

ORIGINAL REPORT

PRACTICE VARIATION IN THE STRUCTURE OF STROKE REHABILITATION
IN FOUR REHABILITATION CENTRES IN THE NETHERLANDS

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Objective: To describe practice variation in the structure of stroke rehabilitation in 4 specialized multidisciplinary rehabilitation centres in the Netherlands.

Design and methods: A multidisciplinary expert group formulated a set of 23 elements concerning the structure of inpatient and outpatient stroke rehabilitation, categorized into 4 domains: admission-related ($n=7$), treatment-related ($n=10$), client involvement-related ($n=2$), and facilities-related ($n=4$). In a cross-sectional study in 4 rehabilitation centres data on the presence and content of these elements were abstracted from treatment programmes and protocols. In a structured expert meeting consensus was reached on the presence of practice variation per element.

Results: Practice variation was observed in 22 of the 23 structure elements. The element “strategies for patient involvement” appeared similar in all rehabilitation centres, whereas differences were found in the elements regarding admission, exclusion and discharge criteria, patient subgroups, care pathways, team meetings, clinical assessments, maximum time to admission, aftercare and return to work modules, health professionals, treatment facilities, and caregiver involvement.

Conclusion: Practice variation was found in a wide range of aspects of the structure of stroke rehabilitation.

Key words: practice variation; stroke; multidisciplinary rehabilitation; structure; quality of healthcare.

J Rehabil Med 2016; 48: 287–292

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Accepted Nov 10, 2015; Epub ahead of print Feb 4, 2016

INTRODUCTION

Stroke is one of the leading causes of death and disability worldwide (1). In Europe, the mean annual incidence of stroke in men is 141/100,000 (2). Stroke can lead to severe impairments in physical, cognitive, speech-related and/or behavioural functioning (3). Stroke care is one of the most expensive types

of healthcare (2, 4). In most European countries, a chain of institutions is involved in the treatment of stroke.

Incidence of stroke in the Netherlands in 2012 was approximately 44,000 on a population of 16,800,000 (5). Acute care in hospital, including basic rehabilitation, is generally short and ends when the patient is medically stable. More than half of all patients return home. Older patients with multiple impairments are usually admitted to a nursing home (30%). Younger patients with complex impairments and substantial learning potential are referred for rehabilitation in a specialized rehabilitation centre (RC) (5); approximately 3,200 yearly. When severe medical complications occur, the patient is (temporarily) referred back to hospital. All costs for stroke rehabilitation are reimbursed by the patients’ insurance companies.

Due to the differences in healthcare systems and reimbursement policies, variations in quality of stroke rehabilitation across countries are to be expected. The CERISE (Collaborative Evaluation of Rehabilitation in Stroke across Europe) study, comparing stroke rehabilitation across 4 European countries, showed variation in admission criteria (6), amount and content of therapy (7), follow-up (8), and recovery (9). Due to the wide array of impairments and treatment options, and the interplay between other institutions in the integrated stroke care pathway, variation in the quality of stroke rehabilitation between RCs within the Netherlands is expected. According to Donabedian (10, 11), quality of healthcare can be described in terms of *structure* (“attributes of settings in which care occurs”), *process* (“what is actually done in giving and receiving care”) and *outcomes* (“health status of patients and populations”). Hoenig et al. (12, 13) found that the structure of rehabilitation can be regarded as the basis for its process and outcomes.

Despite national guidelines (14), practice variation was observed regarding the *process* of stroke rehabilitation in the Netherlands (15). As practice variation may imply differences between rehabilitation institutions across and within nations in the quality of care, including efficiency, accessibility, and client-centeredness (16), it is an important topic of research. The aim of this study is therefore to explore practice variation in the structure of stroke rehabilitation in the Netherlands.

