Question 43 evidence tables

# Question 43: Does transporting people with suspected acute stroke directly to a thrombectomy centre improve outcomes compared to being taken to the patient's nearest acute stroke centre?

*NB Any discrepancies between reviewers in evidence quality and comment were discussed at the corresponding evidence review meeting*

EVT = endovascular therapy, LVO = large vessel occlusion, MS = mothership, MT = mechanical thrombectomy, CSC = comprehensive stroke centre, PSC = primary stroke centre, DS = drip and ship, LKW = last known well, INR = interventional neuroradiologist, HEMS = helicopter emergency services, GMS = ground medical services, QALY = quality-adjusted life year, CT = computed tomography, CTA = computed tomography angiography, IVT = intravenous thrombolysis, DTN = door-to-needle, DIDO = door-in-door-out, TICI = thrombolysis in cerebral infarction, SR = systematic review, MA = meta-analysis, RCT = randomised controlled trial, IPDMA = individual patient data meta-analysis, MDT = multidisciplinary team, PICO = patient/population, intervention, comparison and outcomes, OR = odds ratio, CI = confidence interval, QoL = quality of life, ADL = activities of daily living, OR = odds ratio, RR = relative risk, aOR = adjusted odds ratio, cOR = crude odds ratio, CI = confidence interval, RoB = risk of bias, I2 = heterogeneity statistic.

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 85 | S. Abilleira et al. (2019). Transfer to the Local Stroke Center versus Direct Transfer to Endovascular Center of Acute Stroke Patients with Suspected Large Vessel Occlusion in the Catalan Territory (RACECAT): Study protocol of a cluster randomized within a cohort trial. *Int J Stroke,* 14:7 734-744 | This is a study desription rather than a published study outcome. It is a randomised study with blinded andpoints. The aim is to establish whether for patients with clinical LVO, direct transfer to EVT unit results in better outcomes than to PSC and secondary transfer to EVT unit. The study utilises clinical RACE scale for ambulance assessment rather than imaging. Patients included MRS<2; transfer can be completed within 7 hours of onset. The study aims to balance patients within and out of hours, in urban and rural areas. Randomisation is via smartphone with neurologist communicating directly with ambulance staff. | The patients will either be managed at their nearest non-EVT centre or transferred directly to EVT centre according to their randomisation. If patient is subsequently found to be eleigible for EVT at non-EVT centre they wil be transferred secondarily and treated as per regional protocol. | Primary outcome measures are: MRS at 90 days. Secondary outcomes ordinal shift analysis into MRS changes; outcomes in psecific groups e.g. age, sex, tpa or not, early improvement in NIHSS, mortality, ICH (shift analysis) in the following populations: all | Equivalent good outcomes (90-daye MRS 0-2) 32.8% PSC vs 33.4% EVT centre. Mortality was 37.3% and 35.8% respectively in these groups. MRS shift was also balanced. | ++ |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 77 | K. M. Adams et al. (2019). Outcomes after Thrombectomy in Belfast: Mothership and Drip-and-Ship in the Real World. *Cerebrovascular Diseases,* 47:44717 231-237 | Northern Ireland. Stroke network of single CSC, 7 PSCs. Retrospective cohort study. n=214 patients. Data collected retrospectively from clinical records of all AIS patients who had thrombectomy in CSC between Jan 2014-Dec 2017. | Two groups: MT patients presenting directly to CSC/mothership (MS,n=124) vs MT patients brought first to PSC then drip and ship to CSC (DS,n=90). | Primary outcome measure: functional independence 3 months mRS 0-2. Secondary outcome measures: full recovery mRS 0 at 3 months, symptomatic ICH rates, mortality rates. | No significant difference in primary outcome (mRS 0–2 at 3 months, MS 51.6%, DS 62.2%, p= 0.123). Secondary outcomes: No significant difference in full recovery (mRS 0, MS group 21.8%, DS 12.2%, p = 0.071). No significant difference in sICH (MS 0.8%, DS 4.4%, p = 0.082) and mortality at 3 months (MS 24.2%, DS 20.0%, p = 0.468). MS group were older (73 vs 70yrs, p=0.026). More basilar artery occlusions in DS group (18.9% vs 6.5% p=0.014). No significant difference in baseline NIHSS, IV thrombolysis rates, or TICI 2b-3 between groups. Where known, LSW/onset time to CSC door was shorter in MS group (71 vs 218 min, p< 0.001). CSC door to groin puncture time longer in MS group (60 vs 30 min, p < 0.001). | -<br><br>Observational retrospective analysis with a relatively small sample size. Simple analysis only, confounders such as difference in age, number of basilar occlusions, and difference in onset/LKW to recanalization time not controlled for in analysis. Relatively large difference in proportion of patients with mRS 0-2 in DS group versus MS group but did not meet statistical significance. No mRS shift analysis undertaken. Selection bias: Patients transferred by drip & ship but no longer suitable for thrombectomy not identified or included. Fewer patients treated in DS group despite the fact that more patients with AIS presented to PSCs than CSC during study period. No significant difference in functional independence between MS and DS groups does not necessarily imply both paradigms are equally effective. DS group analysed likely reflects a select group from PSCs who were referred and had good collaterals. Strengths: data from an entire country, all patient treated in single centre, no patients lost to follow up. