International Summit on Science Technology and Humanity
ISETH 2024
ISSN: 2615-1588 (online)

Building a Code Stroke at Hospital without CT-scan Facilities

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Abstract

Purpose: To determine the medical and management steps for building a code stroke at Rizki Amalia Medika Hospital.
Methodology: his research is a descriptive qualitative study using a case report approach using observation and interview methods. Observations were carried out at in January-June 2024. The sample was obtained by purposive sampling method.
Results: Landscape analysis is carried out on internal and external factors. The creation of a multidisciplinary team involves medical and nonmedical service units. The stroke protocol is carried out starting from pre-hospital, emergency unit, stroke code activation and administration of alteplase therapy for ischemic stroke. Training and education are carried out internally and externally to the hospital. Community socialization and education involve public campaigns and collaboration between elements. Improving the quality and analysis of data focuses on collecting medical data, medical audits, and feedback loops. In January to June 2024, there were 7 ischemic stroke visits with 57% receiving alteplase therapy. The success of alteplase therapy in ischemic stroke patients at Rizki Amalia Medika Hospital was 100%. Conclusion: Building a code stroke requires a comprehensive approach. By prioritizing rapid stroke identification and treatment, hospitals can significantly improve patient outcomes.

Introduction Section

Stroke is the second leading cause of death in the world. In Indonesia, stroke is also the third leading cause of death after heart disease and diabetes. The prevalence of stroke increases from year to year (Collaborators, 2021). Based on the 2018 Basic Health Research (RISKESDAS) data, the prevalence of stroke in Indonesia reached 10.9% in the population aged over 15 years, increasing from 7% in 2013.Yogyakarta is the province with the second highest prevalence, with a stroke morbidity rate is 14.6% (Badan Penelitian dan Pengembangan Kesehatan, 2020). This disease causes permanent disability that causes more than half of patients to experience disruption of daily activities. This has a major impact on the quality of life of individuals and the economic burden on families (Wardlaw et al., 2014).

Rizki Amalia Medika Hospital is a class D private hospital located in Kulon Progo Regency, Yogyakarta.The total area of Kulon Progo Regency is 586.27 km2 with a population of 436,395 people in 2020. The number of referral level health facilities in the Kulon Progo area is 8 hospitals, consisting of 1 class B hospital, 1 class C hospital, 6 class D hospitals. Of the 8 hospitals that serve Kulon Progo Regency, only 2 hospitals have alteplase services, one of which is Rizki Amalia Medika Hospital. Stroke itself is included in the top 10 most common diseases at Rizki Amalia Medika Hospital. The number of inpatients with a stroke diagnosis is 157 patients, while outpatients are 424 visits in 2023. For this reason, it is important for Rizki Amalia Medika Hospital to build a stroke alert system as an effort to reduce mortality and morbidity related to stroke. Improving the quality of this service aims to achieve a definitive diagnosis in all obstacles that the hospital has so that treatment can be started as soon as possible. This concept refers to a hospital-based emergency response system that integrates rapid diagnostics, specific treatment, and coordinated referrals (Powers et al., 2018).

Although the benefits of code stroke have been widely studied in developed countries, data on the effectiveness and challenges of implementation in Indonesia are still very limited.due to various obstacles, including the lack of support for health infrastructure and minimal public knowledge (Goyal et al., 2016). Therefore, this study aims to explore the implementation of stroke codes in hospitals, especially in hospitals that do not have CT Scan services. This study focuses on system efficiency, patient clinical outcomes, and implementation constraints.This report details the steps and considerations involved in transforming a hospital into a stroke-ready hospital. The specific aspect of this research report is the successful establishment of a stroke-ready hospital in a health facility that does not yet have CT scanning as a standard protocol in stroke management.

