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Review article

Stroke patients' neurorehabilitation

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Abstract

Background: A stroke has an impact on the lives of patients and families, including disruption to the fulfillment of daily needs, the disturbance of the nervous system, and a decrease in the quality of life. Rehabilitation is needed to overcome these problems. However, the current concept of rehabilitation still requires in-depth analysis to make the concept clearer.
Objective: This study discusses in detail the concept of stroke neurorehabilitation based on the relevant literature.
Methods: This study applies a literature study by searching the literature through PubMed MESH data, and EBSCO with the following keywords: rehabilitation nursing, and stroke. Meanwhile, the concept analysis uses guidance from Walker and Avant.
Results: The literature search found 51 articles that met the inclusion criteria and were analyzed. Based on the review that has been carried out, there are 2 antecedent factors, namely internal and external. The are 6 rehabilitation attributes, including (1) Providing holistic biopsychosocial care, (2) Nurses' ability to communicate effectively, therapeutically, and creatively, (3) Being caring and active, (4) existence of collaboration among care teams, patients and families, (5) Having a structured intervention system through clear guidelines, and 6) Using technology to support interventions. By applying those attributes, an increase in the quality of life of stroke patients can be optimally obtained.
Conclusions: Neurorehabilitation requires a multidisciplinary approach, a caring attitude, and the mastery of technology.

Keywords: Rehabilitation; Quality of life; Stroke

Introduction

Stroke is the second cause of death and disability in the world (Feigin et al., 2022). Based on the data, 69.8% of stroke patients die and 52.3% become disabled (Avan and Hachinski, 2021). Risk factors that influence the occurrence of stroke include unhealthy lifestyles, high blood pressure, and disorders of the body's metabolic system (Feigin et al., 2022).

Early rehabilitation is a step taken to reduce the risk of severity/complications and physical disorders in stroke survivors (Whitehead and Baalbergen, 2019). The need for rehabilitation increases as the patient's condition decreases (Stinear et al., 2020). Rehabilitation is carried out to improve the patient's quality of life (Stephens, 1998). Rehabilitation is an active process of change and recovery for patients who experience health problems to acquire the knowledge and skills needed based on optimal physical, psychological, and social aspects (Bernhardt et al., 2020). Prompt neurorehabilitation will have a positive impact on the patient, and the team must ensure that the patient receives this neurorehabilitation intervention (Murie-Fernández et al., 2010).

Neurorehabilitation is important for the recovery process of stroke patients and requires teamwork in stroke care (Prab-

hakaran et al., 2008). The success of neurorehabilitation is influenced by early, specific, targeted treatment as well as the coordination of the treatment team.

The care needs of stroke patients are increasing and neurorehabilitation practices are constantly changing. Hence, it is necessary to discuss in more detail how the factors influence the success of rehabilitation and an in-depth understanding of the neurorehabilitation of stroke patients. Therefore the purpose of this article is to provide a detailed discussion of the concept of rehabilitation (neurorehabilitation) in stroke patients based on relevant literature.

Materials and methods

This conceptual analysis applies a guide compiled by Walker and Avant, which consists of eight stages (Walker and Avant, 2013). Stages 1 and 2 (identification of the concept and the purpose of the concept) have been explained in the introduction. The next stages are (1) concept use, (2) attribute identification, (3) antecedents, (4) consequences, (5) empirical references and (6) case models. These will be explained in the results and discussion. A literature search was carried out through the PubMed, EBSCO database with the following

keywords: rehabilitation nursing and stroke. Inclusion criteria included: articles in English, full text (case studies, qualitative, experiments), topics focused on stroke patients, specifically related to neurorehabilitation. The year of publication was not limited. Quantitative articles were excluded.

