

**ORIGINAL ARTICLE**

## Structured Periodic Rehabilitation Intervention Sessions To Stroke Patients. A Longitudinal Review

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### ABSTRAK

Walaupun bukti menunjukkan rehabilitasi secara tersusun meningkatkan fungsi keseluruhan, kewujudan rehabilitasi secara berterusan dari hospital ke komuniti masih lagi belum direalisasikan. Perkhidmatan ini seharusnya mengambilkira pelbagai jenis ketidakupayaan and keperluan pesakit-pesakit strok itu sendiri. Kajian ini bertujuan untuk mengkaji kesan perkhidmatan pesakit luar rehabilitasi pelbagai disiplin untuk pesakit strok di dalam komuniti. Pesakit yang telah didiscaj dari Pusat Perubatan Universiti Kebangsaan Malaysia selepas mengalami serangan strok akut dirujuk kepada Klinik Strok Bersepadu Rehabilitasi (KSBR). Pesakit strok diberikan program bersifat individu yang berpandukan masalah pesakit serta menggunakan aktiviti berpandukan perkerjaan bagi mencapai objektif yang ditetapkan. Pesakit dipantau secara berkala samada sehingga cukup 2 tahun didalam program, ataupun sehingga mereka boleh kembali berdikari dikomuniti. Pemantauan di lakukan menggunakan 'Modified Barthel Index' (MBI) dan 'Berg Balance Scale' (BBS). Seramai 68 pesakit dirawat di KSBR selama 2 tahun, dengan purata umur 62.4 tahun (SD 12.4); purata tempoh telah menghidap strok semasa pemeriksaan pertama di KSBR ialah 11.5 bulan (SD 11.9). Majoriti pesakit (67.4%) mendapat samada dua atau tiga jenis intervensi rehabilitasi. Pengukuran MBI dan BBS menunjukkan peningkatan berkesan dalam masa 12 bulan (nilai p 0.006 dan 0.017). KSBR membuktikan intervensi rehabilitasi secara tersusun berfaedah untuk meningkat fungsi fizikal dan keseimbangan badan pesakit-pesakit strok.

*Kata kunci: rehabilitasi, strok, pas-discaj, pesakit luar, multidisiplinari*

### ABSTRACT

Despite evidence showing that structured rehabilitation after stroke improves functional outcomes, providing seamless rehabilitation from hospital to community has been elusive. The service provided should be able to accommodate variable degree of impairments and needs of the stroke survivors. This study aimed to assess the outcome of a multidisciplinary-based outpatient rehabilitation service for stroke patients living in the community. Patients who were discharged from Universiti Kebangsaan Malaysia Medical Centre after an acute stroke were referred to the Combined Stroke

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Rehabilitation Clinic (CSRC). Post stroke patients were assigned individually designed programs which were problem based and used task specific activities to achieve desired goals. Patients were reviewed on a regular basis either up to completion of the 2 year-program, or are able to be discharged to the community, whichever is earlier. Modified Barthel Index (MBI) and Berg Balance Scores (BBS) were used for monitoring. A total of 68 patients were managed in CSRC for two years since its initiation, with mean age of 62.4 years (SD 12.4) with the mean duration of stroke when first reviewed in CSRC was 11.5 months (SD 11.9). Majority of patients (64.7%) received either two or three types of intervention. Both MBI and BBS demonstrated significant improvement over 12-months period (p value of 0.006 and 0.017 respectively). CSRC proved that structured rehabilitation intervention was beneficial in terms of functional status and improvement in balance to post-stroke patients.

**Key words:** rehabilitation, stroke, post-discharge, outpatient, multidisciplinary

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## INTRODUCTION

Stroke has become one of the major public health problems worldwide with 795,000 cases of newly diagnosed stroke reported yearly. Two thirds of the stroke survivors will have neurological and functional impairments that render them dependent in performing functional tasks and activities of daily living (Sudlow & Warlow 2009).

The last two decades has witnessed the emergence of new medical advances namely better acute medical care and the availability of reversal agents for stroke (Dobkin 2004; Johansson 2010). These therapies were however either minimal or not easily accessible to all patients. Rehabilitation intervention remains a practical option for stroke care, providing therapeutic interventions that may minimize disability, thus helping in achieving independence and reducing social costs.

