NATIONAL CLINICAL EFFECTIVENESS COMMITTEE

National Patient Safety Office
Oifig Náisiúnta um Shábháilteacht Othar

The Irish Paediatric Early Warning System (PEWS)

National Clinical Guideline No. 12

Summary

An Roinn Sláinte
DEPARTMENT OF HEALTH

November 2015
Updated November 2016, version 2

HSE National Clinical Programme for Paediatrics and Neonatology

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive
Quality Improvement Division

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive
Clinical Strategy and Programmes Division

FACULTY OF PAEDIATRICS
ROYAL COLLEGE OF PHYSICIANS OF IRELAND

This National Clinical Guideline has been developed by the Irish Paediatric Early Warning System (PEWS) Guideline Development Group (GDG), within the HSE National Clinical Programme for Paediatrics and Neonatology.

Using this National Clinical Guideline Summary

This National Clinical Guideline applies to infants and children admitted to paediatric inpatient settings. It does not apply to infants within maternity and neonatal units. This National Clinical Guideline is relevant to all healthcare professionals working in paediatric inpatient settings.

Disclaimer

NCEC National Clinical Guidelines do not replace professional judgement on particular cases, whereby the clinician or health professional decides that individual guideline recommendations are not appropriate in the circumstances presented by an individual patient, or whereby an individual patient (or their parent/carer in the case of children) declines a recommendation as a course of action in their care or treatment plan. In these circumstances the decision not to follow a recommendation should be appropriately recorded in the patient's healthcare record.

This Guideline summary should be read in conjunction with the full version guideline.
Users of NCEC National Clinical Guidelines must ensure they have the current version (hardcopy, softcopy or app') by checking the website: http://health.gov.ie/national-patient-safety-office/ncec/
The complete list of references can be found in the full version of the Guideline.

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Version history

Date	Version	Full update or rapid update	Details
November 2015	1		New
November 2016	2	Rapid update	Refer to 'summary of updates table'

Membership of the Guideline Development Group

The GDG was chaired by Dr. John Fitzsimons, Chair of the National PEWS Steering Group and Clinical Director for Quality Improvement, Quality Improvement Division, Health Service Executive (HSE). This National Clinical Guideline is supported by the HSE National Clinical Programme for Paediatrics and Neonatology, the Faculty of Paediatrics, Royal College of Physicians of Ireland (RCPI) and the Clinical Strategy and Programmes Division, HSE.

Membership nominations were sought from a variety of clinical and non-clinical backgrounds so as to be representative of all key stakeholders within the acute paediatric hospital sector. GDG members included those involved in clinical practice, education, administration and research methodology, as well as representation from PEWS pilot sites and parents. In addition, when required, a process of consultation was employed with subject matter experts.

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1 These members of the GDG are also current members of the National PEWS Steering Group. The National PEWS Steering Group is responsible for the development of the Irish Paediatric Early Warning System, and oversees implementation activities nationally.

2 Membership of the Guideline Development Group: Rapid Update November 2016

NCEC National Clinical Guidelines

The National Clinical Effectiveness Committee (NCEC) is a Ministerial committee set up in 2010 as a key recommendation of the report of the Commission on Patient Safety and Quality Assurance (2008).

The aim of National Clinical Guidelines endorsed by the NCEC is to reduce unnecessary variations in practice and provide a robust basis for the most appropriate healthcare in particular circumstances. As a consequence of Ministerial mandate, it is expected that NCEC National Clinical Guidelines are implemented across all relevant services in the Irish healthcare setting.

The NCEC is a partnership between key stakeholders in patient safety. NCEC's mission is to provide a framework for national endorsement of clinical guidelines and audit to optimise patient and service user care. The NCEC has a remit to establish and implement processes for the prioritisation and quality assurance of clinical guidelines and clinical audit so as to recommend them to the Minister for Health to become part of a suite of National Clinical Guidelines and National Clinical Audit. The aim of the suite of National Clinical Guidelines is to provide guidance and standards for improving the quality, safety and cost-effectiveness of healthcare in Ireland. The implementation of these National Clinical Guidelines will support the provision of evidence-based and consistent care across Irish healthcare services.

NCEC Terms of Reference

1. Provide strategic leadership for the national clinical effectiveness agenda.
2. Contribute to national patient safety and quality improvement agendas.
3. Publish standards for clinical practice guidance.
4. Publish guidance for National Clinical Guidelines and National Clinical Audit.
5. Prioritise and quality-assure National Clinical Guidelines and National Clinical Audit.
6. Commission National Clinical Guidelines and National Clinical Audit.
7. Align National Clinical Guidelines and National Clinical Audit with implementation levers.
8. Report periodically on the implementation and impact of National Clinical Guidelines and the performance of National Clinical Audit.
9. Establish sub-committees for NCEC work-streams.
10. Publish an annual report.

Summary of guideline updates November 2016

Section	Details
Section 1. Background	**Glossary:** Child/children refers to an infant, child or adolescent admitted to inpatient paediatric services.
Section 2. Recommendations **Note: recommendations have been renumbered in this updated version**	**Recommendation 1** Updated to provide clearer guidance for hospitals on applicable/ non-applicable areas for implementation and how to ensure continuity of observation trending between areas. **Recommendation 2 & 3** (formerly recommendation 2 & 5) New layout of two sections on concern/clinical judgment. Additional reference to resources and standardised approach to assessment of parent/carer concern. **Recommendation 9** (formerly recommendation 9 & 10, see revised wording below) Revised wording reflects national experience and learning. Greater clarity provided regarding use of clinical judgement (use of variance orders) and application to parameter scoring or escalation guide. The GDG decided to give responsibility to local governance structures for assessing whether sufficient paediatric experience and support is available to safely use the Medical Escalation Suspension facility. A decision may be made to operate PEWS without the Medical Escalation Suspension option in use.
Appendices	Appendices on implementation, audit, chart examples and international systems in use have been removed from main document and are now available online at www.hse.ie/pews New implementation toolkit overview New audit outcomes updated

Changes to recommendations

	Version 1 text (November 2015)	Version 2 updated text (November 2016)
Rec 9	A parameter amendment should only be decided by a doctor of registrar grade or above, for a child with a pre-existing condition that affects their baseline physiological status. If an unwell but stable child has an elevated PEWS score, a decision to conditionally suspend escalation may be made by a doctor of registrar grade or above.	Variances to PEWS parameters or Escalation Guide may be made by senior medical personnel with caution in certain permitted circumstances.

