Factors Affecting Obedience of Nurses in Applying Intravenous Catheter Procedure

Yanis Kartini1,2*, Dian Istianti1, Imamatul Faizah1, Ratna Yunita Sari1, Nursalam Nursalam2*

1Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, Surabaya, East Java, Indonesia; 2Doctoral Program of Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya, East Java, Indonesia

Abstract

BACKGROUND: Intravenous therapy is one of the most common procedures in patients hospitalized. Applying intravenous catheter procedure requires obedience not to cause infections that can cause phlebitis. The characteristics of nurses are predicted to influence obedience to intravenous catheter installation procedures.

AIM: This study aims to analyze factors affecting obedience of nurses in applying intravenous catheter procedure.

METHODS: Research objectives were to analyze the characteristics factor of nurses related to obedience to applying intravenous catheter procedures. Samples of nurses in the Mitra Keluarga Surabaya Hospital, with a total of 93 respondents selected with a simple random sampling technique. Independent variables in this study are age, education, career ladder, knowledge, and attitudes. Dependent variables are the obedience of nurses. The instruments used are questionnaires and observation sheets. Data were analyzed using Chi-square and logistic regression test.

RESULTS: The results of the study showed that nurses in Mitra Keluarga Surabaya Hospital are mostly 26–35-year-old respondents, mostly educated Nurse Profession Program, mostly a career ladder of Clinical Nurse II, and mostly obedient. The factors that affect the obedience of nurses in Applying Intravenous Catheter Procedure are age (0.03), education (0.000), career level (0.001), knowledge (0.029), and attitude (0.000). Of these five factors after being tested with multiple logistic regression, the most influential of obedience is the attitude, with the largest B value (0.03), followed by education (0.000), career level (0.001), knowledge (0.029), and attitude (0.000). Of these five factors after being tested with multiple logistic regression, the most influential obedience is the attitude, with the largest B value of 0.03.

CONCLUSIONS: For hospitals, it is expected to make efforts to increase the obedience of nurses by providing training on safe injection and providing supervision to the nurse to comply with intravenous catheter procedure.

Introduction

Patients who are hospitalized almost entirely carried out infusion, to obtain intravenous therapy. The World Health Organization (WHO) Surveillance Data are stated that the incidence rate of infection in the emergency installation is high enough 85% per year, 120 million people from 190 million patients hospitalized with infusion [1]. Intravenous therapy is an integral part of nursing practice professionals in all health institutions in Indonesia. A nurse in the intravenous intervention must adhere to the operational procedure standard, given that intravenous therapy is often accompanied by complications, namely, phlebitis [1], [2], [3].

The WHO (2017) reported that there are 10 global public health facts about nosocomial infections, including those are phlebitis which is a serious problem, found 1 in 300 patients likely injured during treatment in health care, especially in hospitals [2], [4], [5] and about 6.2% infections due to intravenous therapy [6]. The incidence rate of phlebitis in Southeast Asia annually reaches 10%, data from the CDC (2017) indicate that the incidence of phlebitis ranks fourth as an infection often found in patients during hospital treatment. The figures of the highest phlebitis in developing countries were: India (27.91%), Iran (14.20%), Malaysia (12.70%), Philippine (10.10%) and Indonesia (9.8%) [7].

Factors that contribute to the incidence of phlebitis are divided into four main groups, namely, (1) patient factors such as age, gender, and underlying conditions; (2) chemical factors such as type of drugs and fluids; (3) mechanical factors such as catheter material, size, and duration of cannulation; and (4) health professional practice [8]. Health Professional Practice is a factor that contributes greatly to the incidence of phlebitis related to the disobedience of the standard operational procedures (SOP) and soft skills [9], [10]. Based on the results of the survey obtained, 70% of nurses are not obedient in carrying out infusion installation standard based on predefined standards [9]. Non-compliance with procedure standards is influenced by the individual aspects of the worker, working conditions, and organizational structure [2]. Another
opinion suggests that disobedience is influenced by lack of training, lack of knowledge, provision of inadequate protective equipment and equipment, and inadequate working conditions [3]. Complications that can occur due to intravenous therapy, among others, the patient’s quality of life, morbidity, mortality, treatment costs, and the length of day hospitalization are increasing.

Given that intravenous therapy often causes complications, which inflict a lot of harm, the nurse has a responsibility to minimize incidents by complying with the SOP. Efforts can be made to address the problem of infection that occurs by providing training on the basic principles of infection prevention, as well as supervision in the implementation of SOP to maintain the quality of service and patient safety [2], [11].

Aim
The purpose of this study is to determine the factors that affect the compliance of nurses with the standard operating procedure infusion in the Mitra Keluarga Surabaya Hospital, with a focus on individual nurses; including age, level of education, level of knowledge, attitude, and career ladder.

