

**Original article**

**The situation awareness of health workers about needlestick and sharp injuries at hospital**

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**Abstract**

**Background:** The nosocomial infection occurs in patients who are under medical treatments in hospitals or other health facilities, which has not yet occurred at the time of admission. This infection can occur as delivering treatments for other diseases; and even after the patients has returned from the hospital. The purpose of this study is to analyze the effectiveness of an education about the danger of needlestick to the situational awareness of health workers regarding the needlestick and sharp injuries in hospitals. **Method:** This study is a quasi-experiments with pre-test and post-test control group design. The samples of this study was collected using purposive sampling with 98 respondents in the experiment group and 29 respondents in the control group. The data were analyzed by Wilcoxon and Independent sample T test. Meanwhile, the data were collected by questionnaires. **Result:** The measurement results of the situation awareness in the control group, *mean* is 45.31, and SD is 3.57; in the treatment group, *mean* is 46.77, and SD is 4.04. The differences of the situation awareness of needlestick and sharp objects in the control group, before and after education, is  $p = 0.981 (> 0.05)$ ; the result is not significant. The differences of the situation awareness of needlestick and sharp objects in the treatment group, before and after education, is  $p = 0.001 (< 0.05)$ ; the result is significant. The differences of the situation awareness in control group and treatment group, after education, is  $p = 0.001 (< 0.05)$ ; the result is significant. **Conclusion:** The education about the prevention of needlestick and sharp objects on health workers is effective to raise the situation awareness about the danger of needlestick and sharp objects in health workers in hospitals.

**Keywords:** education, situation awareness, needlestick and sharp objects, health workers

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**Introduction**

The nosocomial infection occurs in patients who are under medical treatments in hospitals or other healthcare facilities, which has not yet occurred at the time of admission. This infection can occur as delivering treatments for other diseases; and even after the patients has returned from the hospital. Such

infection is also an occupational-associated infection of health workers. Invasive devices such as catheters and ventilators used in modern healthcare are related to this infection. From every thousand inpatients, seven people in developed countries and ten people in developing countries can get one of the healthcare-associated infections<sup>1</sup>.

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The Infection Prevention and Control needs to be established to minimize the risk of the infection in hospitals and other healthcare facilities, which includes the activities of deepening the spread of infections, training, and education about the prevention and control of infections for healthcare workers<sup>2</sup>. The concrete manifestation of such efforts is by implementing the standard precaution. The health workers and nursing students are potentially exposed to microorganisms that may cause serious infections and even death. The exposure to infectious devices can be minimized by adhering to the standard precaution designed to reduce the risk of occupational infections from both known and unexpected sources in the healthcare environment<sup>3</sup>.

One of the efforts to implement the standard precaution is by increasing the situational awareness about the danger of needlestick and other sharp injuries. Health workers in hospitals, including doctors, nurses, technicians, and assistants, are all vulnerable to injuries caused by contaminated needles and sharp injuries. Serious *bloodborne* pathogens such as HIV, HBV, HCV, and *Treponema Pallidum*, can be transmitted from these injuries. The risk of the infectious diseases being reported after being injured by needlestick or sharp objects, which are positively pathogenic, is 0.3% for the HIV; 6.0% - 30.0% for the HBV; and 0% - 10.0% for the HCV. The previous research showed that population in Taiwan, the seropositivity of HBsAg and HCV antibodies was 15% -21%, and each was 2.5%. In fact, the occupational contraction of HBV or HCV from needlestick or sharp injuries is one of the most common occupational hazards among the health workers in Taiwan<sup>4</sup>.

The sharp object injury is a penetrating wound from needlestick, scalpels, or other sharp objects which can cause exposure to the blood or other body fluids. The sharp object injury is generally the result of using dangerous equipment in environments which are fast-paced, stressful, and lack of employees. This heavy demand often creates feelings of fatigue, frustration, and sometimes anger. In the surgery room, health workers become less comfortable because they cannot take a rest. However, they have to continue their duties until the procedure is completed. This condition may increase the risk of injury and infection on health workers<sup>5</sup>.

