Clinical Medicine 2013, Vol 13, No 5: 444–8

National Sentinel Stroke Audit 1998–2011

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ABSTRACT – Stroke is a common and devastating disease and, until very recently, was largely unrecognised as a preventable or treatable condition. Between 1998 and 2010, the National Sentinel Stroke Audit (NSSA) achieved 100% voluntary participation, collecting data on more than 60,000 patients from stroke services within England, Wales and Northern Ireland and becoming a benchmark for hospital stroke services. In this way it has informed stroke improvement at the local, regional and national levels and has overseen a radical change in stroke care within the NHS. This article describes the achievements of the NSSA and the lessons learned.

KEY WORDS: clinical audit, service improvement, stroke

Sentinel (noun) *a soldier whose job is to guard something*
Oxford English Dictionary

Background to the audit

In 1995, the Royal College of Physicians (RCP) of London initiated a stroke programme with the aim of setting national clinical standards in stroke care. At that time, a series of 'sentinel' audits investigating conditions ranging from cataract surgery to managing violence in mental health settings were commissioned by the Department of Health (DH).[1] Stroke was included in this original list of sentinels, but the stroke audit is the only one to have kept its 'sentinel' title.

Through seven rounds of the National Sentinel Stroke Audit (NSSA) between 1998 and 2010,[2] the RCP's stroke programme has audited both clinical process and outcomes for stroke patients within the NHS and the organisation of stroke services within its hospitals. By 2004 this included all hospitals in the UK, save those in Scotland where a different approach was taken, following devolution between 1997 and 1999.

The RCP's stroke audit programme is informed by the Intercollegiate Stroke Working Party (ICSWP) which comprises representatives of professional bodies across the multidisciplinary stroke team and from patient and carer organisations.[3] The ICSWP has set national standards for stroke care, publishing evidence-based clinical guidelines[4] to instruct the NSSA, drive service improvement and inform national policy.

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Early days, 1998–2002 (rounds 1–3)

The first round was a retrospective case note audit in 1998. Participation was voluntary and this aspect of the audit, together with the fact that all of the rounds have been self-reported by participating sites, did not change between rounds. Forty consecutive cases over a fixed period were audited using a paper questionnaire. About 65% of eligible trusts participated in the first rounds and the results have previously been published.[5]

Funding of the early audits came from both the DH and the Stroke Association and, in 2001–2, from a consortium of funders from the pharmaceutical industry and the Stroke Association (Table 1). The audit pro formas were in paper copy and in 2002 were collected on a bespoke database and analysed using SPSS statistical software. The early audit pro forma left a legacy in the design of stroke-specific clerking documentation, which represented the beginning of a hospital pathway for stroke care. By incorporating aspects of the audit into routine, clinical documentation services could easily monitor their progress between rounds of NSSA.

The questions designed by the ICSWP in the early rounds of the NSSA were exploratory, trying to gauge the state of stroke services, as well as looking for evidence of the aspects of organised stroke care that had shown benefit in early trials of care in stroke units.[6] With publication of the ICSWP's first national clinical guidelines in 2000, subsequent audits kept a core set of questions (following a review of the representativeness of items), while adding new items based on changes in evidence and tightening definitions around specialist stroke care.

Data have always been analysed independently by a medical statistician to give robust reporting of results and a construct to compare services to the national average. Reports of local and national data were sent in electronic form to the named audit lead in each site, but no public report was released. Results of rounds 1 and 2 were cited as an important influence on stroke standard 5 of the national service framework for older people, which was published in 2001.[7]

The audit goes electric – birth of the web tool, 2002–6 (rounds 4 and 5)

From 2002, a new stream of funding from the Health Commission (and in 2008 from the Healthcare Quality Improvement Partnership [HQIP]) saw a review of the NSSA process and investment in the audit infrastructure.

