

The Effect of Early Mobilization on Functional Status of Stroke Patients: A Literature Review

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Abstract

Stroke impact to the altering functional status. Early mobilization is one of stroke care components that can minimize impact due to altering functional status such as weakness and paralysis in stroke patients. The review of early mobilization was proved increasing the functional status among critical illness patients. Limited review regarding the effect of early mobilization on changes in the level of functional status of stroke patients. The aim the study was to determine the effect of early mobilization at the level of functional status of stroke patients. This research used the literature review with the MeSH search tool. The keywords and syntax included "stroke", "early mobilization", and "functional status". Articles found with keywords early mobilization; functional status; stroke retrieve 12,114 articles, including 2,069 articles from Proquest, 4,774 articles from Pubmed, 35 articles from Scopus, and 5,236 articles from Science Direct which were filtered based on the specified criteria and obtained 10 articles for review published in the period 2011-2021, with samples were stroke patients. The effect of early mobilization mostly showed an increasing degree of functional status level among stroke patients. It is recommended to provide early mobilization among stroke patient. Future research should conduct a meta-analysis in analysing effect of early mobilisation among stroke patients.

Keywords: Early mobilization; functional status; stroke

INTRODUCTION

Stroke or cerebrovascular accident (CVA) is a permanent neurological disorder that occurs due to impaired blood circulation to the brain. This clinical syndrome of stroke can occur suddenly and is progressive so that it has an impact on acute brain damage with clinical signs both focally and globally (Lingga, 2013). Stroke is the second leading cause of death in the world after ischemic heart disease and the third leading cause of disability worldwide. Around 7.75 million people die from strokes in the world in 2018 (World Health Organization [WHO], 2018). The prevalence of stroke in 2018 in Indonesia is 10.9 per 1000 population (Republic of Indonesia Ministry of Health, 2019). This prevalence has increased compared to stroke sufferers in Indonesia from 2013, which amounted to 7 per 1000 population in 2018 (Republic of Indonesia Ministry of Health, 2018). Hence, disability effect the requirement of activity daily living as well.

Stroke will have an impact on physical health in the form of experiencing weakness, stiffness, and paralysis of the limbs which causes a decrease in muscle strength so that the extremities fall to one side, unable to maintain balance because the limbs feel heavy and cannot be moved. According to research, 54% of stroke patients had right hemiparesis, 41% had left hemiparesis, and 5% had bilateral hemiparesis (Bindawas et al., 2017). This weakness will put

stroke patients at risk of experiencing disability and being limited and requiring assistance in carrying out daily activities (ADL) (Raghavan, 2015). Functional status is the ability to carry out daily activities in basic needs, role status, and maintaining health and well-being. Physiological changes in stroke patients cause obstacles in carrying out daily activities so that their functional status changes (Cahyati, 2018). Based on research, patients with stroke with hemiparesis mostly have a mild dependency rate of 27.4%, moderate 39.5%, and severe 33.3% in fulfilling daily activities (ADL) (Elizabeth & Taviyanda, 2013).

Rehabilitation is an important component in stroke care, especially providing early mobilization with activities outside of bed which has the potential to reduce medical complications due to immobility in stroke patients as a result of weakness or paralysis (Cassidy & Cramer, 2017). Early mobilization is an intensive activity carried out as early as possible or within 24 hours after the onset of such symptoms which has been recommended (AVERT Trial Collaboration group, 2015). Other studies have shown that giving early mobilization starting within 48 hours after a stroke is also safe and feasible and does not cause complications during early mobilization in the form of hypotension and worsening of neurological conditions (Poletto et al., 2015). Meanwhile, other opinions suggest that early mobilization is carried out if the patient is stable and that transfer, sitting and walking exercises begin between 24-72 hours after an ischemic attack (Williams et al., 2013). Activities carried out in the form of mobilizing in bed, ROM, sitting with the back of the bed, sitting without the back of the bed, transferring with assistance, rolling over and sitting on the edge of the bed, sitting without support on the edge of the bed, moving with feet on the floor, standing, early walking, and advanced walking (Chippala & Sharma, 2016).

