Stroke- the evolution of a system of care in Victoria; Australia

Mick Stephenson
Executive Director – Emergency Operations
Ambulance Victoria
The burden of stroke in Australia

- ~60,000 new or recurrent strokes in 2018 (1 every 9 mins)
- 3rd leading cause of death - 11,000 (2015), 7% of all deaths
- 500K living with effects of stroke (1m by 2050)
- 30% survivors are of working age
- $5 billion annual cost in Australia

Ambulance Victoria

- 4700 suspected strokes transported by AV/year – 10,000+ by other means
Why don’t we see them all - Public awareness

- Less than 50% of patients recognise stroke in themselves
- Call to GP more likely than ambulance.
- ~60% wait to see if symptoms resolve (60% of patients and 80% of public worried about bothering people)
- Call to hospital time 2 hours median for ambulance; 7 hours for GP
- ~45% of patients with TIA do not seek medical attention within 24 hours

Elements of effective stroke care

- Critical mass of believers
- Patient or bystander recognises symptoms and calls 000
- Call taker identifies likely stroke (50/50)
- Paramedic recognition and prompt transport to stroke capable centre (50/50)
- Stroke capable centre offers CT scan (CTA/CTP)
- Thrombolysis
- Transfer protocol (with time targets) in place for LVO
- Effective retrieval system
- Large vessel occlusions managed by endovascular clot retrieval specialist centers
- Registry and research
Victorian stroke care evolution – ‘s’ strategy

- 1st thrombolysis 2003
- Prior to 2007 – no organised state wide system
- Victorian Government Stroke Care Strategy 2007 (strategic framework)
- Appointment of a state-wide stroke project manager and regional facilitators
- Development of new stroke nurse champions in seven regional hospitals (rural cities)
- Comprehensive (multidisciplinary) stroke units in 5 Melbourne Hospitals (now 11)
- Code stroke 2007
Victorian stroke care evolution – AV & ‘s’ strategy

- AV CPG changes – screen and transport
- AV on Victorian Stroke Clinical Network
- AV – Government stroke contract - KPI
- Helsinki model @ RMH 2013 – pre notify Pt details, direct to CT, TPA in CT (61mins to 46mins, 25% decrease in DNT)
- 2013 Introduction of Victorian Stroke Telemedicine (2018 AV)
- Endovascular Clot Retrieval (ECR) – formal protocol for state wide transfers in Feb 2016
- Mobile Stroke Unit Trial – November 2017
Ambulance Victoria – stroke history

- Pre-hospital Stroke Assessment tool introduced in 2006 - 4 part S/S assessment
- 1st stroke Clinical Practice Guideline
- Simple goal - Expeditious transport of patients to the newly active Stroke Units
Melbourne Ambulance Stroke Screening tool and CPG

### Suspected Stroke or TIA

#### Status
- Suspected stroke or TIA

#### Assess
- Symptom onset time
- Stroke Mimics
- Co-morbidities

#### Stroke Mimics
- Intoxication drug/alcohol
- Hypertension
- Hypo/hyperglycaemia
- Subdural haematoma
- Sudden death
- Brain tumour
- Syncope

#### Co-morbidities
- Dementia
- Significant pre-existing physical disability

#### Management
- **Action**
  - BLS – maintain adequate airway and ventilation
  - Manage symptomatically – support affected limbs
  - Provide analgesia as per CPG A0061 Pain Relief: Severe Headache
  - Treat sustained seizure activity as per CPG A0703 Continuous Tonic – Clonic Seizures
  - If GCS < 10 consider intubation as per CPG A0302 Endotracheal Intubation

#### Transport
- **Action**
  - Where patient is unstable consider time to appropriate receiving hospital versus rendezvous with MCA / AAV.
  - If patient is stable with no significant co-morbidities, onset time < 4.5 hours and transport time < one hour – then transfer to the nearest hospital providing thrombolysis or stroke unit care and notify of pending arrival.
  - If patient does not meet criteria above – then transport to a closer centre preferably with stroke unit care / CT imaging.
  - If patient deteriorates consider rendezvous with MCA / AAV.

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**Suspected Stroke or TIA CPG A0711**

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Who are we missing?

