



Féidhmeannacht na Seirbhíse Sláinte  
Health Service Executive

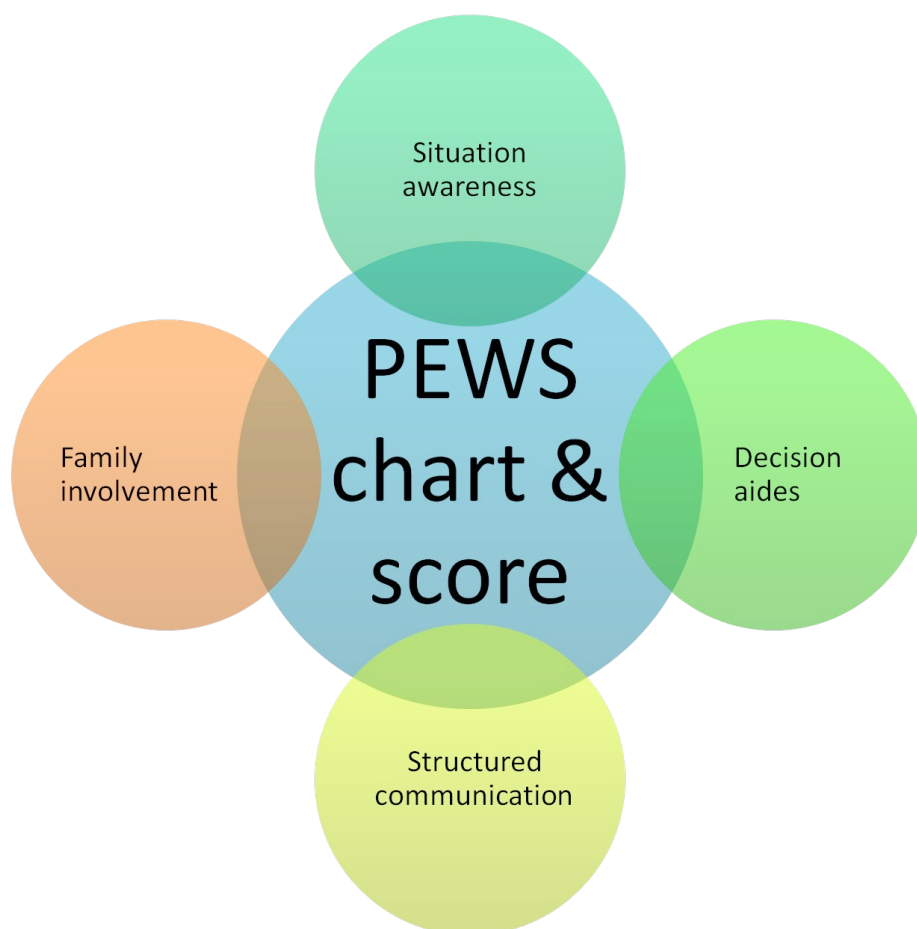
Clinical Strategy and Programmes Division



PAEDIATRICS

Tús Áite do  
Shábháilteacht **1** Othar  
Patient Safety **1** First

# PAEDIATRIC EARLY WARNING SYSTEM (PEWS)



## USER MANUAL

2nd Edition, Version 2, updated May 2023

Updated to align with Sepsis Guideline 2021

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## DISCLAIMER

The editors and authors of this manual have made every effort to provide information that is accurate and complete as of the date of publication. The authors, editors and other contributors to the content and the PEWS Steering Group cannot be held responsible for any errors or omissions or from the results from the use of information contained herein.

The paediatric observation chart and incorporated Irish Paediatric Early Warning System (PEWS) Score has been designed for use with paediatric patients in the hospital setting. It has not been designed for use with adult patients or neonates under the care of the neonatal/maternity units.

Check <https://www.hse.ie/eng/about/who/cspd/ncps/paediatrics-neonatology/paediatric-early-warning-score/> for the most up to date information and to ensure that resources in use are current.

