MPPKI

Media Publikasi Promosi Kesehatan Indonesia
The Indonesian Journal of Health Promotion

Review Articles   *Open Access*

Effectiveness of Stroke Bundle Care in Emergency Unit on Acute Stroke Patient's Outcome: Literature Review

Agus Setyo Nugroho[1]*, Ni Luh Widani[2]
[1]Program Pasca Sarjana STIK Sint Carolus Jakarta Jl. Salemba Raya No. 41, Jakarta Pusat 10440, Indonesia |
agussetyonugroho320@gmail.com
[2]Dosen Magister Keperawatan, STIK Sint Carolus | widani24@gmail.com
*Author Correspondence: agussetyonugroho320@gmail.com

Abstract

Background: Stroke leads to death and disability with continuously increasing incidence rates. Immediate management of acute stroke plays a crucial role in minimizing its impact. Comprehensive management through effective stroke bundle care in emergency units has been recognized as an efficient approach and is a crucial step in determining accurate actions, with the potential to enhance patient independence and reduce morbidity and mortality.
Objective: The aim of this theoretical study is to explore the impact of implementing a stroke care bundle in the emergency unit on the outcome of acute stroke patients.
Method: This study employs a literature review method with 20 journals from three databases: PubMed, Semantic Scholar, and Google Scholar.
Results: Stroke bundle care significantly improves patient outcomes, evident in increased Barthel Index and decreased mortality rates. Clinical factors, particularly NIHSS scores, significantly determine patient outcomes, and attention to nursing, time coordination, and clinical factor management can enhance stroke care effectiveness.
Conclusion: This study reaffirms that the implementation of stroke bundle care significantly enhances outcomes for patients with acute stroke by reducing mortality rates, improving independence, and fostering effective coordination among the care team.
Recommendation: Further integration of stroke bundle care into clinical practice is needed, with in-depth research on clinical factors and interdisciplinary collaboration to enhance acute stroke management.

Keywords: Outcome; Stroke Bundle Care; Emergency Unit

INTRODUCTION

Stroke is an acute and focal neurological deficit condition that arises suddenly due to damage to blood vessels in the central nervous system [16]. According to the Global Stroke Fact Sheet in 2022, stroke remains the second leading cause of death and the third leading cause of death and disability worldwide. Data indicate a significant increase in the incidence, mortality, and morbidity of stroke, especially in low-and-middle-income countries [7]. Riset Kesehatan Dasar (RISKESDAS) data in 2018 indicates varying stroke incidence rates in different regions, with the highest in East Kalimantan (14.7%) dan Yogyakarta Special Region (14.6%), and the lowest in Papua (4.1%) and North Maluku (4.6%), while in Banten Province there are around 11.0% of stroke incidence cases [11].

Immediate management of acute stroke is crucial to improve the prospects of recovery and the quality of life for patients. The principle of "Time is Brain" underscores the urgency of rapid action in preventing brain damage, where every second holds critical value [19]. Stroke bundle care entails an integrated approach to managing acute stroke patients, encompassing a series of clinical actions designed to deliver prompt and effective care. This concept emphasizes the importance of providing a series of actions simultaneously and coordinatedly to improve post-stroke patient outcomes [14]. The stroke bundle care consists of several components, including rapid early stroke screening, ABCD2 assessment (age, blood pressure, clinical features, duration, history of diabetes), CT or MRI scanning, swallowing assessment, collaborative medication administration (aspirin), and observation and physiological management [17].

A comprehensive assessment through stroke bundle care becomes a key step in determining appropriate and accurate actions, with the potential to minimize the morbidity and mortality rates of stroke patients. As the primary entry point for patients with stroke symptoms, the emergency department plays a crucial role in initiating stroke bundle care from the outset [13]. Evaluation of the implementation of stroke bundle care, particularly in the emergency department, needs to be conducted. This study aims to explore the impact of implementing a stroke bundle care in the emergency department on stroke patient outcomes.