Hypothesis
The hypothesis proposed in this study is the factor of age, level of education, career ladder, level of knowledge, and attitudes that affect nurse compliance in applying intravenous catheter procedures.

Methods
This study used descriptive analytic research design with cross-sectional approach [12], [16]. Independent variables in this study are age, level of education, career ladder, level of knowledge, and attitude. Dependent variables are obedience of nurses in applying intravenous catheter procedure.

Sample of research
The population of all nurses in the in-patient wards of the stated Mitra Keluarga Surabaya hospital was 119 nurses from which 93 respondents were chosen using cluster random sampling technique. The inclusion criteria involved the nurses who were willing to be the respondents and who have the clinical authority to install infusion, whereas the exclusion criteria included the nurses taking maternity leave and nurses with a working period of <6 months.

Instrument
Data collection was carried out using observation sheets and questionnaire. Independent variable was collected by questionnaire with validity 0.369–0.916 and reliability 0.745. Obedience of nurses in applying intravenous catheter procedure was collected by observation, conducted by researchers.

Data analysis
The preliminary data were analyzed using univariate analysis using percentage. Further, they were analyzed using Chi-square test and logistics regression test with the significance level of $\alpha = 0.05$.

Ethical consideration
This research has been ethically reviewed by the research ethics committee of Universitas Nahdlatul Ulama Surabaya (ref: Certificate No248/EC/KEPK/UNUSA/2019) and was certified ethically eligible.

Results

Respondent's characteristics
Table 1 shows that respondent’s characteristics comprising sex, marital status, age, level of education, career ladder, level of knowledge, attitude, and compliance. The result showed of 93 nurses almost entirely (90.3%) were female, almost entirely (87.1%) the status of marriage, most (53.8%) aged 26–35 years, most (53.8%) the educated diploma 3 of nursing, most (58.1%) with the career ladder of Clinic nurse II, most (62.4%) knowledge level enough, most (68.8%) have a positive attitude, and most (67.7%) obedient with the applying intravenous catheter procedure.

Factors related to obedience of nurses in applying intravenous catheter procedure
Table 2 shows that the factors related to obedience of nurses in applying intravenous catheter procedure are shown in Table 2. The table explained that factor age ($\rho = 0.000$), level of education ($\rho = 0.000$), career ladder ($\rho = 0.001$), level of knowledge ($\rho = 0.001$), and attitude ($\rho = 0.001$). Based on the results of the Chi-square test, all factors result $\rho < \alpha$ (0.05) means the accepted hypothesis where age, education level, career path, knowledge level, and attitude relate to nurses’ obedience in applying intravenous catheter procedures.
Factors mostly correlating with to compliance in applying the intravenous catheter procedures i.e., education, career ladder and the attitude of \( \rho < \alpha \) (0.05). Also, there are 2 factors that do not relate to obedience in applying the procedure of intravenous catheter i.e., knowledge level \( \rho = 0.645 \) and age \( \rho = 0.377 \).

Table 3: Multivariate test first stage multiple logistic regression test

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>P</th>
<th>Wald</th>
<th>OR</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>~5.22</td>
<td>0.377</td>
<td>0.583</td>
<td>0.186</td>
<td>1.891</td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
<td>2.467</td>
<td>0.008</td>
<td>11.786</td>
<td>1.926</td>
<td>72.105</td>
<td></td>
</tr>
<tr>
<td>Career ladder</td>
<td>~1.780</td>
<td>0.003</td>
<td>1.169</td>
<td>0.052</td>
<td>0.549</td>
<td></td>
</tr>
<tr>
<td>Level knowledge</td>
<td>~2.83</td>
<td>0.654</td>
<td>0.754</td>
<td>0.226</td>
<td>2.509</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>3.972</td>
<td>0.000</td>
<td>53.101</td>
<td>8.331</td>
<td>338.449</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>~5.434</td>
<td>0.000</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The final result of multiple logistic regression test is shown in Table 4. Based on Table 4, factors related to compliance with the procedure of installation of intravenous catheter are education (0.004) with the value of OR = 13.106 that has meaning, respondents with education nurse profession program have a chance 13 times more obedient than on the educated diploma 3 nursing. Career ladder (0.002), with the value of OR = 0.166, and attitudes (0.000) with the value of OR 53.748 that have the meaning of respondents who have a positive attitude have the 53 times opportunities to be more obedient than those who have negative. From the interaction test, \( p = 0.000 \) means that the variables interact with each other.

