

Paediatric Early Warning Scores

An individual's issue
A national problem

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How do we define?



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“Perfect”



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“Perfect”

“Early Warning”



How do we define?

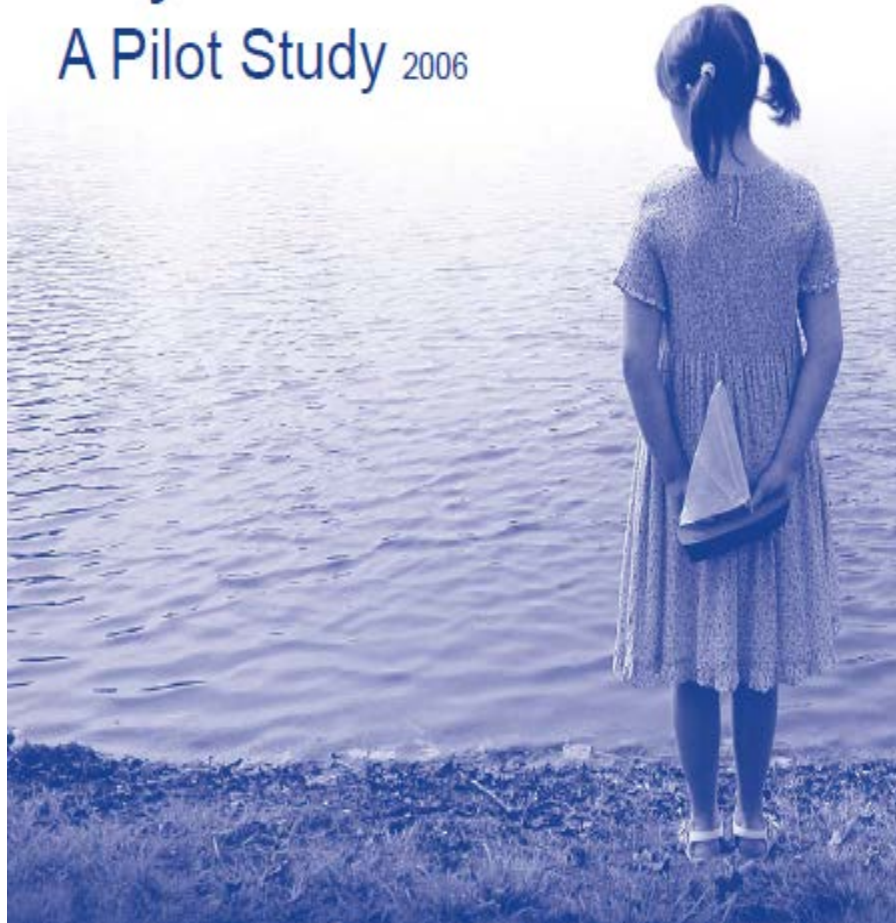
“Perfect”

“Early Warning”

“Children”



Why Children Die: A Pilot Study 2006



Pearson G. Why Children die: A pilot Study. England (South West, North East and West midlands), Wales and Northern Ireland 2008 (CEMACH report)





Problem 1: It is not just a (or 'the') score

- (1) Symptoms and signs of deterioration ("calling criteria") occur and are recognized by ward personnel;
- (2) The ward personnel are empowered to call for assistance without delay, circumventing established hierarchies if necessary;
- (3) A readily available urgent response occurs; and
- (4) This response, along with associated interventions, improves outcomes

Joffe AR, Anton NR, Burkholder SC. **Reduction in Hospital Mortality Over Time in a Hospital Without a Pediatric Medical Emergency Team: Limitations of Before-and-After Study Designs.**

Arch Pediatr Adolesc Med 2011;165(5):419-423.

Problem 2: Observations are often abnormal

Table 2 Frequency of abnormal vital signs in children with serious, intermediate and minor infections

	Serious infection (n = 108)	Intermediate infection (n = 205)	Minor infection (n = 339)	Not infection (n = 48)	χ^2
	No (%)	No (%)	No (%)	No (%)	
Temperature $\geq 39.0^\circ\text{C}$	33/106 (31.1)	49/202 (24.3)	48/335 (14.3)	0/47 (0)	$p < 0.001$
Tachypnoea	62/95 (65.3)	79/163 (48.5)	127/292 (43.5)	19/45 (42.2)	$p = 0.002$
Tachycardia	67/107 (62.6)	124/200 (62.0)	148/334 (44.3)	12/48 (25.0)	$p < 0.001$
CRT > 2 seconds	6/61 (9.8)	9/119 (7.6)	1/193 (0.5)	0/19 (0)	$p < 0.001^*$
O ₂ sats $\leq 94\%$	31/105 (29.5)	27/195 (13.8)	22/327 (6.7)	5/45 (11.1)	$p < 0.001$

*Fisher's exact test.

CRT, capillary refill time; O₂ sats, oxygen saturations.

