Inpatient Stroke Rehabilitation Activity: Barriers, Enablers, and Changes in Activity Behaviour with Diary Use

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ABSTRACT

The Australian Stroke Foundation guidelines recommend participation in at least 3 hours of physical and occupational therapy daily during stroke rehabilitation. The majority of services in Australia do not currently meet this guideline. This study explored the usefulness of activity diary implementation in increasing activity during inpatient stroke rehabilitation and identified barriers and enablers to activity level guideline adherence, as perceived by clinicians. Using a mixed-methods, longitudinal embedded-design study, two participant cohorts were recruited: people undergoing inpatient stroke rehabilitation and stroke rehabilitation clinicians. Behaviour mapping pre- and post-implementation of activity diaries measured inpatient activity levels. Clinician surveys assessed enablers and barriers to inpatient activity level guideline adherence, both pre- and post-implementation. Twelve adults undergoing inpatient stroke rehabilitation were included. Trends toward reduced time spent sedentary (d = –0.797, 95% confidence interval (CI) [–1.811, 0.217]), increased independent ADL practice (d = 0.861, 95% CI [–0.159, 1.88]), and lower limb active practice were noted after diary implementation (d = 0.778, 95% CI [–0.234, 1.791]). Sixteen clinicians completed 14 pre-diary implementation and nine post-implementation surveys. The main themes identified as clinician-perceived barriers to activity level guideline adherence included de-prioritisation of activity, staff shortages, caseload demands, lack of family and patient-friendly resources, and stroke-related factors. The facilitators included activity diaries, behaviour change, and multidisciplinary communication. Active time among people undergoing inpatient stroke rehabilitation increased after implementation of the diaries. Despite the identified institutional barriers to inpatient activity engagement, activity diaries may assist in promoting an increase in activity among people undergoing inpatient stroke rehabilitation.

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Key Words: Barriers and Enablers, Behaviour Mapping, Clinical Practice Guidelines, Implementation, Stroke Rehabilitation

INTRODUCTION

The Stroke Foundation provides evidence-based, living stroke rehabilitation guidelines for Australia and New Zealand (Stroke Foundation, 2024). The guidelines recommend that people undergoing inpatient stroke rehabilitation participate in at least three hours of scheduled physical and occupational therapy daily, with at least two of these hours being active task-practice (Stroke Foundation, 2024). Continued active task-practice outside of scheduled therapy sessions is also recommended (Stroke Foundation, 2024).

The 2020 Stroke Foundation rehabilitation services audit showed that only 25% of the 111 participating Australian rehabilitation services met the guideline for therapy intensity (Stroke Foundation, 2020). The audit report outlined barriers to engagement in physical activity among people in inpatient stroke rehabilitation, including patient factors such as dependence, capacity to engage, and comorbidities, and staff limitations such as time, skill, and experience (Stroke Foundation, 2020).

Higher activity levels during rehabilitation are associated with greater functional improvement (Foley et al., 2012; Stroke Foundation, 2020). Repetition of functional activities and task-specific practice can facilitate recovery of movement, activity of daily living (ADL) function, language, cognition, and perception (Saunders et al., 2021; Stroke Foundation, 2024). Despite evidence supporting a high volume of task-practice, and widespread knowledge of stroke guidelines among clinicians, activity-level recommendations are not consistently met in clinical practice (Barrett et al., 2018; Foley et al., 2012; McLaren et al., 2020). Barrett et al. (2018) reported that most people in stroke rehabilitation were sedentary during their awake hours (12.75 hr, 85.6% sedentary), with greater sedentary behaviour on weekends (13.5 hr, 89.8% sedentary), highlighting the need for strategies to increase engagement in physical activity outside of formal rehabilitation hours. Bernhardt et al. (2007) reported that people undergoing inpatient stroke rehabilitation were more likely to engage in activity during interactions with visitors. The COVID-19 social distancing protocols and inpatient visiting hour changes during the lockdown periods in Australia and New Zealand likely compounded barriers to engagement in activity due to staffing shortages related to self-isolation requirements, reduced engagement with visitors, cancellation of group therapies, and restrictions on use of inpatient common areas such as dining rooms, meaning inpatients spent more time alone (Angus et al., 2023; Australian Government, 2020; New Zealand Government, 2023). These limitations enhanced the need for promotion of self-directed activity for people undergoing stroke rehabilitation (Vadas et al., 2021).

