



Implementation of Pediatric Early Warning Score; Adherence to Guidelines and Influence of Context



Ann-Charlotte Almlad*, Petra Siltberg, Gunn Engvall, Mats Målvqvist

Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden

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ABSTRACT

Purpose: To describe data of Pediatric Early Warning Score (PEWS) registrations and to evaluate the implementation of PEWS by examining adherence to clinical guidelines based on measured PEWS, and to relate findings to work context.

Design and Methods: PEWS, as a part of a concept called Early Detection and Treatment-Children (EDT-C) was implemented at three wards at a Children's Hospital in Sweden. Data were collected from the Electronic Patient Record (EPR) retrospectively to assess adherence to guidelines. The Alberta Context Tool (ACT) was used to assess work context among healthcare professionals ($n = 110$) before implementation of EDT-C.

Results: The majority of PEWS registrations in EPR were low whereas 10% were moderate to high. Adherences to ward-specific guidelines at admission and for saturation in respiratory distress were high whereas adherence to pain assessment was low. There were significant differences in documented recommended actions between wards. Some differences in leadership and evaluation between wards were identified.

Conclusions: Evaluation of PEWS implementation indicated frequent use of the tool despite most scores being low. High scores (5–9) occurred 28 times, which may indicate that patients with a high risk of clinical deterioration were identified. Documentation of the consequent recommended actions was however incomplete and there was a large variation in adherence to guidelines. Contextual factors may have an impact on adherence.

Practice Implications: EDT-C can lead to increased knowledge about early detection of deterioration, strengthen nurses as professionals, optimize treatment and teamwork and thereby increase patient safety for children treated in hospitals.

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Background

Children are vulnerable regarding medical errors and the detection of clinical deterioration (Pruitt & Liebelt, 2010; Shaw et al., 2009; Shaw et al., 2013). A report showed that 4.4% of children from birth to 15 years, who are cared for in hospital settings in Sweden suffer from health-related injuries, i.e. avoidable injuries caused by treatment rather than an underlying disease (The National Board of Health and Welfare, 2008). Shortcomings in clinical judgment and communication are common causes of unsafe conditions in pediatric care (Ruddy et al., 2015). Early recognition of severely ill children and the subsequent appropriate intervention are therefore necessary to prevent deterioration and cardiac arrest. Education and practical teamwork exercises, a structured approach and the use of assessment tools are described as ways to facilitate the care of acutely, severely ill children (Almlad, Malqvist, & Engvall, 2016).

The Pediatric Early Warning Score (PEWS) is a scoring system developed for children and focuses on three components: behavior, color/cardiovascular status and respiratory status (Akre et al., 2010; Monaghan, 2005; Parshuram et al., 2011). A retrospective evaluation of estimated PEWS showed that for 85.5% of the patients, the earliest indicator on a critical PEWS was approximately 11.5 h before deterioration (Akre et al., 2010). A study at a pediatric hospital in Norway showed that a PEWS >3 was associated with severe illnesses and that these children were transferred to a higher level of care more often than children with PEWS 0–2 (Solevag, Eggen, Schroder, & Nakstad, 2013). Sefton, McGrath, Tume, Lane, Lisboa, and Carrol (2014) report that after implementation of PEWS the patients required less Pediatric Intensive Care Unit (PICU) interventions and had a shorter length of stay at the PICU. In addition, PICU service delivery improved.

The Promoting Action on Research Implementation in Health Services (PARIHS) is a framework for the implementation of evidence to practice. It is built around three components: Evidence, Context and Facilitation. Evidence encompasses research evidence, clinical experience and local information. Implementation of such evidence is a dialectical process and a team effort. Successful implementation requires contexts that have transformational leaders, evaluative and feedback

* Corresponding author at: Department of Women's and Children's Health, Uppsala University, Akademiska Sjukhuset, SE-751 85 Uppsala, Sweden.

E-mail address: ann-charlotte.almlad@kbh.uu.se (A.-C. Almlad).

mechanisms and appropriate facilitators who work with individuals and teams to enhance the process (Kitson et al., 2008). PARIHS can identify barriers to research utilization in practice and by processing these barriers increase the susceptibility of an intervention (Obrecht, Van Hulle Vincent, & Ryan, 2014).

The Early Detection and Treatment Program for Children (EDT-C) was developed at Uppsala University Hospital and consists of the Pediatric Early Warning Score (PEWS), Airway, Breathing, Circulation, Disability, Exposure (ABCDE), Crew Resource Management (CRM), Situation, Background, Assessment, Recommendation (SBAR), and recommended action according to EDT-Ladder for Children. ABCDE is a structured tool to examine, treat and evaluate the patient's vital functions on the basis of a pre-determined order (Jafarpour, Nassiri, Bidari, Chardoli, & Rahimi-Movaghar, 2015). CRM is a model for teamwork focusing on communication, situation awareness, leadership and resource management (Flin & Maran, 2004; Jafarpour et al., 2015). SBAR is a standardized tool for clear and concise communication (Sweeney, Warren, Gardner, Rojek, & Lindquist, 2014). It has been shown that structured communication can improve teamwork, increase patient safety and reduce unexpected deaths (Barata, Benjamin, Mace, Herman, & Goldman, 2007; Woodhall, Vertacnik, & McLaughlin, 2008) (Panel 1).

