Background

Intracerebral haemorrhage (ICH) remains a common and fatal condition
Despite the advances in stroke medicine over the last few decades, spontaneous (non-traumatic) intracerebral haemorrhage (ICH) has remained as common and fatal as ever. The crude incidence has been 24 per 100,000 per year in white people, and 40% of patients die within one month of ICH onset.1

Interventions that benefit both ischaemic stroke and ICH
High quality evidence supports a few interventions which benefit both ischaemic and haemorrhagic stroke. A Cochrane systematic review and meta-analysis finds that stroke units are beneficial2 and observational data suggest that stroke unit care may even benefit patients with ICH more than those with ischaemic stroke.3,4 Although no acute pharmacological intervention appears to benefit ICH,5 secondary prevention by blood pressure lowering with an ACE inhibitor and a diuretic reduces the risk of recurrent stroke, and appears to benefit patients with ICH in particular.6

Surgery for infratentorial ICH
The benefits of posterior fossa (infratentorial) ICH evacuation seem to have been sufficiently evident that randomised controlled trials have not been performed,7 and the procedure is part of standard neurosurgical practice. European and American guidelines recommend that neurosurgical intervention should be considered immediately for people with a >2-3cm cerebellar ICH, especially if it is causing deterioration in consciousness (GCS 9-12 to ≤8), brainstem compression, or hydrocephalus.8,9

Surgery for supratentorial ICH
Early neurosurgical evacuation of supratentorial ICH was not more beneficial than initial conservative management in the STICH trial.10 This single trial result appears to have had a dramatic effect on neurosurgical practice: neurosurgical admissions and clot evacuation procedures declined in Newcastle-upon-Tyne after the trial results were known.11 However, the recently-published Cochrane systematic review of surgery for spontaneous supratentorial ICH, which includes the STICH trial result, shows that surgery reduces death or dependence (although there was heterogeneity amongst the included trials).12 Therefore, some patients may not receive an intervention which could be beneficial, because of the change in clinical practice since the STICH trial result (despite the Cochrane review's findings). European guidelines do not recommend neurosurgical referral of deep ICH, but do recommend referral of lobar ICH within 1cm of the cortical surface which does not reach the deep basal ganglia, especially if it is causing deterioration in consciousness (GCS 9-12 to ≤8). The NICE guideline differs slightly,13 and recommends initial medical treatment of: small deep ICH; lobar ICH without either hydrocephalus or rapid neurological deterioration; a large ICH and
significant prior comorbidities before the stroke; a GCS <8 unless this is because of hydrocephalus; posterior fossa ICH.

The need and opportunity for an audit of ICH treatment in NHS Lothian

Stroke physicians are likely to be unsure about which patients they should refer for neurosurgical intervention given the evidence quoted above. This may result in inappropriate referrals to neurosurgery, or the lack of referral of some patients who might benefit. Admission to a stroke unit is audited in NHS Lothian by the Scottish Stroke Care Audit (SSCA). However, prescription of antihypertensive drugs for secondary prevention and specific standards relating to neurosurgical intervention are not audited. There is therefore a need to extend the SSCA in NHS Lothian to audit current practice against the NICE and European guidelines. There is an ideal opportunity to do so since NHS Lothian has one regional neuroscience centre, integrated electronic records (TRAK) and brain imaging (PACS) systems, and a new dedicated ICH clinical team.

Audit standards

The following referral criteria in the European and NICE guidelines would be audited.

1. No need for referral of:
   - small, deep ICH
   - lobar ICH without either hydrocephalus or rapid neurological deterioration
   - large ICH and significant prior comorbidities before the stroke

2. Referral of:
   - cerebellar ICH >2-3cm diameter
   - ICH causing brainstem compression
   - ICH causing hydrocephalus
   - ICH causing deterioration in consciousness GCS 9-12 to ≤8
   - lobar ICH within 1cm of cortical surface

3. Prescription of antihypertensive drugs at hospital discharge (and in the community)

Methods

Because this audit concerns itself with people who are not referred to neurosurgery, as well as those who are referred, comprehensive case ascertainment will be necessary. Furthermore, since many of the referral criteria are radiological, review of patients’ brain imaging will be necessary. The data collection will be lead by the neurologists in the new dedicated ICH clinical team, and supported by NHS Lothian stroke audit.
personnel, as well as by annual follow-up questionnaires to patients’ general practitioners to ascertain antihypertensive prescribing.