The effect of rehabilitation among stroke has a good impact on motoric (Cassidy & Cramer, 2017). Thus, early mobilization is recommended in several acute stroke clinical guidelines (National Stroke Foundation, 2007). The guideline for implementing early mobilization that is most widely used in rehabilitation for acute stroke is AVERT (Luft & Kesselring, 2016). Systematic review also stated that early rehabilitation on Intensive Care Unit (ICU) was effective proved to increase the functional status (Cheng et al, 2015) However, there has been limited review regarding the effect of early mobilization on changes in the level of functional status of stroke patients, thus making researchers interested in conducting further literature studies regarding the effect of early mobilization on changes in the level of functional status of stroke patients.

METHODS

This research used the literature review method, which is a review process that is carried out in a critical way towards previous research on the research topic so that it can examine the information contained in it (Luthfiyah, 2018). The search tools used were Google and MeSH and the articles originate from the libraries of PubMed, Scopus, Science Direct which were published in the period 2011-2021, can be accessed in full text, examines the effect of early mobilization on the functional status of stroke patients with stroke patient research samples, and presents functional status scores. The keywords and syntax used were "stroke", "early mobilization", and "functional status". Articles found from all databases totaled 12,114 articles, including 2,069 articles from Proquest, 4,774 articles from PubMed, 35 articles from Scopus, and 5,236 articles from Science Direct were filtered based on the specified criteria and 10 articles were obtained for review. The criteria of the articles were quasi-experimental design, stroke population, consist of early mobilisation protocol, in English Language, and latest 10 years. Next, the researcher carried out analysis and synthesis of literature using a synthesis matrix by editing, organizing, synthesizing, and identifying to identify important topics that were analyzed and written into a literature review to answer research questions and achieve research objectives (Pautasso, 2013).

RESULTS

The flow of searching for articles from several databases resulted in 10 articles to be analyzed and are explained in Figure 1. The result showed that effect of giving early mobilization was increasing the functional status (Alamri et al., 2019; Chippala & Sharma, 2016; Cumming et al., 2011; Franceschini et al., 2018; Herisson et al., 2016; Liu et al., 2014; Morreale et al., 2016; Rahayu et al., 2019) and no significant effect (Langhorne et al., 2011; Sundseth et al., 2012). The category of increasing functional status in 10 articles obtained the most from moderate dependence to mild dependence (Chippala & Sharma, 2016; Morreale et al., 2016; Sundseth et al., 2012), total dependence became moderate dependence (Alamri et al., 2019), heavy dependency became light dependency (Franceschini et al., 2018; Rahayu et al., 2019), light dependency became light dependency (Liu et al., 2014), mild dependence to be independent (Cumming et al., 2011; Langhorne et al., 2011), could not be categorized (Herisson et al., 2016). Table 1 presents the synthesis matrix of detail article information included in this review.

