# Description of Safe Clinical Practice (SCP) and Implementation Process for Work Package 5 Tool Box

## Title of the SCP

### Paediatric Early Warning Scores (PEWS)

<table>
<thead>
<tr>
<th>Objective of the SCP (the underlying problem that the SCP addresses)</th>
<th>PEWS provide a systematic approach to enable staff to monitor the sick child using appropriate age-related values. The SCP is to be applied by clinical staff in paediatric units in acute hospital settings for all paediatric patients. Early warning scores are generated by combining the scores from a selection of routine observations of patients e.g. pulse, respiratory rate, respiratory distress, consciousness level. Different observations are selected for children and adults due to their naturally different physiological responses. If a child’s clinical condition is deteriorating the “score” for the observations will (usually) increase and so a higher or increasing score gives an early indication that intervention may be required. Early intervention can “fix” problems and can avoid the need to transfer a child to a higher level of care.</th>
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<tbody>
<tr>
<td>To provide a validated, easy to use, practical, generic tool to monitor and to prevent avoidable deterioration in sick children</td>
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<tr>
<td>To provide age-appropriate values to enable the effective monitoring of the sick child</td>
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<td>To enable staff to communicate information about the sick child appropriately and to respond effectively</td>
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</table>

## Innovator of the SCP, country of origin

NHS Institute for Innovation and Improvement; UK

This project has been a collaborative one between the NHS Institute for Innovation and Improvement (NHSIII) and major Trusts in England, e.g. Great Ormond Street Hospital for Children and the Royal Free NHS Foundation Trust.

Previously almost every hospital in the UK used different PEWS charts and calculated PEWS in different ways. There is limited research into the trigger points for scoring and escalation. Even where a system is in place, usage can be variable, scoring unreliable, and escalation unstructured. The NHS Institute led a collaborative with paediatric units across England to address some of the design and implementation issues. They have produced resources which are free and available on their website.

Staff at NHSIII worked with nurses and doctors at the Royal Free NHS Foundation Trust in North London to develop and test the prototype charts. Using established models for improvement and small scale tests of change (PDSA cycles), the chart design was refined and the escalation procedure using SBAR was added.

The project was further tested in a number of major paediatric units in Trusts in England.

18 months after the project was completed, the charts are still in use and paediatric units are currently updating them to support further improvements.
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care and thus avoid or reduce harm.

**Health care organisations (HCOs) which will implement this SCP within Work Package 5 of the PaSQ Project are expected to introduce Pediatric Early Warning Scores charts into routine care which are based on the PEWS charts developed and tested by the NHS Institute for Innovation and Improvement** (See the section on specific tools for PEWS within the tool box on the PaSQ website).

**It is encouraged that health care organisations modify the charts to suit their needs.**

The charts of the NHSIII and those of other hospitals that have used the approach of NHSII to inform their own chart design can be downloaded free to use and adapt. The NHSIII asks that the source is attributed e.g. adapted from an original design by the NHS Institute for Innovation and Improvement, England.

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### Stepwise approach to implementation

**The following outlines crucial factors for the implementation of Paediatric Early Warning Scores** (taken from the presentation „Recognising and responding to deterioration in children - what do we know?“ by Sue Chapman, NHS III, PEWS event 4th Nov. 2010, available within the tools included in the tool box on the PaSQ website).

1. **Local leadership**
   - Executive support
   - Clinical champions
   - Deteriorating patient steering group?
   - Motivation
   - Protected time
   - Resources

2. **Effective implementation**
   - Model for improvement
     - How much
     - By when
     - By whom
   - Small scale tests of change
   - Spread and sustainability
   - Engaging and motivating staff
   - Policies and procedures
### Paediatric Early Warning Scores (PEWS)

#### 3. Training
- Staff training - Nurses, doctors and other frontline staff
  - Initial
  - Ongoing
  - Updates
- Who? When? Where?
- Reliability
- Simulation and e-learning can be used to support training

#### 4. Ongoing evaluation
- Evaluation and feedback strategy
- Ongoing responsibility
- Continuous monitoring
  - process, outcome and balancing measures
- Benchmarking
- Safety and incident reports
- Failure to rescue, M & M and case reports

A human factors approach should be taken into consideration, e.g. factors influencing human performance and human error.

### Information on needed resources
Experience from the UK collaborative shows that few resources are needed to implement the PEWS charts. Staff is required to lead the project. Time for training staff needs to be allocated, although this is generally short (10 minutes can be enough). The PEWS charts need to be printed, although as they might replace the old vital signs charts, this would not necessarily generate an extra need for resources.

### References
NHS Institute for Innovation and Improvement (NHS III). Paediatric Early Warning Scores. 2013. → Note: The NHS III closed on March 31st, 2013. The resources which were available on the NHS III website will be transferred to the NHS Improving Quality website (part of NHS England). All former NHS III PEWS tools are included in the section on specific tools for PEWS within the tool box on the PaSQ website.
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### Summary of evidence for effectiveness

A systematic review by Chapman et al from 2010 investigated the validity, reliability, clinical effectiveness and clinical utility of published paediatric alert criteria. With the umbrella term “paediatric alert criteria” the authors meant either Early Warning Scores/systems, or activation/trigger criteria to mobilise a Rapid Response Team in hospitalized children cared for on wards outside the critical care unit.

Eleven studies fulfilled the inclusion criteria and described ten paediatric alert criteria. Six studies described the introduction and use of paediatric alert criteria as part of the implementation of a Rapid Response Team or equivalent system, four examined the development and testing of the paediatric alert criteria, and one investigated both aspects.

Of the five papers which described the development and testing, only three reported accurate values for positive predictive value, sensitivity and specificity. Only one study evaluated reliability, and none evaluated the clinical utility of the criteria. No study reported the impact of introducing paediatric alert criteria on patient outcome, although five papers described the effect of the Rapid Response team activated as a result of the paediatric alert criteria on rates of cardiac arrest, respiratory arrest and hospital-wide mortality rates.

All paediatric alert criteria contained a measure of consciousness, and the majority included a measure of respiratory rate, heart rate and oxygen saturation. Overall, there was a lack of consistency in the number and type of parameters in the paediatric alert criteria, and in the thresholds for action by health care staff. Where tools were age dependent, there was a lack of agreement on age groupings. The authors note that this diversity limits comparison between studies and undermines the development of an evidence base for paediatric alert criteria.

The authors come to the conclusion that the evidence supporting the validity, reliability and utility of paediatric alert criteria is weak. Studies with a prospective evaluation of these parameters are needed. A more homogenous approach to paediatric alert criteria may produce wider benefits, in terms of training, clinical practice and research.

### References