Complete Summary

GUIDELINE TITLE

Clinical practice guidelines for therapeutic exercises.

BIBLIOGRAPHIC SOURCE(S)

Brosseau L, Wells GA, Finestone HM, Egan M, Dubouloz CJ, Graham I, Casimiro L, Robinson VA, Bilodeau M, McGowan J. Clinical practice guidelines for therapeutic exercises. Top Stroke Rehabil 2006 Spring;13(2):10-21.

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Hemiplegia or hemiparesis following a single clinically identifiable ischemic or hemorrhagic cerebrovascular accident (CVA)

GUIDELINE CATEGORY

Management
Rehabilitation

CLINICAL SPECIALTY

Neurology
Physical Medicine and Rehabilitation

INTENDED USERS

Occupational Therapists
Patients
Physical Therapists
Physicians
Students

GUIDELINE OBJECTIVE(S)

To promote the appropriate use of various rehabilitation interventions in the management of stroke survivors

TARGET POPULATION

Adult patients (>18 years of age) presenting with hemiplegia or hemiparesis following a single clinically identifiable ischemic or hemorrhagic cerebrovascular accident (CVA)

INTERVENTIONS AND PRACTICES CONSIDERED

1. Aerobic training
2. Resistance training
3. Passive range of motion exercises
4. Proprioceptive neuromuscular facilitation
5. Bobath technique
6. Kinetron
7. Use of the overhead pulley

Note: See the "Major Recommendations" field and the original guideline document for specific recommendations for individual interventions.

MAJOR OUTCOMES CONSIDERED

- Body function: pain reduction, muscle strength, motor function/motor recovery, range of motion (ROM), postural status, balance status, gait status, cadence, stride length, sensory status, spasticity/muscle tone, global physician assessment, global patient assessment, and cardiopulmonary function.
- Activities and participation: walking speed, walking distance, endurance, functional status, patient adherence, patient satisfaction, length of stay, discharge disposition, quality of life, and return to work.

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Literature Search

The library scientist developed a structured literature search based on the sensitive search strategy recommended by The Cochrane Collaboration and modifications to that strategy proposed by Haynes et al*. The Cochrane Collaboration method minimizes bias through a quantitative systematic Weighted Mean Difference approach to the literature search, study selection, and data extraction and synthesis. The search was organized around the condition and interventions rather than the outcomes because it was an a priori search. Thus, the guideline developers had no control over the outcomes that the authors of the primary studies decided to measure (See Appendix 1 in the original guideline document for literature search results).

The library scientist expanded the search strategy to identify case control, cohort, and non-randomized studies and conducted the search in the electronic databases of MEDLINE, EMBASE, Current Contents, the Cumulative Index to Nursing and Allied Health (CINAHL), and the Cochrane Controlled Trials Register up to December 2004. She also searched the registries of the Cochrane Field of Rehabilitation and Related Therapies, the Cochrane Musculoskeletal Group, the Physiotherapy Evidence Database (PEDro), and the University of Ottawa EBCPGs Web site. Finally, she searched the reference lists of all of the included trials for relevant studies and contacted content experts for additional studies.

In the first round of study inclusion or exclusion, two trained independent reviewers appraised the titles and abstracts of the literature search, using a checklist with the a priori defined selection criteria (Table 1 in the original guideline document). For each pair of reviewers, individuals independently read the title and abstract of each article and created a list of all of the articles in the database along with a reason for either including or excluding each article. If the reviewers were uncertain about a particular article after having read the abstract, they ordered the article and read it in full before making a determination. Before deciding whether to include or exclude the article, a comparison of their individual lists was performed. A senior reviewer, a methodologist and a clinical expert, checked the two independent lists of articles and the reasons for inclusion or exclusion to determine potential inconsistencies. Seven percent of the abstracts needed the consultation of the senior reviewer and an additional review of the problematic article. For the second round of the inclusion and exclusion process, the pairs of reviewers retrieved articles selected for inclusion from the first round and independently assessed the full articles for inclusion or exclusion in the study. Using predetermined extraction forms, the pairs of reviewers independently extracted from included articles data on the population characteristics, details of the interventions, trial design, allocation concealment, and outcomes. The pairs of reviewers assessed the methodological quality of the studies using the Jadad Scale a 5-point scale with reported reliability and validity that assigns 2 points each for randomization and double blinding and 1 point for description of withdrawals. The reviewers resolved differences in data extraction and quality assessment through consensus with the senior reviewer. This consensus served to support the reliability of data obtained with the article selection process.