METHOD

This study is a literature review conducted using database search methods such as PubMed, Semantic Scholar, and Google Scholar for the period of 2015-2023. Journals were selected based on inclusion criteria using keywords such as "Barthel Index, Emergency, NIHSS, Outcome, Stroke, Stroke Bundle Care".
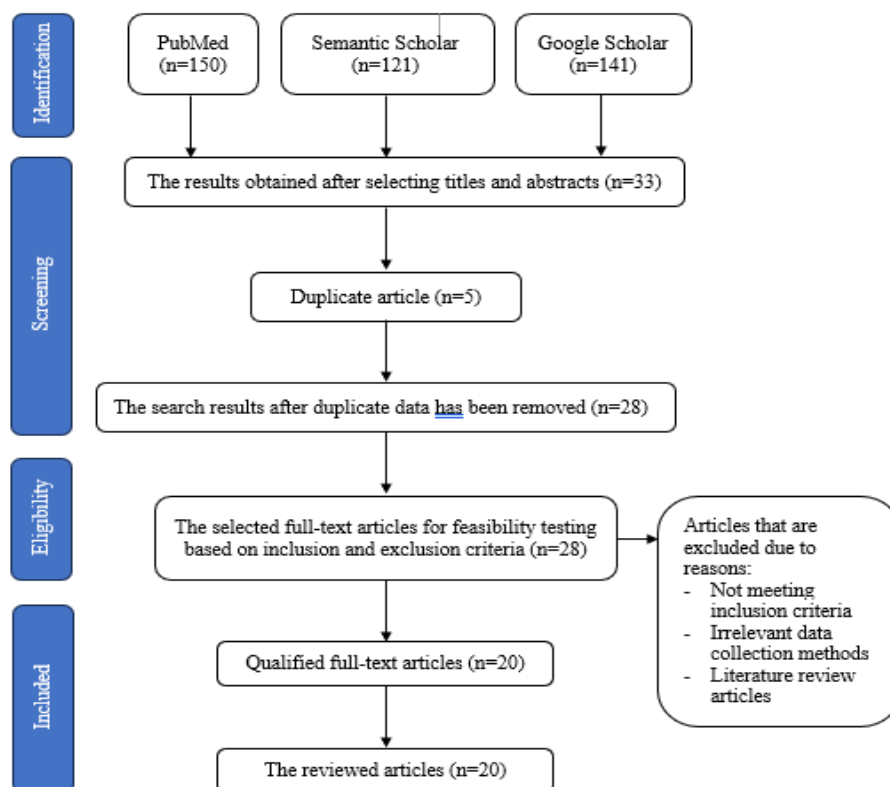
Picture 1. PRISMA flow diagram for literature search process

RESULTS

These are the findings from several studies related to stroke bundle care management and its effectiveness on stroke patient outcomes.

Table 1. Article Findings Summary

No	Title of the Research Study	Name of the Researcher	Year	Research Method	Summary of the Result
1	The Effect of Implementing Initial Emergency Care Bundle on Early Outcomes among Acute Ischemic Stroke Patients.	El-Aziz, et.al..	2021	Experimental	Study group (Barthel Index, swallowing ability, mortality) performed better than the control group (11.7% vs. 30.0% after 7 days in the ICU), with lower risks of ABCD2 and mortality (p=0.025).
2	Effect of a 72 Hour Stroke Care Bundle on Early Outcomes after Acute Stroke: A Non Randomised Controlled Study.	Nakibuuka, et.al..	2016	Non Randomized Control	The mortality rate was higher in the intervention group at 7 days (32.3%), but 30-day survival increased in severe stroke patients within that group (P = 0.018).
3	Effect of Initial Stroke Care Bundle on Clinical Outcomes Among Patients with Acute Ischemic Stroke.	Mohamed, Hamad, Abouzied.	2023	Quasi experimental	Patient independence increased on the 7th day, with 64.29% of the study group able to eat normally, and the 7-day ICU mortality rate: control (30.0%) vs. study (6.67%) with a significant difference (p=0.045).
4	Nurse-Initiated Acute Stroke Care in Emergency Departments: The Triage, Treatment, and Transfer Implementation Cluster Randomized Controlled Trial.	Middleton, et.al..	2019	Randomized Controlled Trial	There was no significant difference in Modified Rankin Scale scores at 90 days (p=0.24).
5	Implementing a Simple Care Bundle is Associated with Improved Outcomes in a National Cohort of Patients With Ischemic Stroke	Turner, et.al..	2015	Retrospective data analysis	A decrease in 30-day mortality by 21%, 6-month mortality by 16%, and an increase in discharge to usual place of residence within 6 months by 9%.
6	Effect of PDCA-based nursing intervention on activities of daily living, neurological function and self-management in acute cerebral stroke	Huang, et.al.	2021	Randomized Controlled Trial	The observation group showed better scores in ADL, NIHSS, self-care, and quality of life compared to the control group (P<0.05).
7	Effect of Comprehensive Nursing Care Strategies in Patients with Stroke on Physiological Parameters	Regu & Koul.	2019	Quasi Experimental	Prior to the intervention, the activity level of the intervention group (Barthel Index) was approximately ±26.65 vs. control ±9.43. Following the implementation of CNCSSP, the NIHSS scores of the intervention group differed significantly (P<0.05).

