Bringing Big Data to Quality Improvement in the Sentinel Stroke National Audit Programme (SSNAP)

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What is a stroke?

A stroke is a serious, life-threatening medical condition that occurs when the blood supply to part of the brain is cut off.

There are two main causes of strokes:
• **ischaemic** – where the blood supply is stopped due to a blood clot (this accounts for 85%-90% of all cases)
• **haemorrhagic** – where a weakened blood vessel supplying the brain bursts

Stroke is the 3rd largest cause of death in the UK and the leading cause of adult disability.

Risk factors include high blood pressure, irregular heartbeat (atrial fibrillation), age, a lack of exercise, being overweight, smoking and a poor diet.
What is SSNAP?

The Sentinel Stroke National Audit Programme (SSNAP) is a programme of work which aims to **improve the quality of stroke care** by auditing stroke services against evidence based standards.

It comprises of **two** components:

- **the SSNAP clinical audit**, a continuous audit which measures the **quality of care received by stroke patients**

- **SSNAP organisational audits**, biennial snap-shot audits of **quality of stroke service organisation** for both **acute** and **post acute** services.

SSNAP is now the **single source of stroke data** in England and Wales

Results are publicly available online at [www.strokeaudit.org/results](http://www.strokeaudit.org/results)
Traditional view of clinical audit

• **Old data** are reported back to providers which is of little significance to current practices

• Data collection and entry is **burdensome** and reduces time spent with patients

• Mainly for **judgement** and **assurance** rather than continuous improvement
What makes SSNAP different?

- **Robust Data:** Over 95% of expected stroke cases are entered onto SSNAP – data is meaningful

- **Participation:** 100% participation of acute hospitals in England and Wales are actively entering data to SSNAP – gives a true reflection of national stroke services

- **Timely data:** Results disseminated back to teams within 6 weeks of reporting deadlines – almost real time feedback

- **Big Data:** 185,000 of patient records have been submitted to SSNAP since January 2013 – unprecedented wealth of data

- **Entire Pathway Reporting:** First national stroke register in the world to prospectively collect **longitudinal information** on every stroke patient from **onset to six months after stroke.**

- **Efficient** means of data collection: As ‘**single source of data**’ avoids duplication of data entry, and saves money
Diverse audiences

- Acute Hospitals: 203
- Rehabilitation Hospitals: 92
- Community Providers: 266
- Stroke Survivors: 80,000 (per year)
- Departments of Health: 2
- Regional Networks: 14
- Funding Bodies: 225
- General Public: 60m

Our priority

To turn vast quantity of data into timely, meaningful and accessible information for a range of audiences that can be used to drive change and improvement.
Our methods: Bringing ‘Big Data’ to quality improvement

- A portfolio of **cutting edge data visualisation outputs** for different audiences are produced **every 3 months**

- This suite includes hospital and regional level **slidedecks**, **performance tables**, commissioner **dashboards**, interactive maps, and **patient friendly reports**

- Stakeholder **feedback** regarding accessibility and usefulness of the resources is sought

- Results are made **publicly available** at [www.strokeaudit.org/results](http://www.strokeaudit.org/results)
Individual Team Slideshows

- graphical presentation of audit results
- >60 visual slides produced for each provider, covering 44 key indicators of stroke care
- benchmark’s individual providers’ data against national results/target level
- monthly changes in performance displayed using line charts, run charts, and bar charts
- slideshows are ready to use, intuitive, and easy to understand

"Just had a quick look through the new powerpoint presentation for centre-specific results – excellent! Very accessible, quick and easy to understand. Very well done, just the ticket.” - Consultant Stroke Physician -
**Colour Coded Performance Tables**

- **Summary of performance** based on 10 key aspects of stroke care
- **Level of participation** and data quality are accounted for
- **Changes over time** in performance are highlighted
- Hospitals are **graded** from A-E in each aspect based on their SSNAP performance, and an final overall **SSNAP score** is given
Interactive Maps

- **dynamic online maps**, enabling stroke audit data to be explored further
- **results available** for each aspect of stroke care at any hospital or geographical region at the click of a button
- **provider and regional level comparisons** can be made for each key indicator
- **Changes over time** in performance are displayed.
Clinical Commissioning Group (CCG) dashboards

- **simple, bespoke, and highly visual dashboards**
- **benchmarks** the quality of care and outcomes for each CCG/LHB against national performance
- covers all stroke measures included in the CCG Outcome Indicators Set

“The dashboard is very useful in giving high level data at a quick glance to gain insight into stroke related activities”

-Central Manchester CCG-
Easy Access Version Reports for patients and carers

- ‘Patient friendly’ report that uses **simple language** and **visual aids** to explain results clearly and coherently

- Accessible to people with communication and cognitive impairments

- Written and designed in collaboration with stroke survivors and patient groups

- Produced at national and regional level **every 3 months**

“I enjoyed it all but just wanted in particular to commend the clarity of presentation. The amount of thought that has gone into the layout, size, spacing, use of colour and explanations to ensure that it is as useful and informative as possible to everyone is obvious” - Stroke Survivor -
Are SSNAP reports and data visualisation tools being used?

SSNAP provides users with an unprecedented level of insight into the performance of stroke services.

