Demographic factors associated with awareness of patient safety among nurses in a public hospital in Makassar, Indonesia

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Abstract

Background: Despite being a global concern, patient safety remains a persistent challenge for Wahidin Sudirohusodo Hospital, evident in performance indicators like mortality rates, nosocomial infections, and hand hygiene practices. Numerous factors influence patient safety, including working hours, nurse awareness, and demographic characteristics.

Purpose: To investigate demographic factors associated with awareness of patient safety among nurses in a public hospital in Makassar, Indonesia.

Method: Cross-sectional analytical research, involving 291 nurses selected through simple random sampling from Wahidin Sudirohusodo Hospital Makassar, Indonesia. Nurses completed a questionnaire that included demographic data, patient safety awareness, and implementation. Analysis uses the smartPLS application which includes bivariate and multivariate logistic regression.

Results: Based on identification, it was found that total work hours for a single week (p=0.002) and nurses' awareness of patient safety (p=0.000) had a direct effect on implementation. Nurses who worked less than 40 hours per week showed twice the effectiveness, while nurses with high conscientiousness showed a fivefold increase in effectiveness. In contrast, age, education level, and years of service did not show a significant impact on implementation.

Conclusion: It highlights that beyond mere working hours, factors such as awareness towards patient safety, age, length of employment, and educational background significantly influence patient safety culture. While shorter total work hours for a single week and good patient safety awareness were found to increase patient safety culture; age, education levels, and length of employment demonstrated nuanced associations.

Keywords: Healthcare Quality; Hospital Management; Length of Employment; Patient Safety.

INTRODUCTION

Patient harm is estimated to be the 14th leading cause of the global disease burden, the statistics are comparable to diseases such as tuberculosis and malaria (World Health Organization, 2019; Slawomirski, Auraaen & Klazinga, 2017). Patient safety is defined as "the absence of preventable harm to a patient and reduction of risk of unnecessary harm associated with health care to an acceptable minimum" (World Health Organization, 2024). In Indonesia patient safety is regulated by

The Indonesian Ministry of Health Regulation No. 1691 year 2011 concerning patient safety in hospitals, which explains incidents related to patient safety, which includes Adverse Events, Near Injury Events, Non-Injury Events, and Potential Injury Events (Ministry of Health of Republic of Indonesia, 2011). Hospitals are an integral part of health and community organizations, and their functions include: Curing disease, preventing disease, outpatient services that reach the patient's family and home

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environment, health worker training center, biosocial research center. Medication errors, unsafe surgical procedures, healthcare-associated infections, diagnostic errors, patient falls, pressure ulcers, patient misidentification, unsafe blood transfusions, and venous thromboembolism are among the most common adverse events (World Health Organization, 2024). These claim is supported by a portuguese study, which state that most adverse events are associated with surgical procedures (27%), medication errors (18.3%) and healthcare-associated infections (12.2%) (Sousa, Uva, Serranheira, Nunes, & Leite, 2014).

Handwashing as recommended by WHO has not become a patient safety culture at Wahidin Sudirohusodo Hospital because the availability of hand rub, soap and tissue is inconsistent. The target for hand washing of 90% by 2023 has not been met with statistics showing that only 74.10% of health workers routinely carry out hand hygiene (Wahidin Sudirohusodo Hospital, 2023). Control & Prevention (CDC) emphasizes that hand hygiene is considered the primary measure to reduce the risk of infection transmission among both patients and healthcare workers (Centers for Disease Control and Prevention, 2016).

Based on the annual accountability report of Wahidin Sudirohusodo Hospital for 2022, it was found that the hospital's performance indicators related to patient safety had not been met adequately. These indicators include the high death rate ≥ 48 hours before hospital admission, namely 58.80%, the nosocomial infection rate (decubitus and phlebitis), and the maternal mortality rate (Wahidin Sudirohusodo Hospital, 2022).