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 77 | K. M. Adams et al. (2019). Outcomes after Thrombectomy in Belfast: Mothership and Drip-and-Ship in the Real World. *Cerebrovascular Diseases,* 47:44717 231-237 | Setting is NI where there has been an in-hours thrombectomy service since at least 2014. All the operators from that time were experienced INRs. This is a retrospective cohort study; the authors reviewed all mechanical thrombectomy patients over a 4-year period and divided them into two groups depending on whether they presented directly to the CSC or PSC and subsequently trasnferred for MT, and compared demographics and outcomes between the two groups. A total of 214 patients (124 direct [Mothership; MS]; 90 drip and ship [DS]). The groups were matched according to age, sex, clinical deficit, known time of onset. | There is no detail on actual technique used; this is primarily a comparitive study on outcomes. There were slightly higher number in PSC group that had IVT prior to MT (41.9 vs 54.4%; not sign.), slightly higher number of basilar thromboses (6.5 vs 18.9%) as time limit in SOP was 12 hours from onset. There was no statistically significant difference in clot locations between the groups. Significantly increased onset to CSC times in PSC group 71 (49-129) vs 218 (192-285) min. | Primary outcomes studued were 24 hr NIHSS, functional independence at 3 months, procedural safety (symptomatic ICH; SITS-MS criteria). | No significant difference in primary outcomes between the two groups: MRS<2 DS 62.2% vs MS 51.6%; non-significant trend towards full recovery (MRS 0) in MS 21.8% vs 12.2%; no significant difference in rates of ICH, 24hr NIHSS or mortality at 3/12. | **+** |
| 77 | K. M. Adams et al. (2019). Outcomes after Thrombectomy in Belfast: Mothership and Drip-and-Ship in the Real World. *Cerebrovascular Diseases,* 47:44717 231-237 | Cohort study treated at single comprehensive stroke centre following direct presentation v transfer from non-thrombectomy centre. N = 214 patients. | Treatment with thrombectomy after direct presentation to the treating centre or treatment after first presenting to a non-thrombectomy enabled centre. | Modified Rankin Scale 0 - 2 at 3 months. Secondary outcomes mortaliy, full recovery and symptomatic haemorrhage. | No difference between groups in primary outcome. Trend to more full recovery in group presenting directly to the thrombectomy centre. Door to groin puncture times at thrombectomy centre were 60minutes for direct presentation and 30 minutes for transferred patients. Median transfer delay in transferred patients was 64 minutes. 65 patients treated outside agreed criteria. | **0**<br><br>Treating centre and a second group that presented directly to the treating centre. Not possible to judge how many patients presented to non-thrombectomy centre and were declined transfer despite meeting criteria or how referral criteria deviations were split across the two groups. No separate analysis on outcomes for patients with known onset times (only c.70% of cases). |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 78 | J. S. Balami et al. (2020). The cost of providing mechanical thrombectomy in the UK NHS: A micro-costing study. *Clinical Medicine, Journal of the Royal College of Physicians of London,* 20:3 E40-E45 | UK, National Health Service. Economic study. Multicentre retrospective study of costs incurred through delivery of thrombectomy. 310 patients treated in 5 neuroscience centres. 192 mothership patients and 118 drip-and-ship patients. | Acute/inpatient costs of thrombectomy were evaluated with individual contributary costs (e.g. Imaging/procedure/transfer/bed stay) also analysed). | Acute costs of providing thrombectomy including costs of imaging, procedure, transfer and bed stay. | The mean total cost of providing MT inpatient care was £10, 846. The MT procedure accounted for 73% of costs. Costs higher with GA use and ITU admission. 192 mothership patients, mean 24-hour costs of MT were £10,780 (SD 2,786) compared with £10,989 (SD 2,832) for the 118 drip-and-ship patients, mean difference £209 (95% CI 453–870). Transportation costs statistically lower for mothership patients (mean difference £236 (95% CI 178–293); p<0.001). 23 patients who could have been treated through a drip and ship route were treated via a direct to mothership model. Costs were ctually higher for these patients but the numbers included were small. | **+**<br><br>The study provides good evidence for acute cost estimation for patients presenting either directly to thrombectomy centres or to acute stroke centres which with known proportions can be used to estimate the overall cost of a service. However, the numbers of patients included in the study who bypassed the acute stroke centre were too small to provide a reliable estimate regarding the economic impact of this model. |
