RESEARCH PAPER

Impact of Rehabilitation Team Approach on Disability in Patients with Stroke

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Abstract:

Background: Stroke is a leading cause of death globally and many stroke survivors lead their lives with multiple disabilities. Rehabilitation is a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment. Stroke rehabilitation is a continuum, starting within days of onset and ending only when it no longer produces any positive effects.

Objective: To evaluate the impact of the rehabilitation team approach on disability among stroke patients.

Methods: This was a quasi experimental study which was conducted in the Physical Medicine and Rehabilitation Department of Bangladesh Medical University (BMU), Dhaka, Bangladesh from November, 2021 to October, 2022. Where 136 subjects were selected and divided in two groups: Group-A (received Rehabilitation Team Approach) and Group-B (received Conventional Rehabilitation Approach) by lottery. Respondents were assessed at 6th weeks, 12th weeks, and 26th weeks. Outcomes were measured by FIM (Functional Independence Measure) scores.

Result: Among 136 patients, 68 patients in group A and 68 patients in group B had completed 26th week follow up. The mean age of the patients in group A and B were 57.25 (± 7.22) and 57.09 (± 6.38) years respectively. Majority of the patients were male (72.06 % & 76.47 % in group A & B respectively). Among the study people Main cause of disability was ischemic 88(64.71%) and hemorrhagic 48(35.29%) stroke. At baseline and after 6th week of treatment, there were no significant statistical differences between the two groups regarding FIM scores. In 12th week, FIM significantly increased in group A (108.17 ± 9.52) compared to group B (103.79 ± 7.37) respectively with a p-value 0.0032 which persisted till 26th week 115.62 ±5.07 & 110.22 ± 4.97 with a p-value <0.0001 in group A & B respectively.

Conclusion: In this study found out that rehabilitation team approach significantly reduces disability of the stroke patients.

Keywords: Rehabilitation Team Approach, Conventional Team Approach, FIM, Stroke rehabilitation.

Introduction

Stroke is the rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin. The pathological background for stroke may either be ischemic or hemorrhagic disturbances of the cerebral blood circulation.[1] The Global Stroke Factsheet released in 2022 reveals that lifetime risk of developing a stroke has increased by 50% over the last 17 years and now 1 in 4 people is estimated to have a stroke in their lifetime.[2] From 1990 to 2019, there has been a 70% increase in stroke incidence, 43% increase in deaths due to stroke, 102% increase in stroke prevalence and 143% increase in Disability Adjusted Life Years (DALY).[3] Stroke rehabilitation is a continuum, starting within days of onset and ending only when it no longer produces any positive effects. After a stroke, many patients regain functional independence and some patients become permanently disabled. All patients after stroke need rehabilitative treatment for proper recovery to minimize disability and to improve quality of life. Many complications after stroke can be prevented or treated effectively by proper rehabilitation program.[4] According to the guidelines for stroke rehabilitation, rehabilitation procedures should be started as soon as the diagnosis is established and life-threatening problems are managed. The objectives are to mobilize the patients and to promote resumption of self-care activities.[5]