Results

Based on the search, 225 articles were found. There were 11 duplicate articles, and 70 articles were excluded (5 articles not in English, 50 articles only abstracts, 3 editorial articles, and 2 magazine articles). 93 articles were not eligible because they did not fit the topic. Overall, the number of accepted articles was 51 (Fig. 1).
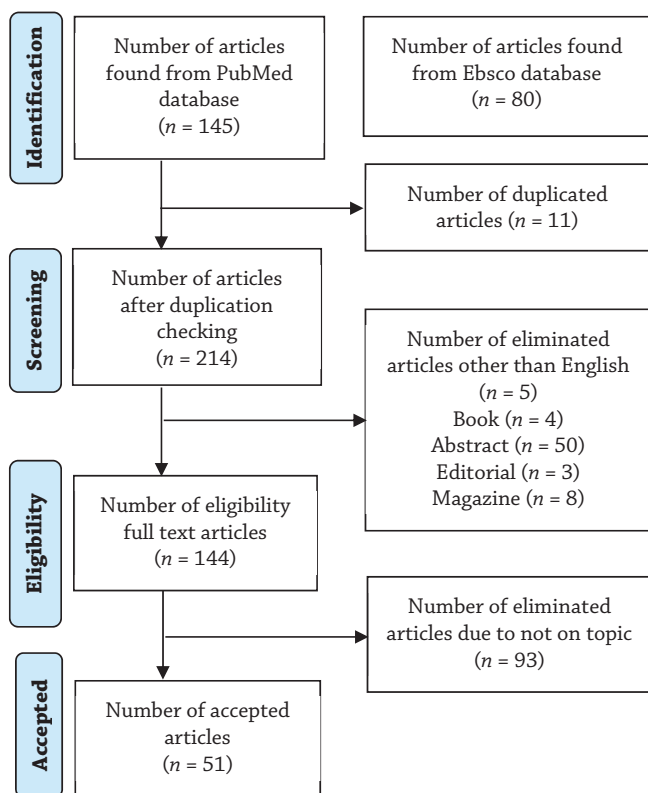

Fig. 1. Prisma chart

Concept usability

The initial stage of concept analysis is to define the usefulness of the concept. Rehabilitation is an intervention given to patients to improve physical function and reduce the occurrence of impaired body functions in interacting with the environment (WHO, 2021). Rehabilitation is the restoration of body function after experiencing an injury, or the restoration of biopsychosocial function after experiencing illness (Dorland, 2002). According to several articles, rehabilitation can also be defined as a program to make patients become independent; especially in relation to self-care (moving, dressing, and personal hygiene). It is carried out in an integrated manner (Purdy, 2007), included as medication management (Yetzer et al., 2016), and as part of fall prevention (Amato et al., 2006). Neurorehabilitation is a medical procedure to repair brain damage and its consequences. It usually always involves a treatment team (Martínez-Pernía, 2020), caregiver support, and interaction between care teams (O'Brien et al., 2017).

Rehabilitation requires collaboration among nurses, doctors, physiotherapists, other health workers, and caregivers (Winstein et al., 2016). It focuses on adaptation, restitution, and the repair of the nervous system (Belagaje, 2017). Rehabilitation provides benefits in optimizing quality of life, adapting to existing changes, integrating with society, and preventing pain (Wade, 2020). Structured neurorehabilitation measures will have an impact on patients, namely increased early mobilization (Masters et al., 2016) and improvement in the quality of life (Flemming et al., 2015). The management of neurorehabilitation improves when there is interaction between the patient, family, and the stroke care team supported by technology such as virtual reality (Chau et al., 2021; Chen et al., 2022; Zhang et al., 2021). The use of internet-based technology is also possible (Munsell et al., 2020; Song et al., 2022).

Therefore, neurorehabilitation is a holistic care collaboration with care teams, including caregivers, to improve body function, prevent physical and nervous system disabilities, and improve the quality of life of stroke patients. Neurorehabilitation measures can be carried out by using technology through technology-based neurorehabilitation intervention management.

Determining the attributes

The next stage of the concept analysis is to investigate/explore the attributes of the concept. It is very important to explain the specific meaning of certain concepts (Walker and Avant, 2013). Six main attributes were found in providing rehabilitation to patients:

1. Providing holistic biopsychosocial care.
2. The ability of nurses to communicate effectively, therapeutically, and creatively.
3. Being caring and active.
4. The existence of collaboration among the care teams, the patients, and families.
5. Performing a structured intervention system through clear guidelines.
6. Using intervention support technology.

