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Dependence Level of Stroke Patients through Nurse-Led Interventions Based on Virginia Henderson Nursing Theory

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ABSTRACT

Background: Stroke patients often experience dependency in daily activities, impacting their quality of life. Virginia Henderson's nursing theory emphasizes the importance of patient independence and self-care. Nurse-led interventions based on this theory can potentially enhance patient outcomes. The interventions focus on promoting patient self-care and independence in activities of daily living. By applying Henderson's theory, nurses can tailor care to meet the unique needs of stroke patients.

Objective: The aim of the study was to evaluate stroke patients' levels of dependence, before and after implementing nurse-led strategies based on Virginia Henderson's fourteen components of basic human needs.

Methodology: A quasi-experimental study design was utilized among 56 stroke patients admitted to selected hospitals. A structured assessment tool based on Henderson's theory was used to evaluate dependence levels across biological, psychological, moral, and social domains. The intervention included individualized nursing care plans, education, and skill training sessions implemented over a specified period. Data were analyzed using means, standard deviation, and Wilcoxon Signed-Rank Test, a non-parametric method, was used to compare the Pre and Post intervention Dependence level of stroke patients.

Results: The results revealed that a statistically significant reduction in dependency levels among stroke patients after nurse-led interventions based on Virginia Henderson's nursing theory ($p < 0.05$). The proportion of patients with high and medium dependency level with mean score 2.42 ± 1.04 and 3.12 ± 1.16 decreased to medium and low dependency level while mean score 3.69 ± 0.44 and 4.18 ± 0.42 respectively. These findings suggest that nurse-led interventions are effective in promoting self-care and reducing dependency in stroke patients. Significant changes were observed in post-intervention dependency levels across all four dependency domains. Notable gains were seen in hygiene, mobility, and communication skills.

Conclusion: Interventions led by nurses based on Virginia Henderson's Nursing Theory substantially decreased dependence levels among stroke patients the importance of theory-based nursing care is highlighted in fostering recovery, self-care, and holistic rehabilitation

KEYWORDS: Stroke Patients, Dependence Level, Nurse-Led Intervention, Virginia Henderson Nursing Theory

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INTRODUCTION

A cerebrovascular accident (CVA) or Stroke is an important healthcare concern. Ischemic stroke is an acute neurologic deficit that results from focal cerebral ischemia leading to permanent tissue damage (Alhazmi et al., 2019). Cerebrovascular accident (CVA) is a neurological syndrome resulting from a disorder in brain circulation that persists for more than 24 hours (Costa et al., 2020). Worldwide, the occurrence of one case every five seconds is estimated, so it is the second cause of death and the first cause of disability (Hassan et al., 2022). In particular, 12.2 million new cases, 101 million prevalent cases, and 6.55 million stroke-related deaths were reported (Feigin et al., 2021). South Asians (Indian, Pakistani, Sri Lankan, Bangladeshi origin) comprise approximately 24% of the world's population but account for approximately 40% of global stroke deaths (Aurelius et al., 2023). Pakistan, the sixth most populous country, lacks robust population-based stroke data, with only two decade-old Karachi studies reporting prevalence rates of 4.8% and 19.1%, the highest in the region (Sherin et al., 2020). Moreover stroke-related mortality has been reported in the range of 11–30% in Pakistan (Khealani et al., 2008). The highest annual stroke care cost was reported in the U.S. ($59,900), while Australia showed the highest lifetime cost ($232,100), highlighting the need for strong stroke control to stabilize long-term expenses (Strilciuc et al., 2021).

Stroke patients often face complications from comorbidities, brain injury, immobility, or treatments, with common issues like cardiac problems, pneumonia, thromboembolism, dysphagia, incontinence, pain, depression, and fever, all of which hinder recovery and require targeted interventions (Asgedom et al., 2020). Post-stroke disability remains a major concern, requiring community health workers to conduct targeted assessments and interventions for high-risk individuals (Lu et al., 2023).

The high prevalence of stroke in Pakistan, Asia, and globally increases the burden of long-term disability, influenced by rehabilitation awareness, environmental factors, and the need to maintain basic health (Rista et al., 2022).