The Implementation Process

In March 2013, EDT-C was implemented, at The University Children's Hospital, Uppsala in accordance with the PARIHS framework. Three inpatient wards participated: the Emergency Care ward with general pediatrics and emergency care with 9 beds, the Elective Care ward with mainly planned care for neurology and surgery with 22 beds, and finally the Oncology ward with 12 beds mainly for planned care for children with blood and tumor diseases. Emergency conditions occur in all units, such as bleeding and infection after surgery, seizures, meningitis and serious brain conditions, life-threatening sepsis and serious

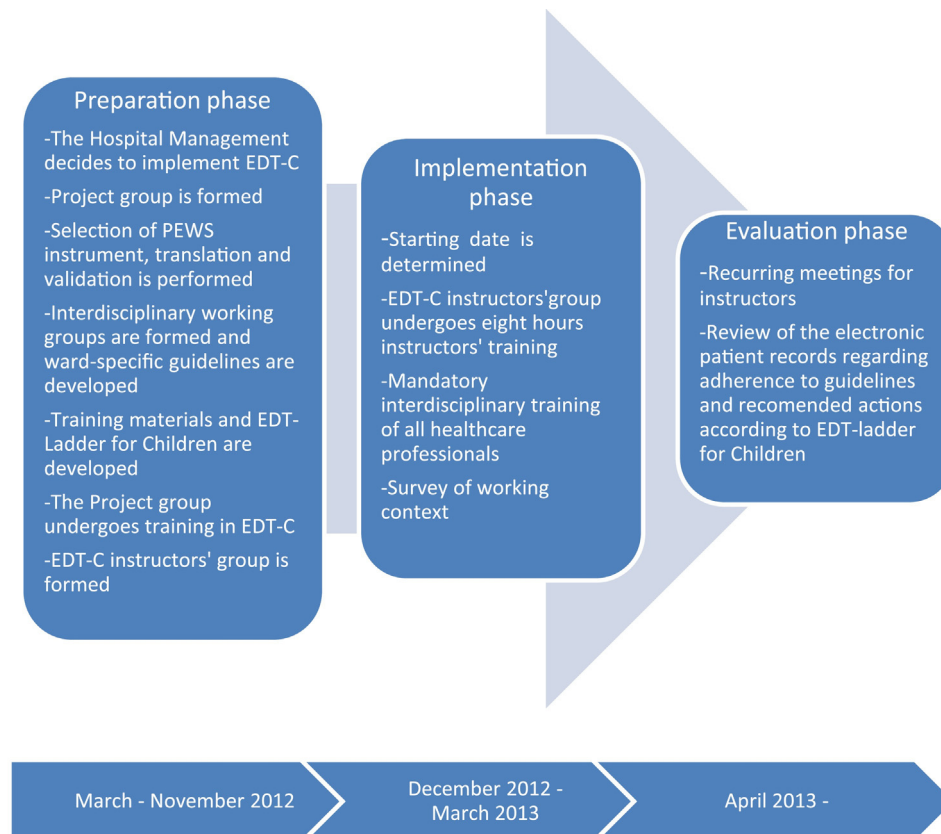
respiratory problems. The implementation process with the preparation phase, implementation phase and evaluation phase is briefly described in Flow Chart 1.

Preparation Phase

The Brighton Pediatric Early Warning Score scoring system was chosen, on the basis that it is a validated instrument (Akre et al., 2010; Monaghan, 2005). Two translators, one with Swedish and one with English as their mother tongue, translated the PEWS instrument, first from English into Swedish and then back to English. A minor adjustment of the instrument was made regarding oxygen treatment and persistent postoperative vomiting, which was regulated in a separate document. A cross-sectional pilot study was conducted to investigate the inter-rater reliability for the Swedish version of the PEWS. The PEWS scores were assessed 56 times by two independent observers at an oncologic ward at a University Hospital. Inter-rater reliability for the total PEWS was good to excellent: Cohen's kappa was 0.80 and ICC was 0.96 (Nilsson & Zitra, 2014).

The PEWS is a structured instrument to assess patients' health (range from 0 to 9): behavior (0–3) color/cardiovascular status (0–3) and respiratory status (0–3) (Akre et al., 2010). Cross-professional reference groups, consisting of physicians, assistant nurses and nurses, were established on each ward to determine the adapted guidelines. These guidelines (Panel 2) determine which patients should be assessed according to PEWS based on the ward's specific needs. The recommendations for actions to be performed on the basis of measured PEWS and/or concern for the patient's health are described in the EDT-Ladder for Children (Panel 1).

Training materials for EDT-C were developed in collaboration with nurses and physicians from the hospital's Clinical Training Center and from various pediatric care wards. The working group underwent EDT-C head instructor training.



Flow Chart 1. The implementation process.

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