The six attributes can be described as follows:

Providing holistic biopsychosocial care
Holistic care is important in providing nursing care to stroke patients and is the basis for rehabilitation (Scottish Government, 2022). The goal of holistic care is to avoid disability (Zuo and Sun, 2022), prevent cognitive impairment, fulfill nutritional needs (Schjolberg and Sunnerhagen, 2012), improve fall prevention (Amato et al., 2006), increase activity/mobilization (Rosario et al., 2013), encourage socialization (An and Shaughnessy, 2011), and enable the patient to get dressed and use the toilet (Purdy, 2007).

Holistic treatment is influenced by several factors, namely age, length of stroke treatment, comorbidities, caregiver abilities, marital status, and the patient's acceptance of the disease (Kobylańska et al., 2019, Zamzam et al., 2020). To achieve holistic care, the stroke care team must be able to carry out indepth examinations (Pang et al., 2022). Besides this, the team plays a role in maintaining the integrity of the patient's cognitive and bodily functions, helping patients and their families to understand the disease and its consequences, relieving the patient's emotional pain and suffering, and helping to carry out activities of daily living (Kirkevold, 2010).

The ability of nurses to communicate effectively, therapeutically, and creatively

The first step and the key to the success of nursing interventions is communication (Lotfi et al., 2019). Communication is an important part of patient nursing and care (especially if the patient has a speech disorder/requires speech therapy) (Barnard et al., 2022). Communication can also become an obstacle to the interaction of patients and nurses. During rehabilitation, communication is an effective way to establish interaction between patients and caregivers (Bright and Reeves, 2022). The hallmark of good communication is maintaining eye contact. This motivates patients and families to tell stories/communicate (Schjolberg and Sunnerhagen, 2012). Other research states that nurse communication can reduce patient pain and stress (Tetteh et al., 2021). Skills in providing care are important. Professional nurses must continually update their nursing knowledge and skills (Meng et al., 2020).

Other important activities that must be mastered by the stroke care team are: knowing the patient's needs, providing a sense of security and comfort, and understanding the side effects of the medications given to the patient (Yetzer et al., 2016). The care team also needs to provide education to patients and families (Booth et al., 2005), build collaboration between them (Vanderzalm et al., 2013), and perform nurse advocacy functions for patients and families (Barreca and Wilkins, 2008).

Being caring and active

A caring attitude towards patients shows mutual respect, commitment, and responsibility (Watson, 2009). A gentle and caring attitude can help to realize predetermined nursing goals (Hemberg and Bergdahl, 2019). The caring attitude the team provides to the patient and their family must be natural and, authentic (Fernández Trinidad et al., 2019). Nurses must always be honest, respectful, motivate patients in uncertain conditions, provide a sense of comfort, and listen to patient and family complaints (Stroehlein, 2016). Caring should include 3 elements of support to the patient: emotional, physical, and personal (Drahošová and Jarošová, 2016).

There are several factors that should appear in caring: (1) respect for patients and families, (2) confidence in the knowledge and skills mastered, (3) interaction between the care team, patients, and families, (4) ensuring a sense of security and comfort, (5) paying attention to and praising patients and families (Wolf et al., 2014).

The existence of collaboration among the care team, patients, and families

Nurses must be able to understand changes in the patient's condition, always have a positive attitude, and feel good about providing nursing interventions (Barreca and Wilkins, 2008). The success of the team is also supported by the provision of clear assignments (Franz et al., 2020) and team motivation (Hancock et al., 2022).