Minor infection—conditions from which the child was expected to **recover without sequelae**



Thompson M, Coad N, Harnden A, Mayon-White R, Perera R, Mant D
How well do vital signs identify children with serious infections in paediatric emergency care *Arch Dis Child* 2009;94:888–893



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Problem 3: Normal sets of observations may be abnormal

Table 1 Numbers of abnormal sets of observations during whole admission in patients without an adverse outcome or before adverse outcome

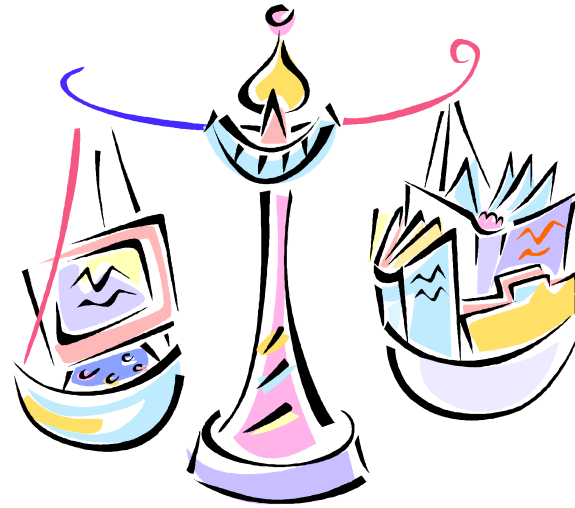
No of sets of abnormal observations	No of patients	
	No adverse outcome	Adverse outcome
0	174	3
1	221	8
2–5	453	0
6–10	87	3
11+	49	2
Total	984	16



Edwards E, Powell C, Mason B, Oliver A **A Prospective cohort study to test the predictability of the Cardiff and Vale paediatric early warning system** *Arch Dis Child* 2009;94:602–606



Problem 4: PEWS may generate work



“...the review activations might have generated an extra 7060 min of additional workload...”



O’Leary F and Chayan G. **Predicting the impact on workload with the application of inpatient clinical review criteria into a paediatric emergency department.** *Emergency Medicine Australasia* (2011) 23, 748–753



Problem 5: ...or that work may not get done

The data in the EWS:

heart rate, systolic blood pressure, capillary refill time, respiratory rate, respiratory effort, transcutaneous oxygen saturation and oxygen therapy



Parshuram CS, Duncan HP, Joffe AR et al. **Multi-centre validation of the Bedside Paediatric Early Warning System Score: A severity of illness score to detect evolving critical illness in hospitalized children.** *Crit Care* 2011;15(4):R184.



Problem 5: ...or that work may not get done

The data in the EWS:

heart rate, systolic blood pressure, capillary refill time, respiratory rate, respiratory effort, transcutaneous oxygen saturation and oxygen therapy

.....was not collected uniformly

in the 23288 hours studies **only 5.1%** of patients had all seven items recorded



Parshuram CS, Duncan HP, Joffe AR et al. **Multi-centre validation of the Bedside Paediatric Early Warning System Score: A severity of illness score to detect evolving critical illness in hospitalized children.** *Crit Care* 2011;15(4):R184.



What's new?

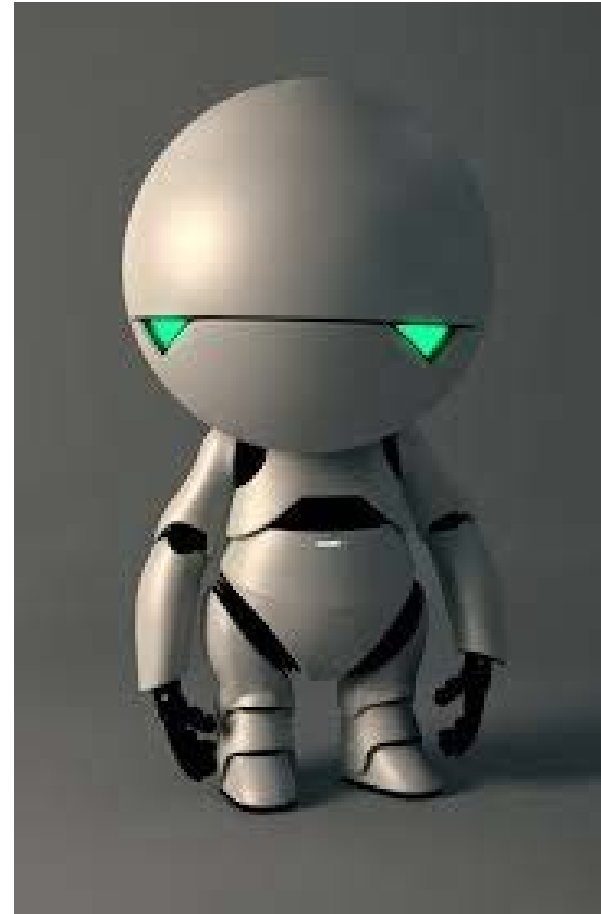


McLellan MC, Gauvreau K, Connor JA **Validation of the Cardiac Children's Hospital Early Warning Score: an early warning scoring tool to prevent cardiopulmonary arrests in children with heart disease.** *Congenit Heart Dis.* 2014 May-Jun;9(3):194-202



What's new?

“When users want what's not best for them”



Christofidisa M, Hill A, Horswill M, Watsona M **A human factors approach to observation chart design can trump health professional prior chart experience** *Resuscitation* 84 (2013) 657–66



The Future

- What have we got?
- What do we want?
- How do we get there?





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