Prior studies have identified barriers such as lack of time to implement change, highlighting additional challenges of staff shortages, staff turnover, and high workloads (Alsop et al., 2023; Lynch et al., 2017). The integration of non-therapy team members into rehabilitation, self-directed therapy guides, group therapy sessions, and therapist availability across a seven-day period have been demonstrated to increase the amount of activity performed by people in stroke rehabilitation (Gittins et al., 2020; Lynch et al., 2017; White et al., 2014; Wong et al., 2022). Alsop et al. (2023) conducted a systematic review and thematic synthesis, which highlighted a lack of prioritisation of physical activity in inpatient settings including rehabilitation. A shift in culture, in which physical activity promotion is an interdisciplinary responsibility, was recommended (Alsop et al., 2023). Therefore, implementation strategies that are tailored to health-care professional groups and guided by theory-informed interventions to improve adherence to clinical guidelines are needed (Wong et al., 2022). Understanding barriers and enablers to stroke guideline adherence, specific to the context of the service, can inform targeted implementation strategies to increase the success of delivery of evidence-based practice.

This project aimed to:

1. Map all task-related activity performed by people undergoing inpatient stroke rehabilitation pre- and post-implementation using activity diaries, and on-site "activity champions" at the Osborne Park Hospital (OPH) stroke rehabilitation unit (SRU) in Western Australia.
2. Explore barriers and enablers to activity diary implementation and activity level guideline adherence, perceived by SRU clinicians.

METHODS

Design

Reporting of this mixed-methods, longitudinal embedded design study conformed to the STROBE statement (von Elm et al., 2008). Behaviour mapping was conducted pre- and post-diary implementation to evaluate inpatient observable time spent in active practice. A clinician survey evaluated pre- and post-implementation perceived enablers and barriers to diary implementation and activity level guideline adherence.

Setting

The study was conducted over one month in February 2023 at the OPH SRU. The SRU has 13 dedicated stroke rehabilitation beds with approximately 150 admissions annually.

Ethical considerations

The project was approved by Osborne Park Hospital (QI44008) and by the University of Notre Dame Australia Human Research Ethics Committee (2022-162F). All participants provided informed consent.

Participants

Two participant cohorts were recruited to address the two study aims. Cohort 1 included people admitted for stroke rehabilitation on the SRU. An a priori power calculation (based on Janssen et al., 2014) determined a minimum sample of $n = 12$ to detect a change in activity from baseline to post-implementation.

The inclusion criteria for Cohort 1 were aged ≥18 years; able to provide informed consent or available appropriate proxy to provide consent; had a diagnosis of stroke and admitted for rehabilitation; and expected to remain on the SRU for at least two weeks from study enrolment. People involved in episodes of care outside of rehabilitation (acute or palliative) were excluded.

Cohort 2 included clinicians who worked on the OPH SRU during the study period and who could influence the structure of rehabilitation (physiotherapists, occupational therapists, speech pathologists, and clinical nurses).

Outcomes of interest

The outcomes of interest across both cohorts in this study were:

- time spent engaged in physical activities
- barriers and enablers to diary use
- barriers and enablers to physical activity on the SRU.

The data collection methods included a pre-implementation clinician survey, post-implementation clinician survey, and a behaviour mapping tool.

Procedures

Stakeholders from the multidisciplinary team including physiotherapy, occupational therapy, speech pathology, and nursing participated in two meetings prior to the commencement of this study. The overarching goal of the project (increasing activity among people undergoing inpatient

rehabilitation on the SRU), roles and responsibilities of team members, and activity diary implementation strategies including appointment of an "activity champion" who was responsible for diary implementation, daily reminders at interdisciplinary board rounds, and visual reminders in rooms of inpatients using the diaries, were discussed and agreed upon during these meetings.

The study timeline is presented in Table 1. A lead clinical implementor ("activity champion", SRU physiotherapy clinician) was responsible for the diary implementation process. An aphasia-friendly version of the activity diary was developed by two senior speech pathologists. Standard and aphasia-friendly activity diaries are presented in Appendix A. The lead clinical implementor ("activity champion") was interviewed and discussed the implementation process and their perceived barriers and enablers to intervention implementation of the activity diary to increase post-stroke activity levels.

Table 1

Study Timeline

Week	Activity
1 2	Cohort 2: Pre-implementation survey distributed
3	Cohort 1: Pre-implementation behaviour mapping
4	Implementation of diary intervention
5	Cohort 1: Post-implementation behaviour mapping
6 7	Cohort 2: Post-implementation survey distributed

Note. Study commenced in February 2023.

Cohort 1

The design and methodology of the behaviour mapping tool (Appendix B) was based on methodology reported by D'Souza et al. (2022) and planned in conjunction with the SRU team. Behaviour mapping measured participant activity engagement (observation at 10 min intervals) before and one week after implementation. During each observation period (pre- and post-implementation), participants were observed in two separate groups across five days. Participants from each group were observed for two blocks of 3.5 hours on weekdays and one block of four hours on the weekend. Participant activity was observed by GM, a physiotherapy honours student, and recorded at a single time-point every 10 min across each block. Table 2 presents activity variables that were recorded.