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Proper rehabilitation of stroke patients includes early physical, occupational and speech therapy. It is directed towards educating the patient and the family about the neurological deficit, how to prevent the complications of immobility (e.g. pressure sore, deep vein thrombosis, pneumonia, pulmonary embolism, muscle contracture etc.), to encourage and give instructions in overcoming the deficits.[6] Teamwork is one of the most fundamental factors in rehabilitation medicine.[7] Team interaction is associated with an improvement in treatment outcomes[8] and a reduction of morbidity,[9] as well as an increase in patient satisfaction,[10] employee satisfaction[11] and a reduction of health economic costs.[12] A recent study showed that following a team meeting template in an inpatient stroke rehabilitation program led to an increased home discharge rate.[13] Disability remains a neglected issue and person with disability face multiple barriers in Bangladesh. Physical, psychosocial, visual, speech, intellectual, hearing, and hearing-visual disability, autism, cerebral palsy, Down syndrome, and multiple disabilities all exist in Bangladesh, of which physical disability is the most prevalent (22.5%).[14] The reported disability prevalence in Bangladesh varies widely from 5.6% to 16.2%.[15] Bangladesh, as 1 of the 194 United Nations member states, endorsed the World Health Organization (WHO) global disability action plan (GDAP) 2014 to2021. There stands a necessity of developing a better service outlet of the patients with pain and paralysis in association of various disabilities.[16-17] Early initiation of rehabilitation procedures can enable greater return of neurological function and improves long term outcome and quality of life.[18] The Functional Independence Measure (FIM) is the most common measurement tools of patient progress and rehabilitation outcome. The FIM is constructed with seven levels of function, two in which no human helper is required, and five in which progressive degrees of help are required. Eighteen items are defined within six areas of functioning: self-care, sphincter control, mobility, locomotion, communication, and social cognition.[19] The FIM measures levels of disability regardless of the nature or extent of the underlying pathology or impairment.[20] The FIM is not designed for use with individuals with mental impairment alone, although it does report on certain important cognitive and behavioral activities.[21] The FIM can be used in multiple settings, including a hospital, a clinic, a nursing home, or an individual's private home.[22]

Bangladesh Medical university (BMU) has started Rehabilitation Team Meeting to reduce disability of the patients through team work. This rehabilitation team consists of a physiotherapist (PT), occupational therapist (OT), speech language therapist (SLT), rehabilitating nurse, nutritionist, P&O specialist, and residents from psychiatry facilitated by senior faculties of rehabilitation and Physical Medicine and Rehabilitation (PMR) residents. The present study will evaluate the impact of rehabilitation team meeting on stroke patient's disability attending in the Department of Physical Medicine and Rehabilitation (PMR) in BMU.

Materials and Methods

This was a Quasi Experimental Study which was conducted in the outdoor & indoor Physical Medicine and Rehabilitation Department of Bangladesh Medical University (BMU), Dhaka, Bangladesh during the period from November, 2021 to October, 2022. Our study sample size was 136 patients. Patients were allocated in two groups- group A (Designated as experimental group who received Rehabilitation Team Meeting service) and group B (Designated as control group who received conventional rehabilitation therapy). In Rehabilitation team meeting services rehabilitation program was specifically designed for each stroke patient where many different disciplines work together toward a common goal. A physiatrist usually directs the team. Other specialists also play important roles in the treatment and education process. Team members involved depend on many factors. These include patient need, facility resources, and insurance coverage for services. In multidisciplinary team members were Physiatrist, Patient and family, Neurologist, Rehabilitation nurse, social worker, Physical therapist, Occupational therapist, Speech/language pathologist, Nutritionist, Orthotist, Prosthetist. Most rehabilitation teams were hold weekly. In group B Conventional stroke rehabilitation involved early mobilization, prevention of complications, focused on restoring function, ADLs, mobility, and communication. In this case no team was formed. These are the following criteria to be eligible for the enrollment as our study participants: a) Patients with stroke who attended the Physical Medicine and Rehabilitation Department; b) Patients who got gross disability, such as mobility, speech, selfcare, vocational problem, splinter control; c) 1st episode of stroke patients after neurological stabilization;

d) Stroke survivors attending within 4 weeks of onset e) Patients who were aged above 18 years old and a) Patients with pregnancy; b) Patients with previous surgical history (surgery in the pelvic region, spinal surgery, LUCS, etc.); c) Patients with serious illness like unconsciousness, recent MI, unstable angina and Bronchial asthma, Dyslipidemia; d) Patients with any history of uncontrolled diabetes mellitus, hypertension or bone disorder or prolapse lumbar intervertebral disc; e) Patients with significant cognitive deficit or any history of chronic inflammatory pain (e.g., rheumatoid arthritis, septic arthritis, ankylosing spondylitis, etc.) were excluded from our study. Respondents of both groups were assessed to see the effects of treatment at 6th weeks, 12th weeks and 26th weeks. Among 136 patients, 68 patients in group A and 68 patients in group B had completed the 26th-week follow-up. Statistical comparison was performed by using the student t-test for the frequency, or Fisher's exact tests for the other categoric variables (significance, $p < 0.05$). Statistical analysis was carried out by using IBM Statistical Package for Social Sciences version 25(SPSS version 25.0) for Windows 10.

