Broad System Improvement: The NSW experience

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Clinical Excellence Commission

Paediatric Patient Safety Program

NSW GOVERNMENT

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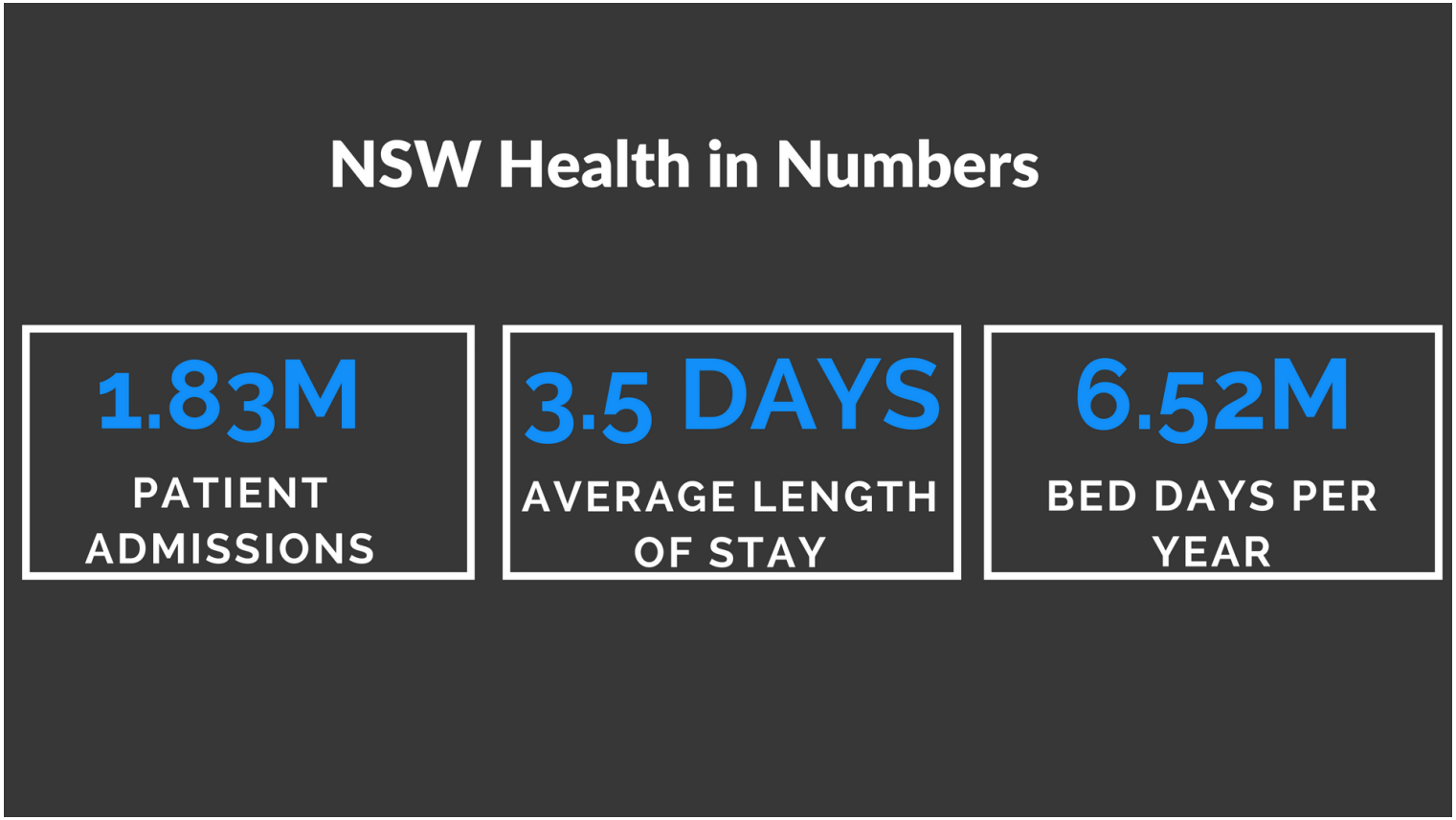
The Clinical Excellence Commission

is responsible for leading safety and quality

improvement in the NSW public health **system**

2018 Was Busy!



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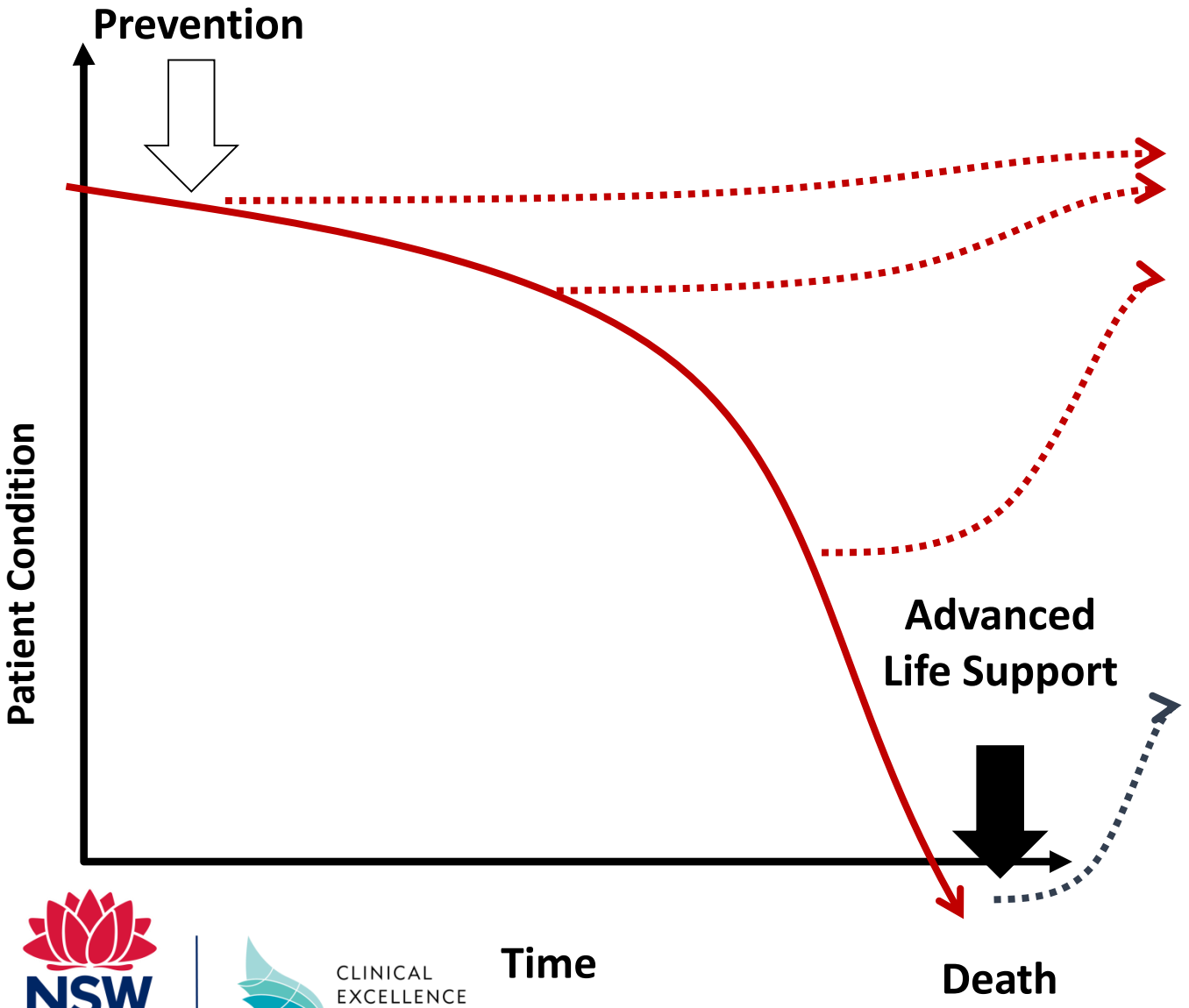
Moving up the ‘slippery slope’



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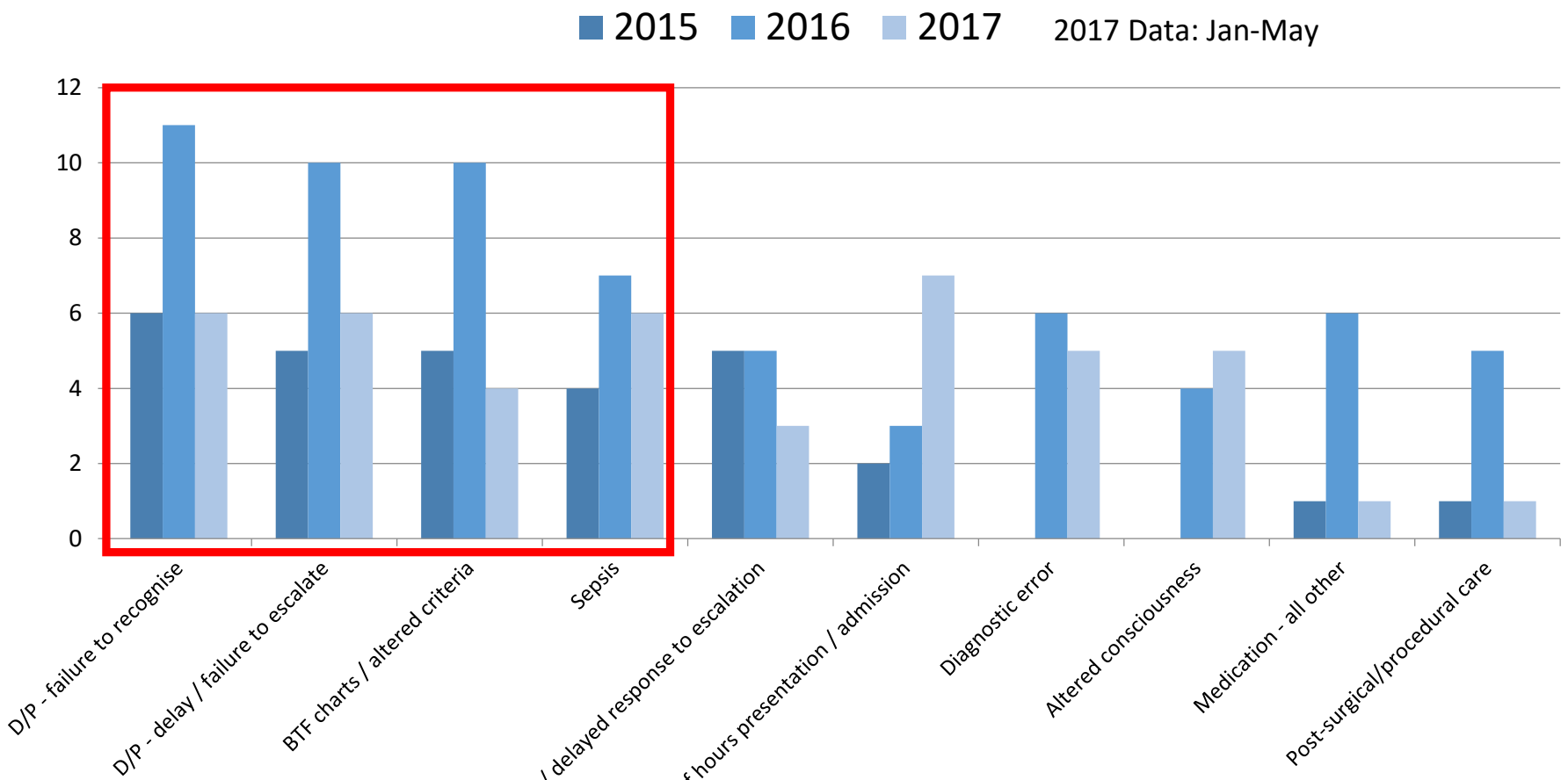
Top 10 RCA risk groups