Cohort 2

Surveys were created using the Qualtrics programme, based on a previously validated survey (Harmsen et al., 2005) that explored clinician-perceived barriers and enablers to health service improvement. The survey used in the present study is presented in Appendix C. Two people with experience of providing stroke rehabilitation on the OPH SRU collaborated in survey development. Eligible clinician participants were invited to complete the surveys via email pre- and post-implementation. Two reminders, in addition to the initial invitation, were sent via email to eligible clinicians to enhance participation.

Table 2

Participant Demographics

Cohort 1	*n*	%
Participants	12	
Age (years), *Mdn* (range)	75 (39–90)	
Sex		
Male	7	58.0
Female	5	42.0
Oxford stroke classification		
Lacunar stroke	2	16.6
Posterior circulation stroke	2	16.6
Partial anterior circulation	6	50.0
stroke	2	16.6
Total anterior circulation stroke		
Side of stroke		
Right	8	66.7
Left	4	33.3
Cohort 2		
Participants	16	
Allied health	13	81.3
Clinical/coordinating nurse	3	18.7
Age (years)		
25–35	9	56.0
35–45	2	12.5
> 45	5	31.3
Sex		
Male	1	6.3
Female	15	93.7
Experience in stroke rehabilitation (years)	3	19.0
< 1	5	31.0
1–5	3	19.0
5–10	5	31.0
> 10		
Experience on OPH SRU (years)		
< 1	7	44.0
1–5	3	19.0
5–10	4	25.0
> 10	2	12.0

Note. OPH SRU = Osborne Park Hospital stroke rehabilitation unit.

Data analysis

Cohort 1

Behaviour mapping data were organised using Microsoft Excel with the outcome variables calculated pre- and post-implementation. Active observations were calculated as the observed occasions spent performing activity relative to total number of observations. Data were imported into IBM SPSS v29 for analysis with mean and interquartile ranges of each variable from all participants and pre- and post-implementation calculated. Normality was assessed using the Shapiro Wilk test. Pre-post differences were assessed with Paired sample *t*-test

and the non-parametric Wilcoxon signed-rank test, with the standardised test statistic and 2-sided *p*-value reported. Effect sizes were reported as Cohen's d point estimates with lower and upper confidence levels.

Cohort 2

Qualitative thematic analysis (Braun & Clarke, 2006) was conducted by one author (GM) and ratified through discussion with two co-authors (JN and PC). Themes and subthemes were identified based on survey data. Further analysis compared qualitative data from a sub-cohort of participants who completed both surveys (n = 7) to explore change in knowledge and perceptions about meeting activity guidelines pre- versus post-implementation of diaries. Analysis was conducted manually using tables, after responses were exported from Qualtrics to Microsoft Excel. Pre- and post-implementation data were analysed separately prior to comparison. Themes were separated by pre- and post-implementation responses. Subthemes were identified where main themes did not capture the full scope of information from responses.

RESULTS

Participant characteristics

Cohort 1

At study commencement, 12 of the 14 people undergoing rehabilitation in the SRU were eligible for study inclusion and provided informed consent to participate. Behaviour mapping observational data during the pre-implementation period were recorded for these 12 participants. Behaviour mapping during the post-implementation period was completed for six participants; four patients were discharged. Flow of participants in Cohort 1 is displayed in Figure 1. Demographic data are presented in Table 2.

Cohort 2

Demographic data of Cohort 2 are presented in Table 2. Seventeen SRU clinicians met the inclusion criteria and a total of 16 clinicians returned at least one complete survey (Figure 2).

Behaviour mapping data - Cohort 1

Participant observation occurred across 22 hr in total, pre- and post-implementation. Behaviour mapping data are presented in Table 3. Post-implementation, participants were observed to be active in a greater proportion of observed occasions. Participants performed more independent practice and spent significantly less time lying in bed. Nursing team members were observed with participants on fewer occasions post-implementation (p < 0.001). Trends toward reduced time spent sedentary (d = -0.797, 95% CI [-1.811, 0.217]), increased independent ADL practice (d = 0.861, 95% CI [-0.159, 1.88]), and lower limb active practice were noted post-implementation (d = 0.778, 95% CI [-0.234, 1.791]).

Survey data - Cohort 2

Barriers and enablers to activity, diary use, and implementation

Following thematic analysis of the pre- and post-implementation survey data, five main themes were identified. These related to SRU clinician-perceived barriers and enablers to the implementation of activity diaries and adherence to activity level stroke rehabilitation guidelines:

1. Activity diaries improved participant engagement.
2. Competing priorities and resource demands.
3. Implementation process requires more consultation.
4. Participant/stroke-related barriers to activity.
5. Clinician knowledge and engagement.