| 79 | D. Coughlan et al. (2021). Secondary transfer of emergency stroke patients eligible for mechanical thrombectomy by air in rural England: economic evaluation and considerations. *Emerg Med J,* 38:1 33-39 | Rural England. Economic study, cost effectiveness analysis of secondary transfer method to CSC of AIS patients eligible for mechanical thrombectomy in rural England from 'unavoidably small and remote' hospitals serving a population of ≤200,000 people who are domiciled more than 60 min travel by road from the nearest (major acute) hospital. Used base case of early-presenting (<6 hours to arterial | Comparison of cost effectiveness of secondary transfer by helicopter emergency medical services (HEMS) with ground emergency medical services (GEMS) of mechanical thrombectomy patients in rural England. | Total costs and QALYs (quality adjusted life years) were modelled for both HEMS and GEMS to estimate the incremental cost per QALY gained (Incremental cost-effectiveness ratio/ICER). | In the base-case analysis, for a reduction in the time to reperfusion by 60 min in an early-presenting patient (360 to 300min), secondary transfer by HEMS for MT was associated with a higher probability of living independently at 90 days than GEMS.<br><br>Over a lifetime horizon using HEMS as a secondary | **++**<br><br>Comment High quality study. The results of this study are however not directly applicable to the patient group targeted by this PICO and guideline. Evaluates cost effectiveness of air and ground transport costs in select group of rural patients for drip and ship model, does not evaluate or compare cost effectiveness of direct |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | puncture) patient aged 75 years with stroke eligible for thrombectomy. | | | transportation strategy to enable thrombectomy 60 min earlier the ICER is £28 027 per QALY gained.<br>When time of arterial puncture and reductions in travel time were altered ICERs were higher and above standard NICE cost-effectiveness threshold (£20–£30 000 per QALY). Reduction of at least 60 min travel time required for the use of HEMS to be considered cost-effective.<br>For late presenters, HEMS not cost-effective at any acceptable cost-effectiveness threshold to NHS commissioners. | transportation of same patient group directly to mothership. |
| 80 | K. Halvorsrud et al. (2018). A Delphi study and ranking exercise to support commissioning services: future delivery of Thrombectomy services in England. *BMC health services research,* 18:1 135 | UK based mutispecialty Delphi study encompassing two rounds of options selection. | To assess preferred model of care for delivery of thrombectomy assessed by members of the British Association of Stroke Physicians (BASP) and British Society of Neuroradiology (BSNR). | 12 options initially assessed ranging from ad hoc delivery by any local provider through to transfer after local imaging to a neuroscience centre for treatment by an interventional neuroradiologist (INR) or for INRs to travel to individial institutions. | The preferred option amongst British Stroke Phycisians and Neuroradiologistswas for patients to be trasferred to the neuroscience centre for thrombectomy based on local CT/CTA in a hub and spoke model. | **+**<br><br>There is some potential for bias in the selction of the Delphi panel(s). However, if it is assumed that the respondents represent the views of British stroke physicians and neuroradiologists. |
| 80 | K. Halvorsrud et al. (2018). A Delphi study and ranking exercise to support commissioning services: future delivery of | Expert opinion (delphi study design); Patients in the UK with acute ischaemic stroke and large vessel occlusion requiring confirmation of diagnosis, evaluation for eligibility for | The Delphi methodology was followed: initial development of 12 propositions for thrombectomy service | Most favoured proposition(s) approved by specialist panel for assessment and transfer to thrombectomy centres of patients with acute | Most supported proposition (97% of the wider panel of stroke physicians and 86% of neuroradiologists) was "patients with large artery occlusive stroke are | 0<br><br>Well performed Delphi analysis with