No	Title of the Research Study	Name of the Researcher	Year	Research Method	Summary of the Result
8	Assessment of Initial Stroke Severity by National Institute Health Stroke Scale (NIHSS) Score at Admission	Ghose, et.al.	2017	Cross Sectional Study	More than half of the patients (51%) presented with moderate NIHSS scores upon hospital admission, unrelated to stroke risk factors, but associated with hypoxia.
9	Is the National Institute of Health Stroke Scale a valid prognosticator of the aftermath in patients with ischemic stroke?	Ramachandran, et.al.	2022	Prospective cohort study	The average age of survivors was 59.77 years, non-survivors 65.58 years. The first-day NIHSS score was associated with the risk of death (RR 0.79), with a cutoff of 15.5 to distinguish ischemic stroke, sensitivity 73.7%, specificity 74.1%.
10	National Institutes of Health Stroke Scale An Alternative Primary Outcome Measure for Trials of Acute Treatment for Ischemic Stroke	Chalos, et.al.	2020	Randomized controlled trial	The MR CLEAN trial found an effect of stroke treatment on mRS and NIHSS at 24 hours and 5-7 days, partially mediated by NIHSS. However, the IMS III trial did not demonstrate a treatment effect on NIHSS.
11	Accuracy of NIH Stroke Scale for diagnosing aphasia	Gronberg, Henriksson, Lindgren.	2020	Prospective cohort study	This study enhances understanding of the accuracy of NIHSS in diagnosing aphasia in first-time ischemic stroke patients, potentially informing future stroke patient care.
12	Baseline NIH Stroke Scale is an inferior predictor of functional outcome in the era of acute stroke intervention	Reznik, et.al.	2018	Retrospective data analysis	The NIHSS scores at 24 hours and at discharge have high predictive accuracy for post-stroke functional outcomes, but not as effective predictors upon admission in the era of acute stroke intervention.
13	Effectiveness of Multidisciplinary Nursing Based on Fever, Blood Sugar, and Swallowing Function Management in Patients with Acute Stroke	Ai, Gu, & Xu.	2022	Randomized Controlled Trial	Multidisciplinary care is effective with low NIHSS scores, high Barthel Index, decreased glucose, 24-hour body temperature, and lower incidences of swallowing dysfunction and aspiration pneumonia within 30 days post-treatment.
14	European Stroke Organisation (ESO) guidelines on intravenous thrombolysis for acute ischaemic stroke	Berge, et.al..	2021	Systematic review, meta-analysis	Intravenous thrombolysis (alteplase) is recommended for acute ischemic stroke patients <4.5 hours, not recommended for patients 4.5-9 hours without brain CT.
15	The Early Outcomes of Nurse Case Management in Patients with Acute Ischemic Stroke Treated with Intravenous Recombinant Tissue Plasminogen Activator: A Prospective Controlled	Kummarg, Sindhu, & Muengtaweepongsa	2018	Prospective Randomized Controlled Study	The experimental group had a faster triage-to-treatment time (average 39.02 minutes), better NIHSS at 24 hours post-treatment, and no symptomatic intracerebral hemorrhage within 24 hours after onset compared to the control group.