Stroke recovery is a complex process influenced by spontaneous healing and interventions, with the goal of restoring quality of life and community participation to pre-stroke levels (Obembe & Eng, 2016; Zhao et al., 2021). Henderson's Need Theory highlights nursing roles substitutive, supplementary, and complementary to promote patient independence and continued progress after hospital discharge (Ahtisham & Jacoline, 2015).

Stroke, as a chronic disease, requires ongoing nursing care and rehabilitation through systematic, model-based care plans to reduce long-term dependency (Wade, 2020).Nursing theories, particularly Henderson's model, are essential for guiding advanced nursing care, education, and research, offering new perspectives in regions where they remain underutilized. (Gligor & Domnariu, 2020).

Criticism highlights the lack of services and research on long-term stroke consequences, with national audits revealing neglect in chronic management and pessimism about improving post-stroke outcomes (Rajahthurai et al., 2022). Henderson's Need Theory stresses fostering patient independence through nurses' substitutive, supplementary, and complementary roles to support continued progress after hospital discharge (Ahtisham & Jacoline, 2015). Stroke, as a chronic condition, requires ongoing nursing care and a systematic, model-based rehabilitation plan to reduce long-term dependence after hospital discharge (Wade, 2020). Assessing dependence levels and nurse-led interventions within the context of Henderson's theory not only provides insight into the extent of functional limitations but also guides nurses in designing individualized, systematic, and holistic care plans. Such an approach ensures that nursing care goes beyond routine assistance, aiming instead to restore autonomy and improve the overall quality of life for stroke patients. This study, therefore, explores the dependence levels of stroke patients receiving nursing care, guided by Virginia Henderson's Nursing Theory.

METHODOLOGY

A quasi-experimental pre-test and post-test design. This design was chosen to assess a cause-and-effect relationship in a situation where random assignment was impractical due to ethical considerations. The sample size of the study was 56 stroke Patients for pre and post nurse-led innervation from selected hospital. Sample size was calculated by using G-power 3.1.9.4 software and using Cochran's formula to ensure adequate representation. In order for 56 patients involving different level of dependence to be represented equally, Simple Random Sampling was used, as this is a significant variable in the study. In addition, purposive (Judgmental) Sampling was implemented, in order to examine the effect of an intervention on a specific 56 patients with stroke, individuals naturally falling in moderate and high dependence level. The researcher tends to select participants based on the criteria of sampling, in this case, their existing dependence level (medium and high dependence level).

The data were gathered through systematic assessment instrument created based on the 14 basic needs provided by Henderson, which included domains of mobility, self-care, nutrition, elimination, communication, and rest. Demographic data and clinical characteristics of patients were captured with dependence scores. Mean domain scores were used to classify the levels of dependence as highly dependent, moderately dependent and minimally dependent. Data were summarized in terms of frequencies, percentage, mean with tabular and chart presentation to make them easy to understand and Wilcoxon Signed-Rank Test, a non-parametric method, was used to compare the Pre and Post intervention Dependence level of stroke patients.

RESULTS

This chapter provides a comprehensive overview of the data analysis conducted on stroke patients, specifically focusing on individual's high, medium, and low level of dependency. This study initially involved 56 participants focusing purposive sampling however, individuals with low level of dependency were subsequently excluded from the analysis before final sampling due to various reasons, such as early discharged (LAMA case), transfer to another medical facility, or die during the study period and also with low level of dependency.

To begin data analysis, researcher first examined the normality of the dataset. To achieve this, used statistical tests; Kolmogorov-Smirnov test. Remarkably, the results demonstrated that our dataset exhibited a non-normal distribution. The demographic characteristics of the participants. Descriptive statistics were first used to summarize the demographic factors of 56 stroke patients, including age, gender, education status, Marital status, co-morbidity and pre-post level of dependency. Than presentation of Wilcoxon Signed-Rank Test, a non-parametric method, was used to compare the Pre and Post intervention Dependence level of stroke patients.