some caveats including, limited response rate by wider stroke and neuroradiology |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | Thrombectomy services in England. *BMC health services research,* 18:1 135 | thrombectomy and treatmet in a thrombectomy centre | provision; in round one, scoring of each of these propositions using a 7-point Likert scale by a group of volunteers from an invited group of stroke specialists employed to participate in 24/7 thrombectomy services removed 3 unsupported propositions (<75% of response falling within favourable categories) and reduced list to three supported propositions by end of round 2; in round three a wider panel of stroke physicians involved with thrombectony and members of british society of neuroradiologists were invited to score final three propositions. | ischaemic stroke and large vessel occlusion potentially eligible for thrombectomy | transferred to nearest [neuroscience] centre for thrombectomy based on local CT/CTA alone." | community (approximately 15% of total membership for both) for participation in round three meant that the initial panel members involved in rounds one and two were a significant minority of round three stroke physician panel and more general potential for bias amongst those participating and initial panel of stroke physicians all based in thrombectomy centres so potential that opinion of stroke community outside of thrombectomy centres was incompletely represented in rounds one and two. |
| 81 | J. K. Holodinsky et al. (2018). Drip and ship versus direct to endovascular thrombectomy: The impact of treatment times on transport decision-making. *Eur Stroke J,* 3:2 126-135 | Theoretical modelling study for Eire on comparison of drip and ship versus mothership. | None as such. | Probability of good outcome (functional independence). | Time to local IVT and time to thrombectomy at tertiary sites heavily impact model outcomes e.g if DTN time is reduced to a median of 30 min at all hospitals, the drip-and-ship model almost always provides the greatest probability of good outcome. | **N/A** Modelling study not clinical study. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | | The impact of reducing DIDO time to 60 min overall (while holding DTP times at baseline values) by both reducing DTN to 30 min and reducing the turnaround time to 30 min. This has a profound impact on transport decision making and the drip-and-ship model predicts the best outcome. If all treatment times are optimised; 60-min DIDO time (comprised of 30-min DTN time and 30-min turnaround time) and 60-min DTP time in the mothership scenario, the drip-and-ship model remains relevant in the majority of the country. The mothership model prevails only in areas very close to EVT centres. | |
| 86 | I. E. R. MacKenzie et al. (2021). Impact of Direct Admission Versus Interfacility Transfer on Endovascular Treatment Outcomes for Acute Ischemic Stroke: Systematic Review and Meta-Analysis. *World Neurosurg,* 152: e387-e397 | Systematic review and meta-analysis of 31 studies (>49,000 patients) measuring impact of direct transfer to thrombectmy centre versus inter-facility transfer on time metrics and functional outcome. Observational (CASE CONTROL, COHORT AND RCT data, although not told specifically about how many were RCT. Note patents were excluded if they had solely thrombolysis (regardless whether they were transferred to thrombectomy). This introduces immediate bias and is a confounder and perhaps limits | Direct transfer of patients with LVO to MT centre undergoing MT versus transfer from primary site. Note patients only receiving IVT were excluded. | mRS (0-2), mRS (0-1) at 90 days, door to puncture, onset to puncture, TICI 2b/3, symptomatic ICH. | Directed transfer patients were older. No significant differences in ICH or mortality. No significant difference in mRS (0-2) between both groups. However significantly higher levels of excellent functional outcome (mRS 0-1) achieved with direct transfer. Door to puncture times and onset to puncture times were shorter with direct transfers. | +<br><br>All studies are observational with no documentation of RCTs noted. Population studies are biased as patients who only received thrombolysis were excluded leading to non generalisability. Acknowledge that numbers analaysed were considerable providing statistical power to the analysis with narrow CI delineating precision. However studies are heterogeneous (urban vs rural). Study should be categorised as acceptable only. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | generalisability. Review carried out by three authors. | | | | |