The situational awareness is a reflection of a person's dynamic awareness of his or her environmental situation<sup>6</sup>. Livnat, *et al.*, (2007) reveals that there

are three levels in the awareness of the following situations. First, the perception of all the environment aspects, that is the basic knowledge or understanding of the environment obtained through eyesight, touch, and feeling. Second, the comprehension is the ability to analyze the collection or integration of various information received. Third, the projection, i.e., ability to predict the future environmental conditions based on information and data received<sup>7</sup>.

The most frequently reported behaviors, associated with the injury caused by needlestick and sharp objects, are patient treatments (31%) and needles recapping (28%). Injuries caused by needlestick and sharp objects are related to the instrument selection, since such thing causes the exposure up to 25%. Dentists have to be more careful in handling patients, and also in using instruments. Dentists who have needlestick and sharp objects injuries, one of which is lacking of knowledge of the infection control procedure. Dentists who experience the injury from the needlestick and sharp objects might have less knowledge about HIV, and are afraid of the HBV infection. The previous published reports also found a correlation between the negative attention regarding the treatment of patient with HIV, and the injury from needlestick and sharp injuries. This study also reports that fingers are the area that is the most-often injured<sup>8</sup>. One of the solutions for the lack of knowledge is the need for an education about the danger of the needlestick and sharp injuries exposure.

The purpose of this study is to analyze the effectiveness of an education about the danger of needlestick to the situational awareness of health workers regarding the needlestick and sharp injuries in hospitals. Thus, by improving the situational awareness of needles and sharp objects would reduce the spreading of microorganisms in hospitals.

### Materials and Methods

This study used the quasy experimental research design with pre-test and post-test control group design<sup>9</sup>. The sampling technique was the purposive sampling involving 98 respondents for the experimental group, and 29 for the control group. The data analysis used here was the Wilcoxon test. Questionnaires were used for the data collection.

**Ethical clearance:** This study was approved by ethics committee of Universitas Muhammadiyah Yogyakarta.

## Result

**Table 1. Ages of respondents**

Variables	Control Group		Treatment Group	
	Frequency	Percentage	Frequency	Percentage
20 – 30 years	16	55.17	57	58.16
31- 40 years	7	24.14	26	26.53
> 40 years	6	20.7	15	15.31
P	0.788**			

\*\*Not Significant ( $p > 0.05$ )

The measurement results of the respondents' age (Table 1) by the chi square test,  $p = 0.788$ ; this data is homogenously distributed.

**Table 2. Respondents' work-time**

Variables	Control Group		Treatment Group	
	Frequency	Percentage	Frequency	Percentage
< 1	9	31.03	9	9.18
1 - 5 years	11	37.93	53	54.08
> 5 years	9	31.03	98	36.73
P	0.012*			

\*Significant ( $p > 0.05$ )

The measurement results of the respondents' age (Table 2) by the chi square test,  $p = 0.012$ , this data is distributed non-homogeneously.

**Table 3. The Differences of The Situation Awareness between The Control Group and The Treatment Group**

Variable	Control Group			Treatment Group			P
	n	Mean	SD	n	Mean	SD	
The Situation Awareness Before the Treatment	29	45.31	3.57	98	46.77	4.04	0.001*
The Situation Awareness After the Treatment	29	45.07	2.27	98	53.93	8.82	
P	0.981**			0.001*			

\*Significant ( $p < 0.05$ )

\*\*Not Significant ( $p > 0.05$ )

## Discussion

The measurement results of the situation awareness in control group, *mean* is 45.31, and SD is 3.57; while in treatment group, *mean* is 46.77, and SD is 4.04. The differences of the situation awareness of the needlestick and sharp objects in control group, before and after education is  $p = 0.981$  ( $> 0.05$ ); this result is not significant. The differences of the situation awareness of the needlestick and sharp objects in treatment group, before and after education is  $p = 0.001$  ( $< 0.05$ ); the result is significant. The differences of the situation awareness in control group and treatment group, after education is  $p = 0.001$  ( $< 0.05$ ); the result is significant.

