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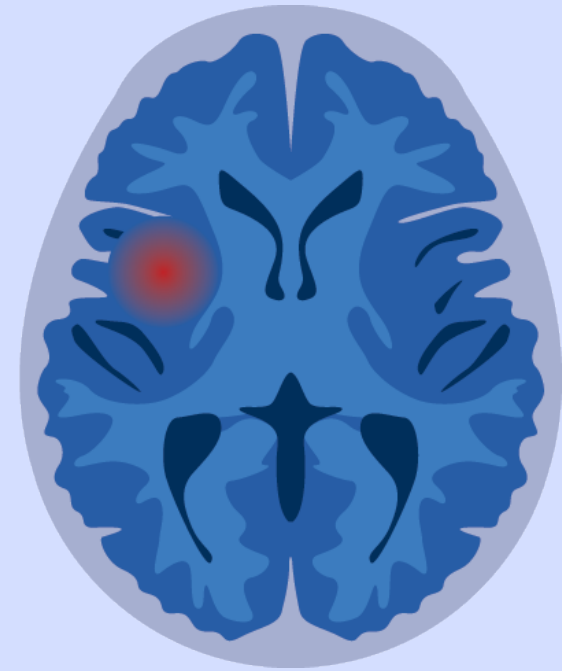
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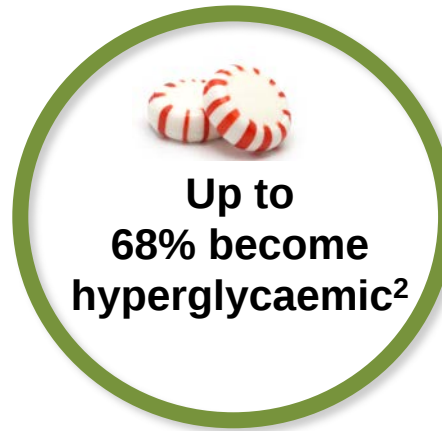
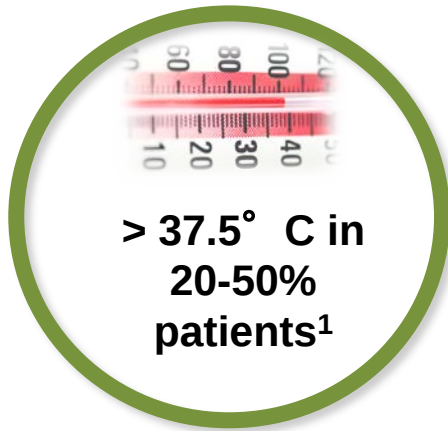
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Triage Treatment and Transfer in Stroke Trial



In the first days of an acute stroke:



All result in increased morbidity and mortality and enlarged infarct size

¹ Azzimondi et al. *Stroke*.1995

² Scott et al. *Stroke*. 1999

³ Martino et al. *Stroke*. 2005

Fever:

- Increased cerebral metabolic demands
- Changes in the blood-brain barrier permeability
- Acidosis
- Increased release of excitatory amino acids

Glucose:

- Toxic to the brain
- Insulin deficiency
- Blood brain barrier disruption

Swallow:

