

Lothian Audit of the Treatment of Cerebral Haemorrhage (LATCH)



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

Stroke unit care

A systematic review and meta-analysis of randomised trials found that stroke units are beneficial for people with ICH,² and observational data suggest that stroke unit care may even benefit patients with ICH more than those with ischaemic stroke.^{3,4} In 2016, only 71.3% of patients with stroke were admitted to the Edinburgh Royal Infirmary within 1 day of admission (<http://www.strokeaudit.scot.nhs.uk/Publications/docs/2017-07-11-SCCA-Report.pdf>).

Acute blood pressure lowering within 6 hours of ICH onset

The INTERACT2 trial found a non-significant reduction in dependence (but not death) amongst adults within six hours of ICH onset receiving interventions to lower systolic blood pressure to <140mmHg compared to <180mmHg, and a significant reduction in the secondary outcome of death/dependence scores on the modified Rankin scale, so guidelines recommend this intervention. However, the frequency of use of acute BP lowering for ICH in NHS Lothian is unknown.

Withdrawal of treatment and use of DNAR orders

Because of the perceived poor prognosis after ICH and the average age of patients, clinicians frequently consider early withdrawal of treatment and putting in place a do not attempt cardiopulmonary resuscitation (DNACPR) order. However, avoidance of DNAR orders within 5 days of ICH onset along with guideline concordant ICH care are associated with substantially lower case fatality than predicted.⁵ In view of this, the American guidelines recommend that new DNACPR orders (excluding patients who have a DNACPR order in place prior to their ICH) are postponed until at least the second day of hospitalisation and European guidelines, which acknowledge the uncertainty outlined above about DNACPR orders, do not provide any recommendation for when and for whom a DNACPR order should be used.^{6,7} The frequency and timing of placing DNACPR orders in NHS Lothian is unknown.

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,⁸ and the procedure is part of standard neurosurgical practice. European and American guidelines

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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.^{6,7} Surgery for ICH is performed infrequently in NHS Lothian.

Surgery for supratentorial ICH

Early neurosurgical evacuation of supratentorial ICH was not more beneficial than initial conservative management in the STICH trial.⁹ 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.¹⁰ However, the 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).¹¹ 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 national clinical guideline for stroke differs slightly,¹² 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. Surgery for ICH is performed infrequently in NHS Lothian.

Identification of cause underlying ICH

In the first year of LATCH, we found that 15% of ICH were found – after further investigation – to be due to an underlying macrovascular cause (such as an intracranial aneurysm, arteriovenous malformation, or venous thrombosis), or other structural cause such as a tumour; the rest were attributed to cerebral small vessel diseases.¹³ Some of these underlying macrovascular and structural causes may affect the risk of recurrent ICH, which can be reduced by their treatment, so their identification is important.

Secondary prevention with BP lowering

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.¹⁴ However, our earlier LATCH in NHS Lothian in 2010-2012 found that 42% of adults with ICH who were discharged from hospital were on no antihypertensive drugs at all, and by one year this proportion had only decreased to 33%. During 2016-2017, we found that 55% of adults with ICH who were discharged from hospital were on no antihypertensive drugs at all, and only 33% of these adults had a good reason for this (e.g. end of life care, systolic BP already <130mmHg, or contraindication due to hypotension).

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

In LATCH 2010-2013 we audited standards for neurosurgical referral (and found that most patients were appropriately referred or not referred) and secondary prevention with blood pressure-lowering drugs (and found that many patients were not treated). However, improvements need to be made and monitored in investigation for underlying causes, secondary prevention with BP lowering, and there are uncertainties about the frequency of use of interventions that are advocated by some guidelines such as acute blood pressure lowering and avoidance of early DNACPR orders.

We have an ideal opportunity to improve the care of patients with ICH in NHS Lothian by introducing new ICH assessment, consultation and treatment (ACT) guidance, and to monitor it by resuming LATCH. This is happening from 1 November 2018.

Audit standards

1. The ICH ACT guidance should be used for the first assessment of adults with ICH at NHS Lothian.
2. Immediate CT angiography/venography should be performed for adults aged ≤ 50 years and CT brain suggests an underlying macrovascular cause.
3. Acute BP lowering should be considered for adults with acute ICH within 6 hours of onset and systolic BP >150 mmHg.
4. DNACPR if already in place pre-ICH, if the assessment of pre-ICH status indicates that DNACPR is appropriate, or if death from ICH appears imminent. The decision should be discussed with a stroke consultant.
5. If not DNACPR, avoid anticipatory care planning <5 days after ICH onset unless death after ICH appears imminent, or discussed with a stroke consultant.
6. Blood pressure-lowering therapy should be prescribed by hospital discharge if systolic BP is >130 mmHg, unless there is a contra-indication to the use of these drugs (e.g. end of life care, hypotension etc)

Methods

Because LATCH concerns itself with everyone with ICH from acute care immediately after onset to secondary prevention, comprehensive case ascertainment will be necessary. Furthermore, since ICH outcome is influenced by radiological findings, review of patients' brain imaging will be necessary to interpret whether the application of the audit standard is appropriate. The data collection will be led by the stroke and ICH clinical teams, and supported by NHS Lothian stroke audit personnel, as well as by

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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, from 1 November 2018, 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 in NHS Lothian, and SCI Store, to determine adherence to the audit standards above.

