


Library Current Awareness Bulletin

Stroke – April 2022

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[New AI diagnostic software framework to support stroke treatment](#)

National Health Executive, March 2022

Reports

[Research demand signalling: National Stroke Programme](#)

NHS Accelerated Access Collaborative, March 2022

[This document highlights the priority areas for research to inform national policy and support the ambitious, but achievable, NHS Long Term Plan targets for England.]

Drug Therapy

[Intravenous Alteplase Treatment of Acute Ischemic Stroke Patients Exhibiting Mild Neurological Deficits](#)

Sun J., Wang H., Sun M., Xie Q., Liu N., and Wang M.

Journal of the College of Physicians and Surgeons Pakistan (JCPSP), vol. 32(12)

March 2022

[Alteplase is increasingly used for treating ischemic stroke cases with low NIHSS scores, but the guidelines and evidence regarding outcomes are lacking. So, the authors conducted an updated meta-analysis to better understand

the effects of alteplase for the treatment of acute mild ischemic stroke. PubMed, Cochrane, EMBASE were systematically explored for all relevant investigations published as in September 2021. Study quality was assessed as per the Cochrane system criteria, and Stata 15.1 was utilised to carry out a meta-analysis. In total, 16 trials incorporating 5,846 patients were analysed (1,926 and 3,920 cases in the rt-PA and non-thrombolytic groups, respectively). The main outcome measure revealed that the treatment of rt-PA was correlated with better odds of a modified Rankin Scale (mRS) score of 0-1 relating to the non-thrombolytic group (OR = 1.12, 95% CI = 1.02-1.23, $p < 0.05$), and with moderate heterogeneity ($I^2 = 0.0\%$, $p = 0.930$). For the secondary study outcomes, symptomatic intracranial hemorrhage incidence was 4.46 times greater in the group of rt-PA, relating to the non-thrombolytic group (OR = 4.46, 95% CI = 2.75-7.23, $p < 0.001$). There were no considerable differences in the mortality between the two groups (OR = 0.64, 95% CI = 0.39-1.03, $p > 0.05$). No significant heterogeneity was detected in secondary study outcomes. Subgroup analysis showed that the function outcomes was the best within 3-4.5 hours; and the risk and mortality of sICH were the lowest within 3-4.5 hours. Intravenous rt-PA administration is associated with improved functional outcomes at three months after the stroke in mild ischemic stroke patients.]

[Off-Label Use of Tenecteplase for the Treatment of Acute Ischemic Stroke: A Systematic Review and Meta-analysis](#)

Katsanos A.H., Psychogios K., Turc G., Sacco S., de Sousa D.A., De Marchis G.M., Palaiodimou L., Filippou D.K. et al
JAMA Network Open, vol. 5(3)

March 2022

[Importance: Tenecteplase is being evaluated as an alternative thrombolytic agent for the treatment of acute ischemic stroke (AIS) within ongoing randomized clinical trials (RCTs). In addition, nonrandomized clinical experiences with off-label use of tenecteplase vs alteplase for AIS treatment are being published. **Objective:** To evaluate the available evidence on the safety and efficacy of intravenous tenecteplase compared with intravenous alteplase provided by nonrandomized studies. **Data Sources:** Eligible studies were identified by searching MEDLINE and Scopus databases. No language or other restrictions were imposed. The literature search was conducted on October 12, 2021. This meta-analysis used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and was written according to the Meta-analysis of Observational Studies in Epidemiology (MOOSE) proposal. **Study Selection:** Nonrandomized studies (prospective or retrospective) comparing intravenous tenecteplase (at any dose) with intravenous alteplase in patients with AIS were included in the analysis. **Data Extraction and Synthesis:** The crude odds ratios (ORs) and 95% CIs were calculated for the association of tenecteplase vs alteplase with the outcomes of interest and adjusted ORs were extracted if provided. Estimates using random-effects models were pooled. **Main Outcomes and Measures:** The primary outcome was the probability of good functional outcome (modified Rankin scale [mRS] score, 0-2) at 90 days. **Results:** Six studies were identified including a total of 1820 patients (618 [34%] treated with tenecteplase). Patients receiving tenecteplase had higher odds of 3-month good functional outcome (crude odds ratio [OR], 1.22; 95% CI, 0.90-1.66; adjusted OR, 1.60, 95% CI, 1.08-2.37), successful recanalization (crude OR, 2.82; 95% CI, 1.12-7.10; adjusted OR, 2.38; 95% CI, 1.18-4.81), and early neurological improvement (crude OR, 4.88; 95% CI, 2.03-11.71; adjusted OR, 7.60; 95% CI, 1.97-29.41). No significant differences were detected in 3-month excellent functional outcome proportions (mRS score 0-1; crude OR, 1.53; 95% CI, 0.81-2.91; adjusted OR, 2.51; 95% CI, 0.66- 9.49), symptomatic intracranial hemorrhage (crude OR, 0.97; 95% CI, 0.44-2.16; adjusted OR, 1.16; 95% CI, 0.13-10.50), or parenchymal hematoma (crude OR, 1.20; 95% CI, 0.24-5.95). **Conclusions and Relevance:** Evidence from nonrandomized studies suggests tenecteplase is as safe as alteplase and potentially associated with improved functional outcomes compared with alteplase. Based on these findings, enrolment in the ongoing RCTs appears to be appropriate.]

