

How electronic emergency and disaster system can reduce nursing workload?

Nofita Dewi Kok Mesa^{1,2}, Titin Andri Wihastuti¹, Fajar Ari Nugroho¹, Muchamad Supriyadi^{1,3}

¹Department of Nursing, Faculty of Health Sciences, Universitas Brawijaya, Malang, Indonesia

²Department of Ners Professional, College of Health Sciences (STIKES), Jayapura, Indonesia

³Departement of Nursing, Regional Specialized Hospital (RSKD) Duren Sawit, Jakarta Timur, Indonesia

Article Info

Article history:

Received Dec 20, 2022

Revised Aug 5, 2023

Accepted Aug 30, 2023

Keywords:

Elektronic emergency

Nurse

Prehospital

Workload

ABSTRACT

Prehospital care is an emergency medical service (EMS) administered outside of the hospital. Time-consuming documentation of medical records is one of the tasks that prehospital nurses have to complete. It requires the development of innovations to improve prehospital care. To enhance prehospital treatment, innovations must be created. The purpose of this study is to ascertain whether the emergency and disaster electronic handling system application (SPEED) decreases the time nurses spend recording patient records. A total of 54 samples will be randomly separated into two groups as part of the study's true experimental design with crossed over method. Each of the three study sessions lasts for three weeks to finish. Group B received the first period of the paper-based intervention, whereas group A received the SPEED intervention. Group B will get the SPEED intervention following the washout period (second period), whereas group A will receive a paper-based intervention (third period). The independent t-test showed that the SPEED application was more efficient than paper-based using a mean difference value of 25.22 and a sig (2-tailed) value of 0.00. The SPEED application can make nurses' jobs easier and lighten their prehospital nurses' mental, physical, and time demands.

This is an open access article under the [CC BY-SA](#) license.



Corresponding Author:

Nofita Dewi Kok Mesa

Department of Ners Professional, College of Health Sciences (STIKES) Jayapura

Youmakhe Street, Hinekombe. Sentani Kabupaten Jayapura, Papua, Indonesia

Email: dewi.kokmesak@gmail.com

1. INTRODUCTION

An out-of-hospital medical emergency service is known as prehospital care or prehospital service [1]. When a medical emergency is reported outside of a hospital, prehospital services are provided [2]. The emergency medical service (EMS) is an extensive system that offers medical personnel, resources, and tools that are efficiently integrated and coordinated to deliver precise and prompt care to patients outside of hospitals [3].

Indonesia's emergency medical service and public safety center system is not yet fully developed do to several factors. These factors included a lack of infrastructure and resources to manage emergency response, integration in providing care for emergency patients is not yet systematic, and there is a lack of efficient communication between health facilities, health employees, and the community. As result, the system is considered less than optimal [4]. There are complaints in contacting the 119 ambulance service, due to the lack of medical personnel and paramedics who have competence in emergency services [5].

Technology that supports the nursing process has emerged as a result of the quickening speed of change and technological advancement. The use of cellular technology, which has several advantages and can

assist to simplify prehospital care by improving timeliness and delivery efficiency [6], has been used in efforts to improve prehospital services [6]. This interdisciplinary cooperation boosts health services' effectiveness, accessibility for patients, and quality, which may result in considerable adjustments to nursing care. Nurses, medical teams, and other healthcare workers can monitor and follow a patient's development using newer equipment and software [7]. The facilitation of comprehensive patient records, enhanced reporting, less data input mistakes, and more effective provision of healthcare are some of the anticipated advantages [8].

The workload of nurses in prehospital services is extremely high because they need to work quickly, precisely, and accurately to maximize patient care and life expectancy [9]. One of the tasks performed by prehospital nurses is documenting medical records which takes time and increases workload [10]. A well-balanced workload could improve performance. Nurses have a higher workload than ordinary staff in hospitals. Workload sharing is crucial since it can impact nurses' ability to perform at their best [11]. The workload of nurses is influenced by two factors, first is internal factors (the condition of nurses who are emphasized to have high skills and hard work in carrying out their duties and responsibilities), second is external factors (physical comfort, environment, relationships between nurses and demands from the hospital) [12].