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1 Background

1.1 Need for National Clinical Guideline

In response to the Health Information and Quality Authority (HIQA) *Patient Safety Investigation Report into Services at University Hospital Galway* (2013), the NCEC was requested by the Minister for Health to commission and quality assure a number of National Clinical Guidelines. This National Clinical Guideline for the Irish Paediatric Early Warning System (PEWS) has been developed in collaboration with the National Clinical Programme for Paediatrics and Neonatology and the Quality Improvement Division of the HSE. It provides the framework for implementation and governance of PEWS in inpatient paediatric settings in Ireland.

A systematic literature review identified that paediatric early warning systems are widely used around the world; though a lack of consensus exists about which system is most useful. Notwithstanding the lack of evidence for a definitive system, positive trends in improved clinical outcomes, such as reduced cardiopulmonary arrest or earlier intervention and transfer to Paediatric Intensive Care Unit (PICU), were noted. Paediatric early warning systems have also been shown to enhance multidisciplinary team (MDT) working, communication, and confidence in recognising and making clinical decisions about clinically deteriorating children (Lambert et al., 2014).

A robust system specifically designed for the identification of the clinically deteriorating child is important and necessary. The application of early warning systems is more challenging in paediatric patients compared to adults for several reasons, including:

- Variation in age-specific thresholds for normal and abnormal physiology
- Children's inability or difficulty to articulate how or what they feel
- Children's ability for early physiological compensation
- Need for greater focus on respiratory deterioration in children.

The Irish PEWS is a multifaceted approach to improving patient safety and clinical outcomes. It is based upon the implementation of several complementary safety interventions, including national paediatric observation charts, PEWS scoring tool and escalation guide, effective communication using the national standard (ISBAR communication tool for patient deterioration), timely nursing and medical input, and clear documentation of management plans. The key to success for the PEWS at institutional level is strong governance and leadership, targeted training, on-going audit, evaluation and feedback. In other countries, earlier recognition and timely intervention in clinical deterioration has been shown to improve outcomes such as reduced unplanned PICU admissions, shorter length of stay in PICU or a lesser severity of illness on admission to PICU (Tibbals et al., 2005). In addition, it is likely that incidence of respiratory and cardiopulmonary arrests may be reduced (Brilli et al., 2007; Zenker et al., 2007). The outcome for clinicians, children and families is a greater awareness and understanding of the child's clinical condition and needs. PEWS depends on the implementation of complex interventions such as improved safety culture, team work and situation awareness (i.e. knowing what is going on). Such interventions are supported by the application of quality improvement methods in many of the studies that informed this guideline.

1.2 Critical illness in children

There are 1,600 admissions per year into Ireland's two paediatric intensive care units in Dublin, of which 440-600 are admissions from external hospitals:

- Our Lady's Children's Hospital, Crumlin PICU admits approximately 1,100 patients per year, of which 30-40% are unplanned or emergency admissions.

- Temple Street Children's University Hospital PICU admits 500 patients annually, of whom 80% are unplanned.
  (*Source PICANet*)

Many children admitted to paediatric wards every year will have features of critical illness but most will stabilise following initiation of therapy. Others will require additional monitoring for evidence of deterioration and the possibility of needing escalation to a higher level of care. Some paediatric centres, outside of the children's hospitals, have the ability to provide a higher level of care (one to one nursing, increased monitoring, limited respiratory or cardiovascular support) to small numbers of sick children which may avoid escalation to PICU. Smaller paediatric units may only see a few children each year who deteriorate to the extent that they require transfer to PICU. In this context, severe critical illness is an uncommon event, relative to the number of children passing through the facility. If escalation to a higher level of care is required, admission to an adult intensive care unit (ICU) may be advised, depending on local arrangements, for stabilisation prior to transfer to PICU.

1.3 Scope of National Clinical Guideline

This National Clinical Guideline applies to infants and children admitted to paediatric inpatient settings. It is not for use within neonatal and maternity units, paediatric intensive care units or perioperative settings. PEWS is not an emergency triage system and should not be used for this purpose.

National Clinical Guideline No. 1; National Early Warning Score (NEWS) is for use in non-pregnant adults, while National Clinical Guideline No. 4; Irish Maternity Early Warning System (IMEWS) is for use in women with a confirmed pregnancy and for up to 42 days post-natally.

This guideline makes recommendations on the process of implementation and utilisation of the Irish Paediatric Early Warning System. It is relevant to hospital management, healthcare professionals, children and their families. It is intended to complement, not replace, clinical judgement. Cases should be considered individually and, where necessary, discussed with a senior or more experienced colleague.