Post-stroke Health

[Combined quality of life and survival for estimation of long-term health outcome of patients with stroke.](#)

Butsing N., Tipayamongkholgul M., Wang J.D., and Ratanakorn D.

Health and Quality of Life Outcomes, vol. 20(1)

March 2022

[Background: Advanced medical technologies can prolong life of stroke survivors. Dynamic change of health outcomes provides essential information to manage stroke. Mathematical models, to extrapolate health status over a lifetime from cross-sectional data, can be used to investigate long term health outcomes among stroke survivors. This study aimed to estimate the health outcomes of ischemic stroke (IS) and intracerebral hemorrhage (ICH) at each survival time point. **Methods:** The cohort of 5391 patients with IS and ICH stroke, registered at Ramathibodi Hospital

from 2005 to 2013, were followed up regarding survival status until 2016 with the National Mortality Registry. Survival functions were extrapolated over 50 years to age- and sex-matched referents simulated from the national data of the Thailand National Health Statistic Office. From July to December 2016, the EuroQoL 5-dimension questionnaire was used to measure quality of life (QoL) among 400 consecutive, cross-sectional subsamples. The survival functions were then adjusted by the utility values of QoL for the stroke cohort to estimate quality adjusted life expectancy (QALE). **Results:** The average health utility values were lower in the initial months, then slowly increased to stable levels. However, male stroke survivors presented higher health utility than females. Throughout lifetime estimation, patients with IS stroke exhibit better health outcomes than those with ICH [10.2 vs. 7.5 quality-adjusted life years (QALYs)]. Patients with ICH presented a significantly decreased QoL than patients with IS (16.3 and 8.5 QALYs). **Conclusion:** Preventing stroke can save people from reduced years and QoL, which can be quantified by loss-of-QALE in QALY units to compare health benefits from prevention, clinical diagnosis and direct treatment.]

[Informing Patients with Acute Stroke About their Risk of Dementia: A Survey of UK Healthcare Professionals.](#)

Ball E.L., Mead G.E., Tang E.Y.H., Religa D., Quinn T.J., and Shenkin S.D.

Journal of Stroke and Cerebrovascular Diseases, vol. 31(3)

March 2022

[Objectives: Cognitive problems following stroke are of key concern to stroke survivors. Discussing risk of dementia at the time of stroke could have implications for follow-up care. However, informing someone who has just had a stroke about risk of dementia could cause distress. This survey explored healthcare professionals' views on discussing risk of post-stroke dementia at the time of stroke. **Materials and Methods:** This online survey was aimed at all UK healthcare professionals who care for patients with stroke. The survey was distributed via the mailing lists of seven professional stroke-related organisations and Twitter. Descriptive statistics were used to summarise findings. **Results:** Sixty healthcare professionals completed the survey. Healthcare professionals were aware of the main risk factors associated with post-stroke dementia (e.g. previous stroke, age). Most respondents (N=34/60, 57%) thought that patients with acute stroke would benefit from knowing if they are at high risk of dementia, and 75% (N=45/60) agreed that carers would benefit. Despite this, the majority of healthcare professionals (N=47/53, 89%) who cared for patients with acute stroke in the past year said they rarely/never discussed dementia with their patients. Most respondents (N=46/60, 77%) thought risk of dementia should be discussed 1-6 months post-stroke. **Conclusion:** Although healthcare professionals felt it would be helpful to discuss risk of post-stroke dementia, in practice, most said that they rarely or never discussed this with their patients. Stroke survivors could benefit from a healthcare system that offers appropriate follow-up care and support to patients at high risk of dementia.]

[The impact of the UK COVID-19 pandemic on patient-reported health outcomes after stroke: a retrospective sequential comparison.](#)

Ozkan H., Ambler G., Banerjee G., Chan E., Browning S., Mitchell J., Perry R., Leff A.P., Simister R.J., Werring D.J.

Journal of Neurology, vol. 269(4) pp. 1741-1750

April 2022

[Background and Purpose: The COVID-19 pandemic and related social isolation measures are likely to have adverse consequences on community healthcare provision and outcome after acute illnesses treated in hospital, including stroke. We aimed to evaluate the impact of the COVID-19 pandemic on patient-reported health outcomes after hospital admission for acute stroke. **Methods:** This retrospective study included adults with acute stroke admitted to the University College Hospital NHS Foundation Trust Hyperacute Stroke Unit. We included two separate cohorts of consecutively enrolled patients from the same geographical population at two time points: 16th March-16th May 2018 (pre-COVID-19 pandemic); and 16th March-16th May 2020 (during the COVID-19 pandemic). Patients in both cohorts completed the validated Patient Reported Outcomes Measurement Information System-29 (PROMIS-29 version 2.0) at 30 days after stroke. **Results:** We included 205 patients who were alive at 30 days (106 admitted before and 99 admitted during the COVID-19 pandemic), of whom 201/205 (98%) provided patient-reported health outcomes. After adjustment for confounding factors, admission with acute stroke during the COVID-19 pandemic was independently associated with increased anxiety ($\beta = 28.0$, $p < 0.001$), fatigue ($\beta = 9.3$, $p < 0.001$), depression ($\beta = 4.5$, $p = 0.002$), sleep disturbance ($\beta = 2.3$, $p = 0.018$), pain interference ($\beta = 10.8$, $p < 0.001$); and reduced physical function ($\beta = 5.2$, $p < 0.001$) and participation in social roles and activities ($\beta = 6.9$, $p < 0.001$). **Conclusion:** Compared with the pre-pandemic cohort, patients admitted with acute stroke during the first wave of the COVID-19 pandemic reported poorer health outcomes at 30 day follow-up in all domains. Stroke service planning for any future pandemic should include measures to mitigate this major adverse impact on patient health.]

