Stroke
Current Awareness Bulletin
June 2020

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Title: Botulinum Toxin Type A for Upper Limb Spasticity in Poststroke Patients: A Meta-analysis of Randomized Controlled Trials.

Citation: Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; Jun 2020; vol. 29 (no. 6); p. 104682

Author(s): Jia, Shiyu; Liu, Yang; Shen, Liuyan; Liang, Xue; Xu, Xiaomin; Wei, Youdong

Background and Aim: Botulinum toxin type A is considered to be an effective antispasmodic in recent years. We assess the effectiveness of botulinum toxin type A for the treatment of poststroke spasticity in the upper extremity using a meta-analysis.

Methods: We searched several databases including PubMed, Web of Science, Embase, and Cochrane database for relevant studies, up until October 2017. All randomized controlled trials of botulinum toxin type A treat poststroke upper limb spasticity published were included. The primary outcome measure was modified ashworth score at the elbow, finger and wrist, pain score, and Barthel index.

Results: Ten randomized controlled trials were identified and reported sufficient data for inclusion in the pooled analysis (n=950). The results of modified ashworth score at different joints, pain score, Barthel index showed no difference was found in the effectiveness of botulinum toxin type A compared with placebo in the treatment of the upper limb spasticity after stroke. But modified ashworth score at the elbow was improved in Dysport subgroups (standardized mean difference [SMD] = -0.39, 95%CI = -0.67 to -0.10, P = .008) compared with Botox subgroups (SMD = 0.08, 95%CI = -0.68 to 0.83, P = .84).

Conclusions: The meta-analysis of these studies showed that the overall effectiveness of botulinum toxin type A does not seem to differ from placebo for poststroke patients. But the meta-analysis yielded a favorable effect of Dysport compared with placebo based on 4 trials.

Title: Can inspiratory muscle training benefit patients after stroke? A systematic review and meta-analysis of randomized controlled trials.

Citation: Clinical rehabilitation; Jun 2020; p. 269215520926227

Author(s): Zhang, Xintong; Zheng, Yu; Dang, Yini; Wang, Lu; Cheng, Yihui; Zhang, Xiu; Mao, Mao; Lu, Xiao

Objectives: The aim of this study was to investigate the effects of inspiratory muscle training in post-stroke patients and to explore the effective training protocol.

Data Sources: PubMed/Medline, Web of Science, Scopus, Embase, Cochrane database, China National Knowledge Infrastructure, and China Science Periodical Database were searched through April 2020.

Review Methods: Trials examining effects of inspiratory muscle training on pulmonary function, cardiopulmonary endurance, pulmonary infection incidence, and quality of life in post-stroke patients were included. Subgroup analysis was performed to compare different training programs. Mean differences and risk ratios with 95% confidence intervals were presented. Risk of bias was assessed with the Cochrane tool.

Results: Thirteen randomized controlled trials involving a total of 373 participants were identified. Meta-analysis conducted in 8 out of 13 trials revealed evidence for beneficial effects of inspiratory muscle training on forced vital capacity (MD: 0.47, 95% CI: 0.28-0.66), forced expired volume in 1 second (MD: 0.26, 95% CI: 0.18-0.35), 6-minute walk test (MD: 52.61, 95% CI: 25.22-80.01), maximum inspiratory pressure (MD: 18.18, 95% CI: 5.58-30.78), inspiratory muscle endurance (MD: 19.99, 95% CI: 13.58-26.40), and pulmonary infection incidence (RR: 0.11, 95% CI: 0.03-0.40). Omitting individual trials from the meta-analysis did not significantly change the results. The effective inspiratory muscle training protocol was suggested by subgroup analysis with three repetitions per week and more than 20 minutes per day for three weeks.

Conclusion: Inspiratory muscle training can be considered as an effective intervention for improving pulmonary function and cardiopulmonary endurance, and reducing pulmonary infection incidence in patients after stroke.

Title: Catheter ablation of atrial fibrillation with uninterrupted anticoagulation: a meta-analysis of six randomized controlled trials.

