The Influence of Nurses' Intentions in Dealing with Needlestick Injury (NSI)

Ketut Ima Ismara[a], Anderias Umbu Roga[b], Widya Hary Cahyati[c], Siti Kaidah[d], [a]State University of Yogyakarta, [b]University of Nusa Cendana, [c]State University of Semarang, [d]University of Lambung Mangkurat, Email: [a]ima.ismara@uny.ac.id, [b]anderias_umburoga@staf.undana.ac.id, [c]widyahary27@mail.unnes.ac.id, [d]siti.kaidah@ulm.ac.id

This study analyses the influence of intention on Occupational Safety and Health (OSH) performance and behaviour following needlestick injury (NSI) handling procedures. This study utilised a qualitative and quantitative mixed method. Data was obtained through in-depth interviews and observations. The structural equation model (SEM) was used to analyse ex-post facto data. The sample of this study consisted of 289 respondents. They were purposively and randomly selected from the population of all nurses (1,042 people) at Dr. Sardjito Education Hospital in Yogyakarta, with an accuracy level of 5%. Findings show that intention directly affected OSH performance and behaviour following NSI handling procedures. This was indicated by a coefficient of 0.779, z arithmetic value of 10.64 and a p value of 0.000 (<0.05). Intention was proven to have a significant influence on OSH climate and behaviour following NSI handling procedures.

Key words: *Nurse, NSI, Intention, Performance.*

Introduction

Work in hospital is closely associated with syringes, medicines, and illnesses. Medical treatment in patients is usually given in compliance with advisable treatment for illnesses. Thus, the risk of hazards faced by healthcare workers in hospital are different from one another. The transmission of diseases in hospital can occur through the air and even through medical equipment, such as syringes and scalpels. This may lead to accidental skin-penetrating wounds or so called needlestick injuries (NSI). Data taken from the occupational safety and health (OSH) unit in Dr. Sardjito hospital showed that in 2013, there were 33 cases of NSI. These included 13 cases (40%) in

nurses/midwives, 14 cases (42%) in seven residents and seven nurse interns, two cases (6%) in doctors and four cases (12%) in other professions. NSI cases in 2014 decreased to 20 cases, consisting of 13 cases in nurses, four cases in students/residents, and three cases in other occupations. In 2015, there were only 22 NSI cases, including 14 cases in nurses, seven cases in students/residents, and one case in analysts. The small number of reports on NSI incidents indicates the tendency toward an iceberg phenomenon. Our further observation shows that 68% of 100 respondents had ever been injured and only 38% of them always reported their incidents. This is possibly caused by their belief that NSI is a common incident that must be experienced by every hospital employee. This raises a number of questions: Is there any intention among hospital employees to report their NSI incidents? Is there any education and training in reporting NSI incidents? Is there any promotion, for example conducting a campaign or meeting about the importance of reporting NSI incidents?

The OSH management system related to NSI is already satisfactory and is even supported by the supervision and control team of infections in synergy. The support of this OSH management system for self-control ability is considered adequate, but there is still data showing that 45% of NSI incidents occurred in preparation and 24% after medical treatment. This indicates that the hospital employees do not completely comply with the standard operational procedures. Furthermore, the aspect of intention is probably not included in the standard operational procedures. It seems that the standard operational procedures are not integrated with the forming of a conducive OSH climate. Perhaps there are overlapping rules as pressure factors. This has even resulted in a new belief that prioritising fulfillment of administrative obligations is more necessary than following occupational safety and health. A number of questions are raised: Is the implementation of the standard operational procedure of OSH by nurses only a completion of administrative obligations? How is a nurse's intention related to NSI prevention?

The data from the preliminary observation is supported by the questionnaire data, showing that 64% of respondents have attended training programs. Almost half of respondents (47%) have diploma degrees while the rest have bachelor's degrees (30%) and professional degrees (21%). Approximately two thirds of respondents (67%) have been working more than 21 years while 13% of them have been working between 16 and 21 years. The data indicates that the target population already has knowledge and/or skills related to hazard risks and NSI prevention. In addition, the data also shows that there are no problems related to experience, length of service, education and training. The competence of respondents in NSI prevention is considered very good, but their OSH performance related to NSI is not optimal. This also raises a number of questions: What are the respondents' opinions about who has influence? Are they less

confident or do they have limited knowledge of the domino effect of NSI? Are there any contributing factors, such as a less conducive OSH climate?