Round 4 of the NSSA was notable for two reasons. Firstly, in light of growing political interest in strokes services, 100% participation of eligible sites was achieved – a record that has subsequently been maintained in the NSSA. Secondly, data collection

Table 1. Summary of the seven rounds of the National Sentinel Stroke Audit, 1998–2010, including details of funding.

Year	Audit	Organisational audit reported	Clinical audit reported	Cohort admission period	Methods and use of data	Participating trusts (%)	Number of cases (clinical)	Funding
1998	Sentinel round 1	Yes March 1998	Yes	First 40 patients: 1 January–31 March 1998	Paper pro forma scanned	80	6,894	M&S, SA, DH
1999	Sentinel round 2	Yes 1 December 1999	Yes	First 40 patients: 1 August–31 October 1999	Paper pro forma scanned	75	5,537	M&S, SA, DH
2001–02	Sentinel round 3	Yes 1 January 2002	Yes	First 40 patients: 1 April–30 June 2001	Microsoft Access pro forma Trust results to CHI	95	8,200	Consortium of funders: SA and four pharmaceutical companies
2004	Sentinel round 4	Yes 1 April 2004	Yes	First 40 patients: 1 April–30 June 2004	Web tool data collection First public results Data used for HCC star ratings	100	8,697	CHI, HCC
2006	Sentinel round 5	Yes 1 April 2006	Yes	First 80 patients: 1 April–30 June 2006	Data used for HCC star ratings	100	12,500	CHI, HCC
2008	Sentinel round 6	Yes 1 April 2008	Yes	First 60 patients: 1 April–30 June 2008	Data used for annual health check	100	11,369	HCC, HQIP
2009	Sentinel interim	Yes 1 April 2009	No		Data used for Public Accounts Committee	100		NAO
2010	Sentinel round 7	Yes 1 April 2010	Yes	First 60 patients: 1 April–30 June 2010		100	11,353	HQIP

CHI = Commission for Health Improvement; DH = Department of Health; HCC = Healthcare Commission; HQIP = Healthcare Quality Improvement Partnership; M&S = Marks and Spencer; NAO = National Audit Office; SA = Stroke Association.

for the NSSA moved to a 'paperless' system, with sites using a web tool to directly enter their data. Development of the web tool in information technology terms was highly innovative in 2004, but implementation required full-time telephone support because the concept was new to the NHS. The obvious benefits of the web tool were less data cleaning, as the onus was on participants to correct inconsistencies, and, importantly, very high levels of complete data entry. As a result of these improvements in the audit, it became appropriate to introduce public reporting in 2004. Trust results were given over to the Commission for Health Improvement (CHI) for purposes of national reporting and DH work. Public reporting on the RCP's website used key indicators and overall ratings by performance in different areas of hospital stroke care grouped together in domains. The domains were drawn from responses to questions that were clinically important but also demonstrated good clinical applicability (ie not a high proportion of 'no but' type responses) and discrimination (with a range of scores to show statistical significance). With the advent of public reporting and direct comparison of services within regions, within strategic health authorities and nationally, NSSA performance became the benchmark for stroke services. The significance of the NSSA to individual hospital providers further increased when participation and performance were incorporated into NHS hospital trust 'star' ratings by the Healthcare Commission in 2003–4 and published on 'NHS Choices'.

As the political healthcare agenda turned towards stroke, public reporting of the NSSA gained increased media coverage – especially when the early rounds exposed a systemic failure of access to specialist stroke units and great inequalities in stroke care nationally. The ICSWP was nominated as the expert group to advise the National Audit Office (NAO)'s report on stroke published in 2005. Results from round 4 were quoted throughout the report and formed a key appendix to the highly influential manuscript.[8] The thrust of the NAO's report was to highlight shortfalls in stroke care being seen as emergency care, and it used international examples for comparison, raising public awareness of deficiencies in stroke services within the NHS. The ICSWP responded by including questions in round 5 of the NSSA to probe the provision of 'hyperacute' stroke care and thrombolysis and to produce the first of its 'easy-access' modified public reports for wider dissemination of the results.

