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STROKE CARE: STROKE UNIT VERSUS NON STROKE UNIT

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ABSTRACT

Background: Stroke is one of the leading causes of death and long-term disability in adults. A comprehensive and integrated stroke unit care plays an important role to reduce these burdens. This paper aims to describe the difference in outcomes between stroke care in stroke units and non-stroke units as information basis to encourage hospitals to establish this service.

Methods: This review is done based on research articles on stroke treatment outcomes in the stroke unit. The literature search was conducted in December 2017 to May 2018 through University of Indonesia's online library and Google Scholar. Five articles are selected based on predetermined criteria. Articles that examined comparison of stroke treatment outcomes in stroke units with non-stroke units were selected and analyzed.

Results: Many studies have shown that stroke treatment in the stroke unit provides better outcomes compared to other non-stroke units. Treatment in the stroke unit improves survival and independency, decreases mortality and disability and shortens length of stay in the hospital.

Conclusion: The stroke unit is an important part of stroke management because it provides comprehensive and integrated services that resulting in better treatment outcomes. Stroke unit will increase hospital credibility.

Keywords: stroke, unit stroke, treatment outcomes, performance

INTRODUCTION

Stroke is a worldwide health problem as one of the leading causes of death and long-term disability in adults. There are 5.5 million deaths from stroke each year and account for about 10% of overall deaths. Even with increasingly evolving health science and technology, approximately 60% of stroke cases will still be fatal or lead to disability [1,2].

Stroke is the leading cause of disability and the second leading cause of death in Australia [3]. Stroke is also a major health problem in the United Kingdom. In 2005, there were approximately 110,000 cases of stroke each year and increased to 152,000 cases by 2016 [4,5]. The 2008 International Stroke Conference in Vienna, Austria revealed an increasing number of stroke cases in Asia. In Indonesia, the stroke prevalence increased each year from 8,3 per 1000 in 2007 to 12,1 per 1000 in 2013 [6].

A comprehensive and affordable stroke care service is essential to deal with increasing number of stroke cases and global, social and individual health burdens due to death and stroke-related disabilities. These burdens are needed to be delivered with special concern. Back in 2013, stroke

was the most leading cause of death in most of the hospitals in Indonesia, accounting for 15,4% of total deaths and this number will increase as stroke cases were predicted to be twice as many as 25-30 per 1000 in the next few years. Stroke unit service has long been known to reduce mortality and disability due to stroke. Various studies have shown that stroke unit care provides better results compared to non-stroke units. Hospitals as health care providers for stroke are expected to alleviate these by providing a comprehensive and integrated service for stroke [6].

The stroke unit is formed and specialized for managing stroke cases in the hospital. The stroke unit provides multidisciplinary specialized care for diagnosis, emergency and acute care, homeostasis normalization, prevention of complications, rehabilitation and secondary prevention.

A study concluded that hospital with at least 100 stroke admissions each year should establish a stroke unit. In Indonesia, number of established stroke units are not enough to provide an adequate care compared to increasing number of stroke cases [1,2,3,4,6,7]. This review article is intended to build more understanding about the difference outcomes of acute stroke care in both units so that the hospitals will be encouraged to establish this special unit and to recommend unit stroke to be included in health system regarding stroke nationally. Stroke unit will increase hospital credibility and help to lessen nation health burden caused by stroke.

MATERIALS AND METHODS

Literatures used in this review were searched and obtained from University of Indonesia online library and Google Scholar. Search was conducted in December 2017 to May 2018. University of Indonesia online library search was focused on the Wiley Online Library and Sciverse Science Direct via the advanced search menu by selecting all publications, journals content types and search years limited between 2007-2017. The keywords were stroke units, comparison and outcomes. Search on the Google Scholar website was done using the keyword stroke unit and collaborative systematic review. Search results were overlooked by title and abstract. Articles that compare stroke care outcomes between stroke units versus non-stroke units were selected. Unrelated articles were excluded. Selected articles were fitted to the inclusion (any stroke cases, both sex, age > 18 years old, treated in stroke unit, compare outcome between both units, and studies between 2007-2017 and exclusion criteria (stroke with comorbids). Final articles were then determined.

ARTICLES SEARCH RESULTS

2359 articles were obtained from remote accessed online library website of University of Indonesia. 643 articles appeared on Google Scholar search. Search was done based on the keywords. The articles obtained were selected to fit the inclusion criteria. Unfit articles were excluded. Article selection was based on the title and abstract assessment. Five final articles were determined for narrative review.