## GLOSSARY OF TERMS

*The following definitions apply within the context of this document*

**Child** Refers to an infant, child and adolescent less than 16 years of age

**Clinician** A doctor or nurse involved in clinical practice

**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: 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

## ACRONYMS AND ABBREVIATIONS

*The following acronyms and abbreviations apply within the context of this document*

|       |                                     |
|-------|-------------------------------------|
| AVPU  | Alert, Voice, Pain, Unresponsive    |
| BP    | Blood pressure                      |
| CPR   | Cardiopulmonary resuscitation       |
| CRT   | Capillary refill time               |
| GCS   | Glasgow Coma Scale                  |
| HHFNC | Humidified High Flow Nasal Cannula  |
| HR    | Heart Rate                          |
| ICTS  | Irish Children's Triage System      |
| IO    | Intraosseous                        |
| IV    | Intravenous                         |
| PEWS  | Paediatric Early Warning System     |
| PICU  | Paediatric Intensive Care Unit      |
| RR    | Respiratory Rate                    |
| RE    | Respiratory Effort                  |
| CPAP  | Continuous positive airway pressure |
| BiPAP | Bilevel Positive Airway Pressure    |

## ACKNOWLEDGMENTS FOR THE SECOND EDITION

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### PEWS Pilot Sites:

**We are indebted to the Pilot Sites and PEWS Clinical Leads who continue to provide valuable feedback and advice to the PEWS Steering Group.**

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## FOREWORD

For most children admission to hospital is a step towards recovery, improvement and wellness. However, some children may deteriorate, even after initiation of treatments and despite regular observations and review. Despite the advances of modern medicine we still have room to learn and improve.

Paediatric early warning scores and systems have been in existence for over 10 years and are the subject of a growing body of research. Attempts to determine the physiological parameters that best identify a child at risk for deterioration have not yet yielded a perfect system. Changes in vital signs may be predictors of deterioration but they may also simply reflect that a child is unwell but not at significant risk. However, if clinical observations are converted to a score and combined with the concerns of nurses or family at the bedside, this information may be used to help clinicians recognise and rescue a sick child, before they deteriorate.

Other features that enhance the Irish PEWS score and create the sense of a patient safety system are: ■ **Standard national observation charts** that prompt good decisions

- Promotion of **situation awareness** in frontline healthcare staff as to how the patient is and what their immediate needs are
- Support for the bedside nurse or the junior doctor to alert senior colleagues using standard **communication** and a clear **escalation pathway**
- Recognition that the score from physiological measurement is one element in the detection of the deteriorating child and that **clinical acumen** and 'gut feelings' are often just as important
- Reliance on everyone in the child's environment, especially their **family**, as those who know the child best when they are 'not right' or 'not themselves'
- Allowance for the fact that not all alerts will indicate deterioration but some will and that effective **teams** accept this and work together to keep this balance right.

This 2<sup>nd</sup> edition of the PEWS manual has been updated by the Steering Group to reflect new learning on the use of early warning scores and the implementation of the complex changes needed for early recognition of the deteriorating child in hospital. In November 2015, National Clinical Guideline No. 12 – *The Irish Paediatric Early Warning System (PEWS)* was published and by the end of 2016 PEWS will be used in all inpatient paediatric units in Ireland. Over the course of designing, testing, piloting and now assisting with the national implementation of PEWS, we have learned much from the experience of our paediatric colleagues around Ireland. We have also benefited from discussions with safety experts and psychologists on the application of human factors research on the design and use of observation charts. This has led to a number of design changes to the original charts with new recommendations on how observations should be displayed using dots and graphs to maximise the ability to see deterioration, providing an additional numerical entry line for HR, RR and BP.

This edition also marks a change from PEWS Education to PEWS User Manual. There is less emphasis on resuscitation guidance, acknowledging that this essential and complementary training is provided through specific courses such as APLS or PALS. Clinicians retain responsibility for maintaining certification in courses appropriate to their clinical level. We have endeavoured to improve guidance around the application of variances such as the Escalation Suspension and Parameter Amendment, recognising that these are areas deserving of special attention and scrutiny as local services introduce PEWS.

Just as we are learning from the implementation of PEWS we expect you are too. We have come to see PEWS not as a destination but rather a journey; not as a project but rather a foundational platform from which new and innovative ideas can be launched with the common purpose of ensuring that hospital remains a safe place for all sick children.

