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EFFECTIVENESS OF IN-TRAY EARLY WARING SYSTEM TRAINING ON KNOWLEDGE AND PRACTICE OF NURSES

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ABSTRACT
Death marks the conclusion of the disease trajectory. Prevention of fatality in patients facing acute and chronic diseases requires the competence of reliable health workers, with nurses playing a crucial role in delivering proficient care. Aiming for early detection of patients' clinical deterioration, nurses use an early warning system. Objective: to determine the effectiveness of EWS training in-tray method on knowledge and practice of EWS. We conducted a quasi-experimental study using one group pretest-posttest without a control group. The sample of this study was 70 executive nurses with consecutive sampling techniques. The research was held at the Inpatient Installation of Sulianti Saroso Infectious Disease Hospital (SSIDH) in June 2023. Observation sheets were utilized to assess Early Warning System (EWS) practices, and we employed valid and reliable questionnaires to gather information on respondents' knowledge. We performed univariate analysis using frequency distribution and bivariate analysis using the Wilcoxon test. Most respondents were in the late adult category (52.9%), female (80.0%), graduate Diploma III in nursing education (54.3%), and the most working period of 5 years (78.6%). The knowledge of participants increased significantly from 7.00 (2.00-13.00) (pretest) to 11.50 (5.00-20.00) (posttest) (p-value = 0.000). There was an increase in nurses' EWS knowledge and practice (p-value <0.05). Efforts to improve nurse competence in caring for patients with critical conditions are necessary. This can be achieved through coaching and regular training with the priority target of implementing nurses in the intensive care room.

Keywords: EWS; knowledge; nurses; practise; training

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INTRODUCTION

The care of acutely ill patients is gaining prominence due to the increased risk of clinical deterioration, which is not only associated with the disease trajectory but also the quality of care and treatment provided (Jones et al., 2013). Untreated clinical deterioration can lead to severe adverse effects, including a high risk of cardiac arrest or the need to transfer patients to higher care units. This escalation contributes to elevated morbidity and mortality rates (Volchenboum et al., 2016). Therefore, nurses should recognize changes in the clinical condition of patients that may result in adverse events, such as unplanned transfer to the intensive care unit due to cardiac arrest and/or respiratory arrest (apnea) (Zuhri & Nurmalia, 2018) According to Fennessy (Subhan et al., 2019), the incidence of in-hospital cardiac arrest varies across the world, between 0.5 to 2%. Studies conducted in Australia and New Zealand show that the incidence of in-hospital cardiac arrest ranges from 2-6 cases per 1,000 admissions. In the United States, the incidence of in-hospital cardiac arrest (IHCA) reaches

200,000 cases annually (Dame et al., 2018). One study conducted on the Taiwanese population reported that the incidence of in-hospital cardiac arrest was 3.25 per 1,000 admissions. In that study, most of the cases were women with a mean age of 67.2 years (Chen et al., 2016).

According to the Indonesian Heart Association (IHA), cardiovascular disease stands as a leading cause of cardiac arrest, characterized by the abrupt cessation of the heart's ability to pump blood. In Indonesia, the number of cardiac arrests in hospitals is not yet available, it is estimated that approximately 10 out of 100,000 normal people under 35 years old, with an annual occurrence ranging between 300,000 to 350,000 incidents. (Indonesia Heart Association, 2015). The success of helping patients with emergencies is highly dependent on the speed and accuracy of conducting initial assessments. These assessments play a pivotal role in determining the success of nursing care within the patient's care system. Emergencies occur not only when the patient is admitted to the hospital, but also when the patient is being treated in the hospital. Therefore, nurses should recognize changes in the clinical condition of patients in hospital inpatient rooms that lead to unexpected events including unplanned transfer to the intensive care unit due to cardiac arrest, and respiratory arrest (Zuhri & Nurmalia, 2018).

According to Duncan et al., (2012), The management of cardiac arrest in hospitals includes surveillance and prevention of cardiac arrest, activation of the emergency system, immediate cardiopulmonary resuscitation, immediate defibrillation, and integrated post-cardiac arrest management. Most patients who develop heart failure or lung failure previously exhibit physiological signs that deviate from the normal range beforehand. These indicated patient's condition is deteriorating, which is an indication that the patient's condition is deteriorating (Zuhri & Nurmalia, 2018). Therefore, monitoring and prevention of cardiac arrest in the inpatient setting are needed to facilitate early detection of clinical deterioration. The Royal College of Physicians (2017) introduced the Early Warning Score (EWS) in healthcare services across Europe, Australia, and America. Based on NCEC (2020), Gibson et al. (2010), and Foley and Dowling, (2019) it can be concluded that the factors that influence EWS implementation are documentation, training, knowledge, skills, educational background, knowledge, communication, EWS training, and supervision. This follows the theory of behavior according to Lawrence Green in Notoatmodjo (2012), which states that a person's behavior is influenced by 3 factors; 1) predisposing factors, such as knowledge about EWS; 2) enabling factors, the factors that facilitate behavior, such as the availability of EWS sheets, and 3) reinforcing factors, namely encouraging or strengthening behavior, such as supervision carried out by the EWS team in monitoring and evaluating EWS implementation.

