Implementation of 24hr stroke service – anaesthesia & critical care

Judith Dinsmore
Girl 'brought back to life' by revolutionary new stroke treatment at London hospital

ROSS LYDALL | Thursday 20 October 2016 | 0 comments

The procedure is a breakthrough for stroke patients Valery Sharifulin/ Getty Images
Fig 3 Forest plot for a good functional outcome (modified Rankin scale core ≤2) at 90 days, including subgroup analysis by year of study publication.

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Endovascular treatment (including AIMT)</th>
<th>Medical care</th>
<th>Risk ratio (95% CI) M-H, random</th>
<th>Weight (%)</th>
<th>Risk ratio (95% CI) M-H, random</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2013</strong></td>
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<tr>
<td>IMS III</td>
<td>177/434</td>
<td>86/222</td>
<td>13.4 1.05 (0.86 to 1.29)</td>
<td>4.4</td>
<td>0.92 (0.44 to 1.92)</td>
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<tr>
<td>MR RESCUE</td>
<td>12/64</td>
<td>11/54</td>
<td>12.7 0.90 (0.72 to 1.14)</td>
<td>30.4</td>
<td>0.98 (0.85 to 1.14)</td>
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<tr>
<td>SYNTHESIS</td>
<td>76/181</td>
<td>84/181</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>265/679</td>
<td>181/457</td>
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<tr>
<td>Test for heterogeneity: $\tau^2=0.00, \chi^2=0.97, df=2, P=0.62, I^2=0%$</td>
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<tr>
<td>Test for overall effect: $z=0.21, P=0.83$</td>
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<tr>
<td><strong>2015</strong></td>
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<tr>
<td>ESCAPE</td>
<td>89/164</td>
<td>43/147</td>
<td>11.4 1.86 (1.39 to 2.47)</td>
<td>7.9</td>
<td>1.79 (1.13 to 2.82)</td>
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<td>EXTEND-IA</td>
<td>25/35</td>
<td>14/35</td>
<td>10.9 1.73 (1.27 to 2.35)</td>
<td>10.7</td>
<td>1.70 (1.23 to 2.33)</td>
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<td>MR CLEAN</td>
<td>77/233</td>
<td>51/267</td>
<td>10.7 1.70 (1.23 to 2.33)</td>
<td>10.7</td>
<td>1.70 (1.23 to 2.33)</td>
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<td>SWIFT PRIME</td>
<td>59/98</td>
<td>33/93</td>
<td>9.4 1.55 (1.06 to 2.27)</td>
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<td>1.55 (1.06 to 2.27)</td>
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<td>REVASCAT</td>
<td>45/103</td>
<td>29/103</td>
<td>6.1 1.31 (0.73 to 2.33)</td>
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<td>1.31 (0.73 to 2.33)</td>
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<td>THERAPY</td>
<td>19/55</td>
<td>14/53</td>
<td>13.2 1.29 (1.04 to 1.59)</td>
<td>13.2</td>
<td>1.29 (1.04 to 1.59)</td>
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<tr>
<td>THRACE</td>
<td>103/109</td>
<td>82/195</td>
<td>69.6 1.56 (1.38 to 1.75)</td>
<td>69.6</td>
<td>1.56 (1.38 to 1.75)</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
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<td>266/893</td>
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<tr>
<td>Test for heterogeneity: $\tau^2=0.00, \chi^2=5.98, df=6, P=0.43, I^2=0%$</td>
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<td>Test for overall effect: $z=7.24, P&lt;0.001$</td>
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<td><strong>Total (95% CI)</strong></td>
<td>682/1557</td>
<td>447/1350</td>
<td>100.0 1.37 (1.14 to 1.64)</td>
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<td>Test for heterogeneity: $\tau^2=0.05, \chi^2=29.12, df=9, P&lt;0.001, I^2=69%$</td>
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<td>Test for subgroup differences: $\chi^2=22.14, df=1, P&lt;0.001, I^2=95.5%$</td>
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</tbody>
</table>

Filipe Brogueira Rodrigues et al. BMJ 2016;353:bmj.i1754
Thousands of stroke patients to benefit from ‘game-changing’ NHS treatment restoring blood flow to brain

Mechanical thrombectomy to be offered to patients at all 24 specialist centres in England

Katie Forster Health Correspondent | @katieforster | Tuesday 11 April 2017 07:10 BST | 0 comments
Implications for anaesthesia & critical care

• Manpower & resources
• Type of anaesthesia
• Critical care
2. **The service**

Manpower & resources

Imaging in the management of acute and chronic Neurological disease is reflected in increased demand for neuroimaging which is now required on a **24/7 basis**.

A combined interventional neuroradiology service must provide **6-7-day endovascular aneurysm treatment** as well as stroke thrombectomy service. The requirements to do this include:

- Immediate neurosurgical & neurocritical care support collocated on the same site as interventional neuroradiology
- Hyperacute stroke unit collocated with the interventional neuroradiology
- Robust arrangements must be in place to facilitate the discussion of all SAH aneurysm cases with a Consultant Neurovascular Neurosurgeon
- A functioning neurovascular MDT for case review including M&M of SAH cases
- **Anaesthetic support** such that 2 angiography suites can be staffed, if necessary, at the same time during daytime, (when it is much more likely to see two simultaneous treatments requiring intervention.)

