

Impact case study (REF3)

Institution: University College London		
Unit of Assessment: 2 - Public Health, Health Services and Primary Care		
Title of case study: Driving improvements in the organisation, delivery, and outcomes of acute stroke care in the UK		
Period when the underpinning research was undertaken: Between September 2011 and June 2017		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Professor Naomi Fulop	Professor of Health Care Organisation and Management	April 2012 – present
Professor Steve Morris	Professor of Health Economics	March 2009 - May 2019
Dr Angus Ramsay	Senior Research Fellow	April 2012 – present
Ms Rachael M Hunter	Associate Professor	August 2010 - present
Period when the claimed impact occurred: 2014 - 2020		
Is this case study continued from a case study submitted in 2014? No		
<p>1. Summary of the impact Research led by UCL has shown that reorganising UK hospital stroke services, so that all patients can be treated in large specialist stroke units, results in better care and outcomes. This evidence was pivotal in hospitals across Greater Manchester reorganising their stroke services in 2015, leading to significant improvements in care for approximately 20,000 stroke patients and 340 additional lives saved in the five years since the changes took place, (approximately 4,000 patients treated and 68 additional lives saved per year). The research has been central to sustaining London hospitals' centralised stroke system, allowing them to maintain better stroke care and patient outcomes in this region. It has also shaped national policy in England, Scotland and Northern Ireland, and influenced regional plans for improving stroke care.</p>		
<p>2. Underpinning research Stroke patients who receive evidence-based care are more likely to survive and make better recoveries. Centralising hospital stroke services in high-volume specialist units has been recommended to improve stroke care delivery.</p> <p>In 2010, the NHS in London (population 8.2 million, approximately 11,000 strokes per year) and Greater Manchester (GM) (population 2.7 million, approximately 4,000 strokes per year) centralised hospital stroke services, developing high-volume 'hyper acute stroke units' (HASUs) and offering rapid access to specialist stroke care, with local units offering ongoing care nearer home. The systems implemented in the two cities differed significantly: in London, all patients were eligible for HASU treatment. In GM, only patients reaching hospital within four hours of symptom onset were eligible. In 2015, GM adopted a system similar to London's, with all patients eligible for HASU treatment [R1].</p> <p>This research was funded by the NIHR Health Services and Delivery Research Programme from 2011 to 2017, led by Professor Naomi Fulop at UCL's Department of Applied Health Research, in collaboration with King's College London and the University of Manchester. It analysed national data, including Hospital Episodes Statistics, Office for National Statistics mortality data, and the national stroke audit (using other urban areas in England as a control) to study effects of centralising hospital stroke services in large, urban settings - on patient outcomes, quality of care, and value for money. It used qualitative data to examine how such changes are planned, implemented, and sustained [R1].</p>		

Key findings: outcomes, care delivery, and cost-effectiveness

The initial research analysed care and outcomes from 2008 to 2012. After stroke services were centralised, length of hospital stay in London and GM was reduced more than elsewhere in England - but only London saw significantly fewer patient deaths than other urban areas (with 96 additional lives saved per year) [R2]. Underlying this, only London patients were more likely to receive evidence-based care (for example, rapid access to brain scan, specialist clinician assessment, and administration of clot-busting drugs if appropriate) than elsewhere. While HASUs treated 93% of stroke patients in London, GM HASUs treated only 39% [R3]. Both London and GM centralisations were cost-effective (by delivering more Quality-Adjusted Life Years than stroke services elsewhere in England, at the NICE cost-effectiveness threshold of GBP20,000 to GBP30,000) but London achieved this through saving more lives, while GM achieved it through patients having shorter hospital stays [R4].

The research team then repeated their analyses to examine care and outcomes from 2013 to 2016. This showed that, following further centralisation in 2015, GM HASUs treated 86% of stroke patients, resulting in 68 fewer deaths per year. This research also demonstrated that the effects on care and outcomes across London hospitals were sustained from 2013 to 2016 [R5].

A limitation of this work is that the UCL researchers could not analyse impact on quality of life directly, as data are not collected sufficiently reliably. However, the UCL team's cost-effectiveness analyses modelled quality of life (drawing on the South London Stroke Register). Further, research suggests that access to high quality care is associated with better quality of life, and a key effect of clot-busting drugs is to improve independence and reduce disability, key components of quality of life in stroke survivors.

