

**Paediatric Observation Charts and
Identification of Deteriorating Paediatric
Patients Workshop:
-the specific needs of children**

Dr Marino Festa
Children's Hospital at
Westmead

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Overview

- Show of hands
- Characterising the problem
 - Paediatric vs adult hospitals
- “Rescuing” the deteriorating child: a chain of events
- Summary and reflection on existing paediatric services

Medical Emergency Team (MET): a conclusive RCT is unlikely ever to occur..

All truth passes through three stages.

First it is ridiculed.

Second it is violently opposed.

Third, it is accepted as being self-evident.

Arthur Schopenhauer (1788- 1860), German philosopher

Confidential enquiry into quality of care before admission to intensive care (adults)

British Medical Journal 1998

- Examined the prevalence, nature, causes and consequences of suboptimal care before admission to ICU
- Prospective cohort study of 100 consecutive emergency admissions to 2 adult intensive care units in the UK

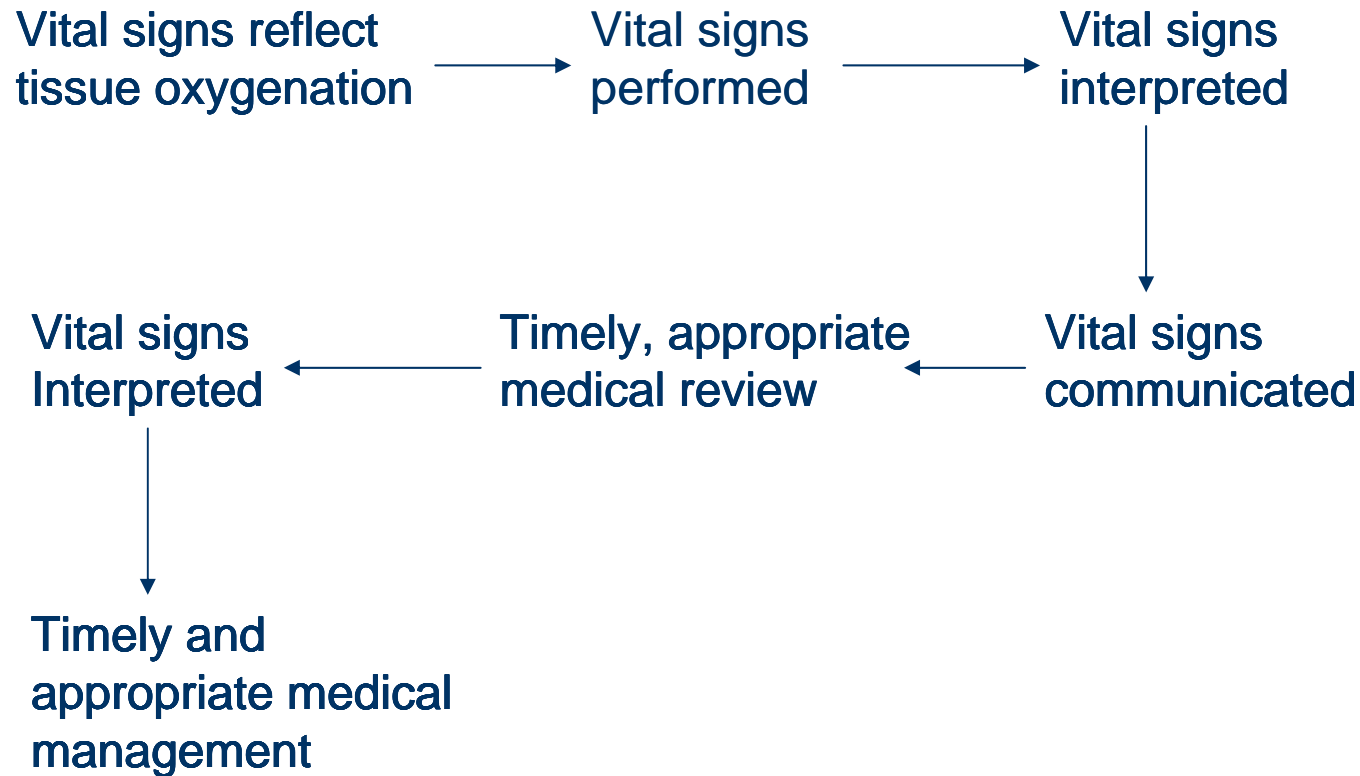
“... the main causes of suboptimal care were failure of organisation, lack of knowledge, failure to appreciate clinical urgency, lack of supervision and failure to seek advice”