According to Groot *et al.* [10] nurses frequently experience a heavy burden due to the extensive service documentation that needs to be completed. In prehospital departments, there is little documentation of medical records, which results in inadequately recorded action data [13]. One way to lessen the amount of effort necessary to record medical records is to employ information technology (IT) systems, particularly electronic medical records (EMR) [14]. Rapid technical breakthroughs are taking place, and these advancements have produced inventions that make the nursing process easier. This interdisciplinary cooperation boosts health services' effectiveness, accessibility for patients, and quality, which may result in considerable adjustments to nursing care. Nurses, medical teams, and other healthcare workers can monitor and follow a patient's development using newer equipment and software [7]. Research by Mullins *et al.* [15] was found that emergency departments need an EMR because it was determined that emergency departments require an EMR due to the positive impact of EMR on burden, quality of care, and quality of care of clinical decisions.

This may impair the ability of nurses to make quick, real-time medical decisions, and the time required to complete duties and error rates can vary widely, resulting in treatment and diagnostic errors [16]. Nurses learn more about new systems and guide seniors on how to use applications, among other responsibilities. Nonetheless, there are a number of studies that explain the barriers to the use of EMR in emergency services, such as the fact that senior nurses struggle to operate the electronic nursing system, the EMR design is not designed according to workflow, causing obstacles [17], and there is no equal distribution of training in using the system. In Indonesia, the distribution of technological advancements is still uneven in many areas [18].

Mobile health apps have the potential to substantially improve healthcare by providing accessible, efficient, cost-effective, and scalable health information and interventions that can enhance disease screening, diagnosis, and prevention, as well as treatment [19]. IT is governed by a combination of hardware, software, and services used to administer, communicate, and share information [20]. The nursing information system is a component of a health care information system pertaining to nursing, specifically nursing record maintenance [6]. In the health sector, technology was developed to improve nurse performance and aid in the resolution of nursing-related issues [21]. The application of health technology and IT in the field of nursing in the form of data, information, knowledge, and nursing care services is closely related to nursing information systems [22].

Research by Abdellah *et al.* [23] explained that the development of prehospital services could be developed with a mobile-based emergency system to improve service quality, facilitating acceleration of prehospital services during emergency situations. Another study was also conducted by Mitropoulos *et al.* [24] demonstrating the impact of technology on prehospital services, which can improve service quality, reduce the total time for EMS procedures, make services easier, provide quality human resources and clear geographical appearance so as to facilitate the work of ambulance drivers in response time to reach the patient's location.

Prehospital services in Indonesia urgently require the development of application innovation. The creation of the emergency and disaster electronic handling system application (SPEED) is anticipated to be able to aid in prehospital services, form a good EMR system, save money and time, better integrate services with others, provide more accurate patient data, and enhance the quality, efficiency, and safety of services and medical care to reduce the risk of clinical error [25]. This study aims to determine the effect of using the SPEED on the amount of time nurses spend documenting medical records. This study tests the hypothesis that documentation of medical records via the SPEED has an effect on the workload of prehospital nurses at Duren Sawit Hospital.

2. RESEARCH METHOD

This study is a true experimental design using the crossed over method, with two groups (A and B) that getting the same treatment for a predetermined amount of the time. The East Jakarta Prehospital Service at Duren Sawit Hospital (RSKD) hosted this trial from August 20 through October 22, 2022. The implementation of the first intervention or treatment took place during the first period, which ran from August 20 to September 10, 2022. The second period, which covered the implementation of a washout, or a pause or no intervention for respondents, took place from September 11 to October 1, 2022. In the last phase, which lasted from October 2 to October 22, 2022, groups switched locations and a second intervention or treatment was given [26].

There were a total of 60 respondents in this study but 6 of the respondents were excluded. The minimum number of samples is 19 [26] while this study employed 54 respondents. Group A received the SPEED intervention, whereas group B received the paper-based intervention (1st period). After the hiatus period (second period), group B will be administered the SPEED intervention and group A will be administered a paper-based intervention (third period). The simple random sampling method was used to obtain a homogeneous sample, after which the random group generator website was used to divide the two groups into 27 members each. The inclusion criteria are a minimum of 1 to 2 years of work experience, a basic life support (BLS) training certificate, the ability to use digital technology, and a willingness to participate in the study from the beginning to the end.