Table 4: Multivariate final stage multiple logistic regression test with interaction model

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>P</th>
<th>Wald</th>
<th>OR</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of education</td>
<td>2.573</td>
<td>0.004</td>
<td>13.106</td>
<td>2.254</td>
<td>76.201</td>
<td></td>
</tr>
<tr>
<td>Career ladder</td>
<td>~1.795</td>
<td>0.002</td>
<td>1.166</td>
<td>0.053</td>
<td>0.519</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>3.984</td>
<td>0.000</td>
<td>53.748</td>
<td>8.744</td>
<td>296.463</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>~7.203</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Factors related to nurse compliance in the application of intravenous catheter insertion procedures based on the Chi-square test include; age, education level, career path, level of knowledge, and attitude. Based on Table 2, age is related to nurse obedience in applying intravenous catheter procedure (\( \rho = 0.000 \)). The older the respondent, the more obedient they are. Increasing age will increase a person’s maturity to increase awareness of obeying the rules [13]. However, when tested together with other factors using multiple logistic regression, age was not associated with nurses’ obedience in applying intravenous catheter procedure (\( \rho = 0.377 \)). This shows that age is a confounding factor for nurses’ obedience in applying intravenous catheter procedures.

The education level factor, the results showed that the background of the nurse’s education level was related to the nurse’s compliance in applying the
intravenous catheter procedure, \((\rho = 0.000)\), both in bivariate testing using the Chi-square test, and when tested multivariate using multiple logistic regression tests (value = 0.008) when tested together with five factors. When tested together with these three factors, \(p = 0.008\) was also obtained. This is in line with the results of research from Ratanto et al. which state that the level of education affects performance [14]. According to Notoamodjo, the level of education will affect a person’s level of thinking and acting which will lead to wise actions [13]. The results also show that nurses who have a nursing professional education program are 13 times more obedient than nurses who have a diploma 3 nursing education.

The career ladder is related to nurse compliance in applying the intravenous catheter procedure, \((\rho = 0.001)\), both tested bivariate using the Chi-square test and multivariate testing using multiple logistic regression (0.002). These results are in accordance with research conducted by Ratanto et al. that career ladder affects compliance [14]. The nurse career ladder is the level of nurses in the roles and responsibilities of clinical authority [15]. The results of the study in Table 2 show that the higher the career ladder of the nurse, the better the nurse’s compliance in applying the intravenous catheter procedure.

The level of knowledge related to nursing compliance in applying the intravenous catheter procedure \((p = 0.001)\) when tested bivariate using the Chi-square test. However, if tested multivariate with other factors, the level of knowledge is not related \((\rho = 0.754)\). This is accordance with research from Milutinović et al.; Osti et al. which state that although knowledge is a predisposing factor in behavior [2], [6], it is not necessarily high knowledge that will show good behavior in obedience because many factors affect compliance[11]. In this study, knowledge is a confounding factor of obedience in applying the intravenous catheter procedure.

The attitude related to obedience in the applying intravenous catheter procedure \((p = 0.001)\) in the bivariate test and \((p = 0.000)\) in the multivariate test. From the results of the multivariate test using multiple logistic regression, attitude is the most dominant factor influencing obedience in applying intravenous. This finding is in accordance with the results of research WHO that attitude is related to infection prevention practices in hospitals [5]. This finding also shows that attitude is the most dominant factor influencing adherence to the applying intravenous catheter procedure. The findings of this study based on the results of the odds ratio obtained the results of 53, 748 which means nurses who have a positive attitude have the opportunity to be 53 times more obedient than nurses who have a negative attitude. This is in accordance with the theory proposed by Notoamodjo and according to the findings by Osti et al. and Abalkhail et al. that attitudes will shape behavior [6], [13], [17]. This study also found that there is an interaction between attitudes, education, and career ladder. This means that nurses who have a high level of education correlate with a high career ladder, and a positive attitude in carrying out their professional duties and responsibilities.

**Conclusions**

Factors related to obedience of nurses in applying intravenous catheter procedure at Mitra Keluarga Hospital Surabaya are education, career ladder, and attitude. These three factors interact with each other. Attitude is the most dominant factor related to obedience.

**Suggestions**

In this study, the focus of research is on the characteristics of nurses, so suggestions for further researchers are to conduct research on organizational characteristics, including leadership factors of the head of the room and organizational culture. It can also be from job characteristics, namely, job design, correction, and feedback regarding compliance with standard operating procedures for intravenous catheter insertion.

Suggestions for hospital leaders or nursing managers, it is important to increase the positive attitude of nurses, to always comply with standard operating procedures to improve service quality and patient safety through infection prevention.

Suggestions for nurses are to always improve compliance with standard operating procedures for nursing actions to improve quality and patient safety.

**Acknowledgments**

We would like to thank all the respondents who have taken the time to participate in this study.

**Authors’ Contributions**

Yanis Kartini: Conceptualization, methodology, writing – original draft, and supervision; Dian Istianti: Visualization, project administration, and funding acquisition; Imamfatul Faizah: Formal analysis, writing
References