The Functional Independence Measure (FIM):[12] FIM is an assessment tool designed to monitor patients' functional status during the rehabilitation process after a stroke, traumatic brain injury, spinal cord injury, or malignancy. The FIM (Functional Independence Measure) score, ranging from 18 to 126, reflects a person's functional independence, with higher scores indicating greater independence. The score is calculated by assessing 18 items across motor and cognitive domains, each scored on a 1-7 scale, where 1 represents total dependence and 7 represents complete independence. The FIM assessment involves observing and evaluating an individual's ability to perform 18 activities of daily living (ADLs). Each of the 18 items is scored on a 1-7 scale, with 1 indicating total dependence on others and 7 indicating complete independence. The scores are then summed to create a total FIM score, which ranges from 18 to 126. The FIM score can also be broken down into motor and cognitive subscales, which range from 13-91 and 5-35 respectively.

In our study outcomes were measured by FIM (Functional Independence Measure) scores at 6th, 12th, and 26th weeks.

Results

In this study, the highest frequency of stroke patients was 77(57%) aged between 51-60 years old, followed by 38(28%) who were 61-70 years old. The lowest frequency was 2(1%), followed by 19(14%) were aged more than 70 years and 41-50 years old, respectively (Figure 1).
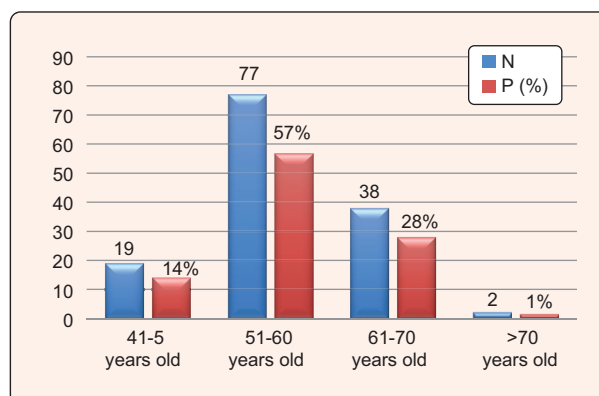

Figure 1: Age Distribution among Study People

Regarding the gender description, we found the highest frequency of stroke patients was among males in our study, and the number is 101 (74%), whereas 35(26%) were female (Figure 2).
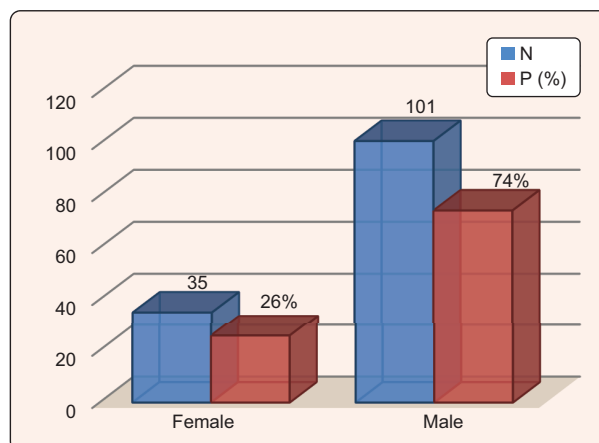