The National Aeronautics and Space Administration Task Load Index (NASA-TLX), a questionnaire instrument with a measurement scale of 0-100 intervals, was used in the study to quantify effort. Six aspects of burden factors are included in the NASA-TLX questionnaire: mental demand, physical demand, temporal demand, performance, effort, and frustration. Validity and reliability assessments of this questionnaire have been done at RSUD Dr. Saiful Anwar Malang. Between 0.85 and 0.97 for Cronbach's alpha on September 19, 2022 Cronbach's alpha values between 0.85 and 0.97. The SPEED application was tested on 15 officers 119 Ambulance personnel (nurses, physicians, administrators, and drivers) at Dr. Saiful Anwar Malang on 10 August 2022 to determine its usability and practicability.

The beginning of the study at RSKD Duren Sawit is distributing and explaining the consent form to potential respondents. If the respondent is inclined to participate, they are asked to sign a consent form. All respondents who were willing to explain the SPEED and paper based intervention procedures were given a pre-test questionnaire regarding their workload. At the conclusion of week nine, the researcher will administer a post-test workload survey.

In this study, demographic information was examined using the univariate analysis. Medical record production utilizing paper based and SPEED was found to have an impact on the workload of prehospital nurses at RSKD Duren Sawit using the bivariate analysis, specifically the paired t-test. The independent sample t-test was also utilized to determine whether the SPEED application and paper-based medical record documentation at Duren Sawit Hospital had different effects on prehospital nurses' labor. This investigation was given the go-ahead by the Health research Ethics Committee, Faculty of Health Sciences, Universitas Brawijaya, under approval number 3804/UN10.F17.10/TU/2022, dated August 11, 2022.

3. RESULTS AND DISCUSSION

This section describes the results of a comprehensive research and discussion. The results are presented as tables and figures that are simple for the reader to comprehend. This study will elaborate on two sub-topics. Characteristics of the respondents are majority of group A's 15 members were men (55.6%), while the majority of group B's 16 members were women (59.3%). For the age of the respondents, the most dominant were 20-30 years old, namely 12 people (44.4 %) for group A and 16 people (59.3%) for group B. The majority of respondents-24 (88.9%) in group A and 25 (92.2%) in group B-had obtained the level of schooling known as D3. With 17 respondents (63%) in group A and 15 respondents (55.6%) in group B, the majority of respondents had more than two years of job experience. In this study, all 27 respondents in each group (100%) underwent BLS and basic training in life support (BTLS) training.

Any workload and job satisfaction data that pass the Shapiro-Wilk normality test with a p value greater than 0.05 are considered to be normally distributed. With a mean difference value of a decrease of (-11.89) and (-20.29) and a sig (2-tailed) value of 0.00, Table 1 demonstrates a change in the mean indicating a significant difference between the pre-test and post-test workload in medical record documentation between groups A and B that received the SPEED intervention. This suggests that the SPEED intervention significantly affects the treatment that is being given. With a mean difference of (+2.11) and (-2.11), respectively, a change in the mean indicates a significant difference between the pre-test and post-test workload of groups A and B that received the paper-based intervention.

Table 1. Different test of medical record documentation using paper based on the workload of prehospital nurses at Duren Sawit Hospital

Variable	Intervention	Groups	N	Pre test		Post test		p-value
				Mean	Std. deviation	Mean	Std. deviation	
Workload	SPEED	A1	27	77.11	1.948	65.22	2.309	0.00
		B2	27	76.30	2.539	56.00	3.101	0.00
	Paper based	A2	27	78.59	2.454	81.22	2.532	0.00
		B1	27	70.48	1.695	80.59	3.238	0.02

Source. Primary data, 2022

Table 2 obtained two information, namely the workload variable for the first treatment, the Levene test value was 0.049 which showed that the data did not have the same variance. Therefore, the first treatment workload variable was tested with a different variant of the independent t-test, yielding a mean difference value of 15.37 and a sig (2-tailed) value of 0.00, indicating a significant difference between the first treatment workload using SPEED and paper based. This table also displays the difference between the mean SPEED and paper-based documentation times, demonstrating that the SPEED intervention further reduces the documentation workload for prehospital nurses at Duren Sawit Hospital.