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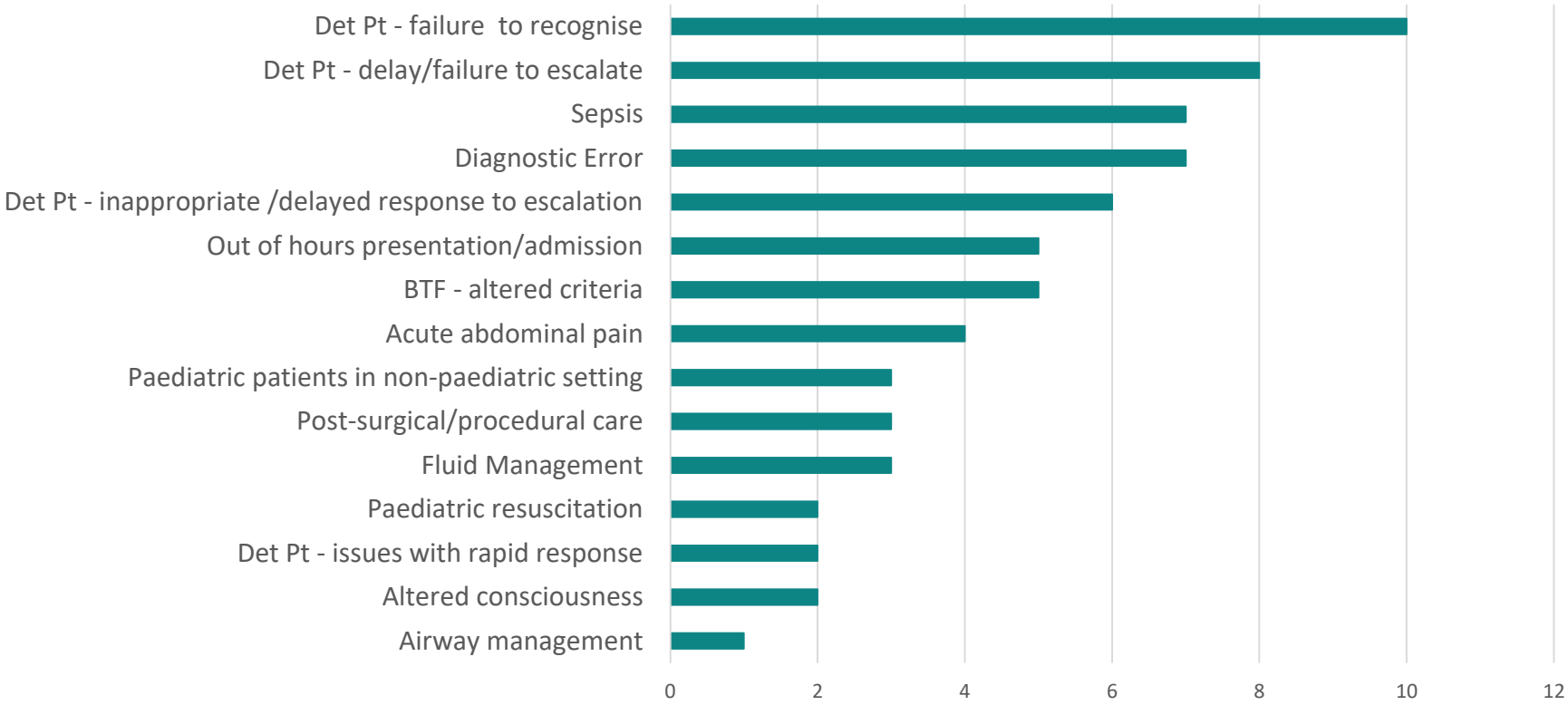
SAC1 Risk Groups
2017



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The Problem

- Failure to recognise,
- Failure to respond to deteriorating patients
- Sepsis

"Patients don't suddenly deteriorate.
Healthcare professionals suddenly notice"

Dr Patrick Brady, Cincinnati Hospital

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Keeping Patients Safe- Between The Flags

Program Aim

To improve early recognition and response to clinical deterioration and thereby reduce potentially preventable deaths and serious adverse events in patients who receive their care in NSW public hospitals.

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NSW Approach

- Broad clinician engagement and consultation
- Standardisation across NSW
- A ‘sick’ child is sick wherever they are
- Allow facilities to customise their response
- Promote and support clinical judgement
- Move to EMR