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Follow-up data from general practitioners will be required to record blood pressure-lowering prescriptions following discharge.

Record linkage may be performed with the approval of the NHS National Services Scotland PBPP.

Data storage

Data will be stored on an NHS server, accessible to audit staff in NHS Lothian. Data need to be stored in identifiable format to collect related clinical, radiological and prescribing 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 audit standards, and anonymised DICOM images will be stored on a secure server.

Approvals

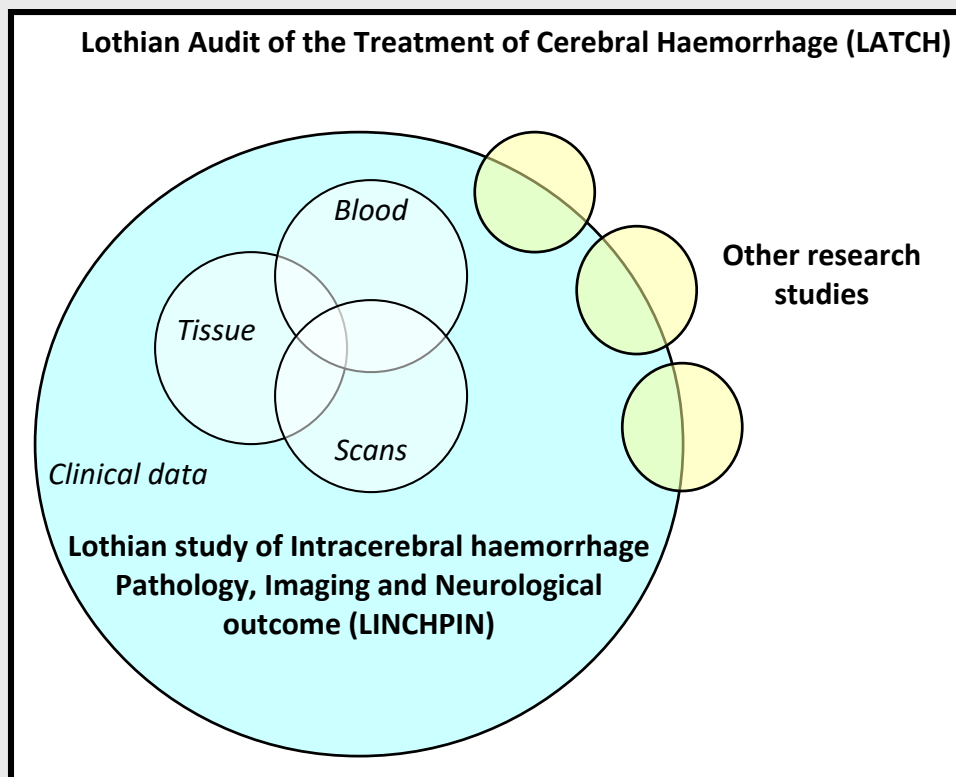
The NHS Lothian Caldicott Guardian approved these data uses for LATCH 2010-2013 and 2018 onwards.

The ICH ACT guideline was developed in consensus with colleagues in NHS Lothian, after their review of the ICH ACT guidance and supporting evidence by representatives of the Emergency Department (Dr S Robinson [clinical director], Kate Easterford), Acute Medical Unit (Dr Andrew Coull [associate medical director], Dr Helen Gillett, SJH clinical director), Critical Care (Dr M Gillies, associate medical director for diagnostics, anaesthetics and critical care), Radiology (Dr F Perks, RIE lead clinician; Dr P Keston, WGH DCN lead clinician; Dr P Maclean, SJH lead clinician), Neurosurgery (Mr P Brennan and Mr M Fitzpatrick [clinical director DCN]), Stroke (Prof M Dennis, lead clinician), Neurology (Dr C Derry, lead clinician), Haematology (Dr Julia Anderson, lead clinician), MOE/Stroke and Integrated Older Peoples service (Billie Flynn, clinical service manager) and NHS Lothian's medical director (Dr Brian Cook).