1.4 Grading of recommendations

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) categories were used to assign the quality of evidence for each clinical question. This involved consideration of the assigned level of evidence in the context of the GDG's expert opinion and findings from the Irish PEWS pilot to determine applicability to clinical practice. The adapted GRADE process was further followed to assign recommendation strength; the GDG considered and rated the quality of evidence of supporting material together with an assessment of the balance of benefits and harms, values and preferences, and resource (cost) implications for each recommendation. The GRADE system has two categories for recommendation strength, which Guyatt et al. (2008b) classified as 'strong' or 'weak'. Guyatt et al. (2008b) also advised that guideline panels may choose different words to characterise the two categories of strength. The PEWS GDG classified the overall strength of each recommendation as either **strong** or **conditional** (weak).

2 National Clinical Guideline recommendations

In the following section, evidence for each of the 17 recommendations is outlined. For recommendations 1-10 the GDG formulated a series of clinical questions to organise the evidence from the literature review and to structure this National Clinical Guideline.

- A **strong** recommendation reflects the GDG's consensus that based on the available evidence, the expected benefits outweigh any potential harms, the values and preferences of patients and professionals are represented, and cost implications are highlighted.
- A **conditional** (weak) recommendation reflects the GDG's consensus that although the evidence base is limited in some aspects, the GDG remains confident of the likelihood of benefits outweighing harms.

Good practice points are included that denote recommended best practice based on the clinical expertise of the GDG. In addition, the GDG offers practical guidance where it is felt that this may aid implementation. Implementation of recommendations 1-10 is supported through the standardised training programme. Section 2.5 details specific implementation guidance for PEWS as a complex healthcare intervention providing clear recommendations for governance, aids to implementation using quality improvement methodology, and additional patient safety practices, training standards and systems for monitoring and audit of PEWS.

All recommendations are of equal importance and should be implemented without preference or bias.

The recommendations are presented under the following themes:

1. **Measurement and documentation of observations**
2. **Escalation of care and clinical communication**
3. **Paediatric sepsis**
4. **Governance**
5. **Supporting practices**
6. **Training**
7. **Audit**

Responsibility for Implementation of Recommendations
The CEO/General Manager, Clinical Director and Director of Nursing of each hospital (and/or hospital group) are accountable for the operation of the Paediatric Early Warning System.

While the Senior Management Team of each hospital has corporate responsibility for the implementation of the recommendations within this National Clinical Guideline, each member of the multidisciplinary team is responsible for the implementation of individual guideline recommendations relevant to their role.

2.1 Summary of recommendations

Section	Recommendations	Recommendation Number
Measurement and documentation of observations	• The Paediatric Early Warning System (PEWS) should be used in any inpatient setting where children are admitted and observations are routinely required. • PEWS should complement care, not replace clinical judgement. • Clinician or family concern is a core parameter and an important indicator of the level of illness of a child, which may prompt a greater level of escalation and response than that indicated by the PEWS score alone. • The core physiological PEWS parameters must be completed and recorded for every set of observations. • Observations and monitoring of vital signs should be undertaken in line with recognised, evidence-based standards.	**1-5**
Escalation of care and clinical communication	• The PEWS escalation guide should be followed in the event of any PEWS trigger. • The ISBAR communication tool should be used when communicating clinical information. • Management plans following clinical review must be in place and clearly documented as part of the PEWS response. • Variances to PEWS parameters or Escalation Guide may be made by senior medical personnel with caution in certain permitted circumstances.	**6-9**
Paediatric sepsis	• Once a diagnosis of sepsis has been made, it is recommended that the Paediatric Sepsis 6 is undertaken within one hour.	**10**
Governance	• The Chief Executive Officer / General Manager, Clinical Director and Director of Nursing of each hospital or hospital group are accountable for the operation of the Paediatric Early Warning System (PEWS). A formal governance structure, such as a PEWS group or committee, should oversee and support the local resourcing, implementation, operation, monitoring and assurance of the Paediatric Early Warning System. • The PEWS governance committee should identify a named individual(s) to coordinate local PEWS implementation.	**11-12**
Supporting practices	• Hospitals should support additional safety practices that enhance the Paediatric Early Warning System and lead to greater situation awareness among clinicians and multidisciplinary teams. • The Paediatric Early Warning System should be supported through the application of quality improvement methods, such as engagement strategies, testing, and measurement to ensure successful implementation, sustainability and future progress.	**13-14**
Training	• The PEWS governance committee in each hospital must ensure that PEWS training is provided to all clinicians. • Clinicians working with paediatric patients should maintain knowledge and skills in paediatric life support in line with mandatory or certification standards.	**15-16**
Audit	• The national PEWS Audit toolkit should be used to aid implementation and to regularly quality assure the Paediatric Early Warning System.	**17**

2.2 Measurement and documentation of observations

Clinical question 1

Should PEWS be used for all children in paediatric inpatient settings for the early identification of, and response to, clinical deterioration?

Recommendation 1
The Paediatric Early Warning System (PEWS) should be used in any inpatient setting where children are admitted and observations are routinely required.

Quality of evidence: Moderate **Strength of Recommendation: Strong**

Good practice point
The national paediatric observation charts replace existing observation charts in paediatric inpatient settings with some exceptions:

PEWS is not intended for use in
- adults
- pregnant women
- paediatric intensive care units (PICU)
- perioperative units
- neonatal units (post-natal, special care baby units or neonatal intensive care settings)
- paediatric emergency triage

PEWS is recommended in
- emergency departments from the 'decision to admit' or earlier if local policy requires

PEWS may be used in
- adult intensive care settings (while awaiting transfer)

The last set of observations for any clinical area not using PEWS (e.g. PICU, recovery area or postoperative unit) **should be documented on the child's paediatric observation chart.**

Practical guidance for implementation
There are five age-specific paediatric observation charts with defined age ranges (samples available online at www.hse.ie/pews)

0-3 months	From presentation to paediatric unit until 12 completed weeks of age or for premature infants until 12 weeks corrected gestational age.
4-11 months	From the 1st day of the fourth month post-birth until the day before the first birthday.
1-4 years	From the child's first birthday until the day before the 5th birthday.
5-11 years	From the child's 5th birthday until the day before the 12th birthday.
12+ years	From the child's 12th birthday onwards.