With growing political interest in stroke services for the first time, documents on the national stroke strategy were developed throughout the UK and cited results of the fifth round of the NSSA. The first ever national stroke strategy for England, published in 2007,[9] reaffirmed performance in the NSSA as a marker of quality of hospital stroke units as it outlined a vision of radical stroke service improvement across all aspects of stroke care.

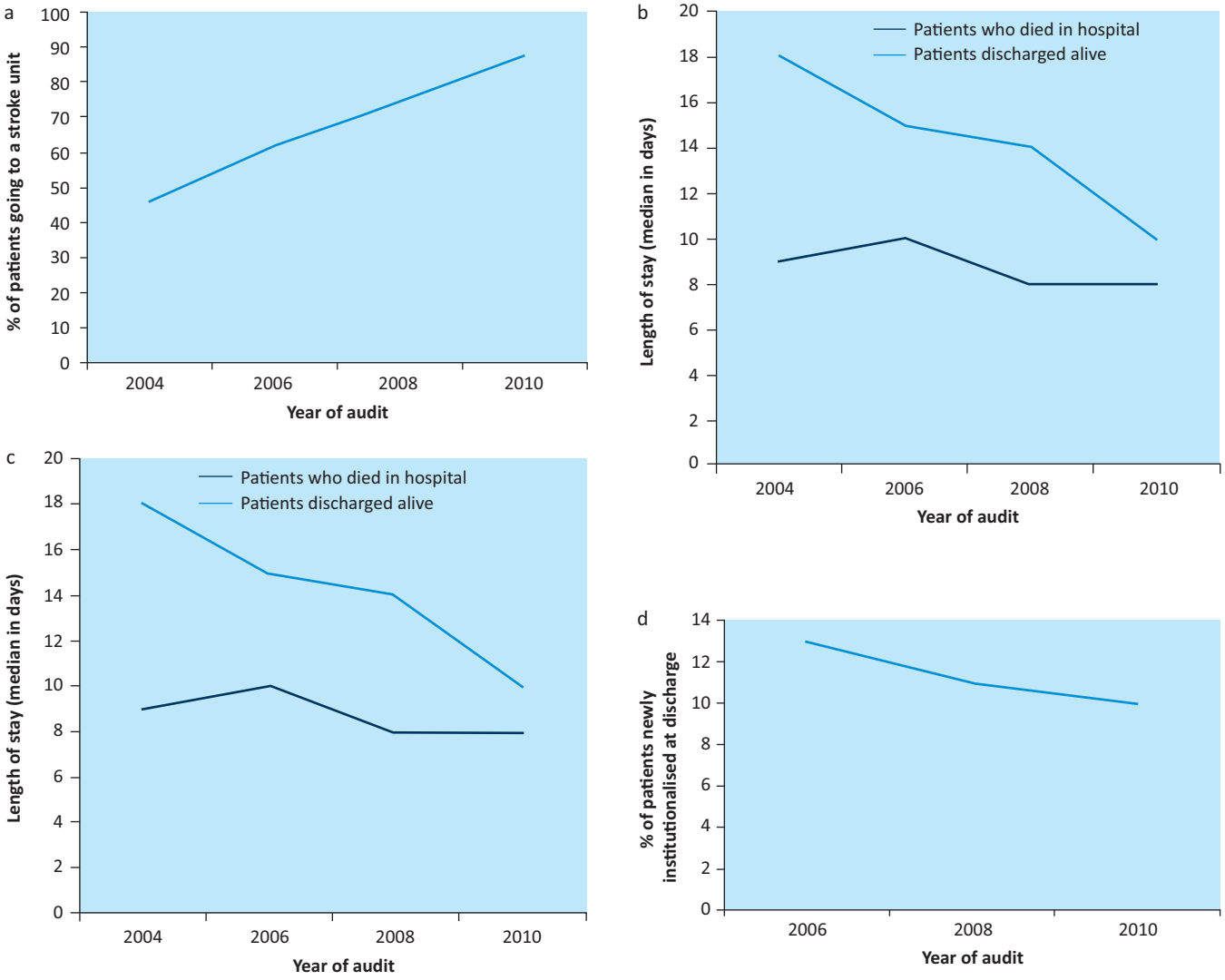

Fig 1. (a) Percentage of patients admitted to hospital with a stroke receiving stroke unit care during the admission, (b) reduction of hospital length of stay for patients admitted with primary diagnosis of stroke, (c) reduction in 30-day hospital mortality for those admitted with primary diagnosis of stroke, and (d) percentage of patients with acute stroke diagnosis in hospital, newly discharged to institutional care.

The goal posts change, 2006–10 (rounds 6 and 7)

Following development of national strategies for delivery of stroke care and associated additional investment, hospital stroke services especially developed at an increased rate, and rounds 6 and 7 of the NSSA captured this improvement. Indeed, in the last four rounds, in which there has been 100% participation, the audit demonstrated major improvements in the quality of and access to specialist stroke unit care and in stroke outcomes in terms of 30-day mortality, hospital length of stay and rates of institutionalisation (Fig 1).

The NSSA has informed relevant political arguments about differential rates of improvement between countries and also within regions. Results from round 5 of the NSSA confirmed, for example, that a postcode lottery existed within greater London, with an obvious mismatch between provision within central London hospitals and needs in the outer parts of London.[10] Results from the NSSA over time have been a powerful lever in forcing the subsequent radical redesign of stroke services for London in 2010.

Following the introduction of the national stroke strategy in England, there has been provision of 'managed' clinical networks, which have looked at delivering stroke care by facilitating a collaborative approach between providers and commissioners. Rounds 6 and 7 produced network-specific reports to help inform gaps in service provision and deliver change.

The public reports from 2010 were further broken down by parliamentary constituency and were presented to members of parliament in the form of annotated maps.