Rehabilitation

[Comparing different montages of transcranial direct current stimulation on dual-task walking and cortical activity in chronic stroke: double-blinded randomized controlled trial.](#)

Wong P.L., Yang Y.R., Tang S.C., Huang S.F., and Wang R.Y.

BMC Neurology, vol. 22(1)

March 2022

[Background: Transcranial direct current stimulation (tDCS) is a noninvasive brain stimulation to modulate cortical activity for improving motor function. However, the different tDCS applications for modulating cortical activity and dual task gait performance in chronic stroke have not yet been investigated. This study investigated the effects of different tDCS applications on dual task gait performance and contralesional M1 activation in chronic stroke.

Methods: Forty-eight participants were randomized to anodal, bilateral, cathodal, and sham tDCS groups. Each group received 20 min of tDCS stimulation, except the sham group. Gait performance was measured by GaitRite system during cognitive dual task (CDT) walking, motor dual task (MDT) walking, and single walking (SW). Contralesional M1 activity of unaffected tibialis anterior (TA) was measured using transcranial magnetic stimulation (TMS). Intragroup difference was analyzed by Wilcoxon sign ranks test with Bonferroni correction, and Kruskal-Wallis one-way analysis of variance by ranks was used for intergroup comparisons, followed by post-hoc Mann-Whitney U tests with Bonferroni correction. **Results:** The bilateral tDCS ($p = 0.017$) and cathodal tDCS ($p = 0.010$) improved the CDT walking speed more than sham group. The bilateral tDCS ($p = 0.048$) and cathodal tDCS ($p = 0.048$) also improved the MDT walking speed more than sham group. Furthermore, bilateral tDCS ($p = 0.012$) and cathodal tDCS ($p = 0.040$) increased the silent period (SP) more than the anodal and sham group. Thus, one-session of bilateral and cathodal tDCS improved dual task walking performance paralleled with increasing contralesional corticomotor inhibition in chronic stroke. **Conclusions:** Our results indicate that one-session of bilateral and cathodal tDCS increased contralesional corticomotor inhibition and improved dual task gait performance in chronic stroke.]

[High-Intensity Post-Stroke Rehabilitation Is Associated with Lower Risk of Pressure Ulcer Development in Patients with Stroke: Real-World Evidence from a Nationwide, Population-Based Cohort Study.](#)

Chen Y.C., Chen T.L., Cheng C.C., Yang Y.C., Wang J.H., Yip H.T., Hsu C.Y., and Cheng H.Y.

Medicina, vol. 58(3)

March 2022

[Background and Objectives: Multiple factors are associated with pressure ulcer (PU) development, including limited mobility following stroke. We performed a nationwide cohort study to investigate the impact of rehabilitation intensity on the incidence of post-stroke PU. **Materials and Methods:** Data of patients diagnosed with stroke between 2000 and 2012 were collected from the 2000 Longitudinal Health Insurance Database (Taiwan). Based on the number of rehabilitation sessions attended within 90 days of discharge, the rehabilitation intensity was classified as low, medium, or high. After adjusting for sociodemographic factors and comorbidities, the Cox proportional hazards model evaluated the risk of PU development during the 12-year follow-up period. Kaplan-Meier curves were used to estimate the cumulative incidence of PUs. **Results:** Our study included 18,971 patients who had their first episode of stroke. Of these, 9829 (51.8%) underwent rehabilitation therapy after discharge. Female patients and patients with a National Institutes of Health Stroke Scale (NIHSS) score >13 points, who commenced high-intensity post-stroke rehabilitation after discharge had a significantly lower risk of PU development than those who underwent low-intensity post-stroke rehabilitation after discharge. Cumulative survival analysis showed a significantly lower cumulative incidence of PU during the 12-year follow-up period in the high-intensity rehabilitation group. **Conclusion:** Compared with low-intensity post-stroke rehabilitation, high-intensity post-stroke rehabilitation after discharge from hospital is associated with a lower risk of post-stroke PU development, especially in female stroke patients and patients with a NIHSS score >13 points. High-intensity rehabilitation is also associated with a significantly lower cumulative incidence of PU events during the 12-year follow-up period.]

[Occupational therapy for cognitive impairment in stroke patients](#)

Gibson E., Koh C.L., Eames S., Bennett S., Scott A.M., Hoffmann T.C.

Cochrane Database of Systematic Reviews 2022, Issue 3. Art. No.: CD006430.

March 2022

[Background: Cognitive impairment is a frequent consequence of stroke and can impact on a person's ability to perform everyday activities. Occupational therapists use a range of interventions when working with people who have cognitive impairment poststroke. This is an update of a Cochrane Review published in 2010. **Objectives:** To

assess the impact of occupational therapy on activities of daily living (ADL), both basic and instrumental, global cognitive function, and specific cognitive abilities in people who have cognitive impairment following a stroke.

