

# Library Current Awareness Bulletin

## Stroke – February 2022


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## Complications

### [European Stroke Organisation and European Academy of Neurology joint guidelines on post-stroke cognitive impairment](#)

Quinn T.J., Richard E., Teuschl Y., Gattlinger T., Hafdi M., O'Brien J.T., Merriman N., Gillebert C., Huygelier H. et al  
*European Journal of Neurology*, vol. 28(12) pp. 3883-3920.  
December 2021

**[Background and purpose:** The optimal management of post-stroke cognitive impairment (PSCI) remains controversial. These joint European Stroke Organisation (ESO) and European Academy of Neurology (EAN) guidelines provide evidence-based recommendations to assist clinicians in decision making regarding prevention, diagnosis, treatment and prognosis. **Methods:** Guidelines were developed according to the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology. The working group identified relevant clinical questions, performed systematic reviews, assessed the quality of the available evidence, and made specific recommendations. Expert consensus statements were provided where insufficient evidence was available to provide recommendations. **Results:** There was limited randomized controlled trial (RCT) evidence regarding single or multicomponent interventions to prevent post-stroke cognitive decline. Lifestyle interventions and treating vascular risk factors have many health benefits, but a cognitive effect is not proven. We found no evidence regarding routine cognitive screening following stroke, but recognize the importance of targeted cognitive assessment. We describe the accuracy of various cognitive screening tests, but found no clearly superior approach to testing. There was insufficient evidence to make a recommendation for use of cholinesterase inhibitors, memantine nootropics or

cognitive rehabilitation. There was limited evidence on the use of prediction tools for post-stroke cognition. The association between PSCI and acute structural brain imaging features was unclear, although the presence of substantial white matter hyperintensities of presumed vascular origin on brain magnetic resonance imaging may help predict cognitive outcomes. **Conclusions:** These guidelines highlight fundamental areas where robust evidence is lacking. Further definitive RCTs are needed, and we suggest priority areas for future research.]

#### [Neuroinflammation as a Key Driver of Secondary Neurodegeneration Following Stroke?](#)

Stuckey S.M., Ong L.K., Collins-Praino L.E., and Turner R.J.

*International Journal of Molecular Sciences*, vol. 22(23)

December 2021

[Ischaemic stroke involves the rapid onset of focal neurological dysfunction, most commonly due to an arterial blockage in a specific region of the brain. Stroke is a leading cause of death and common cause of disability, with over 17 million people worldwide suffering from a stroke each year. It is now well-documented that neuroinflammation and immune mediators play a key role in acute and long-term neuronal tissue damage and healing, not only in the infarct core but also in distal regions. Importantly, in these distal regions, termed sites of secondary neurodegeneration (SND), spikes in neuroinflammation may be seen sometime after the initial stroke onset, but prior to the presence of the neuronal tissue damage within these regions. However, it is key to acknowledge that, despite the mounting information describing neuroinflammation following ischaemic stroke, the exact mechanisms whereby inflammatory cells and their mediators drive stroke-induced neuroinflammation are still not fully understood. As a result, current anti-inflammatory treatments have failed to show efficacy in clinical trials. In this review we discuss the complexities of post-stroke neuroinflammation, specifically how it affects neuronal tissue and post-stroke outcome acutely, chronically, and in sites of SND. We then discuss current and previously assessed anti-inflammatory therapies, with a particular focus on how failed anti-inflammatories may be repurposed to target SND-associated neuroinflammation.]

#### [Risk factors for shoulder pain after stroke: A clinical study.](#)

Hao N., Zhang M., Li Y., Guo Y.

*Pakistan Journal of Medical Sciences*, vol.38(1) pp.145-149

Jan-Feb 2022

**[Objectives:** To investigate the risk factors for shoulder pain after stroke and prevent its occurrence effectively. **Method(s):** The patients with stroke treated in our hospital between September 2016 and October 2020 were reviewed retrospectively. The medical records of the included patients including age, gender, lesion side, stroke duration, hospital stay, diabetes, hypertension, heart disease, limitation of shoulder joint activity, alcohol abuse, smoking, type of stroke, Ashworth scale, Brunnstrom stage, sensory disorders, and motor arm score of National Institutes of Health Stroke Scale (NIHSS) were collected and analyzed to determine the risk factors for shoulder pain after stroke. **Result(s):** A total of 1390 patients were included based on the inclusion and exclusion criteria, consisting of 162 patients with shoulder pain after stroke and the prevalence was 11.6%. The included patients were divided into shoulder pain group and non-shoulder pain group. There were significant differences in age, stroke duration, hospital stay, diabetes, limitation of shoulder joint activity, Ashworth scale, Brunnstrom stage, sensory disorders, and motor arm score of NIHSS between the two groups ( $P < 0.05$ ). Based on the multivariate regression analysis, the independent risk factors for shoulder pain after stroke included diabetes, limited shoulder joint activity, Brunnstrom grade I-III period, Ashworth 3-4 grade, motor arm score of NIHSS 3-4 points, and sensory disturbance. **Conclusion(s):** Great emphasis should be placed on the stroke patients with diabetes, limited shoulder joint activity, Brunnstrom grade I-III period, Ashworth 3-4 grade, motor arm score of NIHSS 3-4 points, or sensory disturbance, as these patients have higher risks for shoulder pain after stroke.]