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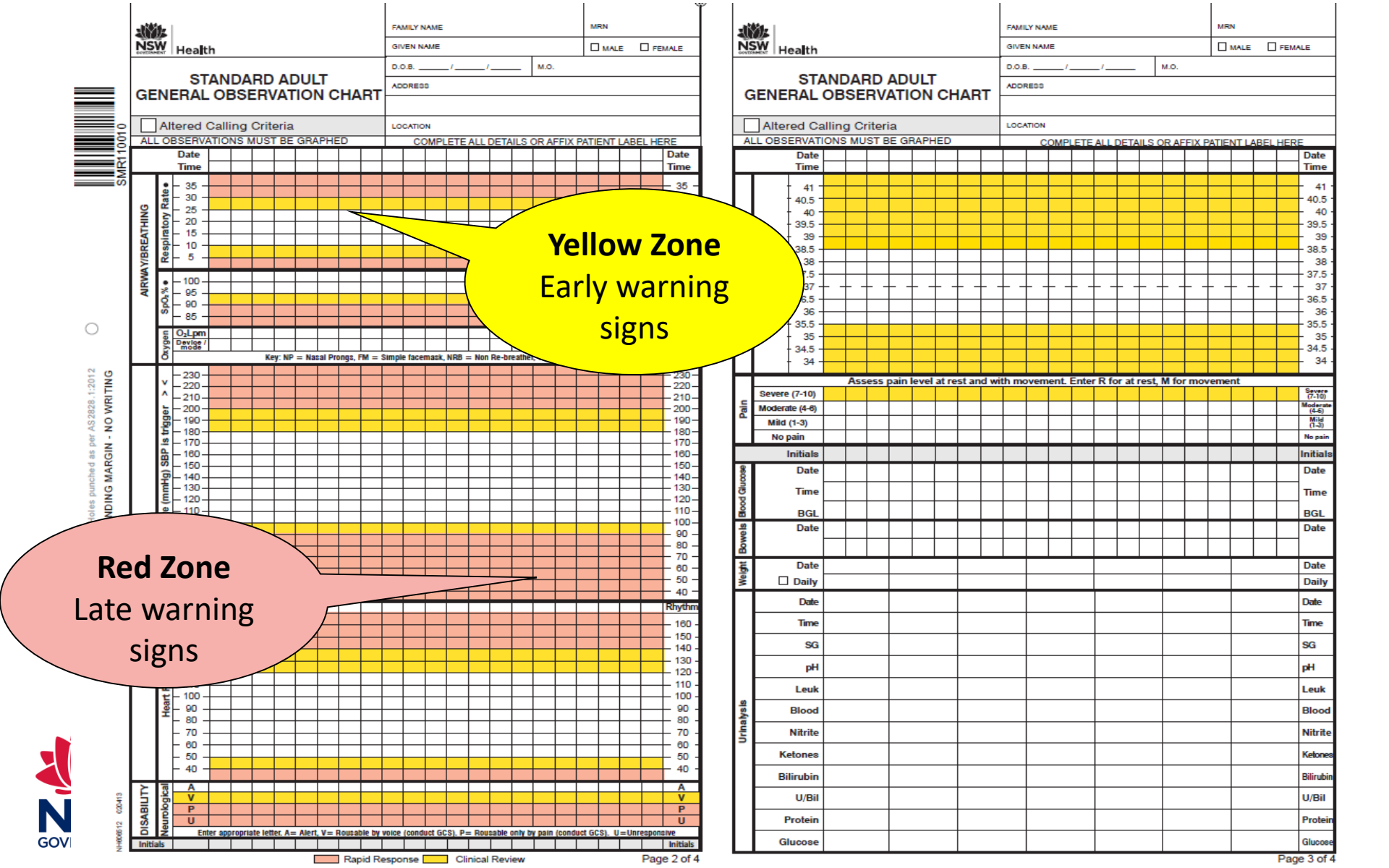
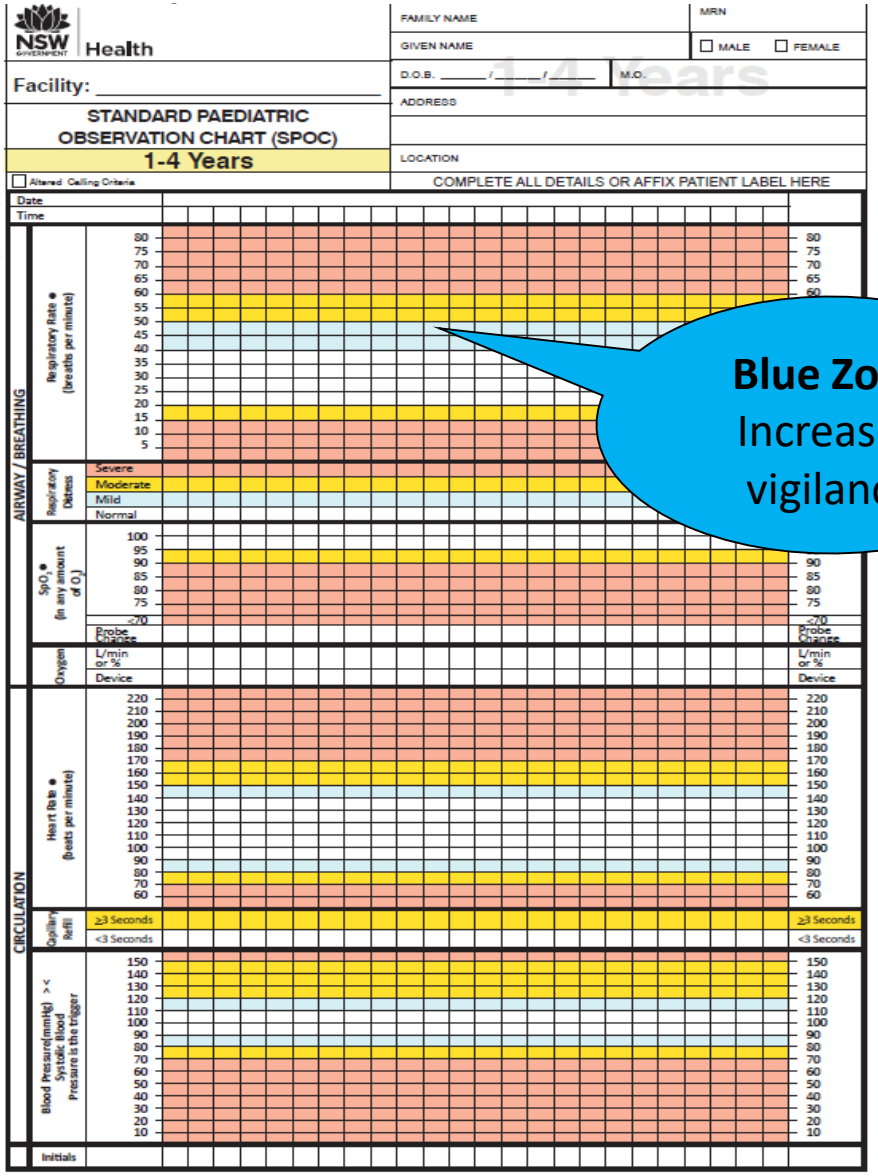
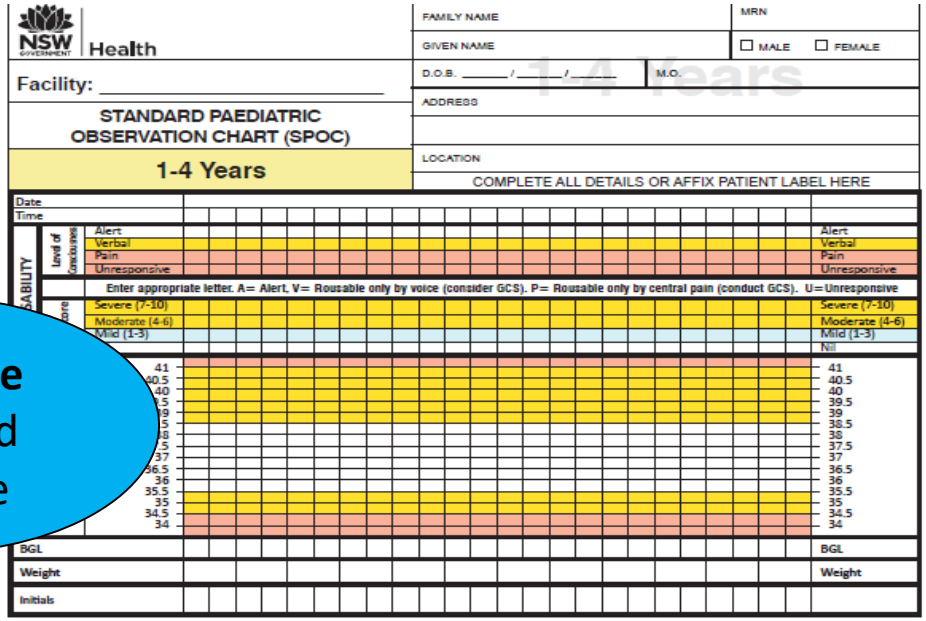
Standard Adult General Observation Chart



Standard Paediatric Observation



Blue Zone
Increased vigilance



CONSIDER EARLIER ESCALATION OF PATIENTS WITH
- Chronic or complex conditions
- Post-operative
- Pre-Existing cardiac or respiratory conditions
- Opioid Infusions

ADDITIONAL CRITERIA FOR ESCALATION ON BACK PAGE

ASSESSMENT OF RESPIRATORY DISTRESS

	MILD	MODERATE	SEVERE
Airway	• Stridor on exertion	• Stridor at rest • Partial airway obstruction	• New onset of stridor • Imminent airway obstruction
Behaviour & Feeding	• Normal • Talks in sentences	• Some / Intermittent irritability • Difficulty talking or crying • Difficulty feeding or eating	• Agitated /Confused • Drowsy • Unable to talk or cry • Unable to feed or eat
Respiratory Rate	• Mildly increased	• Respiratory rate in the yellow zone	• Respiratory rate in the red zone • Decreasing (exhaustion)
Accessory Muscle Use	• None /Minimal	• Moderate recession • Tracheal tug • Nasal flaring	• Severe recession • Gasping • Grunting • Extreme pallor • Cyanosis • Absent breath sounds
Apnoeic Episodes	• None	• Abnormal pauses in breathing	• Apnoeic episodes
Oxygen	• No oxygen requirement	• Mild Hypoxaemia, corrected by oxygen • Increasing oxygen requirement	• Hypoxaemia, may not be corrected by oxygen

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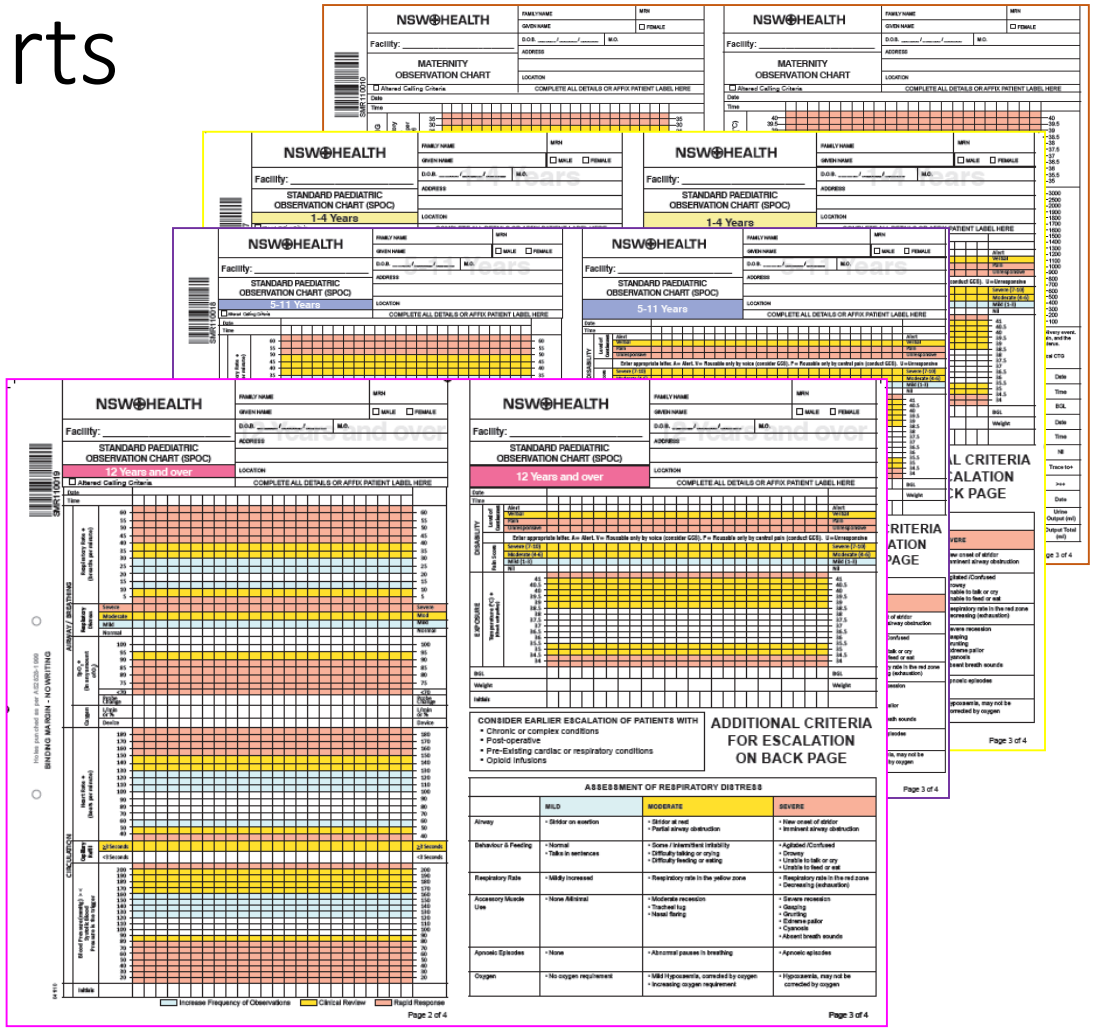
Observation Charts