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Method

Research Design

The type of research is qualitative research. The research design is a case study. This research was conducted to assess a phenomenon or problem that occurred in the implementation of the global budget pilot project at Rizki Amalia Medika Hospital. The research was conducted by creating a complex picture, looking at reports and considering respondents' views on the situation experienced. This research produces a descriptive report in the form of a case study. In this study, researchers will explore the research problem in detail, conduct in-depth data collection and include various sources of information.

The data collected are primary and secondary data. Primary data collection was conducted using an in-depth interview method with the research subjects. Interviews were conducted face-to-face as appropriate. During the interview process, important things were recorded during the interview. The researcher conducted the data collection process himself. The duration of the interview varied between 10 to 30 minutes. Secondary data were in the form of medical record files, outpatient visit data and patient inpatient care at Rizki Amalia Medika Hospital.

The population of this study were parties who knew the steps to build a stroke alert hospital at Rizki Amalia Medika Hospital. Samples and sampling are determined using the purposive sampling method.The sample selection criteria are as follows:

a. Representing the policy makers, namely the chairman of the Rizki Amalia Medika Hospital Foundation, the board of supervisors and the director of the Rizki Amalia Medika Hospital

b. Knowing about the steps to build a stroke alert hospital at Rizki Amalia Medika Hospital, namely the Head of Medical Division, Head of Medical Support Division, Head of Guarantee Division, Head of IGD Unit, Head of HCU ICU Unit, Head of Medical Records Unit

The total number of respondents was 10 people. From these respondents, data on age and gender were obtained, as well as differences in education levels. The age range was between 30 to 65 years. Education levels were Diploma 3 graduates to Strata 2.

The interview was conducted directly (face to face). The interview guide was previously tried out on the Head of Nursing Section of another hospital of the same type to find out whether the interview guide could be used properly. During the interview, the researcher took the data herself, together or in turns with team members. Simple notes were taken during the interview session.

Table 1. Characteristics of Research Respondents

Characteristics	Amount	Percentage
Gender:		
Man	6	60%
Woman	4	40%
Education:		
3-year diploma	3	30%
Bachelor degree	3	30%
Stata 2	4	40%

Place and Time of Research

The research was conducted at Rizki Amalia Medika Hospital located at Jln. Brosot-Wates Km 5, Bumirejo, Lendah, Kulon Progo, Yogyakarta. Data collection and interviews will be carried out from January to June 2024.

Results and Discussion

The following are the steps taken by Rizki Amalia Medika Hospital to build a Code Stroke:

1. Landscape analysis
2. Multidisciplinary team building
3. Stroke protocol development
4. Training and education
5. Socialization and community education
6. Data quality improvement and analysis.

1. Landscape analysis

In this activity, internal and external analysis of the hospital is carried out to build a stroke alert system. Internal factor analysis includes strengths, weaknesses and opportunities that can be developed by the hospital in building the system. While external factor analysis includes community conditions, politics, geography and economy.
Strength:
a. Support from the owner, director, management, medical committee and hospital community of Rizki Amalia Medika Hospital towards the development of new services
b. There are complete service facilities.
The services directly involved in building the Stroke Alert Hospital system are:
1) Have a doctor in charge of the patient who is a specialist in neurology
2) 24-hour emergency room service with doctor response time < 5 minutes is 100%
3) Medical support services in the form of laboratory and radiology are available 24 hours.
4) Public services in the form of transportation are available 24 hours
5) ICU intensive care (+)

Weakness:
a. Does not have a CT scan as the gold standard for diagnosis
Solution: build a fast and structured process for diagnosis, transportation, imaging and consultation.
b. No neurosurgeon available
Solution: full referral is done for hemorrhagic stroke with surgical indications. For hemorrhagic stroke with minimal bleeding, treatment is done in a stroke unit.