## Drug Therapy

#### [Effect of ginkgolide in ischemic stroke patients with large artery atherosclerosis: Results from a randomized trial](#)

Dong Y., Zhang J., Wang Y., Zhao L., Li R., Wei C., Bai Q., Wan L., Sun L., Feng S., You M., Wang C., Zhang H. et al  
*CNS Neuroscience & Therapeutics*, vol. 27(12) pp. 1561-1569.

December 2021

**[Background:** Dual antiplatelet therapy is considered beneficial in acute ischemic stroke (AIS) patients with intracranial artery stenosis (ICAS), with more bleeding events. Ginkgolide is shown to reduce platelet activation after

infarction, which might be of benefit in AIS. We aimed to explore the effect of Ginkgolide in AIS patients with ICAS. **Methods:** This was a randomized, double-blinded, placebo-controlled trial conducted at 61 centers in China. Within 72 h after onset, consecutive patients diagnosed as AIS with ICAS were randomized to either Ginkgolide or placebo treatment. The primary outcome was the composite of mortality and recurrent stroke (ischemic or hemorrhagic) during first 4 weeks in an intention-to-treat analysis. Secondary functional outcome was assessed by modified Rankin Scale and improvement of stroke severity was assessed by National Institution of Health Stroke Scale at day 28. Safety outcome was measured by the rate of severe adverse event (SAE). **Results:** There were 936 patients randomized to either Ginkgolide or placebo treatment. Their average age was  $64.2 \pm 10.4$  years old and 36.0% of the patients were female. The composite index event occurred in six patients in placebo group, and none occurred in Ginkgolide group (risk ratio 1.01; 95% CI 1.00–1.02). There were more patients who achieved favorable outcome in Ginkgolide group, compared with that of the placebo group (OR 2.16, 95%CI 1.37–3.41). SAE occurred in five (1.1%) patients in the Ginkgolide group and three (0.6%) in the placebo group (OR 0.60, 95%CI 0.14–2.53). Intracranial hemorrhage occurred in 1/473 (0.2%) in the placebo group. **Conclusions:** Ginkgolide, working as PAF antagonist, may reduce recurrent stroke in AIS with ICAS patients within 72 hours after onset. It might be an optional treatment in moderate-to-severe AIS patients with ICAS.]

#### [Oral antiplatelet therapy for acute ischaemic stroke](#)

Minhas J.S., Chithiramohan T., Wang X., Barnes S.C., Clough R.H., Kadicheeni M., Beishon L.C., and Robinson T. *Cochrane Database of Systematic Reviews* 2022, Issue 1. Art. No.: CD000029.

January 2022

**[Background:** In people with acute ischaemic stroke, platelets become activated and can cause blood clots to form and block an artery in the brain, resulting in damage to part of the brain. Such damage gives rise to the symptoms of stroke. Antiplatelet therapy might reduce the volume of brain damaged by ischaemia and also reduce the risk of early recurrent ischaemic stroke, thereby reducing the risk of early death and improving long-term outcomes in survivors. However, antiplatelet therapy might also increase the risk of fatal or disabling intracranial haemorrhage. **Objectives:** To assess the efficacy and safety of immediate oral antiplatelet therapy (i.e. started as soon as possible and no later than two weeks after stroke onset) in people with acute presumed ischaemic stroke. **Search methods:** We searched the Cochrane Stroke Group Trials Register, CENTRAL, MEDLINE Ovid, Embase Ovid, and two trials registers, and performed forward reference/cited reference searching in August 2020. **Selection criteria:** Randomised controlled trials (RCTs) comparing oral antiplatelet therapy (started within 14 days of the stroke) with control in people with definite or presumed ischaemic stroke. **Data collection and analysis:** Two review authors independently applied the inclusion criteria and assessed trial quality. For the included trials, they extracted and cross-checked the data. They assessed risk of bias of each study using the Risk of Bias 1 (RoB1) tool and overall certainty of the evidence for each outcome using the GRADE approach. **Main results:** We included 11 studies involving 42,226 participants. Three new trials have been added since the last update (743 participants). As per the previous version of this review, two trials testing aspirin 160 mg to 300 mg once daily, started within 48 hours of onset, contributed 96% of the data. The risk of bias was low. The maximum follow-up was six months. With treatment, there was a decrease in death or dependency at the end of follow-up (odds ratio (OR) 0.95, 95% confidence interval (CI) 0.91 to 0.99; 7 RCTs, 42,034 participants; moderate-certainty evidence). For every 1000 people treated with aspirin, 13 people would avoid death or dependency (number needed to treat for an additional beneficial outcome 79). **Authors' conclusions:** Antiplatelet therapy with aspirin 160 mg to 300 mg daily, given orally (or by nasogastric tube or per rectum in people who cannot swallow) and started within 48 hours of onset of presumed ischaemic stroke, significantly decreased death and dependency, and reduced the risk of early recurrent ischaemic stroke without a major risk of early haemorrhagic complications; long-term outcomes were improved.]

#### [Predictors for symptomatic intracranial hemorrhage after intravenous thrombolysis with acute ischemic stroke within 6 h in northern China: a multicenter, retrospective study.](#)

Xue Y., Li S., Xiang Y., Wang Z., Wang F., Yu Y., Yan P., Liu X., Sun Q., Du Y., and Li J.