METHODS

Study design and participating rehabilitation centres

This study is part of a larger, multicentre cohort study aiming to describe the structure, process and outcomes of stroke rehabilitation in The Netherlands (SCORE: Stroke Cohort Outcomes of REhabilitation). The present study concerned the description of the structure of stroke rehabilitation based on paper and electronic data sources and information from expert clinicians, by December 2014. Participating RCs were the Rijnlands Rehabilitation Center in Leiden, Sophia Rehabilitation in The Hague, Heliomare in Wijk aan Zee, and Rijndam Rehabilitation in Rotterdam. These are 2 large and 2 medium-sized RCs, out of 26 Dutch RCs offering stroke rehabilitation, covering approximately 25% of the total Dutch population. On a yearly basis, these RCs offer inpatient rehabilitation to approximately 90, 190, 210, and 300 newly admitted stroke inpatients, respectively. As the Dutch healthcare system allows broad inclusion criteria in all RCs, our sample is considered as representative. From a preliminary analysis of patient characteristics in 2 of the centres patients appeared comparable in age, stroke type and medical characteristics. All centres have sufficient capacity to serve all patients referred by hospitals for inpatient rehabilitation, although, sporadically, in RC2 and 3 there is a short waiting list (<5 days). The study protocol was approved by the Medical Ethical Review Board of Leiden University Medical Center (protocol NL46531.058.13).

Elements of structure

The set of elements to describe “structure” is based on a framework for arthritis rehabilitation (17, 18). To this framework, we added the elements “clinical assessments” and “facilities” as we considered these as prerequisites for stroke rehabilitation. Clinical assessments are the basis for defining rehabilitation targets and for evaluation of treatment (19). We also added the element “agreements with hospitals in the regional stroke services”, as such agreements influence the timing of multidisciplinary rehabilitation. The actual definitions of these elements were adjusted for stroke rehabilitation by a multidisciplinary working group including rehabilitation physicians (PG, HA) and practice variation experts (TV, JM) and can be found in Table I. The elements were classified into 4 domains, i.e. admission/discharge-related, treatment-related, client-involvement-related, and facilities-related. Practice variation between RCs was investigated regarding the *presence* of the elements as well as regarding the actual *content* of the elements, as shown in Table S1¹.

Data collection and quality assurance

Information on the elements was abstracted in each RC by the first author (IG). Various sources were used, starting with the overall treatment programme, followed by more detailed documents, such as treatment protocols and lists of facilities. In the few cases information on the presence or content of an element was not recorded, the RC’s expert rehabilitation physician was consulted as well as another health professional within his/her institution. When they both confirmed the presence or content of a certain element, this was considered as “recorded” as well. After gathering all data, the expert rehabilitation physicians verified and checked the actuality and completeness of the data referring to their own RCs, being blinded for the data of the other RCs. Data were subsequently adjusted if necessary.

Definition of differences

The confirmed data were then discussed by 2 researchers (IG and JM), who highlighted the elements and items that they found, or expected

to be different across centres. During an expert meeting with all rehabilitation physicians involved (GR, CB, NR, PG) and the members of the working group, the presence and content of all elements were discussed in order to reach consensus on their equality or difference.

RESULTS

During the expert meeting, it was confirmed that, in all elements except for “patient involvement”, practice variation was present, as shown in Table I. Table S1¹ provides an extensive overview of the presence and content of all elements in each RC.

Admission/discharge-related

The maximum time between stroke onset and admission to the RC, as agreed with the nearest hospital in the regional stroke service, ranged from 5 days (RC2), 8 days (RC3), 9 days (RC4) to 14 days (RC1). As to the admission criteria for inpatient rehabilitation, 4 criteria were mentioned by all RCs: patient has complex impairments; requires multidisciplinary rehabilitation; has sufficient learning potential; is able to return to former living situation. Six other criteria varied, such as “remaining impairments expected” (RC1 and 3 only). As to the criteria for inpatient exclusion, “current psychiatric disorder” and “current use of addictives” did not vary across centres, whereas 11 criteria, including “life expectancy <8 weeks” (RC2) and “severe comorbidity” (RC1, 3, 4) did. Criteria for inpatient discharge were defined by 3 RCs (RC1, 2, 4). In total, 13 discharge criteria were defined. Of those, 6 did not vary across the 3 centres (all concerning the patient’s ability to return home) and 7 did (e.g. “patient does not adhere to planned treatment schedule” (RC2)).