- Aspiration can lead to:
 - chest infections
 - aspiration pneumonia
 - Death

QASC Trial - Intervention



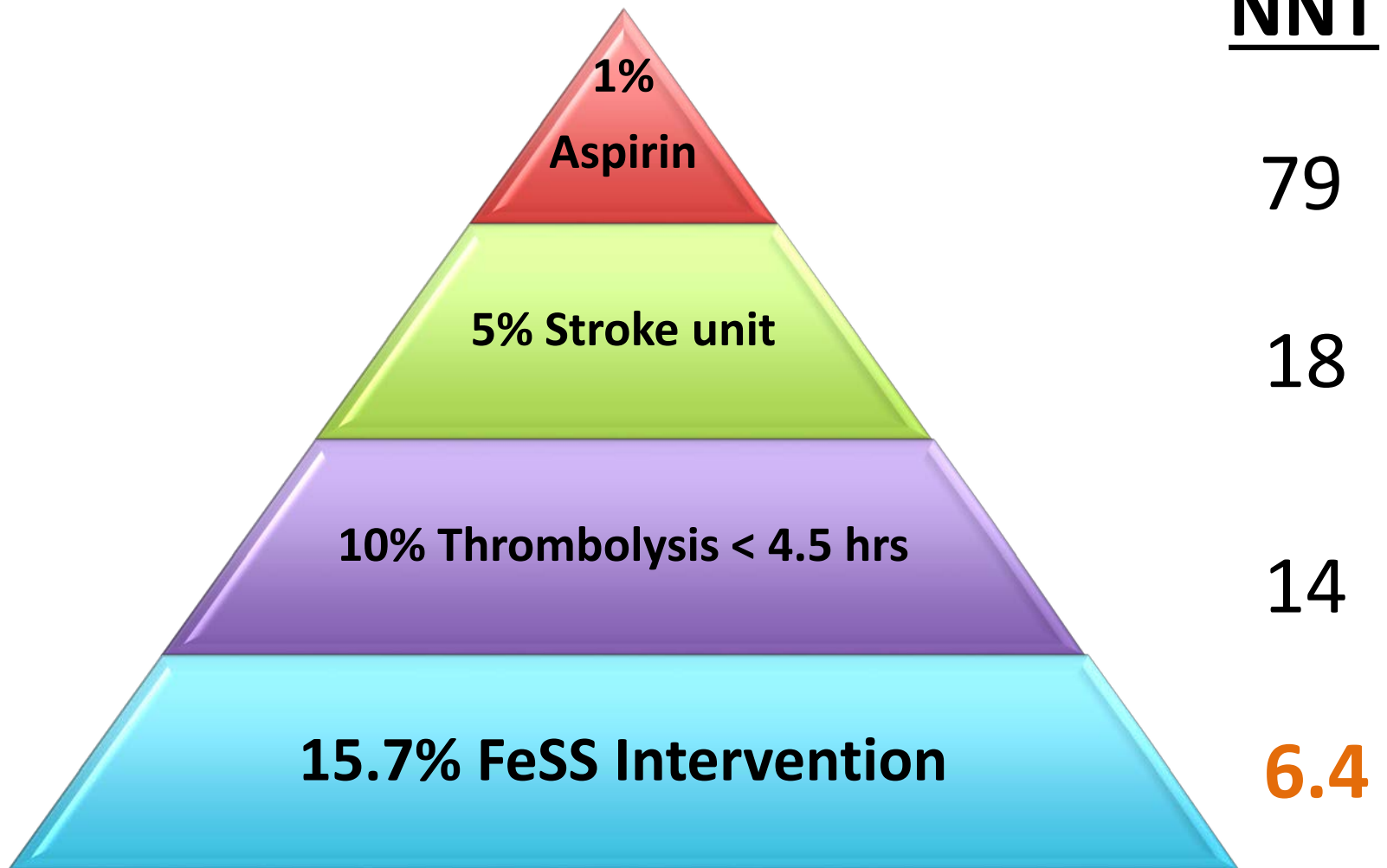
- ***Clinical protocols:*** to manage **Fever, Sugar and Swallowing** (FeSS protocols)
- ***Implementation strategy:***
 - i) Multidisciplinary workshops to assess **barriers and enablers**, reinforce teamwork and provide training
 - ii) Interactive **education** meetings
 - iii) **Reminders** (site visits, telephone and email support)

QASC Trial - Results



- 15.7 % more likely to be **alive and independent** 90 days post-stroke ($p=0.002$)(mRS)
- **lower mean temperature** in first 72 hours of stroke unit admission ($p=0.001$)
- **lower mean blood glucose** levels in first 72 hours of stroke unit admission ($p=0.02$)
- **improved swallow screening** within 24 hours of stroke unit admission ($p<0.001$)
- decreased length of stay ($p>0.144$) (13.7 days v 11.3 days)

Results



THE LANCET

Vol. 378 (9804), 2011

Articles

Implementation of evidence-based treatment protocols to manage fever, hyperglycaemia, and swallowing dysfunction in acute stroke (QASC): a cluster randomised controlled trial