Table 2. Differences in workload in documenting medical records for Prehospital Nurses at Duren Sawit Hospital after being given SPEED and paper-based interventions

		N	Levene test	Mean	Mean difference	Std. Deviation	p-value
Treatment workload 1	SPEED	27	0.049	65.22	15.37	2.309	0.00
	Paper based	27		80.59		3.238	
Treatment workload 2	SPEED	27	0.128	56.00	25.22	3.101	0.00
	Paper based	27		81.22		2.532	

Source. Primary data, 2022

The Levene test value for the workload variable for the two treatments is 0.128, which shows that the data have the same variance. This is the second piece of information that can be inferred from the table. Since the workload variable for the second treatment was examined using the same variant Independent t-test, the results showed a significant difference between the workload for the second treatment using SPEED and paper based, with a mean difference value of 25.22 and a sig (2-tailed) value of 0.00. The SPEED intervention at Duren Sawit Hospital further reduces the documentation effort for prehospital nurses, as shown by the table's comparison of the mean SPEED and paper-based documentation times.

The application that the researcher built from scratch to build the SPEED application is shown in the image below. The SPEED application is a website-based application that can be accessed via desktop computers and mobile devices with a browser that can access the www.speed-ub.id website. This application is used in community-accessible prehospital services and is integrated with ambulance services, medical staff, nursing staff, hospitals, and partners who provide emergency and disaster services.

3.1. The effect of documenting medical records using paper based and SPEED applications on the workload of Prehospital Nurses at Duren Sawit Hospital

The study's findings show a change in the mean, specifically a reduction in workload in the group following the administration of the SPEED intervention, with mean differences of (-11.89) and (-20.29), respectively, and a sig (2-tailed) value of 0.000. This highlights how the SPEED application's integration with EMR can lighten the load on the prehospital nurses at Duren Sawit Hospital. The majority of respondents reported a decrease in workload across all workload dimensions, including temporal demand, physical demand, mental demand, performance demand, effort demand, and frustration demand, according to the findings of the NASA-TLX post-test questionnaire given to 54 respondents.

The nurse's workload all physical, mental, and emotional exertion associated with the time demands placed on nurses in all nursing actions [27]. In addition to emotional burden, documentation also contributes to the time-consuming nature of the nurses' work. Inadequate nursing documentation is viewed as a hazard to individual and patient safety because every aspect of patient care is deemed essential to document [28].

According to temporal demand, prehospital nurses are under less time pressure to complete medical record recording while using an EMR that interfaces with the SPEED program. The results of this study are in line with a study by Bakhoun *et al.* [29] and Vafaei *et al.* [30] which explains that using EMR can reduce nurses' workloads in prehospital services, including a reduction of 4-5 minutes in documenting medical records, ensuring that medical staff can concentrate more on treating patients. One of the factors that affects workload is time pressure, or the existence of a time objective in doing work, in which prehospital nurses are required to work at rapid, precise, and accurate response times to maintain patient life by minimizing mortality and morbidity [30].

Mental demand, physical demand, and effort describes how EMR that integrates with the SPEED application assists prehospital nurses in documenting medical records by facilitating activities such as thinking, remembering, and making decisions swiftly and accurately. This is because the SPEED application makes it simple to maintain all records, facilitating access to medical records. This is consistent with study conducted by Jabour [31] which indicates that the use of EMR assists senior nurses and elderly staff in relying less on memory or memory for written medical record records due to the fear of errors and incomplete medical record recording. This is also supported by the study of Calder-Sprackman *et al.* [32] which demonstrates that the use of EMR reduces errors in dosing medications to patients because EMR makes it simpler to read drug instructions and other actions.

According to performance demand, an EMR that interfaces with the SPEED program makes it easier to complete medical record documentation, which raises prehospital nurses' levels of job satisfaction. The SPEED application also provides medical record output in PDF format that could be promptly downloaded. The SPEED EMR reporting system is accessible to nurses, midwives, and physicians. Workflow and reporting on the SPEED application, which integrates with the ER's system, enables emergency room personnel to prepare for all of the needs that patients will require when they are referred to the ER.

This study's findings are consistent with Tsai *et al.* [33] findings, that is, the implementation of EMR facilitates a productive workflow for nurses and other medical personnel. EMR could properly store information data, nurses can reduce errors, and EMR in quality applications can read a patient's medical history to assure patient safety [34]. This is also supported by Farokhzadian *et al.* [17] finding that EMR improves documentation management and information monitoring (can increase accessibility of data and documents, can establish secure archives of documents and information).