No	Title of the Research Study	Name of the Researcher	Year	Research Method	Summary of the Result
	Trial.				
16	Intravenous thrombolysis in stroke with admission NIHSS score 0 or 1.	Sykora, et.al.	2021	Retrospective and descriptive	After 3 months, better outcomes (mRS 0-1) were observed in the thrombolytic group with NIHSS 0–1 compared to the group with NIHSS 2–5.
17	The Relationship Between Time of Arrival of Patients Post Acute Ischemic Stroke to the Emergency Department and Outcome of Acute Ischemic Stroke Patients.	Muhlis.	2020	Cross sectional study	There is a significant relationship between the time of arrival post acute ischemic stroke to the Emergency Department and outcome (p=0.027).
18	Comparison Between Stroke Triage Scale and Emergency Severity Index to Triage Patients With Neurological Complaints: A Randomized Clinical Trial	Abedi, et.al.	2020	Randomized Clinical Trial	The STS scale is more accurate and efficient than the ESI scale in identifying patients with neurological complaints, showing low error rates, lower triage in the ICU and neurology unit, as well as high sensitivity and specificity.
19	Implementing a Goal-Directed Care Bundle after Acute Intracerebral Haemorrhage: Process Evaluation for the Third Intensive Care Bundle with Blood Pressure Reduction in Acute Cerebral Haemorrhage Trial Study in China	Ouyang, et.al.	2022	Mixed methods: Survey, focus group discussions, interviews, observations	The implementation of care bundles varies, including difficulties in achieving blood pressure targets and glucose control, as well as resistance in high-risk patients. Despite improvements after training, challenges such as non-compliance and organizational factors remain constraints.
20	Application of Bundle Care in Patient with Individualized Sedation Care During the Interventional Therapy for Anterior-circulation Acute Ischemic Stroke	Chen L, Chen J, & Zhang.	2020	Retrospective and observational descriptive study	The administration of intravenous tenecteplase has not been proven to be superior or equivalent to alteplase. Mechanical thrombectomy therapy may improve clinical outcomes in acute ischemic stroke patients, particularly within the time window of up to 24 hours after symptom onset.

DISCUSSION
The effectiveness of stroke bundle care

Stroke bundle care improves patient outcomes as demonstrated by research conducted by El-Aziz, et.al. (2023) in terms of lower mortality rates (11.7%) compared to patients receiving standard care (11.7%) [6]. This is supported by the study of Mohamed, Hamad, and Abouzied (2023) which showed a significant difference (p=0.045) in the mortality rate of patients after 7 days of ICU care (control group 30.0% vs study group 6.67%) [14]. Retrospective analysis by Turner, et.al. (2015) also indicates a decrease in mortality rates within 30 days (21%) and 6 months (16%), as well as an increase in patient discharge within 6 months (9%) [24]. Additionally, research by Nakibuuka, et.al. (2016) shows that severe stroke patients have increased 30-day survival (P = 0.018) [17].

Improvement in patient outcomes in terms of activity and independence is evident from the Barthel Index scores and better swallowing ability after 7 days of ICU care (El-Aziz, et.al., 2021) [6], consistent with the study by Mohamed,

Hamad, and Abouzied (2023) which also showed an improvement in patient independence on the 7th day and the ability to eat normally (64.29%) [14]. Research by Ai, Gu, & Xu (2022) also indicates high Barthel Index scores, decreased incidence of swallowing dysfunction, glucose, 24-hour body temperature, and aspiration pneumonia, as well as lower NIHSS after 30 days of treatment [2]. Significant differences in NIHSS scores (P<0.05) were also demonstrated by the study of Regu & Koul (2019) [21].

The importance of timing and coordination

Time is a crucial factor in the effectiveness of interventions, as evidenced by Muhlis (2020) who linked the time of patient arrival to the Emergency Department with patient outcomes (p=0.027) [15]. The Stroke Triage Scale (STS) by Abedi, et.al. (2020) can be used for rapid triage supporting early interventions [1]. Effective coordination is crucial in managing patients with NIHSS 0-1 receiving thrombolytic therapy (Sykora, et.al., 2021) [23]. The importance of coordination is also evident in achieving blood pressure and glucose control targets in the Goal-Directed Care Bundle for intracerebral hemorrhage (Ouyang, et.al., 2022) [18], as highlighted by Chen L, Chen J, & Zhang (2020) for anterior ischemic stroke with the selection of tenecteplase [5].

The role of multidisciplinary teams and nurses

The implementation of simple care bundles [24], nurse interventions [10], and multidisciplinary care [21, 2, 13], which involve cross-disciplinary collaboration among nurses, doctors, and other specialists, has a positive impact on outcomes, including increased daily activity, neurological function, and independency. Team coordination, especially with the crucial role of nurses in implementing comprehensive care strategies and continuously monitoring patients' physiological parameters [21], aids in fever, blood glucose, and swallowing function management [2], contributing positively to treatment outcomes, alongside the emphasis on the important role of nurses in the emergency department [13].