*Dr. John Fitzsimons*  
*Chair, PEWS Steering Group*

*June 2016*

## LEGEND

Throughout the guide there are highlighted sections with accompanying symbols to highlight important issues. **These are categorised according to the following key:**



### **Key Concept**

Highlights key clinical points

### **Family involvement**

Highlights areas where direct parental involvement may enhance the quality of care delivered



### **Further reading**

Identifies resources to support learning



### **Learning point**

Emphasises important learning concepts

## Section 1. INTRODUCTION

This section addresses the following:

- Background / evidence for PEWS tools
- Introduction to the Irish PEWS

### Introduction to paediatric early warning tools

Infants and children tend to have the capacity for a period of physiological compensation for underlying illness or injury. They may appear to be maintaining their vital signs relatively unchanged between assessments as they continue to compensate but this may change quite rapidly once they begin to tire. Early recognition of serious illness and effective management of respiratory, circulatory and/or neurological problems will prevent the majority of paediatric cardiac arrests thus reducing morbidity and mortality.

An Irish commissioned systematic literature review identified that paediatric early warning systems are widely used around the world though there is lack of consensus about which system is most useful. However, 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 working, communication, and confidence in recognising and making decisions about deteriorating children (Lambert et al., 2014).

### The Irish Paediatric Early Warning System

The Irish PEWS is a multifaceted approach to improving paediatric inpatient safety and clinical outcomes. It is based upon the implementation of several complementary safety interventions.

These include:

- national paediatric observation charts incorporating the PEWS scoring tool □ escalation guide
- standardised communication (ISBAR)
- timely nursing and medical input
- clear documentation of management plans
- ongoing reassessment of the child

The key to the success of PEWS is strong governance and leadership to support continuous learning and improvement. The outcome for clinicians, children and families is a greater awareness and understanding of the child's clinical condition and needs. The governance framework for national PEWS implementation is contained within the National Clinical Guideline No.12 PEWS (DoH, 2015, updated November 2016).



<http://health.gov.ie/wp-content/uploads/2017/02/NCG-12-PEWS-full-report-V21.pdf>  
<http://health.gov.ie/wp-content/uploads/2017/02/NCG-12-PEWS-summary-report-V2.pdf>

### The Irish Paediatric Early Warning System Score

The PEWS score is embedded within a set of standard age-specific paediatric observation charts that will support greater uniformity of practice in children's hospital care across Ireland. A multi-parameter bedside

score is calculated from clinical observations with the aim of detecting early signs of a child's deterioration. It is a valuable additional tool to facilitate the detection of deterioration in paediatric patients. The PEWS Score represents a point-in-time value as one aspect of a safety system toolkit.



**Observation of trends in the child's condition and clinical judgement will enhance the score and add value to the measurement**

The parameters, values and thresholds chosen for the PEWS were agreed by the Irish PEWS Steering Group in a consensus process that drew on several sources. The systematic review of the literature concerning Paediatric Early Warning Systems and scores carried out by Dublin City University provided a firm evidence base for decisions. Additional sources included an examination of PEWS systems and charts in use across the globe, the Irish Children's Triage System and published data on physiological measurements for well children. The most widely validated PEWS triggers came from the Canadian Bedside PEWS and this was the anchor point for many values. It is the view of the Steering Group that there is no precise or specific threshold for any physiological parameter to identify deterioration.



Clinical acumen and judgement remain essential for the detection of deterioration in a child with mild or no abnormal haemodynamic vital signs

Combining and monitoring parameters over time creates situation awareness of a child's clinical status that can be shared with other team members. In addition, using triggers from one parameter, e.g. raised heart rate, to promote information seeking from other parameters, e.g. capillary refill time and blood pressure, enhances the clinical picture.