Recent evidence suggests the benefit of structured rehabilitation in improving post-stroke outcomes in stroke survivors (Stroke Unit Trialists' Collaboration 2007; Aziz et al. 2008; Outpatient Service Trialists' 2003). There is also consensus for the need of re-assessments and further targeted rehabilitation for stroke survivors who report residual impairment after completion of initial

rehabilitation (Canadian Stroke Strategy 2006; Intercollegiate Stroke Working Party 2008). However, the practicality of implementing a seamless rehabilitation intervention from in-patient to the community remains elusive. Rehabilitation of post-stroke patients remains fragmented in many places. Many stroke patients after being discharged from in-patient care receive either single rehabilitation care intervention such as physiotherapy or occupational therapy, or transferred directly to community with minimal rehabilitation intervention. Another setback with post-stroke rehabilitation is lack of regular assessments during rehabilitation intervention to assess patients' progress or the lack of it. The main challenge remains on how to set up a service that not only provides a structured rehabilitation intervention in an out-patient set-up, but the intervention that needs to be in place to accommodate the variable degree of impairments, function and needs of the stroke patients.

Realizing these deficiencies, we initiated a service of combined-stroke rehabilitation clinic (CSRC) with a multi-disciplinary approach to stroke patients attending outpatient rehabilitation. With the aims of minimizing impairments and maximizing function, all stroke patients were registered to

this clinic as soon as they were discharged from the wards. The CSRC team consisted of a stroke rehabilitation specialist, physiotherapist, occupational therapist, speech and language therapist and medical social worker who met on a weekly basis. The main feature of the CSRC was the shared discussion among team members and patients in deciding on further goals and intervention. Post-stroke patients were designed a set of individualized programs which was problem-based approach through task-specific activities, and were monitored regularly until either completion of a two-year program, or able to be discharged to the community, whichever was earliest.

## **MATERIALS AND METHODS**

### *Combined Stroke Rehabilitation Clinic*

The CSRC was started in 2008 as an adjunct service to the existing rehabilitation services in the Universiti Kebangsaan Malaysia Medical Centre (UKMMC), which is a tertiary teaching hospital in Malaysia that covers approximately 750,000 urban and semi-urban populations within the Klang Valley. The weekly clinic reviewed all stroke patients receiving rehabilitation interventions in the unit. All patients were first seen when they had received at least 6 sessions of the first cycle of rehabilitation, whether it was single or combination-based rehabilitation. Patient was assessed for progress achieved since the onset of stroke, functional status, balance and gait, cognition, family support and recently received interventions. History, physical examination and standardized assessment tools were performed; patient's progress, strengths and weaknesses were discussed during the consultation. Based on the assessments, a set of goals that comprised functional and activities of daily living were generated and agreed upon by the patient or family members. A set of task specific activities comprised of physiotherapy inter-

ventions and occupational therapy interventions were planned for the patient. The occupational therapy team did baseline home assessments for patients who required modifications to be done to facilitate their activities of living conditions. Speech and language as well as prosthetics and orthotics interventions were added if indicated.

Patients were seen on 3-monthly intervals in CSRC, in which progress or regression of recovery was assessed. Based on the assessments, targeted goals were either intensified or reduced. Adjunctive therapies in the form of hydrotherapy, music therapy or counseling were added for patients who reached a plateau or regressed in their progress. For those who were ready to be discharged to the community, further interventions in the form of driving or back to work assessments, leisure or social rehabilitation intervention were planned. Throughout the two-year rehabilitation period, patients were structured into phases of intervention namely intensive individual therapy, guided individual therapy and group therapy; which were applicable for physiotherapy and occupational interventions. A summary of the CSRC program is as shown in Figure 1.

### *Patients and methods*

We followed all stroke patients (n=68) who were registered with the CSRC program since the start of the program in May 2008 for a period of two years till May 2010. We recorded demographic profiles, stroke profiles, types and episodes of intervention received whilst in the CSRC program and the outcome after a 2-year period of intervention or till discharged to the community whichever was earliest. The patients who defaulted or dropped out from the program were also recorded. Two assessment tools were used during the follow-up. Both assessment tools were used at baseline and three monthly intervals for a total period of 12 months:

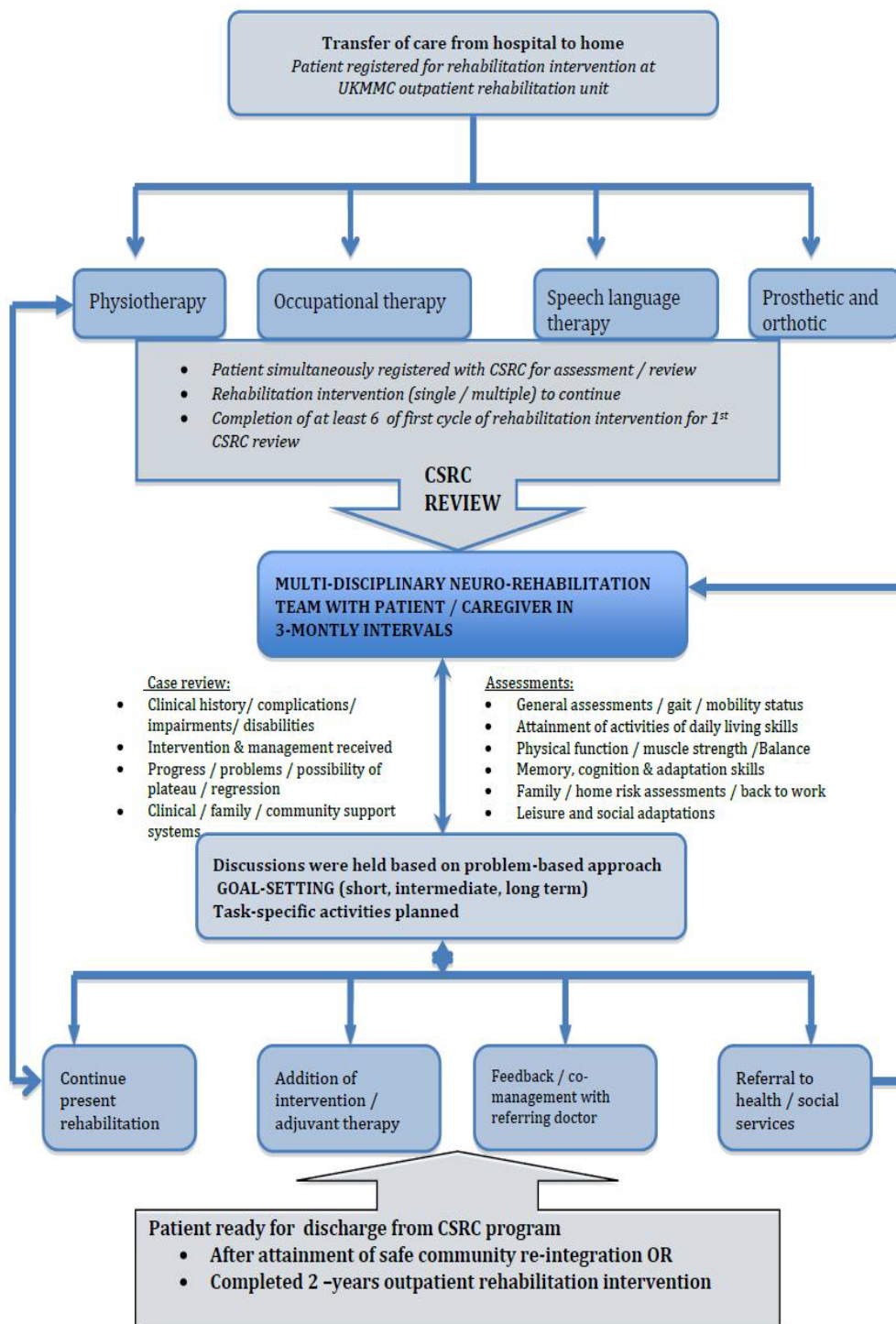


Figure 1: Clinical pathway for patient attended the CSRC program

- A Modified Barthel Index Score (MBI), (range 0–100) measures the degree of autonomy in daily living activities. The BI scores were categorized as: less than 30 as dependent and in need of maximum help in performing daily tasks; 30–70 as semi-dependent and needed some degree of help; and more than 70 as independent in performing functional tasks (Wade & Collin 1988).
- A Berg Balance Score (BBS), (range 0–56) measures impairment in balance function by assessing the performance of functional tasks. The BBS was categorized as: scores of 0–20 as having high fall risk; 21–40 as having medium fall risk and more than 40 as having low fall risk (Berg et al. 1989).

### *Statistical analysis*

Data was analyzed using SPSS 14. Descriptive analyses were used to present categorical data, in which results are presented as mean±SD or proportions (%) as appropriate. The association between patients' characteristics and outcomes after rehabilitation were assessed using multivariate analyses. A significant level of  $p \leq 0.05$  was set for the study.

## **RESULTS**

### *Demographic characteristics*

A total of 68 patients were recruited (the demographic characteristics are as Table 1). The mean age was 62.4 years (12.4) with the majority above 50 years old. The mean duration after the last stroke incident was 21 months (16.4). The mean post-stroke duration when first reviewed in CSRC was 11.5 months (SD 11.9), with the earliest patient referred to CSRC after one month post-stroke and the latest 60 months post-stroke.