The uncompleted documentation of EWS implementation is likely attributed to a decrease in nurse compliance in recording details. Research in Australia states that one of the causes of EWS implementation failure is human error. Hence, EWS implementation has not become a habit or culture for nurses in hospitals and is perceived as an additional workload (Bellomo et al., 2018). However, the results showed a lack of knowledge and skills in recognizing patients' health conditions and decision-making was contradicted to EWS procedures, which could have adverse consequences for patients' health (Cooper et al., 2017; Hart et al., 2016). The level of knowledge plays an important role in improving the quality of patient health. This means that nurses must ensure that the data generated is recorded correctly and communicated with other health workers so that there is no discrepancy between nurses and other health workers. The role of nurses in implementing EWS is related to the observations through monitoring the patient's vital signs. This enables them to assess the patient's health condition

and take effective action when there is potential for deterioration. The goal is to reduce the length of stay and mortality rates as a result of adverse events (Yasmi & Thabrany, 2015).

Sulianti Saroso Infectious Disease Hospital (SSIDH) is one of the hospitals under the supervision of the Ministry of Health, with a capacity of 147 beds that has been accredited 'Excellence' by the Hospital Accreditation Committee 2012 in 2019. Thus, SSIDH has conducted early detection of clinical deterioration using EWS in the inpatient ward and emergency department since February 2019. It was conducted as an effort to improve health services and patient safety. However, EWS training with the latest scoring system has never been carried out. Patients' clinical deterioration is frequently manifested through subtle changes in physiological parameters. Failing prompt intervention, this deterioration can elevate the risk of morbidity, organ dysfunction, extended hospital stays, disability, and even mortality (Kause et al., 2004; Jones et al., 2013). Patient mortality results from various risks associated with both severity and comorbid disease, even when receiving appropriate care and monitoring (Armony et al., 2017). Based on the 2020 SSIDH Inpatient Installation report, the mortality rate reached 14.46% (154/1065 patients). It exceeded the Net Death Rate standard by the Decree of the Minister of Health No.129 of 2008 which is 0.24%. The narration before showed the importance of EWS implementation, resulting in the necessity to increase nurses' knowledge, attitudes, and practices in implementing EWS. Improving knowledge, attitudes, and practices (skills) in EWS implementation requires training with simulation methods. This study aims to evaluate the effectiveness of the EWS training in-tray method for enhancing both knowledge and practical skills in EWS implementation.

METHOD

We conducted a quasi-experiment using a one-group pretest-posttest without a control group design. The intervention was an in-tray method in EWS training. In tray or simulation or hands-on method combining tutorial and simulation where participants have to decide on the nursing procedure. We compare before and after intervention conditions. Observation before the intervention (O1) is called a pre-test and observation after the experiment (O2) is called a post-test (Notoatmodjo, 2018). The sample of this study was 70 executive nurses. The participants were all executive nurses who attended the training and filled in the completed pre and post-tests were included in the sample (consecutive sampling). The research was conducted at the Inpatient Installation of SSIDH in June 2023.

The data collection tool to measure the factors that influence nurses in the implementation of EWS is a questionnaire given to executive nurses. A questionnaire is a list of well-organized, well-thought-out statements/questions, to which the respondent only needs to provide answers or by giving certain signs (Notoatmodjo, 2018). The knowledge questionnaire comprised the characteristics of respondents and 20 questions concerning the concept and implementation of the EWS in managing patients displaying signs of deterioration. It was designed in alignment with the New Early Warning Score (NEWS). We used the modified Rescuing a Patient in Deteriorating Situations (RAPIDS) tool, an instrument for measuring the clinical performance of respondents in early detection of vital signs, nursing assessment, and intervention, and reported clinical deterioration using ISBAR (identify, situation, background, assessment, and recommendation) communication.