Case definition

We, like others, define ICH as, “the abrupt symptomatic onset of severe headache, altered level of consciousness, or focal neurological deficit, anatomically referable to a focal collection of blood within the brain parenchyma as observed on CT or at autopsy, which was not attributable to prior trauma or haemorrhagic conversion of a cerebral infarction.”

Case ascertainment

All incident ICH in NHS Lothian, between 1 June 2010 – 31 May 2012 in the first instance, using the following sources:

- Death certificates
  - ISD
- Sudden deaths via Procurator Fiscal
- Other post mortems
- Admissions to all hospitals in the region
  - ISD
  - Those who die soon after admission to hospital via TRAK
- Neurovascular clinics
- Review of all brain CTs in Lothian
- Collaborative network
  - Neurologists, neurosurgeons, radiologists, stroke physicians, rehabilitation physicians, acute and emergency medicine, trainees, pathologists

Data collection

The SSCA already records the following data which enable auditing of care for patients with ischaemic or haemorrhagic stroke:

- Evidence of new haemorrhage on scan
- ICD 10 final diagnosis
- Was the patient managed in an acute Stroke Unit

Further data collection will be necessary from electronic patient record and imaging systems to determine:

- Whether a neurosurgical referral was made
- What the neurosurgical opinion was
Whether the patients was admitted to the regional neurosurgical unit
What neurosurgical intervention(s) a patient received
The clinical and radiological characteristics of the ICH

Follow-up data from general practitioners will be required to record:
- Antihypertensive prescription following discharge, in view of its powerful influence on stroke recurrence

Record linkage will be performed with the approval of the NHS National Services Scotland Privacy Advisory Committee, without them needing to provide identifiable information.

Data storage

Data will be stored on the WTCRF NHS server, accessible to audit staff in NHS Lothian (Western General Hospital, Royal Infirmary, St John’s Hospital, Liberton Hospital, Royal Victoria Hospital). Data need to be stored in identifiable format to collect related clinical and radiological data, but they will be pseudonymised in any record linkages performed, and identifiable data will not be released to third parties. Radiological information about ICH will be collected to inform the assessment of the neurosurgical referral standards, and anonymised DICOM images will be stored on a secure server. We are seeking the approval of the NHS Lothian Caldicott Guardian for these data uses.

Audit team

Neurology
Rustam Al-Shahi Salman, consultant neurologist (audit lead)
Neshika Samarasekera, clinical fellow

Neurosurgery
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Ian Whittle, consultant neurosurgeon
Mike Fitzpatrick, consultant neurosurgeon and clinical lead for neurosurgery
Anne Addison, National Neurosurgery Network
Fiona Maxwell, National Neurosurgery Network

Stroke Medicine
Martin Dennis, consultant stroke physician
Lothian Audit of the Treatment of Cerebral Haemorrhage (LATCH)

NHS Lothian audit / clinical effectiveness
This audit has been endorsed and approved by:

- Colin Mumford, Clinical Director, Clinical Neurosciences
- Claire Smith, Chief Nurse and Quality Improvement Team chair, Clinical Neurosciences
- Annette Henderson, Clinical Effectiveness

Caldicott guardian
Dr Alison McCallum, Director of Public Health and Health Policy, NHS Lothian Cladicott Guardian
Lothian Audit of the Treatment of Cerebral Haemorrhage
Overlap with related projects

Lothian Audit of the Treatment of Cerebral Haemorrhage (LATCH)

Lothian study of Intracerebral haemorrhage Pathology, Imaging and Neurological outcome (LINCHPIN)

Clinical data

Blood

Tissue

MRI

PATCH randomised controlled trial

STICH 2 randomised controlled trial

Scottish Stroke Care Audit
References