Implementation challenges

Although stroke bundle care has been proven effective, the implementation is not always easy. Several studies have found challenges in achieving treatment targets, such as contextual factors like disease nature, organizational factors, difficulties in achieving blood pressure and glucose targets, and emergency department physicians' non-compliance with care bundles [18, 5]. These factors need to be addressed and overcome to ensure the comprehensive success of implementing stroke care bundles.

The influence of clinical factors

Clinical factors, especially the NIHSS score, are crucial in implementing stroke bundle care to identify the severity level of stroke and tailor treatment strategies [8, 20, 4, 9, 12]. This is associated with timing, particularly in therapy decisions such as intravenous thrombolysis [3]. However, Reznik, et.al. (2018) demonstrated that the NIHSS score upon admission may not be sufficiently effective as a single predictor for post-acute ischemic stroke functional outcomes, indicating that holistic evaluation and adjustable responses are needed in implementing stroke bundle care to improve outcomes [22].

Most of the literature demonstrates consistent findings indicating the effectiveness of stroke bundle care in improving outcomes for acute stroke patients, including reductions in NIHSS scores, increases in Barthel Index scores, and levels of independence. These findings align with the integrated approach in stroke care. The correlation between the time of patient arrival to the Emergency Department and outcomes is also confirmed. Differences emerge primarily in the study designs and healthcare service contexts. Implementation challenges, such as achieving blood pressure and glucose control targets, reflect the complexity and contextual barriers in implementing stroke bundle care. The unique emphasis on the role of nurses and multidisciplinary teams provides insights into the key contribution of nurses in enhancing patient outcomes. Limitations of studies involve variations in study designs, patient populations, and implementation of stroke bundle care in different clinical settings. Some studies focus on specific aspects, such as time management or thrombolysis, without detailing other aspects of stroke bundle care. This affects the generalization of results, resulting in difficulties in depicting the overall effectiveness of stroke care.

CONCLUSION

The consistent implementation of stroke bundle care has been proven effective in improving outcomes for acute stroke patients, including reducing mortality rates, enhancing independence, and daily activities, as evidenced by various studies involving measurements of the Barthel Index score, swallowing ability, and NIHSS score. Timely intervention and effective coordination among teams also play a crucial role in treatment outcomes, while the roles of nurses and

multidisciplinary teams are essential for optimizing patient care. Factors such as disease nature, organizational factors, and non-compliance with treatment protocols can hinder the success of implementation.

RECOMMENDATION

There is a need for enhanced interdisciplinary collaboration and further research on stroke care bundles, particularly in evaluating the long-term effectiveness, improving implementation, and gaining a deeper understanding of the clinical factors influencing patient outcomes.