| Benefits of the Paediatric Early Warning System (PEWS) |                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Child</b>                                           | <ul style="list-style-type: none"> <li>Increases potential to identify and review trends in a child's condition</li> <li>Early warning alarm to flag deterioration</li> <li>Prompts closer monitoring and medical review</li> <li>May reduce incidence of unplanned admissions to intensive care</li> <li>May reduce the number of adverse clinical events</li> </ul> |
| <b>Family</b>                                          | <ul style="list-style-type: none"> <li>Acknowledges the value of the partnership between clinicians, child and family</li> <li>Includes family in assessment</li> <li>Increases potential for identification of subtle signs of deterioration</li> </ul>                                                                                                              |
| <b>Nurse</b>                                           | <ul style="list-style-type: none"> <li>Standardises clinical assessment and recording of observations</li> <li>Empowers nurses to voice their concerns about a child's condition</li> </ul>                                                                                                                                                                           |
| <b>Nurse in Charge</b>                                 | <ul style="list-style-type: none"> <li>Assists in prioritisation of clinical workload</li> <li>Increases awareness of clinical status of all patients</li> <li>Facilitates active discussion at huddle</li> <li>Empowers to escalate concerns earlier as appropriate</li> </ul>                                                                                       |
| <b>Doctor</b>                                          | <ul style="list-style-type: none"> <li>Assists in prioritising the management of their patients</li> <li>Prompts timely medical review</li> <li>Empowers to escalate concerns earlier as appropriate</li> </ul>                                                                                                                                                       |

## Section 2. PAEDIATRIC EARLY WARNING SYSTEM (PEWS) CHARTS

This section details the core knowledge required to complete the national paediatric observation charts

- Key elements of the national chart
  - core parameters
  - additional parameters
- How to complete the PEWS charts
- How to calculate a PEWS score

### Age-specific national charts

| Chart       | Graphic                                                                             | Inclusive age range                                                        | Notes                                                                                                                                                                                                                   |
|-------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0-3 months  |   | To: 12 weeks or 12 corrected weeks                                         | Use this chart for gestationally corrected infants up to 12 weeks corrected age<br>e.g. 24/40 ex-prem born 18 weeks ago is corrected to 2/52 will be on this chart until he is 28 weeks of age (12 weeks corrected age) |
| 4-11 months |  | From: 12 weeks, 1 day<br>To: eve of the 1 <sup>st</sup> birthday           |                                                                                                                                                                                                                         |
| 1-4 years   |  | From: 1 <sup>st</sup> birthday<br>To: eve of the 5 <sup>th</sup> birthday  |                                                                                                                                                                                                                         |
| 5-12 years  |  | From: 5 <sup>th</sup> birthday<br>To: eve of the 12 <sup>th</sup> birthday |                                                                                                                                                                                                                         |

|           |                                                                                   |                                                                                                  |                                                                                                                          |
|-----------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| 12+ years |  | <p>From: 12<sup>th</sup> birthday</p> <p>To: eve of 16<sup>th</sup> birthday or local policy</p> | <p>As per paediatric model of care, 16 is the cutoff age for paediatrics but this may vary between national settings</p> |
|-----------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|

**Sample chart template**



PAEDIATRICS

PEWS Score Key

|   |   |   |   |
|---|---|---|---|
| 0 | 1 | 2 | 3 |
|---|---|---|---|



**1** Patient Safety, First

Chart Date DD/MM/YY

### Parameter Amendment

| Date / Time | Clinical Parameters | New Acceptable Range | Next Medical Review | Doctor<br>Signature/Print name/MCRN |
|-------------|---------------------|----------------------|---------------------|-------------------------------------|
|             |                     |                      |                     |                                     |
|             |                     |                      |                     |                                     |
|             |                     |                      |                     |                                     |
|             |                     |                      |                     |                                     |

### Addressograph

Ward

Consultant

[illegible]

## Measurement of Vital Signs and Observations

The PEWS score is calculated using the observation chart. Each assessment includes six core parameters; respiratory rate and effort, oxygen requirements, heart rate, level of consciousness and clinician/family concern. Clinical judgement allows for additional observations to be assessed, including colour, temperature, oxygen saturations, capillary refill time and blood pressure.

The ABCDE structured approach should be used when assessing and recording vital signs. Visual observation, palpation (touch), listening and communication are all used when assessing vital signs. This includes taking note of any concern expressed by the child's family. Early detection of deranged vital signs is imperative for early treatment and the prevention of clinical deterioration or even death.



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

The UK Royal College of Nursing Standards for Assessing, Measuring and Monitoring Vital Signs in Infants, Children and Young People (2013) is the recommended standard for vital sign measurement.