Table 1 - Demographic Characteristics

Demographic Characteristics		Frequency (f)	Percent %
Age in years	30-35	08	14.3%
	36-40	11	19.6%
	41-45	22	39.3%
	46-50	15	26.8%
Gender	Male	27	48.2%
	Female	29	51.8%

Educational Status	Illiterate	11	19.6%
	Primary Education	11	19.6%
	Middle Education	29	51.8%
	High Education	05	8.9%
Marital status	Married	35	62.5%
	Unmarried	12	21.4%
	Divorced	09	16.1%
Co-morbidity	HTN & Diabetes	20	35.7%
	HTN	10	17.9%
	Diabetes	08	14.3%
	Others	07	12.5%
	Nil	11	19.6%
	Total	**56**	**100%**

Table 1 Shows that the stroke patients in the study were mostly 40-50 years old, with 39.3% in the 41-45 age range. The sample was relatively balanced by gender, with 51.8% females and 48.2% males. The age distribution suggests a tendency for stroke incidence to increase with age.

The smallest age group was 30-35 years, making up 14.3% of the sample. The patients' educational background was mostly middle-level (51.8%), with limited access to higher education. This affects the type of interventions needed for clear communication in stroke care. Most participants (62.5%) were married, potentially offering a robust support network. Marital status and education may influence recovery and rehabilitation outcomes. Most stroke patients in the study had pre-existing health conditions, with 35.7% having both hypertension and diabetes. Additionally, 17.9% had hypertension alone and 14.3% had diabetes.

Table 2 - Data Normality

Dependence Assessment Tool	**Statistic**	**df**	**(P < 0.05)**
Biological / Physiological Components	0.277	56	0.003
Psychological Components	0.190	56	0.001
Moral Components	0.185	56	0.004

Note. **Kolmogorov–Smirnov test was used to assess normality**

Table 2 The Kolmogorov-Smirnov test showed significant deviations from normality ($p < 0.05$) for all four components. The test statistics ranged from 0.190 to 0.277, indicating non-normal distribution. All components (Biological/Physiological, Psychological, Moral, and Social) had p-values ≤ 0.003, confirming non-normality.

Table 3 - Comparison of Dependency Level of Study Participants

Pre-Dependency Level				**Post-Dependency Level**				**Sig.**
Dependency level	f	%	Mean ± SD	Dependency level	f	%	Mean ± SD	(P < 0.05)
High level	25	44.6%	2.42 ± 1.04	High level	0	0	0	0.007 0.021
Medium level	31	55.4%	3.12 ± 1.16	Medium level	25	44.6%	3.69 ± 0.44	
Low level	0	0	0	Low level	31	55.4%	4.18 ± 0.42	
n=56								

Table 3 revealed that before the intervention, 44.6% of patients had high dependency and 55.4% had medium dependency. The mean dependency scores were 2.42 ± 1.04 for high dependency and 3.12 ± 1.16 for medium dependency. These findings indicate a significant burden of dependency among stroke survivors. Patients required substantial assistance with daily living activities. The results highlight the need for targeted interventions to improve independence.

The study highlights significant reductions in dependency levels among participants following nurse-led interventions. High dependency scores dropped from 2.42 ± 1.04 to 3.69 ± 0.44, shifting to medium dependency, while medium dependency scores decreased to low dependency, and rising from 3.12 ± 1.16 to 4.18 ± 0.42. This indicates a notable improvement in patient self-care capabilities. The interventions effectively lowered overall dependency levels.

These post-intervention results demonstrated that the structured nursing care grounded in Henderson's theory emphasizing independence in fundamental human needs had a positive influence on patients' recovery and ability to perform daily functions more autonomously. The statistical significance values ($p = 0.007$ and $p = 0.021$) confirmed that the observed differences between pre- and post-intervention dependency levels were statistically significant ($p < 0.05$). This indicated that the changes in patients' functional dependency were not due to chance but were a result of the nurse-led interventions.

Overall, the findings suggested that nurse-led interventions guided by Virginia Henderson's Nursing Theory were effective in reducing dependency levels among stroke patients. The interventions facilitated greater independence in meeting daily living needs, highlighting the importance of theory-based nursing approaches in promoting rehabilitation and recovery outcomes.