*BMC Neurology*, vol. 22 (1)

January 2022

**[Background and Purpose:** This study assessed the predictive factors for symptomatic intracranial hemorrhage (sICH) in patients with acute ischemic stroke (AIS) after receiving intravenous thrombolysis (IVT) within 6 h in northern China. **Methods:** We retrospectively analyzed ischemic stroke patients who were treated with IVT between November 2016 and December 2018 in 19 hospitals in Shandong Province, China. Potential predictors of sICH were investigated using univariate and multivariate analyses. **Results:** Of the 1293 enrolled patients (845 men, aged

62 ± 11 years), 33 (2.6%) developed sICH. The patients with sICH had increased coronary heart disease (36.4% vs. 13.7%,  $P = 0.001$ ), more severe stroke (mean National Institutes of Health Stroke Scale [NIHSS] score on admission of 14 vs. 7,  $P < 0.001$ ), longer door-to-needle time [DNT] (66 min vs. 50 min,  $P < 0.001$ ), higher blood glucose on admission, higher white blood cell counts ( $9000/\text{mm}^3$  vs.  $7950/\text{mm}^3$ ,  $P = 0.004$ ) and higher neutrophils ratios (73.4% vs. 67.2%,  $P = 0.006$ ) et al. According to the results of multivariate analysis, the frequency of sICH was independently associated with the NIHSS score (OR = 3.38; 95%CI [1.50-7.63];  $P = 0.003$ ), DNT (OR = 4.52; 95%CI [1.69-12.12];  $P = 0.003$ ), and white blood cell count (OR = 3.59; 95%CI [1.50-8.61];  $P = 0.004$ ). When these three predictive factors were aggregated, compared with participants without any factors, the multi-adjusted odds ratios (95% confidence intervals) of sICH for persons concurrently having one, two or three of these factors were 2.28 (0.25-20.74), 15.37 (1.96-120.90) and 29.05 (3.13-270.11), respectively ( $P$  for linear trend  $< 0.001$ ), compared with participants without any factors. **Conclusion:** NIHSS scores higher than 10 on admission, a DNT  $> 50$  min, and a white blood cell count  $\geq 9000/\text{mm}^3$  were independent risk factors for sICH in Chinese patients within 6 h after IVT for AIS.]

#### [Targeted nano-delivery strategies for facilitating thrombolysis treatment in ischemic stroke.](#)

Ma H., Jiang Z., Xu J., Liu J., Guo Z-N.

*Drug Delivery*. 28(1) pp. 357-371 2021

December 2021

[Ischemic stroke is one of the major causes of severe disability and death worldwide. It is mainly caused by a sudden reduction in cerebral blood flow due to obstruction of the supplying vessel by thrombi and subsequent initiation of a complex cascade of pathophysiological changes, which ultimately lead to brain ischemia and even irreversible infarction. Thus, timely and effective thrombolysis therapy remains a mainstay for acute ischemic stroke treatment. Tissue plasminogen activator (tPA), the only thrombolytic agent approved globally, provides substantial benefits by exerting a fibrinolysis effect, recovering the blood supply in occluded vessels and, thereby, salvaging the ischemic tissue. However, the clinical application of tPA was limited because of a few unsolved issues, such as a narrow therapeutic window, hemorrhagic complications, and limited thrombolytic efficacy, especially, for large thrombi. With the prosperous development of nanotechnology, a series of targeted delivery strategies and nanocomposites have been extensively investigated for delivering thrombolytic agents to facilitate thrombolysis treatment. Excitingly, numerous novel attempts have been reported to be effective in extending the half-life, targeting the thrombus site, and improving the thrombolytic efficacy in preclinical models. This article begins with a brief introduction to ischemic stroke, then describes the current state of thrombolysis treatment and, finally, introduces the application of various nanotechnology-based strategies for targeted delivery of thrombolytic agents. Representative studies are reviewed according to diverse strategies and nano-formulations, with the aim of providing integrated and up-to-date information and to improve the development of thrombolysis treatment for stroke patients.]

## Education and Training

#### [Simulation-based training improves process times in acute stroke care \(STREAM\)](#)

Bohmann F., Gruber K., Kurka N., Willems L., Herrmann E., du Mesnil de Rochemont R., Scholz P., Rai H. et al  
*European Journal of Neurology*, vol. 29(1) pp. 138-148.

January 2022

**[Background:** The objective of the STREAM Trial was to evaluate the effect of simulation training on process times in acute stroke care. **Methods:** The multicenter prospective interventional STREAM Trial was conducted between 10/2017 and 04/2019 at seven tertiary care neurocenters in Germany with a pre- and post-interventional observation phase. We recorded patient characteristics, acute stroke care process times, stroke team composition and simulation experience for consecutive direct-to-center patients receiving intravenous thrombolysis (IVT) and/or endovascular therapy (EVT). The intervention consisted of a composite intervention centered around stroke-specific in situ simulation training. Primary outcome measure was the 'door-to-needle' time (DTN) for IVT. Secondary outcome measures included process times of EVT and measures taken to streamline the pre-existing treatment algorithm. **Results:** The effect of the STREAM intervention on the process times of all acute stroke operations was neutral. However, secondary analyses showed a DTN reduction of 5 min from 38 min pre-intervention (interquartile range [IQR] 25–43 min) to 33 min (IQR 23–39 min,  $p = 0.03$ ) post-intervention achieved by simulation-experienced stroke teams. Concerning EVT, we found significantly shorter door-to-groin times in patients who were treated by teams with simulation experience as compared to simulation-naïve teams in the post-interventional phase (–21 min, simulation-naïve: 95 min, IQR 69–111 vs. simulation-experienced: 74 min, IQR 51–92,  $p = 0.04$ ). **Conclusion:** An

intervention combining workflow refinement and simulation-based stroke team training has the potential to improve process times in acute stroke care.]