Performing structured intervention through clear guidelines

Clear procedures will provide benefits in treatment and *vice versa* (Masters et al., 2016). Increased understanding of the guidelines is reaches through training in stroke rehabilitation treatment procedures (Booth et al., 2005). In addition to procedural understanding, the team must be able to master clinical questions. These include: what is the right therapy, what symptoms appear, how can we perform a good assessment, what are the right procedures and interventions, and the experience of carrying out stroke rehabilitation (Kloda and

Bartlett, 2014). Structured assessment is carried out in a systematic, accurate, functional, and effective way (Yetzer et al., 2015; 2016).

Using intervention support technology

Rehabilitation care for stroke patients, and in particular neurorehabilitation, requires technology such as a mobile medical management system (Hughes et al., 2020; Song et al., 2022). Mobile phones area utilized for recognition (O'Brien et al., 2017). The technology used should be easy to use, inexpensive, able to perform quick evaluation, and focus on neurorehabilitation (Salbach et al., 2009).

Identifying antecedents and consequences

Antecedent factors must exist before the concept occurs and they can affect the concept (Walker and Avant, 2013). There are two antecedent factors in this concept: internal and external. Internal factors (related to the patient's condition) include: history of comorbidities, patient and family characteristics, age, self-confidence, psychological status, treatment experience, mastery of technology, social support, treatment plans, and activities. External factors include: the activities supporting the care team (namely health professionals nurses and other health workers), the environment, human resources and the quality of the care team, clear guidelines and assignments, and mastery of technology.

Conditions that have a negative effect on stroke patients are worsening condition and the presence of comorbid factors (Kobylańska et al., 2019). Comorbid factors include hypertension, diabetes mellitus, and hyperlipidemia (Qian et al., 2020). conditions that have positive effect are: the experience of providing patient care, the interaction between patients and families, ability to control fear and sadness. The patients are also able to be cooperative (Misawa et al., 2018). Meanwhile, self-efficacy is influenced by experience, social relationships, emotional and physical factors (Luzzo, 2019).

Coordination with other health workers has a positive impact on the continuity of rehabilitation, while cooperation with the patient's family is urgently needed (Meng et al., 2020; Scottish Government, 2022). Nurse collaboration through technology in the form of telehealth can improve the motor skills of stroke patients (Wu et al., 2020), including oral care (Obana et al., 2019). A conducive environment will provide good care and service to patients (Aviles Gonzalez et al., 2019). The use of technology must be supported by standard policies and guidelines to make it easier for the team (Vehko et al., 2019). This technology can increase knowledge for rehabilitation support elements (Fletcher-Brown et al., 2020) and service quality (Halbert and Bautista, 2019), indicating that these factors are very important in the rehabilitation of stroke patients, especially when it comes to neurorehabilitation.

Consequences

Walker and Avant, (2013) define consequences as all the things that will arise when a condition has occurred. Neurorehabilitation benefits:
1. Reducing the risk of psychological disorders (anxiety, depression, accelerating the healing process) (Mauk et al., 2009; Purdy, 2007).
2. Avoiding the risk of infection (pneumonia and urinary tract infections, improve motor function) (Schjolberg and Sunnerhagen, 2012).
3. Reducing the risk of recurrence (Flemming et al., 2013), physical distractions and disabilities (Lincoln et al., 2000).

4. Providing good quality of care (Dowswell et al., 2000), improving patient quality of life and neurological function (O'Brien et al., 2017; Zuo and Sun, 2022).
5. Avoiding dependence and minimizing complications (An and Shaughnessy, 2011).
6. Providing prompt service regarding diagnosis, treatment, and rehabilitation of stroke patients (Song et al., 2022).

Concept analysis model
The model of analysis of stroke patient rehabilitation concept (based on concept analysis) is shown in Fig. 2.

Empirical reference
The final stage of concept analysis is the empirical application of the concept studied (Walker and Avant, 2013). Several measurement instruments can be used to assess patient rehabilitation outcomes, including measuring the quality of life of stroke patients using the Stroke Specific Quality of Life Scale (SSQOLS) (Khalid et al., 2016). This questionnaire consists of 12 quality domains (energy = 3 questions, family roles = 3 questions, language = 5 questions, mobility = 6 questions, mood = 5 questions, personality = 3 questions, self-care = 5 questions, social roles = 5 questions, thinking = 2 questions, limb function = 5 questions, vision = 3 questions, productivity = 3 questions). Meanwhile, the rehabilitation process can be measured using the Patient Participation in Rehabilitation Questionnaire (PPRQ) (Lindberg et al., 2013). This questionnaire consists of 6 questions about respect and integrity, 4 questions about planning and decision making, 5 questions about motivation, and 4 questions about family involvement.