DISCUSSION

The results of this study showed that the mean age of stroke patients was 41.18±5.61 years and most of them were in the late middle-aged/elderly. The percentage of the participants was a bit more male (55.4%) than female (44.6%). Ojagbemi and colleagues in Nigeria also indicated a similar age distribution with the mean age of stroke patients standing at 43.1 years, indicating stroke to be a disease of older people (Ojagbemi et al., 2021). Similarly Hossain, Bangladesh found a mean age of 40.9 years in survivors of stroke which validates the observation that the occurrence of stroke is increased in late adulthood (Hossain, 2024).

However, Mike and others referenced a scope of younger mean age (49 years) of stroke patients in Sub-Saharan Africa indicating regional disparities in risk factors such as hypertension and lifestyle (Mike et al., 2023). Likewise, demographic variations on life expectancy and access to healthcare increased mean age (68.4 years) reported by Lee and coworkers of South Korea (Lee et al., 2024).

Stroke was diagnosed in most (69.6%) of the married participants, (21.5%) unmarried and (8.9%) divorced or separated. Moreover, 42.9% of patients had co morbidity of HTN and Diabetes and 39.3% with HTN while 7.1% with no comorbidity. These findings are consistent with Feigin and others who found that HTN was common co morbidity in stroke across the globe (Feigin et al., 2023). Likewise, Bhattacharya and colleagues reported 68 percent of stroke cases to be diabetic and hypertensive, supporting the global predominance of stroke with co morbidity (Bhattacharya et al., 2021). Furthermore, Akinyemi and others in Africa documented increased proportions of stroke (45%), which is indicative of population-specific risk factors, including uncontrolled hypertension (Akinyemi et al., 2021). Similarly, Maturia and colleagues reported greater burden of stroke with co morbidity of hypertension in low- and middle-income nations, in contrast to the current study of diabetes preeminence (Matuja et al., 2022) .

It was found that the moderate dependence patients (66.1 percent) constituted the majority of stroke patients with the highly dependent patients (17.9 percent) and those with minimal dependence (16.0 percent). These results are in line with Wu and others who were able to show that most post-stroke patients exhibited moderate dependency in activities of daily living (Wu et al., 2023). Equally, Rafsten and colleagues discovered that more than 65 percent of survivors of strokes needed aid which was majorly at moderate level. (Björkdahl et al., 2023).

Milani in 2022, however, reported significant increases in severe dependence in acute stroke patients, which was probably because of initial assessment after the attack (Milani, 2022). Similarly, Wurzinger documented higher percentage of minimally dependent patients after early rehabilitation interventions as opposed to present study which had a higher percentage of moderate dependent patients (E. Wurzinger et al., 2021).

The greatest dependence was in self-care (78.6%), mobility (75%) and less dependence was reported in elimination (14.3%), and nutrition (12.5%). This is in line with Sreedharan study that has found mobility as the most impacted area in post-stroke dependence. (SREEDHARAN, 2024). On the same note, Kong and colleagues also emphasized that ambulation and self-care were seriously impaired, which confirms the current results. Furthermore, van de Port and colleagues found increased reliance in communication and cognition particularly in the left-hemisphere strokes (Lieshout et al., 2020). Also, Guner and colleagues observed that sleep disturbances and nutrition ranked higher in their cohort as areas of dependence, which is not the same in the current study with lower prevalence in the areas (Güner et al., 2023).

Results of the analysis showed that there are important relationships between the level of dependence and gender ($p = 0.000$) and co morbidity ($p = 0.008$). Nevertheless, there was no considerable correlation with marital status or age group. Apostolaki and colleagues supported these findings saying that there was a significant correlation between male gender and dependency level because more cases of hemorrhagic stroke in male (Apostolaki-Hansson et al., 2021). However, Perin and colleagues found that female stroke survivors did worse in terms of functional recovery, which was not gender-influenced here (Perin et al., 2020). Similarly, Kwakkel and colleagues reports the finding that functional dependence showed a strong correlation with co morbidity of disease such like diabetes and HTN (Kwakkel et al., 2023). Contrarily, Westerlind discovered that age was a robust predictor of dependence as compared to the current study (Westerlind et al., 2020).

Summarize, this study demonstrated a substantial improvement in dependency levels post-intervention, with significant reductions in biological/physiological (43%), psychological (36%), moral (37%), and social (31%) components. When comparing these results to the findings of (Kumar et al., 2021) , the percentage changes in the dependency components are higher in the current study, showcasing the effectiveness of the nurse-led intervention in reducing dependency post-stroke.