Theme 1: Activity diaries improved participant engagement

Most participants perceived that activity diaries increased activity engagement among people undergoing stroke rehabilitation. Greater family involvement in rehabilitation was also noted to be related to diary implementation. Almost all participants reported that activity diaries improved activity engagement. Clinicians reported that the diaries served as a prompt for them to guide and develop therapy programmes that could be performed with visitors. One clinician noted that it "… made me think of other ways in which I could include a patients' family to enable more opportunities for rehabilitation" (allied health professional [AH]7).

Figure 1

Flow of Participants (Cohort 1)

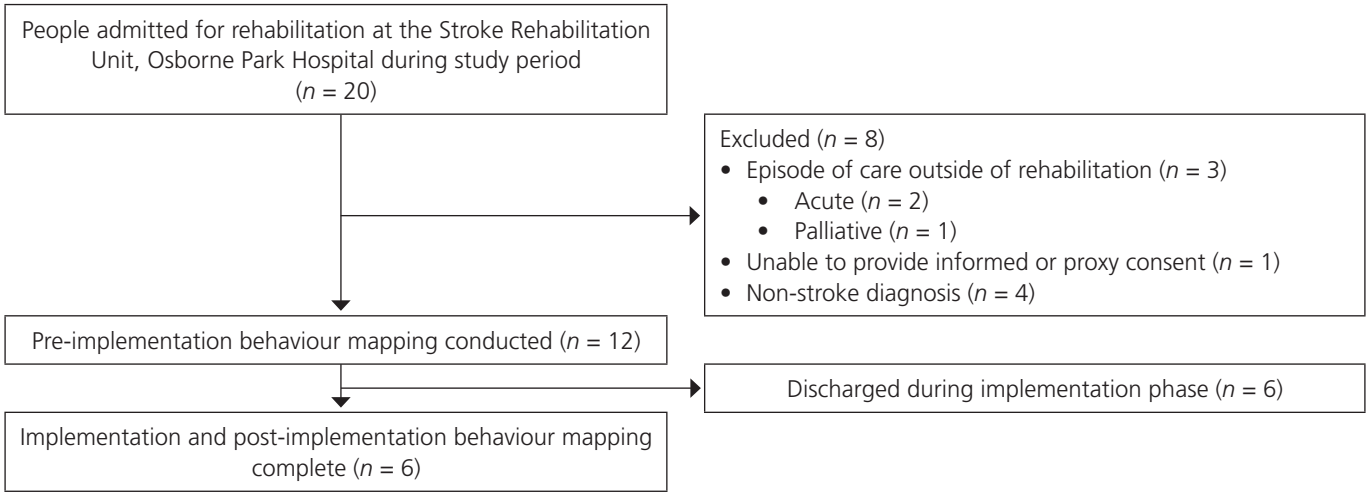
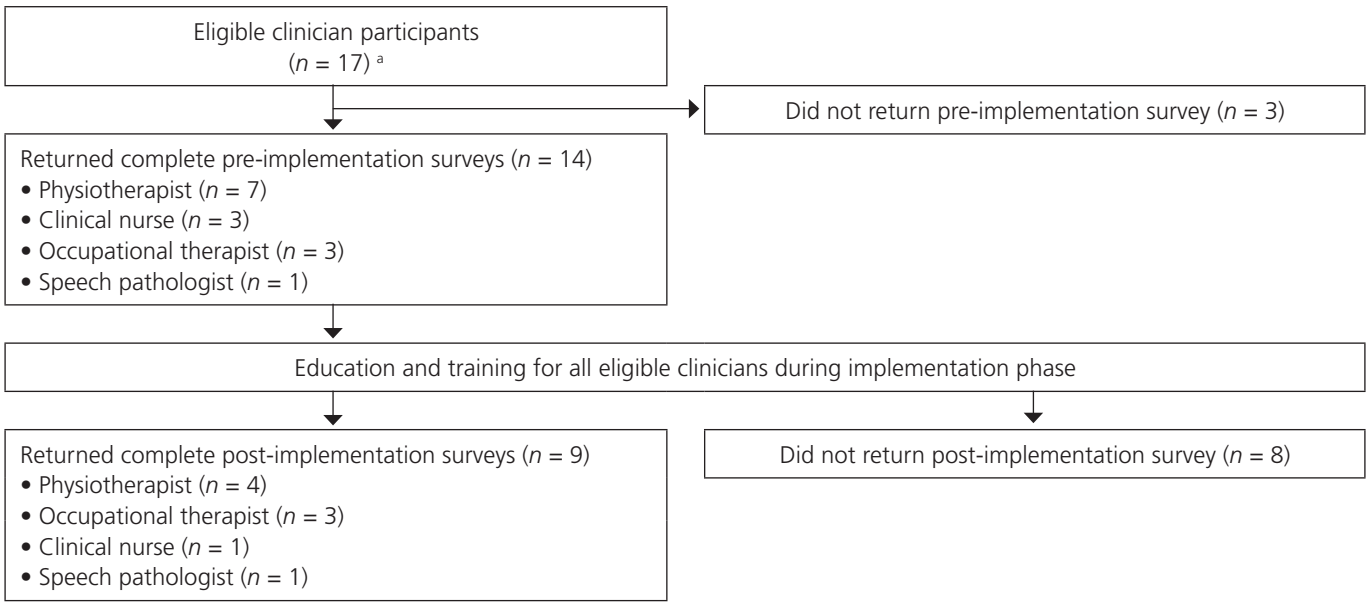


Figure 2

Flow of Participants (Cohort 2)



[a] Seven participants completed both pre- and post-implementation surveys. Seven participants completed the pre-implementation survey only and two completed the post-implementation survey only. A total of 16 participants returned at least one complete survey.