- **5 Paediatric Charts**
- **Neonatal**
- **Maternity**
- **Emergency Dept.**



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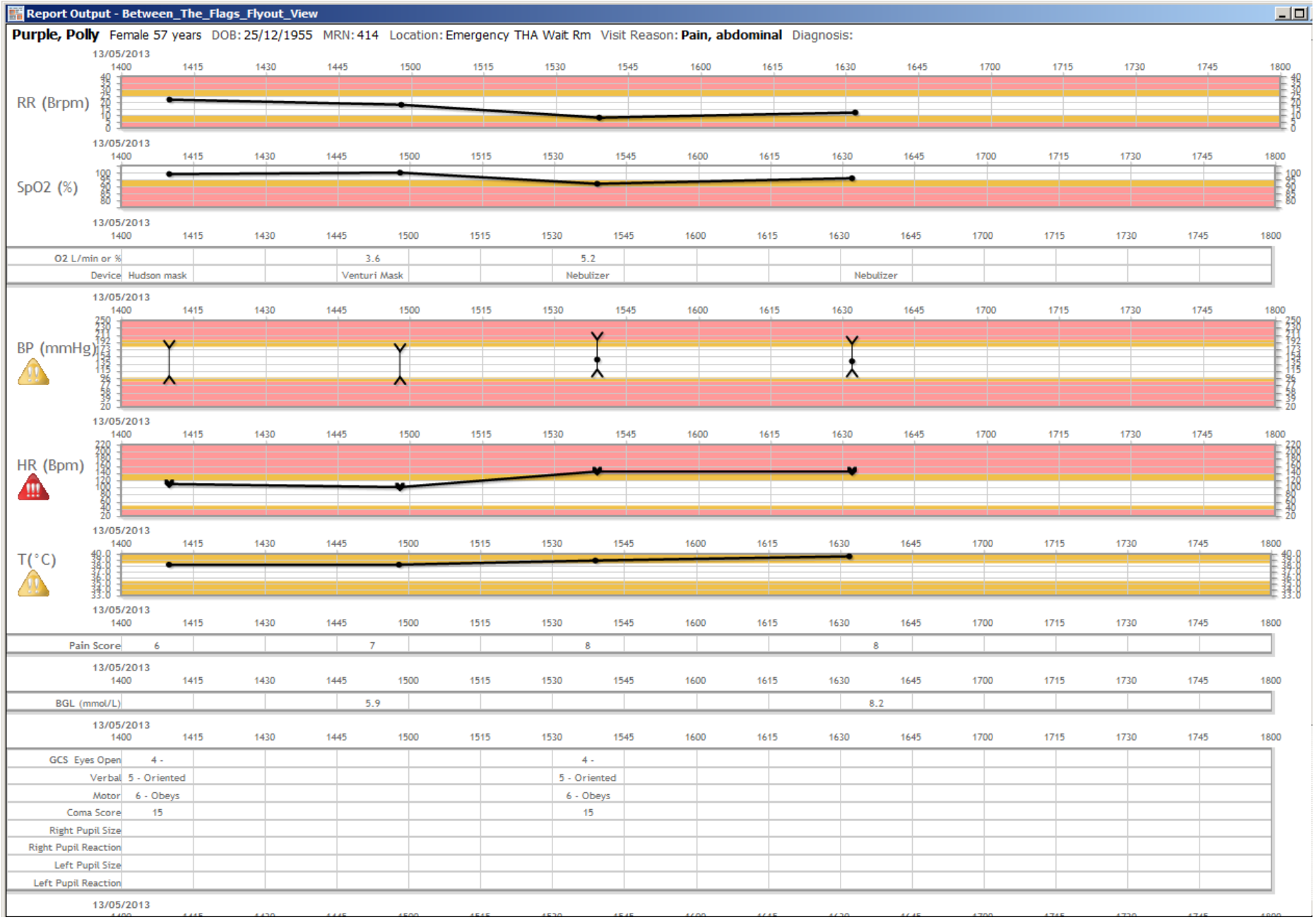
BTF in the electronic Medical Record



SEPSIS IN NSW

The problem: fail… a

Elijah's death prompts new set of guidelines for treating children

Paul Bibby
COURTS

CLEAR and simple guidelines for treating children who are suffering from potentially life-threatening sepsis infections will be introduced at hospitals across NSW following the death of four-month-old Elijah Slavkovic, NSW Health says.

The inquest into Elijah's death in May 2009 from meningococcal meningitis has heard that he wasn't given the antibiotics needed to treat the infection for more than seven hours after he first presented at a South Coast hospital vomiting and with a high temperature. Two doctors and a nurse who treated the baby during the most crucial period of his care said they had been unaware that, under NSW and federal health policies, they should have administered antibiotics earlier.

Elijah Slavkovic ... was not given needed antibiotics soon enough.

NSW Health tendered a letter from the state's top paediatrician, Les White, yesterday setting out a series of changes to the health system as a result of Elijah's death. Elijah's mother Sandra Bernobic welcomed the move.

"It'll never bring back Elijah but if we can save one life then I've done what I came here to do," she said. "It becomes Elijah's little flow chart in my mind. I want to see that these have been put into place and what feedback has come from them. People can make recommendations, but unless they actually do it, it means nothing."

The new guidelines include the introduction of a Paediatric Sepsis Pathway – a clear, easy to understand flow chart that guides doctors and nurses, step by step, through the process of assessing children who may have septic infections, and the appropriate treatment options.

The chart directs doctors and nurses to administer antibiotics within an hour if a child presents with symptoms such as a temperature above 38.5 degrees, elevated heart rate, abdominal pain, neck stiffness and headache.

Professor White said the chart was being trialled at several hospitals and would then be rolled out statewide. The inquest heard that this roll-out would take place next year, and every hospital would have a chart in its emergency room by March.

Coroner Carmel Forbes on Wednesday adjourned the inquest until April next year so that the effectiveness of the new guidelines could be evaluated before she handed down her formal recommendations.

The inquest heard that while meningococcal meningitis can be difficult to diagnose, there is relatively low mortality rate of 5 to 10 per cent among children if the illness is treated quickly with antibiotics.

The administration of antibiotics to Elijah was delayed for crucial hours while doctors carried out a series of blood and urine tests in an attempt to diagnose what was wrong, and to arrange for his transfer to hospital with a paediatri intensive care unit.

In calls between 1.20am an 1.30am on the night Elijah cam to hospital, the paediatric regis trar of Canberra Hospital and consultant paediatrician at the Newborn Emergency Transpor Service advised of the urgen need to administer antibiotics It was another 90 minutes before they were.

At 4am Elijah was flown to Canberra Hospital. His condition initially improved but then deteriorated rapidly and he suffered several violent seizures. By the time he arrived at Sydney Children's Hospital he had severe brain damage.

Ms Bernobic said yesterday the hearings had been gruelling but she would return in April.

"On the inside I'm screaming," she said.

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http://www.cec.health.nsw.gov.au/incident-management/clinical-focus-reports

SEPSIS KILLS PROGRAM

Aim: Improve sepsis recognition and management and reduce preventable harm to patients in NSW hospitals

RECOGNISE

Risk factors, signs and symptoms of sepsis

RESUSCITATE

With rapid IV antibiotics and fluids within 60 minutes

REFER

To specialist care and initiate retrieval if needed

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OBJECTIVES

- Promote uptake of standardised decision support tools
- Improve reliability of recognition of sepsis
- Decrease time to commence treatment
- Promote appropriate use of antibiotics

- Decrease the rate of in-hospital sepsis related mortality
- Decrease admissions/length of stay in ICU
- Decrease hospital length of stay for sepsis related admissions

Reliability: bundle six actions

Give oxygen

Take a lactate

Take blood cultures

Give empirical intravenous antibiotics

Administer intravenous fluids

Monitor and get early senior review

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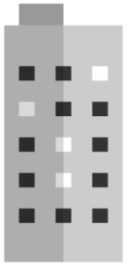
TIMELINE

Between the Flags
Keeping patients safe
A statewide initiative of the Clinical Excellence Commission



2010	2011	2013	2014	2015	2016
Sepsis Pilot in 5 EDs	Sepsis Adult Emergency	Paediatric Emergency + REACH	Inpatient wards	Maternal and Newborn	**All pathways published as medical record forms**

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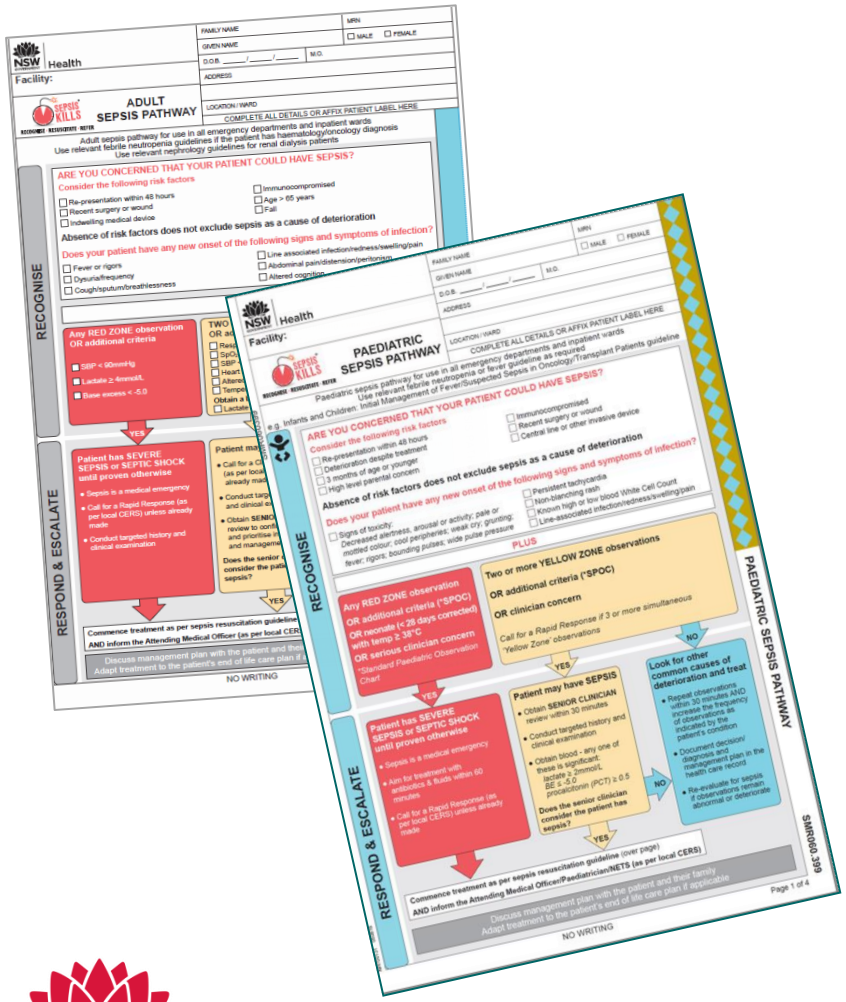
SEPSIS TOOLKIT