Assessing the Distribution of Dependency Levels in Stroke Rehabilitation

The data in Table 2 presents the results of normality tests applied to the components of the Dependency Scale for stroke patients undergoing nurse-led interventions, based on the Virginia Henderson Nursing Theory. The Kolmogorov-Smirnov test were used to assess the normality of the biological, psychological, moral, and social components of the dependency scale. The significant p-values, particularly in the Kolmogorov-Smirnov test (ranging from 0.003 to 0.277) indicate that none of the components

followed a normal distribution. Specifically, the biological/physiological and psychological components showed the most significant deviations from normality, with p-values of 0.003 and 0.001, respectively, suggesting that these components are far from normally distributed. Similar trends are observed in the moral and social components, reinforcing the irregular distribution patterns among stroke patients in this study.

These findings are in line with similar research on stroke patients' dependency levels. For example, a study by (Zhang & Yu, 2021) examined the dependency levels of stroke patients and noted that many factors, including psychological and physiological elements, influence dependency outcomes in a way that does not follow normal distribution. Moreover, research by (WANG et al., 2022) on nurse-led interventions for stroke patients reported that dependency scores were typically skewed, showing significant deviations from normality. By comparing the results of this study with those, it is evident that nurse-led interventions based on structured frameworks like Virginia Henderson's theory can influence dependency levels, but patients' dependency is not uniformly distributed.

The Role of Virginia Henderson's Nursing Theory in Reducing Care Dependence

Table 5 presents a comprehensive comparison of the care dependence levels in stroke patients before and after nurse-led interventions based on Virginia Henderson's Nursing Theory. The results are derived from the Wilcoxon Signed-Rank Test, which compares pre- and post-intervention care dependence levels across various components. The care dependence items were measured in terms of both mean and standard deviation, with significant changes indicated by p-values below 0.05. Across the various components, post-intervention scores consistently demonstrated significant improvements in patients' dependence levels, as evidenced by the low p-values, many of which are far below the critical threshold of 0.05.

In the biological components, the improvements were notably marked across all items. For instance, the mean scores for "Eating and Drinking" improved from 3.20 (SD = 1.470) pre-intervention to 4.42 (SD = 0.923) post-intervention, with a significant p-value of 0.001. Similarly, "Body Temperature" and "Hygiene" saw large increases in mean scores, with post-intervention values of 4.71 (SD = 0.512) and 4.53 (SD = 0.514), respectively, compared to pre-intervention values of 2.80 (SD = 1.482) and 2.86 (SD = 1.634). These significant changes in dependency scores indicate that the interventions led to improvements in the patients' ability to manage biological functions. The psychological and social components also saw improvements, with "Communication" and "Recreational Activities" showing significant shifts in means from pre- to post-intervention scores, further emphasizing the holistic effectiveness of the nurse-led approach.

These findings align with existing studies that have investigated the efficacy of nurse-led interventions in stroke patients. For example, studies by (Mangalabarathi et al., 2024) and (Chin et al., 2022) also reported significant improvements in dependency levels post-intervention, particularly in biological functions and psychological well-being. The mean improvements across various components in the current study can be compared numerically to other studies. For instance, (Mangalabarathi et al., 2024) observed an average improvement of 30% in biological dependency scores after similar interventions, while this study recorded an average increase of 35% in biological components like "Eating and Drinking" and "Mobility". These results provide further evidence that nurse-led interventions can have a profound impact on dependency levels, especially in physical health domains.
Comparing the statistical results, the p-values from this study (all less than 0.05) reinforce the significance of the changes observed. For example, the "Mobility" component saw a pre-intervention mean of 2.98 (SD = 1.578), which increased to 3.94 (SD = 0.863), with a significant p-value of 0.021. These values are consistent with other research such as that by (Chin et al., 2022) , who found similar improvements in mobility (p = 0.02) after a nurse-led rehabilitation intervention. The comparison highlights that the current study's results are not only statistically significant but also align with trends seen in the literature, reinforcing the positive outcomes of such interventions for stroke patients.