The majority of clinicians perceived that the diaries prompted people in stroke rehabilitation to engage in activity outside of scheduled therapy. Most clinician participants found the diary layout useful. A commonly reported benefit was the role of the diaries as a shared document between disciplines, enhancing interdisciplinary teamwork.

Theme 2: Competing priorities and resource demands

Competing priorities between activity and other demands was noted among clinicians. Clinician caseload demands, prioritisation of medical appointments, and discharge planning were identified as barriers to activity levels. As described by two participants: "Discharge planning taking priority over implementing independent practice" (AH5) and "Varying caseload demands within time available" (AH3).

Almost all clinician participants perceived team-related factors as facilitators of independent practice. The majority of participants perceived that clear, meaningful goals and team communication would foster increased activity engagement by people in stroke rehabilitation. A small number of allied health participants suggested increased education of patients and family would increase patient/carer responsibility for independent rehabilitation, thereby reducing caseload and time burdens of the SRU team.

Insufficient staffing was consistently identified as a barrier to activity level guideline adherence, while half of allied health participants perceived communication and involvement of the whole multidisciplinary team as an enabler to activity level guideline adherence.

Pre-implementation, some SRU clinicians suggested the introduction of resources to educate and enable independent practice, such as re-introduction of group training (group sessions had been ceased with COVID-19 restrictions), more frequent therapy sessions, volunteer engagement, and after-hours nursing team to facilitate independent practice. Post-implementation, some SRU team clinicians reported that the diaries created additional time burdens due to the recording and development of individualised, independent programmes.

Theme 3: Implementation process required more consultation

Almost all clinicians reported the implementation process required improvement, to promote sustained use. Participants reported that greater consultation with people with stroke and their families, and the whole multidisciplinary team would improve the process. A quarter of participants suggested that the diaries should be provided on arrival to the SRU in family meetings and supported by an instruction video on its use. A small number of allied health participants stated that the completion of the diaries relied too heavily on therapists.

Theme 4: Participant / stroke-related barriers

In the pre- and post-implementation surveys, clinicians reported a number of stroke-related factors as barriers to activity. The most frequently identified stroke-related barriers were stroke survivors' cognitive function and memory. Approximately half of the clinician participants reported that the diary was less helpful for people who had cognitive impairments, meaning they were unable to use the diary or undertake practice independently. For example, "Patients often are not able to practise unsupervised or even without physical support" (AH8).

Most participants reflected that family engagement and support facilitated increased engagement in activity.

Theme 5: Clinician knowledge and engagement

Half of clinicians incorrectly answered the survey question

Table 3

Behaviour Mapping Data (Percentage of Observed Occasions)

	Variable	Pre-implementation (n = 12)		Post-implementation (n = 6)		Effect size		Between-group differences [a]	
		M	*SD*	*M*	*SD*	*d*	95% CI	Test statistic	*p*
Location	Amenities	4.3	2.1	4.4	1.8	0.063	[–0.917, 1.043]	–0.409	0.699
	Bedroom	70.4	25.3	80.6	13.4	0.455	[–0.536, 1.446]	0.493	0.643
	Corridor	1.7	2.1	3.0	3.1	0.541	[–0.455, 1.537]	–1.837	0.126
	Therapy room	5.2	5.2	5.6	6.1	0.074	[–0.907, 1.054]	0.413	0.697
	Dining room	8.8	19.7	0	0	–0.539	[–1.534, 0.457]		
	Off ward (medical)	2.4	3.2	1.8	3.1	–0.184	[–1.165, 0.798]	0.027	0.980
	Outside	4.9	5.3	3.5	5.3	–0.266	[–1.25, 0.718]	0.123	0.907
	Other	2.3	4.7	1.2	2.9	–0.270	[–1.254, 0.714]	–0.255	0.809
Practice	Active practice	14.4	9.8	19.3	8.7	0.521	[–0.474, 1.515]	–2.748	0.040*
	Sedentary	81.1	12.1	68.4	22.2	–0.797**	[–1.811, 0.217]	1.924	0.112
Personnel present	Physiotherapist	7.2	5.5	6.1	6.1	-0.197	[–1.179, 0.785]	1.383	0.225
	Occupational therapist	6.1	5.8	3.5	5.1	–0.455	[–1.446, 0.536]	0.473	0.656
	Speech pathologist	2.6	4.7	1.8	2.2	–0.211	[–1.194, 0.771]	0.567	0.595
	Nurse	10.5	7.8	4.5	6.5	–0.794**	[–1.808, 0.22]	7.500	< 0.001*
	Medical doctor	1.5	1.7	1.0	1.2	-0.295	[–1.28, 0.689]	0.562	0.598
	Physiotherapy student	4.8	6.4	6.9	9.8	0.273	[–0.711, 1.257]	0.260	0.805
	Occupational therapy assistant	1.2	2.1	1.0	1.8	–0.072	[–1.052, 0.909]	0.668	0.533
	Visitor	37.2	27.1	23.4	29.0	–0.500	[–1.494, 0.493]	1.027	0.352
	Another patient	2.4	3.5	2.3	5.6	–0.046	[–1.026, 0.934]	0.174	0.869
	Alone	32.8	22.3	45.8	21.6	0.588	[–0.411, 1.586]	–1.258	0.264
	Other	1.0	2.0	2.1	1.9	0.536	[–0.459, 1.532]	–0.335	0.751