The NAO's second report on stroke was published in 2010[11] and again cited NSSA results. This follow-up report had a new emphasis on the need to improve stroke care outside of hospitals. The NSSA took this cue for round 7 by, for the first time, auditing the organisation of care of community stroke services

and components of stroke rehabilitation, such as therapy intensity. The fact that the audit has continued to anticipate and respond to the change in focus in developing NHS stroke services has meant that providers could not become complacent about the audit, and services have had to continue to improve in order to maintain their position outside of the lower quartile of performing trusts. The NSSA has continued to 'raise the bar' for stroke services in this way.

Forward planning and future proofing the audit

The NHS is changing and so must the audit. The retrospective selected case-note methods that have been used to date have served the audit well, but issues such as case ascertainment and lack of sensitivity to change in a contemporaneous way are now more evident. This is especially the case as stroke improvement in some areas of the NHS, such as London, is being driven by performance-managed tariff. The future plan for the NSSA is a prospective, self-reported, continuous, web-based audit called the Sentinel Stroke National Audit Programme (SSNAP). This has already been tested in the Stroke Improvement National Audit Programme (SINAP), which has run, since May 2010, as an audit of only the first 72 hours of stroke care.[12] The SINAP pilot has challenged providers to fund administrative support to stroke audit in an ongoing way in return for continuous local reporting, as well as benchmarking, as was the case in the NSSA. Linkage to other national databases, such as the DH's hospital episode statistics and the Office for National Statistics, gives potential for new perspectives on the long-term impact of stroke care and service improvement. The SSNAP now continues on from SINAP, with an extended remit to investigate stroke care out of the hospital environment while serving as a single data-collection tool to meet future demands of commissioning and clinical governance, including the National Institute for Health and Care Excellence (NICE)'s quality standards for stroke, which were published in 2010.[13]

Whether sustainable funding will be made available to the SSNAP is uncertain. However, funding from HQIP for the next 3 years should be sufficient to assess whether the next generation of the sentinel stroke audit will enjoy the same level of clinical engagement and success in overseeing stroke service improvement as its predecessor.