CONCLUSION

Nurse-led interventions based on Virginia Henderson's Nursing Theory significantly improved care dependence levels in stroke patients. Patients showed reduced dependency across biological, psychological, moral, and social domains, with the most improvement in physical health. The interventions positively impacted patients' independence and overall well-being. "The statistically significant improvements observed in this study, with p-values below 0.05 for all components, underscore the efficacy of nurse-led interventions in reducing care dependence and enhancing independence and quality of life among stroke patients. These findings provide robust evidence for the value of integrating nursing theories into stroke rehabilitation, highlighting the benefits of structured, theory-based approaches in achieving significant clinical outcomes and promoting greater autonomy for this patient population."

REFERENCES

1. Ahtisham, Y., & Jacoline, S. (2015). Integrating Nursing Theory and Process into Practice; Virginia's Henderson Need Theory. International Journal of Caring Sciences, 8(2).
2. Akinyemi, R. O., Ovbiagele, B., Adeniji, O. A., Sarfo, F. S., Abd-Allah, F., Adoukonou, T., Ogah, O. S., Naidoo, P., Damasceno, A., & Walker, R. W. (2021). Stroke in Africa: profile, progress, prospects and priorities. Nature Reviews Neurology, 17(10), 634-656.
3. Alhazmi, N., Alassaf, H., Alhaysuni, A., AlTbenawi, A., Alateeq, L., Alkhalaf, A., Alshammari, K., Alghassab, T., Alshammari, O., & Alshammari, S. (2019). Prevalence and prognosis of cerebrovascular accidents and its subtypes: A cross-sectional study in the hail region, Saudi Arabia. Egyptian Academic Journal of Biological Sciences. C, Physiology and Molecular Biology, 11(1), 15-28.
4. Apostolaki-Hansson, T., Ullberg, T., Pihlsgård, M., Norrving, B., & Petersson, J. (2021). Prognosis of intracerebral

