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Home-Based Versus Centre-Based Rehabilitation for Community-Dwelling Postacute Stroke Patients: A Rapid Review

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Evidence Development and Standards Branch at Health Quality Ontario

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Conflict of Interest Statement

All authors in the Evidence Development and Standards branch at Health Quality Ontario are impartial. There are no competing interests or conflicts of interest to declare.

Rapid Review Methodology

Rapid reviews must be completed in a 2- to 4-week time frame. Clinical questions are developed by the Evidence Development and Standards branch at Health Quality Ontario, in consultation with experts, end users, and/or applicants in the topic area. A systematic literature search is then conducted to identify relevant systematic reviews, health technology assessments, and meta-analyses. The methods prioritize systematic reviews, which, if found, are rated by AMSTAR to determine the methodological quality of the review. If the systematic review has evaluated the included primary studies using the GRADE Working Group criteria (http://www.gradeworkinggroup.org/index.htm), the results are reported and the rapid review process is complete. If the systematic review has not evaluated the primary studies using GRADE, the primary studies in the systematic review are retrieved and the GRADE criteria are applied to 2 outcomes. If no systematic review is found, then RCTs or observational studies are included, and their risk of bias is assessed. All rapid reviews are developed and finalized in consultation with experts.

About Health Quality Ontario

Health Quality Ontario is an arms-length agency of the Ontario government. It is a partner and leader in transforming Ontario's health care system so that it can deliver a better experience of care, better outcomes for Ontarians, and better value for money.

Health Quality Ontario strives to promote health care that is supported by the best available scientific evidence. The Evidence Development and Standards branch works with expert advisory panels, clinical experts, scientific collaborators, and field evaluation partners to conduct evidence-based reviews that evaluate the effectiveness and cost-effectiveness of health interventions in Ontario.

Based on the evidence provided by Evidence Development and Standards and its partners, the Ontario Health Technology Advisory Committee—a standing advisory subcommittee of the Health Quality Ontario Board—makes recommendations about the uptake, diffusion, distribution, or removal of health interventions to Ontario's Ministry of Health and Long-Term Care, clinicians, health system leaders, and policy-makers.

Health Quality Ontario's research is published as part of the *Ontario Health Technology Assessment Series,* which is indexed in MEDLINE/PubMed, Excerpta Medica/Embase, and the Centre for Reviews and Dissemination database. Corresponding Ontario Health Technology Advisory Committee recommendations and other associated reports are also published on the Health Quality Ontario website. Visit http://www.hqontario.ca for more information.

About Health Quality Ontario Publications

To conduct its rapid reviews, the Evidence Development and Standards branch and its research partners review the available scientific literature, making every effort to consider all relevant national and international research; collaborate with partners across relevant government branches; consult with expert advisory panels, clinical and other external experts, and developers of health technologies; and solicit any necessary supplemental information.

In addition, Evidence Development and Standards collects and analyzes information about how a health intervention fits within current practice and existing treatment alternatives. Details about the diffusion of the intervention into current health care practices in Ontario add an important dimension to the review. Information concerning the health benefits, economic and human resources, and ethical, regulatory, social, and legal issues relating to the intervention may be included to assist in making timely and relevant decisions to optimize patient outcomes.

Disclaimer

This rapid review is the work of the Evidence Development and Standards branch at Health Quality Ontario, and is developed from analysis, interpretation, and comparison of published scientific research. It also incorporates, when available, Ontario data and information provided by experts. As this is a rapid review, it may not reflect all the available scientific research and is not intended as an exhaustive analysis. Health Quality Ontario assumes no responsibility for omissions or incomplete analysis resulting from its rapid reviews. In addition, it is possible that other relevant scientific findings may have been reported since completion of the review. This report is current as of the date of the literature search specified in the Research Methods section. Health Quality Ontario makes no representation that the literature search captured every publication that was or could be applicable to the subject matter of the report. This rapid review may be superseded by an updated publication on the same topic. Please check the Health Quality Ontario website for a list of all publications: http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations.