Citation: Journal of cardiovascular medicine (Hagerstown, Md.); Jul 2020; vol. 21 (no. 7); p. 483-490
Author(s): Di Monaco, Antonio; Guida, Pietro; Vitulano, Nicola; Quadrini, Federico; Troisi, Federica; Langialonga, Tommaso; Grimaldi, Massimo

Aims: Uninterrupted anticoagulation is recommended during the ablation of atrial fibrillation. This meta-analysis compared the safety and efficacy of uninterrupted direct oral anticoagulants (DOACs) to uninterrupted vitamin K antagonists (VKAs) during atrial fibrillation ablation.

Methods: The meta-analysis included eligible randomized controlled trials from 2009 to 2019. Odds ratios (ORs) and 95% confidence intervals were pooled using a random effects model and a sensitivity analysis was performed by sequentially removing one study or DOAC at a time.

Results: Six studies were included; 1288 received DOAC and 1081 VKA. Pooled ORs indicated a lower nonsignificant incidence in DOACs vs. VKA of composite outcome of major bleeding, stroke, or transient ischemic attack, and mortality (0.69; 0.28-1.71; 31 vs. 45 events), major bleeding alone (0.66; 0.30-1.47; 27 vs. 41 events), and cardiac tamponade (0.56; 0.21-1.45; eight vs. 13 events) with a slightly higher occurrence of minor bleeding (1.17; 0.89-1.56; 139 vs. 106 events) and silent cerebral thromboembolic events (1.12; 0.75-1.66; 72 vs. 58 among 442 and 376 patients performing MRI study). Sensitivity analyses confirmed overall results: pooled ORs ranged from 0.56 to 1.00 for the composite outcome and from 0.54 to 0.92 for major bleedings.

Conclusion: Uninterrupted DOAC is a safe and effective alternative to uninterrupted VKA during atrial fibrillation ablation.

Title: Diagnostic accuracy of various EEG changes during carotid endarterectomy to detect 30-day perioperative stroke: A systematic review.

Citation: Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology; Jul 2020; vol. 131 (no. 7); p. 1508-1516

Author(s): Chang, Robert; Reddy, Rajiv P; Sudadi, Shreya; Balzer, Jeffrey; Crammond, Donald J; Anetakis, Katherine; Thirumala, Parthasarathy D

Objectives: We assessed whether significant intraoperative electroencephalography (EEG) changes have predictive value for perioperative stroke within 30 days after carotid endarterectomy (CEA) procedures for carotid stenosis (CS) patients. We also assessed the diagnostic accuracy of various EEG changes in predicting perioperative stroke.

Methods: We searched databases for reports with outcomes of CS patients who underwent CEA with intraoperative EEG monitoring. We calculated the sensitivity, specificity, and diagnostic odds ratio (DOR) of EEG changes for predicting perioperative stroke. Sensitivity and specificity were presented with forest plots and a summary receiver operating characteristic (ROC) curve.

Results: The meta-analysis included 10,672 patients. Intraoperative EEG changes predicted 30-day stroke with a sensitivity of 46% (95% CI, 38-54%) and specificity of 86% (95% CI, 83-88%). The estimated DOR was 5.79 (95% CI, 3.86-8.69). The estimated DOR for reversible and irreversible EEG changes were 8.25 (95% CI, 3.34-20.34) and 70.84 (95% CI, 36.01-139.37), respectively.

Conclusion: Intraoperative EEG changes have high specificity but modest sensitivity for predicting perioperative stroke following CEA. Patients with irreversible EEG changes are at high risk for perioperative stroke. SIGNIFICANCE Intraoperative EEG changes can help surgeons predict the risk of perioperative stroke for CS patients following CEA.

Title: Dual versus mono antiplatelet therapy for acute non-cardioembolic ischemic stroke or transient ischemic attack, an efficacy and safety analysis - updated meta-analysis.

Citation: BMC neurology; Jun 2020; vol. 20 (no. 1); p. 224

Author(s): Albay, Christessa Emille Que; Leyson, Frederick Gavril D; Cheng, Federick C

Background: New evidence on the efficacy and safety of dual antiplatelet therapy for secondary stroke prevention have been realized in the recent years. An updated meta analysis was done to determine the effect of the various dual antiplatelets vs aspirin alone on recurrence rate of ischemic stroke, cardiovascular morbidity and mortality, and its safety profile as reported through major bleeding.