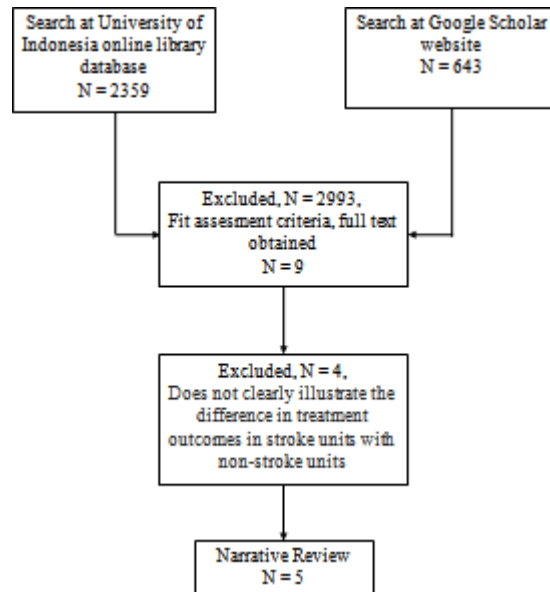


Figure 1. Article Search Process Flow Chart

RESEARCH ARTICLES SELECTION RESULTS

Five scientific articles would be reviewed after searching and assessment processes to confirm with the criteria and intended review topic. Articles were obtained from international research journals conducted in various countries such as Australia, Germany, Belgium and Italy. This paper will review the outcome comparison of stroke treatment in stroke unit compared to non-stroke units. There were five articles used in this review; one systematic review and meta-analysis study, one cross-sectional study, one retrospective study, one descriptive article and one observational study. Four studies using secondary data, stroke patients admitted to hospital and one study based on literature review.

Further descriptions of the studies used in this narrative review were shown in the following table, including titles, authors, publication year, research country, research type and result or conclusion.

Table 2. Comparison of Stroke Treatment Outcomes in Stroke Unit with Non-Stroke Unit

Title	Author and Year	Country	Study Design	Result / Conclusion
Hospitals admitting at least 100 patients with stroke a year should have a stroke unit: a case study from Australia	Dominique A. Cadilhac et al (2017)	Australia	Cross-sectional study	<ul style="list-style-type: none"> Hospitals with stroke unit have greater adherence to recommended treatment processes than hospitals without stroke unit New stroke case and death risk due to stroke are lower in hospitals with stroke unit. Poor stroke outcomes can be much reduced in hospitals with stroke unit Hospitals with at least 100 stroke case admittance were recommended to have stroke

Title	Author and Year	Country	Study Design	Result / Conclusion
				unit to ensure better outcomes for stroke patients
A Systematic review and meta-analysis of acute stroke unit care: What's beyond the statistical significance?	Ying Sun et al (2013)	Belgia	Systematic Review and Meta-Analysis	<ul style="list-style-type: none"> Generally, this research is similar with original Cochrane review used, that stroke unit increase patient survival and independence, also reduce inpatient probability and shorten length of stay
Treatment in acute stroke – Stroke unit is mandatory	Gerhard F. Hamann, Robert Muller, Burkhard Alber, Bernhard Widder (2016)	Germany	Literature review	<ul style="list-style-type: none"> Treatment in stroke unit is proven to provide better outcomes in many aspects : reducing mortality rate, disability, length of stay and increase patient independence
Stroke unit care and trends of in-hospital mortality for stroke in germany 2005-2010	Ulrike Nimptsch, Thomas Mansky (2013)	Germany	Retrospective study	<ul style="list-style-type: none"> Mortality due to stroke are lower in patients treated in stroke unit than non-stroke unit More rigorous patient selection to be treated in stroke unit will lower mortality due to stroke in Germany
Stroke-unit care for acute stroke patients: an observational follow up study	Livia Candelise et al (2007)	Italy	Observational follow up study	<ul style="list-style-type: none"> Treatment in stroke unit is related with decreased probability of death or disability, compared to conventional ward care These potential benefits occur at all age range and clinical presentation

Cadilhac et al published a study conducted in Australia related to the establishment of stroke units in hospitals with stroke patient admission at least 100 cases per year. They conducted a study with initial hypothesis that hospitalized stroke patients with rate of at least 100 cases per year without stroke units would not be able to provide treatment equal to hospitals that have stroke units. The study was conducted using observational, cross-sectional study. The study data were obtained from the Stroke Foundation Acute Services Audit Program in 2011 that collected clinical audit results conducted from 1 July to 31 December 2010 at participating hospitals treating stroke cases. Clinical audits were conducted through surveys completed by competent clinicians and patient medical records. The data collection included demographic characteristics, risk factors, severity, compliance level of the guidelines and health outcomes: the level of independency and mortality rate. The study found that two thousand eight hundred ninety-eight patients from 72/108 eligible hospitals

completing the audit (SU = 60; patients: 2,481 [mean age 76 years; 55% male] and non-SU patients: 417 [mean age 77; 53% male]). Hospitals with SUs had greater adherence to recommended care processes than non-SU hospitals. Patients treated in a SU hospital had fewer new strokes while in hospital (OR= 0.20; 95% CI=0.06-0.61) and there was a borderline reduction in the odds of dying in hospital compared to patients in non-SU hospitals (OR=0.57; 95% CI=0.33-1.00). Among SU hospitals meeting all SU criteria ($n = 59$; 91%) the adjusted odds of having a poor outcome was further reduced compared with patients attending non-SU hospitals. Thus, they recommended that hospitals with a stroke treatment rate of at least 100 cases per year should be prioritized to establish stroke unit service [1].