Acute Paediatric Services

- Relatively small number of acute paediatric beds Vs adults
- Fewer experts in recognition and management of the deteriorating child
- Paediatric nurse:patient ratios vary
- Doctors in training no longer work very long shifts:
 - Increased dependence on handover information
 - Patient / problem ownership not always clear
- Critical illness and cardiopulmonary arrest are rare events
- Intensive care resources may be distant and out of hospital / area
- Practical and ethical issues need to be overcome in order to conduct robust research into the deteriorating child
- Established clinical advice and transport networks do exist
- Collegiality among workers in child health is strong

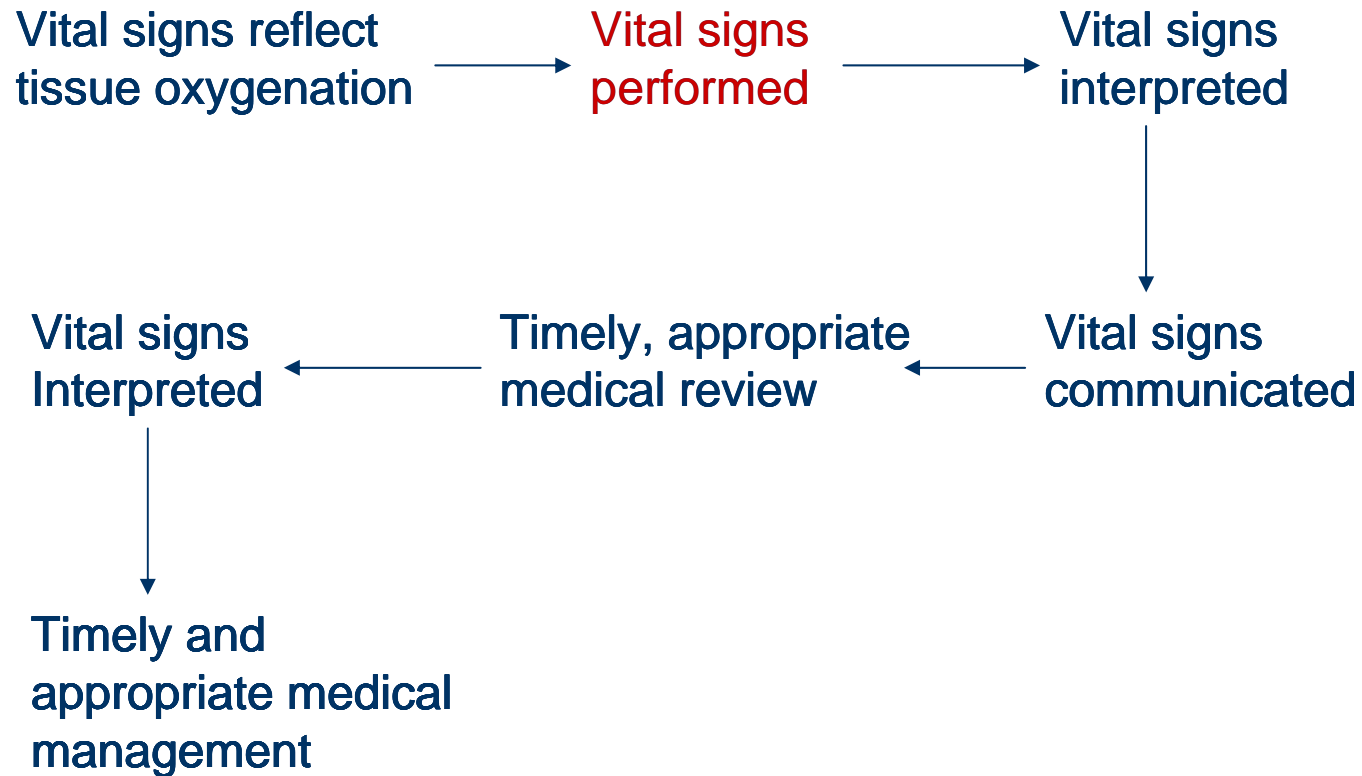
Patients at risk of critical illness

Compass (ACT Health)



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Clinical profile of hospitalised children provided with urgent assistance from a medical emergency team *Pediatrics* 2008