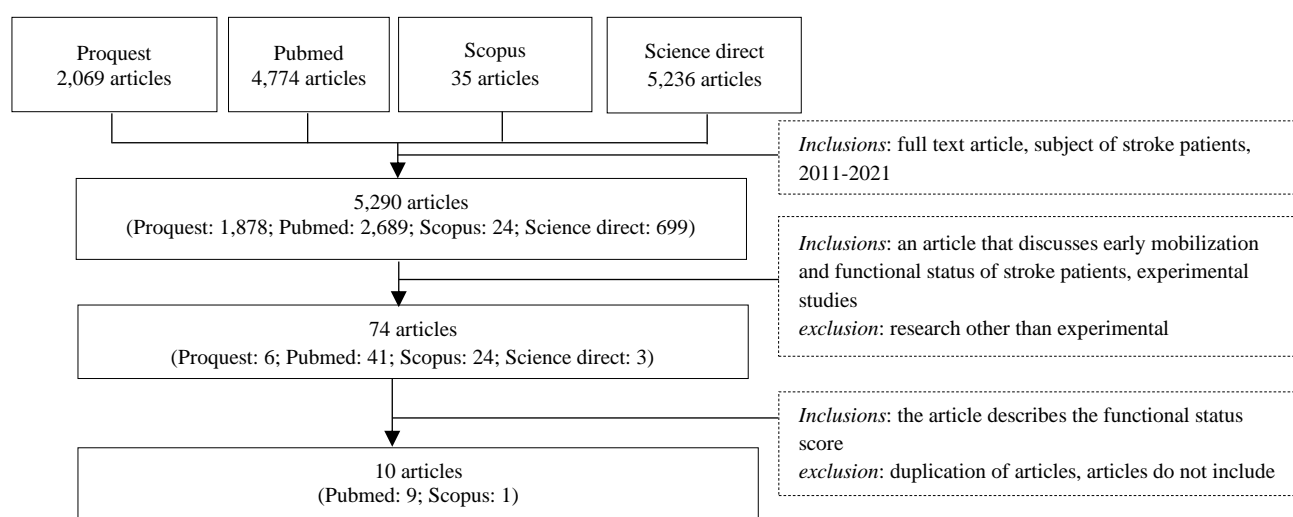


Figure 1. Literature Search Flowchart

DISCUSSION

The study was aimed the effect early mobilization toward functional status. The result showed that mostly articles showed significant result. The significance was related with the brain repair. There is a gap for plasticity and brain repair which is the optimal period for changes to occur in stroke patients in the early post-stroke phase as woptimal rehabilitation time because it involves the process of neuroplasticity during the critical period of the early phase of post-stroke recovery as long as the process is sustainable there will be a dominance of upregulation of growth-promoting genes (Ashcroft et al., 2022). The principle equation is in accordance with the rehabilitation principles according to Harsono, namely rehabilitation is carried out as early as possible, patients should not lie down even one day longer than the time specified for mobilization because it will cause complications, continuity of care is important in rehabilitation, and rehabilitation through training taking into account remaining abilities. patient's neuromuscular function (Harsono, 1996).

Early mobilisation among stroke patients was safe. Previus study studies in patients with hemorrhagic stroke with intracerebral hemorrhage who were mobilized early showed that early mobilization in hemorrhagic stroke patients who were in stable condition with monitoring of vital signs, signs of intolerance based on worsening neurological condition can be used as a treatment program to increase the efficacy of the stroke patient mobilization protocol because

it can improve motor function and reduce the length of stay in hospital (Yen et al., 2020). Another study that gave stroke patients with intracerebral hemorrhage showed that there was no significant difference in the stability of systolic blood pressure compared to patients who were given mobilization 135 hours after onset so that early mobilization is safe (Yen et al., 2021).

Early mobilization may enhance the ability of BDNF to bind to tropomyosin receptor kinase B (TrkB) after hypoxic/ischemic events. TrkB is able to increase nerve regeneration through the maturation, growth and development of nerve cells in the brain, protect nerves from metabolic disorders, induce mRNA in the hippocampus, and nerve cell flexibility which will modulate nerve cell survival. The binding between in BDNF and TrkB can inhibit inflammation, neurotoxicity, and apoptosis of nerve cells. Early mobilization has clinical benefits related to disability that can be seen from its dependency in daily activities. Exercise in early mobilization can affect neural plasticity which correlates with intracortical networks and motor circuit systems that will improve functional ability (Ashcroft et al., 2022). Another positive effect of early mobilization is that it can reduce complications due to immobility such as chest infections, DVT (Deep Vein Thrombosis), urinary tract infections, falls, and fatigue (Langhorne et al., 2011). Medical complications are related to the duration of bed rest in acute stroke so that mobilization is needed to prevent these complications (Diserens et al., 2012). Patients who are given early mobilization also have a lower risk of death, reduce length of stay, anxiety, and improve quality of life in stroke patients (Chippala & Sharma, 2016; Liu et al., 2014). So that the provision of rehabilitation / early mobilization in the early phase after a stroke is needed.

A few articles showed that there was no significant difference in the functional status of stroke patients after 3 months follow-up (Langhorne et al., 2011; Sundseth et al., 2012). Even though there was no significant difference after being given early mobilization, the Barthel Index scores in the two articles continued to increase. The increase in the Barthel Index score in the early mobilization and standard care groups which did not have a significant difference was due to the effect of rehabilitation itself as an act of providing restorative care to stroke patients to maximize improvement/recovery and minimize impairment, disability, and handicaps in stroke patients (Yen et al., 2020). In addition, the body also experiences spontaneous natural repairs in several post-stroke phases, namely several hours after a stroke which provides an opportunity to save threatened tissue, several days to several weeks which is associated with the initiation of brain repair and is the strongest spontaneous recovery mechanisms, and chronic phase of brain repair when the brain is relatively stable (Cassidy & Cramer, 2017).

CONCLUSION AND RECOMMENDATION

The effect of early mobilization mostly showed an increasing degree of functional status level among stroke patients. It is therefore recommended to provide early mobilization among stroke patient. Stroke patient whose conducted early mobilization could have a lower risk of death, reduce length of stay, anxiety, and improve quality of life. The study recommends conducting the meta-analysis in analysing effect of early mobilisation among stroke patients.

