Nurses' Knowledge, Attitude, and Work Fatigue with Needle Sticks

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ABSTRACT

Needlestick incidents are caused by hypodermic syringes, blood draw needles, and connecting needles from intravenous delivery systems which can accidentally puncture the skin, causing injury. WHO states that NSI include to one of the top serious occupational hazards among health workers, including nurses, with >2 million incidents among 35 million health workers. In Indonesia, there was a cohort study which resulted in the finding of 286 cases of NSI with the most frequent occurrence in nurses (42.7%) with an incidence rate of 15.2 out of 1,000 people per year. The purpose of this research is to determine the relationship between knowledge, attitudes, work fatigue of NSI among nurses at Hospital X. This research uses a quantitative cross sectional design. The population was 275 nurses with 80 sample size. This research instrument used a questionnaire. The Fisher Exact test show the result of the research which there is a significant relationship between knowledge and attitudes towards the incidence NSI in nurses (p-value 0.003 and 0.013), while the work fatigue variable does not have a significant relationship with the incidence of NSI (p-value 1.000). It is hoped that the K3 Program can be implemented as an effort to prevent NSI in nurses.

Keywords : Needle stick incident, knowledge, attitude, work fatigue, nurses.

INTRODUCTION

One of the work groups with higher exposure to hazards and risks in hospitals is nurses, with the most frequent risk being Needle Stick Injury (NSI). NSIs are caused by needles, for example, hypordemic syringes, blood collection needles, and needles that connect the vascular system that can cause injuries due to intentional or accidental puncture of the skin. This occupational accident may occur before, during, and after performing curative actions that are not in accordance with the applicable Standard Operating Procedures (1,2).

Needlestick incidents (NSI) are one of the accident cases that often occur in hospitals and nurses are workers who are vulnerable to experiencing them due to direct interaction and medical actions on patients. Data from the World Health Organization (WHO) states that NSI is one of the most serious occupational hazards among health workers, including nurses, with >2 million incidents among 35 million health workers. The highest incidence of NSI also occurs in Southeast Asia with a prevalence of 49.9%. In Indonesia alone, a cohort study conducted by Yunihastuti et al found 286 cases of NSI with the most frequent occurrence in nurses (42.7%) with an incidence rate of 15.2 out of 1,000 people per year (3,4).

The incidence of NSI also occurred at the X Regional General Hospital, which is a type C hospital and there is only 1 such hospital in X District. This hospital has a total of 275 nurses, the most compared to other work groups. Every year, the incidence of NSI always occurs. It was recorded that in 2020 there were 4 cases, in 2021 there were 2 cases and in 2022 it increased more than 4 times higher, namely 9 cases. In 2023 alone, the data recorded up to March 2023 has 2 cases, of which 100% of the incidents (from 2020 to March 2023) occurred in nurses. This number of incidents is feared to be only reported, while there are still other cases that have not been reported due to the perception of nurses who tend to underestimate this incident or are afraid

to report and only tell their colleagues. Health workers who do not report cases of occupational accidents are often based on nurses' unpreparedness for poor judgment and career records that will become a negative reputation record (1).

The allegation above reflects the case that occurred at the Y Regency Hospital which states that there are a total of 61.34% of nurses who have needle stick wounds and other sharp objects, which is quite high and this finding is higher than the data reported in the hospital. This case certainly endangers health workers, especially nurses who have more frequency interacting with patients. Wounds and injuries can be a possible factor in the emergence of around 20 pathogens, as well as sourced from food or beverage intake exposed to viral contamination, or intense interaction with people suffering from diseases or called patients. These pathogens include hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). The WHO estimates that NSI causes 16,000 HCV, 66,000 HBV, and 1,000 HIV infections each year (5).

Needlestick events may fall under episodic memory which involves the ability to learn, store and retrieve information related to unique personal experiences that occur in daily life. This pre-recorded memory usually includes information about the time and place of an event, as well as detailed information about the event itself. Thus, nurses who experience needle sticks will be able to remember the event for a long period of time. However, with regard to the research period carried out for approximately 1 year, it was determined to cut the time for a period of one year back, so that the findings produced could be represented systematically with a predetermined time limit (2).