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List of Abbreviations

AMSTAR	Assessment of Multiple Systematic Reviews
BI	Barthel index
CI	Confidence interval
MD	Mean difference
PEDro	Physiotherapy Evidence Database
RCT	Randomized controlled trial
SR	Systematic review

Background

As legislated in Ontario's *Excellent Care for All Act*, Health Quality Ontario's mandate includes the provision of objective, evidence-informed advice about health care funding mechanisms, incentives, and opportunities to improve quality and efficiency in the health care system. As part of its Quality-Based Procedures (QBP) initiative, Health Quality Ontario works with multidisciplinary expert panels (composed of leading clinicians, scientists, and administrators) to develop evidence-based practice recommendations and define episodes of care for selected disease areas or procedures. Health Quality Ontario's recommendations are intended to inform the Ministry of Health and Long-Term Care's Health System Funding Strategy.

For more information on Health Quality Ontario's Quality-Based Procedures initiative, visit www.hqontario.ca.

Objective of Analysis

The objective of this rapid review is to evaluate whether community-dwelling postacute stroke patients should receive rehabilitation at home or at a centre (an outpatient clinic, hospital outpatient department, community health centre, or rehabilitation clinic), based on outcomes of mortality and functional independence.

Clinical Need and Target Population

In Canada, stroke and other cerebrovascular diseases are the third leading cause of death. Stroke is also the leading cause of disability in adults, with nearly 300,000 Canadians affected. Rehabilitation is a pivotal component of comprehensive stroke care, as it enables impaired patients to reach their optimal physical, cognitive, emotional, and/or functional level. (1) Ideally, postacute community-dwelling stroke patients should receive rehabilitation services that are flexible and appropriate for their specific needs. (2) International guidelines on the management of postacute stroke in the community (1;3-6) acknowledge the importance of improving stroke services, but none of them make any specific recommendations on home-based versus centre-based rehabilitation. The Scottish Intercollegiate Guidelines Network (3) and the Australian National Stroke Foundation (6) both published guidelines on the management of stroke that recommend home-based rehabilitation be available for patients discharged into the community, but neither specify where the optimal setting to receive rehabilitation is. It is therefore important to review current evidence to determine whether a patient should receive rehabilitation at a centre or at home. This will enable Ontario service providers to ensure that patients are receiving rehabilitation that is appropriate for their specific needs to better facilitate recovery and reduce disability.

Rapid Review

Research Question

After acute inpatient stroke care and rehabilitation, where should community-dwelling stroke patients receive rehabilitation to improve outcomes for mortality and functional independence: home-based, or clinic- or centre-based rehabilitation?

Research Methods

Literature Search

A literature search was performed on November 12, 2013, using Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database, for studies published from January 1, 2008, until November 12, 2013. Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

Inclusion Criteria

- English-language full reports
- published between January 1, 2008, and November 12, 2013
- health technology assessments, systematic reviews (SRs), and meta-analyses
- postacute stroke patients in the community
- studies reporting a measure of functional independence and/or mortality

Exclusion Criteria

- primary studies (randomized controlled trials [RCTs], observational studies, case series, etc.)
- children (patients < 18 years)
- acute stroke patients not yet discharged into the community
- studies where outcomes of interest cannot be extracted

Outcomes of Interest

- functional independence
- mortality

Expert Panel

In November 2013, an Expert Advisory Panel on Post-Acute Community-Based Care for Stroke Patients was struck. Members of the panel included physicians, nurses, allied health professionals, and personnel from the Ministry of Health and Long-Term Care.

The role of the expert advisory panel was to provide advice on primary stroke patient groupings; to review the evidence, guidance, and publications related to defined stroke patient populations; to identify and prioritize interventions and areas of community-based care; to advise on the development of a care

pathway model; and to develop recommendations to inform funding mechanisms. The role of panel members was to provide advice on the scope of the project, the methods used, and the findings. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of the expert panel members.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) tool was used to assess the quality of the final selection of the systematic review (SR). (7) Details on the outcomes of interest were abstracted from the selected review, and primary studies were referenced as needed.

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (8) The overall quality was determined to be very low, low, moderate, or high using a step-wise, structural method.

