



Update on the Evaluation of BC Pediatric Early Warning System (PEWS) Implementation in Inpatient Settings



Vancouver
CoastalHealth



OVERVIEW

Pediatric Early Warning System (PEWS)

Global research has shown that failure to recognize and treat deteriorating hospitalized patients is a source of substantive unintended harm, including death, disability, and prolonged stay or readmission. PEWS are used internationally to promote early identification and mitigation of deterioration in hospitalized pediatric patients.

BC PEWS

Child Health BC, Health Authority and Agency Partners have now implemented PEWS in 44 sites serving pediatric inpatients throughout BC. Fifteen sites participated in a comprehensive evaluation to help us track fidelity of implementation, understand how PEWS was functioning in diverse health care settings and determine what health providers both valued and wanted to change about the system. Eleven inpatient sites that did not have a pre-existing PEWS system in place are included in the evaluation results shared in this update. A separate research study was conducted as a pilot of PEWS in Emergency Department (ED).

Vancouver Coastal Health

- Lion's Gate Hospital
- Bella Cooola General Hospital

Fraser Health

- Surrey Memorial Hospital
- Abbotsford Regional Hospital
- Langley Memorial Hospital

Island Health

- West Coast General Hospital
- Cowichan General Hospital

Interior Health

- Vernon Jubilee Hospital
- Kootenay Boundary Hospital
- Kootenay Lake Hospital
- Royal Inland Hospital

*Northern Health joined provincial implementation after the evaluation commenced.

The study was carried out in four phases in 2015 to 2017:

PHASE 1

Design of the
5-component
PEWS

PHASE 2

Baseline data collection
through patient
chart review
(n=230)

PHASE 3

Implementation
of PEWS in
inpatient settings

PHASE 4

Post-implementation
data collection:
patient chart review (n=284),
healthcare provider survey
(n=139) & interview with
site champions (n=11)

BOTTOM LINE FINDINGS

1. Overall, BC PEWS was a valued and useful tool that brought about positive changes in the care of pediatric patients.
2. There was substantive increase in documentation of physiological parameters throughout patient stay.
3. While overall satisfaction of nurses and physicians was high, feedback suggests a need for re-design of the PEWS flowsheet to increase usability.
4. Educational opportunities remain including proper flowsheet usage, score calculation, managing false positive scores and reinforcing the role of PEWS alongside clinical judgment and clinical reassessment.

What was the 5-component PEWS implemented in the site?

PEWS SCORE

The Brighton PEWS score is the most widely used and validated PEWS score for inpatient care. It is a 13-point score based on behavioural, cardiovascular and respiratory status with extra points for frequent bronchodilator use or persistent vomiting following surgery. The PEWS scoring section is embedded in the flowsheet and is colour coded to provide a clear visual when vital signs are outside of the normal range.

PEWS FLOWSHEET

The double-sided nursing flowsheet comprehensively outlines 24 hours of nursing assessment, including PEWS scoring, full head-to-toe assessment and documentation of routine nursing care such as fluid balance monitoring and safety checks. The flow sheets are available in six age grouping (0-3months; 4-11 months; 1-3 years; 4-6 years; 7-11 years and 12+ years) based on naturally-occurring variations in Canadian Triage Acuity Scale (CTAS) vital signs norms.



SITUATIONAL AWARENESS

Situational awareness is an approach to identifying, predicting and addressing risk for patients. Tools to promote situational awareness were used within the unit including posters for visual cueing, staff reporting and flowsheet documentation of situational awareness factors: caregiver concern, watcher patient, unusual therapy and communication breakdown. The situational awareness factors are not included in the total PEWS score but elevate a child's risk profile and influence the escalation of care process.



ESCALATION GUIDE

The escalation guide outlines actions to support clinical decision making following assessment. Recommended mitigation actions (e.g. notification, reassessment, consultation) correspond to pediatric early warning scores and situational awareness factors. A quick-view of the escalation guide was embedded in the flowsheet.



COMMUNICATION FRAMEWORK

The SBAR (situation, background, assessment, recommendation) toolkit was used to improve communication between team members on the patient status.

S B A R

HIGHLIGHTS OF FINDINGS FROM THE STUDY

How did assessment documentation change after PEWS implementation?

