms (World Health Organization, 2011). Patients and health workers are reservoirs of infection, therefore, it is necessary to be firm in implementing infection control in order to improve patient safety (Khan et al., 2017).

Infection control in health care facilities is an important matter and is the responsibility of all health workers. Of the various components of the infection control program, education and training of health workers on safe and good infection prevention practices have a vital role (Atalla, Aboalizm, & Shaban, 2016). However, knowledge of the guides alone is not sufficient for behavior change, so the educational method is expected not only to lecture on guides (Noto et al., 2015). There are nine main components to preventing HAIs. The main components include education and training as well as changing habits to improve service quality, especially prevention of HAIs (WHO, 2016).

If on average the nurses has sufficient knowledge and adherence to the HAIs guidelines, but there is a knowledge gap between one nurse and another, it will cause problems in implementing the guidelines (Accardi et al., 2017). All health care providers have the same responsibility to prevent HAIs (Singh, Chaturvedi, Garg, Datta, & Kumar, 2013). However, nurses are the leading providers of care and support to patients making them an important component in infection prevention and control. To ensure this, it is very important for nurses to keep up-to-date knowledge about infection prevention and control (Dogra, Mahajan, Jad, & Mahajan, 2015).

Based on this, this study is important to carry out an effort to prevent the infection of HAIs in patients. This research has never been conducted before at Prima Medika Hospital, Denpasar, Bali. This study aims to assess the increase in knowledge, skills and behavior of HAIs prevention among nurses by using training methods. This research is a type of quantitative research with a quasi-experimental approach.

#### **METHOD**

The research design was a quasi-experimental design with pre-test and post-test design with control group design. This study involved 80 nurses at Prima Medika General Hospital who were determined based on purposive sampling technique. The inclusion criteria for this study were: 1) nurses who performed aseptic procedures, 2) nurses who were not on leave, sick, on holiday, or undergoing study assignments when the research was carried out, and 3) nurses who were willing to participate in this study by signing an agreement sheet provided by the researcher. The criteria for drop out in this study were nurses who did not follow all stages of the research. The nurses were then divided into two groups using simple random sampling method so that 40 nurses were assigned to the control group and 40 nurses as the intervention group. The dependent variables in this studyare knowledge of HAIs, skills, and behavior to prevent HAIs. Meanwhile, the independent variable is training on HAIs.

On the first day of the intervention, OSCE 1 examinations were carried out in the control and intervention groups. The OSCE that is carried out is the OSCE with a catheter insertion case background that prioritizes the principles of infection prevention and control such as washing hands, using PPE, performing disinfection, and conducting no-touch techniques. In addition, all study participants were given a knowledge questionnaire while waiting their turn for the OSCE as a pre-test. OSCE observations were carried out by an independent party, namely the experienced Medical Education Unit staff from the Faculty of Medicine, Udayana University. On the following day, training was conducted for the intervention group. The training was carried out in one meeting session in the fourth week of May 2018 comprised of lecture, discussion, and practice methods. The materials presented included: 1) Patient Safety Curriculum Guide: HAIs, 2) Hand hygiene procedures, 3) Use of gloves, and 4) Aseptic & Decontamination Procedures. The time allocation for each material presented is approximately 60 minutes. After training, post-test and OSCE 2 were carried out in the control and intervention groups. Two weeks after training, OSCE 3 was conducted for the intervention group to measure behavior.

The data collection of knowledge about HAIs used a questionnaire consisting of 20 questions with multiple choice answers. The validity of the questionnaire has been tested with r value 0.412-0.716> r table 0.294 and its reliability with Cronbach Alpha 0.753. HAIs prevention skills and behavior are measured using a structured observation sheet or checklist consisting of several aspects of assessment including: 1) preparation of tools, 2)patient identification, 3)hand hygiene, 4)use of gloves, 5)aseptic procedures.

The data collection method starts with obtaining a research permit. The researcher then searched for a list of nurses at Prima Medika Hospital to provide research informed consent. Researchers asked for the help of an infection control nurse as a research assistant who had previously been given directions on how to fill out questionnaires and methods of assessing observation sheets or infection prevention checklists. Nurses who had been willing to become research respondents were then given a pre-test questionnaire regarding HAIs, an assessment of infection prevention skills and behavior was carried out before being given training interventions. Nurses in the intervention group were given training on HAIs, while the control group was only given modules on HAIs. After the training was completed, the respondents were again given a post-test

questionnaire regarding HAIs, an assessment of infection prevention skills and behavior was carried out.

Univariate analysis was conducted to describe the distribution and mean value of each variable. The Wilcoxon test was used to analyze the mean difference between groups because the data were not normally distributed. The mean difference between the control and intervention groups was analyzed using the Mann-Whitney test. The confidence interval used was 95% ( $\alpha = 0.05$ ). This study has obtained a statement of ethical suitability from the Research Ethics Commission of the Faculty of Medicine, Udayana University with number 1329/ UN.14.2.2.VII.14 / LT / 2020.