Study design was the first consideration; the starting assumption was that RCTs are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 factors that could raise the quality of evidence were considered: the large magnitude of effect, the dose-response gradient, and any residual confounding factors. (8) For more detailed information, please refer to the latest series of GRADE articles. (8)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	Very confident that the true effect lies close to the estimate of the effect;
Moderate	Moderately confident in the effect estimate—the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different;
Low	Confidence in the effect estimate is limited—the true effect could be substantially different from the estimate of the effect;
Very Low	Very little confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of effect.

Results of Rapid Review

The database search yielded 707 citations published between January 1, 2008, and November 12, 2013 (with duplicates removed). Articles were excluded on the basis of information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

One SR met the inclusion criteria for the outcome of functional independence. The SR by Hillier and Inglis-Jassiem (9) reports the Barthel index (BI) as a measure of overall functional independence. The SR captures 8 RCTs and conducts meta-analyses for the outcome of BI at 6-8 weeks and 6 months post-intervention. The included studies in the meta-analyses vary in the duration and intensity of rehabilitation. This SR received an AMSTAR rating of 9 (Appendix 2, Table A1). For the outcome of mortality, no appropriate evidence was found based on the current rapid review methodology.

The included SR by Hillier and Inglis-Jassiem (9) is summarized in Table 1.

Table 1: Summary of Systematic Review Included

Author, Year	Review Type	Search Dates	Inclusion Criteria	No. of Studies	AMSTAR Score
Hiller and Inglis-Jassiem, 2010 (9)	SR	To December 2008	RCTs Participants over 18 years who had sustained a stroke, of any causation or aetiology, severity, or stage of recovery. Participants in the community discharged to their home. Studies that report functional assessment scales.	8	9

Abbreviations: AMSTAR, Assessment of Multiple Systematic Reviews; SR, systematic review

Results for Outcomes of Interest

The SR by Hillier and Inglis-Jassiem (9) reports on the outcome of functional independence through the BI. The SR rates the methodological quality of the individual trials using the Physiotherapy Evidence Database (PEDro) critical appraisal tool, which assesses the following domains on a scale of 1 to 11: specified eligibility, random allocation, concealed allocation, baseline homogeneity, blinded subjects, blinded therapists, blinded assessors, 85% reporting, intention to treat, between group, and point measures/variability. Since the SR did not assess the GRADE level of evidence, the risk of bias assessment from the PEDro criteria for each RCT reported by Hillier and Inglis-Jassiem (9) was used to determine the GRADE for the outcome of functional independence.

Functional Independence

The Hillier and Inglis-Jassiem SR (9) captures 8 RCTs that use the BI as a measure of functional independence. Since the majority of these trials report the BI as a median or interquartile range, the authors converted the data to means to meta-analyze the outcome. Two meta-analyses were conducted to assess the BI at different times post-intervention: 6–8 weeks and 6 months post-intervention. A third meta-analysis was conducted at 6 months post-intervention as a sensitivity analysis by eliminating 1 RCT that ultimately reduced the heterogeneity.

At 6–8 weeks post-intervention, home rehabilitation showed greater effects than centre-based rehabilitation, but only with a mean difference of 1.00 (MD, 1.00; 95% CI, 0.12, 1.88). The meta-analysis conducted for 6 months post-intervention showed no statistically significant difference between the two groups (MD, 0.65; 95% CI, -0.50, 1.81), but there was an unacceptably high level of heterogeneity (I^2 = 80%, $P < 0.001$). When a sensitivity analysis was conducted by removing one study and its corresponding follow-up (10;11), the analysis showed an effect in favor of home-based rehabilitation, but only with a mean difference of 1.04 (MD, 1.04; 95% CI, 0.05, 2.04), as well as a decrease in heterogeneity (I^2 = 59%, $P = 0.05$). However, while removing this study did reduce the heterogeneity, it remains unacceptably high. None of the study characteristics proved to be significantly different from the other included trials.

To interpret whether this change in BI is clinically significant, the literature was consulted and it was found that clinical significance can be assumed if the mean change in BI within a stroke group is at least 1.85 (12). Based on these findings, none of the meta-analyses conducted by Hillier and Inglis-Jassiem (9) suggest a clinically significant mean difference. The results from all meta-analyses are summarized below in Table 2.