Treatment-related

Three RCs had defined 7 (RC1), 4 (RC3) and 5 (RC4) patient subgroups, respectively. RC1 had subgroups for each combination of impairments, whereas in RC3 subgroups were based on the presence of motor and cognitive impairments only. In RC4, subgroups were based on the presence and severity of impairments in mobility, self-care, communication, cognition and behaviour. For all subgroups, different clinical pathways, tailored to the type and severity of impairments (20), were defined. These clinical pathways differed in length, ranging from 3–10 (RC3) to 20–26 weeks (RC4). The timing of team meetings at the start of treatment varied, ranging from 1 (RC4) to 3 weeks (RC3) after admission. Clinical assessments were timed within 1 week (RC3, 4) or within 2 weeks (RC1, 2) after admission, and just before the final team meeting (RC1, 2) or within 7 (RC3) or 10 days (RC4) before discharge. Only RC3 used protocolled “routine outcome measurements”; the application of intermediate assessments before each team meeting. All RCs offered an aftercare module and a return to work module to those of working age (approximately 80% of the RCs’ stroke population), both showing similarities and differences across RCs, as described in Table II.

¹<https://doi.org/10.2340/16501977-2054>

Table I. Description of, and practice variation in, elements of the structure of stroke rehabilitation in 4 rehabilitation centres (RCs) in the Netherlands

Domains and elements	Description of elements	PV
<i>Admission/discharge-related</i>		
1. Regional stroke service's agreement	a. Presence of regional stroke service's agreements on maximum number of days to admission to the RC b. Content of this agreement	A: No B: Yes
2. Admission criteria inpatients	a. Presence of admission criteria for inpatients b. Contents of inpatient admission criteria	A: No B: Yes
3. Admission criteria outpatients	a. Presence of admission criteria for outpatients b. Contents of outpatient admission criteria	A: No B: Yes
4. Exclusion criteria inpatients	a. Presence of exclusion criteria for inpatients b. Contents of inpatient exclusion criteria	A: No B: Yes
5. Exclusion criteria outpatients	a. Presence of exclusion criteria for outpatients b. Contents of outpatient exclusion criteria	A: No B: Yes
6. Discharge criteria inpatients	a. Presence of discharge criteria for inpatients b. Contents of inpatient discharge criteria	A: Yes B: Yes
7. Discharge criteria outpatients	a. Presence of discharge criteria for outpatients b. Contents of outpatient discharge criteria	A: Yes B: Yes
<i>Treatment-related</i>		
8. Inpatient subgroups	a. Presence of inpatient subgroups b. Content of inpatient subgroups	A: Yes B: Yes
9. Outpatient subgroups	a. Presence of outpatient subgroups b. Content of outpatient subgroups	A: No B: Yes
10. Clinical pathways inpatients	a. Presence of clinical pathways for inpatients b. Duration of inpatient care pathways	A: Yes B: Yes
11. Clinical pathways outpatients	a. Presence of clinical pathways for outpatients b. Duration of outpatient care pathways	A: No B: Yes
12. Timing of team meetings inpatients	a. Timing of team meetings on inpatients at start of treatment b. Timing of team meetings on inpatients during treatment c. Timing of team meetings on inpatients at end of treatment	A: Yes B: Yes C: Yes
13. Timing of team meetings outpatients	a. Timing of team meetings on outpatients at start of treatment b. Timing of team meetings on outpatients during treatment c. Timing of team meetings on outpatients at end of treatment	A: Yes B: Yes C: Yes
14. Timing of clinical assessments inpatients	a. Timing of clinical assessments inpatients at start of treatment b. Timing of clinical assessments inpatients during treatment c. Timing of clinical assessments inpatients at end of treatment	A: Yes B: Yes C: Yes
15. Timing of clinical assessments outpatients	a. Timing of clinical assessments outpatients at start of treatment b. Timing of clinical assessments outpatients during treatment c. Timing of clinical assessments outpatients at end of treatment	A: Yes B: Yes C: Yes
16. Return to work module	a. Presence of return to work module b. Content of return to work module	A: No B: Yes
17. Aftercare module	a. Presence of aftercare module b. Content and duration of aftercare module	A: No B: Yes
<i>Client-involvement-related</i>		
18. Patient involvement	a. Presence of strategies for patient involvement in treatment b. Content of strategies for patient involvement in treatment	A: No B: No
19. Caregiver involvement	a. Presence of strategies for caregiver involvement in treatment b. Content of strategies for caregiver involvement in treatment	A: No B: Yes
<i>Facilities-related</i>		
20. Treatment facilities	Types of facilities for treatment and diagnostics	Yes
21. Health professionals	Types of medical and paramedical treatment disciplines	Yes
22. Content clinical assessments inpatients	Content of clinical assessment instruments for inpatients	Yes
23. Content clinical assessments outpatients	Content of clinical assessment instruments for outpatients	Yes

PV: practice variation; Yes: differences between RCs in this element were concluded; No: no differences between RCs in this element were concluded.