## Mechanical Ventilation

### [Clinical outcomes and prognostic factors for prolonged mechanical ventilation in patients with acute stroke and brain trauma.](#)

Huang H-Y., Lee C., Chiu T-H., Chen H.H., Chan L-Y., Chang C-J., Chang S-C., Hu H-C., Kao K-C., Chen N-H. et al *Journal of the Formosan Medical Association*, vol. 121(1) pp. 162-169

**[Background/purpose:** Neurological dysfunction is a common condition necessitating prolonged mechanical ventilation (PMV). We investigated the clinical features and outcomes of patients with acute neurological diseases requiring PMV. **Methods:** This retrospective observational study was conducted at the Respiratory Care Center (RCC) of Chang Gung Memorial Hospital, Taiwan, between January 2011 and January 2014. The main outcome was weaning success, defined as successful withdrawal from mechanical ventilator support for more than 5 days.

**Results:** The study included 103 patients with acute stroke and brain trauma receiving PMV. Weaning success was reported in 63 (61%) patients and weaning failure was reported in 40 (39%) patients. Patients in the weaning failure group were older and had a lower RCC Glasgow Coma Scale (GCS) score (6.0 vs 7.9,  $p = 0.005$ ), lower albumin level (2.8 vs 3.1,  $p = 0.015$ ), longer RCC stay (28.7 vs 21.3 days,  $p = 0.017$ ), and higher in-hospital mortality rate (47% vs 9%,  $p < 0.01$ ). Multivariate analysis revealed that reduced RCC GCS score is an independent prognostic factor for weaning failure (odds ratio [OR] = 1.22, 95% confidence interval [CI] = 1.05-1.46,  $p = 0.016$ ) and that per unit increase of RCC GCS score is associated with a lower risk of in-hospital mortality (OR = 0.83, 95% CI = 0.70-0.96,  $p = 0.019$ ). **Conclusion:** Reduced RCC GCS score is an independent prognostic factor for weaning failure, and is associated with increased in-hospital mortality rates in patients with acute stroke and brain trauma requiring PMV.]

## Neuroimaging

### [Reclassifying stroke lesion anatomy](#)

Bonkhoff A.K., Xu T., Nelson A., Gray R., Jha A., Cardoso J., Ourselin S., Rees G., Jäger H.R., and Nachev P. *Cortex: A Journal Devoted to the Study of the Nervous System and Behavior*, Vol. 145 December 2021

[Cognitive and behavioural outcomes in stroke reflect the interaction between two complex anatomically-distributed patterns: the functional organization of the brain and the structural distribution of ischaemic injury. Conventional outcome models—for individual prediction or population-level inference—commonly ignore this complexity, discarding anatomical variation beyond simple characteristics such as lesion volume. This sets a hard limit on the maximum fidelity such models can achieve. High-dimensional methods can overcome this problem, but only at prohibitively large data scales. Drawing on one of the largest published collections of anatomically-registered imaging of acute stroke— $N = 1333$ —here we use non-linear dimensionality reduction to derive a succinct latent representation of the anatomical patterns of ischaemic injury, agglomerated into 21 distinct intuitive categories. We compare the maximal predictive performance it enables against both simpler low-dimensional and more complex high-dimensional representations, employing multiple empirically-informed ground truth models of distributed structure–outcome relationships. We show our representation sets a substantially higher ceiling on predictive fidelity than conventional low-dimensional approaches, but lower than that achievable within a high-dimensional framework. Where descriptive simplicity is a necessity, such as within clinical care or research trials of modest size, the representation we propose arguably offers a favourable compromise of compactness and fidelity.]

### [The ENIGMA Stroke Recovery Working Group: Big data neuroimaging to study brain–behavior relationships after stroke](#)

Liew, S-L., Zavaliangos-Petropulu A., Jahanshad N., Lang C.E., Hayward, K.S. Lohse, K.R., and Juliano J.M. *Human Brain Mapping*, vol. 43(1) pp. 129-148. January 2022

[The goal of the Enhancing Neuroimaging Genetics through Meta-Analysis (ENIGMA) Stroke Recovery working group is to understand brain and behavior relationships using well-powered meta- and mega-analytic approaches. ENIGMA Stroke Recovery has data from over 2,100 stroke patients collected across 39 research studies and 10 countries



around the world, comprising the largest multisite retrospective stroke data collaboration to date. This article outlines the efforts taken by the ENIGMA Stroke Recovery working group to develop neuroinformatics protocols and methods to manage multisite stroke brain magnetic resonance imaging, behavioral and demographics data. Specifically, the processes for scalable data intake and preprocessing, multisite data harmonization, and large-scale stroke lesion analysis are described, and challenges unique to this type of big data collaboration in stroke research are discussed. Finally, future directions and limitations, as well as recommendations for improved data harmonization through prospective data collection and data management, are provided.]