Dr. Sardjito Educational Hospital was used as the location to test the application of planned behavioural theory as it had relatively homogeneous characteristics compared to other hospitals on its level, and thus, could be generalised (transferability). The supporting climate of occupational safety and health (OSH) is the context of behaviour, including perceptions about leaders' attitudes and commitments to OSH, risks, perceptions about behavioural control ability to deal with unsafe conditions, OSH management systems, working environment pressures and group norms. The sample of this study consisted of 289 respondents, purposively and randomly selected from the population of 1042 nurses at Dr. Sardjito Education Hospital (α = 5%). This sample was appropriate for the target of Theory of Planned Behaviour (TPB) related to the risk of needlestick injury (NSI).

Action is based on intention to do main tasks and supporting tasks following the standard operational procedure of NSI prevention. In this case, healthcare workers implement the OSH standard operational procedure when they give medical services to patients and face the risk of infection from laceration and puncture wounds caused by sharp, pointed objects. Francis, et al. (2004) and Ajzen (2005) consider that overall, this procedure meets the TACT principle (*target, action, context, time*). The assumption for the limitation criteria above is made to control the heterogeneity of the research subject and narrow the focus on drawing a conclusion.

Based on the current investigation, there is no study on TPB (research dissertation/thesis) associated with needlestick injury (NSI), which is disseminated through journal publication across colleges in Indonesia. There is no study addressing intentions and performances among nurses to behave according to NSI handling procedures related to occupational safety and health in a hospital. A number of relevant studies are used as literature in this study, such as those conducted by Elmiyeh et al. (2004), Ramsay (2005), Yoshikawa (2013), Rohde, MN, RN (2013), Palupi (2019), and Surboyo (2019).

This study aimed to analyse the effect of intentions on OSH performances in terms of compliance with NSI handling procedures among nurses at Dr. Sardjito education hospital, Yogyakarta. The result of this study was a model theoretically based on TPB. The review draft of hospital standard operational procedures regards the implementation of the relationship model between intentions. This model can be used as a foundation for policy development in the form of behavioural standards to prevent needlestick injury (NSI). Theoretically, the results of this study contributed to the

relationship model between intentions and OSH performances in compliance with NSI handling procedures for health personnel, especially nurses. This can be implemented to control the potential risks and hazard in hospital, in this case, the prevention and treatment of NSI.

Research Method

Research Design

This research tested the application model of modified TPB (Theory of Planned Behaviour) by using a mixed approach (qualitative and quantitative). The qualitative method was used to determine the initial conditions, including beliefs, behaviour, and the OSH management system in the location of targeted behaviour, namely Dr. Sardjito Education Hospital, Yogyakarta. The qualitative data was obtained through in-depth interviews, observation, self-reporting and documentation. In-depth observation and interviews were used to assess the feasibility of the model's implementation to improve the hospital OSH management system. The measurement instrument for quantitative data used in this study was a behavioural scale questionnaire with interval data adopted from Hall (2006), Ajzen (2005), and Ferraro (2002). This questionnaire was used to reveal data about norms, intentions and OSH performance in compliance with NSI handling procedures among the nurses as the respondents of this study. The Structural Equation Model (SEM) was used for the statistical analysis to find the relationships, contributions and models between variables.

Location and Time of Research

The study was conducted at Dr. Sardjito Education Hospital, Yogyakarta, including all wards and sections classified to be at risk of needlestick injury and sharps (NSI).

Population and Sample

The population of this study consisted of 1042 nurses at Dr. Sardjito Education Hospital. The required sample included 360 respondents ($\alpha = 5\%$), purposively selected from those who work in units/sections having a risk of injury due to sharp or pointed objects. The selection of respondents in each section was done randomly based on the proportion of the number of nurses available. The distribution of 330 respondents in total, with the consideration of mortality data at around 10%, was as follows: operation room (40), IGD (30), lab (40), Hd. (20), adult VIP (45), VIP child (30), ICU (20), ICCU (15), cath lab (10), children inpatient room (40) and adult children inpatient room (40).