### *Intervention received by patients in CSRC*

Figure 2 and Table 1 illustrate types and outcome of rehabilitation intervention received by stroke patients after being reviewed in CSRC. Patients attending CSRC received interventions that varied from single to quadruple therapy; only 8.8% received single therapy during the intervention period. Outcomes of the patients demonstrated that majority of the patients were followed-up either by the primary care team specialized in long-term stroke care management or as a combination with other specialized clinics (neurology, psychiatry and orthopaedic clinics) based on the needs of the patients ( $n=25$ , 65.8%). The outcome of the patients showed that half of the patients were still in rehabilitation interventions, with only 17.6% who defaulted follow-up.

Scores from assessment tools demonstrated improvement over the twelve months (Table 2). Both assessment tools demonstrated an increasing trend throughout the follow-up period; MBI showed greater improvement. Multivariate analysis of progress over time for MBI demonstrated significant effect of intervention [ $F(3,7.0)=10.40$ ,  $p=0.006$ ]. The BBS also demonstrated similar effect of the intervention over time [ $F(3,10)=5.53$ ,  $p=0.017$ ].

## **DISCUSSION**

This prospective observational study investigated the effectiveness of adding a multi-disciplinary structured review for outpatient stroke rehabilitation, which showed a significant improvement in terms of functional status and balance after a year of regular follow-up. In addition, three quarters of the stroke patients had continuity of care for their stroke problems in a designated primary care clinic and almost 40% were either discharged to the community or prepared to

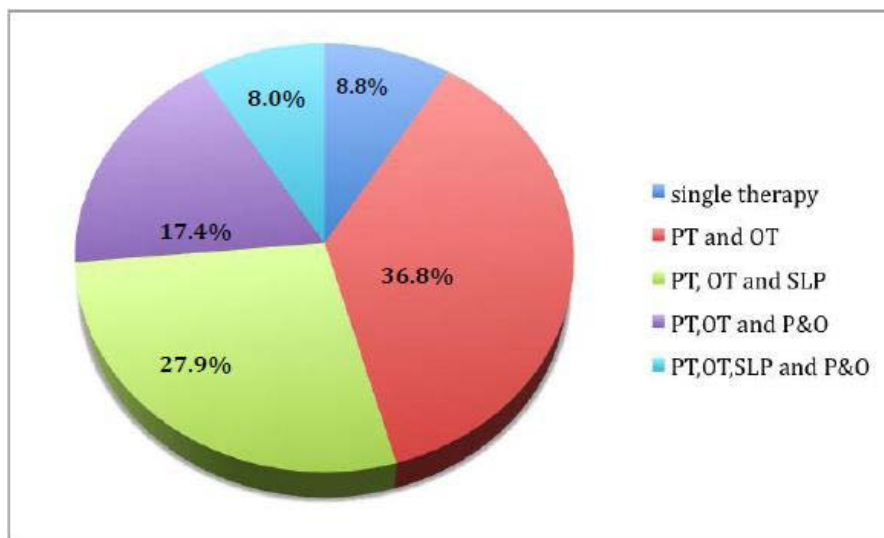
be discharged from intervention. These outcomes reflect the success of our combined stroke rehabilitation services, which aimed to solve the issues on how best to coordinate ongoing rehabilitation following discharge. The enrolment of patients was not guided by any criteria, and depended only on patients' referral from individual rehabilitation units or from the wards they had been discharged. As the patients recruited for this study were

independent of any characteristics, be it severity or potential to improve, outcomes demonstrated the true picture of stroke patients in the community.

The program we used in this study follows the consensus that recovery after stroke might progress beyond plateau phase, as suggested by recent neuro-imaging studies (Seitz et al. 1995; Johansson 2000). Our observations demonstrated an increased trend in both

Table 1: Demographic and clinical profile of stroke patients attending Combined Stroke Rehabilitation Clinic

