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

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Reference ***(include title, author, journal title, year of publication, volume and issue, pages)***	**Evidence level (I-VII)**	**Key findings, outcomes or recommendations**
Allen D, Lloyd A, Edwards D, Hood K, Huang C, Hughes J, et al. Development, implementation and evaluation of an evidence-based paediatric early warning system improvement programme: the PUMA mixed methods study. BMC Health Services Research. 2022;22(1):1-21.	*IV*	Evaluation of a system wide improvement programme: Paediatric early warning system Utilisation and Morbidity Avoidance (PUMA). Framework highlights the importance of family involvement in the detection of patient deterioration as follows: • Staff understand the value of family concerns in the detection of deterioration • Families are involved with defining normal physiological parameters for their child • Families are in a position to discern patterns of signs and symptoms in their child • Families receive guidance about what to do if they are concerned that their child is deteriorating • Staff keep families informed about the developments in their child's care and treatment
Australian Commission on Safety and Quality in Health Care (2021). National Safety and Quality Health Service Standards: Guide for Hospitals (2nd Ed.). Sydney: ACSQHC.	*V11*	National Standard outlines criteria: • Clinical governance and quality improvement to support recognition and response systems • Detecting and recognising acute deterioration and escalating care • Responding to acute deterioration
Australian Commission on Safety and Quality in Health Care ACSQHC (2021). National Consensus Statement: Essential elements for recognising and responding to acute physiological deterioration (3rd Ed.). Sydney: ACSQHC.	*V11*	• Core set observations: Respiratory rate, SpO_2, Heart rate, BP, Temperature, Level of Consciousness, and a new onset confusion or behaviour change • Some patients may not need all the core vital sign observations to be monitored at the same frequency (eg young children may not need BP monitored as often as Resp rate and SpO_2) • These parameters should be monitored: o at time of admission or initial assessment and when a patient transitions between areas in the hospital o usually at least once every six hours but may be more or less frequently • The frequency of observation should be consistent with the clinical situation of the patient and modified according to changes in clinical circumstances
Bonafide CP, Brady PW, Keren R, Conway PH, Marsolo K, Daymont C. (2013). Development of heart and respiratory rate percentile curves for hospitalized children. *Pediatrics*,131 (4), e1150-e1157).	IV	• Large cross-sectional study 14014 hospitalised children • Heart Rate and Respiratory Rate percentiles established • ViCTOR parameters: Red (Purple) zone either 1st or 99th percentile according to the upper or lower limit of parameter. Orange zone 5th & 95th percentiles.

Bonafide, C. P., Localio, A. R., Holmes, J. H., Nadkarni, V. M., Stemler, S., MacMurchy, M.,. Keren, R. (2017). Video Analysis of Factors Associated With Response Time to Physiologic Monitor Alarms in a Children's Hospital. JAMA Pediatrics, 171(6), 524-531.	IV	• Retrospective cohort study evaluating 38 nurses and response time to alarms • The adjusted median response time among nurses was 10.4 minutes (95%CI, 5.0-15.8) & varied: o the patient was on complex care service (5.3 minutes [95%CI, 1.4-9.3] vs 11.1 minutes [95%CI, 5.6-16.6] among general pediatrics patients), o family members were absent from the patient's bedside (6.3 minutes [95%CI, 2.2-10.4] vs 11.7 minutes [95%CI, 5.9-17.4] when family present), o nurse had less than 1 year of experience (4.4 minutes [95%CI, 3.4-5.5] vs 8.8 minutes [95%CI, 7.2-10.5] for nurses with 1 or more years of experience), o if there were prior alarms requiring intervention (5.5 minutes [95%CI, 1.5-9.5] vs 10.7 minutes [5.2-16.2] for patients without intervention), • Each hour that elapsed during a nurse's shift was associated with a 15%longer response time (6.1 minutes [95%CI, 2.8-9.3] in hour 2 vs 14.1 minutes [95%CI, 6.4-21.7] in hour 8)
Dionne, J., Abitbol, C., & Flynn, J. (2012). Hypertension in infancy: diagnosis, management and outcome. Pediatric Nephrology, 27(1), 17-32. Dionne, J., Abitbol, C., & Flynn, J. (2012). Erratum to: Hypertension in infancy: diagnosis, management and outcome. Pediatric Nephrology, 27(1), 159-160.	IV	• Estimated BP values, after 2 weeks of age in infants from 26 to 44 weeks postconceptional age • ViCTOR parameters: High BP – (orange zone only) 99th centile +5mmHg
Haque, I., & Zaritsky, A. (2007). Analysis of the evidence for the lower limit of systolic and mean arterial pressure in children. Pediatric Critical Care Medicine, 8(2), 138-144.	1V	• Developed new estimates of the fifth percentile SBP for children 1–17 yrs of age from analysis of published blood pressure data from the Task Force on Hypertension. • SBP is significantly affected by height • ViCTOR charts: Low BP (Purple zone only) based on 5th percentile for Systolic BP and 50th height percentile
Kinney, S., Sloane, J., & Moulden, A. (2014). Statewide Paediatric Observation and Response Chart (SPORC) Project: Phase One and Phase Two Report. Paediatric Clinical Network: Department of Health, Victoria, Australia.	V11	• Report outlining the development, implementation and evaluation of a set of standardised observation and response charts for five age groups • The final charts rolled out across Victorian Health services and known as Victorian Children's Tool for Observation & Response (ViCTOR)
McKay, H., Mitchell, I. A., Sinn, K., Mugridge, H., Lafferty, T., Van Leuvan, C., Mamootil, S. & Abdel-Latif, M. E. (2013). Effect of a multifaceted intervention on documentation of vital signs and staff communication regarding deteriorating paediatric patients. *Journal of Paediatrics & Child Health. 49*(1), 48-56.	1V	• Prospective controlled before and after study evaluating introduction of newly designed age specific paediatric observation charts (colour coded vital signs resulting in estimation of Paediatric Early Warning Score) and education intervention • Significant improvement in documentation of vital signs, communication from nurses to doctors following clinical instability and time to medical review

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. Values derived from normal healthy children. • ViCTOR parameters: High systolic BP limits (Orange zone) were based on the 99th percentile of height + 5mmHg for respective ages groups (equivalent to cut-off for stage 2 hypertension)
Paine, C. W., Goel, V. V., Ely, E., Stave, C. D., Stemler, S., Zander, M., & Bonafide, C. P. (2016). Systematic Review of Physiologic Monitor Alarm Characteristics and Pragmatic Interventions to Reduce Alarm Frequency. Journal of Hospital Medicine, 11(2), 136-144.	V	• Systematic review of 24 observational studies evaluating alarm characteristics, response times and 8 studies evaluating interventions • High alarm exposure associated with longer response time in 2 studies • Strategies to reduce alarm fatigue included widening alarm parameters, instituting alarm delays, using disposable ECG wires and changing ECG electrodes daily
Royal College of Nursing (2017). Standards for assessing, measuring and monitoring vital signs in infants, children and young people. RCN: London .	V11	Describes standards and criteria to help guide local procedures in relation to vital sign monitoring which include: • Education and training, teaching children, young people and parents and carers, assessing & measuring vital signs, medical devices & equipment, record keeping