For frustration demand, it could be explained that EMR that is integrated with the SPEED application is extremely useful in reducing prehospital nurses' feelings of pressure, stress, and anxiety when documenting medical records. Using the SPEED application, the majority of comprehensive medical record documentation is completed after stabilization measures are administered and when the patient wishes to return to the hospital. Short interviews were also conducted after the ambulance service to ensure that nurses could easily and comfortably complete the EMR on the SPEED application, without having to search for a ballpoint pen and a comfortable position. This is consistent with study by Lopez *et al.* [35] indicating that EMR helps reduce stress and anxiety in nurses and medical personnel. Due to the accuracy of the data and the results acquired, EMR is also able to reduce the feeling of being born out among medical personnel in emergency services [36]. This is also supported by the study of Farokhzadian *et al.* [17], which indicates that EMR improves management in documenting and monitoring information (can improve data and document accessibility, can produce precise and secure archives of documents and information).

3.2. Differences in workload in groups after being given paper-based interventions and the SPEED application

The study's findings show a significant difference between the two workload treatments using SPEED and paper based, with a sig (2-tailed) value of 0.00 and a mean difference of 15.37 (first treatment) and 25.22 (second treatment), respectively. This table also shows differences in values the mean SPEED and Paper based were 56.00 and 81.22, which shows that the SPEED intervention was more effective in reducing the workload in documenting medical records for prenatal care. This occurs because the SPEED application offers numerous benefits and advantages in prehospital care. This happens because the SPEED application has many benefits and advantages in prehospital services. The SPEED application has and provides various facilities including emergency (the main feature of SPEED, where all users can perform this service either to submit an emergency or receive and process an emergency according to the existing user level), manage data (this feature can only be accessed by admin only where system data includes agency data, partners, equipment and ambulances can be managed, apart from that nurse and medical staff data can also be managed together), EMR that integrate with emergency departments and the final output can output pdf files, and notes real time on the application.

EMR have many advantages in prehospital care, including allowing health professionals to view and double-check previous medical documentation [32], allowing officers to double-check information they may have forgotten to enter when administering actions on the scene, facilitating better officer collaboration, integrating EMRs with ER systems [25], and increasing the effectiveness and quality of medical care. In addition, the benefits of EMR are significant in terms of facilitating communication management (facilitate communication in services, improve inter-organizational communication, and expand intra-organizational communication), improving management in documenting and monitoring information (improve data and document accessibility, create document archives and appropriate and safe information) [17], and improving resource management (reduce nurse workload [37] and reduce the usability error rate [16]). EMR mitigates the risk of data errors, supports a variety of remote diagnostic information in real time, facilitates referral systems, offers automatic information storage and management, and reduces paper usage and storage space [38].

4. CONCLUSION

The study's findings suggest that the EMR of the SPEED application could lighten the prehospital nurses' duty at Duren Sawit Hospital. The time pressure prehospital nurses have when finishing medical record writing is lessened by an EMR that connects with the SPEED program with regard to the temporal demand component. An EMR that connects with the SPEED program makes work easier in terms of work procedure service flow in the completion of medical record recording, ensuring that prehospital nurses are happy with their work. Additional research with a larger sample size and a longer duration is needed to determine the effectiveness of the SPEED application. This SPEED application uses a browser for its use, so an Internet connection is required to access it. Therefore, it becomes a consideration when the SPEED application is applied in remote and outermost areas, where internet connection access is limited and even unaffordable.

ACKNOWLEDGEMENTS

We would like to thank the STIKES Jayapura, RSKD Duren Sawit, supervisors, examiners, and mentors for their support in this publication.