Methods: PubMed, Cochrane and Science Direct data bases were utilized, RCTs evaluating dual antiplatelet vs mono antiplatelet therapy for acute ischemic stroke or transient ischemic attack within < 72 h from ictus were searched up to July 2019. Risk ratio at 95% confidence intervals were calculated to evaluate stroke recurrence, cardiac events and mortality, and major bleeding.
**Results:** Sixteen randomized controlled trials with a population of 28,032 patients were pooled into a meta-analysis. Dual antiplatelet therapy was significantly superior over mono antiplatelet therapy in the reduction of stroke (RR 0.75, 95% CI: 0.68-0.83, p value<0.00001) and composite events namely cardiovascular morbidity and mortality (0.73 95% CI: 0.65-0.82, p value < 0.00001), while bleeding events were noted to be not significant (1.22 95% CI: 0.87-1.70, p value = 0.25).

**Conclusion:** In acute non-cardioembolic ischemic strokes or those who have suffered a transient ischemic attack, dual antiplatelet therapy was associated with efficacy in stroke recurrence and composite cardiac events, with a non-significant risk of major bleeding.

**Title:** Dysarthria and stroke. The effectiveness of speech rehabilitation. A systematic review and meta-analysis of the studies.

**Citation:** European journal of physical and rehabilitation medicine; Jun 2020
**Author(s):** Chiaramonte, Rita; Vecchio, Michele

**Introduction:** Speech difficulties, such as dysarthria or aphasia, in addition to motor impairments are frequently seen in post-stroke patients.

**Evidence Acquisition:** Literature searches with the keywords: "stroke" and "dysarthria" and "diagnosis" and "stroke" and "dysarthria" and "assessment" were conducted using PubMed, EMBASE, Cochrane Library, and Web of Science databases to perform the systematic review about the methods used to measure the severity of dysarthria in subjects post-stroke. The search was performed by two authors from 15 January to 22 February 2020. The research identified a total of 402 articles for the search using the keywords "stroke" and "dysarthria", and "diagnosis" and "assessment". Sixty-nine selected articles were analysed by the reviewers. Thirty-seven publications met the inclusion criteria and were included in the systematic review. Thirty-two articles were excluded for several reasons: (1) 12 involved individuals with aphasia or other speech problems different from dysarthria, 12 examined different topics from our aim, and (3) eight did not include post-stroke cases.

**Evidence Synthesis:** The systematic review identified methods for measuring the severity of post-stroke dysarthria. The meta-analysis showed the acoustic parameters affected in dysarthria secondary to stroke and the differences in these parameters after speech therapy.

**Conclusions:** The alternating and sequential motion rate (AMR-Pa, AMR-Ta, AMR-Ka, and SMR-PaTaKe) and maximum phonation time were significantly improved after speech rehabilitation.

**Title:** Fluoxetine for stroke recovery: Meta-analysis of randomized controlled trials.

**Citation:** International journal of stroke : official journal of the International Stroke Society; Jun 2020; vol. 15 (no. 4); p. 365-376
**Author(s):** Mead, Gillian E; Legg, Lynn; Tiiney, Russel; Hsieh, Cheng Fang; Wu, Simiao; Lundström, Erik; Rudberg, Ann Sofie; Kutlubaev, Mansur; Dennis, Martin S; Soleimani, Babak; Barugh, Amanda; Hackett, Maree L; Hankey, Graeme J

**Objective:** To determine whether fluoxetine, at any dose, given within the first year after stroke to patients who did not have to have mood disorders at randomization reduced disability, dependency, neurological deficits and fatigue; improved motor function, mood, and cognition at the end of treatment and follow-up, with the same number or fewer adverse effects.

**Methods:** Searches (from 2012) in July 2018 included databases, trials registers, reference lists, and contact with experts. Co-primary outcomes were dependence and disability. Dichotomous data were synthesized using risk ratios (RR) and continuous data using standardized mean differences (SMD). Quality was appraised using Cochrane risk of bias methods. Sensitivity analyses explored influence of study quality.