Guide to ‘think sepsis’

NOT prescriptive ……clinical judgement is **KEY**

Emphasis on senior clinician review

6 interventions - O_2, lactate, cultures, abs, fluids, monitoring

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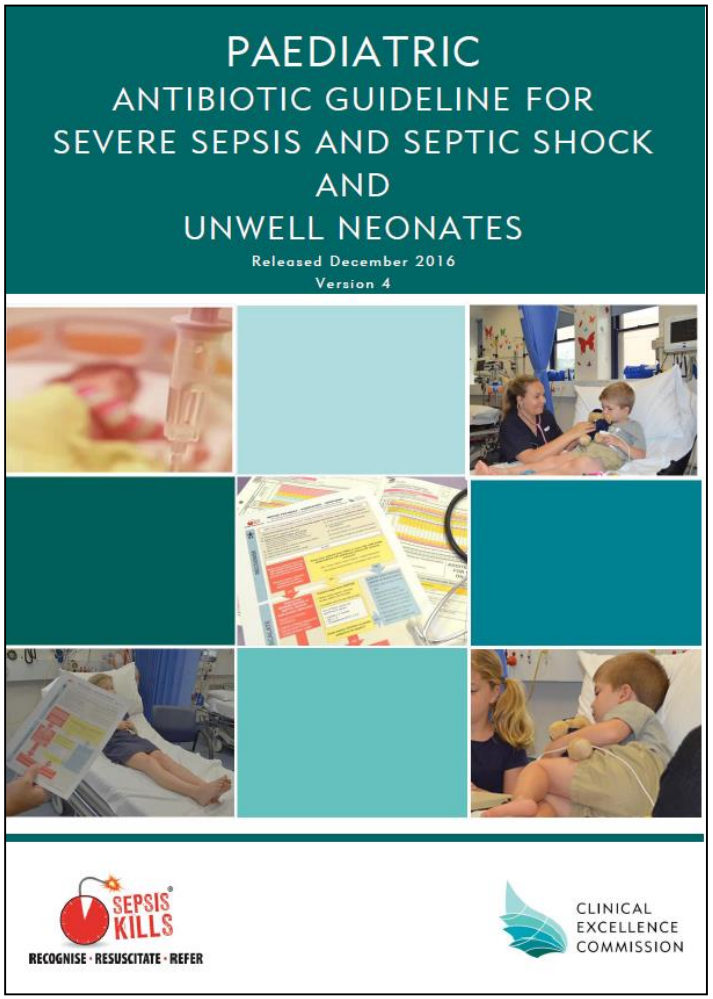
Antibiotic guideline



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http://internal.cec.health.nsw.gov.au/cec/SEPSIS

EDUCATION

- Deteriorating patient education
- Paediatric Watch Newsletters

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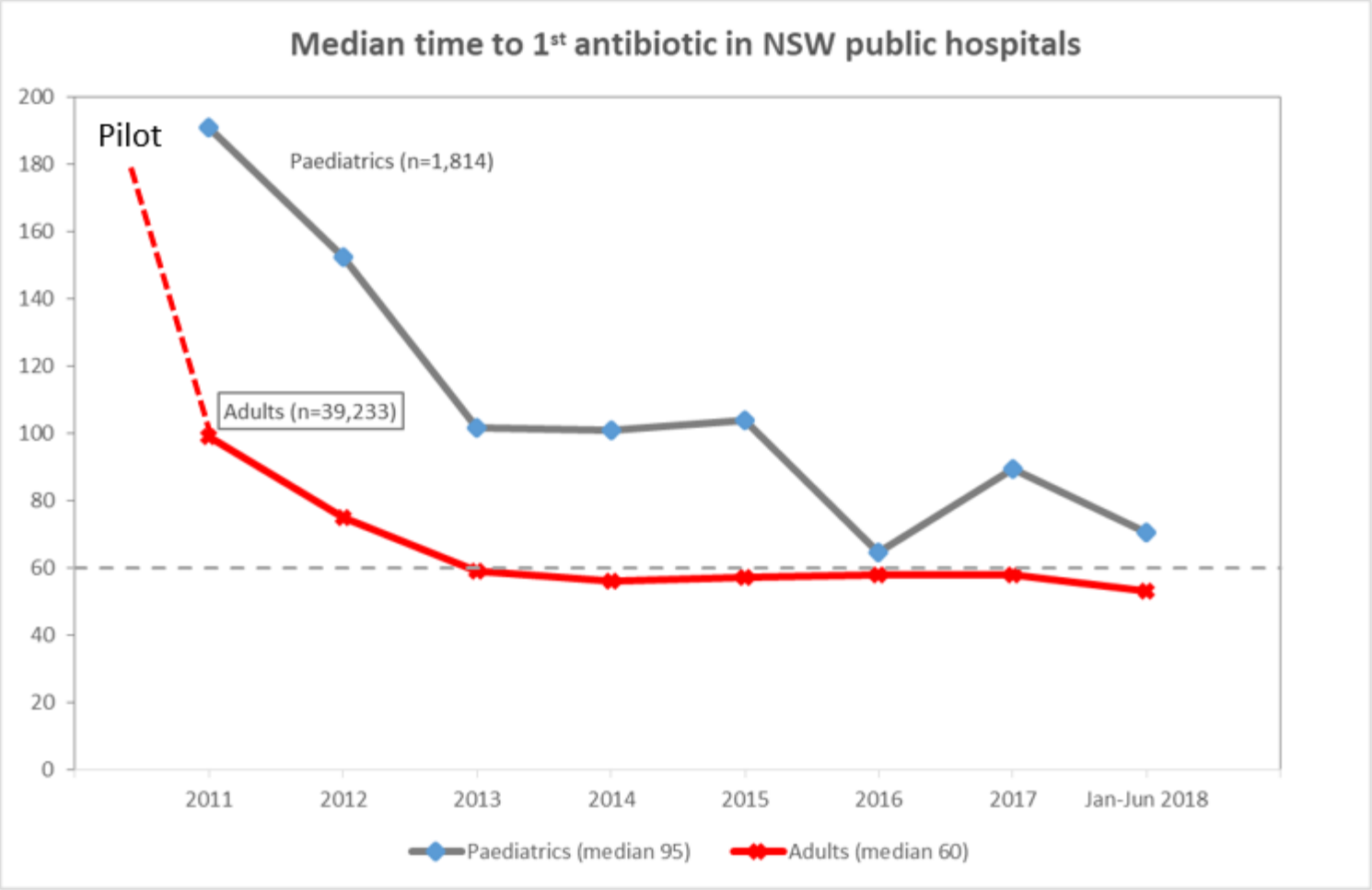
PROCESS DATA



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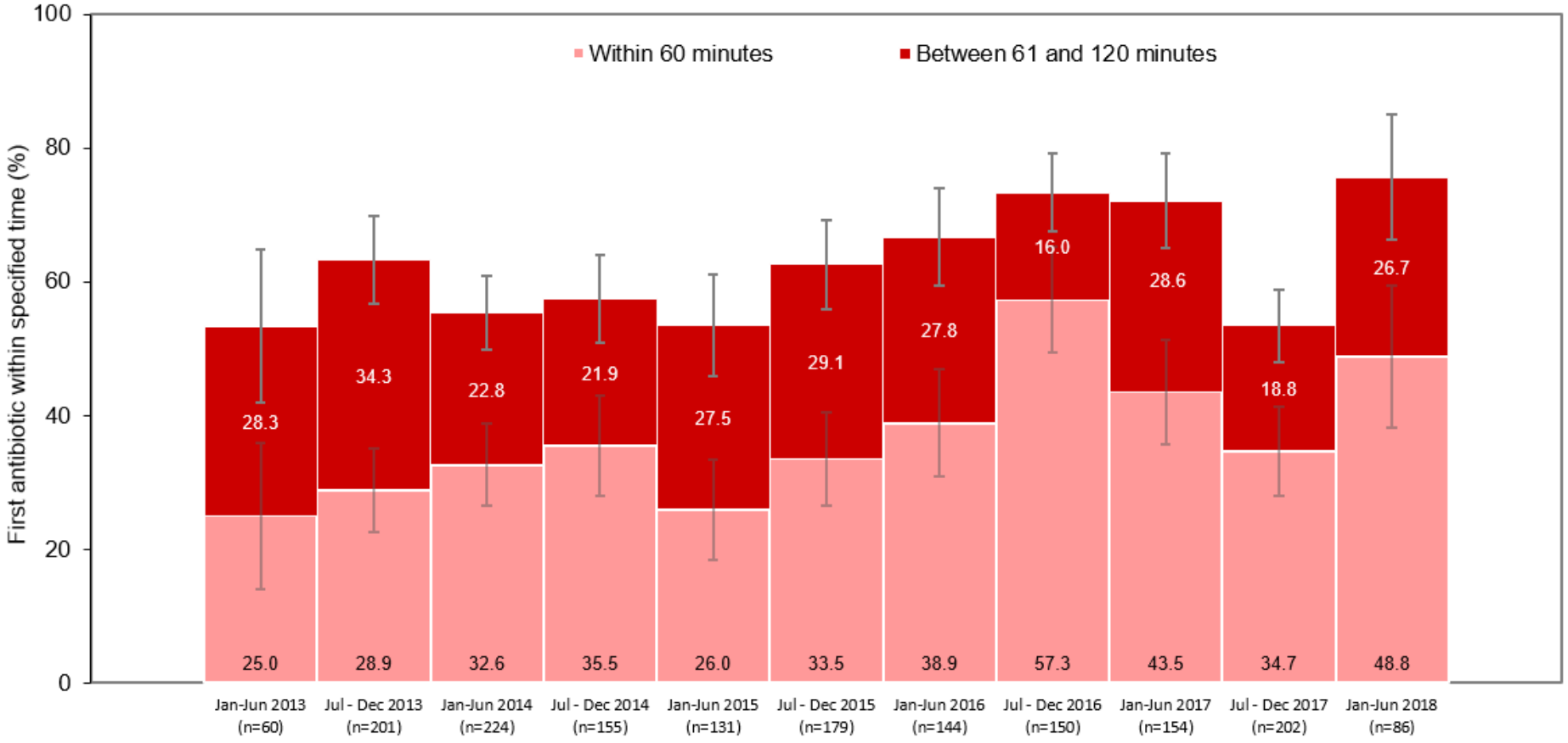
ANTIBIOTICS: PAEDIATRICS