Key findings: influence of implementation approaches

UCL's qualitative research showed that London's simpler, more inclusive referral pathway and single launch date meant ambulance and hospital staff had a clear understanding of the new system and when it would 'go live'. GM's more selective referral pathway reduced patient eligibility and its phased implementation caused uncertainty amongst staff. All London's services had to achieve quality standards, linked to financial incentives and supported by the local stroke network, which ensured that services had the capacity to provide evidence-based care. In GM, services were not required to meet standards and staff had less hands-on support, leading to varied capacity to deliver evidence-based care. These differences in service model and implementation approaches in London and GM contributed to different proportions of patients being treated in HASU and different likelihood of receiving evidence-based care, in turn leading to more lives being saved in London hospitals [R6].

3. References to the research

[R1] **Fulop, N.J., Ramsay, A.I.G., Hunter, R.M.,** McKevitt, C., Perry, C., Turner, S.J., et al. (2019). 'Evaluation of reconfigurations of acute stroke services in different regions of England and lessons for implementation: a mixed-methods study'. *Health Services and Delivery Research*.7. DOI: <https://doi.org/10.3310/hsdr07070>.

[R2] **Morris, S., Hunter, R.M., Ramsay, A.I.G.,** Boaden, R., McKevitt, C., Perry, C., et al. (2014). 'Impact of centralising acute stroke services in English metropolitan areas on mortality and length of hospital stay: difference-in-differences analysis'. *BMJ*. **349**, g4757. DOI: <https://doi.org/10.1136/bmj.g4757>.

[R3] **Ramsay, A.I.G., Morris, S., Hoffman, A., Hunter, R.M.,** Boaden, R., McKevitt, C., et al. (2015). 'Effects of centralizing acute stroke services on stroke care provision in two large metropolitan areas in England'. *Stroke*, **46**, 2244-5. DOI: <https://doi.org/10.1161/STROKEAHA.115.009723>.

[R4] **Hunter, R.M., Fulop, N.,** Boaden, R., McKevitt, C., Perry, C., **Ramsay A.I.G.,** et al (2018). 'The potential role of cost-utility analysis in the decision to implement major system change in acute stroke services in metropolitan areas in England'. *Health Res. Policy Syst.* **16**, 23-6. DOI: <https://doi.org/10.1186/s12961-018-0301-5>

[R5] **Morris S., Ramsay A.I.G.,** Boaden R., **Hunter R.M.,** McKeivitt C., Paley L., et al. (2019). 'Impact and sustainability of centralising acute stroke services in English metropolitan areas: retrospective analysis of hospital episode statistics and stroke national audit data'. *BMJ*. **364**, 1. DOI: <https://doi.org/10.1136/bmj.l1>.

[R6] **Fulop N.J., Ramsay A.I.G.,** Perry C., Boaden R., McKeivitt C., Rudd A.G., et al. (2016). 'Explaining outcomes in major system change: a qualitative study of implementing centralised acute stroke services in two large metropolitan regions in England.' *Implement Sci*. **11**, 80. DOI: <https://doi.org/10.1186/s13012-016-0445-z>.

4. Details of the impact

This research has contributed to further centralisation and the lives of more stroke patients being saved in Greater Manchester (GM). Furthermore, it has supported sustained effectiveness of the London stroke care system; helped shape national policy in England, Scotland and Northern Ireland; and has been cited in documents making the case for regional stroke service reorganisations.