This EWS implementation observation sheet has been declared valid and reliable by the inventor, Liaw Sok Ying. Roshy Damayanti translated it with the title 'Effects of Early Warning Score (EWS) Tutorial Simulation on Nurses' Knowledge and Clinical Performance. The questionnaire used was tested for validity and reliability in Roshy Damayanti's research,

'Effects of Early Warning Score (EWS) Tutorial Simulation on Nurses' Knowledge and Clinical Performance,' in 2019. We analysed the data using Statistical Product and Service Solution (SPSS) for Windows 24.0. Descriptive analysis for categorical data was served with frequency (n) and proportion (%), while numerical data was served by minimum, maximum, mean, and median values. We performed the Wilcoxon test to show whether the skills of nurse executives significantly increased before and after the intervention, in conclusion by a P value equal to or less than 0.05.

RESULTS

The number of participants obtained in this study was 70 people. Based on Table 1, it is known that most of the 70 respondents were in the late adult category (36-45 years), namely 37 respondents (52.9%). Most of them were female as many as 56 respondents (80.0%), had graduated with a Diploma 3 of nursing education, namely 38 respondents (54.3%), and most of them had worked for 5 years, as many as 55 respondents (78.6%).

Table 1.
Characteristics of Participants (n=70)

Characteristics of Respondents	f	%
Age		
ate Adolescence (17-25 Years)	1	1.4
arly Adults (26-35 Years)	26	37.1
ate Adults (36-45 Years)	37	52.9
Early Elderly (46-55 Years)	6	8.6
Sex		
ale	14	20.0
emale	56	80.0
Education		
Diploma-3 of Nursing Education	38	54.3
Bachelor of Nursing	32	45.7
Work Period		
5 years	15	21.4
5 years	55	78.6

Table 2.
Overview of EWS Knowledge and Skills of Nurses (n=70)

Variable	pre-test, f (%)	Post-test, f (%)
Knowledge		
Poor (< 75%)	70 (100%)	40 (57.1%)
Good (≥ 75%)	0 (0%)	30 (42.9%)
Practice		
Poor (score <100%)	66 (94.3%)	54 (77.1%)
Good (score = 100%)	4 (5.7%)	16 (22.9%)

Table 2, it is known that from 70 respondents, none of the respondents had 'Good' knowledge about the Early Warning Score (EWS) in the pre-test. However, in the post-test, 40 respondents (57.1%) have 'Good' knowledge about EWS. More participants had 'inadequate response' to the Early Warning Score (EWS) implementations, namely 4 respondents (5.7%) in the pre-test. However, the number increased to 16 respondents (22.9%) which reflected adequate response.

The Wilcoxon test results also showed that the knowledge of executive nurses increased significantly from 7.00 (2.00-13.00) (pretest) to 11.50 (5.00-20.00) (posttest) (p-value = 0.000). The Wilcoxon test results also showed that the skills of nurse executives had a significant increase in median scores from 60 (10-80) (pretest) to 70 (10-80) (posttest) (p-value = 0.001) (Table 3).

Table 3.
Differences in Knowledge and Skills Before and After In-Tray EWS Training

Nurse	Minimum	Maximum	Mean (SD)	Median	P
Knowledge					
Pre-test	2	13	7.51 (2.19)	7	0.000
Post-test	5	20	13.56 (5.39)	11.50	
Practice					
Pre-test	10	80	56.29 (19.72)	60	0.001
Post-test	10	80	59.29 (22.35)	70	

DISCUSSION

Of the 70 respondents, most of them (n=37, 52.9%) are in the late adult (36–45 years old) category. This is consistent with another study by Prihati and Wirawati (2019), which reports that the majority of nurses' age are between 20 and 40 years old (Prihati & Wirawati, 2019). In general, age is a good indicator to describe a person's life experiences influencing a spectrum of behaviors corresponding to different stages of life. Young adulthood, spanning from approximately 20 to 40 years old, is regarded as a prime phase for career development as individuals are actively engaged in pursuing their professional aspirations (PA & AG, 2014). In the young adult stage, individuals start to cultivate independence, gain proficiency, adapt their lifestyle, and forge connections with their environment (14). Age has an impact on a person's ability to work, their mental and physical health, their sense of duty, and their tendency to be absent. Older employees, on the other hand, are less physically fit but put in more effort and have more responsibility (Nurlelasari Ginting et al., 2023). Age has an impact on mentality and capture power, which improves knowledge acquisition. A nurse's maturity and experience level increase with age when it comes to taking a job offer. An individual's capacity to make decisions, think, regulate their emotions, and accept the opinions of others will all become wiser as they age, which will impact their ability to perform better.