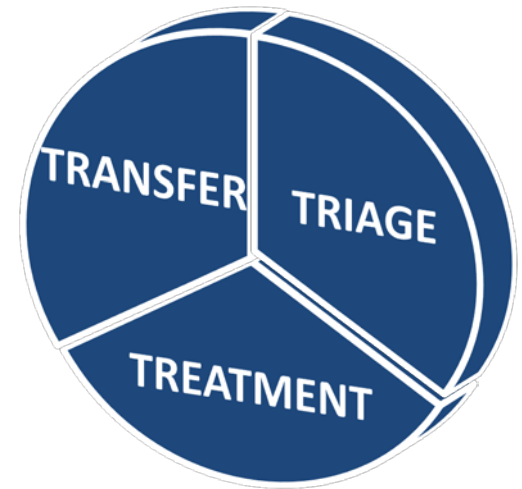
Sandy Middleton, Patrick McElduff, Jeanette Ward, Jeremy M Grimshaw, Simeon Dale, Catherine D'Este, Peta Drury, Rhonda Griffiths, N Wah Cheung, Clare Quinn, Malcolm Evans, Dominique Cadilhac, Christopher Levi, on behalf of the QASC Trialists Group

Middleton S, McElduff P, Ward J, Grimshaw JM et al. Implementation of evidence-based treatment protocols to manage fever, hyperglycaemia, and swallowing dysfunction in acute stroke (QASC): a cluster randomised controlled trial. *The Lancet* 2011; 378(9804): 1699-1706

Background



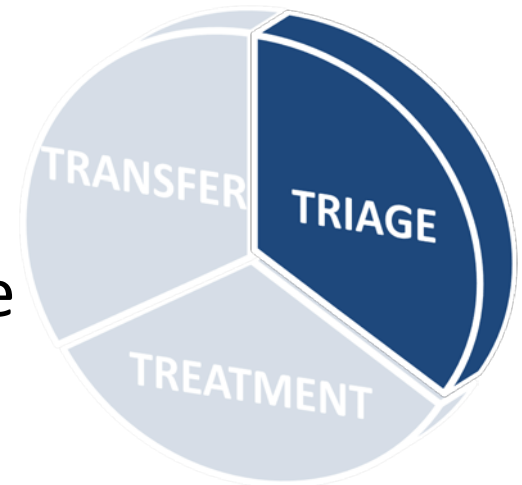
Clinical guidelines
currently recommend
early management of
the stroke patient in the
Emergency Department



Background - Triage



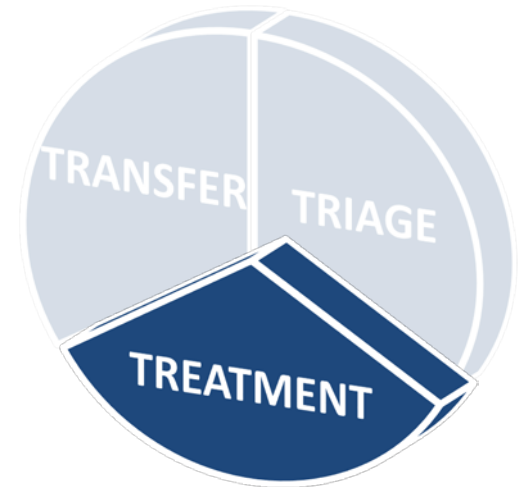
- Triage times of ≤ 10 mins (ATS Cat 1 or 2) recommended for patients with stroke signs/symptoms
 - $< 13\%$ of stroke patients triaged to Cat 2
 - 62% triaged to Cat 3 (seen in < 30 mins)
 - 25% were triaged Cat 4 (seen in < 1 hour)
 - 30% were not allocated an urgent triage category (1 or 2)



Background – Treatment (tPA)