REFERENCES

- [1] R. Pap, C. Lockwood, M. Stephenson, and P. Simpson, "Indicators to measure prehospital care quality: a scoping review," *JBI Database of Systematic Reviews and Implementation Reports*, vol. 16, no. 11, pp. 2192–2223, Nov. 2018, doi: 10.11124/JBISIRIR-2017-003742.
- [2] F. H. Abuzeyad, G. Al Qasim, L. Alqasem, and M. I. Al Farras, "Evolution of emergency medical services in the Kingdom of Bahrain," *International Journal of Emergency Medicine*, vol. 13, no. 1, pp. 1–9, 2020, doi: 10.1186/s12245-020-00280-2.
- [3] O. Kotsiou, D. Srivastava, P. Kotsios, A. Exadaktylos, and K.ourgoulisanis, "The emergency medical system in Greece: opening aeolus' bag of winds," *International Journal of Environmental Research and Public Health*, vol. 15, no. 4, pp. 1–14, Apr. 2018, doi: 10.3390/ijerph15040745.
- [4] M. Boyle, J. Wallis, and S. M. Nurs, "Time to improve pre-hospital care in developing countries," *Australasian Journal of Paramedicine*, vol. 13, no. 3, pp. 1–3, 2016, doi: 10.33151/ajp.13.3.538.
- [5] A. Kholil and F. I. Handian, "The relationship between service quality and user satisfaction with emergency 119 ambulance services at the emergency room of the Regional Hospital. Dr. Saiful Anwar Malang (in Indonesian: Hubungan kualitas pelayanan dengan kepuasan pengguna jasa layanan ambulans emergency 119 di IGD RSUD. Dr. Saiful Anwar Malang)," *Journal of Nursing Care and Biomolecular*, vol. 6, no. 1, pp. 43–54, 2021, doi: 10.32700/jnc.v6i1.223.
- [6] H. Kim, S. W. Kim, E. Park, J. H. Kim, and H. J. Chang, "The role of fifth-generation mobile technology in prehospital emergency care: An opportunity to support paramedics," *Health Policy and Technology*, vol. 9, no. 1, pp. 109–114, 2020, doi: 10.1016/j.hlpt.2020.01.002.
- [7] S. Homeyer, W. Hoffmann, P. Hingst, R. F. Oppermann, and A. Dreier-Wolffgramm, "Effects of interprofessional education for medical and nursing students: Enablers, barriers and expectations for optimizing future interprofessional collaboration - a qualitative study," *BMC Nursing*, vol. 17, no. 1, pp. 1–10, 2018, doi: 10.1186/s12912-018-0279-x.
- [8] R. G. Bentvelsen, E. Holten, N. H. Chavannes, and K. E. Veldkamp, "eHealth for the prevention of healthcare-associated infections: a scoping review," *Journal of Hospital Infection*, vol. 113, pp. 96–103, 2021, doi: 10.1016/j.jhin.2021.04.029.
- [9] D. Bohström, E. Carlström, and N. Sjöström, "Managing stress in prehospital care: Strategies used by ambulance nurses," *International Emergency Nursing*, vol. 32, pp. 28–33, 2017, doi: 10.1016/j.ienj.2016.08.004.
- [10] K. De Groot, A. J. E. De Veer, A. M. Munster, A. L. Francke, and W. Paans, "Nursing documentation and its relationship with perceived nursing workload: a mixed-methods study among community nurses," *BMC Nursing*, vol. 21, no. 1, pp. 1–13, 2022, doi: 10.1186/s12912-022-00811-7.
- [11] A. R. N. Rusdi, S. S. Russeng, A. U. Salmah, A. Wahyu, A. Mallongi, and I. H. Yanti, "The influence of workload on the nurses performance at Ambon general hospital," *Enfermeria Clinica*, vol. 30, pp. 419–422, 2020, doi: 10.1016/j.enfcli.2019.10.114.
- [12] J. A. Asamani, N. P. Amertil, and M. Chebere, "The influence of workload levels on performance in a rural hospital," *British Journal of Health Care Management*, vol. 21, no. 12, pp. 577–586, 2015, doi: 10.12968/bjhc.2015.21.12.577.
- [13] M. A. Hagiwara *et al.*, "Adverse events in prehospital emergency care: A trigger tool study," *BMC Emergency Medicine*, vol. 19, no. 1, pp. 1–11, 2019, doi: 10.1186/s12873-019-0228-3.
- [14] B. G. Arndt *et al.*, "Tethered to the EHR: Primary care physician workload assessment using EHR event log data and time-motion observations," *Annals of Family Medicine*, vol. 15, no. 5, pp. 419–426, 2017, doi: 10.1370/afm.2121.
- [15] A. Mullins *et al.*, "Health Outcomes and Healthcare Efficiencies Associated with the Use of Electronic Health Records in Hospital Emergency Departments: a Systematic Review," *Journal of Medical Systems*, vol. 44, no. 12, 2020, doi: 10.1007/s10916-020-01660-0.
- [16] R. Schnall, H. Cho, and J. Liu, "Health information technology usability evaluation scale (Health-ITUES) for usability assessment of mobile health technology: Validation study," *JMIR mHealth and uHealth*, vol. 6, no. 1, pp. 1–11, 2018, doi: 10.2196/mhealth.8851.
- [17] J. Farokhzadian, R. Khajouei, A. Hasman, and L. Ahmadian, "Nurses' experiences and viewpoints about the benefits of adopting information technology in health care: A qualitative study in Iran," *BMC Medical Informatics and Decision Making*, vol. 20, no. 1, pp. 1–12, 2020, doi: 10.1186/s12911-020-01260-5.
- [18] A. R. T. Hidayat, K. Onitsuka, C. P. M. Sianipar, M. Basu, and S. Hoshino, "To migrate or not to migrate: Internet use and migration intention among rural youth in developing countries (case of Malang, Indonesia)," *Digital Geography and Society*, vol. 4, no. March, p. 100052, 2023, doi: 10.1016/j.diggeo.2023.100052.
- [19] Y. Terhorst *et al.*, "Validation of the Mobile Application Rating Scale (MARS)," *PLoS ONE*, vol. 15, no. 11 November, pp. 1–14, 2020, doi: 10.1371/journal.pone.0241480.
- [20] S. Tilley and H. J. Rosenblatt, *Systems analysis and design*, 8th ed. Boston, USA: Cengage Learning, 2016.
- [21] S. Agboola *et al.*, "Healthcare utilization in older patients using personal emergency response systems: An analysis of electronic health records and medical alert data: Brief Description: A Longitudinal Retrospective Analyses of healthcare utilization rates in older patients," *BMC Health Services Research*, vol. 17, no. 1, pp. 1–11, 2017, doi: 10.1186/s12913-017-2196-1.