Data Collection Instruments

The data collection was conducted using a closed questionnaire. The qualitative data was obtained using an elicitation study questionnaire, observations and in-depth interviews related to behavioural beliefs. The data obtained from the open questionnaire was used as the basis for the initial preparation of the grid and the questionnaire items.

The questionnaire used in this study was developed by using a creative adaptation of the instrument used by Hall (2006). It is also in accordance with Ajzen's theory of planned behaviour. The enrichment of terms or supporting keywords related to intentions in complying with NSI handling procedures in hospital and OSH performance was conducted by reviewing and comparing them with the results of a study conducted by Ferraro (2002). This regards the Safety Climate Survey: 101 Main Street, Cambridge. FEMA. (2006); Task Book: Assessment Guide: Safety Officer/Assistant Safety Officer; and Emergency Management Institute, National Emergency Training Centre Emmitsburg, Maryland 21727 ATTN.

The initial study was conducted by distributing open questionnaires and conducting observations and in-depth interviews. The results of these elicitation studies were then identified. The data showed that most believed that implementing the NSI handling procedures made it:

- easy to work with a sense of security,
- easy to understand and learn independently,
- easy to implement or apply,
- easy to get additional explanation from the personnel,
- easy to get supporting information,
- easy in making reports, and
- easy in handling events.

Research Variables

Variables used in this study consisted of the dependent variable or endogenous variable (Y) and independent variable or exogenous variable (X). The exogenous variable was the norm representing a latent OSH climate. Meanwhile, the endogenous variable was the OSH performance in complying with the OSH handling procedures.

Data Analysis

This study employed SEM analysis (a structural equation model) as it accommodated problems with more than one equation (multi equation) and with observable or unobservable data input.

Results

Data Description

The construct of intentions was directly measured by four items in the questionnaire. The result of tendency for scores can be seen in Table 1.

Table 1: Tendency of intention scores (intention to follow the standard operational procedure of OSH related to NSI prevention)

	Range	Frequency	Percentage
Very high	23.2 - 28	229	63.61%
High	18.4 - 23.1	128	35.55%
Medium	13.6 - 18.3	3	0.83%
Low	8.8 - 13.5	0	0
Very low	4 - 8.7	0	0
Total		360	100%

According to Table 1, the tendency for intention factor scores to follow the standard operational procedures of OSH related to NSI prevention is very high at 63.61%. This is based on the average and ideal standard deviation. Meanwhile, others are categorised as high (35.55%) and medium (0.83%). This indicates that many respondents belong to the category of high intentions.

The performance construct of OSH related to NSI prevention is measured by using two indicators: main tasks and contextual behaviour. The indicator for main tasks is measured by 7 measurement items. The indicator for supporting tasks is directly measured by 6 items. The tendency for performance scores is presented in Table 2.

Table 2: Tendency for OSH performance scores related to NSI prevention (main tasks)

	Range	Frequency	Percentage
Very high	40.6 - 49	224	62.22%
High	40.6 - 49	133	36.94%
Medium	23.8 - 32.1	3	0.83%
Low	15.4 - 23.7	0	0
Very low	7 - 15.3	0	0
Total		360	100%

Table 2 shows that in terms of the main tasks, the tendency for OSH performance scores related to NSI prevention is very high at 62.22%. This is based on the average and ideal standard deviation. Meanwhile, others are categorised as high (36.94%) and medium (0.83%). This indicates that many respondents belong to the category of high performances.

**Table 3:** Tendency for performance scores of OSH related to NSI prevention (contextual behaviour)

	Range	Frequency	Percentage
Very high	29 – 35	242	67.22%
High	23 – 28	117	32.5%
Medium	17 – 22	1	0.27%
Low	11 – 16	0	0
Very low	5 – 10	0	0
Total		360	100%

According to Table 3, in terms of contextual behaviour, the tendency for OSH performance scores related to NSI prevention is very high at 67.22%. This is based on the average and ideal standard deviation. Meanwhile, others are categorised as high (32.5%) and medium (0.27%). This indicates that many respondents belong to the category of high performances.