Clinical question 2

What is the role of clinician or parent concern in the Irish PEWS?

Recommendation 2

Clinician or family concern is a core parameter and an important indicator of the level of illness of a child, which may prompt a greater level of escalation and response than that indicated by the PEWS score alone.

Quality of evidence: Moderate **Strength of Recommendation: Strong**

Practical guidance for implementation

An assessment of parent concern is recorded with every set of observations. To enhance the validity of the score, parents and carers should be engaged in this assessment. Parents and carers should be given information about PEWS at admission or at the earliest opportunity following admission. Verbal and written information sharing is encouraged.

Despite the provision of information, parent/carer concern may not be explicit. Open-ended questioning techniques may elicit responses from the parent/carer that indicate the presence and degree of concern for their child. Examples include: *How do you feel your child is doing today? or How does your child look to you today? Do you feel that this is an improvement?* Direct questions may be appropriate, such as: *Are you worried/concerned about your child?*

A toolkit to support clinician and parent/carer engagement, 'PEWS: Listening to you', is available at http://www.hse.ie/pews

Other useful resources may be accessed at:
http://www.rcpch.ac.uk/safe-system-framework/2-partnerships-patients-and-their-families/safe-system-framework-2-partnership

Recommendation 3

Clinicians should escalate concern about an individual child, irrespective of the PEWS score. The level of escalation should be reflective of the degree of clinical concern.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point

The PEWS score should never undermine the intuition of the child's family or clinician.

Open communication and active engagement in the care partnership with the child and family from admission will facilitate participation in PEWS and enable and encourage expression of clinical concern.

Communication between all multidisciplinary team members is essential for the effective interpretation of clinical concern.

Clinicians should use their clinical judgement when determining the level of response required to the concern expressed and act accordingly.

Clinical question 3

What physiological parameters should be included in assessment to generate a valid PEWS score? How and when should these observations be performed?

Recommendation 4
The core physiological PEWS parameters must be completed and recorded for every set of observations*.

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Good practice point
To obtain the total PEWS score:

1. Complete and record the core physiological parameter observations*
2. Score individual observations according to the colour coded criteria on the age-specific paediatric observation chart
3. Calculate the total PEWS score by adding the scores for each core parameter together
4. Additional parameter observations should be completed and recorded as clinically appropriate

* Where a child is sleeping, with normal sleep pattern and no concern about neurological status, it may not be necessary to wake them to check AVPU (Alert, Voice, Pain, Unresponsive).

Recommendation 5
Observations and monitoring of vital signs should be undertaken in line with recognised, evidence-based standards.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point
The recommended standards for measurement of vital signs and observations are the UK Royal College of Nursing *Standards for Assessing, Measuring and Monitoring Vital Signs in Infants, Children and Young People (2013)*.

The baseline frequency of observations will depend on the child's individual clinical circumstances. For all paediatric inpatients, it is recommended that observations are carried out at least once per shift (or once every 12 hours), regardless of reason for admission.

The escalation guide details the minimum observation frequency for any child triggering PEWS.

It is essential to note any individual outlying parameters, observe trends over current and previous shifts, and be aware that a child showing no signs of improvement may quickly lose the ability to compensate.

2.3 Escalation of care and clinical communication

Clinical question 4

In paediatric inpatient settings, when the PEWS is triggered, what is the appropriate response to ensure timely intervention for a child with suspected clinical deterioration?

Recommendation 6
The PEWS escalation guide should be used to inform the clinical response in the event of any PEWS trigger.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point
If there is clinical concern a higher level of alert and response may be activated regardless of the PEWS score.

Practical guidance for implementation
An urgent response pathway should be agreed under the guidance of the local PEWS governance committee, taking into account suitability and availability of local resources. Team members should be appropriately trained and maintain their competency in the management of an acutely ill child. Guidance on quality standards, team membership and competencies may be found via the following online resources:

1. https://www.resus.org.uk/quality-standards/acute-care-quality-standards-for-cpr/#prevention
2. https://www.rcplondon.ac.uk/sites/default/files/documents/national-early-warning-score-standardising-assessment-acute-illness-severity-nhs.pdf
3. NHS England ReACT (Response to ailing children tool) http://www.england.nhs.uk/ourwork/patientsafety/re-act/

Recommendation 7
The ISBAR communication tool (Identify, Situation, Background, Assessment and Recommendation) should be used when communicating clinical information.

Quality of Evidence: High **Strength of Recommendation: Strong**

Practical guidance for implementation
The National Clinical Guideline No. 11; Communication (Clinical Handover) in Acute and Children's Hospital Services provides detailed information around the use of ISBAR communication for the deteriorating child patient.

Recommendation 8
Management plans following clinical review must be in place and clearly documented as part of the PEWS response.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point
Management plans should include actions for all members of the team and timeframes in which interventions must occur. Medical staff must always document their impression, which is the provisional diagnosis. When this is done, each member has a clear idea of their roles and responsibilities. A management plan may include directions as to the required frequency of observation until certain measurable improvements are achieved, or criteria for escalation of care to occur. It may also give guidance as to when to be concerned in relation to the management of a deteriorating patient, changes in patient drug therapy or interventions and planned further investigations.

Clinical question 5

What are the appropriate amendments (variances) that can be made to a child's PEWS parameters or escalation response to support clinical judgement?