Authors' conclusions: The effectiveness of occupational therapy for cognitive impairment poststroke remains unclear. Occupational therapy may result in little to no clinical difference in BADL immediately after intervention and at three and six months' follow-up. Occupational therapy may slightly improve global cognitive performance of a clinically important difference immediately after intervention, likely improves sustained visual attention slightly, and may slightly increase working memory and flexible thinking after intervention. There is evidence of low or very low certainty or insufficient evidence for effect on other cognitive domains, IADL, and community integration and participation. Given the low certainty of much of the evidence in our review, more research is needed to support or refute the effectiveness of occupational therapy for cognitive impairment after stroke. Future trials need improved methodology to address issues including risk of bias and to better report the outcome measures and interventions used.]

[Quantifying the amount of physical rehabilitation received by individuals living with neurological conditions in the community: a scoping review.](#)

Saumur T.M., Gregor S., Xiong Y., and Unger J.

BMC Health Services Research, vol. 22(1)

March 2022

[Background: Physical rehabilitation is often prescribed immediately following a neurological event or a neurological diagnosis. However, many individuals require physical rehabilitation after hospital discharge. The purpose of this scoping review was to determine the amount of physical rehabilitation that individuals living in the community with neurological conditions receive to understand current global practices and assess gaps in research and service use.

Methods: This scoping review included observational studies that 1) involved adults living with a neurological condition, and 2) quantified the amount of rehabilitation being received in the community or outpatient hospital setting. Only literature published in English was considered. MEDLINE, EMBASE, AMED, CINAHL, Cochrane Library, and PEDro databases were searched from inception. Two independent reviewers screened titles and abstracts, followed by full texts, and data extraction. Mean annual hours of rehabilitation was estimated based on the amount of rehabilitation reported in the included studies. **Results:** Overall, 18 studies were included after screen 14,698 articles. The estimated mean annual hours of rehabilitation varied greatly (4.9 to 155.1 h), with individuals with spinal cord injury and stroke receiving the greatest number of hours. Participants typically received more physical therapy than occupational therapy (difference range: 1 to 22 h/year). Lastly, only one study included individuals with progressive neurological conditions, highlighting a research gap. **Discussion:** The amount of rehabilitation received by individuals with neurological conditions living in the community varies greatly. With such a wide range of time spent in rehabilitation, it is likely that the amount of rehabilitation being received by most individuals in the community is insufficient to improve function and quality of life. Future work should identify the barriers to accessing rehabilitation resources in the community and how much rehabilitation is needed to observe functional improvements.]

Stroke Risk

[Association of triglyceride-glucose index and stroke recurrence among nondiabetic patients with acute ischemic stroke.](#)

Yang X., Wang G., Jing J., Wang A., Zhang X., Jia Q., Meng X., Zhao X., Liu L., Li H., Wang Y., and Wang Y.

BMC Neurology, vol. 22(1)

March 2022

[Background and Purpose: Triglyceride-glucose (TyG) index has been considered a surrogate marker of insulin resistance. We investigated the association between TyG index and stroke recurrence and compared the effectiveness of TyG index with homeostasis model assessment of insulin resistance (HOMA-IR) in predicting stroke recurrence and death in nondiabetic acute ischemic stroke patients. **Methods:** Nondiabetic acute ischemic stroke patients from the ACROSS-China (Abnormal Glucose Regulation in Patients with Acute Stroke across China) registry were included. TyG index was performed and classified into four groups by quartiles. The outcomes were stroke recurrence and death within 1 year. The association between TyG index and the risk of stroke recurrence and death were analyzed by Cox regression models. Receiver operating characteristic (ROC) curve analysis was performed to

evaluate the prediction of TyG index and HOMA-IR for stroke recurrence and death. Delong test was used for comparing the differences between area under the curve (AUC) of TyG index and HOMA-IR. **Results:** Among the 1226 patients included, the median (interquartile range) of TyG index was 5.8 (5.5-6.2). Both the third and fourth quartiles of TyG index were associated with an increased risk of stroke recurrence (adjusted hazard ratio 2.04, 95% confidence interval 1.26-3.31; adjusted hazard ratio 1.86, 95% confidence interval 1.13-3.06). Patients with fourth quartiles of TyG index were associated with a higher mortality risk (adjusted hazard ratio, 2.91; 95% confidence interval, 1.62-2.53). Regarding stroke recurrence within 1 year, the AUC (95% confidence interval) of the ROC curve for the TyG index was similar to that of the HOMA-IR [0.56 (0.52-0.61) vs 0.57 (0.52-0.61); $P = 0.93$]. Regarding death within 1 year, the AUCs (95% confidence interval) of the ROC curve for the TyG index and HOMA-IR were 0.55 (0.50-0.61) and 0.59 (0.53-0.64), respectively ($P = 0.32$). **Conclusions:** Elevated TyG index was associated with an increased risk of stroke recurrence and death. However, neither of TyG nor HOMA-IR can be a qualified predictor of stroke recurrence and death in nondiabetic acute ischemic stroke patients.]

[Diabetic kidney disease and risk of incident stroke among adults with type 2 diabetes](#)

Kaze A.D., Jaar B.G., Fonarow G.C., and Echouffo-Tcheugui J.B.