**Results:** The searches identified 3414 references of which 499 full texts were assessed for eligibility. Six new completed RCTs (n = 3710) were eligible, and were added to the seven trials identified in a 2012 Cochrane review (total: 13 trials, n = 4145). There was no difference in the proportion independent (3 trials, n = 3249, 36.6% fluoxetine vs. 36.7% control; RR 1.00, 95% confidence interval 0.91 to 1.09, p = 0.99, I² = 78%) nor in disability (7 trials n = 3404, SMD 0.05, -0.02 to 0.12 p = 0.15, I² = 81%) at end of treatment. Fluoxetine was associated with better neurological scores and less depression. Among the four (n = 3283) high-quality RCTs, the only difference between groups was lower depression scores with fluoxetine.
Conclusion: This class I evidence demonstrates that fluoxetine does not reduce disability and dependency after stroke but improves depression.

Title: High on-clopidogrel platelet reactivity in ischaemic stroke or transient ischaemic attack: Systematic review and meta-analysis.

Citation: Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; Jul 2020; vol. 29 (no. 7); p. 104877

Author(s): Alakbarzade, Vafa; Huang, Xuya; Ster, Irina Chis; McEntagart, Meriel; Pereira, Anthony C

Objectives: To assess the prevalence of high on-clopidogrel platelet reactivity (HCPR) in patients with ischaemic stroke or transient ischaemic attack (IS/TIA), their outcome and genetic basis of on-treatment response variability in IS/TIA patients.

Methods: We conducted a comprehensive search of PubMed and EMBASE from their inceptions to March 9, 2019. Studies that reported absolute numbers/percentages of HCPR at any time point after IS/TIA onset evaluated with any type of platelet function tests, clinical outcomes and genotyping data were included.

Results: Among 21 studies of 4312 IS/TIA patients treated with clopidogrel, the pooled prevalence of HCPR was 28% (95%CI: 24-32%; high heterogeneity: I² = 88.2%, p < 0.001). Heterogeneity degree diminished across groups defined by the HCPR testing method. Clopidogrel non-responder IS/TIA patients had poorer outcome compared to responders (RR = 2.09, 95%CI: 1.61-2.70; p = 0.036; low heterogeneity across studies: I² = 27.4%, p = 0.210). IS/TIA carriers of CYP2C19*2 or CYP2C19*3 loss of function alleles had a higher risk of HCPR compared to wild type (RR = 1.69, 95%CI: 1.47-1.95; p < 0.001; I² = 0.01%, p = 0.475).

Conclusions: This systematic review shows a high prevalence of clopidogrel resistance in IS/TIA and poor outcome in these patients. CYP2C19 polymorphisms may potentially influence clopidogrel resistance.

Title: Hypertensive emergencies and urgencies in emergency departments: a systematic review and meta-analysis.

Citation: Journal of hypertension; Jul 2020; vol. 38 (no. 7); p. 1203-1210

Author(s): Astarita, Anna; Covella, Michele; Valletonga, Fabrizio; Cesareo, Marco; Totaro, Silvia; Ventre, Luca; Aprà, Franco; Veglio, Franco; Milan, Alberto

Objectives: The prevalence of hypertensive emergencies and urgencies and of acute hypertension-mediated organ damage (aHMOD) in emergency departments is unknown. Moreover, the predictive value of symptoms, blood pressure (BP) levels and cardiovascular risk factors to suspect the presence of aHMOD is still unclear. The aim of this study was to investigate the prevalence of hypertensive emergencies and hypertensive urgencies in emergency departments and of the relative frequency of subtypes of aHMOD, as well as to assess the clinical variables associated with aHMOD.

Methods: We conducted a systematic literature search on PubMed, OVID, and Web of Science from their inception to 22 August 2019. Two independent investigators extracted study-level data for a random-effects meta-analysis.