Nurses who experience a needle stick incident should report the incident experienced with a mechanism that starts from reporting the case to the head of the room who is then reported to the K3. Followed by investigation and assistance and the reporting time must be done within 4 hours and not later than 72 hours after exposure so that further examination is carried out to the laboratory. Reporting is done to the OHS in coordination with Infection Prevention and Control (1, 2). Reporting the needle stick incident is still not fully the first step taken by nurses to get immediate treatment. The results of previous studies state that this is due to the assessment that the nurse is negligent in discipline, worried about negative assessment records, worried about reputation, fear of being treated, tendency to maintain clean personal records, and not optimal understanding of the importance of accident reports (1, 2).

Prevention efforts can be done by implementing a hierarchy of control that emphasizes elimination and reduction of the use of needles and other sharps as a good practice in hospitals. When isolation and reduction are not possible, PPE is required at the last resource. In addition, universal precautions are required to reduce the incidence of needlestick and sharps injuries. These precautions must be in accordance with the principles of maintaining individual sanitary hygiene, room sanitary hygiene and sterilization. According to OSHA and CDC, universal precautions are as important as the use of PPE and work management controls so that they will be more effective in preventing wound exposure to bloodborne pathogens through needlesticks (7).

According to Heinrich's Domino theory, accidents are caused by a sequence of factors including lack of supervision, basic causes, main causes, incidents, and losses. In the main cause domino, it is known that there are many factors that cause work accidents, including knowledge, attitude, and fatigue (2). Knowledge is knowing the existence of something or understanding the situation based on information that has been obtained. Knowledge will determine how a person takes an action. If a person has good knowledge related to needle stick incidents, it will determine his attitude and practice at work which makes the worker more aware of the risks he may experience. This is in line with research by Mapanawang S et al (2018) that there is a relationship

between knowledge and the incidence of needlesticks in nurses at Liun Kendage Hospital with the results of the Chi-Square Test analysis, namely p-value = 0.042, <α = 0.05 which shows that there is a significant relationship between knowledge and the incidence of needlestick injuries in nurses at Liun Kendage Hospital. This study shows the results that the Odd Ratio value was obtained with a value of 2.130, which means that nurses who have poor knowledge have a 2.1-fold tendency to experience accidents in the form of needlestick wounds at Liun Kendage Hospital when paired with nurses who have knowledge that falls into the good category (7).

Attitude is a result of evaluation or feelings that are reacted to and categorized into positive effects or negative effects towards a psychological goal. The evaluation or assessment leads to the risk of needlestick injuries. Therefore, if the worker gives a positive attitude response that considers that needlestick injuries are dangerous and should be avoided, then a positive attitude is crucial to be implemented by the worker. Research by Motulo et al (2022) said that there was a significant relationship between attitude and the incidence of needle sticks in workers (nurses) at Anugerah Tomohon Hospital. A positive attitude will reflect positive actions, especially in avoiding injury at work (7).

Meanwhile, fatigue is a reaction to the body's mechanisms that can affect a person's health, and has the effect of being a factor in enabling accidents in the workplace (11). Research by Gethami et. al (2018) states that fatigue is one of the triggers for needle stick incidents in nurses, which is based on long working hours, so this is also related to circadian rhythms in workers and causes fatigue (7).This study was conducted with the aim of knowing the relationship between knowledge, attitudes, and fatigue towards work accidents in nurses in hospitals. Researchers hope that these findings can be useful new information for future research and provide benefits in various sectors, especially for the safety of workers and resources around the hospital which is also one of the implementations of the K3RS Risk Management program.

METHOD

This study is quantitative using an analytic observational design that aims to determine the relationship between knowledge, attitudes, and work fatigue to the incidence of needle sticks in nurses at X Hospital. The research design used is cross sectional, because in this study design all variables are measured and observed at the same time (one point in time) so that it is easier for researchers to conduct research to identify the relationship between the independent variable and the dependent variable, both measured at the same time, namely in the present. The test used in this study is the fisher exact test which is used because the requirements of the chi-square test are not met,