## Rehabilitation

### [Aromatherapy in stroke patients: Is it time to begin?](#)

Contrada M., Cerasa A., Tonin P., Bagetta G., and Scuteri D.

*Frontiers in Behavioral Neuroscience*, vol. 15

December 2021

[Stroke is the second largest cause of death worldwide, causing disease with long-term consequences and considerable healthcare costs. The application of new nursing interventions aimed at reducing distressing behaviors and at increasing patient comfort is an important part of the care and, until now, there are no defined guidelines. Aromatherapy has been demonstrated to be efficient in several other neurological disorders for the treatment of somatic and emotional diseases and to promote patient health. In the management of stroke patients, aromatherapy is still in its infancy. The first evidence coming from animal models demonstrated a consistent and reliable neuroprotective effect in reducing cerebral ischemia–reperfusion injury. In the last few years, some preliminary data being to be collected in humans revealed significant influence in reducing patients' pain and emotional distress. In this perspective study, we sought to summarize, for the first time, the main findings emerging from this new field of study, discussing the future opportunities to be translated into primary care practice.]

### [Effects of virtual reality-based intervention on cognition, motor function, mood, and activities of daily living in patients with chronic stroke: A systematic review and meta-analysis of randomized controlled trials](#)

Gao Y., Ma L., Lin C., Zhu S., Yao L., Fan H., Gong J., Yan X. and Wang T.

*Frontiers in Aging Neuroscience*, vol. 13

December 2021

**[Background:** The efficacy of virtual reality (VR)-based intervention for improving cognition in patients with the chronic stage of stroke is controversial. The aims of this meta-analysis were to evaluate the effect of VR-based training combined with traditional rehabilitation on cognition, motor function, mood, and activities of daily living (ADL) after chronic stroke. **Methods:** The search was performed in the Cochrane Library (CENTRAL), EBSCO, EMBASE, Medline (OVID), Web of Science databases, PubMed, CINAHL Ovid, and Scopus from inception to May 31, 2021. All included studies were randomized controlled trials (RCTs) examining VR-based intervention combined with traditional rehabilitation for chronic stroke. The main outcomes of this study were cognition, including overall cognition (combined with all cognitive measurement results), global cognition (measured by the Montreal Cognitive Assessment, MoCA, and/or Mini-Mental State Examination, MMSE), and attention/execution. The additional outcomes were motor function, mood, and ADL. Subgroup analyses were conducted to verify the potential factors for heterogeneity. **Results:** Six RCTs including 209 participants were included for systematic review, and five studies of 177 participants were included in meta-analyses. Main outcome analyses showed large and significant effect size (ES) of VR-based training on overall cognition ( $g = 0.642$ ; 95% CI = 0.134–1.149; and  $P = 0.013$ ) and attention/execution ( $g = 0.695$ ; 95% CI = 0.052–1.339; and  $P = 0.034$ ). Non-significant result was found for VR-based intervention on global cognition ( $g = 0.553$ ; 95% CI = –0.273–1.379; and  $P = 0.189$ ). Additional outcome analyses showed no superiority of VR-based intervention over traditional rehabilitation on motor function and ADL. The ES of VR-based intervention on mood ( $g = 1.421$ ; 95% CI = 0.448–2.393; and  $P = 0.004$ ) was large and significant. In the subgroup analysis, large effects for higher daily intensity, higher weekly frequency, or greater dose of VR intervention were found. **Conclusion:** Our findings indicate that VR-based intervention combined with traditional rehabilitation showed better outcomes for overall cognition, attention/execution, and depressive mood in individuals with chronic stroke. However, VR-based training combined with traditional rehabilitation showed a non-significant effect for global cognition, motor function, and ADL in individuals with chronic stroke.]

[Evaluating the impact of a training program to support transitioning from the hospital to the community for people after stroke: a community case study.](#)

Lui, Michelle; McKellar, Katherine; Cooper, Shari; Eng, Janice J.; Bird, Marie-Louise  
*BMC Health Services Research*, vol. 22(1)  
January 2022

**[Background:** The transitions in care along the stroke recovery path are challenging, particularly in finding mechanisms to continue one's recovery once at home. We aim to evaluate the impact of training physiotherapists and fitness instructors from one regional community together to deliver an evidence-based group exercise program starting in the hospital and transitioning to the community using an implementation approach. **Methods:** The evidenced based exercise program Fitness and Mobility Exercise (FAME) for stroke was chosen as the intervention. Data from interviews with stakeholders (community centre and health authority hospital staff including a physiotherapy navigator) was transcribed and themes evaluated using the RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance) framework. These data were supplemented by information collected as a quality assurance project within the health authority. **Results:** Two programs were established; one in the community centre (run over 15 months by fitness instructors) and one in the regional hospital (run over 12 months by a rehabilitation assistant under the direction from a physiotherapist). Transitions in care were facilitated by implementing the same evidence-based group exercise class in both the hospital and community setting, so people living with stroke could seamlessly move from one to another. An existing physiotherapist navigator service also was valued as a support for the transitions between the two centres for people with stroke. The hospital group accessed group-based physiotherapy service on average 31 days earlier than they were able to in a one-to-one format. **Conclusions:** This case study described the implementation of the Fitness and Mobility Exercise (FAME) program in one community and the use of a physiotherapist navigator to assist transition between them. After a community training workshop, FAME programs were established within the health authority and the community centre. FAME program participants within the health authority benefited from reduced wait times to access hospital outpatient physiotherapy service. Improvements in function were measured in and reported by the people after stroke attending either the health authority or community centre FAME groups.]