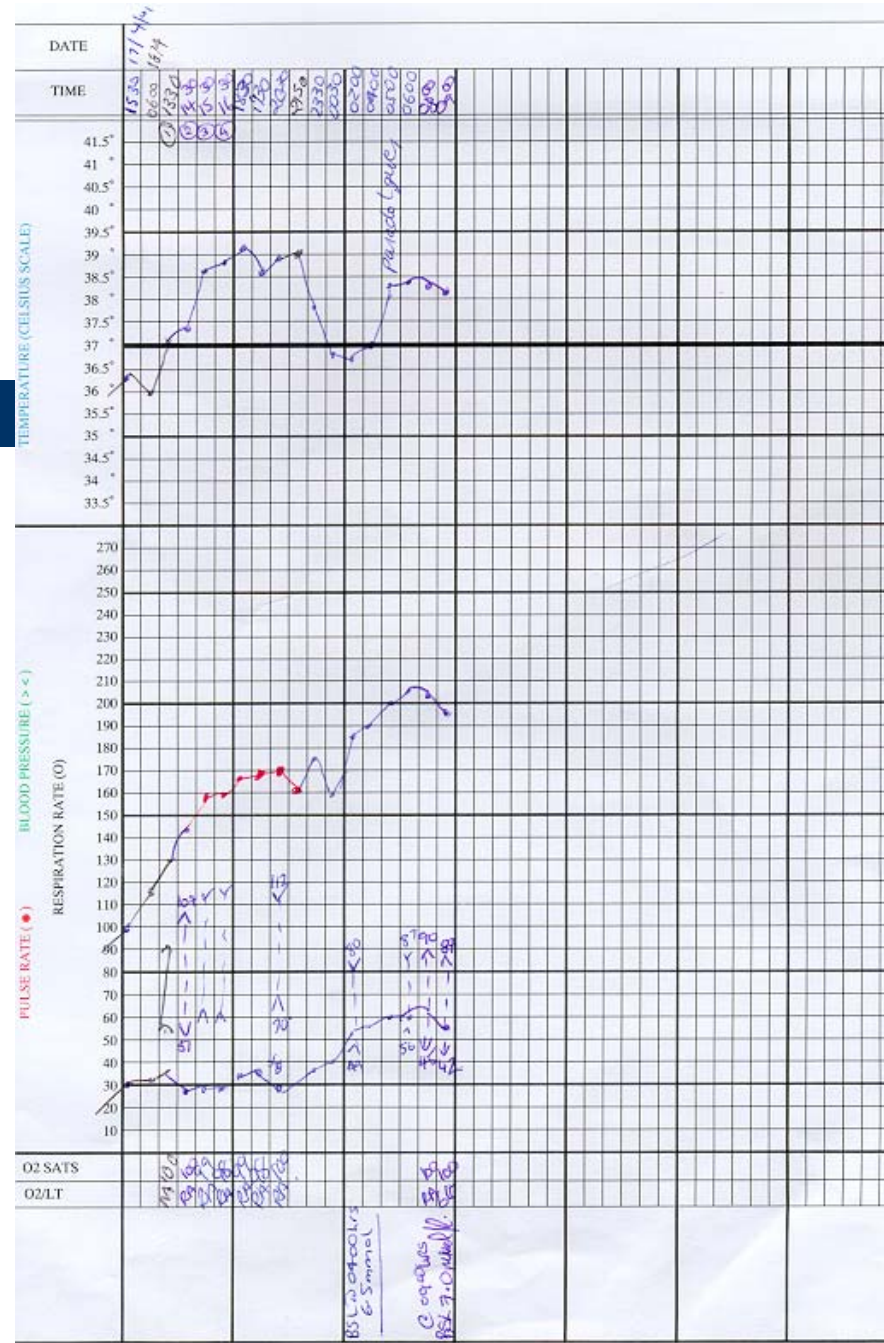
- 18-month audit in a single Australian tertiary paediatric hospital:
 - 42% calls for infants (<1 yr old)
 - Pre-existing chronic disease was common: 20% had a pre-existing neurological disorder
 - 44% were post-operative

18-month old boy: Pre- and Post-op observations (elective reversal of colostomy)

Should an urgent review have occurred?