We found 56 (80.0%) nurses were female. In alignment with the results of Prihati and Wirawati's research (2019) which shows that the characteristics of nurses in RSUD K.R.M.T. Wongsonegoro Semarang are mostly women, namely 25 (64.1%) (Prihati & Wirawati, 2019). According to Jamal's research (2020), 127 nurses, or 93.4% of the total, are women who work at H. Adam Malik Hospital in Medan (Jamal, 2020). Compared to male nurses, there are more female nurses in the nursing field. Compared to men, there are more college graduates in nursing. In terms of giving her patients nursing care, sympathy, and support, the nursing profession mirrors the image of a woman. According to Maslow's hierarchy of needs, women are more motivated to pursue health education than men (Mufidah, 2020). The percentage of females is more representative in Indonesia, where women also predominate in the medical field. This occurs because women are typically more in demand for nursing jobs due to the field's proximity to mother instinct. However, with the era of globalization and other influences such as gender equality, evolving needs, and advancements in science and technology, the inclusion of male nurses has also become a notable consideration. Out of the 38 (54.3%) respondents graduated with Diploma 3 of Nursing. The results of this study are in line with other studies (Damayanti et al., 2019; Handayani, 2022). Education serves as a pathway for organizational development, enabling employees to acquire knowledge and skills aligned with constructive objectives. This knowledge is vital for enhancing performance across cognitive, psychomotor, and attitudinal domains. Assessing a person's level of education provides valuable insights into their capability to fulfill assigned tasks effectively (Nurlelasari Ginting et al., 2023). Education has the power to change a person's behavior, especially their tendency to behave well and obey. A person's attitude towards values or

newly provided information will not evolve if they lack education; on the other hand, the more educated someone is, the easier it is for them to absorb information and the more knowledge they possess (Soekidjo Notoatmodjo, 2015).

Out of the 70 respondents, 55 respondents (78.6%) had the longest work period of five years. According to the research findings of Pradnyana et al. (2021), the highest number of nurses at BIMC Kuta Hospital had more than five years of experience—35 individuals, or 60.3% of the total—than any other hospital (Pradnyana et al., 2021). Jamal's Research (2020) reported that 98 nurses, or 72% of the total, had worked at H. Adam Malik Hospital in Medan for longer than six years (Jamal, 2020). A person's performance as a nurse might be enhanced by his or her length of employment, as this indicates a greater amount of knowledge and expertise. The longer a nurse has been employed, the more experience she has in giving nursing care in compliance with established protocols or standards (Nursalam, 2016). A person can acquire knowledge through experience, which they gain over an ill-defined length of time. All human intellect, personality, and temperament are psychologically shaped by sensory experience. Work experience can serve as a source of knowledge or a means of demonstrating prior expertise. Experience can also be anything that a person encounters. A person learns a great deal of new things from his experiences.

The findings of the univariate analysis showed that none respondents were categorized as having good knowledge about the EWS in the pre-test group. But, in the posttest group, 42.9% have good knowledge about EWS. There was a significant difference in the pre-test and post-test knowledge (p-value <0.05). Based on the results of this study, it can be seen that EWS tutorial simulation could increase nurses' knowledge related to EWS. The outcomes in nursing education are knowledge, performance skills, learner satisfaction, critical thinking, and self-confidence. (Cowperthwait, 2020) The strengths of the in-tray method are that it is suitable for participants who work in a managerial manner, have a clear picture of problems and their solutions in real situations, and train participants in setting priorities. This type of method is usually a very expensive training method, but it is also beneficial and needed. It is suitable for training the ability to analyse and make multi-faceted decisions. Participants take on the role of managers within an organization and engage in decision-making within simulated, near-real-life scenarios. It simulated competitive environments akin to real-life situations. This training aims to replicate work conditions, fostering learning conducive to the development of technical and motor skills.

Tutorial learning is essential for grasping abstract concepts. Conversely, simulations provide opportunities for hands-on, concrete experiences, making them particularly effective for practical learning (Hernandez et al., 2020). Conversely, simulations provide opportunities for hands-on, concrete experiences, making them particularly effective for practical learning (Lateef, 2010; Saleem & Khan, 2023). Therefore, simulations require basic knowledge that must be owned by participants in advance so that they can carry out clinical skills and have the ability to apply case-handling algorithms (Al-Hassan & Omari, 2023). Our study revealed there was an increase in the number of subjects with Good Category in clinical performance. In addition, the clinical performance score experienced a significant increase in the median between pretest and posttest (p-value <0.05).