But are the suite of reporting outputs produced each quarter being used?

Analysis in early 2015 showed downloads of:

>27,000 provider level outputs

>10,000 regional level outputs

>20,000 national level outputs
Have SSNAP data improved patient care?

SSNAP has received numerous case studies from stroke care providers in recent months highlighting how they have used SSNAP data to improve stroke care. The efforts of SSNAP teams to improve their service have been reflected in audit results as the following slides will illustrate.
Musgrove Park Hospital have used SSNAP results to restructure initial acute care processes for stroke patients.

“All strokes now go directly to CT [scanner], being met by either stroke practitioner or level one stroke nurse who is then able to swallow screen, etc... patient is taken directly to the stroke unit, speeding up initial assessments from stroke nurse/stroke specialist consultant and often therapists.

We used SSNAP data to identify that we sometimes only breached [targets] by a few minutes, but now patients are reaching the unit in a much more timely way.”
Mount Gould Hospital has used their SSNAP data to "investigate how more group therapy can be implemented". The median % of inpatient days in which occupational therapy is received has increased from only 23% in October 2013 to 73% in September 2014.
Speech and Language Therapy at Colchester General Hospital

Colchester General has improved their Speech and Language Therapy (SLT) performance by “integrating SLT into the MDT and improving efficiency of referrals and assessments which has doubled the SLT target metric”

Only 45% of SLT target was achieved in October 2013 but this had increased to 72% in August 2014.
And that’s just to name a few!

- Improve nursing care and outcomes for patients!!!
  - Jo Hill, Stroke Nurse, Yeovil District Hospital

- Cheer up the therapists and help to improve and develop our stroke programme.
  - Weston Trust

- Highlight and recognise pitfalls and achievements in our performance.
  - Implementing changes to our practice on the back of this.

- Increase the number of O.T. staff in our acute service
  - Sandwell + West Biham Team

- We have used SSNAP data to...

- Raise awareness of areas where we meet targets and highlights gaps in service provision—UHA

- Highlight in team meetings areas for improving service + compare results with previous publication to check for improvement.

- DIY Analysis to aid improvement in daily minutes and proportional days receiving therapy. Improve efficiency of therapy utilising available staffing and maximising patient participation—Wycombe Hospital

Royal College of Physicians
Setting higher standards
How the RCP Stroke Programme have used ‘big data’ to identify some of the key factors that lead to better quality care?

The wealth of robust, complete data submitted to SSNAP and the Sentinel Improvement National Audit Programme (SINAP) has enabled researchers to identify key factors that impact stroke care.

A number of recent studies have used this ‘big data’:

• Associations between Stroke Mortality and Weekend Working by Stroke Specialist Physicians and Registered Nurses (Bray BD 2014)

• Derivation and External Validation of a Case Mix Model for the Standardized Reporting of 30-Day Stroke Mortality Rates (Bray BD 2014)

• The Effect of Out of Hours Presentation with Acute Stroke on Processes of Care and Outcomes (Campbell J 2014)

• Bigger, Faster? Associations Between Hospital Thrombolysis Volume and Speed of Thrombolysis Administration in Acute Ischemic Stroke (Bray BD 2013)
Adjusted Hazard Ratio of 30-day Mortality of Patients Admitted on Weekends, by Ratio of Registered Nurses Per Ten Beds on the Weekend

Mortality outcomes after stroke are associated with the intensity of weekend staffing by registered nurses but not 7 day or weekend ward rounds by stroke specialist physicians.

The findings have implications for quality improvement and resource allocation in stroke care.

Bray BD, Ayis S, Campbell J, Cloud GC, et al. (2014)
http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001705
This study concluded that hospitals with higher volumes of thrombolysis (clot busting treatment) activity achieve statistically and clinically significant shorter delays in administering tPA to patients after arrival in hospital.

Benjamin D. Bray, MRCP, James Campbell, LLB, Cloud C. Geoffrey, FRCP, Alex Hoffman, MSc, Pippa J. Tyrrell, FRCP, Charles D.A. Wolfe, FFPHM, Anthony G. Rudd, FRCP and on behalf of the Intercollegiate Stroke Working Party Group

http://stroke.ahajournals.org/content/early/2013/09/19/STROKEAHA.113.001981
The Effect of Out of Hours Presentation with Acute Stroke on Processes of Care and Outcomes: Analysis of data from the Stroke Improvement National Audit Programme (SINAP)

This study identified inequalities in the provision of stroke care for people admitted out of regular hours persist in contemporary stroke in England.

The association with mortality is small and largely attributable to higher illness severity in patients admitted out of hours.

Campbell J, Bray B, Hoffman A, Kavanagh S, Rudd A, Tyrrell P.
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0087946
Conclusion

SSNAP is a potential new model of healthcare quality measurement that uses recent developments in big data analytics and visualization to provide information on stroke care quality that is useful to stakeholders.

Stroke service providers, commissioners, policy makers, regulators, public health professionals, and the general public are actively using this information to improve stroke services at local, regional, and national level.

SSNAP has used this big data to identify a number of the key factors that can lead to better quality stroke care.

Similar approaches to quality improvement could be used in other healthcare settings and populations.

For more information

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