Activity	Formal individual	14.8	8.3	14.2	8.9	–0.066	[–1.046, 0.915]	0.321	0.761
	Formal group	1.4	3.4	0	0	–0.512	[–1.507, 0.482]	0	0.180
	Walking	0.9	1.2	0.8	1.3	–0.109	[–1.09, 0.871]	3.000	0.157
	Independent speech	0.1	0.4	0	0	–0.348	[–1.334, 0.639]		
	Independent activities of daily living practice	0.5	1.8	2.3	2.7	0.861**	[–0.159, 1.88]	–2.090	0.091
	Independent cognition/ occupational therapy	1.0	2.8	1.8	3.1	0.249	[–0.734, 1.232]	3.000	0.180
	Independent physical activity	0.5	1.8	1.6	2.4	0.529	[–0.466, 1.524]	2.000	0.655
	Socialisation	25.9	13.3	15.9	14.8	–0.722	[–1.73, 0.286]	0.697	0.517
	Sleeping	9.7	9.7	11.9	11.7	0.209	[–0.774, 1.191]	–0.287	0.785
	Watching television	6.3	8.5	11.4	13.3	0.498	[–0.495, 1.492]	–2.132	0.086
	Reading	7.6	10.7	6.9	11.0	–0.065	[–1.045, 0.915]	11.000	0.917
	Medical/nurse intervention	5.1	7.3	2.8	1.8	–0.386	[–1.374, 0.602]	2.000	0.273
	ADL shower/dressing	4.2	2.8	2.9	2.2	–0.502	[–1.496, 0.492]	0.134	0.899
	Meal	7.4	4.8	7.6	2.8	0.061	[–0.919, 1.041]	10.000	0.916
	Phone (talking)	1.5	2.8	1.3	3.1	–0.087	[–1.067, 0.894]	0	0.317
	Phone (typing/looking)	6.5	9.5	8.3	7.0	0.202	[–0.78, 1.185]	0.084	0.936
	Other	0.1	0.4	0.3	0.6	0.254	[–0.73, 1.237]	1.000	0.317
Active limb	Upper limb	7.4	6.1	7.5	3.4	0.029	[–0.951, 1.009]	–0.877	0.421
	Lower limb	3.9	3.6	8.7	9.5	0.778**	[–0.234, 1.791]	–2.000	0.102
Position	Sitting	60.4	27.1	57.0	22.4	–0.135	[–1.116, 0.846]	–1.607	0.169
	Lying in bed	26.0	26.0	23.8	25.2	–0.086	[–1.066, 0.894]	3.955	0.011*
	Standing	3.4	3.2	2.8	3.2	–0.197	[–1.18, 0.785]	–0.109	0.917
	Other	0.5	1.8	0	0	–0.348	[–1.335, 0.639]	0	0.317
	COVID isolation	0	0	0	0				
	Independent practice [b]	0.5	1.7	1.4	2.1	0.477	[–0.516, 1.469]	–2.646	0.0046*

[a] Between-group differences were computed on paired data only ($n = 6$).
[b] Independent practice = independent speech, cognitive, physical, or activity of daily living practice.

* $p < 0.05$.
** Large effect size (> 0.8).

examining knowledge of current rehabilitation guideline recommendations. The majority of participants who answered incorrectly underestimated the guideline-recommended amount of daily activity for people in stroke rehabilitation.