The needlestick injury is an accidental percutaneous puncture wound, caused by contaminated objects – usually the holed needle from the needlestick – and is one of the most commonly used transmission routes in the blood obtained from work. More than 20 blood infections can be transmitted by needlestick and sharp injuries. In the most severe case, the transmission of HIV, HBV and HCV, can severely damage the quality of life, and reduce the life expectancy, while incurring the substantial cost, especially in the long term. The World Health Organization allows the use of injection devices, and instructs the government to switch their exclusive use starting in 2020. US, Canada, Brazil, Taiwan, UK, and European Union countries have stipulated the constitution which requires the use of safety injections equipments. In spite of the awareness and constitution that are increased in some countries, the injuries caused by needlestick and sharp objects with its effects still occur<sup>10</sup>.

The needlestick and sharp injury is a serious risk in various health care facilities. The contact with contaminated needles, scalpels, broken glass, and other sharp objects, can cause the health workers being exposed to the blood which contains dangerous and potential deadly pathogenic microorganisms<sup>11</sup>.

Needlestick and sharp injuries which are largely preventable are one of the most important occupational injuries experienced by nurses in hospitals. The main potential problems caused by needlestick and sharp objects are infectious diseases such as Hepatitis B, Hepatitis C, and HIV, which are transmitted through pathogenic blood microorganisms from needlestick or contaminated sharp objects. According to WHO, needlestick and sharp injury causes around 40% of Hepatitis B and C infections, and 2.5% of HIV

infections, on health workers around the world. In addition to the potential risks of infectious diseases, the needlestick and sharp injuries causes the direct costs needed for laboratory tests, including the HIV antibody test, the Hepatitis B serology, and the initial anti-Hepatitis C test, as well as other treatments for such condition. There are also costs associated with the post-prophylaxis exposure to nurses along with the economic loss from hospitals caused by the absence at the work. The estimation of the annual cost of the test and treatment of needlestick and sharp objects injuries varies from \$6.1 million in France, to \$118-591 million in the United States<sup>12</sup>.

The Centers for Disease Control and Prevention (CDC) estimates that around 385,000 sharp objects-related injuries occur annually to the health workers in hospitals. The latest data from the Exposure Prevention Information Network (EPINet) states that this injury is reduced, such as sharp object injuries in non-surgical hospitals locations which decreased by 31.6% during 2001-2006 (according to the Needlestick Safety and Prevention Act of 2000). However, surgical site injuries increased by 6.5% in the same period, whereas the use of safety devices was limited compared to non-surgical sites. It is estimated that around half or more sharp objects are not reported. Most reported sharp object injuries involve staff nurses, yet other laboratory staffs, doctors, helpers, and other health workers, are also injured<sup>13</sup>.

The research at the orthopedic academic medical center found that twenty-eight percent of medical students, 83% of residents, and 100% of staffs, had suffered from sharp objects injury at some point during their careers, and 42% of residents had experienced sharp objects exposure in the past year. Compared to the staffs, significant students and residents were more likely to experience sharp objects injury of the solid-bore needle than all other devices combined ( $p = 0.04$ ). Medical students were more likely to ignore the exposure than residents ( $p = 0.004$ ) or staffs ( $p = 0.036$ ). Only 12.5% of medical students followed all of the post-exposure protocol steps<sup>14</sup>.

The exposure to blood and body fluids from patients, when carrying out daily professional work is a serious problem for health workers, especially for nursing

staff. However, this is also a threat to the health of nursing students during their clinical practice. According to WHO, out of 35 million healthcare workers (HCWs) in the world each year, there are as many as 3 million people that are exposed to *bloodborne* pathogens, including 37.6% of HBV, 39% of HCV, and 4.4% of HIV/AIDS infection. In Vietnam, according to the recent survey by the Institute of Occupational Health and Environmental Sanitation in three hospitals in Hanoi, shows that the sharp objects injuries on health workers generate a very high rate: Thanh Nhan Hospital (68.7%), Dong Anh Medical Center (85.2%), and Trang An the Hospital (50%). According to the Department of Preventive Medicine and HIV/AIDS, in 45 out of 64 provinces and cities, there are 343 cases in total, of occupational injury risk to exposures of HIV/AIDS in health workers, which the highest percentage is in nursing (45.2% of cases), doctors (29.7 %), and technicians (9.6%)<sup>15</sup>.

## Conclusion

The education about the prevention of needlestick and sharp objects for health workers is effective to raise the situation awareness about the danger of needlestick and sharp objects on health workers in the hospitals.

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## Author Contributions

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