Study Inclusion/Exclusion Criteria

The inclusion/exclusion criteria were based upon previous criteria used by the Philadelphia Panel. This list of criteria, which had been created for multiple diagnoses, was adapted and approved by the Ottawa Methods Group (OMG) for use with patients post stroke (Table 1 in the original guideline document).

All original comparative controlled studies that evaluated relevant physical rehabilitation interventions in stroke patients were included: randomized controlled trials (RCTs), controlled clinical trials (CCTs),** cohort studies, and case-control studies. Crossover studies were included, but to avoid potential confounding carry-over effects the data from only the first part of the study (before crossing) was analyzed. Studies where patients served as their own controls were excluded. No limitations based on methodological quality were imposed a priori with regard to the selection of comparative controlled studies; however, the quality of the studies was considered when grading the recommendations resulting from our analysis.

Uncontrolled cohort studies (studies with no comparison group) and case series were excluded, as were eligible studies with greater than a 20% drop-out rate or a sample size of fewer than 5 patients per group. Trials published in languages other than French and English were not analyzed, because of the additional time and resources required for translation. Abstracts were excluded if they contained insufficient data for analysis and additional information could not be obtained from the authors. For further exclusion criteria, see Table 1 in the original guideline document.

*Haynes R, Wilczynski N, McKibbon KA, Walker CJ. Developing optimal search strategies for detecting clinically sound studies in MEDLINE. *J Am Med Inform Assoc*. 1994;1:447-458.

**Controlled clinical trials (CCTs) are considered the same as randomized control trials (RCTs). However, according to the Jadad Scale, CCTs are either not randomized or have not been appropriately randomized.

NUMBER OF SOURCE DOCUMENTS

29 trials met the inclusion criteria and were then included.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Committee)
Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Level I: Randomized controlled trials

Level II: Nonrandomized studies

METHODS USED TO ANALYZE THE EVIDENCE

Meta-Analysis of Randomized Controlled Trials
Review of Published Meta-Analyses

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The data were analyzed using Review Manager Software. Continuous data, "data with a potentially infinite number of possible values along a continuum," were analyzed using the weighted mean differences (WMDs) between the intervention and control groups at the end of the study, where the weight is the inverse of the variance. A WMD is "a method of meta-analysis used to combine measures on continuous scales (such as weight), where the mean, standard deviation and sample size in each group are known." Dichotomous data or data with only two classifications were analyzed using relative risks. According to Cochrane, the relative risk is "the ratio of risk in the intervention group to the risk in the control group. The risk (proportion, probability, or rate) is the ratio of people with an event in a group to the total in the group."

See the original guideline document for more information.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The research staff reviewed articles and created draft evidence tables, which the nine clinical experts received in preparation for their consensus meeting with the Ottawa Methods Group (OMG). These tables were used as the basis for making the Ottawa Panel recommendations.

A methods group developed the draft guidelines and they were adopted by expert consensus.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grade A: Evidence from one or more randomized controlled trials (RCTs) of a statistically significant, clinically important benefit (>15%)

Grade B: Statistically significant, clinically important benefit (>15%), if the evidence was from observational studies or controlled clinical trials (CCTs)

Grade C+: Evidence of clinical importance (>15%) but not statistical significance

Grade C: Interventions where an appropriate outcome was measured in a study that met the inclusion criteria, but no clinically important difference and no statistical significance were shown

Grade D: Evidence from one or more randomized controlled trials of a statistically significant benefit favoring the control group (<0%: favors controls)

Grade D+: Evidence of clinical importance ($\leq$-15% for controls) without statistical significance

Grade D-: Evidence from one or more randomized controlled trials of a clinically important benefit (≤-15% for controls) that was statistically significant, where the number of participants in the study is equal to or higher than 100