- A PEWS score was documented at first assessment in 90% of charts; 86% of these PEWS scores were accurate. Compared to documentation pre-PEWS, this represents a 49% increase in documentation of the complete set of physiologic parameters included in a PEWS score at first assessment.
- Rates of “consistent” documentation of physiologic parameters (with every assessment throughout the patient stay) rose dramatically, as did documentation of some situational awareness factors. (see Charts 1 and 2)
- The rates of consistent documentation of neurovitals was high for all parameters (84% to 90%) except for pupils, (40%). Reviewer notes and medical record review suggest room for improvement in consistent documentation of nursing care, particularly of pain and output.

How well did we do completing PEWS scoring?

- 87% of charts post PEWS had a completed PEWS score with each vital signs assessment.
- In only 47% of charts, PEWS scores were always accurate

100% of the time. Inaccuracies caused by human error were common and include: math errors, subsections added instead of taking highest score, not completing sections i.e. missed parameters or not totaling sections or overall score, assigning wrong score value, etc.

How well did the PEWS score reflect risk?

- 42% of charts had a critical PEWS (5 to 13) at some point during the visit indicating early warning.
- Post PEWS, in 71% of charts (177/250), scores reflected clinical picture of risk. In instances where scores did not reflect (3%) or somewhat reflected risk (26%), risk related to factors PEWS scores were not designed to capture eg. abnormal lab values, abnormal neurovitals, surgical risk.
- Nurses reported instances of false positive scores i.e. PEWS scores elevated without clinical evidence of deterioration.

HIGHLIGHTS OF FINDINGS FROM THE STUDY



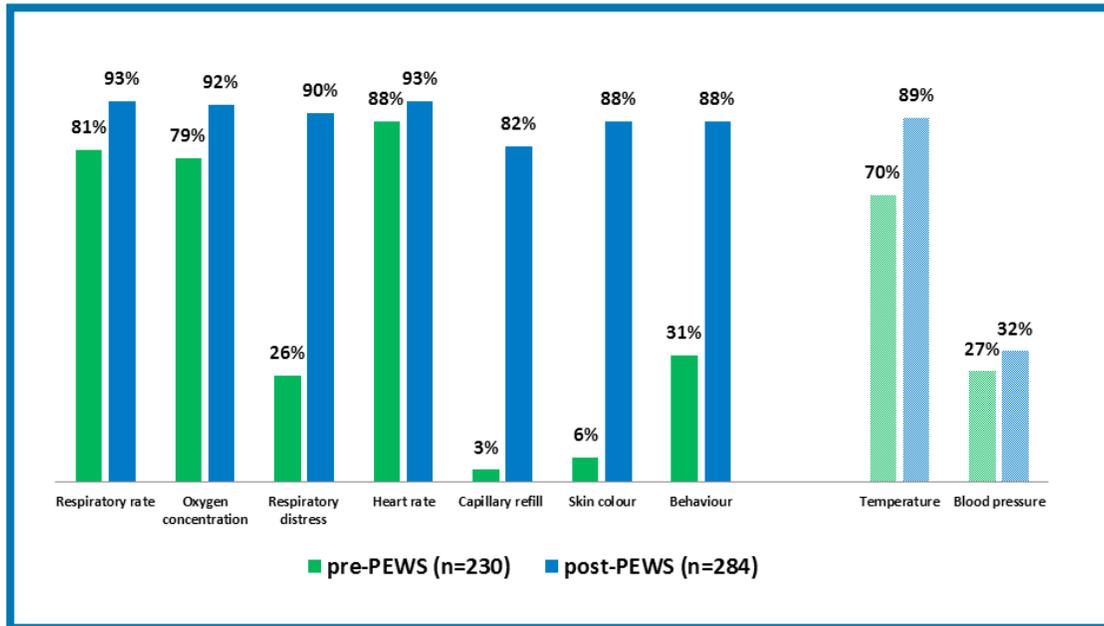
How were the PEWS Flowsheets being used?

- 98% of charts had a PEWS flowsheet (n=278 of 284)
- While flowsheets were designed for documentation of 24-hours of assessment there was considerable variability in usage within and between sites.
- The most common documentation errors included using one flowsheet for multiple days of assessment and/or charting Q4 vitals without leaving blank columns for the hourly documentation. These two errors inaccurately depict trending across time and leave no room for documentation of hourly checks.

Could PEWS scoring help nursing assesment in the ED?