Figure 2: Gender Description among study people

The highest frequency (35%) of stroke patients was found among service holders, 22% was found among farmers, 19%, 16% & 8% was found among housewives, businessmen & retired persons, respectively (Figure 3).
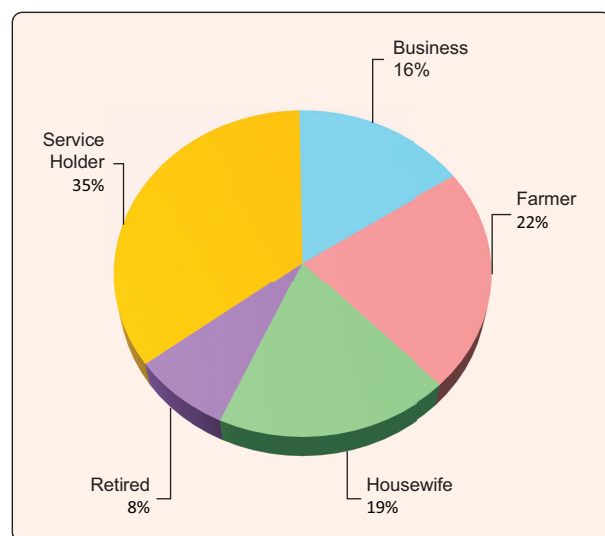
Figure 3: Occupation of the Study People

The freqency of ischemic stroke was 88(64.71%) & the hemorrhagic stroke was 48(35.29%) (Figure 4).
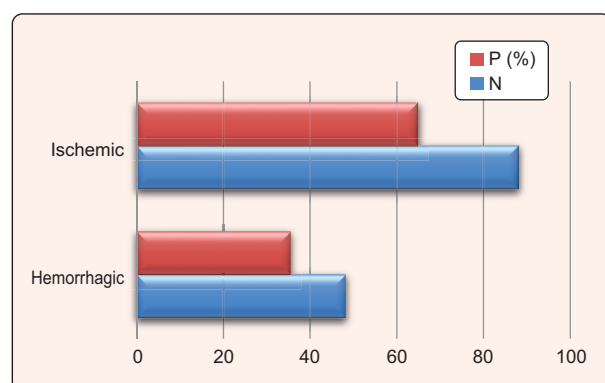
Figure 4: Types of Strokes found among study people

The Mean ± SD age of our study was 57.25 ± 7.22 & 57.09 ± 6.38 for group A & B, respectively. In group A there were 49(72.06%) male & 19(27.94%) female patients and we studied on 52(76.47%) male & 16(23.53%) female patients in group B. Regarding comorbidity, we found DM 26(38.24%) & 29(42.65%) among group A & B respectively. HTN was found in 27(39.71%) & 28(41.18%) patients among group A & B respectively. The prevalence of dyslipidemia was 18(26.47%) in group A and 17(25%) in group B. The prevalence of smoking was found among 17(25%) & 15 (22.06%) patients in group A & B, respectively. F/H of stroke was found in 12(17.65%) & 8 (11.76%)

patients among group A & B, respectively (Table I).

Table I: Demographic characteristics and Comorbidities of patients

Demographic characteristics	Group A (n=68)	P (%)	Group B (n=68)	P (%)
Age (in years)				
41-50	11	16.18	8	11.76
51-60	36	52.94	40	58.82
61-70	19	27.94	19	27.94
>70	2	2.94	1	1.47
Mean ± SD	57.25 ± 7.22		57.09 ± 6.38	
Gender				
Male	49	72.06	52	76.47
Female	19	27.94	16	23.53
Comorbidity				
DM	26	38.24	29	42.65
HTN	27	39.71	28	41.18
F/H of stroke	12	17.65	8	11.76
Dyslipidemia	18	26.47	17	25.00
Smoking	17	25.00	15	22.06

Table II shows the progression of Functional Independence Measure (FIM) scores in Group A and Group B at four-time intervals: baseline, 6th week, 12th week, and 26th week. At baseline, there was no statistically significant difference in FIM scores between the two groups (Group A: 84.01 ± 10.86; Group B: 84.35 ± 10.79; p = 0.855). However, from the 6th week onwards, Group A showed significantly greater improvements compared to Group B. At the 6th week, Group A had a mean FIM score of 93.73 ± 10.65, while Group B had a mean FIM score of 89.20 ± 11.98 (p =0.0213). This trend continued at the 12th week (Group A: 108.17 ±9.52 vs. Group B: 103.79 ± 7.37) with a p-value of 0.0032 and 26th week (Group A: 115.62 ± 5.07 vs. Group B: 110.22 ± 4.97), showing statistically significant difference (p < 0.0001).