Several studies have been conducted to evaluate patient safety attitudes among healthcare providers, primarily nurses, and the findings consistently indicate that healthcare providers exhibit negative attitudes towards patient safety. Such studies claim that there is a significant relationship between healthcare providers and workload, impacting healthcare services through staffing challenges, burnout, and turnover employment rates resulting in increased mortality, and adverse events (Bottcher, Abu-El-Noor, Abuowda, Alfaqawi, Alaloul, El-Hout& Abu-El-Noor, 2019; Fishbein, Nambiar, McKenzie, Mayorga, Miller, Tran & Capan, 2020; Alzahrani, Jones, & Abdel-Latif, 2018). Extended working hours

among nurses may undermine their patient safety culture, consistent with similar results reported in two studies conducted in China and one study in Korea (Wu, Fujita, Seto, Ito, Matsumoto, Huang & Hasegawa, 2013; Wang, Fan, Wang, Ma, Wu, Shi & Liu, 2020; Kong, Zhu, He, Chen, Yang, Qi & Peng, 2019; Choi, Mun, Chung & Noh, 2019). Before work, nurses usually do not get the recommended amount of sleep, which often has an impact on their health and performance at work. Interventions to ensure nurses get enough sleep to improve their performance need to be carried out by hospital management. Long working hours can lead to fatigue, decreased cognitive function, and increased susceptibility to errors. Understanding the influence of weekly working hours on patient safety outcomes can help identify optimal scheduling practices that minimize the risk of fatigue-related errors while ensuring adequate staffing levels to meet patient needs (Stimpfel, Fatehi, & Kovner, 2020; Virtanen, Singh-Manoux, Ferrie, Gimeno, Marmot, Elovainio & Kivimäki, 2009; Wong, Chan & Ngan, 2019).

Nurses who demonstrate an increased awareness of patient safety protocols and guidelines are more proactive in risk mitigation and adverse event prevention (Joshi & Saini, 2022). Exploring the level ofawareness towards patient safety among staff at Wahidin Sudirohusodo Hospital can provide insights into areas where further training and education may be necessary to enhance patient safety practices. Demographic factors such as age, education and working experience also influence patient safety outcomes. Some research suggests that older nurses may possess more experience, leading to improved patient safety outcomes due to better judgement and clinical skills. Conversely, other studies propose that younger nurses may have increased digital capabilities and adherence to updated protocols, which could positively influence patient safety measures. Understanding how demographic characteristics intersect with patient safety can inform strategies for workforce development and training tailored to the unique needs of different groups.

RESEARCH METHOD

The study was conducted in a public hospital in Makassar, a province in Indonesia, with a total of 1067 nurses working in the hospital; The inclusion

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criteria were all registered nurses working in Wahidin Sudirohusodo Hospital. This study excluded nurses who were part-time employees, trainees, or did not finish the questionnaire.

The sample size needed for the analysis was determined using the Slovin formula with the following parameters: population size = 1067, confidence level= 95%, and margin of error= 5%. As a result, 291 nurses were included in the study. Next, the nurses will be selected to fill out a questionnaire based on the simple random sampling method.

The study used a cross sectional design. Before commencing data collection, this research has been granted ethical approval from Hasanuddin University under the reference number 166/UN4.6.4.5.31/PP36/2024. Data were collected from March to April 2024 by using a descriptive data tool, The Patient Safety Questionnaire, and The Individual Awareness with The Implementation of Patient Safety Questionnaire. Demographic data of the participants such as gender, age, education level, total work hours for a single week, and total working experience were obtained using a descriptive data tool researchers prepared. Subsequently, age data will be categorized into two groups based on the WHO definition: youth (≤24 years) and adult (>24 years). Education levels will be grouped into two categories: diploma degree, representing the minimum education requirement for a nurse, or bachelor's degree or higher. Total work hours for a single week will be classified according to law no.13 of 2003 article 77 paragraph 2, which stipulates that cumulative working hours should be ≤40 hours or >40 hours per week. Additionally, employment duration will be divided into <5 years or ≥5 years.

The original version of The Patient Safety Questionnaire was developed by (Mulyatiningsih, 2013). The questionnaire was declared valid with a Cronbach alpha value of 0.979. The questionnaire consists of six patient safety goals; patient identification, effective communication, medication safety, accuracy of location, procedures, and patient risk reduction for infection and fall risk reduction. Similarly, The Individual Awareness with The Implementation of Patient Safety Questionnaire developed by (Limbong, 2018) was declared valid with a Cronbach's Alpha value of 0.932.