The population in this study were all nurses at X Hospital as many as 275 people who were permanent employees at the local hospital. Based on the sample calculation using the Lemeshow formula, the sample in this study was 72 nurses. The calculation was added with a correction factor to avoid data processing errors by using an estimated exclusion proportion of 10% or 0.1 of the minimum sample size so that the total sample of researchers taken was 80 nurses at RSUD X as samples in the study. This study is quantitative using an analytic observational design that aims to determine the relationship between knowledge, attitudes, and work fatigue to the incidence of needle sticks in nurses at X Hospital. The research design used is cross sectional, because in this study design all variables are measured and observed at the same time (one point in time) so that it is easier for researchers to conduct research to identify the relationship between the independent variable and the dependent variable, both measured at the same time, namely in the present. The test used in this study is the fisher exact test which is used because the requirements of the chi-square test are not met,

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This research instrument uses a questionnaire adapted from several previous studies and has been adapted to the research topic to be carried out. This research instrument has previously been tested for validity and reliability at X Hospital in X Regency until it was found that there were 2 invalid question items on the knowledge questionnaire, and 3 invalid statement items on the needle stick incidence questionnaire. All questionnaires used in this study were categorized as reliable. This research was conducted for approximately 4 months, namely in September-December 2023, from the preparation of the proposal to the results of the study. Research data collection was carried out for 8 days. This research has been declared ethical with No.467/KEPK-FK ULM/EC/XII/2023.

RESULTS AND DISCUSSION

The results of the study in terms of respondent characteristics are presented in table 1 below

Table 1. Distribution of categorization of respondent characteristics

Category	Frequency	Percentage
Age		
Nurse Age ≤30	26	32,5%
Nurse Age > 30	54	67,5%
Gender		
Male	33	41,3%
Female	47	58,8%
Last Education		
Diploma	37	46,3%
Bachelor/Ners	43	53,8%
Work Shift		
Morning	41	51,2%
Afternoon	24	30%
Night	15	18,8%

Sumber : Data primer 2023

The results of the study seen from the age category of respondents showed that out of 80 respondents, the majority of respondents were >30 years old (62.5%), while a small proportion of respondents were ≤30 years old, namely 26 (32.5%). The most needle stick incidents when viewed from the age categorization were respondents aged >30 years, namely 24 respondents, while respondents aged ≤30 years and had experienced needle stick incidents were known to be 12 respondents. Age can be a factor in the occurrence of work accidents. This is due to physical conditions and general health, adjustments to the work environment, and the ability of individuals to react and respond (2).

The results of the study seen from the respondent's gender category showed that the dominant respondent was female, namely 47 respondents (58.8%), while 33 respondents were male (41.3%). When categorized by gender, similar results were obtained, namely 19 male

respondents and 17 female respondents who experienced needle sticks. This may be based on differences in physical, psychological, cultural, and social factors where these differences can affect sensitivity and tendency to take action and make decisions (2).

The results of the study seen from the category of the last education of the respondents showed that most of the respondents had taken a Bachelor / Nurse education, namely 43 respondents (53.8%). The incidence of needle sticks if the categorization refers to the last education obtained the results that respondents who took the last diploma III / diploma IV education tended to experience more needle sticks, namely 20 respondents, while nurses who had taken Bachelor / Nurses education tended to experience fewer needle sticks, namely 16 respondents. Education is one of the factors that have an impact on the incidence of needle sticks because education is closely related to the knowledge of each individual. Education and knowledge possessed by nurses determine understanding and safety awareness, risk awareness and risk-taking tendencies, and skills possessed, especially when performing nursing care (2).

The results of the study seen from the work shift category showed that the majority of respondents were found in the morning shift, namely 41 respondents (51.2%) and the minority in the night shift, namely 15 respondents (18.8%). The incidence of needle sticks when viewed from the categorization of work shifts showed that there was an equal number of respondents who experienced needle sticks, namely 14 respondents each in the morning and afternoon shifts. However, when viewed based on the ratio, the majority of respondents who experienced needle stick incidents were mostly found in the day shift. Shift work is also a factor in the occurrence of work accidents due to work fatigue, biological rhythm disturbances, and work stress (2).