BMC Medicine, vol. 20(1), pp.127

March 2022

[Background: Data on the relations between kidney function abnormalities and stroke in type 2 diabetes are limited. We evaluated the associations of kidney function abnormalities and chronic kidney disease (CKD) stages with incident stroke in a large sample of adults with type 2 diabetes. **Methods:** Participants with type 2 diabetes from the Action to Control Cardiovascular Risk in Diabetes (ACCORD) study without history of stroke at baseline were included. Urine albumin-to-creatinine ratio (UACR) and estimated glomerular filtration rate (eGFR) were assessed at baseline. CKD categories were defined according to the KDIGO (Kidney Disease: Improving Global Outcomes) guidelines. Cox proportional hazards regression models were used to compute hazard ratios (HR) and 95% confidence intervals (CI) for stroke in relation to measures of kidney function and CKD categories. **Results:** A total of 9170 participants (mean age 62.8 [SD: 6.6] years, 38.2% women, 62.9% white) were included. Over a median follow-up of 4.9 years (interquartile range: 4.0–5.7), 156 participants developed a stroke (incidence rate 3.6/1000 person-years [95% CI 3.0–4.2]). After adjusting for relevant confounders, higher UACR and lower eGFR were each associated with increased risk of stroke. Compared to UACR < 30 mg/g, moderate albuminuria and severe albuminuria were associated with increasing hazards for stroke (HR 1.61 [95% CI 1.12–2.32] and 2.29 [95% CI 1.39–3.80], respectively). Compared to eGFR of ≥ 60 mL/min/1.73 m², decreased eGFR (eGFR < 60 mL/min/1.73 m²) was associated with higher risk of stroke (HR 1.50, 95% CI 0.98–2.29). Compared to no CKD, worsening CKD stage was associated with an increasing risk of stroke (HRs of 1.76 [95% CI 1.10–2.83] for CKD G1, 1.77 [95% CI 1.13–2.75] for CKD G2, and 2.03 [95% CI 1.27–3.24] for CKD G3). **Conclusions:** In a large sample of adults with type 2 diabetes, increasing albuminuria and worsening stages of early CKD were independently associated with higher risk of incident stroke.]

[Galectin-3: A Novel Marker for the Prediction of Stroke Incidence and Clinical Prognosis.](#)

Sayed A., Munir M., Nabet M.S., Alghamdi B.S., Ashraf G.M., Bahbah El., and Elfil M.

Mediators of Inflammation

March 2022

[Stroke, whether ischemic or haemorrhagic, is one of the main causes of mortality and disability all over the world, which entails huge burdens in both healthcare environments as well as social and economic aspects of life. Therefore, there is a continuous search for novel reliable biomarkers that can enhance the recognition of stroke events in a timely manner and predict the clinical outcomes following a stroke event. Galectins are a group of proteins expressed by many types of cells and tissues including vasculature, certain immune cells, fibroblasts, and gastrointestinal epithelial cells. These proteins vary in their structure and configuration according to their type and have a diversity of functions according to the type of tissue they are expressed in. Among these proteins, a few studies investigated mainly the roles played by galectin-1 (Gal-1) and galectin-3 (Gal-3) in the molecular mechanisms

of atherosclerosis and in brain tissue remodelling after a stroke event. In this review, we present an updated overview of the current understanding of Gal-3's functions and implications in stroke occurrence and the response of the brain tissue to stroke events, which may be a key to its utility as a predictor of stroke incidence and clinical prognosis in the future.]

[Myocardial Injury and the Risk of Stroke in Patients With Chronic Kidney Disease \(From the Chronic Renal Insufficiency Cohort Study\).](#)

Hajjari J., Janus S.E., Albar Z., and Al-Kindi S.G.

Angiology, vol. 73(4) pp. 312-317

April 2022

[Patients with chronic kidney disease (CKD) are at increased risk for stroke. High-sensitivity troponin (hsTP), a marker of myocardial injury, has been associated with stroke risk in patients without CKD, but whether this applies to patients with CKD is not known. We assessed whether hsTP levels is associated with incident stroke in patients with mild-to-moderate CKD without a history of stroke enrolled in the Chronic Renal Insufficiency Cohort. Patients were followed for incident stroke, and the association with hsTP was assessed. A total of 3477 patients without prior stroke were included in this investigation. Over a median follow-up of 7.3 years, 101 (2.8%) patients had an incident stroke. Baseline hsTP was associated with a 9-year risk of stroke (quartile 1: 1.8%, quartile 2: 3.8%, quartile 3: 4.9%, quartile 4: 7.3%; $P < .001$). After adjusting for traditional stroke risk factors, patients in the fourth quartile (hazard ratio: 2.52, 95% CI: 1.10-5.76, $P = .021$) had higher risk of stroke when compared with the lowest quartile of hsTP. In conclusion, hsTP levels are associated with increased risk of incident stroke in patients with mild to moderate CKD, and this association remains significant despite the adjustment for traditional risk factors and CKD.]

[New Insights into Stroke Prevention and Treatment: Gut Microbiome](#)

Zhao L., Yang L., Guo Y., Xiao J., Zhang J., Xu S.