AUTHOR CONTRIBUTION

All authors contribute for the study design, data collection, data analysis, manuscript writing, review, and revision.

CONFLICT OF INTEREST

All authors declare no conflict of interest in this article.

Table 1. Synthesis Matrix

Author (Year)	Title	Methods and Protocol of Action	Findings
Cumming, TB, Thrift, AG, Collier, JM, Churilov, L., Dewey., LM, et.al. (2011)	Very Early Mobilization after Stroke Fast-Tracks Return to Walking: Further Results from the Phase II AVERT Randomized Controlled Trial	Randomized controlled trial, AVERT manual Both groups received standard care. The intervention group intervened as quickly as possible within 24 hours after onset, received additional interventions such as standing up, getting out of bed 2x a day.	<ul style="list-style-type: none"> - The mean time for giving early mobilization to the intervention group was 18 hours while the standard care group was 31 hours. - Mild NIHSS scores (1-7) were 46% in the standard group and 39% in the intervention group. - The majority mRs score was 0 (no symptoms) in the standard group 61% and the intervention group 47%. - The median for being able to walk 50 m was 3.5 days for the intervention group and 7 days for the standard group. 2 weeks after stroke 67% of the intervention group could walk without assistance compared to the standard group 50%. - The Rivermead Motor score of the two groups had the same median score, from 10 to 11, but the increase occurred in more respondents in the intervention group (62%) than in the control group (56%) at 3 months follow-up. - There was a greater increase in the Barthel Index score in the early mobilization group at 3 months from a median score of 18.5 (light dependence), IQR 2.0 to 20.0 (self-reliant). While in the group at 3 months the median was 16.5 (mild dependence), IQR 9.0 to 20.0 (self-sufficient). - The median Barthel index score (0-20) at 3 months indicated that the intervention group (median=18.5) was higher than the standard group (median=16.5) with mild dependence. <p>(Cumming et al., 2011)</p>
Langhorne, P., Stott, D., Knight, A., Bernhardt, J., Barer, D., & Watkins, C. (2011)	Very Early Rehabilitation or Intensive Telemetry after Stroke: A Pilot Randomized Trial	A Pilot Randomized Trial AVERT guidelines in the early mobilization group <ul style="list-style-type: none"> - Standard care consists of sitting, standing and walking from the day of admission (30-60 minutes/day), checking 	<ul style="list-style-type: none"> - Early mobilization time after symptoms for the EM group was 27.3 hours, the AM group was 28.3 hours. - There was an increase in the Barthel Index score at 3 months in the EM group from 18 (light dependence) to 20 (independent). - There is a difference in the Barthel Index score at 3 months. - EM had a significant relationship to hospitalization readmissions (p<0.01), the EM group had 0 admissions compared to the control group which had 5

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
Sundseth, A., Thommessen, B., & Rønning, M. (2012)	Outcome after Mobilization within 24 Hours of Acute Stroke: A Randomized Controlled Trial	<ul style="list-style-type: none"> - pulse (4 hours), temperature, oxygen saturation, blood pressure. - EM is given standard care and EM protocol, taught to sit, stand, and walk within 24 hours after stroke. - AM is given standard care and the AM protocol that responds to abnormalities in heart rate, blood pressure, temperature, oxygen saturation, and blood glucose is continued for the first 3 days and can be extended for another 7 days. 	<ul style="list-style-type: none"> - patient readmissions. - The EM group experienced fewer complications, namely without complications (8 respondents), chest infection (1 respondent), other complications from immobility (3 respondents), and other complications (4 respondents) than the control group EM without complications (7 respondents), chest infection (1 respondent), other complications from immobility (2 respondents), and other complications (5 respondents). (Langhorne et al., 2011) - The time for carrying out early mobilization in the intervention group was 13.1 hours after onset while the control group was 33.3 hours. - The average mRs score when entering the intervention group was 3.9 ± 0.9 SD (severely severe disability) while the control group was 3.8 ± 0.7 SD (severely severely disabled). - The mean NIHSS score at admission to the intervention group that was still alive was 7.2 ± 5.3 SD (moderate severity) while at 3 months follow-up it was 3.3 ± 3.6 SD (mild severity) so that there was an improvement in the score during 3 months of 3.9 ± 3.8 SD. While in the control group at