REFERENCES

1. Abedi A, Mirhaghi A, Ebrahimi M, Mazloum SR. Comparison between stroke triage scale and emergency severity Index to triage patients with neurological complaints: A randomized clinical trial. Int Emerg Nurs. 2020;53:100871. doi:10.1016/j.ienj.2020.100871.
2. Ai D, Gu Y, Xu S. Effectiveness of Multidisciplinary Nursing Based on Fever, Blood Sugar, and Swallowing Function Management in Patients with Acute Stroke. Evid Based Complement Alternat Med. 2022;2022:5949760. doi:10.1155/2022/5949760.
3. Berge E, et al. European Stroke Organisation (ESO) guidelines on intravenous thrombolysis for acute ischaemic stroke. Eur Stroke J. 2021;6(1)–LXII. doi:10.1177/2396987321989865.
4. Chalos V, et al. National Institutes of Health Stroke Scale: An Alternative Primary Outcome Measure for Trials of Acute Treatment for Ischemic Stroke. Stroke. 2020;51(1):282–290. doi:10.1161/STROKEAHA.119.026791.
5. Chen L, Chen J, Zhang P. Application of Bundle Care in Patient with Individualized Sedation Care During the Interventional Therapy for Anterior-circulation Acute Ischemic Stroke. Am J Nurs Sci. 2020;9(2):79-83. doi:10.11648/j.ajns.20200902.18.
6. El-Aziz WW, Al-Metyazidy HA, Mansour HE, Weheida SM. The Effect of Implementing Initial Emergency Care Bundle on Early Outcomes among Acute Ischemic Stroke Patients. Egypt J Health Care. 2021;12(1):213-234. doi:10.21608/ejhc.2021.138795.
7. Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, Fisher M, Pandian J, Lindsay P. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. Int J Stroke. 2022 Jan;17(1):18-29. doi: 10.1177/17474930211065917.
8. Ghose SK, et al. Assessment of Initial Stroke Severity by National Institute Health Stroke Scale (NIHSS) Score at Admission. J Dhaka Med Coll. 2017;26(2):90-93. doi:10.3329/jdmc.v26i2.38765.
9. Grönberg A, Henriksson I, Lindgren A. Accuracy of NIH Stroke Scale for diagnosing aphasia. Acta Neurol Scand. 2021;143(4):375–382. doi:10.1111/ane.13388.
10. Huang L, et al. Effect of PDCA-based nursing intervention on activities of daily living, neurological function and self-management in acute cerebral stroke. Am J Transl Res. 2021;13(5):5315–5321.
11. Kementerian Kesehatan RI. Hasil Riset Kesehatan Dasar (Riskesdas) 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan Kementerian RI; 2018. https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf
12. Kummarg U, Sindhu S, Muengtaweepongsa S. The Early Outcomes of Nurse Case Management in Patients with Acute Ischemic Stroke Treated with Intravenous Recombinant Tissue Plasminogen Activator: A Prospective Randomized Controlled Trial. Neurol Res Int. 2018;2018:1717843. doi:10.1155/2018/1717843.
13. Middleton S, et al. Nurse-Initiated Acute Stroke Care in Emergency Departments: The Triage, Treatment, and Transfer Implementation Cluster Randomized Controlled Trial. Stroke. 2019;50(6):1346–1355. doi:10.1161/STROKEAHA.118.020701.
14. Mohamed RD, Hamad AH, Abouzied WR. Effect of initial stroke care bundle on clinical outcomes among patients with acute ischemic stroke. Egypt Nurs J. 2023;20(1):79-92. doi:10.4103/enj.enj_15_22.
15. Muhlis R. Hubungan Waktu Kedatangan Pasien Post Serangan Stroke Iskemik Akut ke Instalasi Gawat Darurat dengan Outcome Pasien Stroke Iskemik Akut. J Nurs Care Biomolecular. 2023;8(1):98-104.
16. Murphy SJ, Werring DJ. Stroke: causes and clinical features. Medicine (Abingdon). 2020 Sep;48(9):561-566. doi: 10.1016/j.mpmed.2020.06.002.
17. Nakibuuka J, et al. Effect of a 72 Hour Stroke Care Bundle on Early Outcomes after Acute Stroke: A Non Randomised Controlled Study. PLoS ONE. 2016;11(5):1-17. doi:10.1371/journal.pone.0154333.
18. Ouyang M, et al. Implementing a Goal-Directed Care Bundle after Acute Intracerebral Haemorrhage: Process Evaluation for the Third INTEnsive Care Bundle with Blood Pressure Reduction in Acute Cerebral Haemorrhage Trial Study in China. Cerebrovasc Dis. 2022;51:373-383. doi:10.1159/000520669.
19. Rabinstein AA. Update on Treatment of Acute Ischemic Stroke. Continuum (Minneapolis, Minn.). 2020;26(2):268–286. doi:10.1212/CON.0000000000000840.

20. Ramachandran K, Radha D, Gaur A, Kaliappan A, Sakthivadivel V. Is the National Institute of Health Stroke Scale a valid prognosticator of the aftermath in patients with ischemic stroke? J Family Med Prim Care. 2022;11(11):7185–7190. doi:10.4103/jfmpc.jfmpc_611_22.

21. Regu M, Koul P. Effect of Comprehensive Nursing Care Strategies in Patient's with Strke on Physiologic Parameters. Int J Nurs Midwifery Res. 2019;6(4):44-51. doi:10.24321/2455.9318.201932.

22. Reznik ME, et al. Baseline NIH Stroke Scale is an inferior predictor of functional outcome in the era of acute stroke intervention. Int J Stroke. 2018;13(8):806–810. doi:10.1177/1747493018783759.

23. Sykora M, et al. Intravenous thrombolysis in stroke with admission NIHSS score 0 or 1. Int J Stroke. 2022;17(1):109–119. doi:10.1177/1747493021991969.

24. Turner M, et al. Implementing a simple care bundle is associated with improved outcomes in a national cohort of patients with ischemic stroke. Stroke. 2015;46(4):1065–1070. doi:10.1161/STROKEAHA.114.007608.