How do we ensure that more patients receive stroke thrombectomy in the UK?

Stroke is a major cause of death in the UK. Mechanical thrombectomy is the most effective treatment for large vessel ischaemic strokes. Despite this, very few patients in the UK receive mechanical thrombectomy. This editorial explores the main barriers to mechanical thrombectomy use and mechanisms to improve uptake.

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Introduction

Stroke is the fourth leading cause of death in the UK and the largest cause of long-term disability (Stroke Association, 2018). In approximately 10% of acute ischaemic strokes, there is occlusion of a large vessel. In these cases, percutaneous mechanical thrombectomy is the most effective treatment since, unlike intravenous thrombolysis, it removes thrombus from the cerebral circulation to restore blood flow and thereby mitigates the extent of brain damage (Sentinel Stroke National Audit Programme, 2021). Despite the proven effectiveness of thrombectomy from multiple randomised controlled trials, only 2% of patients in the UK who have had an ischaemic stroke currently receive mechanical thrombectomy, which means that over 7000 eligible patients per year are unable to access this treatment (Sentinel Stroke National Audit Programme, 2021). This editorial explores the main barriers to provision of mechanical thrombectomy in the UK and potential mechanisms to overcome them.

The evidence

The Sentinel Stroke National Audit Programme (2021) report contained data from 89 280 patients who had had strokes in the UK from April 2019 to March 2020, with 87% caused by cerebral infarction (ie ischaemic). It is estimated that approximately 10–12% of these patients would have been eligible for mechanical thrombectomy, whereas only 1.57% actually received thrombectomy (Sentinel Stroke National Audit Programme, 2021).

Until around 2014, intravenous thrombolysis was the mainstay of treatment for ischaemic stroke. However, depending on the location of the thrombus in the cerebral circulation, successful vessel recanalisation was only achieved in up to 10% of cases (del Zoppo et al, 1992). Data from randomised trials then showed significant benefits of mechanical thrombectomy over conventional treatment, with a number needed to treat of just 2.6 for a one-point improvement in the modified Rankin score (0= no disability; 6 = dead) (Goyal et al, 2016). As a result, the NHS Long Term Plan has made it a priority to expand access to mechanical thrombectomy, with the stated aim to make the UK the best in Europe at delivering timely, appropriate thrombectomy services by 2025 (NHS, 2019). Several important barriers to achieving this ambition remain in place in the UK, which are now explored in turn.

Barrier 1: rapid diagnosis by computed tomography imaging

National Institute for Health and Care Excellence (2019) guidelines currently recommend that thrombolysis or thrombectomy should be offered to all patients with anterior circulation strokes within 6 hours (or 6–24 hours if there is salvageable brain tissue on specialised imaging). One of the most significant barriers to the delivery of mechanical thrombectomy is the capability to achieve a diagnosis and confirm anatomical suitability very rapidly. Traditional pathways involve the transfer of a FAST (face, arm, speech, test) positive

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patient via an ambulance to the nearest emergency department to undergo a computed tomography scan to exclude intracerebral haemorrhage. However, eligibility for mechanical thrombectomy is based on a combination of clinical presentation and dedicated computed tomography angiography to visualise the cerebral vasculature and localise the culprit blood vessel. Therefore, rapid access to computed tomography angiography is key, but is not currently performed on a 24/7 basis at all hospitals to which acute stroke patients will be conveyed (Routledge et al, 2022). Furthermore, the availability of specialised expertise required to report the scans is limited.

This barrier could be overcome by a combination of more widely available computed tomography angiography for patients who might be candidates for mechanical thrombectomy and more staff trained in computed tomography reporting and/or greater use of artificial intelligence (AI) software for this reporting task. The national optimal stroke imaging pathway, which includes training and AI support at a national level, has been developed with a view to all parts of the UK having access to the appropriate imaging required (NHS England, 2021).

Barrier 2: streamlined stroke pathway to enable interhospital transfer

Currently, there are only 24 neuroscience centres that could be capable of performing mechanical thrombectomy (Routledge and Curzen, 2023), so most potentially eligible patients will present first to a hospital without these facilities. The receiving clinical team at the first hospital is critically important in identification, referral and transfer of suitable patients so that they receive mechanical thrombectomy within the required timeframe. Specifically, prompt diagnosis of the clinical signs of large vessel occlusion, the severity of the stroke (prestroke modified Rankin Score and National Institutes of Health Stroke Scale scores) and any contraindications to thrombectomy or thrombolysis are needed, on arrival, before computed tomography scan diagnosis. This facilitates the speed for referral for mechanical thrombectomy at the nearest specialist centre.