Table 2. Categorization distribution of knowledge, attitude, fatigue, and needle stick incidence

Range	Category	Frequency	Percentage
X < 4	Less	36	45%
X ≥ 4	Good	44	55%
X = 12-29	Negative	48	60%
X = 30-48	Positive	32	40%
X = 20-38	Tired	38	47,5%
X < 20	Less Tired	42	52,5%
X ≥ 1	Ever	36	55%
X = 0	Never	44	45%

Sumber : Data primer 2023

Knowledge is knowing something exists or understanding a situation based on information that has been obtained. Knowledge will determine how a person takes an action. If a person has good knowledge related to needle stick incidents, it will determine his attitude and practice at work which makes the worker more aware of the risks he might experience. Based on primary data from the questionnaire that has been collected, it is known that there are 36 respondents who have a level of knowledge that is categorized as less (45%), and 44 respondents have a level of knowledge that is categorized as good (55%). Of the total 80 respondents, it was found that the majority or 73 respondents answered correctly to question number 1 about needle stick incidents, followed by question number 5 about prevention and control of needle stick incidents, 61 respondents answered correctly. Meanwhile, in question number 8 about medical waste management, the majority of respondents, 56 respondents, answered the question incorrectly.

Attitude is a reflection of how workers pay attention to needs rather than wants regarding compliance in the workplace. Workers' attitudes can be an evaluation or assessment of the risks and hazards that may be experienced when carrying out tasks and workers consider that these risks and hazards are important things that should be prevented (12). Referring to the data

presented in the table, it is known that 48 respondents (60%) have attitudes that are categorized as negative and 32 respondents (40%) have attitudes that are categorized as positive. The results of the data review from the questionnaire show that in statement number 1, almost all respondents, namely 78 respondents, answered strongly agree to the statement "I agree that the implementation of work safety in hospitals aims to protect staff from needle stick incidents". Whereas in the 12th statement item, the majority of respondents, namely 58 respondents, checked the answer strongly disagree to the statement "I do not pay attention to the procedures that apply in work when handling patients."

Work fatigue is a reaction of the body mechanism that can affect a person's health. Fatigue can result in decreased productivity and performance and increase the level of errors in work so that it becomes an opportunity for work accidents. Work fatigue is a condition that often occurs in the workforce which can result in a decrease in enthusiasm and work stamina (13). Based on the table above, it is known that 38 respondents (47.5) are in the tired category and 42 respondents (52.5) are in the less tired category. The results of the data review show that the most respondents, 71 respondents, answered "never" to question number 14. And several questions such as in items 5, 13, and 16 no respondents (0 respondents) answered "Yes, often."

Needlesticks are occupational accidents caused by needles such as hypordemic syringes, blood collection needles, and needles connecting intravenous delivery systems that can cause puncture wounds to the skin without intentionally causing injury. These injuries may occur during the process of using, disassembling, and disposing of needles that are not correct or do not refer to procedures. Based on the table presented, it was found that 36 respondents (55%) had experienced needle sticks and 44 (45%) respondents had never experienced needle sticks. The primary data based on the questionnaire showed that the majority of respondents, 31 respondents, answered "yes" to the statement "in the past year, I have been pricked by a needle when opening a new syringe". And as many as 24 respondents answered "yes" to the statement "in the past year, I have been punctured by a syringe when removing the needle from the valve."
The results of the bivariate analysis are shown in the following table.

Table 3. Analysis of the relationship between knowledge and the incidence of needle sticks

Variable	incidence of needle sticks		*p-value*
	Yes	No	
Knowledge			
Less	23 (63,9%)	13 (36,1%)	0,003
Good	13 (29,5%)	31 (70,5%)	
Attitude			
Less	23 (63,9%)	13 (36,1%)	0,013
Good	13 (29,5%)	31 (70,5%)	
Work Fatigue			
Less	23 (63,9%)	13 (36,1%)	1,000
Good	13 (29,5%)	31 (70,5%)	

Source: Primary research data, 2023

Referring to the table that has been presented, it is known that out of 80 respondents, the dominance of respondents has good knowledge and has never experienced a needle stick incident, namely 31 nurses (38.8%). There are 23 nurses (28.7%) who have poor knowledge and have experienced needle stick incidents. The results of the Chi-Square test analysis did not meet in this study so that the results of the analysis using the fisher exact test to determine the relationship between knowledge and the incidence of needle sticks in nurses at RSUD X and

showed a significance value (p) = 0.003 (p <0.05) which means Ho has been rejected and Ha can be accepted, so from this it is concluded that the results of statistical tests indicate a significant relationship between knowledge and needle stick events in nurses at RSUD X.