In summary, at all reported stages of post-intervention in this SR (9), community dwelling stroke patients showed no clinically significant difference in functional independence based on having received rehabilitation at home versus at a centre. This outcome received a low GRADE quality of evidence. (Appendix 2, Tables A2 and A3)

Table 2: Results for the Barthel Index as a Measure of Functional Independence from the Hillier and Inglis-Jassiem, 2010 (9) Meta-Analyses

Type	No. of Studies	No. of Participants in Home	No. of Participants in Centre	Pooled Mean Difference (95% CI)	I^2	*P*-heterogeneity
6–8 weeks post-intervention	2	124	121	1.00 (0.12, 1.88)	0%	1.00
6 months post-intervention (original)[a]	6	449	463	0.65 (-0.50, 1.81)	80%	0.0002
6 months post-intervention (excluding one RCT)[a]	5	287	298	1.04 (0.05, 2.04)	59%	0.05

Abbreviations: CI, confidence interval; No., number.
[a]There is high heterogeneity for the results at 6 months post-intervention, and therefore these numbers should be interpreted with caution.

Limitations

It is important to note that this meta-analysis combines RCTs examining varying durations, intensities, and types of rehabilitation. Additionally, the majority of the RCTs report their results as medians and/or interquartile ranges. The Hillier and Inglis-Jassiem (9) SR converted this ordinal and skewed the data into means for meta-analysis. This outcome was downgraded because of indirectness. Additionally, the authors did not categorize by severity in their meta-analysis. Furthermore, at 6-months post-intervention, the heterogeneity is too high and must be interpreted with caution. Finally, while the authors claimed that the results from their meta-analyses are in favor of the home-based rehabilitation group, further analysis of the literature on the BI suggests that there is no clinically significant difference between the intervention and control group.

Mortality

One SR met the inclusion criteria upon abstract and title review for the outcome of mortality. The SR by Shepperd et al (13) reports captures 5 RCTs reporting mortality at the 3-month follow-up and 3 of those RCTs also report the mortality at the 6-month follow-up. However, upon full text review, the comparators were found to be inappropriate, as the home group received significantly more services and represented different levels of acuity than the centre-based rehabilitation group. Additionally, the home-based rehabilitation services acted more as a hospital-at-home service than a purely rehabilitation service. Therefore, no evidence was found based on the current rapid review methodology to assess the outcome of mortality for home-based rehabilitation versus centre-based rehabilitation in postacute community dwelling stroke patients.

Conclusions

On the basis of one SR comparing home-based rehabilitation to centre-based rehabilitation in community dwelling stroke patients, the following conclusions were reached:

- Low quality evidence indicates that community dwelling stroke patients receiving rehabilitation at a centre do not experience a clinically significant difference in functional independence compared to those receiving rehabilitation at home.
- No appropriate evidence was found reporting on the outcome of mortality.

Acknowledgements

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Health Quality Ontario Expert Advisory Panel on Post-Acute, Community-Based Care for Stroke Patients

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Dr Leanne Casaubon	Toronto Western Hospital; University of Toronto	Assistant Professor-Division of Neurology, Stroke Program
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Name	Affiliation(s)	Appointment(s)
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Patient Representation		
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Nicole Martyn-Capobianco	University of Guelph-Humber	Program Head of Human Services

Appendices

Appendix 1: Literature Search Strategies

Search date: November 12, 2013
Databases searched: OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, All EBM Databases (see below)

Q: After acute inpatient stroke care and rehabilitation, where should community living stroke patients receive rehabilitation to improve outcomes of mortality and functional independence: home-based rehabilitation or rehabilitation at rehabilitation clinic or centre?
Limits: 2008-current; English
Filters: Meta-analyses, systematic reviews, health technology assessments

Database: EBM Reviews - Cochrane Database of Systematic Reviews <2005 to September 2013>, EBM Reviews - ACP Journal Club <1991 to October 2013>, EBM Reviews - Database of Abstracts of Reviews of Effects <4th Quarter 2013>, EBM Reviews - Cochrane Central Register of Controlled Trials <October 2013>, EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012>, EBM Reviews - Health Technology Assessment <4th Quarter 2013>, EBM Reviews - NHS Economic Evaluation Database <4th Quarter 2013>, Ovid MEDLINE(R) <1946 to October Week 5 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <November 11, 2013>
Search Strategy:

#	Searches	Results
1	exp Patient Discharge/	19805
2	exp Aftercare/	6980
3	exp Convalescence/	3336
4	"Continuity of Patient Care"/	15038
5	exp "Recovery of Function"/	34137
6	((patient* adj2 discharge*) or after?care or post medical discharge* or post?discharge* or convalescen*).ti,ab.	37609
7	or/1-6	106752
8	exp Stroke/	88631
9	exp brain ischemia/	84048
10	exp intracranial hemorrhages/	55999
11	(stroke or poststroke or tia or transient ischemic attack or ((cerebral vascular or cerebrovascular) adj (accident* or infarct*)) or CVA or cerebrovascular apoplexy or brain infarct* or (brain adj2 isch?emia) or (cerebral adj2 isch?emia) or (intracranial adj2 h?emorrhag*) or (brain adj2 h?emorrhag*)).ti,ab.	198658
12	or/8-11	285773
13	7 or 12	384821
14	exp Rehabilitation/	162179
15	exp Rehabilitation Nursing/	1130
16	exp "Physical and Rehabilitation Medicine"/	19929
17	exp Rehabilitation Centers/	12845
18	exp Physical Therapy Modalities/	136504
19	(rehabilitat* or habilitat* or movement therap* or physiotherap* or physical therap* or exercis* or occupational therap* or mobilization or mobilisation or strength train*).ti,ab.	413311
20	or/14-19	602769
21	exp Stroke/rh [Rehabilitation]	7860
22	(13 and 20) or 21	39821
23	Meta Analysis.pt.	52069
24	Meta-Analysis/ or exp Technology Assessment, Biomedical/	61269
25	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	208749
26	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	2700
27	or/23-26	225508
28	22 and 27	1449
29	limit 28 to english language [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained]	1397
30	limit 29 to yr="2008 -Current" [Limit not valid in DARE; records were retained]	864
31	remove duplicates from 30	707

Appendix 2: Quality-Assessment Tables

Table A1: AMSTAR Score of Systematic Reviews[a]

Author, Year	AMSTAR Score[a]	1) Provided Study Design	2) Duplicate Study Selection	3) Broad Literature Search	4) Considered Status of Publication	5) Listed Excluded Studies	6) Provided Characteristics of Studies	7) Assessed Scientific Quality	8) Considered Quality in Report	9) Methods to Combine Appropriate	10) Assessed Publication Bias	11) Stated Conflict of Interest
Hillier and Inglis-Jassiem, 2010 (9)	9	✓	✓	✓	✓		✓	✓	✓	✓	✓	

Abbreviation: AMSTAR, Assessment of Multiple Systematic Reviews.
[a]Details of AMSTAR method are described in Shea et al (7).

Table A2: Risk of Bias for All Studies Included in the Hillier and Inglis-Jassiem (9)[a] Systematic Reviews

Source Author, Year	Allocation Concealment	Blinding	Complete Accounting of Patients and Outcome Events	Selective Reporting Bias	Other Limitations
Andersen et al, 2000 (14)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Baskett et al, 1999 (15)	Serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Gilbertson et al, 2000 (16)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Gladman and colleagues, 1993/1994 (10;11)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Lincoln et al, 2004 (17)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Roderick et al, 2001 (18)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Walker et al, 1999 (19)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations
Young and Forster, 1991 (20)	No serious limitations	Serious limitations[b]	No serious limitations	No serious limitations	No serious limitations

[a]Risk of bias assessment based on details from the individual PEDro scores provided in the Hillier and Inglis-Jassiem (9) SR.
[b]Subjects and therapists were not blinded in any of the studies.

Table A3: GRADE Evidence Profile for Home-Based Versus Centre-Based Rehabilitation in Post-Acute Stroke Patients

No. of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
Functional Independence (Barthel Index)							
8 (RCTs)	No serious limitations	No serious limitations	Very Serious limitations (-2)[a]	No serious limitations	Undetected	None	⊕⊕ Low

Abbreviation: No., number.
[a]The majority of the original RCTs reported their results as interquartile ranges and/or medians. Hillier and Inglis-Jassiem (9) converted this ordinal and skewed the data into means for meta-analysis.

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