[Pre-stroke physical activity in relation to post-stroke outcomes - linked to the International Classification of Functioning, Disability and Health \(ICF\): A scoping review.](#)

Viktorisson A., Reinholdsson M., Danielsson A., Palstam A., and Sunnerhagen K.S.  
*Journal of Rehabilitation Medicine*, vol. 54  
January 2022

**[Objective:** This scoping review aims to identify how pre-stroke physical activity (PA) has been studied in relation to outcomes after stroke using the ICF framework. **Methods:** MEDLINE, CINAHL, Scopus, and grey literature databases were systematically searched from inception to March 15, 2021, with no language restrictions. Risk of bias was evaluated for all included studies. Identified outcome measures were linked to ICF components using linking rules, and the main findings were summarized. **Results:** Of 3664 records screened, 35 studies were included. The risk of bias was graded as moderate to critical for all studies. There were 60 unique outcome measures studied in relation to pre-stroke PA, covering the hyper acute to chronic phases of stroke recovery. Outcome measures linked to body functions were most common (n=19), followed by activities and participation (n=14), body structures (n=7), environmental factors (n=4) and personal factors (n=2). There were large differences in assessments of pre-stroke PA, and only one study analysed haemorrhagic cases separately. **Conclusions:** Pre-stroke PA has been studied in relation to all components in the ICF framework. However, this review highlights the high risk of bias, heterogeneity in pre-stroke PA assessments, and the lack of information regarding haemorrhagic strokes in the current literature.]

[The spasticity-related quality of life 6-dimensions instrument in upper-limb spasticity: Part I Development and responsiveness.](#)

Turner-Stokes L., Theodoroff K., Jacinto J., Lambert J., De La Loge C., Calvi-Gries F., Whalen J., Lysandropoulos A. et al  
*Journal of Rehabilitation Medicine*, Vol. 54

**[Objective:** To describe the development of the Spasticity-related Quality of Life 6-Dimensions instrument (SQoL-6D) and its sensitivity to clinical change (responsiveness). **Design:** Multicentre, prospective, longitudinal cohort study at 8 UK sites (NCT03442660). **Patients:** Adults (n = 104) undergoing focal treatment of upper limb spasticity. **Methods:** No condition-specific health-related quality of life tool is available for upper-limb spasticity of any aetiology. The SQoL-6D was developed to fulfil this need, designed to complement the Upper Limb Spasticity Index (which incorporates the Goal Attainment Scaling evaluation of upper limb spasticity [GASeous] tool) with targeted

standardised measures. The 6 dimensions of the SQoL-6D (score range 0-4) map onto common treatment goal areas identified in upper-limb spasticity studies. A Total score (0-100) provides overall spasticity-related health status. To assess responsiveness, the SQoL-6D, Global Assessment of Benefit scale and "GASeous" were administered at enrolment and 8 weeks. **Results:** Significant differences in mean SQoL-6D Total score change and effect sizes across patients rating "some benefit" (0.51) and "great benefit" (0.88) supported responsiveness. **Conclusion:** The SQoL-6D is a promising new measure of health status in upper limb spasticity, that enables systematic assessment of the impact of this condition in relation to patients' priority treatment goals. A psychometric evaluation of SQoL-6D is presented separately.]

## Stroke Risk and Severity

### [Effects of estimated glomerular filtration rate on clinical outcomes in patients with intracerebral hemorrhage.](#)

Li Z., Li Z., Zhou Q., Gu H., Wang Y., Zhao X., Wang K., Ji X., Qin X., Wang N., Ge Z., Zeng J., Li L., Chu L., Chen Z. et al  
*BMC Neurology*, vol. 22(1)