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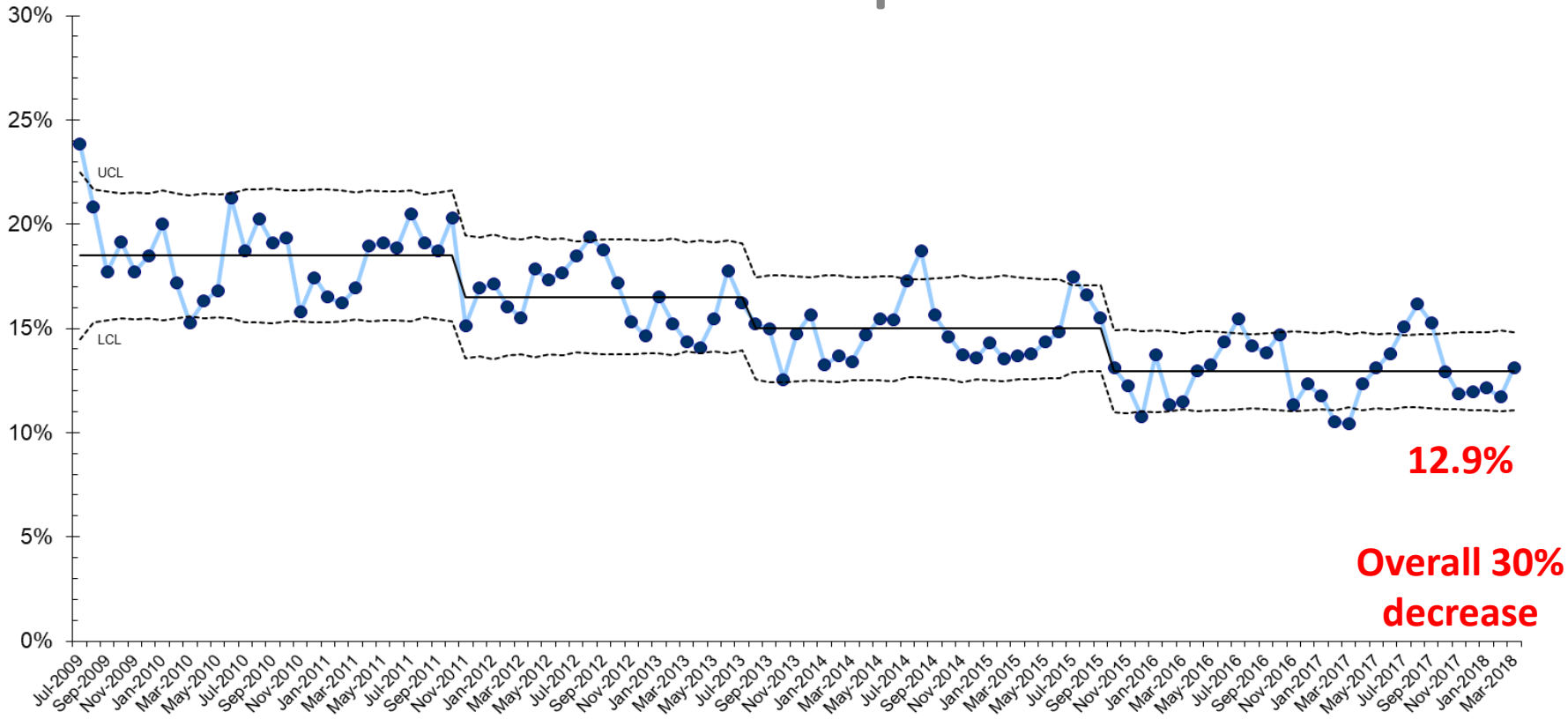
Patients with a sepsis diagnosis who die in a NSW hospital 2009 -2018



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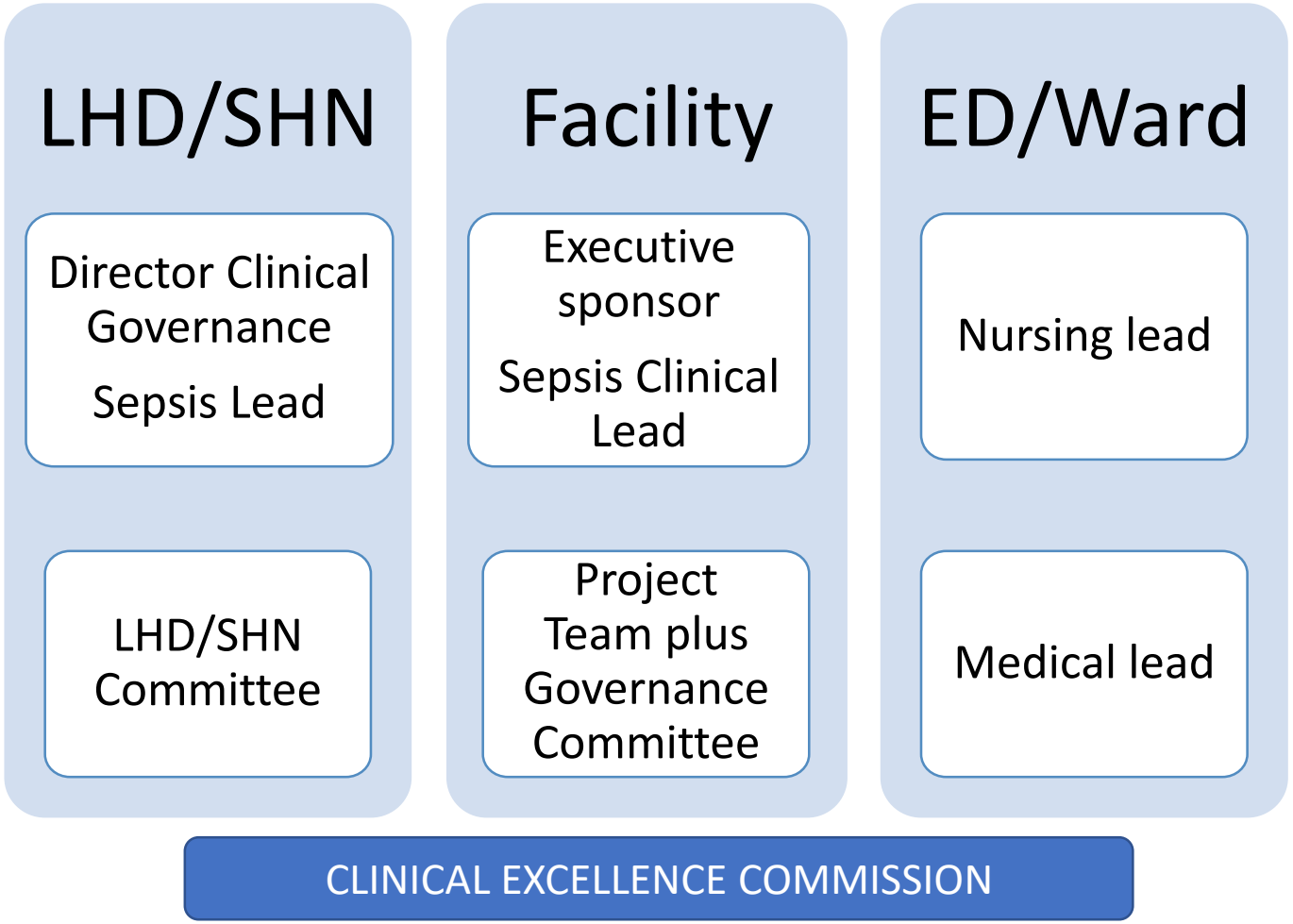
IMPLEMENTATION STRATEGY