Results: Eight studies were analysed, including 1970 hypertensive emergencies and 4983 hypertensive urgencies. The prevalence of hypertensive emergencies and hypertensive urgencies was 0.3 and 0.9%, respectively [odds ratio for hypertensive urgencies vs. hypertensive emergencies 2.5 (1.4-4.3)]. Pulmonary oedema/heart failure was the most frequent subtype of aHMOD (32%), followed by ischemic stroke (29%), acute coronary syndrome (18%), haemorrhagic stroke (11%), acute aortic syndrome (2%) and hypertensive encephalopathy (2%). No clinically meaningful difference was found for BP levels at presentations. Hypertensive urgency patients were younger than hypertensive emergency patients by 5.4 years and more often complained of nonspecific symptoms and/or headache, whereas specific symptoms were more frequent among hypertensive emergency patients.

Conclusion: Hypertensive emergencies and hypertensive urgencies are a frequent cause of access to emergency departments, with hypertensive urgencies being significantly more common. BP levels alone do not reliably predict the presence of aHMOD, which should be suspected according to the presenting signs and symptoms.
Title: Intensities in the application of robotic technologies in upper extremity rehabilitation after a stroke: a systematic review of randomised controlled clinical trials

Citation: Revista de neurologia; Jun 2020; vol. 70 (no. 12); p. 434-443
Author(s): García-Rudolph, A; Bernabeu-Guitart, M; Opisso, E

Introduction: In the vast majority of cases stroke entails long-term limitations in the use of the upper extremities that are affected. Robotic technologies provide beneficial results in motor rehabilitation, but the optimal levels of intensity are not known. AIMS To review the scientific literature (over the last 10 years) on robotic therapies (intervention group) compared to conventional therapies (control group) in the chronic phase of stroke, and to study correlations between variables that characterise the interventions and intensity variables.

Subjects and Methods: A systematic review was conducted of randomised controlled clinical trials in PubMed, Web of Science, Cochrane Library and Google Scholar, with results assessed by the Fugl-Meyer Assessment-Upper Extremity Motor Score (mFMA-UE). The methodological quality was analysed using the Physiotherapy Evidence Database scale (PEDro).

Results: Thirteen studies from evidence level I (92%, excellent) were selected. Positive correlations between minutes per week and improvements in mFMA-UE are observed in the control group and in the intervention group, with a higher level of significance for the latter. Negative correlations are observed between the number of months since the lesion and improvements in the control and intervention groups. An exponential regression is included, which illustrates differences between the control group and the intervention group in favour of the latter. A negative correlation is observed between the total duration and the number of minutes per week.

Conclusion: Significant correlations are observed between intensity (minutes per week) and mFMA-UE, with a higher level of significance in the intervention group.

Title: Meta-Analysis Comparing Direct Oral Anticoagulants Versus Warfarin in Morbidly Obese Patients With Atrial Fibrillation.

Citation: The American journal of cardiology; Jul 2020; vol. 126; p. 23-28
Author(s): Kido, Kazuhiko; Shimizu, Mikiko; Shiga, Tsuyoshi; Hashiguchi, Masayuki

Abstract: The International Society of Thrombosis and Haemostasis recommends warfarin therapy over direct oral anticoagulants (DOACs) in patients with a body mass index >40 kg/m² or weight > 120 kg due to limited clinical data in morbidly obese patients. The aim of the meta-analysis was to compare DOACs with warfarin in morbidly obese patients with atrial fibrillation (AF) and to optimize an anticoagulation therapy in the population. MEDLINE, Embase, Google Scholar, Web of Science, and Cochrane Library database searches for relevant articles through December 23, 2019 were performed. Total 5 studies for the event rate of stroke or systemic embolism (SE) and 4 studies for major bleeding were included in the meta-analysis. It showed that there was no statistically significant difference in stroke or SE event rate between the DOAC and warfarin groups (odds ratio: 0.85; 95% confidence interval: 0.60, 1.19; p = 0.35; I² = 0 %). The DOAC use was significantly associated with a lower major bleeding event rate compared the warfarin group (odds ratio: 0.63; 95% confidence interval: 0.43, 0.94; p = 0.02; I² = 30%). In conclusion, DOACs should be considered as an oral anticoagulant for preventing stroke or SE in morbidly obese patients with AF. A randomized controlled trial comparing a DOAC with warfarin is needed to confirm our meta-analysis results in morbidly obese patients with AF.

Title: Retrieval Practice in Memory- and Language-Impaired Populations: A Systematic Review.