- [22] R. K. Damanik, *Development of nursing management information system design* (in Indonesian: *Pengembangan desain sistem informasi manajemen keperawatan*). Malang: Ahlimedia Book, 2020.
- [23] O. A. Abdellah, M. M. Aborokbah, and A. O. Elfaki, "Improving pre-hospital care of Road Traffic Accident's victims with smartphone technology," *International Journal of Interactive Mobile Technologies*, vol. 12, no. 2, pp. 130–141, 2018, doi: 10.3991/ijim.v12i2.8118.
- [24] S. Mitropoulos, C. Mitsis, P. Valacheas, and C. Douligeris, "An online emergency medical management information system using mobile computing," *Applied Computing and Informatics*, pp. 1–13, Jun. 2021, doi: 10.1108/ACI-03-2021-0069.
- [25] F. B. Jensen, K. T. Ladefoged, T. A. Lindskou, M. B. Søvsø, E. F. Christensen, and M. Teli, "Understanding the effect of electronic prehospital medical records in ambulances: A qualitative observational study in a prehospital setting," *International Journal of Environmental Research and Public Health*, vol. 18, no. 5, pp. 1–9, 2021, doi: 10.3390/ijerph18052330.
- [26] M. S. Dahlan, *Multiaxial diagnostic statistics and multiaxial substance diagnosis gateway to understanding epidemiology, biostatistics, and research methods (in Indonesian)*. Jakarta: Epidemiologi Indonesia, 2018.
- [27] C. Hummel, L. A. Laabs, B. Tyczkowski, B. Teuteberg, K. Franzen, and J. Pelkola, "Using the electronic medical record to engage staff in equitable workload and justify staffing levels," *Nurse Leader*, vol. 18, no. 4, pp. 376–380, 2020, doi: 10.1016/j.mnl.2019.09.018.
- [28] L. Akhu-Zaheya, R. Al-Maaitah, and S. B. Hani, "Quality of nursing documentation: paper-based health records versus electronic-based health records," *Journal of Clinical Nursing*, vol. 27, no. 3–4, pp. 578–589, Feb. 2018, doi: 10.1111/jocn.14097.
- [29] N. Bakhoun *et al.*, "A Time and Motion Analysis of Nursing Workload and Electronic Health Record Use in the Emergency Department," *Journal of Emergency Nursing*, vol. 47, no. 5, pp. 733–741, 2021, doi: 10.1016/j.jen.2021.03.007.
- [30] S. M. Vafaei, Z. S. Manzari, A. Heydari, R. Froutan, and L. A. Farahani, "Improving nursing care documentation in emergency department: A participatory action research study in iran," *Open Access Macedonian Journal of Medical Sciences*, vol. 6, no. 8, pp. 1527–1532, 2018, doi: 10.3889/oamjms.2018.303.
- [31] A. M. Jabour, "The impact of electronic health records on the duration of patients' visits: Time and motion study," *JMIR Medical Informatics*, vol. 8, no. 2, pp. 1–9, 2020, doi: 10.2196/16502.
- [32] S. Calder-Sprackman *et al.*, "The impact of adoption of an electronic health record on emergency physician work: A time motion study," *Journal of the American College of Emergency Physicians Open*, vol. 2, no. 1, pp. 1–8, 2021, doi: 10.1002/emp2.12362.
- [33] C. H. Tsai, A. Eghdam, N. Davoody, G. Wright, S. Flowerday, and S. Koch, "Effects of electronic health record implementation and barriers to adoption and use: A scoping review and qualitative analysis of the content," *Life*, vol. 10, no. 12, pp. 1–27, 2020, doi: 10.3390/life10120327.
- [34] H. Laitinen, M. Kaunonen, and P. Åstedt-Kurki, "The impact of using electronic patient records on practices of reading and writing," *Health Informatics Journal*, vol. 20, no. 4, pp. 235–249, 2014, doi: 10.1177/1460458213492445.
- [35] K. Dunn Lopez *et al.*, "Electronic health record usability and workload changes over time for provider and nursing staff following transition to new EHR," *Applied Ergonomics*, vol. 93, no. February 2020, 2021, doi: 10.1016/j.apergo.2021.103359.
- [36] J. Kaipio, A. Kuusisto, H. Hyppönen, T. Heponiemi, and T. Lääveri, "Physicians' and nurses' experiences on EHR usability: Comparison between the professional groups by employment sector and system brand," *International Journal of Medical Informatics*, vol. 134, no. June 2019, p. 104018, 2020, doi: 10.1016/j.ijmedinf.2019.104018.
- [37] A. Karbakhsh Ravari, J. Farokhzadian, M. Nematollahi, S. Miri, and G. Foroughameri, "The effectiveness of a time management workshop on job stress of nurses working in emergency departments: an experimental study," *Journal of Emergency Nursing*, vol. 46, no. 4, pp. 548.e1–548.e11, 2020, doi: 10.1016/j.jen.2020.03.013.
- [38] A. Porter *et al.*, "Electronic health records in ambulances: the ERA multiple-methods study," *Health Services and Delivery Research*, vol. 8, no. 10, pp. 1–140, 2020, doi: 10.3310/hsdr08100.