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The guidelines were sent to the external experts for review. To judge the clinical usefulness of the guidelines, the positive recommendations were also sent to practitioners for feedback. Practitioners were asked four questions for each guideline: whether the recommendation was clear, whether the practitioners agreed with the recommendation, whether they felt that the literature search on the different intervention of rehabilitation was relevant and complete, and whether the results of the trials in the guidelines were interpreted according to the practitioners' understanding of the data. Their questions and comments were carefully addressed to improve the clarity of the final guidelines.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations are graded by their level (I, II) and strength (A, B, C+, C, D, D+, D-) of evidence. Definitions for the level and strength of the recommendations are presented at the end of the "Major Recommendations" field.

Clinical Practice Guidelines for Therapeutic Exercises

Aerobic training versus control, level I (randomized controlled trial [RCT]): **Grade A** for cardiopulmonary function (expiration per minute [VE]), muscle power, and functional status (walking) at end of treatment, 10 weeks (clinically important benefit demonstrated); **grade C+** for gait speed at end of treatment, 10 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for cardiopulmonary function (maximal heart rate, maximal oxygen uptake [VO_2 max], maximal carbon dioxide production [VCO_2 max]) and motor function at end of treatment, 10 weeks, and for functional status (Frenchay Activities Index [FAI]: global, social outings, walking outside) at end of treatment, 6 months (no benefit demonstrated); **grade D** for functional status (FAI: light housework activities) at end of treatment, 6 months (no benefit demonstrated but favoring control). Patients with subacute and chronic stroke.

Aerobic individualized program training versus control, level I (RCT): **Grade A** for physical fitness (highest test stage completed of the stress test and

maximal workload) and mobility (stair climbing) at end of treatment, 8 weeks (clinically important benefit demonstrated); **grade C+** for mobility (walking distance) at end of treatment, 8 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for cardiovascular function (maximal heart rate, decrease of resting heart rate and decrease of resting systolic and diastolic blood pressure), gait speed, and functional status at end of treatment, 8 weeks (no benefit demonstrated). Patients with subacute stroke.

Proprioceptive neuromuscular facilitation (PNF) for upper extremity versus standard customary muscle training, level I (RCT): **Grade C** for functional status and upper extremity muscle strength at end of treatment, 6 weeks (no benefit demonstrated); **grade D** for mobility at end of treatment, 2, 4, and 6 weeks, range of motion (ROM) of the wrist at end of treatment, 6 weeks (no benefit demonstrated but favoring control); **grade D+** for ROM of the ankle at end of treatment, 6 weeks (clinically important benefit favoring control demonstrated without statistical significance). Patients with postacute stroke.

Proprioceptive neuromuscular facilitation versus Bobath approach training, level I (RCT): **Grade C** for mobility at end of treatment, 2, 4, and 6 weeks, ROM of the wrist and ankle at end of treatment, 6 weeks (no benefit demonstrated). Patients with subacute stroke.

Bobath approach versus standard customary muscle training, level I (RCT): **Grade C+** motor function (Sodring Motor Evaluation Scale [SMES]: upper extremity) at follow-up, 4 years, quality of life (Nottingham Health Profile [NHP]–global) at follow-up, 1 year and 4 years, and quality of life (NHP–loss of energy) at end of treatment, 3 months (clinically important benefit demonstrated without statistical significance); **grade C** for mobility at end of treatment, 2, 4, and 6 weeks, motor function (SMES: lower extremity and trunk, balance, and gait, and Motor Assessment Scale) at end of treatment, 3 months, and follow-up, 1 year and 4 years, motor function (SMES: upper extremity) at end of treatment, 3 months, and follow-up, 1 year, functional status (Barthel Index) at follow-up, 4 years (no benefit demonstrated); **grade D** for ROM of the wrist and ankle at end of treatment, 6 weeks, functional status (Barthel Index) at end of treatment, 3 months, and follow-up, 1 year, (no benefit demonstrated but favoring control); **grade D+** for pain relief (NHP–pain) at end of treatment, 3 months (clinically important benefit favoring control demonstrated without statistical significance). Patients with acute and subacute stroke.