Citation: Archives of clinical neuropsychology: the official journal of the National Academy of Neuropsychologists; Jun 2020
Author(s): de Lima, Marcos Felipe Rodrigues; Cavendish, Beatriz Araújo; de Deus, Juliana Silva; Buratto, Luciano Grüdtner

Objective: Neurological conditions, such as multiple sclerosis and stroke, may impair memory and language. A technique called retrieval practice (RP) may improve memory and language outcomes in such clinical populations. The RP effect refers to the finding that retrieving information from memory leads to better long-term retention than restudying the same information. Although the benefits of RP have been repeatedly observed in healthy populations, less is known about its potential applications in
cognitive rehabilitation in clinical populations. Here we review the RP literature in populations with acquired memory and language impairments.

**Method:** Systematic searches for studies published before January 2020 were conducted on Elsevier, PsycARTICLES, PsycINFO, Pubmed, Web of Science, and Wiley Online Library, with the terms "retrieval practice"/"testing effect" and "cognitive rehabilitation". In addition, backward and forward snowballing were used to allow the identification of important publications missed by the initial search. Studies were included if they were peer-reviewed, empirical work in which memory or language outcome measures were compared between an RP condition and a re-exposure-control condition in patients with acquired memory or language impairments.

**Results:** Sixteen articles fulfilled the inclusion criteria. Studies from memory-impaired samples were relatively homogeneous with respect to experimental protocols and materials and favored RP over control conditions. The results were mostly positive despite short retention intervals and predominantly single-session designs. Similarly, studies from language-impaired samples focused on naming impairments in patients with aphasia and also favored RP over name repetition.

**Conclusion:** The results indicate that RP is a viable technique for cognitive rehabilitation.

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**Title:** Serum Neurofilament Light Chain as a Predictive Biomarker for Ischemic Stroke Outcome: A Systematic Review and Meta-analysis.

**Citation:** Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; Jun 2020; vol. 29 (no. 6); p. 104813

**Author(s):** Liu, Daoshen; Chen, Jing; Wang, Xuanying; Xin, Jialun; Cao, Ruili; Liu, Zhirong

**Background:** Stroke is the leading cause of death and long-term disability worldwide. The purpose of the study is to examine the role of serum neurofilament light chain (sNfL) as a predictive biomarker for ischemic stroke outcome.

**Methods:** We searched PubMed, Web of Science, and EMBASE for potential studies published in English previous to November 15, 2019. Two independent reviewers screened the search results for studies reporting the correlation between sNfL and stroke outcome in ischemic stroke or transient ischemic attack patients. The Newcastle-Ottawa Scale was adopted to evaluate the quality of the included studies. The pooled odds ratio (OR) of sNfL for stroke functional outcome was calculated with the Comprehensive Meta-Analysis software, version 2. Heterogeneity and publication bias were assessed with the I2 test and funnel plot, respectively.

**Results:** Seven studies met the inclusion criteria. The qualities of the included studies ranged from moderate to high. Despite of the different methods used to measure infarct volume, 5 of the included studies reported similar results about the association between sNfL and infarct volume. Two studies investigating the relationship between sNfL and recurrent ischemic events both reported positive results. In pooled analysis with the adjusted odds ratios (Ors) from multivariate regression models, the meta-analysis reached a pooled adjusted OR = 1.71 [95% CI: 1.17-4.29], which represented that the patients with higher sNfL, compared with lower sNfL patients, had a 1.71 times higher risk of poor functional outcome during follow-up. Both meta-regression and subgroup analysis found that sampling time was an important source of heterogeneity. Based on funnel plot and Egger's test, we did not detect obvious publication bias in our study. CONCLUSIONS The sNfL was a promising predictive biomarker for ischemic stroke outcome, and blood sampling time was of great importance in the correlation. The temporal change of sNfL after stroke deserves further exploration in large longitudinal studies and a standardized procedure is warranted.

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**Title:** Statin-based therapy for primary and secondary prevention of ischemic stroke: A meta-analysis and critical overview.