Domino Theory by Heinrich states that knowledge is one of the factors causing work accidents (2). Knowledge is the result of knowing, and occurs after people make senses of certain objects. Sensing occurs through the five human senses, namely the senses of sight, hearing, smell, taste and touch. Most human knowledge is obtained through the eyes and ears, namely the process of seeing and hearing. In addition, it can also be obtained from experience and the learning process in formal and informal education. Knowledge is also an important domain in shaping a person's actions, therefore lack of knowledge can be the cause of work accidents (2).

Other findings of fact based on knowledge questionnaire data, it is known that the majority of respondents who have good knowledge have never experienced a needle stick incident, namely 31 nurses (38.8%). From this data, it can be concluded that these 31 nurses have never been pricked by needles in the last 1 year, departing from the knowledge they have categorized as good, so that if it refers to curative actions when opening a new syringe, removing the needle from the valve, taking the patient's blood, withdrawing the drug from the ampoule, as well as when closing back and disposing of needle waste to the safety box, they have never experienced a needle stick incident. Nurses who have taken a diploma or bachelor's degree, of course, have received the knowledge of

The data findings from this research show results that are in line with research that has been carried out by Mapanawang et al (2017) S. Mapanawang et al (2017) which in their research results obtained the results that there is a significant relationship between knowledge and the incidence of needlestick injuries in nurses at Liun Kendage Hospital. The incidence of needlesticks or other sharp objects can be caused by unsafe work tools, negligence by the officers themselves and performing work activities that are not in accordance with standard operating procedures (SPO) and because it is still found that the supervision system in hospitals is still not strong and optimal. Based on this, a common thread can be found that the incidence of needlestick work accidents has a scope or scope of problems that tend to be complex, where health workers are classified as a unit of workers who are most at risk of needlestick incidents having various enabling factors, one of which is knowledge. Research by Wardani IS (2019) with the title Factors Associated with the Incidence of Needle Stick Injury in Nurses at Ulin Banjarmasin Hospital also states that one of the factors associated with the incidence of NSI is knowledge. The results of knowledge determine individual understanding of the work environment, work procedures, to communication and safety awareness (7).

The results of the study of the attitude variable showed that the majority of respondents had a good positive attitude and had never experienced a needle stick incident, namely 32 nurses (40%). And there are 20 nurses (25%) who have a negative attitude and have experienced needle stick incidents. The results of the Chi-Square test analysis did not meet in this study so that the results of the analysis using the Fisher exact test to determine the relationship between attitude and needle stick incidents in nurses at RSUD X and showed a significance value (p) = 0.013 (p <0.05) which means Ho is rejected and Ha is accepted, so the conclusion is that the results of the statistical test show a significant relationship between attitude and needle stick incidents in nurses at RSUD X.

Based on the Domino Theory by Heinrich (1972), attitude is the main cause that departs from the human factor (unsafe action) which results in work accidents (2). Attitude is a reflection of how workers pay attention to needs rather than desires related to compliance in the workplace. Workers' attitudes can be in the form of evaluations or assessments of risks and hazards that may be experienced when carrying out tasks and workers consider that these risks and hazards are

important things that should be prevented (2). Attitude is one of the factors determining individual compliance with work procedures, awareness of work risks, participation in the implementation of universal precautions, response to an event or change in the workplace, so that a positive attitude will reflect positive actions as well, and vice versa (2). From the primary data of the study, it can be concluded that nurses who have a positive attitude can evaluate and assess the risk of harm from needle sticks so that they pay attention to work procedures and reflect a positive attitude towards their vigilance in avoiding needle sticks when performing curative actions on patients.

In accordance with research by Motulo et al (2022) which shows the results that there is a significant relationship between attitudes and needle stick incidents in nurses. Nurses on duty must have and foster awareness of health as well as the need for universal vigilance which is formed which is an effort to prevent injuries due to needle sticks. A good response or response from the attitude by nurses shows comparable results, that nurses have obediently used PPE and carried out the shoveling technique with one hand in order to avoid the occurrence of needlestick injuries (12). Attitude is one of the factors determining individual compliance with work procedures, awareness of work risks, participation in the implementation of universal precautions, response to an event or change in the workplace, so that a positive attitude will reflect positive actions as well, and vice versa (2). From the primary data of the study, it can be concluded that nurses who have a positive attitude can evaluate and assess the risk of harm from needle sticks so that they pay attention to work procedures and reflect a positive attitude towards their vigilance in avoiding needle sticks when performing curative actions on patients.