The legacy

Over seven rounds, the NSSA has collected more than 60,000 clinical case records and provided a powerful lever for change within hospital stroke services. The NSSA has also been highly successful in motivating stroke clinicians to participate in national audit and to act on the results and so fuel the cycle of service improvement. The changes in delivery of stroke care demonstrated over time in the NSSA have been testimony to national strategies, local endeavour and the overriding desire to make things better for those afflicted by stroke.

During the lifespan of the audit, access into specialist stroke units has increased, while 30-day mortality has decreased, along with length of stay and rates of institutionalisation following stroke (Fig 1). All of these successes were predicted by the early randomised trials of care in stroke units, but demonstrating these outcomes on a national scale gives credence to the generalisability of trial results for organisation of care and justifies the pursuit of an evidence-based approach to delivering healthcare. The NSSA model has also been used successfully outside of the NHS, influencing international stroke audits in Australia, Catalonia in Spain and the Republic of Ireland.

Lessons learned

Healthcare professional leadership and ownership have been at the heart of the NSSA's success. The fact that the audit has been steered by the ICSWP and conducted independent of the DH (although centrally funded) has given further impartial credibility. Participation in the audit(s) has been key and has many and varied motivating factors. For some it is to review practice and constantly strive to improve – this may mean making changes as a result of conducting the audit (Hawthorn effect), identifying shortfalls and making immediate changes. For others it is part of competition with regional neighbours, or other hospital specialties, to be the best in the country. Non-participation becomes uncomfortable in the context of continuous audit with public reporting, when regional press, commissioners and current and past patients have the opportunity to review performance.

The audit has not stood still and has stayed fit for purpose by refining data-collection techniques and keeping a spine of core questions while introducing new items in line with changes in evidence-based care, such as thrombolysis and early supported discharge. Having an independent statistician as part of the RCP's stroke programme team has helped to improve it, as well as providing robust analysis of the data. The ability of the RCP's stroke programme to listen to its stakeholders has been central to this iterative process and a helpdesk to address verbal and email queries has been essential.

The reporting structure – delivering timely, bespoke reports for healthcare professionals, commissioners and patients – is undoubtedly another wider lesson learned. By delivering public reporting, including constituency reports for parliamentarians, the NSSA has been political in terms of highlighting local and regional variations of stroke, with one aim of improving stroke care for all. The role it played by informing the national stroke strategy in 2007 should not be understated, as this would have been much more difficult for any secretary of state without the early audits focussing on a stroke improvement agenda.

The move to continuous, web-based prospective audit with quarterly reporting is the next evolutionary step to keep up with developments in computerised technology and the needs of commissioners.

Conclusions

National clinical audit works when there is a good evidence base, clinician engagement and the results have tangible meaning for those who participate. Patients and carers now have a good idea of what suitable structures for stroke services and care should look like and how their local units perform. Hospital managers and commissioners negotiating improvements in care can now engage in meaningful discussions using good quality data, and the Departments of Health in England, Wales and Northern Ireland have an opportunity to look at regional and temporal changes as they invest and revise structures.

The title of 'sentinel' was given to the RCP's stroke audit in 1998 to give it a sense of being a 'beacon' audit. Fifteen years later the term sentinel is still highly appropriate, although now much more in terms of the original dictionary definition of a 'guard' – keeping watch on the improvements made in stroke care and safeguarding to make sure that they continue.

Provenance statement

Dr Geoffrey Cloud wrote the first draft of the narrative article. He has worked for the RCP's stroke programme since October 2009 and helped with the design, implementation, analysis and reporting of round 7 of the NSSA. Mrs Alex Hoffman has been the stroke programme project manager since 2002 and has helped design, implement, analyse and publish the results of rounds 2–7 of the NSSA. She helped revise the article to its final version. Prof Anthony Rudd helped design, implement, analyse and report all rounds of the NSSA. He helped revise the article to its final version.

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