Ying Sun et al conducted a systematic review and meta-analysis of the results of an acute stroke unit at the request of Belgian health authorities. This Cochrane's review and database searches were done through Medline, Embase, the Cochrane Central Register of Controlled Trials and Physiotherapy Evidence Database (PEDRO) to find researchs published since 2006. The established search inclusion criteria were studies on the comparison of treatments in acute stroke unit with other alternative units. Evidence from eight studies that serve as synthesis and major analysis data gave results, which in overall, in accordance with the findings of the original Cochrane review that the acute stroke unit improves survival and independency, also decreases the likelihood of hospitalization and shortening the length of hospital stay [2].

Hamann et al provides an overview of the acute stroke treatment in stroke unit. They emphasized that the stroke unit is a must-have for the management of acute stroke cases. These results were based on several studies analyzed both in the early 1990s and the latest meta-analysis of Stroke Unit Trialists' Collaboration, 2013. Treatment in the stroke unit has proven to provide better results in many aspects: reducing mortality, disability, length of hospital stay and improving independency [8].

Ulrike Nimptsch and Thomas Mansky conducted research on acute stroke units and their association with stroke death rates in hospitals throughout 2005-2010 in Germany. This was motivated by the increasing number of stroke units established through health funding since 2006 and the benefits associated with the death rate from the stroke. This study used data on the number of treatments caused by acute stroke from 2005 to 2010 obtained through the National Agency of Statistics German Diagnosis Related Groups. The data obtained were associated with a trend of stroke-related mortality in hospitals with stroke units. The results showed that mortality in patients admitted to stroke unit hospitals is lower (crude 9.2%; adjusted 9.8%) compared to patients admitted to non-stroke unit hospitals (12.7%; 11.6%). A more strict and rigorous selection of patients to be treated in a stroke unit is likely to reduce the mortality rate of stroke in Germany [9].

Candelise et al performed an observational study with follow-up of 11,572 patients who were directly treated within 48 hours after the onset of stroke symptoms in both acute stroke units ($n=4936$) and in the conventional treatment ward ($n=6636$). These patients were identified retrospectively through medical record of 260 hospitals in Italy. Overall, 1576 patients died in the hospital, 2169 patients died during the monitoring and 347 patients disappeared during follow up period. The main results of this study found compared to with conventional-ward care, stroke-unit care was associated with a reduced probability of death or being disabled at the end of follow-up (OR=0.81; 95%CI=0.72–0.91; $p=0.0001$). The potential benefit was significant across all age ranges and clinical characteristics, except for unconsciousness. No specific elements of setting, organisation, or process of care were associated with outcome. [11].

These five articles had some similarities in results which showed better treatment outcomes in stroke units compared to non-stroke units. The better outcomes included improvement in survival rate and independency, decrease mortality and disability and shortens length of stay in the hospital. Ying Sun et al. also found the probability of stroke patients to be hospitalized or readmitted was decreased after treatment in stroke units.

DISCUSSION

Stroke unit is a special unit providing focused health services for stroke cases only. Thus, it can provide a better, comprehensive and integrated health service for stroke cases compared to treatment in other non-stroke units. Hospital commitment to establish a stroke unit will provide a system that ensures multidisciplinary health services for stroke patients; emergency services, specialist diagnostic from neurologist and neurosurgical specialists, acute care and homeostatic stabilization, early medical rehabilitation interventions for the prevention of complications, minimization of disability and secondary prevention.

As a special focused unit for stroke, the stroke unit will establish an all level acknowledgement to stroke care in the hospital. With the availability of a stroke unit in the hospital, early stroke recognition education through FAST (Face, Arm, Speech, Time) method will be given more intensively. The Recognition of Stroke in Emergency Room (ROSIER) criteria will be used to help to diagnose suspected stroke case in emergency room. The criteria for patient admission to stroke unit will also be more selective. Prompt neurologist and neurosurgery assessments are provided and supported by radiologic imaging technology such as Computed Tomography (CT) Scan and Magnetic Resonance Imaging (MRI) so that the management of stroke cases can be delivered immediately and precisely.