Assessing and measuring caring in nursing can be using various instruments. (Watson, 2009). 21 measurement tools can be used, but the four most popular: CARE-Q, Caring Behavior Assessment, Caring Behavior Inventory, and CDI (Beck, 1999). Besides these, the rehabilitation of stroke patients can also be assessed with the DISKO tool (Palmcrantz et al., 2017).
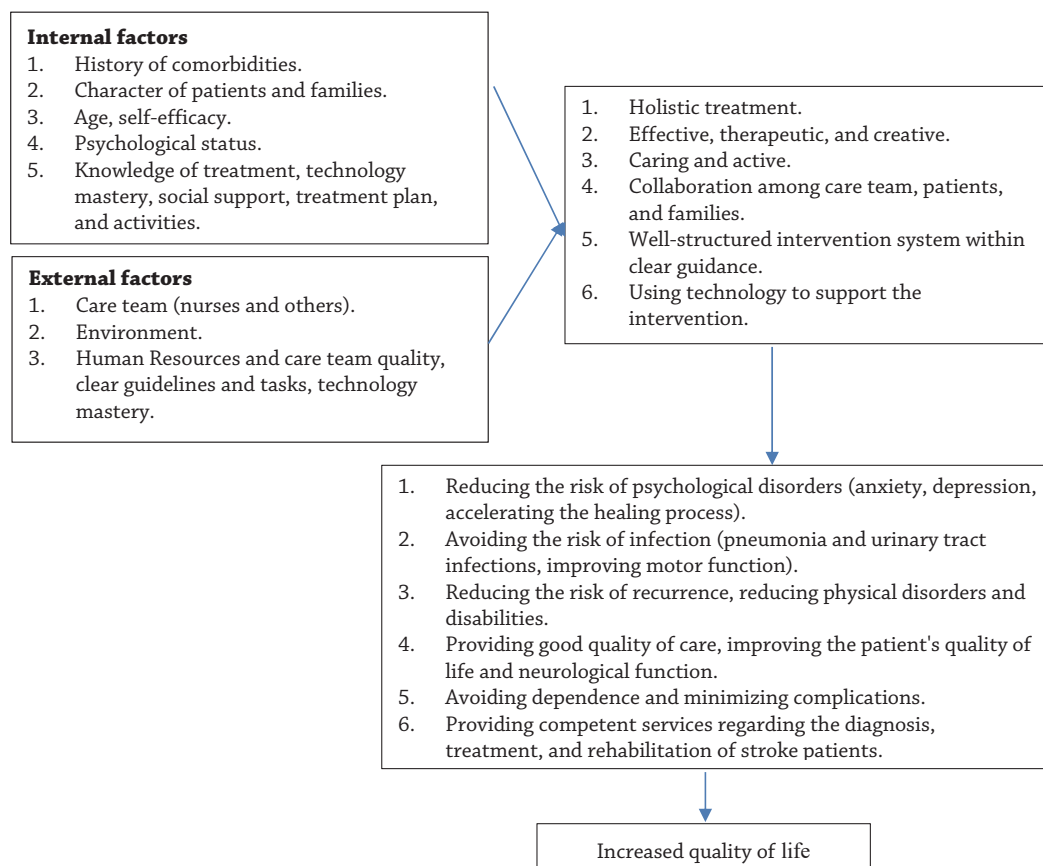
A model case
A man is admitted to the internal medicine ward and receives treatment for a stroke. The day before entering the hospital, the patient suddenly felt weak and began to speak slur. The patient receives treatment from the care team. Nurses conduct assessments, monitor patient responses, meet the patient's needs, and provide education to the patient and their family. Meanwhile doctors conduct MRI examinations to determine the disorders experienced and provide medical therapy. Meanwhile, another team that consists of physiotherapists, nutritionists and other care team staff provides care according to the response that appears in the patient.