Table II: Comparison of patients by FIM scores

FIM scores	At baseline	At 6th week	At 12th week	At 26th week
Group A	84.01 ± 10.86	93.73 ±10.65	108.17 ±9.52	115.62 ±5.07
Group B	84.35 ± 10.79	89.20 ± 11.98	103.79 ± 7.37	110.22 ± 4.97
P-value	0.8550	0.0213	0.0032	< 0.0001

Discussion

In this study, the highest prevalence of stroke patients was 77(57%) aged between 51-60 years old followed by 38(28%) were 61-70 years old. The lowest prevalence was 2(1%) followed by 19(14%) were aged between >70 and 41-50 years old respectively. [Figure I] While in a study by Nessa J.et al. found the highest prevalence (n=15) was among 41-50 years old and the lowest prevalence was (n=5) found in 31-40 years old patients.[17] Another study by Shoma FK et al. found in group A, 19 (24.7%) patients were from 21-40 years age group and 33 (42.9%) patients were from 41-60 years age group while in group B, 14 (19.7%) patients were from 21-40 years age group and 42 (59.2%) patients were from 41-60 years age group.[20]

In our study, the prevalence of male patients was 101 (74%), whereas the prevalence of female patients was 35(26%). On the other hand, Shoma FK et al. found in their study n=99 and n=49 male & female patients, respectively.[20]

In this study, the highest prevalence (35%) of stroke patients was found among service holders, 22% was found among farmers, 19%, 16% & 8% was found among housewives, businessmen & retired persons, respectively. While a study by Shoma FK et al. found 23 (29.9%) patients were service holder and others were housewives (24.7%), students (18.2%), and businessmen (14.3%) in group A while in group B, 27 (38.0%) patients were service holder and others were housewives (22.5%), students (14.1%), and businessmen (15.5%).[20]

In our study, we studied one risk factor of disability among study participants. We found two types of strokes (Ischemic and Hemorrhagic) among our patients. The prevalence of ischemic was 88(64.71%) & the hemorrhage's prevalence was 48(35.29%). While in a study by Shoma FK et al., patients had disability mainly due to stroke (36.4%, n=28) while others had disability due to traumatic brain injury (28.6%, 42.3%), spinal cord injury (15.6%, 15.5%), spinal cord

compression (13.0%, 12.7%), rheumatoid disease and others (6.5%, 8.5%) in group A & B respectively.[20]

In our study, the Mean ± SD of age was 57.25 ± 7.22 & 57.09 ± 6.38 for group A & B, respectively. In group A there were 49(72.06%) male & 19(27.94%) female patients and while in group B there were 52(76.47%) male & 16(23.53%) female patients. We found DM 26(38.24%) & 29(42.65%) among group A & B respectively. HTN was found in 27(39.71%) & 28(41.18%) patients among group A & B respectively. The prevalence of dyslipidemia was 18(26.47%) in group A and 17(25%) in group B. The prevalence of smoking was found among 17(25%) & 15 (22.06%) patients in group A & B, respectively. F/H of stroke was found in 12(17.65%) & 8 (11.76%) patients among group A & B, respectively. While a study by Shoma FK et al. found that the Mean ±SD of age was 42.21 ±17.53 & 45.66 ±14.59, and the majority of their patients were male.[20]