| 83 | D. Weisenburger-Lile et al. (2019). Direct Admission versus Secondary Transfer for Acute Stroke Patients Treated with Intravenous Thrombolysis and Thrombectomy: Insights from the Endovascular Treatment in Ischemic Stroke Registry. *Cerebrovascular Diseases,* 47:44654 112-120 | France. Multicentre, observational cohort study of select group of patients with anterior circulation stroke, who had IV thrombolysis and thrombectomy, from prospective ETIS registry, n=971 patients from 3 CSCs and 35 PSCs. | Comparison of outcomes in two groups: patients presenting directly to CSC/mother ship (MS,n=298) vs patients brought first to PSC then drip and ship to CSC (DS,n=673). | Primary outcome: % of pts with 90 day functional independence (mRS 0-2). Secondary outcomes: 90 day excellent outcome (mRS 0-1), global disability by overall distribution of mRS at 90 days, early major neurologic improvement (NIHSS 0-1 at 24 h, or NIHSS d. | Greater mRS 0-2 in MS (60.1%) than DS (52.6%). Difference remained significant after adjustment (RR 0.87; 95% CI 0.77-0.98) (model included age, admission NIHSS, ASPECTS, occlusion site, all baseline differences at $p < 0.10$ in bivariate analyses except process times. Greater excellent outcome in MS than DS group (adjusted RR 0.83, 95% CI 0.71–0.97). No difference in rate of early neurological improvement, TICI 2b/3, mortality at 90 days. Stratified by transfer distance: greater mRS 0-2 in MS than DS group when transfer >12.5 miles (adjusted RR 0.82; 95% CI 0.71-0.94). At distance ≤12.5 miles rate of mRS 0-2 in DS not different to MS. After adjustment on time between symptom onset to groin puncture all effect sizes were attenuated and none remained significant. Of note, onset to imaging and imaging to IVT significantly longer in DS group than MS group, implying less efficient process in PSCs. Of note, onset to imaging and imaging to IVT | **++**<br><br>Large cohort from prospective registry, with detailed analysis, and adjustment for potential confounders, and including analysis of DS group stratified by transfer distance. |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | | | | | significantly longer in DS group than MS group, implying less efficient process in PSCs. | |
| 83 | D. Weisenburger-Lile et al. (2019). Direct Admission versus Secondary Transfer for Acute Stroke Patients Treated with Intravenous Thrombolysis and Thrombectomy: Insights from the Endovascular Treatment in Ischemic Stroke Registry. *Cerebrovascular Diseases,* 47:44654 112-120 | Setting is major French metropolitatan area with 3 SCS and 35 PSCs with a high annual caseload. Established and highly regarded INR centres. Study compared outcomes for patient admitted directly to CSC compaed with those admitted to PSC. Design: Retrospective cohort study. Subjects: 867 out of total 1838 LVO patients admitted over the 4 year period. Basilar occlusions were excluded. IV pre-treatment was an inclusion crieria and patients were excluded (n=588 in total) if they had not received this. 77 did not have 90-day follow up and were excluded. | The study groups were balanced wrt to age, sex, background history (HTN, lipids, smoking), NIHSS (mean 15), ASPECTS, occlusion site, general anaesthesia vs local anaesthesia. No detail on exact method of MT but it is expected to be balnced between the two groups. Balloon-guide catheters were not readily available for most of the study period. Distance from CSC was also noted with mean of 12.5 miles being a cut-off. | Primary outcome measured wAS: 90-day functional independence (MRS 0-2). Secondary outcomeds; rate of excellent neurological recovery at 90 days (MRS 0-1); Improvement in NIHSS at 24 hours; successful reperfusion; 90-day all-cause mortality; ICH and sICH. | Greater functional indepencence in MS group compared with DS/PSC group: 60.1 vs 52.6%. If PSC was less than 12.5 miles from CSC then the difference was not significant. Difference in excellent outcome overall for MS model (RR 0.88). No difference in recan and early neurological improvement. No significant difference in all ICH between groups although high rates were obsevred (41.4% DS vs 32.8% MS) as definition included non sICH and any ICH on MRI. | **+**<br><br>The time to transfer only represented 17% of delay between symptom onset and groin puncture. This indicates there are still significant improvements that can be made to the stroke pathway that are at least as important to outcomes. |