Bobath approach training versus control, level I (RCT): **Grade C+** for balance standing at follow-up, 2 and 12 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for balance sitting at end of treatment, 4 weeks (no benefit demonstrated); **grade D** for balance sitting at follow-up, 2 weeks, and balance standing at end of treatment, 4 weeks (no benefit demonstrated but favoring control); **grade D+** for balance sitting at follow-up, 12 weeks (clinically important benefit favoring control demonstrated without statistical significance). Patients with subacute stroke.

Progressive resistance training versus active training for the lower extremity, level I (RCT): **Grade A** for functional status at end of treatment, 1 month (clinically important benefit demonstrated). Patients with post-acute stroke.

Active training for the lower extremity versus control (no exercise), level I (RCT): **Grade D** for functional status at end of treatment, 1 month (no benefit demonstrated but favoring control). Patients with post-acute stroke.

Progressive resistance training for the lower extremity versus control, level I (RCT): **Grade C+** for functional status at end of treatment, 1 month (clinically important benefit demonstrated without statistical significance). Patients with postacute stroke.

Progressive resistance versus no resistance training, level I (RCT): **Grade C** for motor recovery at end of treatment, 4 weeks and 8 weeks, and follow-up, 6 months (no benefit demonstrated); **grade D** for gait endurance at end of treatment, 4 weeks and 8 weeks, and follow-up, 6 months (no benefit demonstrated but favoring control). Patients with subacute stroke.

Functional task training for upper extremity versus strength training, level I (RCT): **Grade C+** favoring functional task training for functional status (functional independence measure [FIM] self-care and FIM mobility), isometric torque, grip strength, and palmar pinch at follow-up, 6.5 to 8 months, and lateral pinch at end of treatment, 4 weeks, and follow-up, 6.5 to 8 months, and **grade C+** favoring strength training for grip strength and palmar pinch at end of treatment, 4 weeks (clinically important benefit demonstrated without statistical significance); **grade C** functional status (FIM self-care and FIM mobility) at end of treatment, 4 weeks, ROM upper extremity, pain relief, sensory function upper extremity, motor function upper extremity, functional status (Functional Test of the Hemiparetic Upper Extremity [FTHUE]) at end of treatment, 4 weeks, and follow-up, 6.5 to 8 months, isometric torque at end of treatment, 4 weeks (no benefit demonstrated). Patients with subacute stroke.

Strength training versus control, level I (RCT): **Grade A** for upper extremity isometric torque at end of treatment, 4 weeks (clinically important benefit demonstrated); **grade C+** for motor function upper extremity and functional status (FTHUE) at end of treatment, 4 weeks, palmar pinch at end of treatment, 4 weeks, and follow-up, 6.5 to 8 months, grip strength and lateral pinch at follow-up, 6.5 to 8 months (clinically important benefit demonstrated without statistical significance); **grade C** for sensory function upper extremity at end of treatment, 4 weeks, and follow-up, 6.5 to 8 months, functional status (FIM mobility), pain relief, and grip strength at end of treatment, 4 weeks (no benefit demonstrated); **grade D+** for lateral pinch at end of treatment, 4 weeks, functional status (FIM self-care and FIM mobility), upper extremity isometric torque at follow-up, 6.5 to 8 months (clinically important benefit favoring control demonstrated without statistical significance); **grade D** for ROM upper extremity at end of treatment, 4 weeks, and follow-up, 6.5 to 8 months, functional status (FIM self-care) at end of treatment, 4 weeks, pain relief, motor function upper extremity, functional status (FTHUE) at follow-up, 6.5 to 8 months (no benefit demonstrated but favoring control). Patients with subacute stroke.

Aerobic and strength versus aerobic training, level I (RCT): **Grade A** for cardiopulmonary function and peak torque for shoulder flexors at end of treatment, 16 weeks (clinically important benefit demonstrated); **grade C+** for peak torque for knee flexors at end of treatment, 16 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for peak torque for

shoulder extensors and peak torque for knee extensors at end of treatment, 16 weeks (no benefit demonstrated). Patients with chronic stroke.