'Door in, door out' time is a useful way to summarise the speed with which diagnosis of a suitable stroke patient, referral to the local mechanical thrombectomy centre and transfer is achieved, and this is critical for optimal reperfusion (Routledge and Curzen, 2023). Recommended ways of enabling optimal transfer times include immediate clinical assessment of potential stroke patients, rapid communication with and acceptance by the thrombectomy centre. Throughout this process, the patient remains on the original ambulance trolley in the first hospital so that if accepted, transfer can be initiated immediately by the same ambulance crew.

Barrier 3: infrastructure

Currently, very few mechanical thrombectomy centres provide a continuous 24/7service. Planning is therefore ongoing to provide 24/7 provision of mechanical thrombectomy at all 24 established neuroscience centres. However, modelling suggests that between four and seven further mechanical thrombectomy centres are needed to achieve adequate geographical coverage of the UK (Routledge et al, 2022). This will require significant investment in training and infrastructure, particularly in rural and remote areas, in order to achieve equity of access to mechanical thrombectomy. Currently, patients in London are much more likely to receive thrombectomy compared to other regions (8% vs 0–3%) (Sentinel Stroke National Audit Programme, 2021).

Barrier 4: workforce challenges

Unlike many countries in the world, in the UK thrombectomy is conducted almost exclusively by interventional neuroradiologists, and there are fewer than 100 interventional neuroradiologists in the UK. Modelling suggests that between 142 and 192 operators would be needed to provide 24-hour mechanical thrombectomy coverage at all 24 existing neuroscience centres, with up to 240 operators needed to provide full geographical coverage

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Key points

- Stroke is the fourth leading cause of death in the UK and largest cause of long-term disability.
- In about 10% of patients with acute ischaemic stroke there is occlusion of a large vessel and in these cases percutaneous mechanical thrombectomy is the most effective treatment.
- Data from randomised trials show significant benefits of mechanical thrombectomy over conventional treatment.
- Despite the proven effectiveness of mechanical thrombectomy, only 2% of patients with ischaemic stroke in the UK currently receive this treatment, which means that over 7000 eligible patients per year miss out.
- To increase uptake, coordinated action is needed to increase access to specialised brain imaging to determine eligibility for thrombectomy and a greater number of hospitals need to provide 24/7 stroke thrombectomy services.
- In addition, significant workforce planning is needed to increase the number of clinicians able to perform mechanical thrombectomy.

of the UK (Routledge et al, 2022). Based upon the current training model for interventional neuroradiologists, these numbers cannot be achieved by this group of specialists alone.

Other healthcare systems have overcome similar workforce barriers by using the percutaneous catheter skillset of trained interventional cardiologists, who already provide emergency percutaneous coronary intervention for acute ST elevation myocardial infarctions 24/7, 365 days a year. For example, in St Petersburg, Russia, an interventional stroke programme was developed using their existing ST elevation myocardial infarction network (Savello et al, 2020). This rapidly improved treatment access, with a 26-fold increase in the number of thrombectomy cases performed (650 vs 25) when interventional cardiologists and interventional neuroradiologists worked together to deliver the service (Savello et al, 2020).

In the UK, the emergency primary intervention pathway is mature and offered to almost all patients with ST elevation myocardial infarction. Surveys suggest that over 80% of existing trained interventional cardiologists in the UK would be willing to contribute to a stroke mechanical thrombectomy rota if they could be trained to do so while maintaining their interventional cardiology commitments. This would involve developing a bespoke mechanical thrombectomy training programme for experienced interventional cardiologists to provide the extra skillset needed to deliver mechanical thrombectomy. According to the precedent set in other countries, this could be achieved within 6 months. The British Cardiovascular Intervention Society endorses this approach, but progress will now require concerted cooperation to facilitate it from the interventional neuroradiology community and NHS England (Routledge et al, 2022).

Conclusions

The clinical effectiveness of mechanical thrombectomy for large vessel ischaemic stroke is unequivocal, and the NHS Long Term Plan has prioritised the management of stroke with the ultimate aim of providing some of the best stroke services in Europe by 2025. Despite some improvements, the 2022 timeline target of offering mechanical thrombectomy to 10% of all eligible patients with strokes has already been missed. Furthermore, several barriers need to be overcome, as outlined in this editorial, to enable timely reperfusion therapy to eligible patients. The success of timely reperfusion in primary percutaneous coronary intervention has been celebrated and achieved in the UK, so there is no reason why this cannot be achieved with stroke management in the near future. Workforce challenges can be most easily overcome by using the skillset of willing interventional cardiologists and possibly integrating the stroke pathway with existing acute coronary syndrome pathways that include 24/7 catheterisation laboratory access.

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