| 84 | L. Zhang et al. (2021). Hub-and-spoke model for thrombectomy service in UK NHS practice. *Clinical Medicine, Journal of the Royal College of Physicians of London,* 0: E26-E31 | Single centre. Series. Pateints referrred for thrombectomy either presenting directly to the centre or transferred from other hospitals | Recanalisation rates. mRS at 3 months | Similar results to HERMES. | This study is of academic interest but does not have a clearly focussed question. Comparisons are open to bias. The statistical tests are not clear. Some comparisons that look significant are not and vice versa. In a supplementary table one median lies outside the interquartile range. | |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| 84 | L. Zhang et al. (2021). Hub-and-spoke model for thrombectomy service in UK NHS practice. *Clinical Medicine, Journal of the Royal College of Physicians of London,* 0: E26-E31 | UK, National Health Service. Observational study: retrospective review of prospectively acquired registry. Single thrombectomy centre with multiple spoke institutions. | Assessment of clinical outcomes dependant of whether the patient presented directly to the thrombectomy centre or whether they were referred to the thrombectomy centre via initial assessment/treatment at an acute stroke centre. | Process time (symptoms to arterial puncture and symptoms to recanalisation). Successful recanalisation (TICI 2b/3); Favourable functional outcome (mRs 0-2); Mortality. | Despite longer process times, the technical outcome (recanalisation rate) and clinical outcomes (mRs and mortality) did not differ significantly suggesting that a hub and spoke pattern of delivery was safe. | **+**<br><br>As the authors state, a potential bias in the study is the group that were transferred but did not proceed to thrombectomy (perhaps due to long DIDO or transfer times) as they had developed large infarcts before the procedure. This highlights the need for organisation and investment in the whole pathway. |
| 696 | N. Perez De La Ossa et al. (2022). Effect of Direct Transportation to Thrombectomy-Capable Center vs Local Stroke Center on Neurological Outcomes in Patients with Suspected Large-Vessel Occlusion Stroke in Nonurban Areas: The RACECAT Randomized Clinical Trial. *JAMA - Journal of the American Medical Association* 327:18 1782-1794 | Multi centre RCT (cluster) with suspected LVO (Catalonia) examining whether direct transportation to thrombectomy centres improves outcome compared to transfer to local centre (non-urban population) where MT was not possible. | Transportation to thrombectomy centre vs Local stroke centre. | Primary outcome: mRS at 90 days Secondary (IVT metrics, MT metrics, mortality. | 1401 patients (safety analysis) 1369 (as randomised analysis) thrombectomy centre: 688 Local centre 713. No difference in mRS TC: 3 LC:3 Higher rates of IVT in local centre and higher rates of MT in thrombectomy centre and no difference in mortality. | Good study, however conducted in single geographical region and requires replication in other regions with specific similarities with UK systems. |
| 696 | N. Perez De La Ossa et al. (2022). Effect of Direct Transportation to Thrombectomy-Capable Center vs Local Stroke Center on | Cluster spatial-temporal RCT Catalonia.<br><br>6 CSCs<br>22 “PSCs” included | Evaluating superiority of direct transport to CSC bypassing PSC -Transport to CSC 20-180mins | Primary: Shift analysis of mRS at 90/7 for disability. Central assessment over telephone by blinded reviewers | 7475 screened, 2054 assessed for eligibility & 653 excluded so 1401 randomised (688 to bypass, 713 to usual PSC care route) | **+**<br><br>Not generalisable to UK so of limited value except to generate caution in instigating bypass on grounds of clinical |

| Ref ID | Source | Setting, design and subjects | Intervention | Outcomes | Results | Evidence quality (SIGN checklist score) and comment |
|---|---|---|---|---|---|---|
| | Neurological Outcomes in Patients with Suspected Large-Vessel Occlusion Stroke in Nonurban Areas: The RACECAT Randomized Clinical Trial. *JAMA - Journal of the American Medical Association* 327:18 1782-1794 | March 2017-June 2020<br><br>Patients eligible if suspected LVO stroke after paramedic assessment using RACE tool and RACE 5-9<br>Pre stroke FI<br>Estimated arrival at CSC within 7h of symptom onset. | -Lower (closer PSC) not included<br><br>Complex as although 1:1 used 12h time slots of cluster randomisation stratified by geography and day of the week (weekday vs weekend).<br><br>Error occurred with first 350 so not randomised by cluster. | Multiple secondary endpoints<br>-Usual efficacy & safety ones<br>-ICH subgroup<br>-Other typical stroke subgroups<br>-Rates & times of IVT & EVT<br><br>Stopped for futility after 2nd interim analysis. | 1369 included in as randomised analysis & 1401 in safety analysis<br><br>Primary outcome in target population – no difference: aOR 1.03 (0.81-1.29)<br><br>Main secondary analysis of note was strong trend to HARM for ICH patients – aOR 0.72 (0.44-1.18)<br>Further analysis on this ICH subgroup presented at ESOC may22 found aOR favouring PSC over Bypass in shift analysis of disability of 1.58 (1.04-2.41) and increased mortality aOR 1.59 (1-2.54). | efficacy (or even safety bearing in mind ICH results)<br><br>Why:<br>-Transfer times differ from England<br>-DIDO times much better than in UK currently – median 78 (RACECAT) VS 155 (SSNAP) so cannot assume same result for PSC standard care.<br><br>UK ambulance services not in a position to implement RACE anytime soon. |