Nurse's awareness of patient safety refers to the level of knowledge, vigilance, and accountability that a nurse demonstrates in relation to patient safety within healthcare services. This is assessed using a four-item survey with response options ranging from Always (SL) = 4, Frequently (SR) = 3, Infrequently (JR) = 2, to Never (TP) = 1. The results are classified as Good (score 11-16) or Inadequate (score 4-10). Patient safety, defined as the prevention of avoidable harm and the reduction of risks to an acceptable level in healthcare, is measured through a nine-item questionnaire. Responses are similarly scored from Always (SL) = 4 to Never (TP) = 1, with a Good rating given for scores at or above the median (98-156) and an Inadequate rating for scores below the median (39-97).

The measurement of questionnaire items used a 4-point Likert scale where 1 = never, 2 = sometimes, 3 = often, and 4 = always. The scores gathered from the Likert scale are summed up each for the Patient Safety Questionnaire and the Individual Awareness with the Implementation of Patient Safety Questionnaire. The resulting outcomes will be categorized as good if they are greater than or equal to the median, and as inadequate if they are less than the median. The data collected was analyzed by using bivariate and multivariate analysis through the SmartPLS program.

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RESEARCH RESULTS

Table 1. Characteristic of Respondents (N=291)

Variables	Results
Age (n/%)	
(Mean+SD)(Range)(Year)	(29.3+3.584)(20-35)
≤ 24	24/8.25
> 24	267/91.75
Gender (n/%)	
Male	95/32.6
Female	196/67.4
Education (n/%)	
Diploma Degree	132/45.4
Bachelor Degree	159/54.6
Total Work Hours for a Single Week (n/%)	
≤ 40 hours/week	79/27.1
> 40 hours/week	212/72.9
Length of Employment (n/%)	
< 5 years	76/26.1
≥ 5 years	215/73.9
Patient Safety Awareness (n/%)	
Good	171/58.8
Poor	120/41.2
Patient Safety Implementation (n/%)	
Good	146/50.2
Poor	145/49.8

The majority of respondents in this study were women, accounting for 67.4% (196 individuals), whereas men comprised only 32.6% (95 individuals). Furthermore, the majority of respondents were categorized as adults, aged over 24 years old, constituting 91.8% (267 individuals). The average age of participants in this study was 34 years. Regarding education level, 159 respondents (54.6%) had completed a bachelor's degree or higher, which was comparable to the 132 individuals (45.4%) with a diploma degree level education. As for weekly working hours, the majority exceeded the government's standard of 40 hours per week, with 212 respondents (72.6%). The average weekly working hours of nurses at Wahidin Sudirohusodo Hospital were found to be 50 hours. In terms of length of employment, the majority of nurses, totaling 215 respondents (73.9%), had been in their profession for five years or more. The average length of employment among participants was 9.5 years. Moving on to awareness of patient safety, 171 individuals (58.8%) demonstrated good awareness, while the remaining

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41.2% exhibited inadequate awareness. When it comes to the implementation of patient safety practices, there was a minor variation, with 146 respondents (50.2%) effectively implementing them, while 145 respondents (49.8%) implemented patient safety measures less satisfactorily.

Table 2. Bivariate Analysis on Factors Affecting Patient Safety

Variables	p-value	Odd Ratio	95% Confidence Ratio	
			Lower Bond	Upper Bond
Total Work Hours for a Single Week				
≤ 40 hours/ week	0,001*	2.481	1.412	4.141
> 40 hours/ week				
Patient Safety Awareness				
Good	0.000*	5.316	3.082	8.559
Inadequate				
Age				
≤ 24 years	0.209	0.569	0.241	1.346
> 24 years				
Level of Education				
Diploma Degree	0.814	0.934	0.589	1.482
Bachelor Degree				
Length of Employment				
< 5 years	0.351	1.318	0.780	2.230
≥ 5 years				