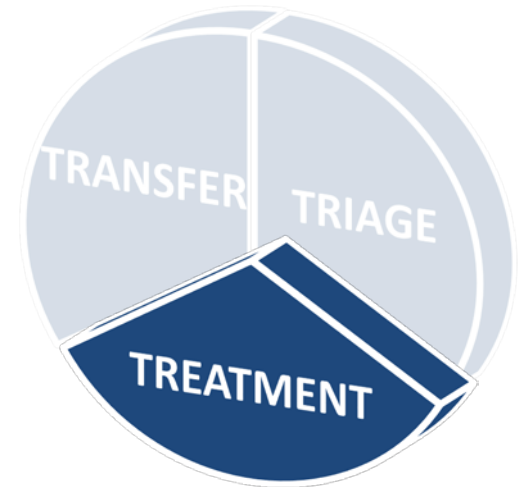
- Only 45% of ischaemic stroke patients presenting to hospital within 3 hrs of stroke were assessed for eligibility for rt-PA (2013)
- Currently, only 7% of eligible patients in Australia receive thrombolytic therapy



Background – Treatment (FeSS)



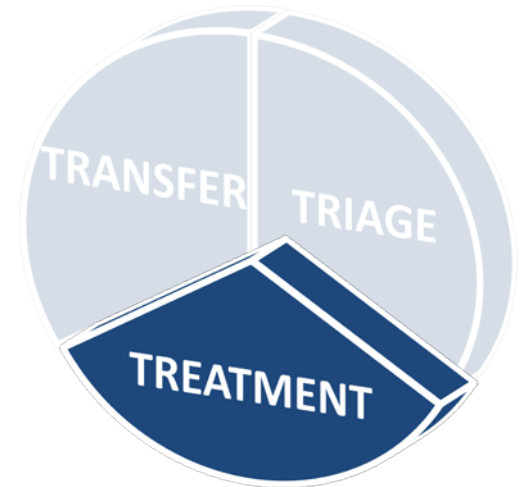
- **Fever:** 60% received regular monitoring in first 72 hrs of admission
- Only 36% with fever (≥ 37.5 C) received paracetamol within 1 hour
- **Glucose:** 21% received regular monitoring in first 72 hrs of admission
- Only 25% patients with hyperglycaemia (≥ 10 mmol/L), received insulin within 1 hour



Background - Treatment (FeSS)



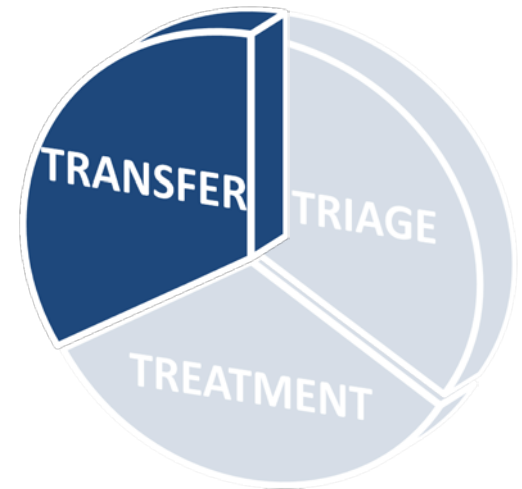
- **Swallowing:** 66% of patients received screen/ assessment within 24 hours of admission
- Only 52% received a swallow screen/ assessment prior to oral intake
- QASC: 22% given oral fluid or food before screen
- QASC: 34% given oral medications



Background



- QASC trial showed a median ED LOS 7 hrs (max 20 hrs)
- ED LOS of 11 hrs (20% >20 hrs)
- Median transfer time from ED to stroke unit of 8 hours



Aim



To develop, implement and evaluate the impact on death and dependency, functional dependency and quality of care, of a multidisciplinary organisational intervention to improve the **Triage, Treatment and Transfer** of stroke patients in Emergency Departments (ED)



Design

- Cluster Randomised Controlled Trial; single blind; allocation concealment; blinded outcome assessment
- Unit of randomisation: EDs
- Unit of analysis: Patients

Sample Size

- 26 sites in 3 states plus ACT
- 682 patients pre-lx
- 1160 patient post-lx

Method



Site eligibility

- EDs in ACT, NSW, VIC and QLD hospitals with:
 - a stroke unit
 - deliver thrombolysis

Patient eligibility

- English-speaking
- Aged ≥ 18 years
- Admitted within 48 hrs of symptom onset
- Clinical diagnosis of stroke
- Not for palliation