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COLLABORATION

Clinical lead and Executive support

Monthly teleconferences

Phone support

Site visits

6 monthly reports

Webinars

Statewide and local workshops

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SEPSIS KILLS

TIME IS LIFE

Recognise Resuscitate Refer

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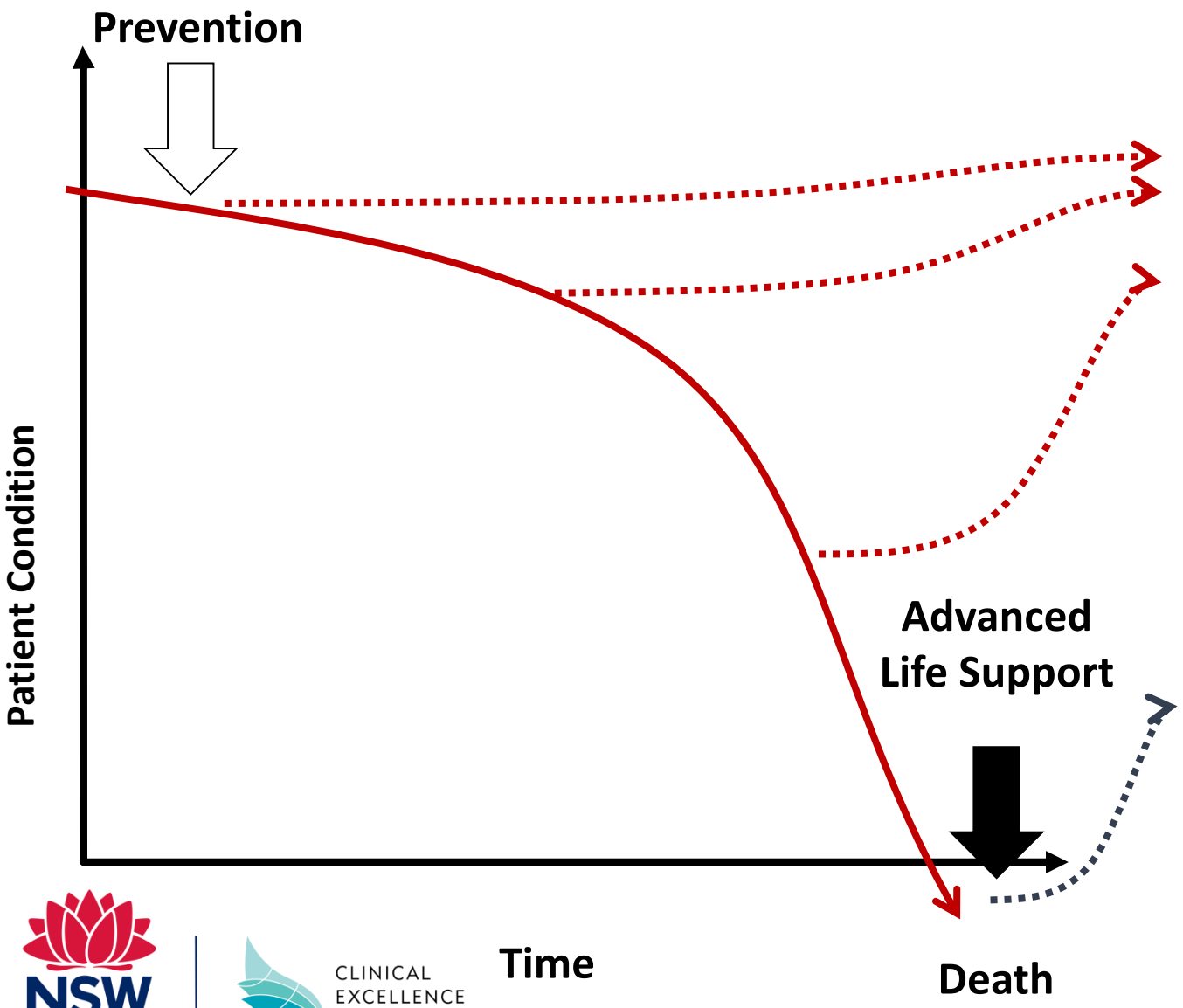
SEPSIS KILLS

RECOGNISE · RESUSCITATE · REFER

The past



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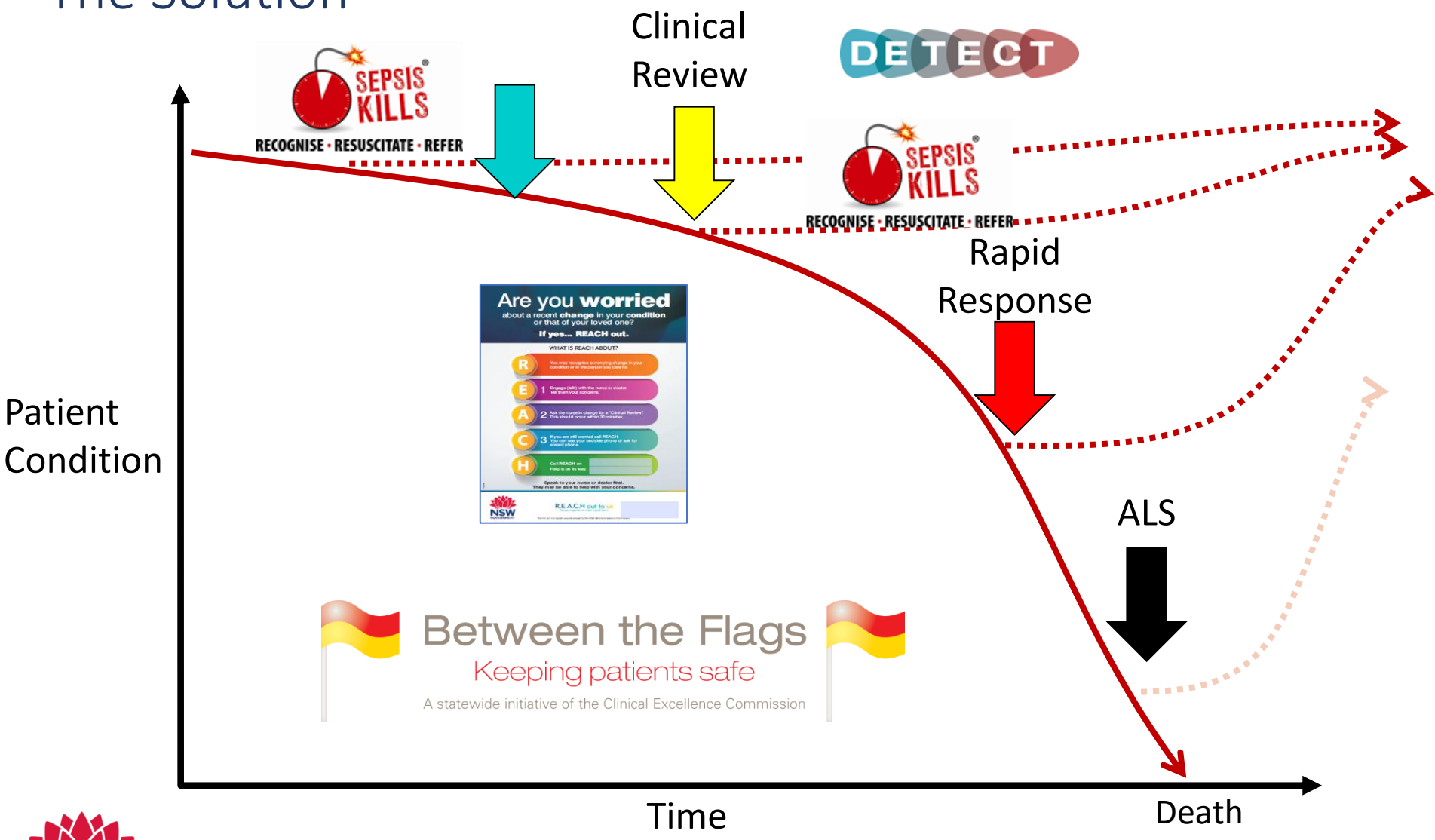
The Solution



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Lessons Learned

- Build a guiding coalition of clinicians, managers and administrators
- Even in large campaigns local leadership is key to success
- State wide collaboration essential
- Standardise with local customisation

Lessons Learned

- Use local patient stories and data- case for change
- Clinicians need time and skills in improvement science
- Start small and pilot
- Make it easy to do the right thing - have resources easily accessible and available

paediatric WATCH

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Lessons from the frontline

A publication of the Clinical Excellence Commission
Edition 3/18

All that wheezes is not asthma…

A 7-year-old girl presented to ED with reduced oral intake, cough and increased respiratory rate. She was prescribed antibiotics and asked to return if her mother had any concerns.

She re-presented the following evening to another facility with fever and cough. On arrival she was in acute respiratory distress, with severe wheezing and was given a triage category 2. It was reported she had had blood stained sputum for one day.

The reviewing clinician noted that the patient was afebrile, wheezing, grunting, tachycardic and tachypnoeic with a SpO_2 of 85% in room air. There was a family history of asthma, and this was the first presentation of its kind for the patient.

Inhaled salbutamol and humidified high flow nasal prong oxygen was commenced, and a request for transfer to the closest level 4 paediatric hospital was made. A chest X-ray (CXR) was performed suggesting widespread pneumonia.

At approximately 2230 hrs, the treating team discussed these results via telephone with NETS. A NETS team was dispatched, however, there was an estimated time of arrival to the facility of approximately 4 hours.

Despite increasing the inhaled salbutamol and oxygen therapy, the patient continued to deteriorate and a dose of IV ceftriaxone was prescribed.

This was administered via an intraosseous route as intravenous access had failed. A second CXR was ordered which showed a significantly enlarged heart which was also abnormal in shape.

NETS arrived shortly after midnight and assessed the patient as exhibiting signs of pulmonary oedema. Not long after NETS arrival, the patient significantly deteriorated with a loss of cardiac output requiring cardiopulmonary resuscitation (CPR). Despite their efforts and after mutual agreement between the clinicians and the family, it was decided to cease resuscitation and the patient was pronounced deceased at approximately 0200 hrs.

Investigation

It was identified that the patient did not have a history of asthma which had been communicated to clinicians involved in her care. It is possible this may have led to diagnostic anchoring of asthma or a respiratory infection.

The initial CXR showed enlargement of her heart, pulmonary oedema and consolidation on the left side.

The patient's blood stained sputum had not been communicated to NETS and the two critical signs of heart failure from acute rheumatic fever - a new systolic murmur and hepatomegaly - were not identified by the clinician managing her care.

Lessons Learned

In 2016-2017, there were 10 RCAs (18 SAC2 incidents) where the Principle Incident Type was classified as *diagnosis; missed, delayed or wrong*. Cognitive bias was identified in 9 of these RCAs. In all paediatric RCAs over this period, 1 in 4 involved diagnostic error, while cognitive-based errors (bias) was identified in over half of these RCAs.

Shortness of breath or tachypnoea can be from a pulmonary, cardiac, metabolic or combined cause. Consider all features of the presentation - clinical and investigations - when forming a provisional diagnosis, and ensure that the treatment has the expected outcome.

Continuing to re-evaluate. 'All that wheezes is not asthma'.

What can we do to overcome cognitive bias?

There were multiple examples of cognitive bias involved in this case. The following simple strategies can be used to reduce the risk of diagnostic error:

- Write down a differential diagnoses
- When reviewing a deteriorating patient, or a patient with concerning features, pause to check if your working diagnosis is correct
- When something isn't quite right, think again about your diagnosis
- When someone else is worried about your patient, think again about what could be going on
- When you are stressed, are finding the interaction with the patient difficult, or are hungry, angry, late or tired, pause to check if your working diagnosis could be wrong
- At handover, make it clear when you have uncertainty about your diagnosis
- Ask for senior input to help review your clinical decision-making

*The **Red Team** / **Blue Team** Challenge* is a useful tool to safety question and challenge the diagnostic decision making within the team environment. It aims to remove hierarchy, ensuring all clinicians have an equal voice and are able to share within a supported environment. The CEC's *Take 2 - think, do* is another useful resource to support accurate diagnostic decision making.