# **RESULTS**

The frequency distribution of the characteristics of the respondents is described in table 1.

Table 1. Distribution of Respondent Characteristics (n = 80)

| dent characteristics | $(\Pi = 00)$   |   |
|----------------------|--|---|
| Grou                 |  |   |
| Intervention         | Control  | Total   |
| (n=40)               | (n=40)   |   |
|                      |  |   |
| 9 (22.5%)            | 8 (20%)  | 17 (21.25%)   |
| 31 (77.5%)           | 32 (80%  | 63 (78.75%)   |
|                      |  |   |
| 1 (2.5%)             | 1 (2.5%)   | 2 (2.5%)  |
| 37 (92.5%)           | 36 (90%)   | 73 (91.25%)   |
| 2 (5%)               | 3 (7.5%)   | 5 (6.25%)   |
|                      |  |   |
| 38 (95%)             | 24 (60%)   | 62 (77.5%)  |
| 2 (5%)               | 16 (40%)   | 18 (22.5%)  |
|                      |  |   |
| 15 (37.5%)           | 18 (45%)   | 33 (41.25%)   |
| 25 (62.5%)           | 22 (55%)   | 47 (58.25%)   |
|                      | Groud Intervention (n=40)  9 (22.5%) 31 (77.5%)  1 (2.5%) 37 (92.5%) 2 (5%)  38 (95%) 2 (5%)  15 (37.5%) | (n=40)     (n=40)       9 (22.5%)     8 (20%)       31 (77.5%)     32 (80%)       1 (2.5%)     1 (2.5%)       37 (92.5%)     36 (90%)       2 (5%)     3 (7.5%)       38 (95%)     24 (60%)       2 (5%)     16 (40%)       15 (37.5%)     18 (45%) |

Table 2.
Scores of Knowledge, Skills, and Behavior to Prevent HAIs Before and After Intervention (n = 80)

|            |    |                    | (    |               |       |      |
|------------|----|--------------------|------|---------------|-------|------|
| Variable - | I  | Intervention Group |      | Control Group |       |      |
| variable — | n  | Mean               | SD   | n             | Mean  | SD   |
| Knowledge  |    |                    |      |               |       |      |
| Pre-test   | 40 | 6.66               | 1.32 | 40            | 6.52  | 0.80 |
| Post-test  | 40 | 9.13               | 0.96 | 40            | 6.48  | 0.96 |
| Skills     |    |                    |      |               |       |      |
| Pre-test   | 40 | 67.15              | 8.89 | 40            | 69.57 | 1.40 |
| Post-test  | 40 | 97.87              | 3.22 | 40            | 70.4  | 1.42 |
| Behavior   |    |                    |      |               |       |      |
| Pre-test   | 40 | 97.87              | 3.22 | 40            | 70.42 | 9.02 |
| Post-test  | 40 | 98.65              | 2.44 | 40            | 68.67 | 8.15 |

Table 3.
Wilcoxon Test Results Score of Knowledge, Skills, and Behavior of HAIs Prevention in the Intervention and Control Groups Before and After the Intervention (n = 80)

| Variable           | P value |
|--------------------|---------|
| Knowledge          |         |
| Intervention Group | <0.001* |
| Control Group      | 0.803   |
| Skills             |         |
| Intervention Group | <0.001* |
| Control Group      | 0.052   |
| Behavior           |         |
| Intervention Group | 0.041*  |
| Control Group      | 0.051   |

Table 4.

Mann-Whitney Test Results Score of Knowledge, Skills, and Behavior of HAIs Prevention Between the Intervention Group and the Control Group (n = 80)

| Variable  | P value |
|-----------|---------|
| Knowledge | <0.001* |
| Skills    | <0.001* |
| Behavior  | <0.001* |

Table 1 shows that the majority of respondents in both the intervention and control groups were female, had a D3 nursing education, were under 40 years of age, and had a workexperience of more than eight years.

Table 2 shows an increase in the score of the intervention group in knowledge, skills and infection prevention behavior after being given the intervention. Whereas in the control group there was a decrease in the score of knowledge and infection prevention behavior after the post-test.

Table 3 illustrates the effect of training on knowledge (p value <0.001), skills (p value <0.001), and behavior (p value =0.041) on prevention of HAIs in the intervention group. In contrast, in the control group, it was found that there was no effect of training on knowledge, skills, and behavior of prevention of HAIs (p value> 0.005).

Table 4 shows that there are differences in knowledge, skills, and behavior of HAIs prevention between the intervention group and the control group (p value <0.001).

#### **DISCUSSION**

The results of the study obtained shows that the value of nurses' knowledge about HAIs after being given training in the intervention group exhibits an increase. Whereas in the control group, the knowledge score of nurses decreased. This is in line with research Puspasari (2015) that there is an increase in the knowledge of nurses after training in preventing nosocomial infections.