**Citation:** International journal of stroke : official journal of the International Stroke Society; Jun 2020; vol. 15 (no. 4); p. 377-384

**Author(s):** Milionis, Haralampos; Ntaios, George; Korompoki, Eleni; Vemmos, Konstantinos; Michel, Patrik

**Background and Aims:** To reassess the effect of statin-based lipid-lowering therapy on ischemic stroke in primary and secondary prevention trials with regard to achieved levels of low-density lipoprotein-cholesterol in view of the availability of novel potent hypolipidemic agents.

**Methods:** English literature was searched (up to November 2018) for publications restricted to trials with a minimum enrolment of 1000 and 500 subjects for primary and secondary prevention, respectively,
meeting the following criteria: adult population, randomized controlled design, and recorded outcome data on ischemic stroke events. Data were meta-analyzed and curve-estimation procedure was applied to estimate regression statistics and produce related plots.

**Results:** Four primary prevention trials and four secondary prevention trials fulfilled the eligibility criteria. Lipid-lowering therapy was associated with a lower risk of ischemic stroke in primary (risk ratio, RR 0.70, 95% confidence interval, CI, 0.60-0.82; p < 0.001) and in the secondary prevention setting (RR 0.80, 95% CI 0.70-0.90; p < 0.001). Curve-estimation procedure revealed a linear relationship between the absolute risk reduction of ischemic stroke and active treatment-achieved low-density lipoprotein-cholesterol levels in secondary prevention (adjusted R-square 0.90) in support of "the lower the better" hypothesis for stroke survivors. On the other hand, the cubic model followed the observed data well in primary prevention (adjusted R-square 0.98), indicating greater absolute risk reduction in high-risk cardiovascular disease-free individuals.

**Conclusions:** Statin-based lipid-lowering is effective both for primary and secondary prevention of ischemic stroke. Most benefit derives from targeting disease-free individuals at high cardiovascular risk, and by achieving low treatment targets for low-density lipoprotein-cholesterol in stroke survivors.

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**Title:** The effectiveness of extracorporeal shock wave therapy for improving upper limb spasticity and functionality in stroke patients: a systematic review and meta-analysis.

**Citation:** Clinical rehabilitation; Jun 2020 ; p. 269215520932196

**Author(s):** Cabanas-Valdés, Rosa; Serra-Llobet, Pol; Rodríguez-Rubio, Pere Ramón; López-de-Celis, Carlos; Llauró-Fores, Mercé; Calvo-Sanz, Jordi

**Objective:** To assess the effectiveness of Extracorporeal Shock Wave Therapy for reducing spasticity and improving functionality of the upper limb in stroke survivors.

**Data Sources:** A systematic review of MEDLINE, Cochrane Central Register of Controlled Trials, CINAHL, PEDro, REHABDATA, Scielo, Scopus, Web of Science, Tripdatabase and Epistemonikos from 1980 to April 2020 was carried out.

**Review Methods:** The bibliography was screened to identify randomized controlled clinical trials that applied extracorporeal shock waves to upper limb spastic muscles in post-stroke individuals. Two reviewers independently screened references, selected relevant studies, extracted data and assessed risk of bias using the PEDro scale. The primary outcome was spasticity and functionality of the upper limb.

**Results:** A total of 1,103 studies were identified and 16 randomized controlled trials were finally included (764 individuals) were analyzed. A meta-analysis was performed and a beneficial effect on spasticity was found. The mean difference (MD) on the Modified Ashworth Scale for comparison extracorporeal shock wave versus sham was -0.28; with a 95% confidence interval (CI) from -0.54 to -0.03. The MD of the comparison of extracorporeal shock wave plus conventional physiotherapy versus conventional physiotherapy was -1.78; 95% CI from -2.02 to -1.53. The MD for upper limb motor-function using the Fugl Meyer Assessment was 0.94; 95% CI from 0.42 to 1.47 in the short term and 0.97; 95% CI from 0.19 to 1.74 in the medium term.

**Conclusion:** The extracorporeal shock wave therapy is effective for reducing upper limb spasticity. Adding it to conventional therapy provides an additional benefit.

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**Title:** The Effects of Upper Limb Motor Recovery on Submovement Characteristics among the Patients with Stroke: A Meta-Analysis.