* Significant Result

Bivariate analysis was conducted in this study to determine if there was a notable association between each independent variable and the dependent one. As seen on table 3, the findings revealed that only two variables showed statistical significance: total work hours for a single week and patient safety awareness, with p-values of 0.001 and 0.000 respectively. The odds ratio for total work hours for a single week adhering to the government's regulations (<40 hours per week) indicates a 2.418 timer higher likelihood of better patient safety implementation among nurses. Meanwhile, in terms of patient safety awareness, the odds ratio was determined to be 5.316, suggesting that the implementation of patient safety would be significantly better, approximately 5.316 times, for nurses with good awareness of patient safety.

On nurse's characteristics such as age, the odds ratio revealed that individuals under 24 years old had a 0.569 times lower likelihood of implementing patient safety effectively compared to those over 24 years old. Similarly, regarding education level, individuals with a diploma degree level education had a 0.934 times lower likelihood of implementing patient safety effectively compared to those with a Bachelor's degree or higher. This suggests that individuals aged over 24 years old or those with a Bachelor's degree or higher education level are positively associated with better patient safety implementation. Lastly, in terms of length of employment, individuals who have worked for less than 5 years were found to have a 1.318 times higher likelihood of implementing patient safety effectively compared to those who have worked for more than 5 years. However, the variables related to nurse characteristics, such as age, education level, and length of employment, cannot be considered statistically significant as the p-value is greater than 0.5.

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Table 3. Multivariate Analysis on Factors Affecting Patient Safety

Variables	p-value	Odd Ratio	95% Confidence Ratio	
			Lower Bond	Upper Bond
Total Work Hours For A Single Week				
≤ 40 hours/ week	0.002*	2.719	1.454	5.085
> 40 hours/ week				
Patient Safety Awareness				
Good	0.000*	5.442	3.077	9.625
Inadequate				
Age				
≤ 24 years	0.811	0.876	0.297	2.588
> 24 years				
Level of Education				
Diploma Degree	0.600	1.148	0.685	1.925
Bachelor Degree				
Length of Employment				
< 5 years	0.256	0.672	0.339	1.334
≥ 5 years				

* Significant Result

Multivariate analysis concurrently examines multiple independent variables' impact on one dependent variable. Results echo the bivariate analysis, indicating significant effects from total work hours for a single week (p= 0.002) and patient safety awareness (p= 0.000) on patient safety implementation. Nurses working fewer than 40 hours per week implement patient safety twice as effectively as their overworked counterparts. Furthermore, nurses with strong patient safety awareness demonstrate fivefold higher patient safety implementation compared to those with poor awareness.

Meanwhile, data on nurse characteristics such as age, education level, and length of employment were deemed statistically insignificant. A similar trend emerged for age as observed in the bivariate analysis, indicating that nurses over 24 years old are 1.233 times more adept at implementing patient safety. Conversely, contradictory findings were noted for education level and length of employment compared to the bivariate analysis. In the multivariate analysis, a diploma degree education level was associated with a 1.148 times higher likelihood of effective patient safety implementation, while a length of employment of 5 years or more was linked to a 1.488 times higher likelihood of better patient safety implementation. The inconsistency between bivariate and multivariate analyses regarding education level and length of employment could be attributed to their lack of statistical significance, suggesting that the differences in these variables may occur randomly.

$$\frac{1}{1 + e^{-(1.working\ hours + 1,694.awareness - 0,132.age + 0,138.education - 0,397.employment\ length - 1,087)}}$$

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Table 4. Coefficient B of Independent Variables

Variables	Coefficient B
total work hours for a single week	1.000
Awareness	1.694
Age	-0.132
Education	0.138
Employment Length	-0.397
Constant	-1.087

A regression equation is constructed by integrating the B coefficients of the variables, facilitating the development of a predictive model for analysis. This equation provides insights into the relationships between the variables and aids in forecasting outcomes based on their values.