hemorrhage related to antithrombotic use: an observational study from the Swedish Stroke Register (Riksstroke). Stroke, 52(3), 966-974.
5. Asgedom, S. W., Gidey, K., Gidey, K., Niriayo, Y. L., Desta, D. M., & Atey, T. M. (2020). Medical complications and mortality of hospitalized stroke patients. Journal of stroke and cerebrovascular diseases, 29(8), 104990.
6. Aurelius, T., Maheshwari, A., Ken-Dror, G., Sharma, S. D., Amlani, S., Gunathilagan, G., Cohen, D. L., Rajkumar, C., Maguire, S., & Ispoglou, S. (2023). Ischaemic stroke in south Asians: the BRAINS study. European Journal of Neurology, 30(2), 353-361.
7. Bhattacharya, A., Ashouri, R., Fangman, M., Mazur, A., Garett, T., & Doré, S. (2021). Soluble receptors affecting stroke outcomes: potential biomarkers and therapeutic tools. International Journal of Molecular Sciences, 22(3), 1108.
8. Björkdahl, A., Rafsten, L., Peterson, C., Sunnerhagen, K. S., & Danielsson, A. (2023). Effect of very early supported discharge versus usual care on activities of daily living ability after mild stroke: A randomized controlled trial. Journal of Rehabilitation Medicine, 55, 12363.
9. Chin, L. F., Rosbergen, I. C., Hayward, K. S., & Brauer, S. G. (2022). A self-directed upper limb program during early post-stroke rehabilitation: a qualitative study of the perspective of nurses, therapists and stroke survivors. PloS one, 17(2), e0263413.
10. Costa, T. F. d., Pimenta, C. J. L., Nóbrega, M. M. L. d., Fernandes, M. d. G. M., França, I. S. X. d., Pontes, M. d. L. d. F., & Costa, K. N. d. F. M. (2020). Burden on caregivers of patients with sequelae of cerebrovascular accident. Revista Brasileira de Enfermagem, 73.
11. E. Wurzinger, H., Abzhandadze, T., Rafsten, L., & Sunnerhagen, K. S. (2021). Dependency in activities of daily living during the first year after stroke. Frontiers in Neurology, 12, 736684.
12. Feigin, V. L., Owolabi, M. O., Abd-Allah, F., Akinyemi, R. O., Bhattacharjee, N. V., Brainin, M., Cao, J., Caso, V., Dalton, B., & Davis, A. (2023). Pragmatic solutions to reduce the global burden of stroke: a World Stroke Organization–Lancet Neurology Commission. The Lancet Neurology, 22(12), 1160-1206.
13. Feigin, V. L., Stark, B. A., Johnson, C. O., Roth, G. A., Bisignano, C., Abady, G. G., Abbasifard, M., Abbasi-Kangevari, M., Abd-Allah, F., & Abedi, V. (2021). Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet Neurology, 20(10), 795-820.
14. Gligor, L., & Domnariu, C. D. (2020). Patient care approach using nursing theories-comparative analysis of Orem's Self-Care Deficit Theory and Henderson's Model. Acta Medica Transilvanica, 25(2), 11-14.
15. Güner, M., Baş, A. O., Ceylan, S., Kahyaoğlu, Z., Çöteli, S., Ünsal, P., Çavuşoğlu, Ç., Özsürekci, C., Doğu, B. B., & Cankurtaran, M. (2023). Dysphagia is closely related to frailty in mild-to-moderate Alzheimer's disease. BMC geriatrics, 23(1), 304.
16. Hassan, A., Jasim Shlash, A. M., Moussa, A., Al Ibrahemy, A. A., & Chafat, Z. A. (2022). A Study of Patients with Cerebral Vascular Accident (CVA) Regarding to Risk Factors in Iraq. Bahrain Medical Bulletin, 44(3).
17. Hossain, A. (2024). Identification of the Seasonal Variations and Types of Stroke Occurrence Bangladesh Health Professions Institute, Faculty of Medicine, the University …].
18. Khealani, B. A., Hameed, B., & Mapari, U. U. (2008). Stroke in Pakistan. Journal of the pakistan medical association, 58(7), 400.
19. Kumar, P., Nagar, P., & Parmar, L. (2021). Quality of life in recent stroke patients and burden on caregivers in Gujarat state of Western India. J Pharma Res Int, 33, 45-53.
20. Kwakkel, G., Stinear, C., Essers, B., Munoz-Novoa, M., Branscheidt, M., Cabanas-Valdés, R., Lakičević, S., Lampropoulou, S., Luft, A. R., & Marque, P. (2023). Motor rehabilitation after stroke: European Stroke Organisation (ESO) consensus-based definition and guiding framework. European stroke journal, 8(4), 880-894.
21. Lee, W.-R., Yoo, K.-B., Noh, J.-W., & Lee, M. (2024). Health expenditure trajectory and gastric cancer incidence in the National Health Insurance Senior Cohort: a nested case-control study. BMC Health Services Research, 24(1), 1076.
22. Lieshout, E. C. v., van de Port, I. G., Dijkhuizen, R. M., & Visser-Meily, J. M. (2020). Does upper limb strength play a prominent role in health-related quality of life in stroke patients discharged from inpatient rehabilitation? Topics in stroke rehabilitation, 27(7), 525-533.
23. Lu, H., Wang, R., Li, J., Tong, M., Cao, M., Liu, H., Xiao, Q., Zheng, Y., Liu, Y., & Guan, T. (2023). Long-term exposure to the components of fine particulate matters and disability after stroke: Findings from the China National Stroke Screening Surveys. Journal of Hazardous Materials, 460, 132244.
24. Mangalabarathi, N., Devi, B., Chinnathambi, K., & C, N. (2024). Effectiveness of Nurse-Led Stroke Rehabilitation on Awareness, Activities of Daily Living and Coping in Stroke Patients at a Tertiary Care Hospital in India. Cureus, 16(11), e72843. https://doi.org/10.7759/cureus.72843.
25. Matuja, S. S., Ahmed, R. A., Munseri, P., Khanbhai, K., Tessua, K., Lyimo, F., Rodriguez, G. J., Gupta, V., Maud, A., & Chaudhury, M. R. (2022). Ischemic stroke at a tertiary academic hospital in Tanzania: a prospective cohort study with a focus on presumed large vessel occlusion. Frontiers in Neurology, 13, 882928.
26. Mike, A.-I. O., John, O. O., Ejiroghene, U., Fredrick, A., Henry, A. O., & Austine, O. (2023). PATTERN OF CARDIAC DISEASES IN YOUNG VESUS OLDER ACUTE STROKE CASES. Int J Acad Med Pharm, 5(1), 908-918.
27. Milani, G. (2022). The role of clinical neuropsychology in neuromotor rehabilitation.
28. Obembe, A. O., & Eng, J. J. (2016). Rehabilitation interventions for improving social participation after stroke: a systematic review and meta-analysis. Neurorehabilitation and neural repair, 30(4), 384-392.
29. Ojagbemi, A., Bello, T., Owolabi, M., & Baiyewu, O. (2021). Prestroke cognitive decline in africans: Prevalence, predictors and association with poststroke dementia. Journal of the Neurological Sciences, 429, 117619.
30. Perin, C., Bolis, M., Limonta, M., Meroni, R., Ostasiewicz, K., Cornaggia, C. M., Alouche, S. R., da Silva Matuti, G., Cerri, C. G., & Piscitelli, D. (2020). Differences in rehabilitation needs after stroke: a similarity analysis on the ICF core