Opportunity:
a. There are only 2 hospitals in Kulon Progo Regency that have alteplase services.
Kulon Progo Regency has 12 sub-districts with 88 villages. Alteplase services are available at Wates Regional Hospital (class B) located in the western part of Kulon Progo. Rizki Amalia Medika Hospital is one of the hospitals in the southern region. In terms of business processes, the development of alteplase services in these 2 hospitals does not overlap with service areas.
b. Increased patient visits.
In 2021, the average number of visits to Rizki Amalia Medika Hospital was 2989, in 2022 it increased to 3852 and in 2023 it increased to 4373 patients per month. The profile of patients visiting this hospital is dominated by BPJS Kesehatan patients, where payments using BPJS take up to 92% for inpatients and 48% for outpatients. Alteplase costs can be made to BPJS patients with special drug claims that are made separately from regular claims.
c. The inclusion of alteplase as a drug guaranteed by BPJS Health

External factor analysis is
a. Public awareness of stroke symptoms and the importance of immediate medical attention is relatively low, resulting in delayed treatment.
Solution: conducting cross-sectoral education programs with various communication approaches.
b. Lack of cross-sectoral support for the referral process to hospitals
Solution: build easy and timely internal and external transportation processes. Things that Rizki Amalia Medika Hospital does are:
1) Establishment of fast communication media between ambulances in Kulon Progo Regency to speed up the referral process in the form of a WA group for Kulon Progo ambulances
2) Gathering and strengthening between ambulance drivers throughout Kulon Progo Regency
3) Providing free patient pick-up and drop-off facilities at Level 1 Health Facilities and residents' homes through the LAMPU URUP program (Pick-up and drop-off services at health centers and patients' homes).

2. Multidisciplinary team building

The multidisciplinary team involved in preparing the stroke alert hospital is the Neurology Unit, Anesthesia, Emergency Installation, Intensive Unit, Radiology Unit, Laboratory Unit, General Unit, Assurance Unit, PKRS Unit and Quality Committee. The medical service unit is responsible for direct services to patients. Medical support services are responsible for providing supporting data to establish a diagnosis. The General Unit provides transportation needed during the service process. The Assurance Unit provides insurance clarity. The PKRS Unit carries out socialization and community education efforts. The Quality Committee conducts PDSA analysis and medical audits related to ischemic stroke services.

3. Stroke protocol development

The stroke protocol created by Rizki Amalia Medika Hospital is:
a. Stroke Clinical Practice Guidelines
b. Clinical Pathway stroke
c. NIH Stroke Scale
d. Alteplase assessment form
e. SPO Code Stroke
The stroke protocol developed by Rizki Amalia Medika Hospital includes:
a. Pre-Hospital Care
In this phase, coordination is carried out with first-level health facilities and transportation service providers to identify potential stroke patients and initiate pre-hospital notification to the hospital. Direct communication is carried out to the emergency number of Rizki Amalia Medika Hospital. Internal team communication is carried out by activating the stroke code.
b. Emergency Unit Protocol
Rapid triage, immediate assessment using the NIH Stroke Scale (NIHSS) and rapid imaging. The challenge of Rizki Amalia Medika Hospital is the absence of CT Scan facilities so that a rapid response team is needed to be able to transport stroke patients to get imaging services at other hospitals based on the MOU and coordination with the stroke sign code. Due to this limitation, Rizki Amalia Medika Hospital developed a modification protocol by analyzing the delay in transportation time from diagnosis, partial CT scan referral, waiting time for imaging readings to returning to the hospital. The time required for this process is 60 minutes so that the onset modification that can receive thrombolytic therapy is a maximum of 3 hours. This onset modification process is carried out by PDSA 2 cycles with trial patients (probandus). After the evaluation of cycle 2, the modification is applied to patients with monitoring and evaluation. In 4 cases of alteplase patients, the protocol modification was acceptable and continued.
c. Stroke Code Activation
Stroke code activation is done after triage screening and emergency treatment. NIHSS assessment provides direction for disease diagnosis. After the diagnosis is confirmed, the doctor on duty activates the stroke code with the following flow chart: diagnosis of suspected stroke - customer service - hospital internal radio announcement - related units are ready (radiology, laboratory, ambulance driver, IGD, laboratory)
Radiology communicates with the designated referral hospital. Ambulance drivers prepare emergency imaging transport and immediately return to the hospital for further therapy. The ER prepares to carry out the imaging referral process. Pharmacy prepares alteplase. The laboratory prepares INR and GDS examinations. The Intensive Unit prepares further services.
d. Hospital Care
Thrombolytic therapy (tPA) is given after ischemic stroke is established. Regular monitoring is performed during thrombolysis. Post-therapy is monitored in the intensive care unit.