Recommendation 9
Variances to PEWS parameters or the Escalation Guide may be made by senior clinicians with caution in certain permitted circumstances.

Quality of Evidence: Low **Strength of Recommendation: Conditional**

Nursing Variance to PEWS Escalation Guide: Special Situation
A senior nurse may decide against immediate escalation when he/she believes that a child is not deteriorating and that measures to reduce pain, discomfort or distress are likely to reduce the PEWS score over a short period of observation. This is termed a **special situation** and must be clearly documented in the child's notes.

Good practice point
- Transient, readily identifiable cause for PEWS score increase
- Decision not to escalate made in conjunction with senior nurse
- **Engage with the child and family in determining the plan**
- Reassessment must occur within a short and defined timeframe (complete 'reassess within' section) at the discretion of the senior nurse and appropriate to the child's condition and triggering parameter(s)
- Explicit documentation within the child's healthcare record to reflect rationale for decision not to escalate

Medical Variance to PEWS Parameters: Parameter Amendment
A child with a condition that permanently, or for a fixed period, alters their baseline physiological parameters from the expected baseline for age may have a **Parameter Amendment** put in place by a senior doctor, using the Parameter Amendment section on the paediatric observation chart.

Key points:
- Chronic conditions only, not for acute presentation
- Only to be decided by a doctor at registrar level or above (consider discussion with consultant)
- Must be a ranged (upper and lower) value
- Must have an end point or timeframe for review (this may be post-surgery, post specific treatment or for reassessment at the next admission)

Good practice point
- Parameter amendments should only be used for chronic and not acute conditions
- Discussion with the child's specialist consultant should be considered
- Any decision regarding a parameter amendment must be discussed with the child and family as appropriate
- All variances, including clinical rationale and planned review, must be clearly documented in the child's healthcare record

Medical Variance to PEWS Escalation Guide: Medical Escalation Suspension*
*specialist paediatric knowledge, experience and competence are critical for safe use of Medical Escalation Suspension

This may be used to establish an agreed care pathway for children who are experiencing an acute episode of illness with observations that deviate from expected normal limits and triggering high PEWS scores. These children may be considered 'sick but stable' and their increased score reflects their illness as expected. Following assessment they are considered unlikely to deteriorate if they remain stable in this new range. In these circumstances a temporary, conditional **medical escalation suspension** may be ordered.

It is the responsibility of local governance structures to determine if sufficient paediatric experience and support is available to safely use the Medical Escalation Suspension facility. A decision may be made to operate PEWS without the Medical Escalation Suspension option in use. This governance decision must be documented.

Good practice point:
- Child has acute illness and is determined to be 'sick but stable'
- Only to be requested by a doctor of registrar level or above (consider discussion with consultant) following review of an individual child
- Tolerance typically applied to respiratory parameters; caution required if accepting an elevated heart rate for example
- Period of observation is required to determine stability before longer suspensions
- Child is recognised as unlikely to deteriorate if they remain stable in this new range
- Deviations from the agreed parameters should be referred to the senior nurse present
- Child must be reviewed frequently (alert to changes in the child's condition)
- Suspension agreement should be reviewed at least every 24 hours
- Planned review may occur sooner than planned expiry date/time

Temporary adjustment of the escalation guide is overridden at any time where there is clinical concern or changing clinical condition of a child.

Practical guidance for implementation of any variance to parameters or escalation
- **Engage** with the child and family
- **Document** all decisions clearly
- **Escalate** concerns quickly
- **Monitor** closely for complacency/effect /safe use

2.4 Paediatric sepsis

Clinical question 6

In children with suspected sepsis, what additional investigations should be performed?

Recommendation 10

Once a diagnosis of sepsis has been made, it is recommended that the Paediatric Sepsis 6 is undertaken within one hour. Sepsis is diagnosed by the presence of SIRS criteria due to suspected or proven infection.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point

The timely recognition of sepsis is a challenge for all paediatric staff. Clinical history and physical examination may reveal features in keeping with infection or some of the diagnostic criteria of SIRS.

- Recognition of a child at risk:
  In a child with suspected or proven infection AND with at least 2 of the following SIRS criteria:
  - Core temperature <36^{0}C or >38.5^{0}C
  - Inappropriate tachypnoea
  - Inappropriate tachycardia
  - Reduced peripheral perfusion/prolonged capillary refill time
  - Altered mental state (including: sleepiness/irritability/lethargy/floppiness)
- There should be a lower threshold of suspicion for age <3 months, chronic disease, recent surgery or immunocompromise.
- Not every child with suspected or proven infection has sepsis, however rapid initiation of simple timely treatment following recognition of sepsis is key to improved outcomes.

Practical guidance for implementation

Temperature is an additional, non-scoring parameter in the Irish PEWS. The paediatric observation charts contain a graph for temperature and some clinical prompts for consideration of paediatric sepsis. These are not substitutions for clinical education and training in the management of a child with known or suspected infection/sepsis.

The Paediatric Sepsis 6 is an operational tool to help deliver the initial steps of sepsis treatment in a simple and timely fashion:

Take 3:
1. IV or IO access*
2. Urine output measurement
3. Early SENIOR input

Give 3:
4. High flow oxygen
5. IV or IO fluids and consider early inotropic support
6. IV or IO broad spectrum antimicrobials

*IV: intravenous, IO: Intraosseous

This represents the minimum intervention. Other blood tests, cultures or investigations may be required depending on the clinical scenario. Blood tests must be sent marked urgent and must be reviewed and acted upon in a timely fashion. This also applies to any investigations ordered.

