Overview

- North Shore 1995
- Nambour 2013
- Charts, processes and guidelines
- Reducing Variations in Care
- Building a Safety Culture
Preventable harm in health care


- Review of 14,000 records
- 16.6% associated with an adverse event
- 51% were considered preventable
- The outcome of the adverse event for 4.9% of patients was death
What types of harm....

- **Diagnostic**
  - Error in or delay in diagnosis
  - Failure to employ an indicated test
  - Failure to act on results

- **Treatment**
  - Error in the performance of an operation or procedure
  - Error in administering treatment
  - Medication error

- **Preventative**
  - Failure to provide prophylaxis
  - Inadequate monitoring or follow up
Millions sought in brain-damage case

By Jewel Topsfield June 22, 2004

Nathan Liu, victim of a treatment that went wrong.

The Royal Children's Hospital in Parkville is being sued for millions of dollars after a four-week-old baby was left severely brain damaged when he was given an intravenous drip with 10 times the recommended dose of glucose.

Nathan Liu, who is now almost three, was admitted to the hospital on September 16, 2001, because his parents, Guilin and Lin Liu, were concerned by his persistent vomiting.
1. Lilli Sweet was six years of age when she died on Tuesday 27 August 2013 from complications associated with a severe bacterial infection.

2. At the time of her death, Lilli was known to have a medical condition, known as hereditary spherocytosis, which made her more susceptible to severe and life-threatening infections. She had a splenectomy (removal of the spleen) performed some two years previously. She was not receiving antibiotic prophylaxis in the time immediately preceding her death.

3. Lilli had a two day history of vomiting, diarrhoea, and headache and was not taking adequate fluid. On 25 August 2013, Lilli’s mother appropriately took her to see a GP. The GP referred her to Nambour Hospital Emergency Department. In a letter of referral the GP clearly stated that Lilli had had a splenectomy and that it was unclear as to whether she was fully immunised. He suggested bloods be taken for analysis and a paediatric review. Lilli was taken by her mother to Nambour Hospital immediately.

4. In the Nambour ED she continued to vomit and complained of headache. On arrival she had a mild temperature of 37.6°C. It was noted that she had ceased prophylactic antibiotics post splenectomy in 2012. She was admitted to the paediatric ward on IV fluids and given paracetamol/ibuprofen. Her headache however persisted. Routine blood tests were not ordered in the ED. These were only ordered once she was admitted to the paediatric ward during the evening. Around midnight the doctor on night shift received advice of test results and that the white cell count was highly elevated at 46.5. No further action was taken in respect to this result. Subsequent expert review opined, that in an asplenic child, such a high white cell count indicates serious sepsis.

5. By the following morning, Lilli rapidly deteriorated with an increasing headache, high fevers and neck stiffness. It was at this time Lilli was commenced on intravenous antibiotics. Soon after, she became unresponsive and required emergency resuscitation. A CT scan demonstrated brain stem herniation. She was intubated, ventilated and transferred to the Royal Children’s Hospital (RCH). Blood cultures grew a Streptococcus pneumoniae.

6. On arrival at the RCH Lilli was unresponsive with fixed dilated pupils. She died on 27 August 2013. A cause of death certificate issued with the cause of death being brain stem herniation due to pneumococcus. Her death was not initially reported to the coroner.

7. Subsequently as per protocol, the RCH conducted an internal death review. Concerns were raised about the management of Lilli at Nambour Hospital. The case was reported to the Office of the State Coroner on 24 September 2013.
We haven't been idle....

- Every State has charts to assist in recognising deterioration
- Every Hospital in the country has an escalation process once deterioration has been recognised
- We have numerous Clinical Practice Guidelines on the management of sepsis and septic shock
- And yet ... in every State last year, children died or had significant morbidity from a delayed diagnosis of sepsis
ViCTOR charts, QLD PEWS, Between the flags...
# Children’s Health Queensland Sepsis Guideline

**Management of Paediatric Septic Shock**

<table>
<thead>
<tr>
<th>Infection</th>
<th>1st Choice Antimicrobial</th>
<th>Alternative antibiotic in the event of immediate type (eg. anaphylaxis) or delayed type (eg. rash) hypersensitivity to penicillins and cephalosporins</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPTICAEMIA</td>
<td>Ampicillin IV (or Amoxicillin IV)</td>
<td><strong>COMMUNITY ACQUIRED SEPSIS (Non PICU)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(For neonates and infants ≤2 months old) Note: If Meningitis suspected treat as stated under MENINGITIS</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>COMMUNITY ACQUIRED SEPSIS (Non PICU)</strong> (For infants and children &gt;2 months old) Note: If Meningitis suspected treat as stated under MENINGITIS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immediate type hypersensitivity, seek ID advice</td>
</tr>
</tbody>
</table>

**Purpose**

The guideline provides recommendations for best practice management of septic shock in paediatric patients. The recommendations and flow diagram in Appendix 1 are consistent with recent international recommendations.