4. Training and education

Comprehensive training and education programs for all hospital staff involved in stroke care are conducted through internal and external training. Training media are through tutorials, case studies and simulations. Things done by Rizki Amalia Medika Hospital are:
a. External stroke training for DPJP conducted at national and international levels.
b. Inhouse Training for Medical Services and Stroke Emergency through a series of activities of the Hospital Training Unit in collaboration with the Medical Committee, Nursing Committee and other PPA Committees.
c. Socialization and Simulation of Code Stroke through big assembly activities which are carried out routinely every month.
d. Case Study of ischemic stroke patients with alteplase therapy in the medical audit of the Quality Committee.

5. Socialization and community education

Socialization and community education activities are aimed at increasing public awareness of stroke symptoms and the importance of timely medical intervention. This can be achieved through:
a. Public Campaign
Using media, social platforms and community events to raise awareness. Things that Rizki Amalia Medika Hospital does are:
1) Socialization of the Stroke Alert Hospital in a cross-sectoral forum in the "Halal Bi Halal" activity attended by leaders of organizations and governments at the village, sub-district and district levels.
2) Socialization of Stroke Alert Hospital to Posyandu cadres in the "Kader Care" activity which is carried out once every 3 months in the service coverage area.
3) Socialization of the Stroke Alert Hospital through Instagram, TikTok, YouTube in the "RAM CAST" agenda, radio in the Health podcast program on Radio Swaragama FM which is carried out in a programmed and continuous manner.

b. Collaboration
Partner with local organizations and networked healthcare provider facilities to enhance outreach efforts.

6. Data quality improvement and analysis

Quality improvement and data analysis activities are conducted to monitor and evaluate the effectiveness of stroke protocols and treatment outcomes. These activities focus on:
a. Medical Data Collection: systematically collect data on stroke cases, treatment time, and patient outcomes.
b. Medical audit: medical audit is conducted to identify areas that need improvement.
c. Feedback Loop: creating feedback mechanisms from staff and patients to improve protocols and practices.
Comparison of average data for inpatient stroke patients in 2023 and 2024 is as follows:

Table 2. Stroke Patient Data Month

	Data quality improvement and analysis	**Data quality improvement and analysis**
Number of stroke patients hospitalized	157	72
Average number of stroke patients hospitalized	13 patients/month	12 patients/month

Stroke patient data for January to April 2024 is as follows:

Table 3. Stroke Patient Data January to April 2024

Month	**Hemorrhagic Stroke**	**Ischemic Stroke**	**Not Upright Stroke Hemorrhagic or Ischemic**
January	16	2	0
February	13	0	1
March	7	2	1
April	8	3	0
May	1	6	6
June	0	3	4

Data on ischemic stroke patients who received Alteplase services during January to June 2024 are as follows:

Table 4. Data on Patients Receiving Alteplase January to June 2024

Month	**Number of Patients**
January	2
February	0
March	1
April	1
May	1
June	1

From the data above, it can be seen that there is a difference between the number of ischemic stroke patients and alteplase recipients. This occurs because during the alteplase therapy control checklist, contraindications for use were found.