Outcome Measures

90-Day Outcome Data



- Computer assisted telephone interview (CATI)
- Death and dependency: modified Rankin Scale (mRS) ≥ 2
 - Functional dependency: Barthel Index (BI)
 - Health Status: Medical Outcomes Short Form 36 Health Questionnaire (SF-36)

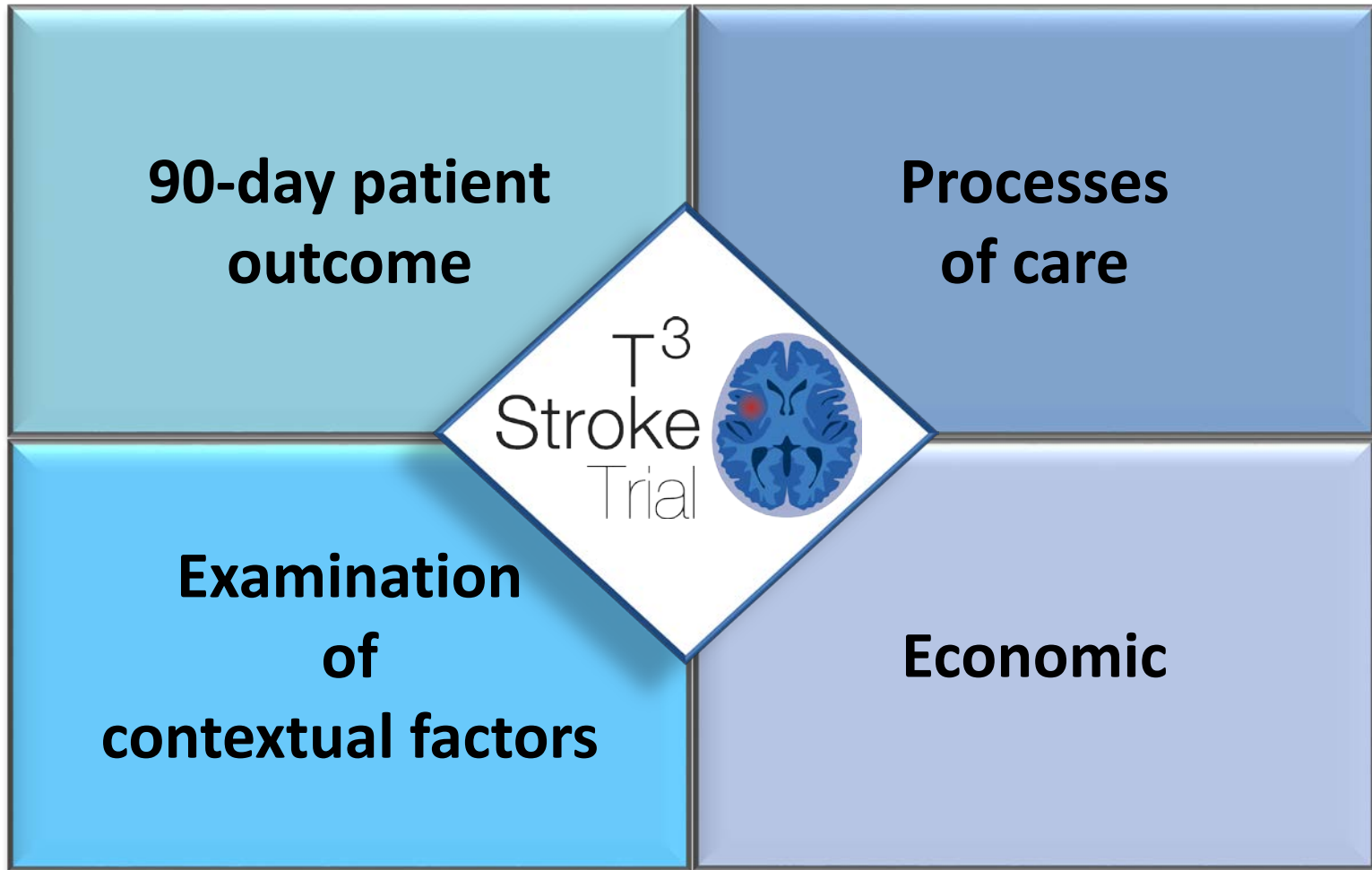
Outcome Measures

Process of Care Data



Retrospective medical record audit

- ATS category allocation; waiting time
- Assessment of eligibility for tPA and result (eligible/ not eligible)
- Receipt of tPA
- Fever, glucose, swallow screen
- LOS: ED, stroke unit, hospital