Kinetron training for lower extremity versus control (no Kinetron), level I (RCT): **Grade D** for mobility at end of treatment, 5 weeks (no benefit demonstrated but favoring control). Patients with post-acute stroke.

Home-based exercise training versus control, level I (RCT): **Grade A** for change in gait speed, gait endurance, torque (change in knee isometric extensors), endurance, and cardiopulmonary function at end of treatment, 12 weeks; **grade C+** for motor function (change in Fugl-Meyer lower extremity), change in gait speed, gait endurance, and functional status (physical function index), strength (change in grip strength) at end of treatment, 12 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for motor function (change in Fugl-Meyer upper extremity and lower extremity), balance (Berg balance and change in Berg balance), functional status (Instrumental Activity of Daily Living (ADL) and Barthel ADL Index), at end of treatment, 12 weeks (no benefit demonstrated); **grade D+** for balance (functional reach) at end of treatment, 12 weeks (clinically important benefit favoring control demonstrated without statistical significance); **grade D** for torque (change in ankle isometric dorsiflexors) (no benefit demonstrated but favoring control). Patients with post-acute stroke.

Skateboard versus overhead pulley training for the shoulder, level I (RCT): **Grade C+** for pain relief at end of treatment, 8 to 10 weeks (clinically important benefit demonstrated without statistical significance). Patients with subacute stroke.

Overhead pulley versus control (passive ROM training for shoulder), level I (RCT): **Grade D** for pain relief at end of treatment, 8 to 10 weeks (no benefit demonstrated but favoring control). Patients with subacute stroke.

Passive ROM training for shoulder versus skateboard, level I (RCT): **Grade C** for pain relief at end of treatment, 8 to 10 weeks (no benefit demonstrated). Patients with subacute stroke.

Resisted extension versus ballistic extension training for the hand, level I (RCT): **Grade C+** for ROM at end of treatment, 2 weeks (clinically important benefit demonstrated without statistical significance); **grade C** motor function at end of treatment, 2 weeks (no benefit demonstrated). Patients with subacute and post-acute stroke.

Resisted extension versus resisted grasp training for the hand, level I (RCT): **Grade A** for motor function (change in tapping) at end of treatment, 2 weeks (clinically important benefit demonstrated); **grade C+** for ROM at end of treatment, 2 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for motor function (change in grasp/release) at end of treatment, 2 weeks (no benefit demonstrated). Patients with subacute and post-acute stroke.

Resisted extension training for the hand versus control, level I (RCT): **Grade A** for motor function (change in tapping) and ROM at end of treatment, 2

weeks (clinically important benefit demonstrated); **grade D** for motor function (change in grasp/release) at end of treatment, 2 weeks (no benefit demonstrated but favoring control). Patients with subacute and post-acute stroke.

Ballistic extension versus resisted grasp training for the hand, level I (RCT): **Grade A** for motor function (change in tapping) at end of treatment, 2 weeks (clinically important benefit demonstrated); **grade C+** for ROM at end of treatment, 2 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for motor function (change in grasp/release) and ROM at end of treatment, 2 weeks (no benefit demonstrated). Patients with subacute and postacute stroke.

Ballistic extension training for the hand versus control, level I (RCT): **Grade C+** for motor function (change in tapping) at end of treatment, 2 weeks (clinically important benefit without statistical significance); **grade C** for ROM at end of treatment, 2 weeks (no benefit demonstrated); **grade D** for motor function (change in grasp/release) at end of treatment, 2 weeks (no benefit demonstrated but favoring control). Patients with subacute and post-acute stroke.

Resisted grasp training for the hand versus control, level I (RCT), **Grade C+** for ROM at end of treatment, 2 weeks (clinically important benefit demonstrated); **grade C** for motor function (change in tapping) at end of treatment, 2 weeks (no benefit demonstrated); **grade D** for motor function (change in grasp/release) at end of treatment, 2 weeks (no benefit demonstrated but favoring control). Patients with subacute and post-acute stroke.