24 hour access to the appropriate diagnostic modalities with staff cover to enable this service to be provided safely and robustly including:

- Immediate/next available slot access to multislice CT (16 slice or greater) – if there is not more than 1 multislice CT scanner on site then arrangements must be in place to maintain CT access during service/unexpected downtime
- **24/7 access** to a high field strength MRI scanner with Echo Planar Imaging and multichannel head coils.
2.4 **Staff**

All centres must have sufficient clinicians with appropriate competencies to be able to provide a 24/7 service (an extended hours 7 day service may be acceptable whilst working towards full 24/7 provision. Most eligible patients will present for treatment between 8 am and midnight.

Any post for aneurysm interventional neuroradiology work should have at least two nominated procedural sessions per week. Neurointerventional operators should undertake a minimum of 40 cerebral endovascular interventions per annum, of which a reasonable proportion are thrombectomy.

Centres must have immediate access to:
- Appropriately trained nurses
- Radiographers
- Anaesthetists & ODPs with neuroscience experience

**Stroke pathway requirements (commissioned by CCGs)**

HASU Centres will need access to CT angiography 24/7 (extended hours 7 days per week may be acceptable whilst working towards 24/7 access. (HASU will already have access to 24/7 CT)

Ambulance service agreement for critical patient transfers and Acute and stroke rehabilitation services commissioned such that that they are available for patients to be transferred back for local care within 24 hours of request by the centre.
## Manpower & resources

<table>
<thead>
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<th></th>
<th>2016</th>
<th>→</th>
<th>2017</th>
<th>SGH</th>
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<tr>
<td>Mon</td>
<td>pm</td>
<td>→</td>
<td>all day</td>
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<td>Tues</td>
<td>all day</td>
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<tr>
<td>Wed</td>
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<td>Thurs</td>
<td>all day</td>
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<tr>
<td>Fri</td>
<td>pm</td>
<td>→</td>
<td>all day</td>
<td></td>
</tr>
<tr>
<td>Sat</td>
<td>none</td>
<td>→</td>
<td>all day *</td>
<td>As extra session</td>
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</tbody>
</table>

3 job-planned additional sessions = 1 new anaesthetist

ODPs / Recovery staff – work absorbed
Who should provide the service?

- Isolated site
- Hostile environment
- ASA 3 + patients
- Neuroanaesthetists?
- Consultant delivered?
But....

• Time critical service

• On call commitment to neurosurgery

• No dedicated trainee

• Busy MTC
The reality:
SGH experience workload (May-Oct 2017)

Timings

• Cases referred vs cases that proceed (92 vs 85)

• 42 % after 20.00 hrs

• 143 (16 mins – 185) mins average (range) duration of input

Conflicts / Clashes

• 17 % of cases anaesthetist busy

• 5 cases – thrombectomy was delayed

• 9 theatre cases delayed until completion of thrombectomy
Type of anaesthesia?

• Choice of anaesthesia

• Haemodynamic control

• Timings
Anaesthesia & haemodynamic goals
Current standards and guidelines

• UK Consensus guidelines
http://www.basp.ac.uk/Portals/2/Final%20Thrombectomy%20StandardsSeptember%202015-2%20(1).pdf

• ESO guidance

• SNACC guidance
**Guidance:**

<table>
<thead>
<tr>
<th>Timings</th>
<th>BASP ESO</th>
<th>Onset to arterial puncture &lt;6 hours</th>
</tr>
</thead>
</table>

**Anaesthetic care pathway**

<table>
<thead>
<tr>
<th>Anaesthetic Goals:</th>
<th>BASP SNACC</th>
<th>Choice of anaesthetic – tailor to individual patient but aim for LA +/- sedation if possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimising any time delay</td>
<td></td>
<td>Airway: Tracheal intubation SaO2 &gt;94% Continuous pulse oximetry and capnography</td>
</tr>
<tr>
<td>Haemodynamic control</td>
<td></td>
<td>Haemodynamics: Continuous or 3min BP SBP &gt;140 and &lt;180 mmHg</td>
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<tr>
<td></td>
<td></td>
<td>Postoperative care: HASU/NICU</td>
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</tbody>
</table>
General Anesthesia Increases Health Risks During Blood Clot Removal Surgery: Study

December 28, 2017  Written by: Irvin Jackson  Add Your Comments

The findings of a new study suggests that side effects of general anesthesia (GA) may include an increased risk of health problems for stroke patients undergoing surgical procedures to remove blood clots, leading researchers to conclude that general anesthesia should be avoided “whenever possible.”
Conscious sedation vs General anaesthesia

• **SIESTA**¹
  - No advantage of CS over GA
  - Number of patients with mRS <2 at 3 months higher in GA group