2.5 Implementation of the Paediatric Early Warning System

The task of implementing the Paediatric Early Warning System is as important and challenging as operating the system itself. Implementation requires foundational supports including governance, leadership, patient and staff engagement, training and capability in improvement methodology. These supports generate the planning, motivation and culture change necessary to embed new and complex practices.

Recommendation 11
The Chief Executive Officer/General Manager, Clinical Director and Director of Nursing of each hospital or hospital group are accountable for the operation of the Paediatric Early Warning System (PEWS).

A formal governance structure, such as a PEWS group or committee, should oversee and support the local resourcing, implementation, operation, monitoring and assurance of the Paediatric Early Warning System.

Quality of Evidence: High **Strength of Recommendation: Strong**

Practical guidance for implementation
For co-located units, the governance for PEWS implementation may be incorporated into existing early warning score governance structures, and should:

- Include service users, clinicians, managers
- Have appropriate responsibilities delegated and be accountable for its decisions and actions
- Monitor the effectiveness of interventions and training
- Have a role in reviewing performance data and audits
- Provide advice about the allocation of resources.

Recommendation 12
The PEWS governance committee should identify and support a named individual(s) to coordinate local PEWS.

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Practical guidance for implementation

- PEWS nursing and medical implementation leads for each site should be identified.
- The local PEWS coordinator may not be a new role, but should include protected time for PEWS implementation and audit.
- The selection of trainers is important as successful implementation is reflective of the quality of training provided.
- PEWS champions should be named at ward level to facilitate ad hoc questions/queries from colleagues or parents, and continue to promote compliance with completion of the observation charts, PEWS scoring and escalation.

Further information can be found in Appendix 1 – Paediatric Early Warning System (PEWS) Implementation toolkit.

Recommendation 13
Hospitals should support additional safety practices that enhance the Paediatric Early Warning System and lead to greater situation awareness among clinicians and multidisciplinary teams, such as incorporating briefings, safety pause and huddles into practice and implementation of:

- *National Clinical Guideline No. 11; Communication (Clinical Handover) in Acute and Children's Hospital Services*
- *National Clinical Guideline No. 6; Sepsis Management.*

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Recommendation 14
The Paediatric Early Warning System should be supported through the application of quality improvement methods, such as engagement strategies, testing and measurement to ensure successful implementation, sustainability and future progress.

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Good practice point
- Shared learning and a need for quality improvement capability will be required by all early warning system and safety intervention teams.
- Collaboratives between hospitals should be considered, such as the SAFE programme run by the Royal College of Paediatrics and Child Health (RCPCH) in the UK, which aims to decrease deterioration of children by using interventions such as the huddle developed at Cincinnati Children's Hospital and other safety supports. Early results demonstrate that the system of care to decrease deterioration is essential. A paediatric early warning score is a component of the changes required. See http://www.rcpch.ac.uk/safe for more information.

Recommendation 15
The PEWS governance committee in each hospital must ensure that PEWS training is provided to all clinicians.

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Good practice point
Classroom-based multidisciplinary training is recommended during PEWS implementation and for new staff members that have not had previous experience with PEWS. Ongoing targeted training at team, ward or unit level is recommended to help embed good practices.

Recommendation 16
Clinicians working with paediatric patients should maintain knowledge and skills in paediatric life support in line with mandatory or certification standards.

Quality of Evidence: Moderate **Strength of Recommendation: Strong**

Good practice point
- Hospitals and PEWS governance committees should ensure that all frontline clinicians involved in the acute assessment of children and young people have access to educational resources and complete relevant professional development so that they are confident and competent to recognise a sick child.
- Resources such as Spotting the Sick Child (https://www.spottingthesickchild.com/), which has been endorsed by the UK National Patient Safety Agency (2009), or the following other accredited teaching aids may be used to provide or augment this minimum standard of teaching in hospitals: https://www.resus.org.uk/resuscitation-guidelines/a-systematic-approach-to-the-acutely-ill-patient-abcde/
  NHS ReACT (Response to ailing children tool) http://www.england.nhs.uk/ourwork/patientsafety/react/

Practical guidance for implementation
The PEWS training toolkit is available at http://www.hse.ie/pews.

Practical guidance for implementation
All clinicians should be able to:

- Systematically assess a child
- Understand and interpret abnormal physiological parameters and other abnormal observations
- Understand and follow the PEWS guide for escalation of care
- Initiate appropriate early interventions for patients who are deteriorating
- Respond with life-sustaining measures in the event of severe or rapid deterioration pending the arrival of emergency assistance
- Communicate information about clinical deterioration in a structured and effective way to the primary medical practitioner or team, to clinicians providing emergency assistance and to patients, families and carers
- Undertake tasks required to properly care for patients who are deteriorating such as developing a clinical management plan, writing plans and actions in the healthcare record and organising appropriate follow up.

PEWS training is designed to complement existing paediatric life support courses. All clinicians should attend mandatory training in Cardiopulmonary Resuscitation (CPR)/Basic Life Support (BLS) and the systematic approach to paediatric assessment in addition to completion of PEWS training.

Recommendation 17
The national PEWS audit toolkit should be used to aid implementation and to regularly quality assure the Paediatric Early Warning System.

Quality of Evidence: High **Strength of Recommendation: Strong**

Good practice point
Data regarding clinical outcomes for children should be collated nationally. Until a structure for national data collection and reporting exists, hospitals should use local data to inform improvement practices.

Practical guidance for implementation
Audit must be undertaken to aid PEWS implementation in each clinical area

3 National Clinical Guideline development process

3.1 Aim of National Clinical Guideline

The purpose of this National Clinical Guideline is to improve prevention and recognition of, and response to, children at risk of clinical deterioration in paediatric inpatient settings through the implementation of a standardised paediatric early warning system.