In our study, at baseline, we found no statistically significant difference in FIM scores between the two groups (Group A: 84.01 ± 10.86; Group B: 84.35 ± 10.79; p = 0.855). However, at the 6th week, Group A had a mean FIM score of 93.73 ± 10.65, while Group B had a mean FIM score of 89.20 ± 11.98 (p =0.0213). This trend continued at the 12th week (Group A: 108.17 ±9.52 vs. Group B: 103.79 ± 7.37) with a p-value of 0.0032 and 26th week (Group A: 115.62 ± 5.07 vs. Group B: 110.22 ± 4.97), showing statistically significant difference (p < 0.0001). While a study by Nessa J. et al found mean FIM gain was 47.12 ± 19.33 in a total number of patients.[17] Another study by Shoma FK et al. found that at baseline and after the 6th week of treatment, there were no significant statistical differences between the two groups (p>0.05) regarding FIM scores.[20] In the 12th week, FIM significantly increased in group A (99.73 ± 8.61) compared to group B (95.52 ± 10.80), which persisted till the 24th week.[20] Other researchers found the FIM gain was 29 ±18, 23.4 and 22.9±11.9 respectively in their studies.[21-23]

Limitations of the study

Although the present study provides valuable insights into the impact of the rehabilitation team meeting approach on functional outcomes in stroke patients, several limitations should be acknowledged. Firstly, the study was conducted over a limited period of time (one year), which restricts the ability to assess the long-term sustainability and durability of functional gains achieved through team-based rehabilitation. Secondly, the study was conducted in a single tertiary care center, which may limit the generalizability of the findings to other hospitals or community settings with different healthcare infrastructures, patient demographics, or resource availability.

Conclusion

In this study we found that rehabilitation team approach service significantly reduces disability of the stroke patients. So, further research with prospective longitudinal design needs to be done to build up the rehabilitation team to improve physical rehabilitation and to ensure total care of the disabled following stroke in Bangladesh.

Acknowledgments

References

1. Sacco RL, Kasner SE, Broderick JP, Caplan LR, Connors JJ, Culebras A, Elkind MS, George MG, Hamdan AD, Higashida RT, Hoh BL. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013 Jul;44(7):2064-89.

2. Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, Fisher M, Pandian J, Lindsay P. World Stroke Organization (WSO): global stroke fact sheet 2022. International Journal of Stroke. 2022 Jan;17(1):18-29.

3. Feigin VL, Stark BA, Johnson CO, Roth GA, Bisignano C, Abady GG, Abbasifard M, Abbasi-Kangevari M, Abd-Allah F, Abedi V, Abualhasan A. 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. 2021 Oct 1;20(10):795-820.

4. Gimigliano F, Negrini S. The World Health Organization" rehabilitation 2030: a call for action". Eur J Phys Rehabil Med. 2017 Apr 4;53(2):155-68.

5. King JC, Blankenship KJ, Schalla W, Mehta A. Rehabilitation team function and prescriptions, referrals and order writing. In: Firestein GS, Budd R, Gabriel SE, McInnes IB, O'Dell JR, editors. Kelley's Textbook of Rheumatology. 10th ed. Philadelphia: Elsevier Health Sciences; 2017. p.357.

6. Wu X, Li Z, Cao J, Jiao J, Wang Y, Liu G, Liu Y, Li F, Song B, Jin J, Liu Y. The association between major complications of immobility during hospitalization and quality of life among bedridden patients: a 3 month prospective multi-center study. PLoS One. 2018 Oct 12;13(10):e0205729.

7. Uddin T. Leadership in rehabilitation teamwork: challenges for developing countries. Frontiers in Rehabilitation Sciences. 2022 Dec 21;3:1070416.

8. Omar ZB, Kagaya H, Mac Donell C. Leadership in teamwork: enhancing rehabilitation medicine best practice. Frontiers in Rehabilitation Sciences. 2023 Oct 18;4:1270116.

9. Meyer T, Kleineke V, Stamer M. Cooperative leadership as a condition for patient-reported rehabilitation success. Frontiers in Rehabilitation Sciences. 2023 Mar 15;4:1114666.