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Overlap with related projects

Scottish Stroke Care Audit



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References

- ¹ van Asch CJ, Luitse MJ, Rinkel GJ, van der Tweel I, Algra A, Klijn CJ. Incidence, case fatality, and functional outcome of intracerebral haemorrhage over time, according to age, sex, and ethnic origin: a systematic review and meta-analysis. *Lancet Neurol* 2010;9(2):167-176.
- ² Langhorne P, Fearon P, Ronning OM, Kaste M, Palomaki H, Vemmos K, Kalra L, Indredavik B, Blomstrand C, Rodgers H, Dennis MS, Al-Shahi Salman R; Stroke Unit Trialists' Collaboration. Stroke unit care benefits patients with intracerebral hemorrhage: systematic review and meta-analysis. *Stroke* 2013;44(11):3044-9
- ³ Candelise L, Gattinoni M, Bersano A, Miceli G, Sterzi R, Morabito A; PROSIT Study Group. Stroke-unit care for acute stroke patients: an observational follow-up study. *Lancet* 2007;369(9558):299-305
- ⁴ Terént A, Asplund K, Farahmand B, Henriksson KM, Norrving B, Stegmayr B, Wester PO, Asberg KH, Asberg S; Riks-Stroke Collaboration. Stroke unit care revisited: who benefits the most? A cohort study of 105,043 patients in Riks-Stroke, the Swedish Stroke Register. *J Neurol Neurosurg Psychiatry* 2009;80(8):881-7
- ⁵ Morgenstern LB, Zahuranec DB, Sánchez BN, Becker KJ, Geraghty M, Hughes R, Norris G, Hemphill JC 3rd. Full medical support for intracerebral hemorrhage. *Neurology* 2015;84(17):1739-44
- ⁶ Hemphill JC 3rd, Greenberg SM, Anderson CS, Becker K, Bendok BR, Cushman M, Fung GL, Goldstein JN, Macdonald RL, Mitchell PH, Scott PA, Selim MH, Woo D; American Heart Association Stroke Council; Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology. Guidelines for the Management of Spontaneous Intracerebral Hemorrhage: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke* 2015;46(7):2032-60
- ⁷ Steiner T, Al-Shahi Salman R, Beer R, Christensen H, Cordonnier C, Csiba L, Forsting M, Harnof S, Klijn CJ, Krieger D, Mendelow AD, Molina C, Montaner J, Overgaard K, Petersson J, Roine RO, Schmutzhard E, Schwerdtfeger K, Stapf C, Tatlisumak T, Thomas BM, Toni D, Unterberg A, Wagner M; European Stroke Organisation. European Stroke Organisation (ESO) guidelines for the management of spontaneous intracerebral hemorrhage. *Int J Stroke* 2014;9(7):840-55
- ⁸ Morioka J, Fujii M, Kato S, Fujisawa H, Akimura T, Suzuki M et al. Surgery for spontaneous intracerebral hemorrhage has greater remedial value than conservative therapy. *Surg Neurol* 2006; 65(1):67-72
- ⁹ Mendelow AD, Gregson BA, Fernandes HM, Murray GD, Teasdale GM, Hope DT, Karimi A, Shaw MD, Barer DH; STICH investigators. Early surgery versus initial conservative treatment in patients with spontaneous supratentorial intracerebral haematomas in the International Surgical Trial in Intracerebral Haemorrhage (STICH): a randomised trial. *Lancet* 2005;365(9457):387-97
- ¹⁰ Kirkman MA, Mahattanakul W, Gregson BA, Mendelow AD. The effect of the results of the STICH trial on the management of spontaneous supratentorial intracerebral haemorrhage in Newcastle. *Br J Neurosurg* 2008;22(6):739-46
- ¹¹ Prasad K, Mendelow AD, Gregson B. Surgery for primary supratentorial intracerebral haemorrhage. *Cochrane Database of Systematic Reviews* 2008, Issue 4. Art. No.: CD000200. DOI: 10.1002/14651858.CD000200.pub2
- ¹² The National clinical guideline for stroke. Intercollegiate Stroke Working Party. Fifth edition, 2016
- ¹³ Samarasekera N, Fonville A, Lerpiniere C, Farrall AJ, Wardlaw JM, White PM, Smith C, Al-Shahi Salman R; LATCH Collaborators. Influence of intracerebral hemorrhage location on incidence, characteristics, and outcome: population-based study. *Stroke* 2015;46(2):361-8
- ¹⁴ Chapman N, Huxley R, Anderson C, Bousser MG, Chalmers J, Colman S, Davis S, Donnan G, MacMahon S, Neal B, Warlow C, Woodward M; Writing Committee for the PROGRESS Collaborative Group. Effects of a perindopril-based blood pressure-lowering regimen on the risk of recurrent stroke according to stroke subtype and medical history: the PROGRESS Trial. *Stroke* 2004;35(1):116-21