Driving improvements in care delivery and outcomes in Greater Manchester

Between 2012 and 2014, GM hospitals had attempted to centralise their stroke services, but changes were delayed, as a result of national reorganisations of governance and commissioning of healthcare, and local challenges with governance and service provision. UCL evidence [R1], [R2] on patient mortality was pivotal in driving further change in GM. The researchers shared their findings with senior members of the GM Stroke Network in February 2014 at the project steering committee meeting. At GM stakeholders' request, in May 2014, the UCL team calculated the potential impact of further reorganisation and estimated that an additional 50 lives per year could be saved by doing this. GM stroke leaders used this figure to argue against any further delays. One senior stroke physician stated: *"being able to go to meetings and say to people 'We're looking at fifty excess deaths a year ...' because it was a paper and it was a medical journal, not just another audit report or just another internal report, I think that has had a significant impact."* [R1]

Supporting local buy-in: The argument that further change would increase access to evidence-based care, also saving 50 additional lives per year, was central to a large regional publicity campaign, gaining support for the new system from the public, local authorities, commissioners, and providers in GM. This included tweets from local providers and commissioners, an infographic (see below) and a briefing, which stated: *"if a similar approach is taken in GM it could result in 50 fewer deaths each year. The changes we are introducing in GM are based on a strong evidence base that it works"*.



Fewer deaths from stroke: Findings [R1], [R5] showed that, following further centralisation, 86% of GM stroke patients were treated in a HASU, resulting in an estimated 68 fewer deaths per year than if GM had reduced mortality at the same rate as other large urban areas in England (improvements in other large urban areas are likely to have been achieved through wider efforts to achieve national quality standards combined with public health interventions). National stroke audit data from July to September 2020 [S1] confirm that GM stroke services remain among the highest performing in England, with all routinely-admitting stroke services regularly achieving 'A' or 'B' national audit ratings – classified as indicating world-class stroke care as defined by the Royal College of Physicians.

Providing evidence to sustain centralised stroke services in London

Fulop and colleagues presented their clinical outcomes findings to London's stroke clinical leaders in November 2014. From December 2014, these findings were cited in London's Stroke

acute commissioning and tariff guidance, published by the NHS Strategic Clinical Network. The guidance presents the clinical standards used to assess London stroke services [S2] and cites the finding from [R2] that: “reconfiguration resulted in a significant decline in risk-adjusted mortality, with approximately 168 lives saved at 90 days after admission, and a 7% reduction in length of stay in the first 21 months”. Senior management and frontline clinicians have said that the UCL research on outcomes has played an important part in sustaining the London system. For example, a representative of NHS England in London described making the case to commissioners to continue funding the London system:

“The team bringing their findings to the Stroke Clinical Leadership Group was really valuable [...] it gave us a really good understanding of the research. This ‘heads up’ was crucial in helping clinical leads understand and share the main messages more widely. Your evidence was instrumental in addressing pushback from local commissioners and trusts [...] the fact that we could point to impartial research showing the London system had saved lives and reduced length of stay really swayed CCGs to support the tariff. Your work has also helped London to be seen as an aspirational model or ‘gold standard’ at regional and national level” [S2].

The research team’s follow-up analysis [R5] suggests that, from April 2013 to March 2016, London patients were significantly more likely to receive evidence-based care than patients elsewhere, and the impact on patient mortality was sustained. National stroke audit data from July to September 2020 [S1] suggest that London remains a high-performing system. Like GM, London is amongst the only areas in the English NHS where all routinely admitting stroke services regularly achieve ‘A’ or ‘B’ ratings, which indicate world class stroke care.

Influencing national policy and regional planning

National and regional leadership have used UCL’s work on impact of centralisation of stroke services on patient outcomes [R2], [R5] and quality of care [R3], [R5] as key evidence in their recommendations to centralise hospital stroke services. Findings on the impact on stroke patient outcomes [R2] have been cited in NHS England’s ‘Five Year Forward View’ [S3], the Scottish Government’s ‘National Clinical Strategy for Scotland’ [S4], NHS England’s ‘Configuration support guide for stroke services’ (2015) and proposals to reorganise stroke services in Northern Ireland [S5]. Fulop and colleagues’ findings of impact on stroke care delivery [R3] are cited in England’s ‘National Clinical Guidelines for Stroke’ [S6]. UCL’s work on both implementation and impact of change [R2], [R3], [R6] was cited in the Stroke Association’s position paper on stroke service reorganisation [S7], and 15 ‘case for change’ documents across the English NHS, of which three stroke service centralisations – in South Yorkshire and Bassetlaw; West Yorkshire and Harrogate; and North Cumbria – have been implemented [S8]. Finally, the UCL findings of lives saved per year in London [R2], and Greater Manchester [R5], were cited by change leaders in Kent and Medway in their submission to a judicial review of their proposal to centralise local stroke services into three HASUs; the judicial review ruled in favour of the changes in early 2020 [S9].