Table II. Similarities and differences across 4 rehabilitation centres (RCs) in the return to work module and the aftercare module

Elements	Similarities	Differences
Return to work module	Assessment of work tasks; work task-related training with individual care providers	Meetings with patient's employer and own occupational physician (RC1, 2, 4); application of return to work coordinator ("vocational rehabilitation specialist"; RC4); application of a specialized occupational physician/return to work researcher (RC3, 4)
Aftercare module	Individual counselling by care provider; involvement of caregivers	Maximum number of sessions is 2 (RC3, 4), 3 (RC1) and 5 (RC2); maximum time-frame of module is 0–6 months (RC3, 4); 1 year (RC1); and 2 years after rehabilitation (RC2)

Table III. Similarities and differences across 4 rehabilitation centres in health professionals, treatment facilities and clinical assessment instruments

Elements	Similarities	Differences
Health professionals	Rehabilitation physician, physical therapist, occupational therapist, speech therapist, psychologist, qualified sports and exercise instructor, activity therapist, sexologist, nurse, dietician, social worker, religious worker, rehabilitation technician, 24 h qualified nursing, 24 h access to rehabilitation physician. In-house consultations by psychiatrist, orthopaedist, internist	Music therapist (RC1, 4), speech language therapist specialized in linguistics (RC2, 4), psychologist offering exercises to improve cognitive skills (RC4), psychologist assistant (RC1, 3, 4), specialized occupational physician/return to work researcher (RC3, 4), return to work coordinator (RC4), therapy-assistant (RC1, 3, 4), haptotherapist (RC4), driving instructor (RC4). In-house consultations by dermatologist (RC3, 4), neurologist (RC3, 4)
Treatment facilities	Treatment rooms, sports hall, swimming pool, practice home (sleeping room, living room, kitchen), fitness hall, silence room, practice garden, gait training laboratory	Computer room (RC1, 3, 4), maximum exercise test laboratory (RC3, 4)
Clinical assessment instruments	USER, BI, ARAT, FAC, BFM, 10MWT, BBS, AAT	NSA, 6MWT, Åstrand test, exercise test, MI, Jamar, COPM, ACL, SAT, SAN, Screeling, FDO, FOIS, Radboud scales, FSS, CSI, Stratify, ANTAT, MRS, BNT, HADS, COOP-WONCA, ALDS

6MWT: 6-min walk test; 10MWT: 10-Metre Walk Test; USER: Utrecht Schaal voor Evaluatie van Revalidatie; AAT: Akense Afasie Test; ACL: Allen Cognitive Level; ALDS: Amsterdam Linear Disability Scale; ANTAT: Amsterdam-Nijmegen Test Alledaagse Taalvaardigheden; ARAT: Action Research Arm Test; BBS: Berg Balance Scale; BFM: Brunnstrom Fugl-Meyer; BNT: Boston Naming Test; BI: Barthel Index; COOP-WONCA: World Organization of General Practice/Family Physician COOP Charts; COPM: Canadian Occupational Performance Measure; CSI: Caregiver Strain Index; FAC: Functional Ambulation Categories; FDO: Frenchay Dysarthrie Onderzoek; FOIS: Functional Oral Intake Scale; FSS: Fatigue Severity Scale; HADS: Hospital Anxiety and Depression Scale; MI: Motricity Index; MRS: Modified Rankin Scale; NSA: Nottingham Sensory Assessment; SAN: Stichting Afasie Nederland schaal; SAT: Semantische Associatie Test.

Client-involvement-related

In all RCs, patients were involved throughout the entire rehabilitation process. The strategies for doing so included mutually discussing and adjusting treatment goals. In addition, all RCs reported to invite partners/caregivers to their consultations and all offered partner courses or support groups. Three RCs (RC2, 3, 4) also offered a course for partners/caregivers on communicating with patients with aphasia and 1 RC (RC1) offered a consultation with the sexologist as standard.

Facilities-related elements of structure

Similarities and differences were found regarding the types of health professionals available, as well as in the treatment facilities and the instruments used for clinical assessments, as shown in Table III.