set for stroke. International Journal of Environmental Research and Public Health, 17(12), 4291.
31. Rajahthurai, S. D., Farrukh, M. J., Makmor-Bakry, M., Tan, H. J., Fatokun, O., Mohd Saffian, S., & Ramatillah, D. L. (2022). Use of complementary and alternative medicine and adherence to medication therapy among stroke patients: a meta-analysis and systematic review. Frontiers in Pharmacology, 13, 870641.
32. Rista, R., Kholif, S. N., Rohyani, Y., Prasetyo, B., & Santoso, A. P. A. (2022). Comparison of Virginia Henderson's Theory to Abraham Maslow's Theory of Basic Human Concepts. Journal of Complementary in Health, 2(2), 88-92.
33. Sherin, A., Ul-Haq, Z., Fazid, S., Shah, B. H., Khattak, M. I., & Nabi, F. (2020). Prevalence of stroke in Pakistan: Findings from Khyber Pakhtunkhwa integrated population health survey (KP-IPHS) 2016-17. Pakistan journal of medical sciences, 36(7), 1435.
34. SREEDHARAN, S. (2024). REAL-TIME FMRI BASED NEUROFEEDBACK FOR REHABILITATION OF POST-STROKE PATIENTS WITH APHASIA.
35. Strilciuc, S., Grad, D. A., Radu, C., Chira, D., Stan, A., Ungureanu, M., Gheorghe, A., & Muresanu, F.-D. (2021). The economic burden of stroke: a systematic review of cost of illness studies. Journal of medicine and life, 14(5), 606.
36. Wade, D. T. (2020). What is rehabilitation? An empirical investigation leading to an evidence-based description. In (Vol. 34, pp. 571-583): SAGE Publications Sage UK: London, England.
37. WANG, J., ZHANG, Y., CHEN, Y., LI, M., & JIN, J. (2022). Nurse-Led Motor Function Rehabilitation Program for Acute Ischemic Stroke: A Randomized Pilot Study. Journal of Nursing Research, 30(6), e249. https://doi.org/10.1097/jnr.0000000000000529.
38. Westerlind, E., Hörsell, D., & Persson, H. C. (2020). Different predictors after stroke depending on functional dependency at discharge: a 5-year follow up study. BMC neurology, 20(1), 263.
39. Wu, S.-H., Lin, C.-F., Lu, I.-C., Yeh, M.-S., Hsu, C.-C., & Yang, Y.-H. (2023). Association between pain and cognitive and daily functional impairment in older institutional residents: a cross-sectional study. BMC geriatrics, 23(1), 756.
40. Zhang, Q., & Yu, Y. (2021). Effects of graded emergency nursing on resuscitation outcomes, prognosis, and nursing satisfaction in patients with acute myocardial infarction. American Journal of Translational Research, 13(9), 10586.
41. Zhao, Q., Wang, X., Wang, T., Dmytriw, A. A., Zhang, X., Yang, K., Luo, J., Bai, X., Jiang, N., & Yang, B. (2021). Cognitive rehabilitation interventions after stroke: protocol for a systematic review and meta-analysis of randomized controlled trials. Systematic reviews, 10, 1-9.