The Structural Model of Intention Regarding OSH Performance

The structural model was developed according to the existing measurement model. The standardised final model's structural diagram is shown in Figure 1.

Figure 1: Line Chart of the Structural Model of Norms Toward Intention
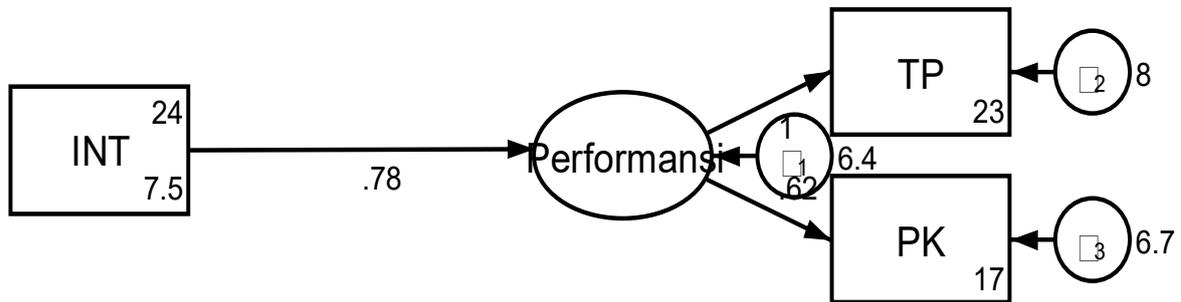
The result of significant test χ^2 is indicated by p <0.05, showing that the model lacks support from the population or the developed model is not theoretically in accordance with the data. The model then needs to be changed as long as it is theoretically supported. In models with about 75 to 200 cases, test X^2 generally fits reasonably. In models with more cases, χ^2 is almost always statistically significant. The value of χ^2 is also affected by the correlation size in the model. The greater the correlation is, the lesser the fit model will be.

Table 4: Dependency Relation Testing of the Influence of Intention on Performance

Relation	Estimate (Unstandardised)	Z	Score of p	Note
OSH → performance main tasks	1.000	-	-	-
OSH → performance supporting tasks	0.622	8.04	0.000	Significant
Intention → OSH performance	0.779	10.64	0.000	Significant

The unstandardised coefficient values presented in the SEM output use Stata as estimate values (β), followed by significance level (p). The p value <0.05 indicates that the relationship between the latent variables in the model is statistically accepted. The value of the non-standardised coefficient of 0.673 shows a close relationship between intentions and performances. It can be interpreted that this value will rise to 0.673 above the standard deviation if the intention increases by 1 unit above the standard deviation.

The null hypothesis (Ho) of intention has no significant and positive effect on performance. According to Table 4, the null hypothesis is rejected because z score is 7.60 greater than z table 1.96 and the p value (significance level) shows that the value

of 0.000 is less than 0.05. This means that the alternative hypothesis (Ha), stating that "the norm significantly and positively affects the intention", is accepted.

Discussion

The data from the questionnaires used in this study showed that the nurses' intentions were categorised as 'very high' at 63%. This is proven by the availability of medical workers giving reports on needlestick injury (NSI) incidents. The NSI reports were beneficial to the unit of occupational safety and health (OSH) in developing a management system to avoid the recurring incidents.

The intentions to avoid NSI and its potential risks among the nurses were directly implemented in preventive actions. They could be obviously identified by their willingness to receive vaccination, follow socialisation, and take more care with the use of sharp and pointed medical equipment. Vaccination, in this case, is an important action to protect against some kinds of diseases caused by viruses spread during NSI incidents.

The main tasks related to NSI handling procedures were very well carried out by most of the respondents in this study. Based on the data, 62% of respondents were categorised as 'very high' in implementing the main tasks related to NSI handling procedures. Meanwhile, 37% of respondents were categorised as 'high' and 1% as 'medium.' The implementation of the main tasks was habitually conducted among the respondents during their work. The respondents willingly used APD, placed the medical equipment properly, and discussed NSI problems with the OSH officials or the unit of infection controller. This indicates that the respondents implemented the hospitals' standard operational procedures related to OSH appropriately.