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
		48 hours after hospital admission.	admission 7.5 ± 4.4 SD (moderate severity) and at follow-up 3 months 2.0 ± 2.2 SD (mild severity). There was a significant increase in both groups $p < 0.001$. <ul style="list-style-type: none"> - The Barthel Index score at initial hospitalization in the intervention group was 10.3 ± 7.3 SD (moderate dependence) to a median score of 19 (mild dependence). Meanwhile in the control group from 14.1 ± 5.6 (mild dependence) to a median score of 19 (mild dependence). So that the increase was more in the intervention group. - Deaths occurred more in the intervention group than in the control group at 3 months after stroke with a mean age of 84 years, NIHSS scores of 6.9, and 20. The causes of death were recurrent stroke, pneumonia, lung cancer, and the cause was unknown. (Sundseth et al., 2012)
Liu, N., Cadilhac, DA, Andrew, NE, Zeng, L., Li, Z., Li, J., et.al. (2014)	Randomized Controlled Trial of Early Rehabilitation after Intracerebral Hemorrhage Stroke Difference in Outcomes within 6 Months of Stroke	Prospective, multicenter, randomized control study, with 2 parallel groups Guidelines for Hospital Based Very Early Mobilization <ul style="list-style-type: none"> - The standard treatment group received standard care in the form of daily activity exercises, stretching, neuromuscular electrical stimulation, functional training in the form of grasping, stirring, pointing. 	<ul style="list-style-type: none"> - The time for implementing early mobilization is within 48 hours after onset - The length of stay in the hospital was 10 days shorter in the intervention group, which was 24 ± 11.2 days than the standard care group, which was 34 ± 15.4 days ($p < 0.001$). - The majority of respondents had moderate stroke severity (8-16), namely 120 respondents in the intervention group and 199 respondents in the standard care group. - There was a greater increase in the Barthel Index score (0-100) in the intervention group from an average score of 62.3 ± 32.9 SD (mild dependence) to 68.3 ± 22 SD (mild dependence) at 3 months follow-up, and 73.8 ± 23.2 SD (slight dependence) at 6 months follow-up from the standard care group, from 61.6 ± 32.3 (slight dependence) SD to 67.6 ± 14.3 SD (slight dependence) in 3 months follow-up, and 61.3 ± 20.4 SD (mild dependence) at 6 months follow-up. - Deaths occurred more frequently in the standard than intervention group at 3 and 6 months after stroke (unadjusted hazard ratio 4.25; 95% confidence

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
		- The intervention group was given early mobilization and standard care immediately 48 hours after onset.	interval [CI], 1.20 to 15.07). - There was a significantly better quality of life difference in the intervention group at 3-6 months on the physical and mental components, anxiety score (95% CI, -8.3 to -4.4) than the control group. (Liu et al., 2014)
Chippala, P., & Sharma, R (2016)	Effect of Very Early Mobilization on Functional Status in Patients with Acute Stroke: A Single-Blind, Randomized Controlled Trail	A single blinded, randomized controlled trial AVERT manual - The early mobilization intervention group received standard care and early mobilization got out of bed as soon as 24 hours after onset with time dependentpatient tolerance (5-30 minutes) at least twice a day.	- The time for early mobilization for the intervention group was 18 (16.62–19.75) hours while the standard care group was 30.5 (29–35) hours. - There was an increase in the average Barthel Index score in the intervention group, namely at admission 43.12 ± 17.34 SD (moderate dependence) to 76.25 ± 16.16 SD (mild dependence) at the time of discharge from the hospital, and 88.37 ± 10.08 SD (mild dependence) at 3 months follow-up. Whereas in the standard care group, namely at the time of admission, 47.25 ± 14.76 SD (moderate dependence) became 68.25 ± 14.34 SD (mild dependence) upon discharge from the hospital, and 75.50 ± 11.53 SD (mild dependence) at 3-month follow-up. - The intervention group had significant improvement in functional status at discharge (P < 0.001) and at three months of follow-up (P < 0.001) compared with the standard care group. - Length of stay in hospital was shorter in the intervention group (median: 8 (7–9)) than the control group (median:10 (8–12.75)) p-value <0.001. (Chippala & Sharma, 2016)
Morreale, M., Marchione, P., Pili, A., Lauta, A., Castiglia, SP, et.al. (2016)	Early versus Delayed Rehabilitation Treatment in Hemiplegic Patients with Ischemic Stroke: Proprioceptive or Cognitive Approach?	A blinded interventional multicenter prospective study Guidelines for Kabbat Schemes & Perfetti Theory - Early mobilization is carried out 45 minutes	- The time for early mobilization in the e-PNF group was 17 ± 2 hours, while in the e-CTE group it was 18 ± hours. - The majority of respondents had an NIHSS score of 7-13 (moderate severity), namely 75% in the e-PNF group and 78% in the e-CTE group. - There was a decrease in the average mRs score in 4 groups, namely 4 ± 1 SD (severe-severe disability) to 3 ± 1 SD (moderate-severe disability) at 3