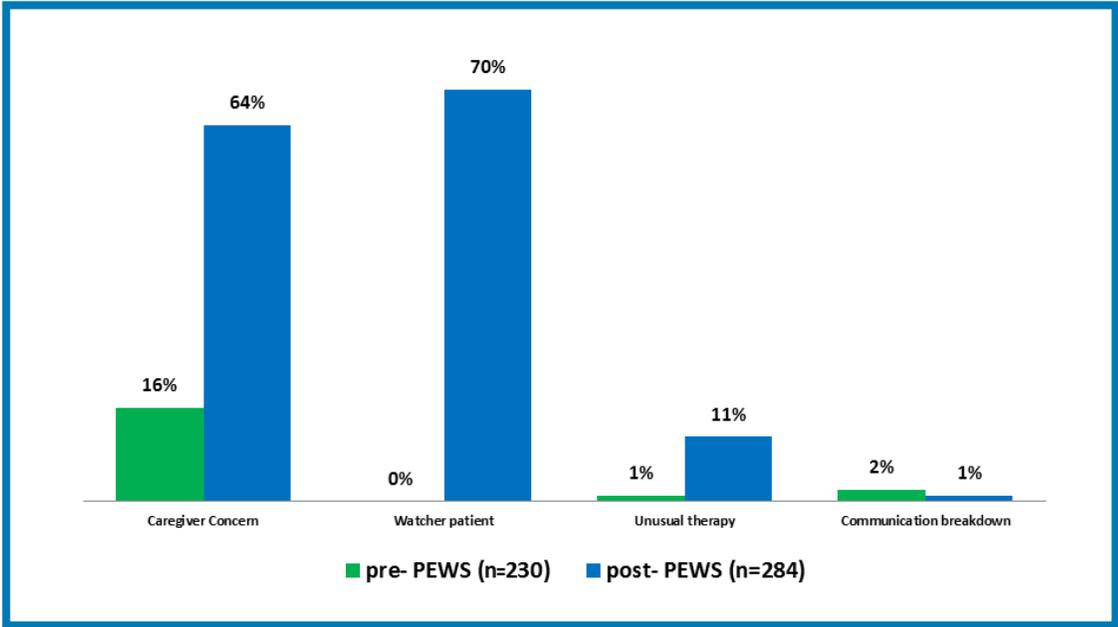
Emergency Department (ED) triage records were reviewed for all children admitted through ED. PEWS score could not be calculated based on data available (n=369). This suggests that adding PEWS scoring in ED could promote a more consistent, thorough assessment of physiologic status.

Chart 1: Percentage of charts with consistent documentation (with every assessment) of physiologic parameters pre & post PEWS



*Note: Blood pressure and temperature are NOT part of a PEWS score

Chart 2: Documentation Rates of Situational Awareness Factors Pre & Post PEWS



What do nurses and physicians think of PEWS? (n=43)

Survey and interview responses were analyzed thematically (Table 1 and 2)

Table 1: Strengths/Positive changes attributed to the introduction of PEWS (common themes) (n=82 responses from open-questions in the survey; n=11 from semi-structured interviews)

Identification

- Vital signs charting by age group provides visual cueing so it is easy to see abnormal/normal
- Trending capacity of PEWS allows for visual of deterioration or improvement
- PEWS prompts earlier/faster identification of deterioration/risk

Assessment /documentation

- The flowsheet guides a thorough/comprehensive assessment
- The flowsheet offers streamlined documentation: everything in one place, easy to follow and use; allows for a quick view of all information in a concise format
- The flowsheet promotes standardization/consistency between RNs in both assessment and charting.
- The flowsheet makes for quicker assessment and charting

Monitoring

- PEWS increases staff alertness/awareness
- Prompts closer, more consistent monitoring according to score
- Prompts more frequent assessment and regular checks i.e. safety, alarm (Q1)

Guides decision making/reduces cognitive load

- Guides/validates care decisions (i.e. when to take action, when to call doctor, level of care)
- Helps to inform logistics planning i.e. required staffing levels
- Helpful guide for nurses in rural areas/where pediatrics is small volume
- Helpful guide for new graduates/junior nurses
- Increases comfort with vital signs norms by age/ don't have to memorize norms

Communication

- Provides clear/improved/efficient format for communication with physicians about patient status
- Health care team members have same language and assessment information making it easier and faster to communicate
- Prompts increased communication between staff about patient status and mitigation

Mitigation

- It's easier to get support from charge RNs/physicians e.g. they listen to the score
- Mitigation occurs faster, earlier

Other

- Increases awareness of watcher patients
- Accounts for family/caregiver perceptions & promotes communication with families
- Overall it is helpful/useful and effective



What do nurses and physicians think of PEWS?