3.2 Methodology and literature review

A systematic review of clinical and economic literature was commissioned by the Department of Health to support the development of this National Clinical Guideline. This review is available on the NCEC website. An adapted Grading of Recommendations Assessment, Development and Evaluation (GRADE) process was used for this clinical guideline.

3.3 Financial implications of the Paediatric Early Warning System

Many recommendations in this guideline represent existing good practice and are therefore cost neutral. It is acknowledged that the required level of governance, implementation oversight, on-going audit and staff training may result in additional costs. Therefore, should resourcing require additional staff hours, there may be a budget impact for some paediatric units. However, such costs may be minimised or eliminated with judicious rostering or utilisation of appropriate existing quality, risk, patient safety or audit roles. Further details on the budget impact are available in the full version of the National Clinical Guideline.

3.4 External review

The draft of this National Clinical Guideline was circulated for review to the RCPI Paediatric Clinical Advisory Group, the Office of the Nursing and Midwifery Services Director (ONMSD) in the HSE and other national stakeholders.

In addition, the draft was externally reviewed by Dr. Peter Lachman, Assistant Medical Director, Great Ormond Street Hospital and Dr. Damian Roland, Consultant and Honorary Senior Lecturer in Paediatric Emergency Medicine, University of Leicester.

3.5 Procedure for update of National Clinical Guideline

A planned review of the PEWS documentation and implementation tools in 2016 incorporated new learning from national and international fields and resulted in some significant changes to the national observation charts and associated training materials. A full guideline update will occur as planned in 2018 at which time a repeat systematic review will be undertaken and the guideline amended to encompass any relevant new evidence and feedback from national and international experts on the current guideline.

3.6 Implementation of National Clinical Guideline

The HSE, hospital groups and individual healthcare institutions are responsible for the implementation of the Irish Paediatric Early Warning System using this guideline as a framework.

It is recommended that hospitals use quality improvement (QI) methodology when implementing the Irish PEWS.

There should be designated local PEWS coordinator(s), with appropriate protected time, to coordinate implementation, audit and evaluation and to report directly to the hospital PEWS Governance group.

Barriers to implementation should be identified and addressed locally by the PEWS governance team/committee/group as part of organisational quality improvement.

3.7 Roles and responsibilities

This National Clinical Guideline should be reviewed by each hospital's senior management team, in conjunction with the relevant local implementation leads and project groups, to appropriately plan implementation of the recommendations. This will ensure that the inpatient care of children admitted to their facility is optimised, irrespective of age, location or reason for admission.

3.8 Audit criteria

Audit can be a powerful tool to assess the impact of interventions, the quality of care and clinical outcomes (RCP, 2012). Regular audit of implementation and impact of this National Clinical Guideline is recommended to support continuous quality improvement. The audit process is coordinated in each paediatric unit under the local PEWS governance committee and should be undertaken from a multidisciplinary perspective where appropriate.

Audit should be undertaken using the national PEWS Audit toolkit. The recommended frequency is at least weekly during the initial 12 week implementation phase and then at least monthly for ongoing monitoring. There is mandatory reporting of PEWS Key Performance Indicators (KPI) to the HSE Business Intelligence Unit.

4 Appendices

Appendix 1: Paediatric Early Warning System (PEWS) implementation toolkit

Available at: www.hse.ie/pews. The contents of this webpage will be updated as required. Contents as from November 2016 are below but subject to change:

Toolkit Contents:

1. PEWS Training and Support

The following resources are available to support PEWS implementation and training:

- PEWS Implementation Guidance
- Sample National Age-specific Paediatric Observation Charts
- PEWS User Manual
- Quick Reference Guide
- PEWS Physiological Parameter Tables
- Paediatric Sepsis 6 Poster

2. PEWS Trainer Toolkit (for leads and trainers only)

- PEWS Training Guidance
- PEWS Training sign in sheet
- PEWS Training slides
- PEWS Training quiz and answer sheet
- PEWS Case Study 1-4
- PEWS Case Study Template
- PEWS Training evaluation sheet
- PEWS Training certificate template

3. PEWS Audit Toolkit

- Clinical outcome minimum dataset (Excel)
- PEWS Audit for Quality Improvement (word document)
- PEWS Audit for Quality Improvement (excel datasheet)

4. PEWS Parent/Carer Engagement Toolkit

- Information for staff and parents/carers about PEWS
- Listening to You posters (A3)
- Listening to You leaflet (A5)

5. PEWS Supplemental Resources

- PEWS Systematic Literature Review
- PEWS Focus Group Report

Appendix 2: Paediatric early warning system audit toolkit

The implementation of the Irish PEWS, as shown in other countries, is expected to lead to earlier recognition and timely intervention in clinical deterioration and to improve outcomes such as reduced unplanned PICU admissions, shorter length of stay in PICU or a lesser severity of illness on admission to PICU. Other possible outcome improvements include reduction in incidence of respiratory and cardiopulmonary arrests.

For clinicians, children and families there may be increased satisfaction and enhanced safety culture.

Hospitals must monitor PEWS implementation and compliance at local level and engage with national monitoring initiatives such as Nursing Metrics and the HSE Key Performance Indicators for the Acute Hospitals metadata. The PEWS Steering Group has worked to engage with key stakeholders in these areas to establish helpful audit tools and value driven metrics.