The results of this study reinforce previous research, reporting that providing education or EWS tutorial training stimulated increasing knowledge and clinical performance of nurses, especially in the handling of deteriorated clinical conditions of patients. Nurses do not only require adequate knowledge and skills in carrying out their duties and responsibilities but

must be able to transform effective clinical performance in every situation.(Mlambo et al., 2021; Rodríguez-Pérez et al., 2022; Saab et al., 2017). The demand for knowledgeable and proficient clinical performance from nurses is escalating, coinciding with the rise in complex health issues among patients in acute care settings. This increase underscores a higher number of patients at risk of deteriorating clinical conditions. Mishandling such situations could result in Serious Adverse Events (SAE), including cardiac arrests, unplanned ICU admissions, and unexpected fatalities (Taenzer et al., 2011). Most SAE is preceded by signs of deterioration, in the form of changes in vital signs (Fagan et al., 2012). Hence, SAEs ideally should not occur, or their rates of occurrence should be minimally preventable.

The EWS tutorial simulation combines two learning methods, tutorial and simulation. This is in line with Scalese, Obeso, and Issenberg (2008), who claim that the actual clinical meeting model is a simulation because this method provides an opportunity for educators to evaluate the clinical performance of participants in a simulated environment (Damayanti et al., 2019; Scalese et al., 2008) It is also supported by studies that clinical simulation requires participants to have clinical knowledge in advance, so they can demonstrate clinical skills, and have the ability to apply case management algorithms, analyze patient responses, and evaluate outcomes so that successful patient management is realized (Karlsaune et al., 2023; Koukourikos et al., 2021). A systematic review demonstrated that clinical simulations have the potential to enhance critical thinking, clinical judgment, and clinical decision-making, with proficiency increasing in correlation with experience (Alrashidi et al., 2023; Damayanti et al., 2019; Koukourikos et al., 2021; Theobald et al., 2021). The simulation method improves psychomotor abilities, self-confidence, and clinical judgment (Alrashidi et al., 2023; Damayanti et al., 2019), as well as improves critical thinking, performance skills, knowledge, and clinical reasoning (Dewi et al., 2021; Koukourikos et al., 2021; Theobald et al., 2021). Clinical judgment is often described as a combination of critical thinking and clinical reasoning (Hong et al., 2021). In addition, these factors, i.e., psychomotor, cognitive, affective, non-clinical skills (teamwork, decision-making, planning), emotional status, personality traits, environmental factors, and psychological, and physical status affect clinical performance (Rosen et al., 2018).

Performance is a competency that can be considered as a specific behavior (behavior) and is also referred to as actual behavior in certain situations (Fukada, 2018). education, training, and competence are a mandatory requirement for all healthcare personnel involved in assessing and monitoring acutely ill patients. Clinical staff with an EWS score of seven or higher should possess competency in critical nursing skills and airway management (Damayanti et al., 2019; Dean et al., 2020). We assessed the implementation of the EWS using an observation sheet divided into three sections: evaluation of clinical deterioration, evaluation of clinical response, and evaluation of clinical performance. This aligns with research by Subhan et al. (2017), which reported that only 72% of the available EWS data were completed (Subhan et al., 2017). Following the research findings of Rorimpandey et al. (2019), which provide an overview of the EWS implementation in Siloam Hospitals Balikpapan, he concluded that 80% of inpatients showed compliance with EWS SOPs.(Rorimpandey, 2019). The implementation of the Early Warning System (EWS) involves using a simple algorithm based on physiological indicators to detect a decline in the patient's clinical condition while hospitalized. All patients will be able to be identified early if there are physiological abnormalities thanks to the 100% application of EWS, which prevents patients from experiencing clinical deterioration. However, the evaluation of the workflow remained incomplete due to the absence of a standard operating procedure (SOP) for EWS implementation, leading to ambiguity regarding how to report scoring results and manage the

workflow effectively. The study had several limitations. Firstly, the researchers did not control for confounding variables, particularly the heterogeneous educational levels among research respondents. Secondly, the timing of the EWS implementation assessment was based on the subjects' shifts on duty, potentially resulting in suboptimal observation results. Lastly, the training method employed a hybrid approach (online for theoretical aspects and offline for practical sessions), which relied on internet connectivity, thereby introducing a potential limitation due to network dependencies.

CONCLUSION

Most of the participants were in the late adult category (36-45 years), female, graduated from Diploma-3 of Nursing Education, and had worked for 5 years. We concluded there was a significant increase in knowledge and clinical practice after attending EWS training with the in-tray method. Efforts to improve nurse competence in providing care to patients with critical conditions are imperative. This can be accomplished through regular coaching, education, and training sessions facilitated by management. Priority should be given to training nurses working in the intensive care unit to ensure effective implementation of these skills.

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