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**[Background:** The influence of chronic kidney disease (CKD) on the severity and prognosis of spontaneous intracerebral hemorrhage (ICH) has been scarcely investigated. We aimed to explore the association of admission estimated glomerular filtration rate (eGFR) levels with hemorrhagic stroke severity and outcomes in ICH patients. **Materials and Methods:** The patients enrolled in this study were from the China Stroke Center Alliance study (CSCA). Patients were divided into four groups according to differences in eGFR at admission ( $\geq 90$ ; 60-89; 45-59;  $< 45$ ). Multivariable logistic regression analysis was used to determine the association of the eGFR at admission with hemorrhagic stroke severity, in-hospital complications, discharge disposition, and in-hospital mortality after ICH. **Results:** A total of 85,167 patients with acute ICH were included in the analysis. Among them, 9493 (11.1%) had a baseline eGFR  $< 60$  ml/min/1.73 m<sup>2</sup>. A low eGFR was associated with an increased risk of in-hospital mortality [eGFR 60-89 ml/min/1.73 m<sup>2</sup>, odds ratio (OR) 1.36 (95% confidence interval (CI) 1.21-1.53); eGFR 45-59, 2.35 (1.97-2.82); eGFR  $< 45$ , 4.18 (3.7-4.72); P for trend  $< 0.0001$ ], non-routine discharge [eGFR 60-89, 1.11 (1.03-1.2); eGFR 45-59, 1.16 (1-1.35); eGFR  $< 45$ , 1.37 (1.23-1.53); P for trend  $< 0.0001$ ], hemorrhagic stroke severity [eGFR 60-89, 1 (0.95-1.05); eGFR 45-59, 1.39 (1.26-1.53); eGFR  $< 45$ , 1.81 (1.67-1.96); P for trend  $< 0.0001$ ], in-hospital complications of pneumonia [eGFR 60-89, 1.1 (1.05-1.14); eGFR 45-59, 1.3 (1.2-1.4); eGFR  $< 45$ , 1.66 (1.57-1.76); P for trend  $< 0.0001$ ] and hydrocephalus [eGFR 60-89, 0.99 (0.87-1.12); eGFR 45-59, 1.37 (1.1-1.7); eGFR  $< 45$ , 1.54 (1.32-1.8); P for trend = 0.0139] after adjusting for confounding factors. With the decline in eGFR, the risk of hematoma evacuation increased in patients with an eGFR 45 to 59 ml/min/1.73 m<sup>2</sup> (OR 1.48; 95% CI 1.37-1.61). No significant association between differences in eGFR at baseline and in-hospital complication of recurrent intracerebral hemorrhage was observed. **Conclusions:** Low eGFR at baseline was associated with an increased risk of in-hospital mortality, non-routine discharge, hemorrhagic stroke severity and in-hospital complications such as pneumonia, hydrocephalus and hematoma evacuation in acute ICH patients.]

### [Fewer COVID-19-associated strokes and reduced severity during the second COVID-19 wave: The Madrid Stroke Network.](#)

Fuentes B., Alonso de Lecinana M., Rigual R., Garcia-Madrona S., Diaz-Otero F., Aguirre C., Calleja P. et al  
*European Journal of Neurology*, vol. 28(12) pp. 4078-4089

December 2021

**[Background and purpose:** The experience gained during the first COVID-19 wave could have mitigated the negative impact on stroke care in the following waves. Our aims were to analyze the characteristics and outcomes of patients with stroke admitted during the second COVID-19 wave and to evaluate the differences in the stroke care provision compared with the first wave. **Methods:** This retrospective multicenter cohort study included consecutive stroke patients admitted to any of the seven hospitals with stroke units (SUs) and endovascular treatment facilities in the Madrid Health Region. The characteristics of the stroke patients with or without a COVID-19 diagnosis were compared and the organizational changes in stroke care between the first wave (25 February to 25 April 2020) and second wave (21 July to 21 November 2020) were analyzed. **Results:** A total of 550 and 1191 stroke patients were admitted during the first and second COVID-19 waves, respectively, with an average daily admission rate of nine patients in both waves. During the second wave, there was a decrease in stroke severity (median National Institutes of Health Stroke Scale 5 vs. 6;  $p = 0.000$ ), in-hospital strokes (3% vs. 8.1%) and in-hospital mortality (9.9% vs. 15.9%). Furthermore, fewer patients experienced concurrent COVID-19 (6.8% vs. 19.1%), and they presented milder COVID-



19 and less severe strokes. Fewer hospitals reported a reduction in the number of SU beds or deployment of SU personnel to COVID-19 dedicated wards during the second wave. **Conclusions:** During the second COVID-19 wave, fewer stroke patients were diagnosed with COVID-19, and they had less stroke severity and milder COVID-19.]

### [What is the added value of CT-angiography in patients with transient ischemic attack?](#)

Maier I.L., Herpertz G.U., Bähr M., Psychogios M-N., and Liman, J.

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**[Background:** Transient ischemic attack (TIA) is an important predictor for a pending stroke. Guidelines recommend a workup for TIA-patients similar to that of stroke patients, including an assessment of the extra- and intracranial arteries for vascular pathologies with direct therapeutic implications via computed tomography angiography (CTA). Aim of our study was a systematic analysis of TIA-patients receiving early CTA-imaging and to evaluate the predictive value of TIA-scores and clinical characteristics for ipsilateral vascular pathologies and the need of an invasive treatment. **Methods:** We analysed clinical and imaging data from TIA patients being admitted to a tertiary university hospital between September 2015 and March 2018. Following subgroups were identified: 1) no- or low-grade vascular pathology 2) ipsilateral high-risk vascular pathology and 3) high-risk findings that needed invasive, surgical or interventional treatment. We investigated established TIA-scores (ABCD2-, the ABCD3- and the SPI-II score) and various clinical characteristics as predictive factors for ipsilateral vascular pathologies and the need for invasive treatment. **Results:** Of 812 patients, 531 (65.4%) underwent initial CTA in the emergency department. In 121 (22.8%) patients, ipsilateral vascular pathologies were identified, of which 36 (6.7%) needed invasive treatment. The ABCD2-, ABCD3- and SPI-II-scores were not predictive for ipsilateral vascular pathologies or the need for invasive treatment. We identified male sex (OR 1.579, 95%CI 1.049-2.377, p = 0.029), a short duration of symptoms (OR 0.692, 95% CI 0.542-0.884, p = 0.003), arterial hypertension (OR 1.718, 95%CI 0.951-3.104, p = 0.073) and coronary heart disease (OR 1.916, 95%CI 1.184-3.101, p = 0.008) as predictors for ipsilateral vascular pathologies. As predictors for the need of invasive treatment, a short duration of symptoms (OR 0.565, 95%CI 0.378-0.846, p = 0.006), arterial hypertension (OR 2.612, 95%OR 0.895-7.621, p = 0.079) and hyperlipidaemia (OR 5.681, 95%CI 0.766-42.117, p = 0.089) as well as the absence of atrial fibrillation (OR 0.274, OR 0.082-0.917, p = 0.036) were identified. **Conclusion:** More than every fifth TIA-patient had relevant vascular findings revealed by acute CTA. TIA-scores were not predictive for these findings. Patients with a short duration of symptoms and a vascular risk profile including coronary heart disease, arterial hypertension and hyperlipidaemia most likely might benefit from early CTA to streamline further diagnostics and therapy.]