Table 5. Data on Patients Receiving Alteplase January to June 2024

Patient Identity	**Onset**	**Time span from patient admission to ER to alteplase therapy**	**Initial assessment for admission to the ER**	**Home resume**	**Information**
A	30 minutes before entering hospital	The patient entered the ER at 20.01 and received alteplase therapy at 22.30.	Weakness of left limbs, suddenly feels weak when sitting (+). Upper extremity strength 5/2 NIHSS SCORE: 11	Weakness in the left limbs It's getting better, but sometimes it's still hard to move no headache, no bleeding	SUCCEED

				Upper extremity strength 5/4	
B	30 minutes before entering hospital	The patient entered the ER at 12.20 and received alteplase therapy at 15.20.	The patient came with complaints of suddenly falling while in the well, speaking unclearly, left hand weakness about 30 minutes smrs. os nodded when asked Dizzy, vomiting (-) sudden fever just discovered this afternoon. Upper extremity strength 5/1 lower extremity strength 5/5 NIHSS SCORE: 21	Weakness of the left limb is already reduced, can be lifted higher, speech is not slurred, there is no bleeding. Upper extremity strength 5/4	SUCCEED
C	1 hour before entering hospital	The patient entered the ER at 05.45 and received alteplase therapy at 10.00.	The patient was brought by his family after falling for approximately 1 hour at the hospital. the kitchen then could not be communicated with, weakness of the right limb (+), Upper limb strength 2/5 Lower limb strength 3/5 NIHSS SCORE: 7	Weakness improved. Upper limb strength 4/5, Lower limb strength 4/5	SUCCEED
D	30 minutes before entering hospital	The patient entered the ER at 11.13 and received alteplase therapy at 13.45.	The patient complained of sudden shortness of breath (approximately 30 minutes after breath), fainting (-), weakness of hands and feet (-), nausea (-), vomiting (-). CA (-/-), SI (-/-), fascialis paresis (+) Thorax: SDV (+/+), Rh (-//-), Whe (-/-), regular BJ I-II, murmur (-/-) Abd: BU (+) Ext: strength 5/5/5/5 NIHSS SCORE: 2	Speech slurred (+) improved KU: Good, Composmentis, GCS: E4 V5 M6	SUCCEED
E	2 hours before entering hospital	The patient entered the ER at 08.16 and received alteplase therapy at 11.10.	The patient came with complaints of unclear speech, lips drooping to the left since 6 o'clock. morning, nausea and vomiting denied, history of head injury denied RDP:HT R.Medicine; amlodipine 5mg CM I'm in the middle NIHSS SCORE: 4	right limb weakness (+) reduced, speech still not clear (+) I'm having CM, GCS E4M6V5	SUCCEED

F	1.5 hours before entering hospital	The patient entered the ER at 13.18 and received alteplase therapy at 16.40.	The patient was brought by his family with complaints of weak right limbs. accompanied by not being able to speak since 1.5 hours SMRS (11.30) and vomiting (-), pain head (-), decreased consciousness (-) cm upper motor 2/5 lower motor 2/5 NIHSS SCORE: 12	Weakness of right limb improved, 4/5 4/5, seizures (-) I am currently CM	SUCCEED

From the data above, it can be seen that the establishment of the Stroke Alert Hospital increases the speed of stroke diagnosis and treatment at Rizki Amalia Medika Hospital. From January to June 2024, there were 7 ischemic stroke visits with 57% receiving alteplase therapy. The success of alteplase therapy in ischemic stroke patients at Rizki Amalia Medika Hospital was 100%.

Conclusions

Building a code stroke at hospital requires a comprehensive approach that includes landscape analysis, multidisciplinary team building, stroke protocol development, training and education, community outreach and education, and data quality improvement and analysis. By prioritizing rapid stroke identification and treatment, hospitals can significantly improve patient outcomes. It is necessary to conduct periodic evaluations and medical audits to obtain a comprehensive picture of the success of building a stroke alert hospital.

Acknowledgement

The author would like to express our gratitude to the entire academic community of the Faculty of Medicine, Aisyiyah University of Yogyakarta and Rizki Amalia Medika Hospital so that this research can be carried out properly and produce recommendations that can be used by other hospitals.

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