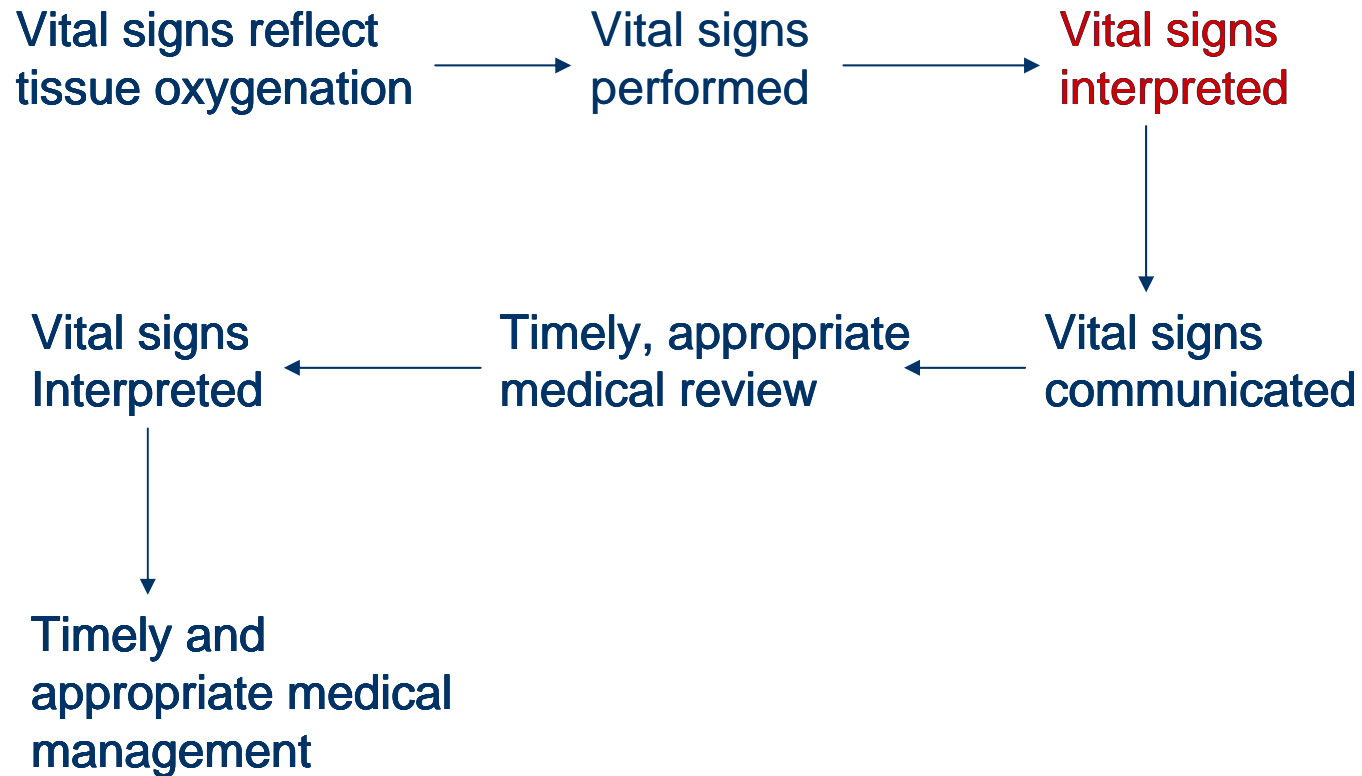
When?

By who?



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Infants and Children: Altered Physiology Usually Precedes Cardiac Arrest and Death

- Early detection of seriously altered physiology is a crucial first step:
 - Requires “experience”
 - Requires direct patient contact
 - May be improved with effective observation charts and early warning systems
 - Paediatric Early Warning System (PEWS) score: area under ROC curve 0.90, sensitivity 78%, specificity 95% at a score of 5

Impact of patient monitoring on the diurnal pattern of medical emergency team activation

Crit Care Med 2006

- MET activation events were more frequent during the day (7am – 7pm) in both monitored and unmonitored patients
- No diurnal variation noted in the ICU
- ?evidence for impact of staffing and monitoring capabilities on quality of patient care

Survey of early identification systems to identify inpatient children at risk of physiological deterioration Arch Dis Child 2006

- 21% of UK hospitals reported use of an early identification system
- 36 different parameters used for early identification. 5 most common:
 1. Respiratory rate
 2. Heart rate
 3. Nurse concern
 4. Doctor concern
 5. Respiratory effort

Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: preliminary results *Arch Dis Child* 2005

Criteria for activation of a medical emergency team:

1. Nurse or Doctor worried about clinical state
2. Airway threat
3. Hypoxaemia (SpO₂ <90% in any amount of oxygen; <60% for cyanotic heart disease)
4. Severe respiratory distress, apnoea or cyanosis
5. Tachypnoea
6. Tachcardia or bradycardia
7. Hypotension
8. Acute change in neurological status or convulsion
9. Cardiac or respiratory arrest

What were the top 3 reasons for activation of a MET?

Reasons for MET call..