DISCUSSION

This study investigated practice variation in the structure of stroke rehabilitation across 4 RCs in the Netherlands. In 22 out of 23 elements of structure, practice variation occurred. Only patient involvement seemed to be equally organized in all RCs. Three elements are highlighted below.

First, the maximum number of days before admission, according to the regional stroke service's agreements, differed, ranging between 5 and 14 days. This implies variation in efficiency of care, as an early start of intensive rehabilitation is important to optimize recovery (3). Moreover, timely commencement of multidisciplinary rehabilitation may shorten the length of stay in both hospital and RC and can lower overall costs (21). Secondly, the variety in patient subgroups and

clinical pathways appeared large. Apparently, even though stepwise protocols for the development of clinical pathways exist, each RC developed its own (22). Although the definition of clinical pathways is broader, we focused on *length* of treatment (20). Between RC3 and RC4 there is a 10-week difference in length of the longest pathway. It was found that resource allocation differs between RCs. Thirdly, large variations were seen in the duration of aftercare. Stroke should be seen as a lifelong disorder with increased risks of medical and psychosocial complications, requiring long-term follow-up (23, 24). Although all RCs refer patients to the appropriate community care providers after rehabilitation, only RCs 1 and 2 have a structured trajectory for monitoring the patient's longer-term wellbeing. Finally, there might be variations across RCs in the "treatment potential" of their team of health professionals. For example, considering the complexity of speech and language disorders, a therapist who is academically educated in clinical linguistics, as in RC2 and RC4, may be better able to meet the needs of patients than a non-academically educated speech therapist (25).

Thus, a clear overview of stroke rehabilitation includes not only information on the actual process, but also on the contextual factors and conditions (structure) in which the process is embedded (11–13). For example, the time patients spend in therapy is the result of clinically needed input as well as organizational and financial constraints (6). Despite national guidelines, we found substantial practice variation *within* a country, when comparing only a small number of RCs; whether this is true for other countries needs to be explored. We recommend considering the "structure" elements of rehabilitation as an indispensable topic of research, both nationally and internationally, when exploring quality of care. Only when

fully exploring all factors involved in stroke rehabilitation will we be able to offer future patients the best possible care.

Strengths and limitations

A limitation of this study is that written procedures may only partially reflect actual practice. For example, discharge of patients may be influenced by several factors, such as the documented discharge criteria (if any), the achievement of treatment goals, the prescribed duration of the clinical pathway, and the clinician's views (26). Moreover, admission and discharge from the RC may also be influenced by environmental factors, such as the capacity, team functioning (27), and (discharge/admission) criteria of other institutions in the integrated stroke care pathway. The interplay between all of these factors should be explored further. Another limitation is that we described a medical speciality that is currently in transition. Because of an ongoing increase in healthcare use, reimbursement policies of insurance companies become tighter. Dutch RCs will need to work more efficiently. For example, treatment and nursing hours of the less severely disabled will be reduced. Therefore, separate clinical pathways are currently being developed by RCs. In our study, RC 1, 3 and 4 already implemented such clinical pathways. As RC2 will do so in the near future, there will be no more practice variation in the "presence of clinical pathways". Nevertheless, practice variation across RCs in most other elements is expected to persist. However, our results should be interpreted with caution, and our evaluation should be repeated in the future.

Strengths of our study are also apparent. First, we developed a stroke-specific framework for describing elements of structure based on literature and expert opinions, which can be used in future national and international studies. Secondly, we used a structured approach for identifying and checking variation between RCs. Thirdly, our set of structure elements, which is much broader than in previous studies (5, 28) provides a complete and detailed picture of the *basis* for stroke rehabilitation. The actual *process* of care will be investigated on the patient's level in the SCORE cohort study.

Conclusion

Practice variation in structure was found in a wide range of aspects of stroke rehabilitation, which might imply differences between RCs in the quality of care. National guidelines leave substantial room for practice variation within a country. Considering the impact on patients' health, suboptimal quality of stroke rehabilitation is highly unwanted. Altogether, insight into practice variation may add to the formulation of best practices aimed at optimizing the quality of care.

ACKNOWLEDGEMENTS

The authors are grateful to the Stichting Kwaliteitsgelden Medisch Specialisten for funding this study.

The authors declare no conflicts of interest.

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