BIOGRAPHIES OF AUTHORS






Nofita Dewi Kok Mesa    has completed the Master of Nursing school majoring in Emergency Department in 2023. She works as a lecturer at STIKES Jayapura. She completed her diploma in nursing at the Health Polytechnic Ministry of Health Jayapura. She completed her Bachelor of Nursing and Professional Nursing Education at Universitas Brawijaya. Her interest is design and development: electronic emergency and disaster management systems and applications. She can be contacted at email: dewi.kokmesak@gmail.com.






Titin Andri Wihastuti    is a lecturer in the Department of Nursing at the Faculty of Health Sciences of Universitas Brawijaya. Some of her professional experiences include Head of the Nursing Masters Study Program, Faculty of Medicine, University of Brawijaya, Consultant of the Scientific Division of PT. Friends of the Environment, Surabaya, Member of the MONEV team and Lecturer of the Doctoral Study Program in Medical Sciences, Head of the Center for Degenerative Disease Studies, University of Brawijaya and Deputy Dean 1 for Academic Affairs of the Faculty Brawijaya University Health Sciences (at present). Currently, she is engaged in the tridharma of higher education and contributes to numerous national and international seminars and publications. She can be contacted at email: wihastuti.fk@ub.ac.id.



Fajar Ari Nugroho    is a lecturer in Universitas Brawijaya. Presently, he is responsible in lecturing, supervising (bachelor program, dietician profession program, and community service), and researching on biomolecular science, human nutrition, and epidemiology. Currently, he is engaged in the tridharma of higher education and contributes to a number of national and international seminars and publications. He can be contacted at email: fajar_arinugroho.fk@ub.ac.id.



Muchamad Supriyadi    has completed the master of nursing school majoring in Emergency Department in 2023. He is currently working at Duren Sawit Hospital as KSP Outpatient and ER. He obtained his bachelor of nursing degree from the Muhammadiyah University of Jakarta. He has several publications entitled: Online PKB and Management Handbook, the Integrated Nursing Care System, Design and Development: Emergency and Disaster Electronic Handling Systems and Applications for Emergency and Disaster Electronic Handling Systems. He can be contacted at email: nurseyadi@gmail.com.