**Citation:** PM & R : the journal of injury, function, and rehabilitation; Jun 2020; vol. 12 (no. 6); p. 589-601

**Author(s):** Naghibi, Seyyed Somayeh; Ghassemi, Farnaz; Maleki, Ali; Fallah, Ali

**Objective:** To evaluate the evidence related to the effect of upper limb motor recovery on submovement characteristics, including duration, amplitude, overlap, interpeak distance, and the number of submovements in stroke patients using a meta-analysis.

**Type Of Study:** Meta-analysis.

**Literature Survey:** The literature search was restricted to articles written in English published from inception to October 2018 in Web of Science, PubMed, Science Direct, IEEE Explore, MEDLINE, CDSR, Scopus, Compendex, Wiley Online Library, Springer Link, and REHABDATA.

**Methodology:** Studies were included if they encompassed adult participants with a clinical diagnosis of stroke who underwent upper limb rehabilitation and if they assessed and reported submovement characteristics as the outcome measures in pre- and posttreatment stages. Changes in submovement
characteristics between pre- and postinterventions were compared using the standardized mean difference (SMD). Finally, a test for heterogeneity and publication bias was implemented for all meta-analyses.

**Synthesis:** Among the 188 retrieved articles, seven of them (one randomized controlled trial, six pre-post) involving 259 patients were selected for meta-analysis. Based on the results, the overall observed changes in all meta-analyses were statistically significant. In total, submovement amplitude (SMD 0.624, 95% confidence interval [CI] [0.356, 0.893]), duration (SMD 0.61, 95% CI [0.332, 0.888]), and overlap (SMD 0.928, 95% CI [0.768, 1.088]) increased whereas interpeak distance (SMD -0.278, 95% CI [-0.42, -0.137]), and the total number of submovements (SMD -0.804, 95% CI [-1.069, -0.538]) decreased.

**Conclusions:** The submovements appeared to become longer, fewer, and more overlapped with motor recovery. Based on the results, the ability of the neural system to blend submovements increased in both acute/subacute and chronic patients during recovery. Therefore, assessing the submovements during recovery can be a new quantitative measure of motor improvement, providing another means of comparing rehabilitation interventions and individualizing therapy for stroke patients.

**Title:** Water-based exercises for improving walking speed, balance, and strength after stroke: a systematic review with meta-analyses of randomized trials.

**Citation:** Physiotherapy; Jun 2020; vol. 107; p. 100-110

**Author(s):** Nascimento, Lucas R; Flores, Louise C; de Menezes, Kênia K P; Teixeira-Salmela, Luci F

**Background:** Water-based exercises have the potential to reduce impairments and walking limitations after stroke.

**Objective:** To examine the effects of water-based exercises on walking speed, balance, and strength after stroke.

**Data Sources:** Eletronic searches on MEDLINE, CINAHL, EMBASE, Cochrane, PsycINFO, and PEDro databases.

**Eligibility Criteria:** The review included randomized trials. Participants in the reviewed studies were ambulatory adults, who have had a stroke. The experimental intervention was comprised of water-based exercises.

**Data Synthesis:** Outcome data related to walking speed, balance, and strength were extracted from the eligible trials and combined in meta-analyses. The quality of the included trials was assessed by the PEDro scores and the quality of evidence was determined according to the Grading of Recommendations Assessment, Development, and Evaluation system.

**Results:** Thirteen trials involving 464 participants were included. Random-effects meta-analyses provided moderate-quality evidence that water-based exercises significantly increase walking speed by 0.06m/second (95% CI 0.01 to 0.10) and balance by 4.5 points on the Berg Balance scale (95% CI 2.2 to 6.8), compared with land-based exercises, without concurrent changes in strength (MD 5.2Nm/kg; 95% CI -1.4 to 11.9).

**Conclusions:** This systematic review provided low-quality evidence regarding the efficacy of water-based exercises, compared with no intervention. However, there is moderate quality evidence, which suggested significant benefits of water-based exercises in walking speed and balance, compared with land-based exercises. Differences appear small to be considered clinically relevant, and, therefore, water-based exercises can be prescribed as alternative interventions, based upon individuals’ exercise preferences.

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