Post-implementation, participants reported challenges in remembering to use the diary and prescribing activities that could be performed independently. Some SRU team participants reported that they lacked the support and time to facilitate and prompt daily diary use. Half of the allied health participants reported that activity champions and reminders from colleagues aided diary implementation. One clinician reported that "[the diaries] prompted more written instruction. I would always provide things for patients to do but wouldn't always write it down or be as prescriptive" (AH10).

DISCUSSION

This study aimed to evaluate the usefulness of diaries to increase activity of people in stroke rehabilitation and explore staff-perceived barriers and enablers to inpatient engagement in activity. Engagement in activity was greater among people undergoing stroke rehabilitation after implementation of the diaries.

The present study found that people in stroke rehabilitation spent less time lying in bed, post-diary implementation. Previous studies have illustrated increased activity levels when nursing staff facilitated personal care task-practice as rehabilitation activity (Rosbergen et al., 2019; van de Port et al., 2012). Clinician participants identified that with diary implementation, visitors and family facilitated higher levels of independent stroke rehabilitation practice. Existing literature (Alsop et al., 2023) also encouraged implementation of patient and family-friendly resources such as an activity diary. Pre-diary implementation surveys raised the barrier of competing priorities, in line with existing literature (Alsop et al., 2023; Lynch et al., 2017; Stewart et al., 2020). Post-implementation, participants were with nurses on fewer occasions than pre-implementation. We hypothesise that this may reflect that diaries empowered participants to perform tasks independently, although this finding and hypothesis should be interpreted with caution due to low participant numbers and the difference could also be explained by participant functional improvement or variation in work practices among nursing staff. Medical appointments and discharge planning, staff shortages, and caseload demands were identified as barriers to rehabilitation activity engagement in the present study, which is consistent with findings of previous studies (Alsop et al., 2023; Burton et al., 2013; Lynch et al., 2017).

The perception among clinician participants that interdisciplinary team communication and goal setting were promoted by the diaries supports existing implementation theory for behaviour change (Atkins et al., 2017; Cane et al., 2012; French et al., 2012; Jobber et al., 2021; Lynch et al., 2017). It is hypothesised that the staff behaviour change was a facilitator of behaviour change among people undergoing rehabilitation.

Cognitive function and memory among people in stroke rehabilitation were identified by clinician participants as barriers to engagement in activity, similar to findings from previous studies (Preston et al., 2017; Stewart et al., 2020). Clinician participants perceived the diaries were of little use for people in stroke rehabilitation with poor cognitive function and memory, especially those lacking familial support. Further work is needed to explore appropriate strategies to promote activity among people with impaired cognition, which affects more than half of stroke survivors and is associated with reduced independence (El Husseini et al., 2023). Clinician participants noted inability to complete the tasks without supervision among some stroke survivor participants to be a barrier to diary use. Further exploration is needed into whether the diary model was unsuitable for some participants, or whether the tasks set in the diaries were unsuitable for the individual stroke survivors. Further clinician training and experience may promote increased prescription of suitable tasks for individual stroke survivors.

Clinician participants suggested improving diary implementation by providing diaries on admission to the SRU in family meetings and conducting regular diary reviews. This is predicted to facilitate early activity-related goal setting and expectation setting for people undergoing stroke rehabilitation and their families. It is recommended that the implementation process is tailored to the individual rehabilitation setting, considering processes and team culture, in future studies exploring activity diaries in stroke rehabilitation.

A strength of the present study was the mixed-methods approach, which enabled investigation of amount of activity performed before and after diary implementation, as well as factors that facilitated and hindered both participation in activity during stroke rehabilitation and implementation of the activity diaries. Findings may inform future implementation projects.

Limitations and future research

Limitations of this study should be considered, when interpreting findings. The study was conducted at a single site, over a limited time period (conducted as an undergraduate physiotherapy honours project; consequently the project was restricted to the allocated honours timeframe). This meant that data represented a small number of stroke survivor participants. The limited time period for the study meant that data regarding long-term behaviour change were not collected, so sustainability of change related to the diaries remains unknown. Time for clinician familiarisation and for piloting of the diary before implementation were also restricted and the process may have improved with more time to prepare for implementation. Future research with larger cohort sizes over a longer time period, with multi-site implementation, is required to investigate the sustainability and generalisability of the findings to other stroke rehabilitation sites. The activity diaries lacked co-design by people with lived experience of stroke, and people with lived experience of stroke were not included in the stakeholder meetings. Perceptions of stroke survivors using the diaries should also be explored and future iterations of the diary should be co-designed by people with lived experience of stroke and should incorporate feedback from stroke survivors undergoing rehabilitation. The present study also did not investigate the association between functional recovery and engagement in activity among people in stroke rehabilitation, which may have confounded results. It is recommended that future studies control for functional recovery when measuring activity levels pre- and post-intervention.