Robot-aided training versus no robot-aided training, level I (RCT) and level II (controlled clinical trials [CCT]): **Grade A** for motor power for shoulder and elbow at end of treatment, 5 weeks, change in motor power upper extremity at end of treatment, 6 weeks, motor function (Fugl-Meyer for shoulder, elbow, and coordination and Motor Status Score [MSS] for shoulder and elbow) at end of treatment, 5 weeks, motor function (MSS for wrist and hand) at end of treatment, 5 weeks, and motor function (change in MSS for shoulder and elbow) at end of treatment, 6 weeks, and follow-up, 3 years, motor function (MSS for wrist and hand) at end of treatment, 5 weeks (clinically important benefit demonstrated); **grade B** for motor function (MSS for upper extremity) at end of treatment, 6 weeks (clinically important benefit demonstrated); **grade C+** for change in motor power for shoulder and elbow at follow-up, 3 years, motor function (Fugl-Meyer scale for upper extremity), motor power for upper extremity at end of treatment, 6 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for motor function (change in Fugl-Meyer for shoulder, elbow, and coordination) at end of treatment, 6 weeks, functional status (FIM for upper extremity) at end of treatment, 5 weeks and 6 weeks, motor function (change in Fugl-Meyer for wrist and hand and change in MSS for wrist and hand) at end of treatment, 6 weeks, and follow-up, 3 years (no benefit demonstrated); **grade D** for motor function (change in Fugl-Meyer for shoulder, elbow, and coordination) at follow-up, 3 years (no benefit demonstrated but favoring control). Patients with subacute-chronic stroke.

Robot-assisted versus neurodevelopmental (NDT) training, level I (RCT): **Grade A** for strength (change in elbow extensors, shoulder internal rotators, abductors, adductors, and flexors strength [%]) and functional reach (change in

forward medial, forward, forward lateral, and lateral reach extent) at end of treatment, 2 months; **grade C+** for strength (change in shoulder external rotators and extensors strength [%]) at end of treatment, 2 months (clinically important benefit demonstrated); **grade C** for functional status (change in Barthel Index and change in FIM) at follow-up, 6 months, motor function (change in Fugl-Meyer shoulder and elbow) at end of treatment, 1 month, 2 months, and follow-up, 6 months, motor function (change in Fugl-Meyer hand and wrist) at end of treatment, 1 month, 2 months, and follow-up, 6 months, (no benefit demonstrated). Patients with chronic stroke.

Robot-aided progressive resistance training versus robot-aided active-assisted training, level I (RCT): **Grade C** for decrease of spasticity, motor function, and strength at end of treatment, 6 weeks (no benefit demonstrated). Patients with chronic stroke.

Progressive-resistive robotic training versus sensorimotor training, level I (RCT): **Grade C+** for decrease of spasticity at end of treatment, 6 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for motor function (Fugl-Meyer upper extremity and MSS for shoulder and elbow and wrist and hand), and motor power for shoulder and elbow at end of treatment, 6 weeks (no benefit demonstrated). Patients with chronic stroke.

Music-making training versus control, level I (RCT): **Grade C+** for ROM (elbow extension) at end of treatment, 10 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for ROM (shoulder flexion) at end of treatment, 10 weeks (no benefit demonstrated). Patients with post-acute stroke.

Water-based training versus control, level I (RCT): **Grade A** for hip and knee extensors strength (affected side) at end of treatment, 8 weeks (clinically important benefit demonstrated); **grade C+** for cardiopulmonary function (VO_2 max) at end of treatment, 8 weeks, muscle power at end of treatment, 8 weeks, and gait speed at end of treatment, 8 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for hip and knee extensors strength (unaffected side) at end of treatment, 8 weeks (no benefit demonstrated); **grade D** for balance at end of treatment, 8 weeks (no benefit demonstrated but favoring control). Patients with chronic stroke.

Agility exercise versus stretching/weightshifting exercise, level I (RCT): **Grade C+** for step reaction time at follow-up, 1 month (clinically important benefit demonstrated without statistical significance); **grade C** for balance, mobility, balance confidence, and quality of life at end of treatment, 10 weeks, and follow-up, 1 month, step reaction time at end of treatment, 10 weeks (no benefit demonstrated). Patients with chronic stroke.