Personal protective equipment was used to prevent NSI and protect against viruses spread during NSI incidents. Exposure to viruses is caused not only by NSI incidents but also the medical equipment used for work, especially syringes. Improper use of syringes (without following procedures) may cause patients' exposure to viruses. A syringe is also likely to be reused when its waste is not well managed. This increases the risk of NSI. Placing a syringe in a disposal container after it has been used is also a main task performed by the nurses as part of the OSH procedure related to NSI. Besides, socialisation and active participation among colleagues (to always remind one another about the OSH procedure related to NSI) are other important factors to note.

It is also necessary to implement 5S' (*seiri, seiton, seiso, seiketsu, shitsuke*) or 'sort, set in order, sweep, standardise, sustain' in the workplace. In Indonesia, these 5S' are well

known as 5Rs *(ringkas, rapi, resik, rawat, rajin)*. The 5S'/5Rs express a culture about how to organise a workplace appropriately (Fatimah, Kurniawan and Widjasena, 2014: 254). A clean, tidy, and well-maintained workplace enables nurses to carry out their work very well. Nurses, in this way, should willingly maintain their workplace regularly.

The implementation of supporting tasks related to the OSH procedure conducted by the respondents was also very good. Based on the data, 67% of respondents were categorised as 'very high' in implementing the supporting tasks. Meanwhile, the remaining 33% of respondents were categorised as 'high.' This means that if the supporting tasks related to the OSH procedure are implemented, the main tasks will be surely implemented by the respondents. The supporting tasks have secondary roles in the implementation of the OSH procedure related to NSI. They can be used to complete unfulfilled main tasks.

The supporting tasks are also performed by the nurses to monitor the management system, especially relating to the implementation of the OSH procedure when giving medical services. For example, they monitor and remind one another during their work or even volunteer themselves to monitor a record of medical equipment use. The display of posters, signs, and warnings is also important to indirectly stimulate medical workers to follow OSH procedures. However, sometimes these are ignored.

Hypothesis testing showed that intention had a positive and significant effect on OSH performance. It is assumed that intention is useful in revealing factors influencing behaviour (Ajzen, 1991). A person will behave in a certain way based on their own intention. Intention is considered a reason or purpose to perform target behaviour. In this case, it involves applying the standard operational procedure of OSH related to NSI prevention. An intention possessed by an individual is a starting point to perform any behaviour. When an individual has possessed an intention in complying with the procedure of NSI prevention, they will automatically perform safely in carrying out main and supporting tasks in order to avoid needlestick and sharps injuries caused by medical equipment.

Intention in this study was shown when the nurses willingly gave reports on carelessness causing NSI. They reported every NSI incident either experienced by themselves or their colleagues as an evaluation for NSI prevention in order to anticipate future carelessness. Other nurses could also learn from this incident to avoid the same carelessness. As a result, the nurses can be more careful in working and implementing the standard operational procedures of OSH to avoid NSI. They would work following the procedures and take good care in using sharp equipment for work.

In addition, they willingly received vaccination to prevent infection due to NSI. They also placed syringes in a disposal container, so that other nurses or medical workers could avoid the potential risks of NSI.

Bandura (1977) states that one's behaviour is influenced by their self-efficacy. If an individual believes in complying with expected behaviour, they are likely to do it. However, if they are in doubt or a bit unsure about compliance, they are unlikely to. Furthermore, Bandura (1999) explains that behaviour is generally represented as a pattern controlled by external conditions or internal motivation. This means that the implementation of expected behaviour is also influenced by intention in the form of self-beliefs. People with strong beliefs in their abilities are more likely to be encouraged to carry out expected behaviour, both for themselves and others.

According to Niemivirta and Tapola (2007), high self-efficacy is closely related to high interest. Therefore, the level of self-efficacy in performing a task influences fluctuation in interest. They indicate that self-efficacy possessed by a nurse reflects their intention to comply with the NSI handling procedures. This self-efficacy shows a belief that they are able to implement the NSI handling procedures.

Conclusion

Based on the results of this study, it can be concluded that intention is proven to have a significant influence on OSH climate in terms of compliance with NSI handling procedures. This is indicated by the availability of medical workers who report their NSI incidents. The report is beneficial to the OSH unit in developing a management system to avoid recurring incidents.