**Scope**

This guideline relates to all CHQ clinical staff.
SEPSIS – assessment and management

This guideline has been adapted for statewide use with the support of the Victorian Paediatric Clinical Network

See also:
- Antibiotics guideline
- Feverle neutropenia guideline
- Feverle child guideline
- Intravenous fluid guideline
- Intravenous access guideline

Background to condition

Septic children may present with:
- warm shock characterised by a wide pulse pressure and rapid capillary refill
- cold shock characterised by a narrow pulse pressure and prolonged capillary refill.

Note: The type of shock may change during resuscitation and needs to be continuously reassessed.

Early recognition and antibiotic administration has been shown to improve survival.

Children at increased risk of severe sepsis include:
- Neonates
- Immunosuppressed children
- Children with central venous access devices

Fluid resuscitation should be judicious; inadequate as well as excessive fluid resuscitation may be harmful.

If, after assessment, you do not think that the patient is septic, refer Feverle child guideline. If you are unsure whether a child may have early signs of sepsis, senior clinician (or paediatrician on-call) review is necessary.
Assessment and Management

**RECOGNITION**

- Fever or hypothermia
- Tachycardia
- Hypotension
- Warm shock – wide pulse pressure, rapid capillary refill
- Cold shock – narrow pulse pressure, prolonged capillary refill
- Tachypnea +/- hypoxia
- Altered conscious state
- Unwell appearance

Call for help from experienced clinician
Apply oxygen 8L/min via face mask (→ Resuscitation guideline)
Continuous cardiorespiratory monitoring

**TIME = 0 min**

**TIME < 15 mins**

If no IV access within 15 minutes insert IO
- Take BC, venous gas and blood glucose (if easy bleed consider FBE, UEC, coags). Do NOT delay other therapy to take blood tests
- Lactate >4mmol/L is a sign of severe illness

**TIME < 30 mins**

**ANTIBIOTICS**

- Give initial antibiotics on cannulation as a push
  - Age <1 month – Cefotaxime IV 50mg/kg + Benzylpenicillin IV 50mg/kg
  - Age ≥1 month – Cefotaxime IV 50mg/kg OR Ceftriaxone IV 50mg/kg (2g) + Fluclaxaciniln IV 50mg/kg (2g)
  - (2g) for age < 1 month and age ≥1 month
  - Antibiotics guideline, Febrile neutropenia guidelines
- If no IV/IO access within 30 minutes:
  - Give IM Ceftriaxone 50mg/kg (2g) and seek assistance in obtaining IV access

**TIME > 30 mins**

**IV FLUID**

- Give initial 20ml/kg bolus of Normal Saline as a push over a maximum of 10 minutes (not through an infusion pump)
- Monitor for improvement in vital signs / conscious state
- If only transient improvement occurs, consider additional fluid boluses to a maximum total volume of 40ml/kg
- Total volumes >40ml/kg should be discussed