10. Lewis AN. Advancing rehabilitation counseling: Leadership, research, and positioning the profession in 2018 and beyond. Journal of Applied Rehabilitation Counseling. 2017 Sep 1;48(3):12-5.

11. Cieza A. Rehabilitation the health strategy of the 21st century, really?. Archives of physical medicine and rehabilitation. 2019 Nov 1;100(11):2212-4.

12. Kushner DS, Peters KM, Johnson-Greene D. Evaluating use of the siebens domain management model during inpatient rehabilitation to increase functional independence and discharge rate to home in stroke patients. PM & R. 2015;7:354-64. doi: 10.1016/j.pmrj.2014.10.010.

13. Uddin T, Khasru MR, Islam MT, Emran MA, Rahman MS, Shakoor MA, Moyeenuzzaman M. Rehabilitation in Bangladesh. Phys Med Rehabil Clin N Am. 2019;30:795-805. DOI: 10.1016/j.pmr.2019.07.005

14. Uddin T, Islam MT, Rathore FA, O'Connell C. Disability and rehabilitation medicine in Bangladesh: Current scenario and future perspectives.JISPRM. 2019;2:168. DOI: 10.4103/jisprm.jisprm_61_19 Rondinelli RD and Ranavaya MI. Practical

aspects of impairment rating and disability determination. 2020. In: Cifu DX editor. Braddom's physical medicine and rehabilitation E-book. Elsevier Health Sciences. p.65.

15. World Health Organization. WHO global disability action plan 2014-2021: Better health for all people with disability. InWHO global disability action plan 2014-2021: better health for all people with disability 2015.

16. Rice D, Janzen S, McIntyre A, Vermeer J, Britt E, Teasell R. Comprehensive outpatient rehabilitation program: hospital-based stroke outpatient rehabilitation. Journal of Stroke and Cerebrovascular Diseases. 2016 May 1;25(5):1158-64.

17. Nessa J, Khaleque MA, Begum S, Ahmed AH, Islam S, Afsan M. Rehabilitation of stroke patients-effects of early intervention of physical therapy on functional outcome. Bangladesh Journal of Anatomy. 2009;7(1):62-7.

18. Cameron MH, Monroe LG. Physical Rehabilitation-E-Book: Evidence-based examination, evaluation, and intervention. Elsevier Health Sciences; 2007 Apr 5.

19. Thornicroft G, Sunkel C, Aliev AA, Baker S, Brohan E, El Chammay R, Davies K, Demissie M, Duncan J, Fekadu W, Gronholm PC. The Lancet Commission on ending stigma and discrimination in mental health. The Lancet. 2022 Oct 22;400(10361):1438-80.

20. Shoma FK, Uddin MT, Emran MA, Islam MT, Ahmed B, Chowdhury ZR. Effect of rehabilitation team meeting on the patient's disability in the Department of Physical Medicine and Rehabilitation (PMR) in a Tertiary Care Hospital in Dhaka. Bangladesh Medical Research Council Bulletin. 2020;46(3):228-32.

21. Otokita S, Uematsu H, Kunisawa S, Sasaki N, Fushimi K, Imanaka Y. Impact of rehabilitation start time on functional outcomes after stroke. Journal of rehabilitation medicine. 2020 Dec 4;53(1):2736.

22. Oyanagi K, Kitai T, Yoshimura Y, Yokoi Y, Ohara N, Kohara N, Sakai N, Honda A, Onishi H, Iwata K. Effect of early intensive rehabilitation on the clinical outcomes of patients with acute stroke. Geriatrics & Gerontology International. 2021 Aug;21(8):623-8.

23. Kimura Y, Otobe Y, Suzuki M, Masuda H, Kojima I, Tanaka S, Kusumi H, Yamamoto S, Saegusa H, Yoshimura T, Yamada M. The effects of rehabilitation therapy duration on functional recovery of patients with subacute stroke stratified by individual's age: a retrospective multicenter study. European Journal of Physical and Rehabilitation Medicine. 2022 Sep 1;58(5):675.