Profile	Variable	Number (n=68)	Percentage (%)
Age group	20 – 30 years	3	4.4
	31 – 40 years	1	1.5
	41 – 50 years	4	5.9
	51 – 60 years	19	27.9
	61 – 70 years	21	30.9
	71 – 80 years	18	26.5
	81 – 90 years	2	2.9
Sex	Male	43	63.2
	Female	25	36.8
Race	Malay	41	60.3
	Chinese	24	35.3
	Indian / others	3	4.40
Type of stroke	Left CVA	30	48.4
	Right CVA	29	46.8
	Bilateral	2	3.2
	Not known	1	1.6
Frequency of consultations	One session	28	41.2
	Two sessions	21	30.9
	Three sessions	11	16.2
	Four sessions	8	11.8
Follow-up management received by patients after first assessment in CSRC	• Specialized clinics	4	10.5
	• Primary care long-term stroke clinic	25	65.8
	• Community-based services	2	5.3
	• Combination of specialized clinics and primary care long-term stroke clinic	7	18.4
Outcome of patients attending CSRC	• Discharge to community	19	27.9
	• Proceed to group therapy	8	11.8
	• Continue individual therapy	29	42.6
	• Defaulted	12	17.6



\* Footnote: PT – physiotherapy; OT – occupational therapy; SLP – speech & language pathologist; P&O – prosthetic & orthotics

Figure 2: Types of rehabilitation intervention received by stroke patients in CSRC

Table 2: Progress of patients over time based on Modified Barthel Index and Berg Balance Score

Point of assessment	Mean (SD)			
	3 months	6 months	9 months	12 months
Modified Barthel Index (full score: 100)	49.9 ± 27.7	72.6 ± 28.6	84.0 ± 25.6	90.0 ± 22.3
Berg Balance Scale (full score; 56)	10.2 ± 12.3	20.9 ± 17.8	30.0 ± 21.0	32.9 ± 22.1

Modified Barthel Index and Berg Balance Scale scores over twelve months follow-up in CSRC. Despite the mean stroke duration first seen in CSRC was quite late (11.5 months), the results suggest that patients post-stroke were able to improve in functional recovery if continuous and structured rehabilitation addressed the real problems and needs of the patients, rather than standard therapy that most stroke survivors now receive. Our approach in combining more than one therapy intervention in a single day may accentuate the effect of the intervention to the survivors, hence the improved functional recovery over-time. However,

a randomized controlled trial comparing this new intervention with the standard approach may be able to substantiate the effectiveness of this approach.

A comparison of our program to those of post-discharge stroke interventions (Kuptniratsaikul et al. 2009; Grasel et al. 2006; Hartman-Maeir et al. 2007) demonstrated a similar trend in the long-term outcome of stroke patients. Kapniratsakul and Grasel provided intervention whilst the patients were in the ward, whereas Maeir continued the intervention following discharge to the community. All these findings demonstrated an improvement in terms of functional outcomes, awareness

to health facilities and level of activities that were consistent with our current findings. Our hypothesis is that the provision of continuity of care and multidisciplinary team care approach has the potential to emulate the success of acute care management of stroke patients, in which involvement of multiple disciplines with regular meetings and assessments improved both survival and functional outcomes over long-term follow-up (Kalra & Langhorne 2007; Rodgers et al. 1999).

Although it is evident that there is an apparent shift towards providing a multidisciplinary rehabilitation to post-discharge stroke patients in the community, variability was apparent in terms of provision of care in previous studies and of the current program. Our program, which was outpatient-based, was successful due to the fact that it was held as an extension of the existing stroke rehabilitation service in the hospital. Although the rehabilitation intervention program for stroke patients was already in place prior to CSRC, there were no structured assessments or evaluations performed during the routine two years period of intervention. Hence, the CSRC provided a one stop-point for clinicians and therapists to discuss and individualize the treatment plan for each patient. This in turn, enabled us to prognosticate the recovery for patients thus giving them realistic expectations in their recovery.

In view of the optimum place for post-stroke rehabilitation, inpatient rehabilitation has been acknowledged to provide the most intensive rehabilitation for patients with variable level of disabilities; however the choice of rehabilitation should be determined not only by the patient needs, but should consider other factors as well (Lee et al. 1997). In this program, the decision of providing follow-through rehabilitation intervention as an outpatient basis was based on several factors namely familiarity of post-stroke patients to the hospital set-up, post-acute

care availability and most importantly the aims of providing continuous rehabilitation to these patients. The early findings of our results suggest out-patient rehabilitation program with a multi-disciplinary approach might be the catalyst for a more comprehensive care of stroke patients in the community, with the rehabilitation providing the link to other services at this stage of recovery.

There are several limitations to the study. Since the study was an observational study, no comparison was made with patients not with the CSRC program. Further research should be done to investigate the effectiveness of this program using a larger sample size for it to be recommended as standard practice.

In conclusion, the CSRC provides a structured rehabilitation intervention that was beneficial to post-stroke patients in terms of functional status, and improvement in balance and mobility. It also showed that stroke patients over a period of six months and beyond are able to improve if given sufficient intervention.

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