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
		<p>in bed or out of bed with active/passive proximal joint ROM according to the Kabat scheme in the PNF group given positioning in bed, outside of bed, or active/passive guided movement for 15 minutes according to Prefetti's technique in the CTE group then given bed positioning for the next 15 minutes and continued with CTE & PNF rehabilitation 2.15 hours/day.</p> <ul style="list-style-type: none"> - Standard care consists of 60 minutes of bed positioning for 4 day.s 	<p>months follow-up and 2 ± 1 SD (mild-moderate disability)) at 12 months follow-up ($p < 0.001$).</p> <ul style="list-style-type: none"> - There was a greater increase in the average Barthel Index score in the e-PNF and e-CTE early mobilization groups, from 46 ± 8 SD (moderate dependence) to 63 ± 6 SD (light dependence) at 3 months follow-up and 89 ± 2 SD (mild dependence) at 12 months follow-up in the e-PNF group while in the e-CTE group from 45 ± 8 SD (moderate dependence) to 62 ± 7 SD (moderate dependence) at 3 months follow-up and 86 ± 7 SD (moderate dependence) mild) at 12 months follow-up ($p < 0.001$) compared to the delayed PNF and CTE groups. - There was a significant difference in the 6MWT score between early mobilization and delayed mobilization ($p < 0.01$). - According to the post-acute rehabilitation program, there was no significant difference in MI scores in the lower and upper extremities between early mobilization and delayed mobilization ($p < 0.01$ and $p < 0.001$, respectively). - The MMSE and BDI scores were the same in all groups. (Morreale et al., 2016)
Herisson, F., Godard, S., Volteau, C., Le Blanc, E., Guillon, B., & Gaudron, M. (2016)	Early Sitting in Ischemic Stroke Patients (SEVEL): A Randomized Controlled Trial	<p>Prospective multicenter study SEVEL guidelines</p> <ul style="list-style-type: none"> - The early group of patients will be seated in bed as early as possible not > 24 hours after onset. - The progressive group 	<ul style="list-style-type: none"> - The time for carrying out early sitting mobilization was carried out on day 1.08 ± 0.26 SD while in the progressive sitting group, namely on day 2.97 ± 0.26 SD - There was an improvement in the NIHSS average score of patients in the early sitting mobilization group, from 7.2 ± 3.9 SD (moderate severity) to 1.75 ± 2.44 SD (mild severity) at 3 months follow-up and in the progressive sitting group, namely 7.8 ± 5.6 SD (moderate severity). to 1.71 ± 2.52 SD (mild severity) at 3 months follow-up. - The time for carrying out early sitting mobilization was carried out on day

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
Franceschini, M., Fugazzaro, S., Agosti, M., Sola, C., Di Carlo, A., et al (2018)	Acute Phase Predictors of 6-Month Functional Outcome in Italian Stroke Patients Eligible for In-Hospital Rehabilitation	<p>Multicenter prospective project study (ISC study) Guidelines not listed</p> <p>Patients are given rehabilitation, activities out of bed, sitting out of bed during the acute phase</p>	<p>1.08 ± 0.26 SD while in the progressive sitting group, namely on day 2.97 ± 0.26 SD.</p> <ul style="list-style-type: none"> - There was an improvement in the NIHSS average score of patients in the early sitting mobilization group, from 7.2 ± 3.9 SD (moderate severity) to 1.75 ± 2.44 SD (mild severity) at 3 months follow-up and in the progressive sitting group, namely 7.8 ± 5.6 SD (moderate severity). to 1.71±2.52 SD (mild severity) at 3 months follow-up. - There was an increase in respondents with an average mRs score of 0-2 (no mild symptoms) in the early mobilization group, from 19 (31.1%) to 48 (76.19%) in the 3-month follow-up while in the control / progressive group from 23 (31.5%) to 58 (77.33%) at 3 months follow-up. - The mean score of the Barthel Index 3 months follow-up in the early mobilization group was 96.67±8.09 SD (independent) while in the progressive group it was 90.53±22.28 SD (independent). (Herisson et al., 2016) <hr/> <ul style="list-style-type: none"> - Early mobilization time ≤48 hours (n=106) had a Barthel Index score <75 in 37 patients while a score ≥ 75 in 69 patients (p<0.0001). - There was an improvement in the Barthel Index score at admission, which was 25.0 (n=310) so that 160 patients had a score <75 (mild-severe dependence) and 150 patients had a score ≥75 (self-sustained-slightly dependent). - The initial NIHSS score (n=310) was 8 (moderate severity) to 11 (moderate severity) in patients with Barthel Index <75 and to 6 (moderate severity) in patients with Barthel Index ≥75. - The initial admission mRs score (n=310) was 0 (no symptoms) remained at 6 months in patients with a Barthel Index <75 or ≥75. - In the EM group ≤48 hours, there were more respondents who had mRs