Table 2: Challenges/Negative changes attributed to the introduction of PEWS (n=75responses)
(common themes)

Documentation (Flowsheet)

- Charting can be time consuming
- Issues with formatting of the flowsheet:
 - Too long, cumbersome, unwieldy, clumsy, flipping and folding required
 - The flowsheet is too busy, too small, not enough room
 - The ins/outs section is unclear/hard to read & tally & is not used consistently
 - Miss having room for narrative notes, observations
 - Unable to personalize the flowsheet
 - Because of 24-hour format, it's difficult to trend score and/or other information over more than 1 day
 - Difficult to photocopy for transfers
 - Charting is excessive, arduous
- Relevance of flowsheet:
 - There could be more age appropriateness in each of the flowsheets (some boxes are irrelevant for some patients)
 - Flowsheets may be excessive for some patients i.e. mental health, orthopedic
 - Mental health assessment not sufficient for mental health patients

PEWS Scoring Tool

- Sometimes scores don't reflect clinical risk (false positives), examples provided:
 - Children on the cusp of an age range
 - Points given for sleeping
 - Changes post treatment (e.g. increase in heart rate post Ventolin)
 - Fever
 - Irritability
 - Children whose baseline vital signs norms vary from typical (e.g. children with chronic diseases, developmental impairments, highly athletic youth)

Human Factors

- Perception that the escalation aid precludes clinical judgment (e.g. RN feels they must follow escalation guide even when clinical judgement suggests differently)
- Staff can become too fixated/reliant on the score, takes away from patient care and using judgement
- Some staff disregard higher scores and decide independently on mitigation
- Variability in use of flowsheet makes it difficult to compare across shifts
- Poor physician buy in i.e. MDs do not appreciate/care when they are called about scores, are not influenced by scores in care planning

Site Variation (Inpatients /ED)

- ED uses CTAS and wards use PEWS- the scores have different meanings

Education

- Some respondents indicated a need for more education/refresher training. Specific areas for education included:
 - Category scoring and adding
 - Head to toe assessment & hourly check requirements
 - How to use flowsheet
 - Situational awareness - not properly understood or used
 - Ins/outs section
- PEWS not intuitive/ can be confusing & hard to develop proficiency if not used regularly (low volume sites)

IN THEIR OWN WORDS...

Provider Comments

Strengths of the PEWS system

“PEWS system and charting is concise while also being thorough. It is nice to have all required information on one sheet rather than on multiple different flow sheets to get the info across.” -RN

“We are able to identify children deteriorating quicker and able to react to changes in patient status now that we are using PEWS. We are also able to communicate to the physicians using the same language and assessments to make care of patient more effective.” -RN

“Because we deal with mostly adult patients and the ICU RN’s working there do not all have PALS and other formal pediatric education and/or frequent experience/exposure to peds, the PEWS system is very helpful in determining risk of deterioration” -RN

“I find I do a more thorough head to toe assessment. I am much more aware of small changes in the patient’s assessment that trigger me to watch the patient closer or note some improvement.” - RN



Challenges of the PEWS system

“Checklist could be more age appropriate - such as removing the option for breastfeeding on older age forms and self-voiding on babies.” -RN

“Scoring does not reflect if a patient has a chronic disease or is developmentally challenged-their normal score can be 4-5.” -RN

“Small number of pediatric admissions and large number of RN staff involved, so each nurse gets little opportunity to become familiar with the charting.” -RN

“I struggle with the PEWS scoring and escalation guideline most when I have a patient who is asleep and their HR or RR drops below the “normal” level giving a score of three in one or both categories this combined with a score of 1 for sleep may give a [high] PEWS “ -RN

“PEWS promotes good anticipatory care of pediatric patients. We are transferring patients earlier, prior to patient deteriorating. For example, we had one child admitted to inpatients from the ED who was febrile but looked well- otherwise asymptomatic. Attention was not paid to the vital signs and blood pressure was very high. The patient was admitted but required immediate fluids and norepinephrine; they were in septic shock and required transfer to BC Children’s PICU. PEWS helped the nurses identify that this patient was deteriorating and escalation of care happened faster as a result. Had PEWS been in place in ED, this patient may have been picked up then and transferred to BCCH instead of admitted to the ward first.”