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Medically, fatigue is nonspecific in that it has many causes. Occupational fatigue is one of the possible factors for occupational accidents, especially needle stick incidents. However, there are many other factors that contribute to the incidence of needle sticks in nurses, both external factors from the work environment and other internal factors originating from the individual. Thus, nurses who feel tired but do not experience needle stick incidents may be based on the awareness and vigilance that has become a culture for the nurses themselves so that they can successfully strive to avoid needle stick accidents (9).

Based on the Domino Theory by Heinrich in 1972, it is stated that fatigue is one of the many factors that cause work accidents that are included in human factors (unsafe action) (2). Fatigue is a mechanical condition that is a protection of the body so that the body avoids more dangerous disturbances and will form a recovery if it has rested. Work fatigue is a determining factor in the emergence of health and safety problems for workers. Fatigue can lead to several things, namely reducing productivity, increasing the incidence of work errors and the risk of work accidents. Occupational fatigue is an issue or condition experienced by workers that can lead to a decrease in effectiveness efficiency and productivity in work (7).

Previous research states that work fatigue can increase the risk of needle sticks, but this can be prevented by implementing work shifts and reducing working hours. Work fatigue is subjective or different in each individual so that each individual has a different level of fatigue, fatigue can also be determined by the temporal adaptability of an individual. Individuals may be able to adapt to fatigue levels over time. For example, someone who is tired at first may gain additional energy or alertness after a while, which may reduce the risk of accidents (12). This has

been well implemented by RSUD X where the division of work shifts consists of morning, afternoon, and night shifts. Nurses on duty in each shift can take turns performing nursing care, so this makes nurses continue to carry out procedural curative actions due to commitment and awareness of universal vigilance to prevent needle stick accidents.

The results of the data review found that the majority of respondents who felt tired were nurses who were categorized as having never experienced a needle stick incident, namely 23 nurses (28.3%). Work fatigue is included in subjective feelings, which can be caused by physical or mental. Medically, fatigue is nonspecific where fatigue has many causes. Occupational fatigue is one of the possible factors for occupational accidents, especially needle stick incidents. However, there are many other factors that contribute to the incidence of needle sticks in nurses, both external factors from the work environment and other internal factors originating from the individual. Thus, nurses who feel tired but do not experience needle stick incidents may be based on the awareness and vigilance that has become a culture for the nurses themselves so that they can successfully strive to avoid needle stick work accidents.

Reflecting on the facts in the field, nurses who are categorized as less tired or tired, tend to never experience needle stick incidents due to the formation of an optimal OSH culture and good implementation of these nurses so that when providing nursing care, when these nurses feel tired or less tired, they are still aware and accompanied by universal precautions that are applied to the maximum which can be a preventive effort to avoid work accidents, especially needle stick incidents. The weakness of this study is that the research was only conducted on nurses at RSUD X, so that the results of the study only provide an overview of the relationship between the incidence of needle sticks in nurses, while the incidence of needle sticks may also occur in non-medical personnel in the hospital. In addition, the factors studied are still only a small part of the factors that cause occupational accidents when referring to the theory used by researchers, so that the independent variables of this study have not been able to fully represent things related to occupational accidents, especially the incidence of needle sticks in nurses.

CONCLUSION

The results of the study which raised the topic of the relationship between knowledge, attitudes, and work fatigue on the incidence of needle sticks in nurses at RSUD X showed that a significant relationship was found between knowledge and the incidence of needle sticks in nurses at RSUD X (p=0.003), a significant relationship was found between attitudes and the incidence of needle sticks in nurses at RSUD X (p=0.013), and no significant relationship was found between work fatigue and the incidence of needle sticks in nurses at RSUD X (p=1.000).

The recommendations that can be given are for RSUD X to hold education and training in the form of an OHS Program in order to increase competence as well as awareness, commitment, and universal vigilance as a preventive effort for needle stick incidents in nurses. Recommendations for future researchers in the future are needed to examine the topic of influence or other causes that become a possible factor in the occurrence of needle stick incidents that are in accordance with the theory used and can be carried out research in different places and with different methods so that this research can bring development and provide varied results and will become useful new reference material.

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