Table 5. Omnibus Test of Model Coefficients

Chi-square	Df	p-value
53.831	5	0.000*

* Significant Result

The Omnibus test of model coefficients is used to evaluate overall whether the regression model is statistically significant or not. With a p-value of 0.000, indicating high statistical significance, the test confirms that at least one independent variable significantly influences the dependent variable in the regression model. Thus, the Omnibus test underscores the validity and reliability of the regression model in explaining the relationship between independent and dependent variables.

DISCUSSION

This study suggests that not only working hours but also awareness towards patient safety are significantly related to patient safety culture in Wahidin Sudirohusodo Hospital, taking into consideration age, length of employment and educational background. The findings of this study will enable medical institutions to carefully address and manage complex factors related to patient safety culture, identifying areas of strength and weakness that require attention as prior research did not take into consideration these additional variables.

Research has revealed a noteworthy correlation between the total work hours for a single week of nurses and patient safety. The study specifically highlighted the substantial variation in nurses' working hours based on the specific unit to which they are assigned. This correlation between the duration of their work and a subsequent decline in their health status underscores a consequential loss in their capability to provide high-quality service and uphold patient safety standards (Son, Lee & Ko, 2019). Moreover, another research demonstrated that extended working hours contribute to a reduction in the duration of sleep that nurses obtain. This, in turn, results in fatigue, diminished psychomotor abilities, and difficulties in concentration, posing challenges in maintaining the quality of service delivered to patients (Stimpfel, Fatehi, & Kovner, 2020).

We aimed to investigate the characteristics of nurses such as age, education level, and length of work. Age is strongly correlated with an individual's level of maturity. As age increases, individuals tend to demonstrate greater maturity, rational thinking, wisdom, emotional control, and openness to different perspectives (Robbins, 2006). Therefore, it is anticipated that as nurses age, their involvement in patient safety would also grow. Next, we will consider the individual's educational attainment. Research indicates that the educational attainment of nurses can impact their job effectiveness. Highly educated nursing workers outperform less educated nurses due to their superior knowledge, insight, innovative ideas, and task comprehension (Siagian, 2006; Ellis,

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Priest, MacPhee, & Sanchez McCutcheon, 2006). Studies suggested that the performance of nurses in a hospital might be affected by their length of service. Nurses with extensive experience are better equipped to comprehend the unique requirements of patients, hence improving patient safety (Selano, Kurniawan & Sambodo, 2019).

Self-awareness is the ability of an individual to confront and acknowledge many external and internal stimuli, such as memories, thoughts, emotions, and bodily sensations. Self-awareness plays a significant role in the implementation of patient safety by influencing healthcare professionals' ethical attitudes and commitment to continuous improvement, thereby enhancing their competence and the quality of care they deliver to patients (Tampubolon, Waruwu, Sinurat & Tumanggor, 2022).

The study results indicated that long working hours (>40 hours) deteriorate patient safety culture among nurses working in Wahidin Sudirohusodo Hospital. A study in Korea further supports this finding by suggesting that healthcare workers who work more than 40 hours per week have a significantly lower patient safety grade compared to those working less than 40 hours per week (Choi et al., 2019). The current study's findings are consistent with prior studies (Choi et al., 2019; Wang & Tao, 2017; Kong, Zhu, He, Chen, Yang, Qi & Peng, 2019). However, prior studies did not take into account awareness toward patient safety, age, level of education and length of employment. The relationships among these factors are multidimensional. Longer working hours, especially without adequate rest periods, can lead to fatigue and reduce awareness of patient safety practices regardless of age or education level.

In this study, more than half (58.8%) of the respondents were found to have good awareness towards patient safety. This is comparable to a study conducted in Turkey where awareness towards patient safety are deemed good. However, a study conducted in Ethiopia (48.4%), Brazil (50%) and Africa (12.4%-44.8%) showed lower percentage of patient safety awareness (Biresaw, Asfaw & Zewdu, 2020; Kiyancicek, Dedeli, Yildiz, & Senakin, 2014; Konlan & Shin, 2022). The variation in outcomes could arise from the diversity in training program methods, as well as the developmental status of the country (Mayeng & Wolvaardt, 2015). Having sufficient awareness and knowledge about patient safety is crucial for enhancing health outcomes, mitigating risks, and minimizing potential dangers related to patient care (Kim, Lyder, McNeese-Smith, Leach & Needleman, 2015).