1. PEWS audit support tools (audit parameters)
Audit parameters: compliance with documentation standards, recording observations, escalation and safe variance use.
All sites must record the following clinical outcomes on a monthly basis:

- Number of recorded urgent PEWS call triggers (PEWS Score ≥7)/MET/emergency team activations including PEWS total score and trigger parameters
- Unplanned admissions to PICU/adult ICU, including readmissions
- Length of stay in PICU/adult ICU
- Incidence and outcomes from in-hospital paediatric cardiac arrest, using a standardised minimum data set such as the UK and Ireland National Cardiac Arrest Audit (NCAA) (2014):
  - Age in years
  - Sex
  - Length of stay in hospital prior to arrest
  - Reason for admission to/attendance at hospital
  - Location of arrest
  - Presenting or first documented rhythm.

The PEWS Audit Toolkit is available at: http://www.hse.ie/pews

- Clinical outcome minimum dataset (Excel)
- PEWS Audit for Quality Improvement (word document)
- PEWS Audit for Quality Improvement (excel datasheet)

2. PEWS national monitoring
The Quality Assurance and Verification Division, Health Services Executive will be undertaking a national PEWS Audit in Q1 2017.

The HSE Acute Hospitals Division 2017 Key Performance Indicator (KPI) for PEWS, titled 'Percentage of hospitals with implementation of PEWS (Paediatric Early Warning System)' examines the following parameters:

- Compliance with national PEWS documentation standards (minimum standard of 5 assessed charts per inpatient clinical area per month)
- Governance (named governance group and medical and nursing leads)
- Training (offered to all relevant staff)
- Audit (hospitals are recording the minimum dataset)

As implementation matures, the KPI will be updated accordingly.

Glossary of Terms and Abbreviations

Definitions within the context of this document

Child/Children Refers to an infant, child or adolescent admitted to inpatient paediatric services.

Clinician A health professional, such as a doctor or nurse, involved in clinical practice.

Early Warning Score A bedside score and 'track and trigger' system that is calculated by clinical staff from the observations taken, to indicate early signs of deterioration of a patient's condition

Family A set of close personal relationships that link people together, involving different generations, often including (but not limited to) parents and their children. These relationships are created socially and biologically, and may or may not have a formal legal status.

Infant A child, from birth to one year of age.

ISBAR A communication tool: the acronym stands for Identify, Situation, Background, Assessment, and Recommendation.

Nurse in charge A nurse assigned to manage operations within a specific clinical area for the duration of the shift.

Senior Doctor A medical professional of registrar level or higher.

Senior Nurse This refers to a senior nursing colleague who may be a Senior Staff Nurse, Shift Leader, CNM or ADON/DNM for example.

Track and Trigger A 'track and trigger' tool refers to an observation chart that is used to record vital signs or observations so that trends can be 'tracked' visually and which incorporates a threshold (a 'trigger' zone) beyond which a standard set of actions is required by health professionals if a patient's observations breach this threshold.

Abbreviations

Abbreviation	Meaning
ABC-SBAR	Airway, Breathing, Circulation followed by Situation, Background, Assessment, and Recommendation
ADON	Assistant Director of Nursing
AVPU	Alert, Voice, Pain, Unresponsive
BIA	Budget Impact Analysis
BLS	Basic Life Support
CEMACH	Confidential Enquiry into Maternal and Child Health
CEO	Chief Executive Officer
CEWT	Children's Early Warning Tool
CNM	Clinical Nurse Manager
CPR	Cardiopulmonary Resuscitation
CRD	Centre for Reviews and Dissemination
DCU	Dublin City University
DNM	Divisional Nurse Manager
DoH	Department of Health
EPOCH	Evaluating Processes of Care and the Outcomes of Children in Hospital
EWS	Early Warning Score
GDG	Guideline Development Group
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HIQA	Health Information and Quality Authority
HSE	Health Service Executive
ICT	Information and Communication Technology
ICTS	Irish Children's Triage System
ICU	Intensive Care Unit
IMC	Irish Medical Council
IMEWS	Irish Maternity Early Warning System
IO	Intraosseous
IPATS	Irish Paediatric Acute Transport System
ISBAR	Identify, Situation, Background, Assessment, and Recommendation
IV	Intravenous
KPI	Key Performance Indicator
ManchEWS^2	Manchester Children's Early Warning Score
MDT	Multidisciplinary Team
MET	Medical Emergency Team
NCAA	National Cardiac Arrest Audit
NCEC	National Clinical Effectiveness Committee
NCEPOD	National Confidential Enquiry into Patient Outcomes and Deaths
NCG	National Clinical Guideline
NEWS	National Early Warning Score (Adults)
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NICU	Neonatal Intensive Care Unit

Abbreviation	Meaning
NMBI	Nursing and Midwifery Board of Ireland
NPSO	National Patient Safety Office
NTS	Neonatal Trigger Score
ONMSD	Office of the Nursing and Midwifery Services Director
PASQ	Patient Safety and Quality of Care
PEW	Paediatric Early Warning
PEWS	Paediatric Early Warning System
PICANet	Paediatric Intensive Care Audit Network
PICO	Population, Intervention, Comparison, Outcome
PICU	Paediatric Intensive Care Unit
QI	Quality Improvement
RCN	Royal College of Nursing
RCP	Royal College of Physicians
RCPCH	Royal College of Paediatrics and Child Health
RCPI	Royal College of Physicians of Ireland
RCT	Randomised Controlled Trial
RESPOND	REcognising Signs of Paediatric hOspital iNpatients Deterioration
RRS	Rapid Response System
RRT	Rapid Response Team
SAFE	Situation Awareness For Everyone
SBAR	Situation, Background, Assessment, and Recommendation
SCBU	Special Care Baby Unit
SIGN	Scottish Intercollegiate Guideline Network
SIRS	Systemic Inflammatory Response Syndrome
SOP	Standard Operating Procedure
TeamSTEPPS	Team Strategies and Tools to Enhance Performance and Patient Safety
UK	United Kingdom
US	United States

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