Stroke unit also provides different and more specific stroke focused approaches to patient. Thorough assessment of normal body function is always done prior to any nursing care. The principle is to let body function as normal as possible without any assistance hold an importance to speed the recovery. Insertion of intravenous line on the normal side of the body, performing swallowing test before deciding to place a nasogastric tube, consideration for urinary catheterization and bladder training are some of the different approaches in stroke unit care. Assessment of medical rehabilitation is done as early as possible to minimize disability and also act as secondary prevention [5,7,12,13].

Cerebrovascular disease and oral hygiene are related. Grau et al (2004), Sim et al (2008) and Pradeep et al (2010) found that oral diseases such as periodontitis are more common in stroke patients. Development of education and staff training in performing oral health care in the stroke unit would be beneficial for stroke patients and improve outcomes [14]. Stroke patients suffering impaired vision and field of view and aphasia disorders require interdisciplinary care and early rehabilitation [15,16]. Early mobilization also provides more encouraging results for stroke patients [17].

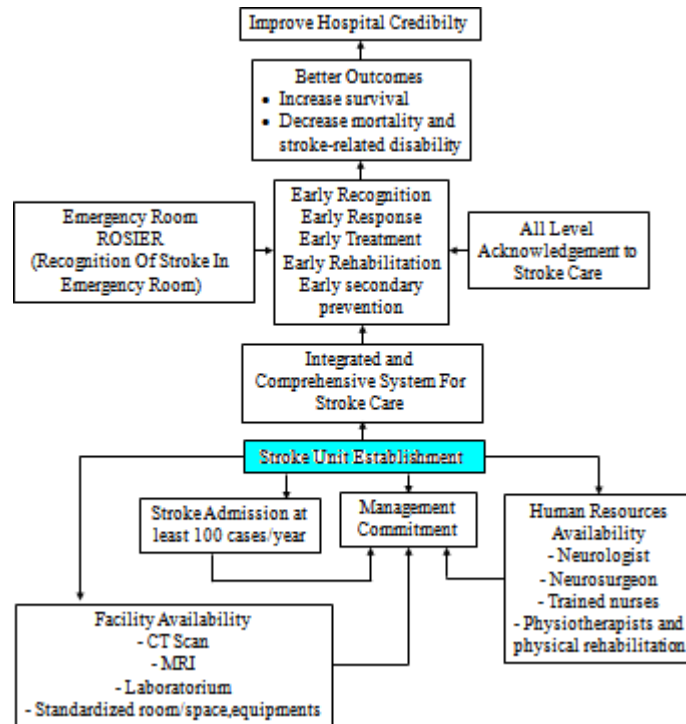


Figure 2. Logical Empirical Tree of Stroke Unit Establishment

Stroke unit can be considered to be able to provide and perform all level of health care for stroke patients. Health promotion, primary and secondary prevention, early treatment and also rehabilitation will ensure better stroke care outcomes. Many past and recent studies have shown that treatment in stroke unit provides more benefits for stroke patients than non-stroke units. Better outcomes were shown in these studies, especially in improving survival, decreasing mortality and stroke-related disability.

From a research paper of Ulrike Nimptsch and Thomas Mansky in 2014, mortality in patients admitted to stroke unit hospitals is 10-12% lower compared to patients admitted to non-stroke unit hospitals [9]. This research confirmed the results of an observational study with follow up done by Candelise et al [11]. They found compared with conventional-ward care, stroke-unit care was associated with a reduced probability of death or being disabled at the end of follow-up. Another research and study by Cadilhac et al [1], Hamann et al [8], and Ying Sun et al [2] also showed same similarities in findings and results. All these researches and studies have proved that stroke unit will ensure improvement in survival rate and independency, decrease mortality and disability and shortens length of stay in the hospital for stroke patients.

A health service or treatment care is worth to be established even if it can save only one life. Furthermore, this stroke unit care have been proven by many researches and studies able to give better outcomes. Thus, individual, social and national health burden caused by stroke can be lessen by establishing more stroke units. A national policy should be made so hospital with adequate number of stroke cases, available human resources and supporting facilities is obliged to establish a stroke unit.

CONCLUSION AND RECOMMENDATION

The stroke unit plays an important role in stroke management in a hospital. Various studies have shown that treatment in stroke unit provides better outcomes compared to non-stroke units. The stroke unit provides comprehensive and integrated stroke treatment and care, so as to increase

survival, reduce mortality and disability and shorten length of stay. Hospitals that have stroke units help to alleviate the health burden caused by stroke and will increase the credibility of hospitals in the community. Hospital should establish a special service unit for stroke. Hospital with stroke patient admission rate of at least 100 cases each year with adequate resources are encouraged to build a joint commitment to establish a stroke unit service in the hospital. Government should include stroke unit in the health system regarding stroke.

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