Evidence table: Observation and continuous monitoring for children

Reference *(include title, author, journal title, year of publication, volume and issue, pages)*	**Evidence level (I-VII)**	**Key findings, outcomes or recommendations**
Australian Commission on Safety and Quality in Healthcare (2010). *National consensus statement: Essential elements for recognizing & responding to clinical deterioration*. Sydney: ACSQHC.	*V11*	• Recommend 8 elements that are essential features of systems of care for recognising & responding to clinical deterioration • Four elements relate to clinical processes: measurement & documentation of observations, escalation of care, rapid response systems and clinical communication
Chapman, S. M., Grocott, M. P. W., & Franck, L. S. (2009). Systematic review of paediatric alert criteria for identifying hospitalised children at risk of critical deterioration. *Intensive Care Med, 36*(4), 600-611.	V	• Systematic Review of 11 studies that examined paediatric alert criteria to identify children with early signs of physiological instability that precede clinical deterioration • Weak evidence supporting the validity, reliability and utility of paediatric alert criteria
Graham, K. C., & Cvach, M. (2010). Monitor alarm fatigue: Standardizing use of physiological monitors and decreasing nuisance alarms. *American Journal of Critical Care*. 19(1), 28-34.	1V	• QI initiative to improve management of monitor alarms in an adult HDU environment, including revision of monitor alarm defaults, careful assessment of monitor alarm parameters limits each shift & implementation of a monitor policy • Critical monitor alarms were reduced 43%
Lawless, S. T. (1994). Crying wolf: false alarms in a pediatric intensive care unit. *Critical Care Medicine, 22*(6), 981-985.	V1	• Prospective observational study evaluating predictive value of patient monitoring alarms as a warning systems in PICU • 68% alarms were false and 94% were not clinically important, with the majority relating to pulse oximetry • More alarms sounded during the day

National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents (2004). *Pediatrics*, *114* (2 suppl 4th report), *555*– 576.	V	• Tables determining normal and abnormal BP values based on gender, age and height percentiles • High systolic BP limits for the MET criteria that have been integrated into the RCH observation charts were based on the 95th percentile of height and 99th percentile for BP for respective ages groups
Parshuram, C.P., Hutchison J., Middaugh, K. (2009). Development and initial validation of the Bedside Paediatric Early Warning System score. *Critical Care* 13(4): R135.	IV	• Evaluation of Toronto bedside Paediatric Early Warning Score (PEWS) with differential scoring of 7 age- related parameters (heart rate, respiratory rate, respiratory effort, oxygen therapy, CRT, pulse oximetry, systolic BP) with scores ranging from 0 to 26 • ROC was 0.92 with a sensitivity of 82% and specificity of 93% at a threshold score of 8 for admission to PICU
Royal College of Nursing (2007). Standards for assessing, measuring and monitoring vital signs in infants, children and young people. RCN: London .	*V11*	• Describes 5 standards and criteria to help guide local procedures in relation to vital sign monitoring which included: • Education and training, teaching children, young people and parents and carers, assessing & measuring vital signs, medical devices & equipment, record keeping
Singh, J. K. S. B., Kamlin, C. O. F., Morley, C. J., O'Donnell, C. P. F., Donath, S. M., & Davis, P. G. (2008). Accuracy of pulse oximetry in assessing heart rate of infants in the neonatal intensive care unit. *Journal of Paediatrics and Child health, 44*(5), 273-275.	V1	• Evaluating the accuracy of pulse oximetry measurement of heart rate in a NICU (n=30) • Pulse oximetry accurately measured heart rate event when the signal quality was low
Teasdale, D. (2009). Physiological monitoring. In, Dixon, M., Crawford, D., Teasdale, D., & Murphy, J. *Nursing the highly dependent child or infant*. Chichester: Blackwell Publishing Ltd.	VII	• Clinical guide about caring for children receiving high dependency care • Identifies indications for continuous cardio-respiratory monitoring and continuous pulse oximetry

Tibballs, J., Kinney, S., Duke, T., Oakley, E., & Hennessy, M. (2005). Reduction of paediatric in-patient cardiac arrest and death with a medical emergency team: Preliminary results. *Archives of Disease in Childhood, 90*(11), 1148-1152.	IV	• Evaluating introduction of paediatric MET service including establishment of paediatric MET criteria at RCH • Significant reductions in cardiac arrest and unexpected death for the subgroup of patients that had fulfilled the MET call criteria - cardiac arrest (Risk difference 0.16/1000: 95%CI: 0.09, 0.24) - unexpected deaths (Risk difference 0.11/1000: 95%CI: 0.05, 0.18)
Townley, C., Theisen, E., Stanzel, B., Chang, C., Goddard, J. & Kinney, S. *An investigation into the use of MET criteria in setting cardiac monitors and the effect on the rate of false alarms.* Master of Nursing Science Presentation Day (27th May, 2011), The University of Melbourne.	VI	• Investigating the role of MET criteria for alarm setting in cardiac monitors and rate of false alarms in a paediatric cardiac ward at RCH (n=201 monitors hours observed) • 2.83 alarms per monitor per observed hour and 82 % of the alarms were false • Significant reductions in false alarms for Heart Rate (p=0.01) and SpO_2 (p=0.004) for alarm settings that at MET criteria.

The Hierarchy of Evidence

The Hierarchy of evidence is based on summaries from the National Health and Medical Research Council (2009), the Oxford Centre for Evidence-based Medicine Levels of Evidence (2011) and Melynyk and Fineout-Overholt (2011).

I Evidence obtained from a systematic review of all relevant randomised control trials.

II Evidence obtained from at least one well designed randomised control trial.

III Evidence obtained from well-designed controlled trials without randomisation.

IV Evidence obtained from well designed cohort studies, case control studies, interrupted time series with a control group, historically controlled studies, interrupted time series without a control group or with case- series

V Evidence obtained from systematic reviews of descriptive and qualitative studies

VI Evidence obtained from single descriptive and qualitative studies

VII Expert opinion from clinicians, authorities and/or reports of expert committees or based on physiology

Melynyk, B. & Fineout-Overholt, E. (2011). *Evidence-based practice in nursing & healthcare: A guide to best practice (2nd ed.).* Philadelphia: Wolters Kluwer, Lippincott Williams & Wilkins.

National Health and Medical Research Council (2009). *NHMRC levels of evidence and grades for recommendations for developers of guidelines* (2009). Australian Government: NHMRC. http://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/evidence_statement_form.pdf

OCEBM Levels of Evidence Working Group Oxford (2011).*The Oxford 2011 Levels of Evidence*. Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=1025