[https://www2.rcn.org.uk/\\_data/assets/pdf\\_file/0004/114484/003196.pdf](https://www2.rcn.org.uk/_data/assets/pdf_file/0004/114484/003196.pdf)

## How to complete the PEWS chart

The child's observations should be recorded onto the age-appropriate PEWS chart following the example column and instructions on the chart (see page 10).

The first time a PEWS chart is used the following should be recorded:

- the child's details or addressograph x 3 (one on each page) - year
- expected frequency of observations

**Frequency of observations** should be indicated on admission and documented in line with the first set of observations on any chart and altered if there is any change to the documented previous planned frequency. It is included to reflect a continuous thought process of clinical judgement and awareness of fluctuations in a child's condition. This is often a nursing decision and while it should be based on the minimum advised in the escalation guide the frequency may be increased at anytime.

Each time the observations are assessed, the following should be recorded:

- date and time of the observations
- nurse initials and NMBI PIN (student nurses should comply with local signature policy)

In the case of an adjustment to the frequency due to a change in the child's condition, new directions from the medical team, as a response to an increase or decrease in a PEWS Score or a change in scoring parameters, the '**reassess within**' line below the Total PEWS Score should be completed to reflect the clinical judgement of the observing nurse (see also Special Situation information on p20).



**Continuous observations indicates a requirement for electronic monitoring. Assessment and documentation of observations should continue to be undertaken as clinically appropriate to the child's needs**

## PEWS Parameters

The 6 core scoring parameters are assessed and recorded everytime for every patient. Additional parameter measurement is determined on a case-by-case basis for an individual child and will depend on the presenting condition, treatments and interventions and on current and predicted clinical status.

For every admitted child record baseline observations on admission and thereafter

- At a frequency appropriate for the child's clinical state (see escalation guide p17)
- Whenever staff or family members are worried about the child's clinical state
- If the child is deteriorating



The PEWS chart and score is specifically designed to enhance the identification of trends in vital signs. It is important to watch for worsening trends or no improvement in trends and escalate these.

### Core PEWS Parameters

1. **Concern**
2. **Respiratory rate**
3. **Respiratory effort**
4. **Oxygen therapy**
5. **Heart rate**
6. **Conscious level**

Each assessment requires the completion of a minimum of **6 core parameters**

Dots in RR and HR are connected by a **straight line** to display the trend



### 1. Concern (Core)

| How to assess                                                                                                                                                                   | How to record                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Is there clinical concern on the part of the clinician? <i>and/or</i><br>Is the parent expressing concern at the child's condition?                                             | Dot • if concern present (clinician <i>or</i> parent)<br><br>Blank if not present                                       |
| <b>Communication tips when assessing parent/carers concern</b>                                                                                                                  |                                                                                                                         |
| <b>Ask</b> Does your child seem different to normal?<br>Is it something you can see or feel?<br>Is it something that he/she is doing/not doing?<br>Has it changed from earlier? | <b>S</b> Stop and listen<br><b>Do U</b> Check your <b>U</b> nderstanding<br><b>N</b> Narrate what you are doing and why |



The total PEWS score should never undermine clinical judgement

Use clinical judgement to determine the appropriate response to the level of concern

Involve the parent/carer in the assessment

Parents/carers know their children best and can be acutely aware that their child is unwell or '*just not right*', sometimes before the physiological parameters become abnormal

Concern on the part of a parent/carer should merit appropriate consideration and may require escalation

## 2. Respiratory Rate (Core)

| How to assess        | How to record                            |
|----------------------|------------------------------------------|
| Count for one minute | Dot ●—●<br>Enter value in RR number line |

## 3. Respiratory Effort (Core)

| How to assess                     | How to record |
|-----------------------------------|---------------|
| Refer to assessment tool on chart | Dot ●—●       |

The assessment of respiratory effort is supported by clinical assessment using the tool below and should reflect the global assessment advice from paediatric respiratory experts. Note: the global assessment row is not included on the observation chart.