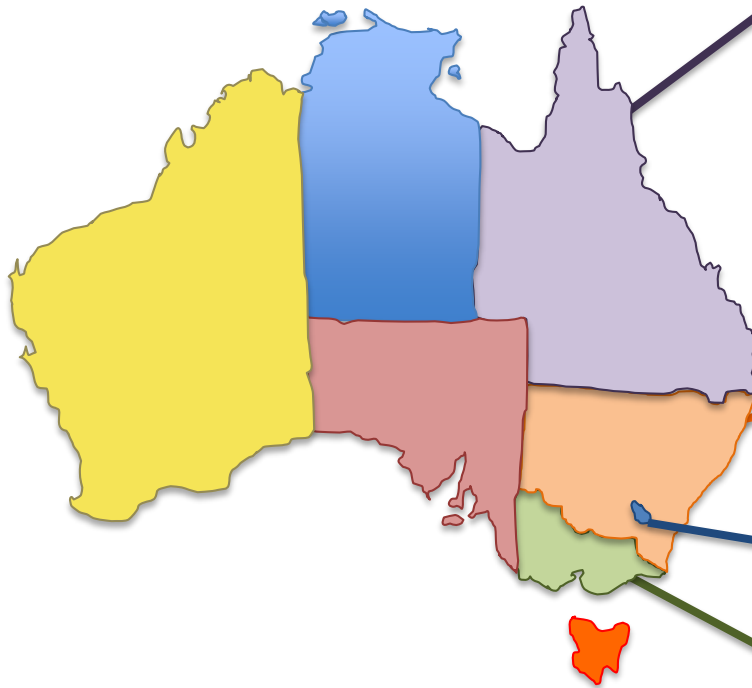


QLD (n=5)

- Gold Coast
- Nambour General
- Townsville
- Royal Brisbane and Women's
- Wesley

NSW (n=10):

- Bankstown
- Bathurst Base
- John Hunter
- Liverpool
- Nepean
- Prince of Wales
- Royal Prince Alfred
- St George
- St Vincent's
- Westmead



ACT (n=1)

- Canberra

VIC (n=10):

- The Alfred
- The Austin
- Bendigo Health
- Box Hill
- Geelong
- Royal Melbourne
- Wangaratta
- Warrnambool Base
- Latrobe Regional
- St Vincent's



Intervention



Care Element

Triage:

- All patients presenting with signs and symptoms of suspected stroke should be triaged at Australian Triage Scale Category 1 or 2 (seen within 10 mins)

Intervention



Care Element

Treatment: **tPA**

- All patients to be assessed for tPA eligibility
- All eligible patients receive tPA

Intervention



Care Element

Treatment: **Fever**

- All patients to have their temperature taken on arrival to ED and then at least four hourly whilst they remain in ED
- Treat temperature 37.5°C or greater with Panadol within one hour



Care Element

Treatment: **Glucose (Sugar)**

- Formal venous Blood Glucose Level (BGL) to be sent to laboratory on admission to ED
- Record finger prick BGL on admission and monitor finger prick BGL every 6 hours (or greater if elevated)
- Administer insulin to all patients with BGL > 10 mMol/L within one hour



Care Element

Treatment: **Swallowing**

- Patients remain NBM until a swallow screen by non-Speech Pathologist (SP) or swallow assessment by SP performed
- No oral food or fluids or meds to be given prior to swallow screen by non-SP or swallow assessment by SP
- All patients who fail the screen are assessed by a SP

Intervention



Care Element

Transfer:

- All patients with stroke to be discharged from ED within 4 hours
- All patients with stroke to be admitted to the hospital's stroke unit



Implementation

- Multidisciplinary Workshops (barrier assessment)
- Identification of site clinical champions
- Implementation plan
- Interactive education
- Reminders:
 - Reminder poster/ pocket cards
 - Site support (site visits; email and phone support)