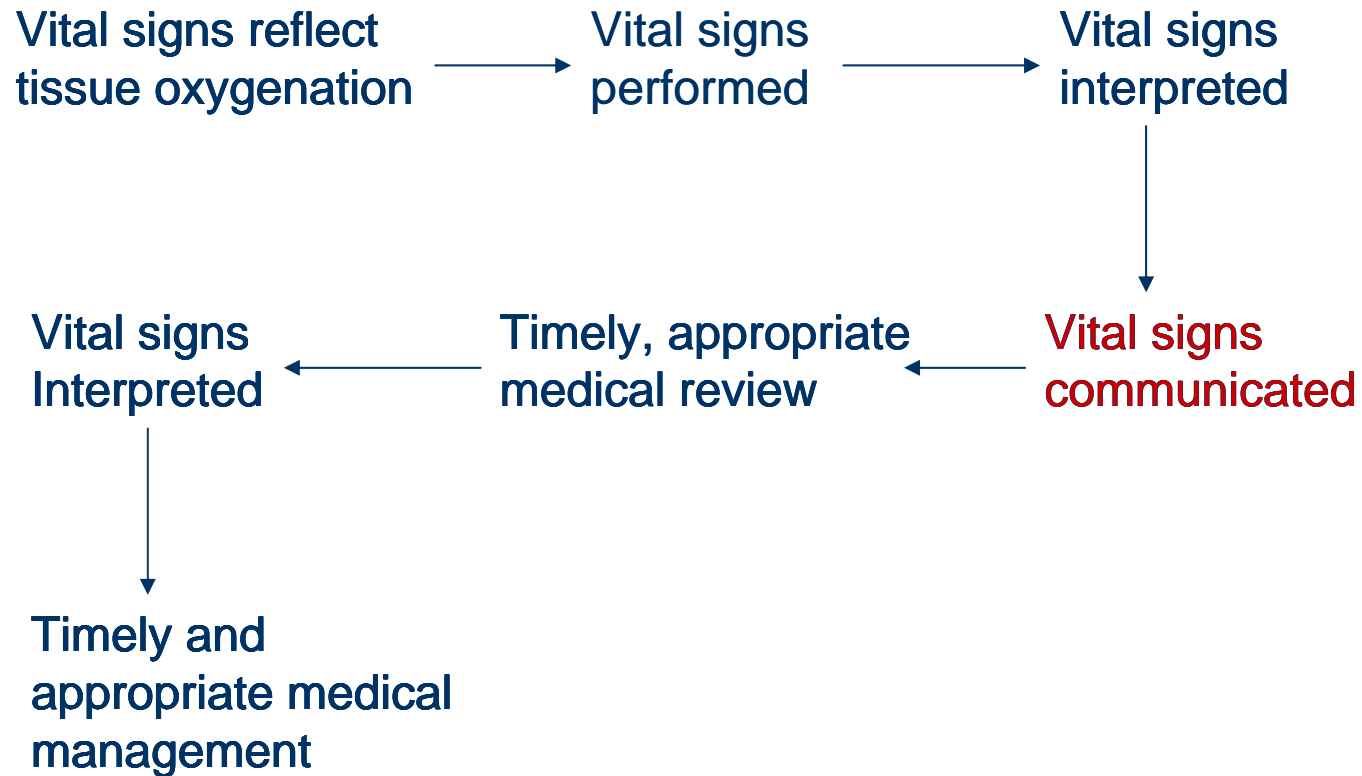
Tibballs J et al *Arch Dis Child* 2005

- 47% hypoxaemia
- 39% respiratory distress
- 27% “worried”
- 27% airway threat
- 20% altered neurological status

Does this reflect the true incidence of the event or the ability to recognise it..?

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Review of adverse events by the Patient Safety Committee at RCH, Melbourne (1999 – 2002)

Arch Dis Child 2005

“...Perceived reasons for unexpected cardiac arrest and death were inability of medical and nursing staff at all levels to recognise serious illness, lack of empowerment of junior staff to obtain assistance, delay in calling for and arrival of assistance, lack of readily available medical staff, or a combination of these reasons”

Introduction to the medical emergency team (MET) system: a cluster randomised controlled study *Lancet* 2005

- 23 hospitals in Australia randomised to continue functioning as usual (n=11) or to introduce a MET system (n=12)
- No difference (5.86 vs 5.31 per 1000 admissions) in the composite primary outcome (cardiac arrest, unexpected death or unplanned ICU admission)
- *MET was called to 30% of patients who fulfilled the calling criteria*

Six year audit of cardiac arrests and medical emergency team calls in an Australian outer metropolitan teaching hospital *BMJ* 2007

.. Identified several important barriers to staff calling for higher order assistance:

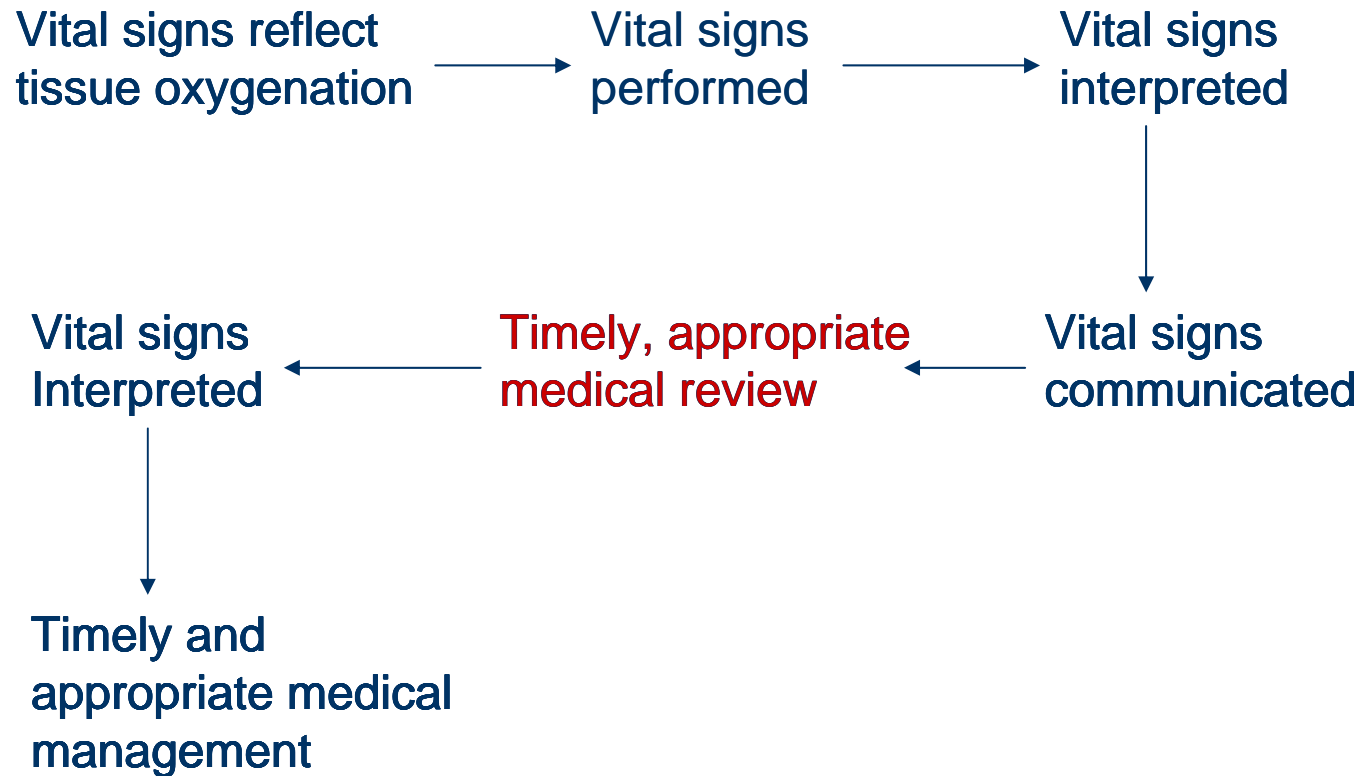
1. Nursing staff were reluctant to breach the traditional hierarchical referral model of care
2. Over a 14-hour post-operative period, the 4 different junior doctors who had responsibility for the patient opted to hand the problem either to the next shift or up the hierarchy to the registrar

Conclusion:

Successful introduction of a MET team was achieved by using educational initiatives to help change culture and awareness..