Cellular and Molecular Neurobiology, vol.42(2) pp. 455-472

March 2022

[Stroke, a lethal neurological disease, accounts for a grave economic burden on society. Despite extensive basic and clinical studies on stroke prevention, a precise effective treatment approach for stroke at this stage remains unavailable. The majority of our body's gut microbiota plays a vital role in food digestion, immune regulation, and nervous system development, which is highly associated with the development of some diseases. Multiple clinical studies have documented variation in the composition of gut microbiota between stroke patients and healthy counterparts. Moreover, the intervention of intestinal symbiotic microorganisms via several mechanisms plays an active role in stroke prognosis. In the prevention and treatment of stroke, the gut microbiota gives off a seductive glow, this is a promising therapeutic target. This paper summarizes the current knowledge of stroke and gut microbiota, and systematically describes the possible mechanisms of interaction between stroke and gut microbiota, the relationship between stroke-related risk factors and gut microbiota, and the treatment of gut flora using microorganisms. Thus, it could valuably elucidate the correlation of gut microbiota with stroke incidence, providing stroke researchers with a new strategy for stroke prevention and treatment by regulating gut microbiota.]

Thrombectomy / Endovascular Treatment

[Direct endovascular treatment versus bridging therapy in patients with acute ischemic stroke eligible for intravenous thrombolysis: systematic review and meta-analysis](#)

Zhang J., Chen S., Shi S., Zhang Y., Kong D., Xie Y., Deng X., Tang J., Luo J., and Liang Z.

Journal of Neurointerventional Surgery, vol. 14(4) pp. 321-325

April 2022

[Objective: In this review and meta-analysis we sought to compare the efficacy and safety of direct endovascular thrombectomy (EVT) and bridging therapy for intravenous thrombolysis (IVT)-eligible patients with acute ischemic stroke caused by large vessel occlusions (AIS-LVO). **Methods:** We searched Medline, Embase, and the Cochrane Library for published randomized clinical trials (RCTs) and observational studies providing outcomes of patients with IVT-eligible AIS-LVO who have undergone EVT with or without IVT. The primary outcome was the proportion of patients achieving a modified Rankin Scale (mRS) score of 0–2 at 90 days. The secondary outcomes included the rates of (1) an excellent outcome defined as an mRS score of 0 or 1 at 90 days, (2) mortality at 90 days, (3) symptomatic intracranial hemorrhage (sICH), (4) any type of intracranial hemorrhage (ICH), (5) successful

recanalization, and (6) clot migration. **Results:** We included three RCTs and six observational studies (4 of which were propensity score-adjusted studies) with a total of 3133 patients. In unadjusted and adjusted analyses, no differences in the rates of mRS scores 0–2, mRS scores 0–1, mortality at 90 days, sICH or successful recanalization were detected between patients with AIS-LVO who underwent direct EVT or bridging therapy. The patients treated with direct EVT had a lower risk ratio for any type of ICH and clot migration than did the patients treated with bridging therapy. **Conclusion:** Compared with bridging therapy, direct EVT may be equally effective and yield a lower rate of ICH and clot migration in patients with AIS.]

[Effect of first pass reperfusion on outcome in patients with posterior circulation ischemic stroke](#)

den Hartog S.J., Roozenbeek B., Boodt N., Bruggeman A.A.E., van Es A.C.G.M., Emmer B.J., Majoie C.B.L.M. et al
Journal of Neurointerventional Surgery, vol. 14 (4), pp. 333-340

April 2022

[Background: First pass reperfusion (FPR), that is, excellent reperfusion (expanded treatment in cerebral ischemia (eTICI) 2C-3) in one pass, after endovascular treatment (EVT) of an occluded artery in the anterior circulation, is associated with favorable clinical outcome, even when compared with multiple pass excellent reperfusion (MPR). In patients with posterior circulation ischemic stroke (PCS), the same association is expected, but currently unknown. We aimed to assess characteristics associated with FPR and the influence of FPR versus MPR on outcomes in patients with PCS. **Methods:** We used data from the MR CLEAN Registry, a prospective observational study. The effect of FPR on 24-hour National Institutes of Health Stroke Scale (NIHSS) score, as percentage reduction, and on modified Rankin Scale (mRS) scores at 3 months, was tested with linear and ordinal logistic regression models. **Results:** Of 224 patients with PCS, 45 patients had FPR, 47 had MPR, and 90 had no excellent reperfusion (eTICI <2C). We did not find an association between any of the patient, imaging, or treatment characteristics and FPR. FPR was associated with better NIHSS (–45% (95% CI: –65% to –12%)) and better mRS scores (adjusted common odds ratio (acOR): 2.16 (95% CI: 1.23 to 3.79)) compared with no FPR. Outcomes after FPR were also more favorable compared with MPR, but the effect was smaller and not statistically significant (NIHSS: –14% (95% CI: –51% to 49%), mRS acOR: 1.50 (95% CI: 0.75 to 3.00)). **Conclusions:** FPR in patients with PCS is associated with favorable clinical outcome in comparison with no FPR. In comparison with MPR, the effect of FPR was no longer statistically significant. Nevertheless, our data support the notion that FPR should be the treatment target to pursue in every patient treated with EVT.]

[Endovascular thrombectomy without versus with intravenous thrombolysis in acute ischemic stroke: a non-inferiority meta-analysis of randomized clinical trials](#)

Lin C.H., Saver J.L., Ovbiagele B., Huang W.Y., and Lee M.