- 50% time of call and ?? on assessment
- Posterior circulation stroke – unsteadiness and slurred speech – often missed and misDx
- Dysphasic patients and no other neurology
- Visual abnormalities, eg hemianopia
- Pre-existing disability now with deterioration

No one stroke screening tool will pick them all
## Accessibility of Stroke Care – the first 5 years

<table>
<thead>
<tr>
<th>Year</th>
<th>% AV stroke Patients directly transported to a hospital with SUC and thrombolysis</th>
<th>% of Rural patients</th>
<th>% of Metropolitan patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan – Mar 11</td>
<td>81%</td>
<td>58.5%</td>
<td>88%</td>
</tr>
<tr>
<td>First 9 months of 2012</td>
<td>88%</td>
<td>76%</td>
<td>91%</td>
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</tbody>
</table>
Between 2010 and 2017, 16 rural health services commenced thrombolysis

2010 to 2017 – Strokes within 60-minutes transport time of a thrombolysis centre improved 77% to 95% (p<0.001)

A 3-hour travel time to two endovascular clot retrieval (ECR) centres is possible for 88% of rural cases 97.4% for the entire state

Strategic framework improves access to stroke reperfusion across the state of Victoria Australia. *Internal Medicine Journal* 47 (2017)

Janet Bray, Sonia Denisenko, Bruce Campbell, Michael Stephenson, Jason Muller, Grant Hocking, Peter Hand, Christopher Bladin
Victorian Stroke Telemedicine (VST)

- 2013 implementation of stroke telemedicine for rural Vic
- Monitoring through the Australian stroke clinical Registry (AuSCR)
- 2013 – agreed statewide protocols for rapid transfer to stroke unit hospitals
- 16 Victorian regional sites (by 2017)
- 1 metro site – gateway to Melbourne’s west (July 2018)
- 18 sessional neurologists
- ~120 Calls per month
- Embedded in AV Jan 2018
- Early stage of planned support to northern Tasmania 2019
VST 2017/18

Consultations

- Primary consultations - 1471
- 60% confirmed stroke (~880)

Treatment Recommendations

- TPA – 207
- ECR – 76

Currently

- ~60/Q thrombolysis
- 20/Q to ECR
Victorian Stroke Telemedicine
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<td>Jan – Mar 11</td>
<td>81%</td>
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<td>88%</td>
</tr>
<tr>
<td>Jan – Mar 18</td>
<td>97.4%</td>
<td>95%</td>
<td>99%</td>
</tr>
<tr>
<td>1098 patients</td>
<td></td>
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</tbody>
</table>
Thrombolysis – not the panacea

Numbers needed to treat
90 day independence

4  9  14
Thrombolysis vs ECR (NEJM 2015)
ECR vs Time vs Function

- 200 min Melbourne hospital Median to ECR*
- 90 min MSU median to ECR*

*Time to puncture
Endovascular Cot retrieval (ECR)

State Protocol - Feb 2016 – transfer from VST sites to ECR centre

- Imaging
- Treatment (lysis)
- Transfer
- AV care

Criteria for ECR centres

- High volume
- Neurointervention capable
- Meet the Australian requirements of comprehensive Stroke Service
ECR & AV

- Transfer, communications and medical protocol
- Majority ALS care
- Airway compromise or CVS instability – MICA or Adult Retrieval
- Rx orolingual oedema and mx thrombolysis
Figure 1: Suspected stroke or transient ischaemic attack patients within 60 minutes travel time by ambulance to a thrombolysis-enabled health service, Financial Year 2017/18

99% patients within 60 minutes of thrombolysis enabled health centre

97% patients within 3 hours of ECR centre

Source: Ambulance Victoria 2018
What’s next - Mobile Stroke Unit (MSU)

- AV & RMH commenced on the 20th November 2017
- Operates ~ within 20 km radius of RMH
- Monday – Friday 08:00 – 18:00 hrs
- Ceretom CT – for CTA & CTB and contrast Injector.
- Staff - Stroke nurse, Radiographer, Neurologist, Intensive care and ALS paramedic
- Thrombolysis, Anticoagulant reversal, antihypertensive and anticonvulsant therapies
- Trials – TXA/Alteplase vs Tenecteplase & ACT – FAST assessment
- Telemedicine technology
Mobile Stroke Unit

- 6 dispatches per 10hr day
- Attend 48%
- \( \frac{1}{2} \) are scanned
- ✓ If <6 hrs 50% lysed +/- ECR
- 17% lysed within 60 mins onset (2% best in hosp)

- 36 TPA
- 24 thrombectomy
- ✓ 48 min saving in onset to therapy time
What’s next

- AI in call taking
- MSU expansion
- 24 hours to Rx (DAWN/DEFUSE)
- Utstein collaboration - defined steps for success
- Data linkage – AV to national stroke registry & AV to hospital data

- Pre hospital Notification improvements
  - 60 minute target from door to needle – 21% to 40% stroke (Pulsara)
- LVO identification in field (ACT- FAST)
- Identify other strokes in field
What’s next - Utstein Stroke Meeting June 2018

- Stroke Registry
- Public Awareness/Education
- Early Recognition
- Rapid and Timely Dispatch
- Prehospital Stroke Care and Triage
- In-hospital Basic and Advanced Care
- Smart Technologies
- Accountability
- Culture of Excellence

Global Resuscitation Alliance
Thank You