The care team always show a caring attitude so that the patient and their family feel comfortable and the patient's quality of life is improved. This can also reduce physical and neurological disorders, and the risk of infection and complications. Monitoring and intervention measures carried out at home use VR and telehealth to train nerve function ability.

Research limitations
The researchers did not conduct an analysis on collaboration among care teams in providing care to stroke patients (especially neurorehabilitation), or the form of education for pa-

Internal factors
1. History of comorbidities.
2. Character of patients and families.
3. Age, self-efficacy.
4. Psychological status.
5. Knowledge of treatment, technology mastery, social support, treatment plan, and activities.

External factors
1. Care team (nurses and others).
2. Environment.
3. Human Resources and care team quality, clear guidelines and tasks, technology mastery.

1. Holistic treatment.
2. Effective, therapeutic, and creative.
3. Caring and active.
4. Collaboration among care team, patients, and families.
5. Well-structured intervention system within clear guidance.
6. Using technology to support the intervention.

1. Reducing the risk of psychological disorders (anxiety, depression, accelerating the healing process).
2. Avoiding the risk of infection (pneumonia and urinary tract infections, improving motor function).
3. Reducing the risk of recurrence, reducing physical disorders and disabilities.
4. Providing good quality of care, improving the patient's quality of life and neurological function.
5. Avoiding dependence and minimizing complications.
6. Providing competent services regarding the diagnosis, treatment, and rehabilitation of stroke patients.

Increased quality of life

Fig. 2. Model analysis of stroke patient rehabilitation concept

tients and families. Thus, it might not be comprehended that the study reveals the entire construct of the concept.

Conclusions

From this concept analysis, we can conclude that there are antecedent concepts (including internal and external factors), and 6 rehabilitation attributes. The Neurorehabilitation of stroke patients always requires collaboration between teams and a caring attitude. The use of technology will improve a patient's quality of life.

Ethical aspects and conflict of interests
The authors have no conflict of interests to declare.

Neurorehabilitace pacientů po cévní mozkové příhodě

Souhrn
Úvod: Cévní mozková příhoda má dopad na životy pacientů a rodin, včetně narušení plnění každodenních potřeb, narušení nervového systému a snížení kvality života. K překonání těchto problémů je nutná rehabilitace. Současná koncepce rehabilitace však stále vyžaduje hloubkovou analýzu, aby byla koncepce jasnější.
Cíl: Tato studie podrobně rozebírá koncept neurorehabilitace iktu na základě relevantní literatury.
Metodika: Tato studie byla založena na prohledávání literatury prostřednictvím dat PubMed MESH a EBSCO s následujícími klíčovými slovy: rehabilitační ošetřovatelství a cévní mozková příhoda. Zároveň koncepční analýza využívá pokyny od Walkerové a Avantové.
Výsledky: Literární rešerše nalezla 51 článků, které splňovaly kritéria pro zařazení a byly analyzovány. Na základě provedeného přezkumu existují 2 předcházející faktory, a to interní a externí. Jedná se o 6 rehabilitačních atributů, mezi něž patří (1) poskytování holistické biopsychosociální péče, (2) schopnost sester efektivně, terapeuticky a kreativně komunikovat, (3) pečování a aktivita, (4) existence spolupráce mezi pečovatelskými týmy, pacienty a rodinami, (5) strukturovaný systém intervencí prostřednictvím jasných pokynů a (6) používání technologií k podpoře intervencí. Aplikací těchto atributů lze optimálně dosáhnout zvýšení kvality života pacientů po cévní mozkovou příhodě.
Závěr: Neurorehabilitace vyžaduje multidisciplinární přístup, pečlivý přístup a zvládnutí technologie.

Klíčová slova: cévní mozková příhoda; kvalita života; rehabilitace

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