Shaping the ‘NHS Long Term Plan’: UCL’s 2014 research on stroke outcomes was one of just 11 documents cited in an internal paper resulting in stroke’s inclusion as a priority in the ‘NHS Long Term Plan’ [S10]. This followed considerable engagement activity carried out through an NIHR Knowledge mobilisation Fellowship held by Ramsay, who, for example, presented key findings at national workshops for development of the ‘NHS Long Term Plan’. A representative of the team leading its development stated: *“The research was clearly presented in initial publication, ensuring it was accessible to less academic audiences, with clear messages more easily translated into policy initiatives. This led us to highlight the work as one of a small number of key references within our internal proposal for ‘NHS Long Term Plan’ prioritisation. The research clearly strengthened our case, and helped support its ultimate success. We have subsequently continued to refer back to this research and to reference within further documentation.”*- Team member, ‘NHS England Long Term Plan’ [S10].

Prioritisation in the ‘NHS Long Term Plan’ has resulted in additional resources for development of stroke services across England, including the new Integrated Stroke Delivery Networks, which

will reshape organisation and delivery of stroke care across the whole of the English NHS over the coming years.

5. Sources to corroborate the impact

- [S1] Sentinel Stroke National Audit Programme (SSNAP) clinical audit results – national level, disaggregated by region – see: <https://www.strokeaudit.org/results/Clinical-audit/National-Results.aspx>
- [S2] NHS England Strategic Clinical Networks (London). Stroke acute commissioning and tariff guidance – see: <http://www.londonscn.nhs.uk/wp-content/uploads/2015/01/Stroke-acute-commissioning-and-tariff-guidance-2014.pdf> and Testimonial from NHS England and NHS Improvement.
- [S3] NHS England, Public Health England, Health Education England, Monitor, Care Quality Commission, NHS Trust Development Authority: 'Five year forward view'. London: NHS England, 2014. <https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf> [p23]
- [S4] The Scottish Government: A national clinical strategy for Scotland. Edinburgh: Crown, 2016. <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2016/02/national-clinical-strategy-scotland/documents/national-clinical-study-scotland/national-clinical-study-scotland/govscot%3Adocument/00494144.pdf> [pp70-72]
- [S5] Northern Ireland Department of Health: 'Reshaping stroke care: saving lives, reducing disability', 2019. <https://www.health-ni.gov.uk/sites/default/files/consultations/health/rscs-consultation-document.pdf> [p25]
- [S6] Intercollegiate Stroke Working Party. National clinical guideline for stroke, 5th edition. London: Royal College of Physicians, 2016. [https://www.strokeaudit.org/SupportFiles/Documents/Guidelines/2016-National-Clinical-Guideline-for-Stroke-5t-\(1\).aspx](https://www.strokeaudit.org/SupportFiles/Documents/Guidelines/2016-National-Clinical-Guideline-for-Stroke-5t-(1).aspx) [pp12-13; p15]
- [S7] Stroke Association: 'What we think about: Reorganising acute stroke services', 2019. https://www.stroke.org.uk/sites/default/files/new_pdfs_2019/our_policy_position/psp_-_reorganising_acute_stroke_services.pdf [p8]
- [S8] Evidence of three changes that have been implemented resulting from these case for change documents [document available on request]
- [S9] Evidence of use of our research in Kent and Medway Judicial Review [<https://kentandmedway.nhs.uk/wp-content/uploads/2020/02/DEFENDANTS-SKELETON-ARGUMENT-26-Nov-19.pdf> – page 6, paragraph 12] and outcome of judicial review in favour of changes [<https://kentandmedway.nhs.uk/wp-content/uploads/2020/02/CO-1908-2019-CO-1926-2019-Jt-APPROVED-FINAL-21-02-2020.pdf>]
- [S10] NHS England. 'The NHS Long Term Plan', 2019. <https://www.longtermplan.nhs.uk/wp-content/uploads/2019/01/nhs-long-term-plan-june-2019.pdf> [p64] and Testimonial from 'NHS Long Term Plan' team member.