**Normal values**

<table>
<thead>
<tr>
<th>Age</th>
<th>Min. sys. BP (mmHg)</th>
<th>HR (bpm)</th>
<th>HR (bpm/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m</td>
<td>60</td>
<td>100-170</td>
<td>40-60</td>
</tr>
<tr>
<td>3m</td>
<td>60</td>
<td>100-170</td>
<td>30-60</td>
</tr>
<tr>
<td>6m</td>
<td>60</td>
<td>100-170</td>
<td>30-60</td>
</tr>
<tr>
<td>1y</td>
<td>65</td>
<td>100-170</td>
<td>30-60</td>
</tr>
<tr>
<td>2y</td>
<td>85</td>
<td>105-160</td>
<td>20-30</td>
</tr>
<tr>
<td>3y</td>
<td>70</td>
<td>90-120</td>
<td>20</td>
</tr>
<tr>
<td>5y</td>
<td>75</td>
<td>75-115</td>
<td>15</td>
</tr>
<tr>
<td>8y</td>
<td>80</td>
<td>70-110</td>
<td>15</td>
</tr>
<tr>
<td>10y</td>
<td>85</td>
<td>60-108</td>
<td>15</td>
</tr>
<tr>
<td>12y</td>
<td>90</td>
<td>60-100</td>
<td>15</td>
</tr>
<tr>
<td>14y</td>
<td>90</td>
<td>60-100</td>
<td>15</td>
</tr>
<tr>
<td>17y</td>
<td>90</td>
<td>60-100</td>
<td>15</td>
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**Antibiotics**
- **Give initial antibiotics on cannulation as a push:**
  - **Age <1 month:** Cefotaxime 50mg/kg
  - **Age >1 month:** Cefotaxime 50mg/kg or Ceftriaxone 50mg/kg (2g) + Flucloxacillin 50mg/kg (2g)
  - **(2g) for age <1 month and age >1/1 month:** Antibiotics guideline, Febrile neutropaenia guideline
  - If no IV/IO access within 30 minutes:
    - Give IM Ceftriaxone 50mg/kg (2g) and seek assistance in obtaining IV access
    - Once IV access is obtained immediately give full IV antibiotic doses as listed above

**IV Fluid**
- **Give initial 20ml/kg bolus of Normal Saline as a push over a maximum of 10 minutes (not through an infusion pump)**
- Monitor for improvement in vital signs / conscious state
- If only transient improvement occurs, consider additional fluid boluses to a maximum total volume of 40ml/kg
- Total volumes >40ml/kg should be discussed with senior clinician

**Inotropes**
- If no improvement in vital signs/conscious state occurs after fluid boluses, correct hypokalaemia and consider:
  - Noradrenaline for warm shock
  - Dobutamine for cold shock
  - Dobutamine can be given via a peripheral IV. A central line is not required at this stage
- Contact Sick Kids Hotline (03)9345 7007 if inotropes are required

**Ventilatory Support**
- For respiratory distress/hypoxia in a patient with normal conscious state consider non-invasive ventilation
- For respiratory distress/hypoxia in a patient with altered conscious state consider intubation/ventilation

**Further Management**
- If initial lactate is >4mmol/L, it should be repeated after ~2 hours of resuscitation. Aim for lactate clearance of >10%
- Correct hypokalaemia
- Monitor BSL
- Secondary resuscitation measures including second inotrope, steroids, haemofiltration, and ECMO should be discussed.
High Reliability

- Building systems that make it impossible to do the wrong thing
  - ATM - money / card - card / money

- Some other examples...
High Reliability in Health care ...

- Is it possible to deliver?
- Can we design a system that improves reliability of care for sepsis
Flipping Health Care

- Flip the balance of care - from the hospital to the community
- Flip the balance of delivery - from individual providers to care teams
- Flip the balance of power - from the provider to the patient and family
- Flip the balance of costs - from treatment to prevention and co-production
- Flip the balance of emphasis from volume to value; and from health care to health
Behavioural change

- [https://www.youtube.com/watch?v=P6iLULz_wOg](https://www.youtube.com/watch?v=P6iLULz_wOg)

- Understand core beliefs when planning behavioural change

- Its the big ticket!
Workshop ....

- Design a system that improves reliability of care for children with sepsis
- You might want to consider
  - Enablers
  - Barriers
  - Staff Engagement
  - Decision Support
  - Sustainability
Reducing variations in care

- Measurement
- Enablers
- Barriers
- Staff Engagement
- Decision support
- Measurement
- Sustainability
Leadership drives Culture

Culture drives the rest ...
Building a Safety Culture

- High Functioning Teams
  - Leadership
  - Situational awareness
  - Mutual support
  - Structured communication
Effective Teams

- Shared goals
- Clear role delineation
- Psychological safety
- Structured communication
- Small power gradient
Patient Safety Messages

- Don’t jump to conclusions - premature closure or cognitive bias ie. two ronnies video available at https://www.google.com.au/search?q=two+ronnies+wallpaper&ie=utf-8&oe=utf-8&gws_rd=cr&ei=MNAdV76RIOPemAWNt4_gDw

- Arrogance or self-importance due to positional authority - USS ship and lighthouse video available at https://www.youtube.com/watch?v=GQm5P2KypeE

- Don’t use inappropriate pranks or humour in front of patients - video of zapping the fly available at https://www.youtube.com/watch?v=jfPbQZdUsBo

- Don’t make assumptions about what patients want without asking them what matters to them https://www.youtube.com/watch?v=fjJACryRAOA