For information on the *Red Team / Blue Team Challenge* or additional resources on diagnostic error, visit:

http://www.cec.health.nsw.gov.au/quality-improvement/people-and-culture/diagnostic-error/quality-care

Want to learn more? Please visit our website:

www.cec.health.nsw.gov.au

The Paediatric Patient Safety Program works across a range of areas to improve the quality and safety of health care for children and young people in NSW.

Paediatric Watch – lessons from the frontline: All that wheezes is not asthma… 2018 © Clinical Excellence Commission, SYPN (CEC) 180083

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Lessons from the frontline

A publication of the Clinical Excellence Commission
Edition 5/18

Stop, Reflect & Review

Case 1

A 5-year-old girl presented to the Emergency Department (ED) with decreased oral intake and a one-week history of diarrhoea. At triage, the patient was pale and drowsy, with oxygen saturations of 88% in room air (Red Zone), mild intercostal recession (Yellow Zone), Blood Pressure (BP) in the Yellow Zone and a Glasgow Coma Score (GCS) of 12. The patient had a history of prematurity and an unrepaired atrial septal defect. Hudson mask oxygen was applied and oxygen saturations improved to 96-98%.

Although no wheeze was heard on auscultation, a provisional diagnosis of asthma was given and inhaled salbutamol was administered. The patient was then monitored for a period of 2 hours in the ED and while the patient was on oxygen her heart rate, respiratory rate, BP and oxygen saturations were 'between the flags'. There was no further documentation of a GCS following triage. Oxygen therapy was weaned off and the patient was observed for another 10 minutes, where she maintained oxygen saturations of 95% during this period. No further observations were taken and the patient was then discharged home. The parent was instructed to represent if they had ongoing concerns, or if the patient further deteriorated.

Approximately 3 hours following discharge home, the patient was found in her bed unresponsive. An ambulance was called and the patient was assessed to be in cardiorespiratory arrest and resuscitation was commenced. Despite resuscitation efforts, there was no return of spontaneous circulation and the patient died.

Want to learn more? Please visit our website:

www.cec.health.nsw.gov.au

The Paediatric Patient Safety Program works across a range of areas to improve the quality and safety of health care for children and young people in NSW.

Lessons Learnt

Patients presenting to the ED with abnormal observations should be monitored for an appropriate period of time and re-assessed prior to discharge to ensure it is safe to do so. The Royal Children's Hospital Melbourne recommend when weaning oxygen therapy, all observations should be within normal limits, the patient is feeding adequately, and should be alert, pink and behaving normally[1].

In the ED setting, it is a requirement that all children have a set of observations within one hour prior to discharge[2]. If supportive treatment, such as oxygen, has been used, make sure that the child is stable, off treatment, and well enough for discharge by repeating observations after an appropriate period - usually at least one hour.

Primary responsibility for determining if a patient is 'safe for departure' rests with the senior medical and nursing staff in the ED. The Paediatric ED 'Departure and Discharge from ED' checklists on the observation chart, or in the eMR form, provide an opportunity to identify any concerns or risks prior to discharge home[3].

Case 2

A 4-month-old baby presented to the ED with a history of a barking cough, lethargy and decreased oral intake. Although the patient's heart rate, respiratory rate, temperature and oxygen saturations were 'between the flags', it was reported that the child was unwell looking, lethargic and looked small for their age. A diagnosis of croup was made and the baby was treated with oral steroids which was to be repeated in 12 hours' time.

The patient was discharged one hour after presentation, and the family were advised to represent if the child's condition worsened.

Approximately 12 hours after discharge, the child was found in their cot cold, mottled and unresponsive. The patient was brought to ED in cardiorespiratory arrest and resuscitation was commenced. Despite resuscitation efforts, the patient died.

Lessons Learnt

A post mortem report revealed the patient died of sepsis secondary to a bacterial pneumonia. Whilst the patient presented with observations 'between the flags', the diagnosis of croup for an infant of that age is unusual. In cases, such as this, where the diagnosis does not fit the typical picture, including for age and assessment, an alternative differential diagnosis should be actively pursued. Escalating care to a senior clinician for a second opinion in such cases is a safe diagnostic strategy in mitigating diagnostic error.

In the ED setting, repeated observations over time is critical to ensure subtle signs or cues of illness are detected for any patient who does not fit the typical diagnostic criteria[2]. This is particularly important when assessing the efficacy of treatment prior to discharging a patient home.

The minimum core physiological observations are to include respiratory rate, respiratory distress, oxygen saturation, heart rate, temperature, level of consciousness and pain score, and are to be recorded at the time the observations are taken[2]. The patient's observations should be 'between the flags' prior to discharge from hospital, unless the Senior Medical Officer identifies a safe clinical reason for discharge, such as oxygen saturations greater than or equal to 92% in patients diagnosed with bronchiolitis[4].

References

1. Royal Children's Hospital Melbourne, 2017, *Oxygen Delivery - Clinical Guideline (Nursing)*, viewed 18 May 2018, <https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Oxygen_delivery/#Weaning Oxygen>
2. New South Wales Health, 2010, *Recognition and Management of Patients who are Clinically Deteriorating*, viewed 29 May 2018, <http://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2010_049.pdf>.
3. New South Wales Health, 2014, *Departure of Emergency Department Patients*, viewed 18 May 2018, <http://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2014_023.pdf>.
4. New South Wales health, 2018, *Acute Management of Bronchiolitis*, viewed 21 September 2018, <https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/GL2018_001.pdf>.

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paediatric WATCH

Lessons from the frontline

A publication of the Clinical Excellence Commission
Edition 4/18

Not just swelling… Preventing and identifying extravasation injuries

A neonate was brought to the Emergency Department (ED) with fevers over 39°C and poor oral intake. A peripheral intravenous catheter (PIVC) was inserted for administration of intravenous fluids (IV) and antibiotics. Over the course of the shift the patient became increasingly distressed and when examined, the arm where the PIVC was in situ was exhibiting signs of an extravasation injury. The limb was cool to touch, hard and swollen with blisters, loss of epidermis and a radial pulse was absent. The PIVC was removed and the patient was reviewed by the Plastics team. Due to the extent of the injury, the patient was taken to theatre where a fasciotomy was performed. The patient was discharged home four days later with regular follow-up.

In 2017, there were 153 incidents recorded in IIMS relating to children 16 years and under with an extravasation injury caused by a PIVC. The incidents ranged from mild redness and tenderness at the site to more severe injuries such as compartment syndrome (occurs when there is increased pressure within a compartment in the limb compromising function and circulation of the tissues[1]) requiring a fasciotomy to relieve the pressure and return blood flow. Injuries can be made worse by the types of fluids and/or medications being infused via the PIVC.

Extravasation is defined as the leakage of a medication or fluids into the extravascular space, either from a vessel or direct infiltration[2]. Non-traumatic compartment syndrome can occur as a result of an extravasation injury and should be treated as a medical emergency to prevent neurovascular injury and deficit to the limb.

Taping and securing

When securing a PIVC, a sterile and transparent occlusive dressing should be used to cover the insertion site. Sterile steri-strips can be used for stabilisation. It is recommended that sterile cotton wool or sterile gauze be placed under the hub of the cannula to prevent a pressure injury. Many paediatric pressure injuries are caused by the hub of a cannula.

Avoid tight taping that can act as a tourniquet if the limb was to become swollen. An arm board or splint can be used to immobilise the limb. The taping used to secure the splint should not be too tight and fingers should be in a neutral position[3]. The insertion site should be visible at all times, and if using a non-compressive bandage to prevent patient tampering, a "window" should be created to ensure direct viewing of the insertion site at all times.

Monitoring and observations

All PIVC insertion sites should be assessed for perfusion and IV pump pressures recorded in the patient's medical record hourly as per your local guideline and observed at clinical bedside handover. Ensure pump pressure alarms are set to an acceptable limit for paediatric patients (for example no higher than 75mmHg) and that alarms are audible (Refer to local guidelines for additional guidance). Infant distress without clear explanation should be explored to identify a cause. Pain should always be considered and the source of the pain identified, treated and reversed if able.

Intravenous fluids and medications

Where possible, fluids with high glucose concentrations (>10%) or fluids with high concentrations of potassium chloride (>40mmol per 1000mL) should be administered via a central venous access device. High irritant medications and vesicant agents such as vancomycin and flucloxacillin should be diluted to a suitable concentration and infused slowly to prevent irritation and patient discomfort. For additional information on diluting IV medications, The Paediatric Injectable Medicines Handbook (The Children's Hospital at Westmead) is available via the Clinical Information Access Portal (CIAP) under the medications tab.

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Staging an extravasation injury[4]

Stage 1: There may be swelling and pain at the site. The PIVC will be difficult to flush.

Stage 2: Slight/mild swelling and leakage around the site may be present. Infant skin, however, the site may be warm to touch with a possible hardened area, mild blanching, redness and/or discolouration of the skin. There will be pain at the site and pulses remain palpable.

Stage 3: Moderate swelling and/or hardened area around the site and cool to touch. There may be blanching of the skin, redness and/or discolouration which could be purple or black. Pulses can be weak on the affected limb.
Escalate care via the local Clinical Emergency Response System (CERS) procedure ensuring a senior clinician review.

Stage 4: Severe swelling, blistering and hardening around the site may be present. Skin temperature will be cool or cold to touch with blanching, redness and/or discolouration which may be purple or black. Pulses will be weak or absent on the affected limb and capillary refill time may be ≥4 seconds.
This is a medical emergency and requires immediate escalation and review, following local CERS procedure.

References

1. Elliot, K.G. & Johnstone, A.J. 2003, 'Diagnosing acute compartment syndrome', *Journal of Bone and Joint Surgery*, vol. 85, no. 5, pp. 625-32.
2. Fischer, D., Knobf, M. & Durivage, H. 2003, *The Cancer Chemotherapy Handbook*, 6th edn, Mosby, Philadelphia, PA.
3. Sydney Children's Hospitals Network, 2016, *IV Extravasation Management Practice Guideline*, viewed 6 June 2018 http://www.sahn.health.nsw.gov.au/_policies/pdf/2016-9057.pdf

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The Paediatric Patient Safety Program works across a range of areas to improve the quality and safety of health care for children and young people in NSW.

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