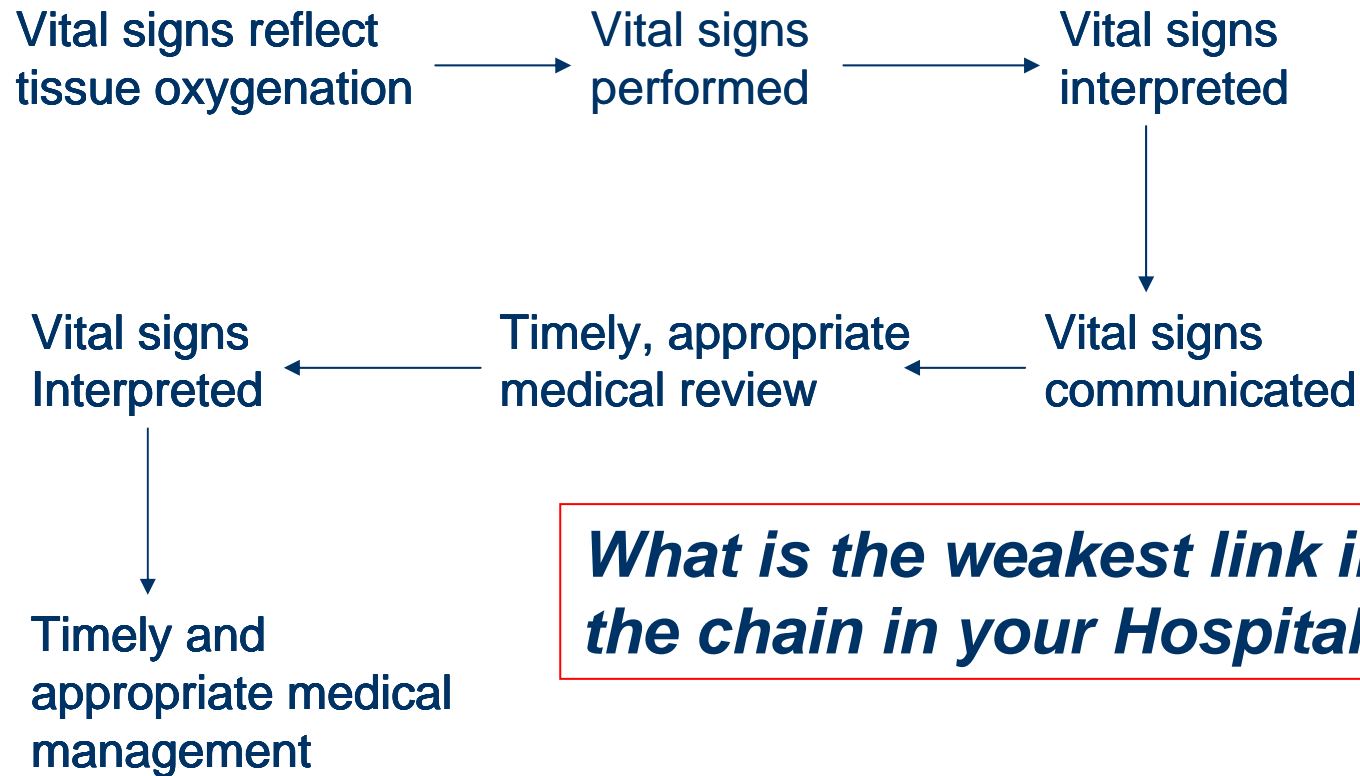
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What is the weakest link in the chain in your Hospital?