Maximal isokinetic strengthening versus control, level I (RCT): **Grade C+** for change in strength at end of treatment, 6 weeks (clinically important benefit demonstrated without statistical significance); **grade C** for quality of life and at end of treatment, 6 weeks (no benefit demonstrated); **grade D** for level-walking and stair-walking (no benefit demonstrated but favoring control). Patients with chronic stroke.

Mental imagery versus standard functional training, level I (RCT): **Grade A** for level of independence in performing tasks at end of treatment, 1 week, 2 weeks, and 3 weeks (clinically important benefit demonstrated). Patients with acute stroke.

Definitions:

Level of Evidence

Level I: Randomized controlled trials

Level II: Nonrandomized studies

Grade of Recommendation

Grade A: Evidence from one or more randomized controlled trials (RCTs) of a statistically significant, clinically important benefit (>15%)

Grade B: Statistically significant, clinically important benefit (>15%), if the evidence was from observational studies or controlled clinical trials (CCTs)

Grade C+: Evidence of clinical importance (>15%) but not statistical significance

Grade C: Interventions where an appropriate outcome was measured in a study that met the inclusion criteria, but no clinically important difference and no statistical significance were shown

Grade D: Evidence from one or more randomized controlled trials of a statistically significant benefit favoring the control group (<0%: favors controls)

Grade D+: Evidence of clinical importance ($\leq$-15% for controls) without statistical significance

Grade D-: Evidence from one or more randomized controlled trials of a clinically important benefit ($\leq$-15% for controls) that was statistically significant, where the number of participants in the study is equal to or higher than 100

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is specifically stated for each recommendation.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Post-stroke physical rehabilitation interventions have been used to reduce pain and spasticity, as well as to increase range of motion (ROM), muscle force, mobility, walking ability, functional status, physical fitness, and quality of life. Post-stroke physical rehabilitation interventions are mostly noninvasive interventions that present very few adverse side effects and contraindications as compared with a large number of pharmacologic interventions.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

This publication is designed to provide accurate and authoritative information in regard to the Subject Matter covered. It is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional service. If legal advice or other expert assistance is required, the services of a competent professional person should be sought. (From a Declaration of Principles jointly adopted by a Committee of the American Bar Association and a Committee of Publishers and Associations.)

Drug and dosage selection: The authors have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with recommendations and practice current at the time of publication. However, we suggest that appropriate information sources be consulted when dealing with new and unfamiliar drugs. It remains the responsibility of every practitioner to evaluate the appropriateness of a particular opinion in the context of the actual clinical situation and with due consideration to any new developments in the field.

Limitations

It is important to point out that the Ottawa Panel Evidence-Based Clinical Practice Guidelines (EBCPGs) are not without limitations. First of all, the strength of clinical practice guidelines depends upon the quality of the primary studies found in the literature. The clinical studies that met the Ottawa Panel's selection criteria rarely exceeded 3 out of 5 on the Jadad scale, and the sample sizes were generally small. These methodological issues limit the reliability of the reported outcomes and the overall quality of the evidence. For example, it is often difficult to achieve adequate blinding with physical treatments that produce cutaneous sensation. However, all guidelines developers face these same issues with regard to methodological considerations. Of additional note, heterogeneity with respect to interventions, treatment schedules, study populations, outcome measures, and comparators was frequently encountered, which reduced the comparability of individual trials. As a result, quantitative pooling of data through meta-analysis

was not appropriate in most cases. Equally, the findings were sometimes inconsistent from one study or outcome measure to the next. Weighing the evidence in such situations inevitably involves value judgments and is subject to interpretation. Due to the absence of a clear consensus with regard to the relative importance of specific, validated outcome measures, individual study findings were not weighted according to the type of outcome assessed or measurement scale used.

The Ottawa Panel also faced other limitations with regard to the development of these guidelines. Articles in the scientific literature were only considered if they were written in English or French due to the additional time and resources required for translation. Moreover, the categorization of studies according to the type of intervention examined was not always straightforward, because in some cases a particular study could be applied to several categories. A decision was made as to which category of intervention a particular study best belonged in order to avoid duplication. This decision was inherently subjective and could contribute to potential variation in the Ottawa Panel's recommendations with other published clinical practice guidelines.