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
			score 0-2 after 6 months (no symptoms-mild disability) than those who had mRs score 3-5 (moderate disability-severe disability) ($p < 0.0001$) than mobilization group ≤ 72 hours. (Franceschini et al., 2018)
Rahayu, UB, Wibowo, S., & Setyopranoto, I. (2019)	The Effectiveness of Early Mobilization Time on Balance and Functional Ability after Ischemic Stroke	Randomized controlled trial Bobath method guidelines, PNF, CIMT - The intervention group received early mobilization at 24 hours after onset. - The control group was given early mobilization at 48 hours after onset. - Early mobilization includes cognitive stage (sensory stimulation, visual, upper and lower extremity proprioceptive verbal), associative stage (active assistance, upper and lower limb exercises), autonomic stage (functional training).	- The time for carrying out early mobilization is within 24 hours after onset - There was an increase in the average Barthel Index score in the intervention group, namely on day 1 22.90 (severe dependence), day 5 was 55.05 ± 11.15 (moderate dependence), and on day 7 70.90 ± 17.93 (mild dependence). While in the control group on day 1 was 23.40 (severe dependence), day 5 38.94 ± 13.47 (severe dependence), and on day 7 was 56.45 ± 20.7 (moderate dependence). - The balance in the two groups did not show a significant difference on days 1 and 5 but showed a significant difference on day 7 ($p < 0.005$). The average increase in the balance value of the intervention group and the control group on day 7 was 33.75 (60.26%) and 22.50 (40.17%), respectively, the difference was assessed as a balance of 11.65 points (20.80%). (Rahayu et al., 2019)
Alamri, MS, Waked, IS, Amin, FM, Al-quliti, KW, & Manzar, MD	Effectiveness of An Early Mobility Protocol for Stroke Patients in the Intensive Care Unit	Single group pretest-posttest Guidelines not listed - Early mobilization is given 60-90 minutes	- The time for carrying out early mobilization is 24 hours after onset. - There is a difference in the Barthel Index score at pre and post intervention, from 15.00 ± 30 SD (total dependence) to 42.00 ± 60 SD (moderate dependence) ($p < 0.001$).

Table 1. Synthesis Matrix (continued)

Author (Year)	Title	Methods and Protocol of Action	Findings
(2019)		<p>according to the stage of the patient's disease which is divided into 3 categories.</p> <ul style="list-style-type: none"> - Category 1: 50 minutes of electrical transcutaneous muscle stimulation, 15 minutes of passive proprioceptive neomuscular stimulation, 15 minutes of chest therapy, 5-10 minutes of bed rest every 2 hours. - Category 2: 30 minutes of transcutaneous electrical muscle stimulation, 15 minutes of chest therapy, 15 minutes of active exercise - Category 3: 15 minutes of chest therapy and 45 minutes of mobilization and resistance exercises 	<ul style="list-style-type: none"> - There were improvements in the pre- and post-intervention mRs score, namely patients with an initial mRs score of 4 (severely disabled): 26±43.3 SD to a score of 3 (moderate disability): 36±60.0 SD while patients with an initial mRs score of 5 (severely disabled): 34±56.7 to score 4 (severely severe disability) as much as 24±40.0 SD. - Muscle strength and lung function increased significantly after being given early mobilization (p<0.001). (Alamri et al., 2019)

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