Paediatric Medical Emergency Team composition: Day vs Night

Pediatrics 2007

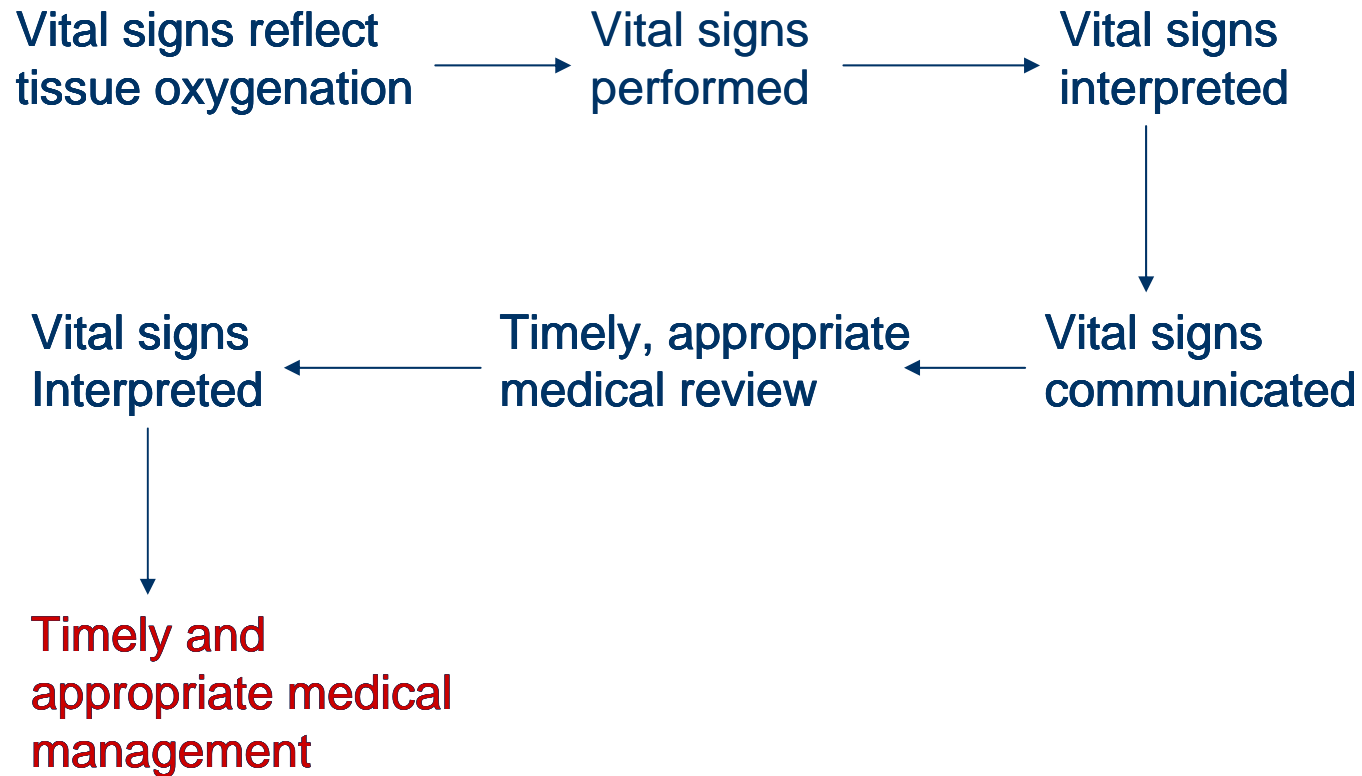
- Survey of North American hospitals with >50 paediatric acute care beds
- Reduced staffing of rapid response teams at night vs. day
 - Specifically reductions in the inclusion of staff physicians in the team

Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: preliminary results *Arch Dis Child* 2005

- MET composition:
 - ICU doctor (consultant / registrar)
 - ICU nurse
 - Emergency department senior doctor
 - Medical registrar
- MET initiation:
 - Hospital switchboard emergency number
 - Telephonists instructed to regard calls for any type of medical assistance as a MET call
 - 184 calls over 12-months Vs. 49 “code-blue” calls in the previous 12-months

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Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: preliminary results *Arch Dis Child* 2005

Action taken during MET calls:

- Immediate treatment
 - 23% advice only
 - 30% oxygen
 - 18% basic airway support (alone)
 - 21% bag-valve mask ventilation
 - 8% endotracheal intubation
 - 2% external cardiac compressions
 - 0.6% DC shock
 - 16% venous cannulation
 - 2% central venous cannulation
 - 0.6% Intraosseous cannulation
 - 17% Resuscitation fluid bolus
 - 4% Resuscitation drugs
- Communication
 - Management plan formulated with the admitting bed-card team members
- Documentation:
 - Standard MET data sheet
- Supportive attitude to ward staff

Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: preliminary results *Arch Dis Child* 2005

- No cardiopulmonary arrest or death was observed in any patient who transgressed MET criteria
- Clinically important differences in cardiopulmonary arrest and death rates seen (not statistically significant)

– Cardiac arrest rate:		Risk Ratio (95% CI)
● Pre-MET	0.1908 / 1000 admissions	1.71 (0.59 – 5.01)
● Post-MET	0.1114 / 1000 admissions	p=0.320
– Death rate		
● Pre-MET	0.1241 / 1000 admissions	2.22 (0.50 – 9.87)
● Post-MET	0.0557 / 1000 admissions	p=0.279

Summary

- Taking critical care expertise to a deteriorating patient is logical and sensible
- There is no good evidence that rapid response or medical emergency teams alone make a difference to outcome
- The key feature of a successful rapid response team service may be the empowerment of ward-based junior staff to request urgent medical assistance without necessarily consulting seniors or doctors in a system that allows prompt review by experienced clinicians

Paediatrics: Issues for discussion

- Is it reasonable to use one set of criteria based upon prioritised clinical signs to identify critical illness in infants and children of all ages?
- Can expertise in recognition of the critically ill or deteriorating infant or child be taught to non-experts?
- Are existing systems of communication flexible enough to activate rapid response teams in your children's ward / hospital?
- Is there sufficient expertise in your rapid response team to perform appropriate assessment and intervention 24/7?
- Does your organisation have a culture that supports the introduction of a rapid response team for children?
- What alternatives to a MET or rapid response team may better suit your institution? Is a PICU outreach service a good alternative? What do you do if you don't have a PICU?