Journal of Neurointerventional Surgery, vol. 14(3), pp. 227-232

March 2022

[Objective: To conduct a meta-analysis of randomized trials to comprehensively compare the effect of endovascular thrombectomy (EVT) versus intravenous thrombolysis (IVT) plus EVT on functional independence (modified Rankin Scale (mRS) 0–2) after acute ischemic stroke due to large vessel occlusions (AIS-LVO). **Methods:** We searched Pubmed, EMBASE, CENTRAL, and clinicaltrials.gov from January 2000 to February 2021 and abstracts presented at the International Stroke Conference in March 2021 to identify trials comparing EVT alone versus IVT plus EVT in AIS-LVO. Five non-inferiority margins established in the literature were assessed: –15%, –10%, –6.5%, –5%, and –1.3% for the risk difference for functional independence at 90 days. **Results:** Four trials met the selection criteria, enrolling 1633 individuals, with 817 participants randomly assigned to EVT alone and 816 to IVT plus EVT. Crude cumulative rates of 90-day functional independence were 46.0% with EVT alone versus 45.5% with IVT plus EVT. Pooled results showed the risk difference of functional independence was 1% (95% CI –4% to 5%) between EVT alone versus IVT plus EVT. The lower 95% CI bound of –4% fell within the non-inferiority margins of –15%, –10%, –6.5%, and –5%, but not –1.3%. Pooled results also showed the risk difference between EVT alone versus IVT plus EVT was 1% (95% CI –3% to 5%) for mRS 0–1, and 1% (95% CI –1% to 3%) for symptomatic intracranial hemorrhage. **Conclusions:** This meta-analysis suggests that EVT alone is non-inferior to IVT plus EVT for several, but not the most stringent, non-inferiority margins.]

[Local anesthesia as a distinct comparator versus conscious sedation and general anesthesia in endovascular stroke treatment: a systematic review and meta-analysis](#)

Butt W., Dhillon P.S., Podlasek A., Malik L., Nair S., Hewson D., England T.J., Lenthall R., McConachie N.

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[Background: The optimal anesthetic modality for endovascular treatment (EVT) in acute ischemic stroke (AIS) is undetermined. Comparisons of general anesthesia (GA) with composite non-GA cohorts of conscious sedation (CS) and local anesthesia (LA) without sedation have provided conflicting results. There has been emerging interest in assessing whether LA alone may be associated with improved outcomes. We conducted a systematic review and meta-analysis to evaluate clinical and procedural outcomes comparing LA with CS and GA. **Methods:** We reviewed the literature for studies reporting outcome variables in LA versus CS and LA versus GA comparisons. The primary outcome was 90 day good functional outcome (modified Rankin Scale (mRS) score of ≤ 2). Secondary outcomes included mortality, symptomatic intracerebral hemorrhage, excellent functional outcome (mRS score ≤ 1), successful reperfusion (Thrombolysis in Cerebral Infarction (TICI) $> 2b$), procedural time metrics, and procedural complications. Random effects meta-analysis was performed on unadjusted and adjusted data. **Results:** Eight non-randomized studies of 7797 patients (2797 LA, 2218 CS, and 2782 GA) were identified. In the LA versus GA comparison, no statistically significant differences were found in unadjusted analyses for 90 day good functional outcome or mortality (OR=1.22, 95% CI 0.84 to 1.76, $p=0.3$ and OR=0.83, 95% CI 0.64 to 1.07, $p=0.15$, respectively) or in the LA versus CS comparison (OR=1.14, 95% CI 0.76 to 1.71, $p=0.53$ and OR=0.88, 95% CI 0.62 to 1.24, $p=0.47$, respectively). There was a tendency towards achieving excellent functional outcome (mRS ≤ 1) in the LA group versus the GA group (OR=1.44, 95% CI 1.00 to 2.08, $p=0.05$, $I^2=70\%$). Analysis of adjusted data demonstrated a tendency towards higher odds of death at 90 days in the GA versus the LA group (OR=1.24, 95% CI 1.00 to 1.54, $p=0.05$, $I^2=0\%$). **Conclusion:** LA without sedation was not significantly superior to CS or GA in improving outcomes when performing EVT for AIS. However, the quality of the included studies impaired interpretation, and inclusion of an LA arm in future well designed multicenter, randomized controlled trials is warranted.]

[Mechanical thrombectomy with retrievable stents and aspiration catheters for acute ischaemic stroke: a meta-analysis of randomised controlled trials](#)

Rajkumar C.A., Ganesanathan S., Ahmad Y., Seligman H., Thornton G.D., Foley M., Nowbar A.N., Howard J.P. et al *EuroIntervention*, vol. 17(17), pp. e1425-e1434