• **AnStroke**²
  - Strict BP control
  - No difference in outcome

• **GOLIATH**³
  - Strict BP control
  - Final infarct volume higher in CS group

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2. Lowhagen et al. Stroke 2017; 481601-07
3. Simonsen CZ et al. ESOC 2017
Effect of general anaesthesia on functional outcome in patients with anterior circulation ischaemic stroke having endovascular thrombectomy versus standard care: a meta-analysis of individual patient data

Bruce C V Campbell, PhD, Wim H van Zwam, MD, Prof Mayank Goyal, MD, Bijoy K Menon, MD, Prof Diederik W J Dippel, MD, Prof Andrew M Demchuk, MD, Prof Serge Bracard, MD, Prof Philip White, MD, Prof Antoni Gávalos, MD, Prof Charles B L M Majoie, PhD, Prof Aad van der Lugt, MD, Gary A Ford, FRCP, Natalia Pérez de la Ossa, MD, Prof Michael Kelly, PhD, Romain Bourcier, PhD, Prof Geoffrey A Donnan, MD, Prof Yvo B W E M Roos, PhD, Prof Oh Young Bang, MD,
AHA/ASA GUIDELINE

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

William J. Powers, Alejandro A. Rabinstein, Teri Ackerson, Opeolu M. Adeoye, Nicholas C. Bambakidis, Kyra Becker, José Biller, Michael Brown, Bart M. Demaerschalk, Brian Hoh, Edward C. Jauch, Chelsea S. Kidwell, Thabele M. Leslie-Mazwi, Bruce Ovbiagele, Phillip A. Scott, Kevin N. Sheth, Andrew M. Southerland, Deborah V. Summers, David L. Tirschwell, on behalf of the American Heart Association Stroke Council
Anaesthesia for intra-arterial Thrombectomy Guideline

Identification
Patients suitable for IAT will be identified after discussion between Neuroradiologist and Stroke consultant

- Neuroradiologist informs Neuro-Anaesthetic Consultant about case and provides initial medical handover. Consultant to inform Registrar on 7647
- Angio suite team to bleep Neuro ODP on 6400

Anaesthetic team meets in Angio suite: Prepare:
- Intubation trolley
- GA drugs: Propofol, Fentanyl, Rocuronium
- Emergency drugs: Ephedrine, Metaraminol, Atropine, Glycopyrrolate
- Metaraminol infusion with long extension, Arterial line set.
- IV Hartmann’s with long extension and 3 way tap.

Take handover from A&E nurse/Stroke Registrar, or Paramedic team if patient’s arriving from distant hospital

Flush cannula, connect IV fluids; if new cannula is required preferably insert in left arm

Patient arrives to Angio Suite

Assess with neuroradiologist and decide to proceed with GA or LA ± Conscious Sedation

ODP and angio suite staff instigate monitoring with ECG, SpO2, and NIBP on 3 minute cycle.
Invasive BP is not routinely required but can be monitored via femoral sheath.

Remember
Time is Brain!

GA
Recommended for patients with:
- Agitation, reduced GCS, nausea and vomiting, posterior circulation stroke.

Airway management:
Endotracheal Intubation is recommended in all patients. RSI for non-fasted patients

Maintenance:
Standard Persus anaesthetic machine is available. Maintain anaesthesia with O2/Air/Sevoflurane.
Aim: PaCO2: 4.5 - 6 Kpa
Aim: SpO2: >94%

If in any doubt proceed with GA

HAEMODYNAMIC MANAGEMENT
Aim for SBP >140mmHg
<180mmHg
Use metaraminol or labetalol infusions to maintain target (start at 10 mil/hr and titrate to effect)

LA
If patient is conscious and cooperative. Always give oxygen via Nasal Cannulae

Patient may require small Fentanyl doses 12.5 - 25 microgram (titrated to effect) prior to groin puncture and contrast injection

Post Procedure:
LA ± Conscious sedation → straight to William Drummond ward.
GA → Neuro recovery (or St James recovery out of hours)
If ICU admission is required for any reason → to be arranged via the stroke team.
Figure 1. Periprocedural MABP stratified by anesthetic management in 128 patients undergoing endovascular therapy following an acute ischemic stroke. Time 0 is baseline values measured just before induction of anaesthesia. R = Reperfusion, E = End of procedure. * = P<0.05. Unpaired t-tests were used to compare between-group MABP differences at each time point.
Critical Care

• Who should be admitted?
• Capacity

• Malignant MCA infarction - 80% mortality
  • Decompressive hemicraniectomy - favourable outcome in 75% of those treated surgically, compared with 24% treated medically along with a significant difference in survival between the surgical and medical groups.

Stroke patients missing out on life-saving treatment after hours

Harriet Alexander

A Sydney hospital with 24-hour stroke care refused to perform a life-saving procedure on a patient because he arrived 45 minutes after business hours.

Prince of Wales Hospital administrators would not allow Shellharbour resident Nick Taousanis to undergo an endovascular clot retrieval in August, despite clinicians being on-site and ready to operate, because the support team had finished their shift, his family were told.
Thank you!