Barriers: (Triage)

- ED nurses do not perceive treatment of stroke to be urgent/ a medical emergency
- A validated stroke screen tool (eg FAST, ROSIER) is not routinely used in the ED to assist in rapid patient assessment
- ED staff, residents and ambulance staff may be inadequately trained in the recognition of stroke symptoms
- Patients presenting with resolving symptoms or coordination loss are less likely to be triaged category 1 or 2
- Lack of stroke leadership to enable a culture of rapid effective stroke care
- No formal/established hospital protocol (critical pathway) for stroke management including 'Code Stroke' for rapid effective stroke care



Barriers: (assessed for tPA eligibility)

- Physician lack of knowledge/ limited experience with tPA
- ED non-triage staff have poor recognition of stroke symptoms and have inadequate appreciation of the critical importance of time in the management of acute ischaemic stroke
- Stressful and overburdened working conditions
- Lack of staff continuity - staff turnover, leadership changes
- Lack of tPA protocol
- Lack of clinical leadership and institutional support for tPA
- Delays in obtaining CT scans (accessing CT scanner - pt block, distance from ED to CT, reading/interpreting scans)
- Disagreements between emergency services staff and neurologists regarding benefits of tPA
- Lack of teamwork



Barriers: (eligible patients receive tPA)

- No point of care testing in ED and/ or delays in laboratory testing
- Emergency department staff don't triage stroke as an emergency and therefore not considered time critical
- Delays - in requesting CT scan, transporting the patient to Radiology, conducting CT scan and reporting scan by radiologist
- Tasks performed sequentially rather than concurrently lead to delays
- tPA not stored in ED
- Lack of appropriately trained staff to monitor tPA patients and manage any complications
- Difficulties obtaining informed consent (patient/relative) for thrombolysis
- Out of hours delays due to staffing/resourcing issues



Barriers: (Fever monitoring)

- Managing and organising busy nursing workload
- Belief that a patient's condition and individual nurse's clinical judgement should determine the frequency of patient observations
- Lack of fever protocols defining monitoring and treatment for patients with stroke
- The longer the patient stays in the ED, the longer the interval between vital signs' assessment
- Patients with less acute (higher triage) category have their vital signs monitored less frequently than patients with a higher acute triage category



Barriers: (Fever treatment)

- Concern for patient safety issues: does administering paracetamol at $\geq 37.5^{\circ}\text{C}$ mask infection?
- If patient Nil by mouth (NBM) intravenous (IV) paracetamol is not prescribed due to cost
- Reluctance of nurses to administer paracetamol per rectum
- Local protocols restrict nurses to only initiate 1-2 doses of paracetamol

Intervention



Barriers: (Glucose [sugar] monitoring)

- EENs are not assessed to test BGL
- Not enough BGL machines



Barriers: (Glucose [sugar] treatment)

- Not enough syringe drivers or pumps
- Nurse: patient ratio an issue with insulin infusions
- Patient will require nurse escort to tests if on insulin infusion
- ED staff fear instigating and managing of hypoglycaemia
- Lack of consensus about the treatment of hyperglycaemia in stroke
- Lack of insulin dosage algorithms
- EENs not able to adjust insulin under their scope of practice



Barriers: (Swallow)

- Doctors reluctant to use formal swallowing screen (i.e. ASSIST tool)
- Doctors prescribing immediate aspirin when patient 'Nil by mouth'
- Nurses administering aspirin before a swallow screen or assessment
- Clinicians believing 'Nil by Mouth' does not include oral medications
- Speech pathology staff shortages lead to delay in training nurses in swallow screen
- Lack of communication between Speech pathologists, doctors and nursing staff
- Swallow screening will add to nurses' already multiple complex care responsibilities in the ED
- Lack of standardised swallow screening tools in ED

Intervention



Barriers: (Transfer)

- Unavailability of inpatient beds in stroke unit
- Delay in obtaining a porter to transport patient from ED to SU
- Administrative procedures for transferring patients too long
- Pressure to transfer patients out of ED within 4 hours and if no stroke unit bed available stroke patients go to general wards or medical assessment units