-Pediatrician



Rankings of usefulness

Health provider survey results (n=105 -107 responses)	Useful/very useful	Somewhat useful	Useful/slightly useful
Vital signs reference cards	75.5%	15.1%	9.4%
PEWS escalation guides	42.9%	29.5%	27.6%
PEWS flowsheet	61.3%	17.0%	21.7%
PEWS scoring	56.1%	21.5%	22.4%

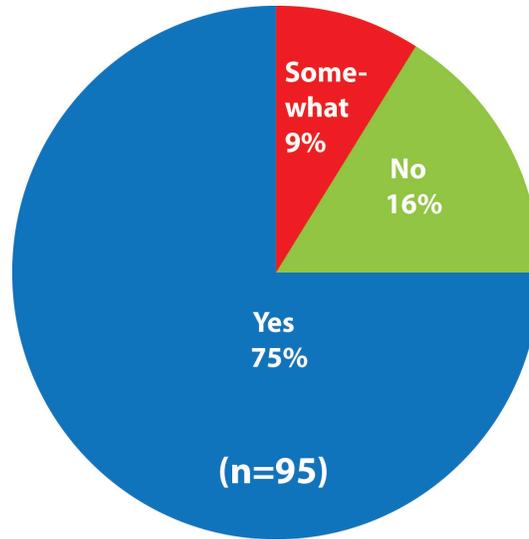


Rankings of satisfaction

- Satisfaction was >80% for all tools included in the PEWS system. 16% were dissatisfied with the flowsheet and 19% with the PEWS scoring (n=105 -107)
- Satisfaction with all aspects of the PEWS implementation and training was >90%(n=105-107), except for implementation of the PEWS escalation aid which had a 16% dissatisfaction rate



Overall, do you feel the introduction of BC PEWS added value to patient care at your facility? (n=95)



Did RNs gain knowledge and confidence through PEWS implementation?

- $\geq 80\%$ of RNs reported some gain in knowledge in pediatric care post PEWS (n=104)
- $\geq 76\%$ of RNs reported some gain in confidence in pediatric care post PEWS (n=105)

KEY MESSAGES

- Chart review of patients admitted through ED suggests that PEWS may enhance assessment practice.
- Documentation of assessment parameters increased substantively with the introduction of BC PEWS at first assessment and throughout the patient stay. As these parameters are important for determining early risk, this represents a big improvement in assessment practice.
- Opportunity remains for education use of the 24-hour flowsheets and scoring to increase accuracy.
- The implementation of PEWS (particularly in low volume pediatrics sites) identified some aspects of pediatric assessment beyond the PEWS system, where support is required e.g. documentation of nursing care, particularly ins/outs and safety checks.
- PEWS scores reflected the clinical picture of risk in the majority of cases but there were reported instances of false positives and risk beyond what PEWS scoring would capture. Situational awareness factors, particularly “watcher”, can help in increasing risk profile.
- While there were high levels of satisfaction with the PEWS tools, implementation and training overall, feedback suggests the flowsheet requires changes to make it more user-friendly and intuitive.
- There is opportunity through education to reinforce that the PEWS escalation aid is a guide for clinical practice and should not replace judgment and clinical reassessment.
- Overall, BC PEWS was a valued and useful tool that brought about positive changes in pediatric care.

We heard you! Using evaluation results for improvement

- Child Health BC will be using your feedback to re-design a new, user-friendly flowsheet in 2018.
- An online PEWS refresher course addressing educational opportunities identified in the evaluation will be released in 2018. In particular, we will re-highlight the role of PEWS in enhancing but not replacing clinical judgement and clinical reassessment, and will review the current escalation aid.



- Following a successful pilot research study of BC PEWS in the Richmond Emergency Department, and a growing body of evidence supporting PEWS in ED, we obtained provincial consensus on moving forward with BC PEWS ED in summer 2017. BC PEWS was re-designed for ED and training and implementation will occur throughout 2018. This will standardize quality pediatric care across and within sites.





We would like to acknowledge the direct care staff and PEWS champions at each site for their dedication and persistence in implementing a new standard of care for pediatric patients.

Thank you to BC Children's Hospital Foundation
for their support of Child Health BC.