Demographic data such as age, level of education and length of employment showed a lack of statistical significance. Indicating that associations occurred are due to chance. However, it must be emphasized that non-significant results do not necessarily indicate a lack of relationship. Older age (>24 years old) are associated with higher odds of implementing patient safety effectively according to both bivariate and multivariate analysis. This is consistent with a prior study conducted in Ethiopia where those who are older have an odds of being 3.3 times more knowledgeable than younger nurses (Biresaw et al.,2020). This finding is said to have direct relationship with patient safety as older age is associated with increased experience in the field of health care in general (Brasaite, Kaunonen, Martinkenas, Mockiene & Suominen, 2017).

However, our study also explored the connection between healthcare experience and patient safety, yielding contradictory results. The discrepancies between bivariate and multivariate analyses regarding the relationship between length of employment and educational background concerning patient safety culture can stem from confounding factors considered, such as age, education level, working hours, and awareness of patient safety.

Bivariate analysis showed length of employment of less than 5 years correlates to better patient safety culture. However multivariate analysis showed contrary results. In a previous study, it was found that a shorter length of employment could be linked to a shorter duration since graduation. The study reported a significant association between the number of years since graduation and respondents' knowledge of evidence-based patient safety practices. Additionally, the study noted that more experienced physicians tended to be more knowledgeable and aware that failures in patient safety might result from systemic and organizational shortcomings rather than individual failures (Flotta, Rizza, Bianco, Pileggi & Pavia, 2012). Consequently, this awareness could lead to reduced efforts in implementing patient safety measures (Brasaiteet.al., 2017).

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However another study revealed a positive correlation between increased nursing experience and higher education levels (p<.01). The research indicated that safety knowledge was notably elevated among individuals with more experience in their primary specialty and a longer overall work history (Hsaio, Chen, Yu, Wei, Fang & Tang, 2010). This suggests that healthcare professionals with extensive work experience have likely amassed knowledge through clinical practice and ongoing education, positioning them as more knowledgeable compared to their younger counterparts.

Indeed, our study suggests that education background is a significant factor that influences length of employment or work experience. Specifically, we found that longer length of employment (more than 5 years) is associated with better patient safety cultures. This highlights the importance of considering not just the duration of employment but also the educational background of healthcare workers when evaluating patient safety outcomes and culture within healthcare settings (Wang & Tao, 2017).

The significance of educational background is evident from the findings of our bivariate analysis, which indicated a positive correlation between higher education and improved patient safety cultures. This results are supported by prior studies done in Saudi Arabia which similar results. However, upon considering various factors in our multivariate analysis, a correlation was observed between lower education titles and better patient safety culture (Al Malki, Endacott & Innes, 2018; Bakr, Abumadini, Al Sultan & Larbi, 2019). This contradicting result could be explained by a previous study conducted in Central China, which revealed higher odds of reporting adverse events among participants with a higher education level (He, Chen, Tian, Long, Li, Yang & Tang, 2023). This suggests that nurses with a lower educational background may overlook adverse events, assuming they have already integrated patient safety protocols.

CONCLUSION

This study highlights the need for a holistic approach to patient safety culture that considers various interconnected factors. It highlights that beyond mere working hours, factors such as awareness towards patient safety, age, length of employment, and educational background significantly influence patient safety culture. While shorter working hours and good patient safety awareness were found to increase patient safety culture; age, education levels, and length of employment demonstrated nuanced associations. Contradictory results between bivariate and multivariate analyses regarding length of employment and educational background suggest complex interplays among these variables. Nonetheless, the study emphasizes the critical role of both experience and education in shaping patient safety culture, advocating for a comprehensive approach to address the intricacies of patient safety within healthcare systems. These findings offer valuable insights for hospital management to tailor strategies effectively, identifying areas for improvement and fostering a culture of patient safety that prioritizes both awareness and experience among healthcare professionals. Continued research and evidence-based interventions are crucial for continually improving patient safety outcomes in healthcare settings.

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