## Thrombectomy / Endovascular Treatment

### [Effect of Antiplatelet Preparation Before Endovascular Thrombectomy for Cerebral Infarction on Procedural Thromboembolism.](#)

Nam T.M., Jang J.H., Kim Y.Z., Kim K.H., and Kim S.H.

*Turkish Neurosurgery*, vol. 32 (1) pp. 69-75

January 2022

**[Aim:** To compare an antiplatelet-preparation group with a no-preparation group to evaluate the effect of the antiplatelet preparation on procedural thromboembolism during endovascular thrombectomy (EVT) with diffusion-weighted imaging (DWI), retrospectively. **Material and Methods:** From January 2017 to April 2020, EVT was performed in 60 patients with cerebral infarction. Patients were categorized into the antiplatelet-preparation group (n=25) or the no-preparation group (n=35). Procedural thromboembolism was defined as new DWI-positive lesions in other areas of the occluded artery after EVT. **Results:** The antiplatelet-preparation and no-preparation groups did not differ in the rate of procedural thromboembolism occurrence (6/25 [24.0%] vs. 6/35 [17.1%]; p=0.532). Procedural thromboembolism was associated with age (74.4 ± 6.95 years vs. 65.7 ± 12.9 years; p=0.028), atherosclerotic occlusion (66.7% vs. 29.2%; p=0.022), and procedural time (97.4 ± 45.7 min vs. 60.1 ± 28.8 min; p=0.001). Multivariable logistic regression analysis showed that factors affecting procedural thromboembolism during EVT for cerebral infarction were old age (odds ratio [OR], 1.133; 95% confidence interval [CI], 1.009-1.273; p=0.035), atherosclerotic occlusion (OR, 7.434; 95% CI, 1.272-43.431; p=0.026), and longer procedural time (OR, 1.023; 95% CI, 1.001 - 1.046; p=0.006). **Conclusion:** The antiplatelet preparation had no significant protective effect on procedural thromboembolism during EVT for cerebral infarction. Old age, atherosclerotic occlusion, and longer procedural time were independent risk factors for procedural thromboembolism during EVT for cerebral infarction.]

[Intravenous thrombolytic treatment and endovascular thrombectomy for ischaemic wake-up stroke](#)

Roaldsen M.B., Lindekleiv H., and Mathiesen E.B.


*Cochrane Database of Systematic Reviews* 2021, Issue 12. Art. No.: CD010995.


December 2021

**[Review question:** Do people who wake up with new acute stroke symptoms benefit from treatments to reopen the blocked blood vessels (recanalisation therapies)? **Background:** Most strokes are caused by a blockage of a blood vessel in the brain by a blood clot (ischaemic stroke). This is a leading cause of death and disability worldwide. Treatments to reopen blood vessels such as clot-dissolving drugs (thrombolysis) or mechanical devices to remove blood clots (thrombectomy) may improve recovery after ischaemic stroke if blood flow is rapidly restored. About one in five strokes occur during sleep (wake-up stroke). People with wake-up stroke have traditionally been considered to be ineligible for recanalisation therapies because the time of stroke onset is unknown. However, recent studies of selected patients suggest benefit from recanalisation therapies. **Search date:** We searched for randomised controlled trials (a type of study in which people are randomly allocated to one of two or more treatment groups) until 24 May 2021. **Study characteristics:** We included seven trials with a total of 980 participants. Five trials with 775 wake-up stroke participants were randomised to intravenous thrombolytic treatment or to control (either placebo (dummy treatment) or standard medical treatment alone). Two trials with 205 wake-up stroke participants with a blood clot in a large brain artery were randomised to either endovascular mechanical thrombectomy plus standard medical treatment or standard medical treatment alone. **Key results:** We found that recanalisation therapies can improve functional outcome and survival in selected patients with wake-up stroke. However, we cannot rule out the possibility that treatment increases the risk of bleeding in the brain. The optimal selection criteria with regard to imaging criteria or time window, or both, for choosing patients to treat is still unclear; these criteria differed between the trials. More trials to investigate this further are therefore warranted. **Quality of evidence:** We judged the included trials to be at low or unclear risk of bias, and the overall certainty of the evidence as high.]

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