Evidence-based paediatric nursing: paediatric early warning systems

In hospital cardiac arrest are rare events in paediatrics. Most children receive appropriate care without experiencing undetected severe clinical deterioration during hospital admission. Outcomes of paediatric cardiac arrests are however generally poor, with high mortality rates and neurological damage at survival. A review of child mortality in the UK showed that a high proportion of unexpected deaths were preventable (Pearsons 2008). Several studies of patient records of children who suffered cardiac arrests showed the presence of clear signs of clinical deterioration up to 24 hours before (Tume 2006). Appropriate recognition of clinical deterioration could have led to timely intervention to stabilise the patient. Missed deterioration may be due to lack of staff situational awareness, communication failure among professionals or between staff and families and other human factors (Brady 2014).

In a healthcare environment with increasing complexity of care and limited resources, early warning systems are wide spectrum complex interventions designed to increase patient safety and improve resource utilisation in the hospital setting. Their application is described in the paediatric setting since 2005. Their concept is derived from experience in the adult population. There are several paediatric alert criteria published, but so far there’s no consensus on the system to be used. The absence of rigorous testing to support validity and reliability is a key issue. So far the best available testing has been performed on the BedsidePEWS though a multicenter study on more than 2,000 patients (Parshuram 2011). The main domains considered for single parameter or aggregated weighed alert criteria are respiratory, cardiovascular and consciousness clinical indicators. Most systems refer mainly to objective indicators such as heart rate, respiratory rate, systolic blood pressure or transcutaneous blood saturation. Subjectively assessed clinical indicators are also often included, such as work of breathing, capillary refill time, skin colour, parental and staff concern. Due to age-related variability of vital signs in the paediatric population most systems use age-specific groupings and thresholds to identify clinical deterioration (Chapman 2010). Consensus on vital signs cut-offs is also weak and consequently variability between systems occurs.

The aim of early warning scores is to identify children that deteriorate to provide appropriate interventions and prevent adverse outcomes. Response algorithms include increased patient monitoring, medical and nursing assessments, nurse patient ratios and Rapid Response Team (RRT) involvement. Benefits such as reduced PICU urgent admissions and reduced PICU interventions in admitted patients are described. However, the available evidence of impact of PEWS on clinical outcomes is still weak. The EPOCH study is so far the first clinical trial that aims to investigate the efficacy of a paediatric early warning system on mortality, processes of care and resource use (Parshuram 2015). Other benefits are related to improved staff communication and nursing empowerment to initiate escalation of care or call the RRT.

Implementation requires staff buy in by focusing on the system’s rationale, staff education and the system integration in the current hospital processes of care. Continuing process monitoring is needed to identify gaps in the implementation. Poor compliance with documenting vital signs and response to high-risk patients may weaken the system’s potential for preventing serious adverse events.
Bibliography