April 2022

[Background: Retrievable stents and aspiration catheters have been developed to provide more effective arterial recanalisation in acute ischaemic stroke. **Aims:** The aim of this analysis was to test the effect of mechanical thrombectomy on mortality and long-term neurological outcome in patients presenting with acute large-vessel anterior circulation ischaemic stroke. **Methods:** A structured search identified randomised controlled trials of thrombectomy (using a retrievable stent or aspiration catheter) versus control on a background of medical therapy which included intravenous thrombolysis if appropriate. The primary endpoint was disability at 90-day follow-up as assessed by the modified Rankin scale (mRS). Secondary endpoints included all-cause mortality and symptomatic intracranial haemorrhage. A Bayesian mixed-effects model was used for analysis. **Results:** Twelve trials met the inclusion criteria, comprising a total of 1,276 patients randomised to thrombectomy and 1,282 patients to control. Randomisation to thrombectomy significantly reduced disability at 90 days (odds ratio [OR] 0.52, 95% credible interval [CrI] 0.46 to 0.61, probability(control better) <0.0001). Furthermore, thrombectomy reduced the odds of functional dependence at 90 days, indicated by an mRS score > 2 (OR 0.44, CrI 0.37 to 0.52, $p<0.0001$). Thrombectomy reduced all-cause mortality at 90 days (16.1% vs 19.2%, OR 0.81, 95% CrI 0.66 to 0.99, $p=0.024$). The frequency of symptomatic intracranial haemorrhage was similar between thrombectomy (4.2%) and control (4.0%) (OR 1.12, 95% CrI 0.76 to 1.68, $p=0.72$). **Conclusions:** In patients with an acute anterior circulation stroke, modern device thrombectomy significantly reduces death and subsequent disability. The magnitude of these effects suggests that universal access to this treatment strategy should be the standard of care.]

[Nomogram to predict 3-month unfavorable outcome after thrombectomy for stroke.](#)

Zhang X.G., Wang J.H., Yang W.H., Zhu X.Q., Xue J., Li Z.Z., Kong Y.M., Hu L., Jiang S.S., Xu X.S., Yue Y.H.

BMC Neurology, Vol. 22 (1)

March 2022

[Background: Mechanical thrombectomy (MT) is an effective treatment for large-vessel occlusion in acute ischemic stroke, however, only some revascularized patients have a good prognosis. For stroke patients undergoing MT, predicting the risk of unfavorable outcomes and adjusting the treatment strategies accordingly can greatly improve prognosis. Therefore, we aimed to develop and validate a nomogram that can predict 3-month unfavorable outcomes for individual stroke patient treated with MT. **Methods:** We analyzed 258 patients with acute ischemic stroke who underwent MT from January 2018 to February 2021. The primary outcome was a 3-month unfavorable outcome, assessed using the modified Rankin Scale (mRS), 3-6. A nomogram was generated based on a multivariable

logistic model. We used the area under the receiver-operating characteristic curve to evaluate the discriminative performance and used the calibration curve and Spiegelhalter's Z-test to assess the calibration performance of the risk prediction model. **Results:** In our visual nomogram, gender (odds ratio [OR], 3.40; 95%CI, 1.54-7.54), collateral circulation (OR, 0.46; 95%CI, 0.28-0.76), postoperative mTICI (OR, 0.06; 95%CI, 0.01-0.50), stroke-associated pneumonia (OR, 5.76; 95%CI, 2.79-11.87), preoperative Na (OR, 0.82; 95%CI, 0.72-0.92) and creatinine (OR, 1.02; 95%CI, 1.01-1.03) remained independent predictors of 3-month unfavorable outcomes in stroke patients treated with MT. The area under the nomogram curve was 0.8791 with good calibration performance (P = 0.873 for the Spiegelhalter's Z-test). **Conclusions:** A novel nomogram consisting of gender, collateral circulation, postoperative mTICI, stroke-associated pneumonia, preoperative Na and creatinine can predict the 3-month unfavorable outcomes in stroke patients treated with MT.]

[Rates of adverse events in patients with ischemic stroke treated at thrombectomy capable hospitals](#)


Chaudhry S.A., Sadaf H., Laleka I., Nasir W., Witzel C., Bahiru Z., Fang Y., Ishfaq F., Altaweel L.R., and Qureshi A.I. *Journal of Neurointerventional Surgery*, vol. 14(4), pp. 346-349.


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[Objective: To identify the beneficial effects of thrombectomy capable hospitals (TCHs), by comparing the incidence of in-hospital adverse events and discharge outcomes among patients with ischemic stroke treated at thrombectomy capable and non-thrombectomy capable hospitals in the United States. **Methods:** We used the data from the Nationwide Inpatient Sample from January 2012 to December 2017. Thrombectomy capable hospitals were identified based on the number of thrombectomy procedures performed by a hospital each year among patients with ischemic stroke. If a hospital performed 10 or more thrombectomy procedures, it was labelled a TCH. The inclusion criteria were age ≥ 18 years, and ischemic stroke (International Classification of Diseases 433.x1-434.x1 (ICD-9) or I63 (ICD-10)) as primary discharge diagnosis. A comparative analysis of propensity-matched patient groups was done to study the influence of TCH admissions on in-hospital outcomes. **Results:** A total of 2 826 334 patients with primary ischemic stroke were identified. In a multivariate logistic regression model after adjusting for age, sex, race/ethnicity, hospital teaching status, comorbidities, and all patients refined diagnosis-related groups-based disease severity, patients admitted to a TCH were found to have low incidence of in-hospital adverse events: pneumonia (OR=0.86, 95% CI 0.78 to 0.93), urinary tract infection (OR=0.87, 95% CI 0.84 to 0.91), sepsis (OR=0.91, 95% CI 0.81 to 1.02), and pulmonary embolism (OR=0.89, 95% CI 0.77 to 1.03); in-hospital death (OR=0.82, 95% CI 0.78 to 0.88); and higher rate of home discharge (OR=1.09, 95% CI 1.06 to 1.12). **Conclusions:** A decrease in-hospital adverse events and improved discharge outcomes were observed among patients with ischemic stroke admitted to a TCH compared with a non-TCH.]

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