With regard to the calculation of treatment benefit, the Ottawa Panel considered a 15% improvement relative to control as clinically important. However, this criterion remains somewhat arbitrary and may not be applicable to all rehabilitation interventions or outcome measures. Interventions that showed clinically important benefits without statistical significance for validated outcomes (grade C+) were interpreted as worthy of consideration in the rehabilitation of stroke patients and were given positive recommendations. Most of the existing EBCPGs on stroke rehabilitation did not consider clinical significance in synthesizing the evidence, which may further account for any differences in recommendations made by other guideline development groups. In the calculations of clinical relevance, difficulties also arose when the variance of data was not directly provided in the published articles. As a result, the Ottawa Methods Group, working closely with a senior biostatistician, developed a standardized methodology to estimate the variance of data (Appendix 2 in the original guideline document). This was the best conservative approximation that could be used to produce the Ottawa Panel recommendations.

Finally, the Ottawa Panel did not formally assess the cost-effectiveness of the various interventions studied. It is recognized, however, that cost and resource availability are important factors in the individual clinician's decision-making process.

The recommendations of the Ottawa Panel cannot replace clinical judgment, which is critical for applying the available evidence appropriately to the care of individual patients under specific circumstances.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Brosseau L, Wells GA, Finestone HM, Egan M, Dubouloz CJ, Graham I, Casimiro L, Robinson VA, Bilodeau M, McGowan J. Clinical practice guidelines for therapeutic exercises. Top Stroke Rehabil 2006 Spring;13(2):10-21.

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006

GUIDELINE DEVELOPER(S)

Ottawa Panel - Independent Expert Panel

SOURCE(S) OF FUNDING

Ottawa Panel

GUIDELINE COMMITTEE

Ottawa Panel Evidence-Based Clinical Practice Guidelines Development Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Group Members: Lucie Brosseau, PhD, School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada; George A. Wells, PhD, Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Ontario, Canada, Centre for Global Health, Institute of Population Health, Ottawa, Ontario, Canada; Hillel M. Finestone, MD, Sisters of Charity of Ottawa Health Service, Ottawa, Ontario, Canada; Mary Egan, PhD, School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada; Claire-Jehanne Dubouloz, PhD, School of Rehabilitation

Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada; Ian Graham, PhD, School of Nursing Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada; Lynn Casimiro, MA; Vivian A. Robinson, MSc, Centre for Global Health, Institute of Population Health, Ottawa, Ontario, Canada; Martin Bilodeau, PhD, School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada; Jessie McGowan, MLIS, Centre for Global Health, Institute of Population Health, Ottawa, Ontario, Canada

External Panel Members: Robert Teasell, MD, University of Western Ontario, London, Ontario, Canada; Johanne Desrosiers, PhD, Research Centre on Aging and Sherbrooke University, Sherbrooke, Québec, Canada; Susan Barreca, MSc, Hamilton Health Sciences, Hamilton, Ontario, Canada; Lucie Laferrière, MHA, Regional Stroke Centre, Ottawa Hospital, Ottawa (Ontario), Canada; Joyce Fung, PhD, Department of Physical Therapy, McGill University, Montreal, Québec, Canada; Hélène Corriveau, PhD, MHA, Research Centre on Aging and Sherbrooke University, Sherbrooke, Québec, Canada; Gordon Gubitz, MD, Division of Neurology, Dalhousie University, Halifax (Nova Scotia), Canada; Michael Sharma, MD, Regional Stroke Centre, Ottawa Hospital, Ottawa (Ontario), Canada; Mr. S. U., Patient who had a stroke.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available for purchase from the Thomas Land Publishers, Inc. Web site.

Print copies: Available from Thomas Land Publishers, Inc., Subscription Office, P.O. Box 361, Birmingham, AL 35201-0361; Email: TLPsubs@ebsco.com

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on December 11, 2006. The information was verified by the guideline developer on January 19, 2007.

COPYRIGHT STATEMENT

DISCLAIMER

NGC DISCLAIMER

The National Guideline Clearinghouse™ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at http://www.guideline.gov/about/inclusion.aspx .

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.

Date Modified: 11/3/2008