Knowledge is the result of knowing, and this happens after people sense a certain object. Knowledge of a new object becomes an attitude if that knowledge is

accompanied by a readiness to act in accordance with the knowledge of that object (Mulyana, 2015). Study shows that nurses' knowledge affects the practice of nurses in carrying out their duties which means the better the knowledge of nurses, the better the practice of nurses in preventing nosocomial infections (Puspasari, 2015).

Nurses can continue to increase in knowledge if the hospital continue to improve their capabilities with various continuous training and education for all employees on all aspects of infection prevention (Yulianti, Rosyidah, & Hariyono, 2013). Education and training interventions have a significant impact in increasing nurses' knowledge of infection prevention practices. Periodic education and training interventions must be carried out to facilitate knowledge of health workers about best practices in infection prevention and control that can reduce HAIs (Gaikwad et al., 2018). Knowledge is very closely related to education, but increased knowledge is not solely obtained from formal education but can be obtained from informal education including training or skill refreshment.

According to the researchers, if all nurses are given HAIs prevention training, it is likely that nurses' performance in controlling HAIs will be very good and of course the incidence of HAIs can be reduced. This will also improve the image of hospital services due to the quality of service standards, one of the indicators is the incidence of HAIs.

The evaluation of learning consists of knowledge and skills. Knowledge is positively correlated with skills (Kirkpatrick & Kirkpatrick, 2008). This is evidenced in several studies that have found a relationship between knowledge and attitudes and behavior of nurses in preventing nosocomial infections (Mariana, Zainab, & Kholik, 2015; Riswantoro, Handayani, & Andoko, 2013). In this study, evaluation of skills after HAIs prevention training was carried out on 4 components, namely 1) Informed consent and patient identification skills and equipment preparation, 2) hand hygiene skills, 3) use of sterile gloves, and 4) catheter and procedure installation. aseptic.

The results of the analysis showed an increase in the score of nurses' skills regarding HAIs prevention after being given training. After training all nurses in the intervention group applied observation, informed consent, patient identification, and tool preparation skills. The simulation of informed consent was carried out well, starting from introducing himself, matching and identifying the patient's identity bracelet. Informed consent is a process of communicating with patients about the medical actions taken in order to obtain their permission (Wardhani, 2009).

The increase in the mean value in the intervention group indicates learning outcomes and shows the effectiveness of the training that had been carried out. Additional knowledge can be acquired by holding training (Atmadja, 2012). Therefore, training on HAIs prevention and aseptic techniques should be carried out on an ongoing basis. However, this increase in knowledge cannot be separated from the relevance of the training material provided. One indicator of the success of a training in increasing knowledge is the quality of training materials (Wardhani, 2009).

This increase in knowledge can be an indication that the material presented is appropriate and relevant in the daily practice of nurses. Teaching materials in training

must have relevance related to the training topic so that they have concrete meaning and are relevant to the needs of participants. Training is a process of teaching certain knowledge and skills so that employees are increasingly skilled and able to carry out their responsibilities in accordance with standards (Wilma, 2013). Thus, training is an effort to improve individual competence. Competent individuals have adequate abilities to do their jobs.

One of the results of the study found that most nurses had intermediate knowledge and skills regarding infection control (Kalantarzadeh, Mohammadnejad, Ehsani, & Tamizi, 2014). Therefore, it is necessary to develop a sustainable education system for all nurses. Education is an effective intervention to increase compliance with HAIs preventive measures, especially the implementation of hand hygiene (Quilab, Johnson, Schadt, & Mitchell, 2019).

The results of the analysis showed that the scores of HAIs prevention knowledge, skills, and behavior between the intervention group and the control group showed significant differences. The results of other studies found that there was a significant relationship between training and the actions of nurses in controlling HAIs (Salawati, Taufik, & Putra, 2014). There was a significant change in scores between pre and post tests for health workers, which indicated that education and training programs has a positive effect on the knowledge, skills and attitudes of health workers in preventing HAIs (Dogra et al., 2015). Effective educational interventions to increase ICU nurse compliance with standard precautions can reduce the incidence of HAIs (Gomarverdi, Khatiban, Bikmoradi, & Soltanian, 2019). Interventions in the form of effective education can be recommended as further education to be applied to nursing staff working in hospitals.

Support for a program must be followed by good management. The leadership is responsible for implementing infection prevention and control efforts in the hospital, one of the efforts that can be done is by increasing knowledge of human resources. The success of infection prevention and control can improve the quality of hospital services, and this is important in preparing for accreditation. Sustainable human resource development is a very important effort to achieve organizational goals, which, in this case, is excellent service (Djuwita, 2011). To carry out the best service to society, organizations need employees who have the knowledge and skills to carry out their work so that the work productivity of employees is high and is directly proportional to the quality of service.

# **CONCLUSION**

There are differences in knowledge, skills, and practices of prevention of HAIs between the intervention group and the control group. There is an effect of training on the knowledge, skills, and behavior of prevention of HAIs in the intervention group. Whereas in the control group, it was found that there was no effect of training on knowledge, skills, and behavior of prevention of HAIs.

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