REFERENCES

Ajzen, I. (1991). *The Theory of Planned Behavior*. Organizational Behavior and Human Decision Processes, 50, 179-211.

Ajzen I, (2005) *Attitudes, Personality and Behavior*. Open University Press.

Bandura, A. 1977. *Self-Efficacy: Toward a Unifying Theory of Behavioral Change*. Psychological Review, Vol. 84, No. 2, 191-215.

Bandura, A. 1999. *Social Cognitive Theory: An Agentic Perspective*. Asian Journal of Social Psychology 2, 21-41.

Elmiyah, B., et al. (2004). "*Needle-Stick Injuries in the National Health Service: A Culture of Silent*". Journal of the Royal Society of Medicine, Volume 97, 326-458.

Fatimah, Kurniawan, B., dan Widjasena, B. (2014). "*Analisis Penataan Tempat Kerja di Industri Pembuatan Sepatu "X" Kota Semarang Berdasarkan Prinsip 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke)*". Jurnal Kesehatan Masyarakat, Vol. 2, No. 4, 253-258.

FEMA. (2006). *Task Book: Assessment Guide: Safety Officer/Assistant Safety Officer*. Emergency Management Institute National Emergency Training Center Emmitsburg, Maryland 21727 ATTN: "Position Task Book."

Ferraro, Lidia. (2002). *Measuring Safety Climate: The Implications for Safety Performance*. The University of Melbourne.

Francis, J. J. et al. (2004). *Constructing questionnaires based on the theory of planned behavior a manual for health services researchers*. Centre for Health Services Research University of Newcastle 21 Claremont Place Newcastle upon Tyne NE2 4AA United Kingdom.

Goodman, D. J. et al. (2003). Sociological Theory. New York: Mc Graw-Hill Companies, Hall, Michael Edward. (2006). *Measuring the Safety Climate of Steel Mini-mill Workers using an Instrument Validated by Structural Equation Modeling*. The University of Tennessee, Knoxville.

Hall, Michael Edward. (2006). *Measuring the Safety Climate of Steel Mini-mill Workers using an Instrument Validated by Structural Equation Modeling*. The University of Tennessee, Knoxville.

Karin, A.R. (2013). "*Minimizing Nurses' Risks for Needlestick Injuries in the Hospital Setting*". Accessed from https://www.ncbi.nlm.nih.gov/pubmed/23650894 on 5 April, at 9.20 a.m.

Niemivirta, M., dan Tapola, A. (2007). *Self-Efficacy, Interest, and Task Performance: Within-Task Changes, Mutual Relationships, and Predictive EffeNSI*. Zeitschrift far Pedagogische Psychologie, 21 (3/4), 241-250.

Palupi, R., Berniyati, T., Akbar, R., Bramantoro, T., Hariyani, N., Ramadhani, A., Romadhoni, S.F. (2019). *"Functional Factors on Compliance Drugs Consumption in Diabetes Mellitus Patients related to Periodontal Health"* Indian Journal of Public Health Research and Development, Volume 10, No. 8, 1049-1053.

Ramsay, J.D. (2005). "*A New Look at Nursing Safety: The Development and Use of JHAs in the Emergency Department.*" The Journal of SH&E Research, Volume 2, No. 2, 1-18.

Sulistomo, Astrid. (2002). *Diagnosis Penyakit Akibat Kerja dan Sistem Rujukan*. Cermin Dunia Kedokteran, No. 136, 2002.

Surboyo, M.D.C., Arundina, I., Rahayu, R.P., Mansur, D., Bramantoro, T. (2019). *"Potential of Distilled Liquid Smoke Derived from Coconut (Cocos nucifera L) Shell for Traumatic Ulcer Healing in Diabetic Rats"*European Journal of Dentistry, Volume 13, No. 2, 271-279.

Yoshikawa, T., et al. (2013). "*Incidence Rate of Needlestick and Sharps Injuries in 67 Japanese Hospitals: A National Surveillance Study*". PLOS ONE, Volume 8, Issue 10, e77524.