CONCLUSION

Activity diary implementation was associated with increased engagement in activity and decreased time spent lying in bed among people undergoing inpatient stroke rehabilitation. Implementation of activity diaries for people in stroke rehabilitation may present a potential strategy to improve adherence to activity level guideline recommendations. Clinician interdisciplinary teamwork, appointment of activity champions, and family engagement facilitated stroke survivor participation in activity, while limited clinician time and patient-related factors were identified as barriers to participation in activity. Future studies to determine usefulness of activity diaries in promoting activity among larger cohorts of participants at multiple sites, as well as implementation studies to guide and inform implementation processes are recommended.

KEY POINTS

1. Clinician interdisciplinary teamwork, appointment of activity champions, and family engagement were identified as facilitators of participation in activity during inpatient stroke rehabilitation.
2. Limited clinician time and patient-related factors were identified as barriers to engagement in activity during inpatient stroke rehabilitation.
3. Implementation of activity diaries for people admitted to stroke rehabilitation may present a potential strategy to enhance engagement in inpatient rehabilitation for people with stroke.

DISCLOSURES

There are no conflicts of interest that may be perceived to interfere with or bias this study. No funding was obtained for this study. JN held a Raine Foundation / Department of Health Clinician Research Fellowship (CRF04-R9) during the time in which the study was conducted.

PERMISSIONS

This project was approved by Osborne Park Hospital (QI44008) and by the University of Notre Dame Australia Human Research Ethics Committee (2022-162F).

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CONTRIBUTIONS OF AUTHORS

All authors contributed to conceptualisation and design of the study. Data collection, GM, EG, and JN; data analysis, GM, PC, and JN; interpretation of findings, GM, PC, and JN; writing-original draft preparation, GM; all authors contributed to editing for publication.

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APPENDIX A

Osborne Park Hospital
Stroke Rehabilitation Unit

Activity Diary

The Australian and New Zealand Guidelines for Stroke Management recommends for stroke survivors, rehabilitation should be structured to provide as much scheduled therapy as possible.

Stroke survivors should also be encouraged to continue with active task practice outside of scheduled therapy sessions. This could include:

- Self-directed, independent practice.
- Semi supervised and assisted practice involving family/friends, as appropriate.

Your therapist will set exercises for you to complete on your own. This diary will help you and your family/carers record how much activity you are completing outside of scheduled therapy sessions.

How long did you do therapy
on your own or with family/friends?

My goal:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Physiotherapy 							

Activity Diary

Write down how many minutes you spent practicing...

My overall goal is:

Therapy	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Physiotherapy							
Occupational therapy							
Speech therapy							

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Occupational therapy 							

Activity

Activity	Therapist	Notes

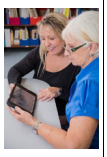
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Speech therapy 							

Image credits: WA Health, RAW image

Activity

Activity Diary *Aphasia friendly*

Doing **therapy** activities **on your own** or **with family/friends** can **improve** your **stroke recovery.**

Use this **diary** to **record** the **therapy** you **do by yourself** or **with family/friends.**

Activity

Activity (write and draw)	Therapist	Notes

APPENDIX B

BEHAVIOUR MAPPING

APPENDIX C

SURVEY QUESTIONS

Pre-implementation survey questions

1. What is your health employment number?
2. What your profession?
   - Clinical or coordinating nurse
   - Occupational therapist
   - Physiotherapist
   - Speech pathologist
   - Other
3. For how long have you worked in stroke rehabilitation?
   - < 1 year
   - 1–5 years
   - 5–10 years
   - > 10 years
4. For how long have you worked on the stroke rehabilitation unit at OPH?
   - < 1 year
   - 1-5 years
   - 5–10 years
   - > 10 years
5. What is your age?
   - < 25 years
   - 25–35 years
   - 35–45 years
   - > 45 years
6. What is your gender?
   - Female
   - Male
   - Non-binary
   - Other/prefer not to say
7. How many hours of independent task practice are recommended per day during stroke rehabilitation, according to the Stroke Foundation?
8. What are some barriers to meeting the independent practice guidelines?
9. What are some things that might help meet the independent practice guidelines?

Post-implementation survey questions

Questions 1–6, as per the pre-implementation survey

7. Has the implementation of the activity diary increased your knowledge about care of patients with stroke?
   - Yes. If yes, how has the diary increased your knowledge?
   - No
8. Has the implementation of the activity diary changed care of patients with stroke survivors and their families?
   - Yes. If yes, how has the diary changed care?
   - No
9. What was helpful about the diary?
10. What was less helpful about the diary?
11. What were the barriers to implementing the diary?
12. What were some facilitators to implementing the diary?
13. What needs to be improved to make the diary more useful?
14. If the diary was not used, what should be used instead?
15. What needs to be done differently regarding the process of implementing the diary?
16. On a scale of 1–10, how active have you been in the implementation process?
17. On a scale of 1–10, how useful has the diary been (i.e., do you consider the diary to have improved care for this patient group)?