| Assessment of Respiratory Effort              |                                                                                           |                                                                                                   |                                                                                                                     |
|-----------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|                                               | Mild                                                                                      | Moderate                                                                                          | Severe                                                                                                              |
| Global Assessment (not included on the chart) | The child has some evidence of increased respiratory effort but is otherwise coping well. | The child has more distinct respiratory effort but is compensating well.                          | The child is displaying significantly increased respiratory effort or tiring.                                       |
| Airway                                        | - Stridor on exertion/crying                                                              | - Mild stridor at rest                                                                            | - Stridor at rest                                                                                                   |
| Behaviour & feeding                           | - Normal<br>- Talks in sentences                                                          | - Some/intermittent irritability<br>- Difficulty talking/crying<br>- Difficulty feeding or eating | - Increased irritability and/or lethargy<br>- Looks exhausted<br>- Unable to talk or cry<br>- Unable to feed or eat |
| Respiratory rate                              | - Mildly increased                                                                        | - Respiratory rate in blue zone                                                                   | - Respiratory rate in pink zone<br>- Increased or markedly reduced respiratory rate as the child tires              |

|                      |                                               |                                                                          |                                                                                       |
|----------------------|-----------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Accessory muscle use | - Mild intercostal and suprasternal recession | - Moderate intercostal and suprasternal recession - Nasal flaring        | - Marked intercostal, suprasternal and sternal recession (head bobbing, tracheal tug) |
| Oxygen               | - No oxygen requirement                       | - Mild hypoxaemia corrected by oxygen<br>- Increasing oxygen requirement | - Hypoxaemia may not be corrected by oxygen                                           |
| Other                |                                               |                                                                          | - Gasping, grunting<br>- Extreme pallor, cyanosis<br>- Apnoea                         |

Adapted with permission from Victorian Paediatric Clinical Network Melbourne, Australia (2014). The Victorian Children's Tool for Observation and Response (ViCTOR). Available from: [www.victor.org.au](http://www.victor.org.au)

#### 4. Oxygen Therapy (Core)

| How to assess                                                                   | How to record                                                    |
|---------------------------------------------------------------------------------|------------------------------------------------------------------|
| Determine if supplemental oxygen is required                                    | Refer to oxygen delivery code and enter relevant letter(s)       |
| Determine Pressure of Flow for pressure delivery system e.g. CPAP, BiPAP, HHFNC | Enter numerical value of flow pressure Blank if no flow pressure |
| Determine L/Mins. oxygen flow                                                   | Enter value of delivered oxygen Blank if no oxygen               |



Pressure of Flow should be monitored for increased requirement. Specific guidance for observation of the child requiring HHFNC therapy should be available locally.

#### 5. Heart Rate (Core)

| How to assess        | How to record                                        |
|----------------------|------------------------------------------------------|
| Count for one minute | Dot ● — ●<br>Enter numerical value in HR number line |

#### 6. Conscious Level (Core)

| How to assess                                 | How to record |
|-----------------------------------------------|---------------|
| AVPU scale (Alert, Voice, Pain, Unresponsive) | Dot ● — ●     |

**Note:** 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. When this happens, the AVPU assessment has not occurred and there cannot be a score. Complete this section as per instruction on chart. See example below:

|                                                                |              |   |   |   |
|----------------------------------------------------------------|--------------|---|---|---|
| Score - if not assessed and put a vertical line through column | Alert        | • | • |   |
|                                                                | Voice        |   |   |   |
|                                                                | Pain         |   |   |   |
|                                                                | Unresponsive |   |   |   |
|                                                                | AVPU Score   | 0 | 0 | — |

| Additional Parameters                                                                                                                                                                                   |                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. Oxygen saturations</li> <li>2. Central capillary refill time</li> <li>3. Blood pressure (systolic)</li> <li>4. Skin colour</li> <li>5. Temperature</li> </ol> | Additional parameters may be assessed and recorded as clinically appropriate for each individual child |

### 1. Oxygen Saturations (Additional)

| How to assess      | How to record         |
|--------------------|-----------------------|
| Use pulse oximetry | Enter numerical value |

### 2. Central Capillary Refill Time (Additional)

| How to assess                          | How to record                                                                        |
|----------------------------------------|--------------------------------------------------------------------------------------|
| Assess centrally (forehead or sternum) | If ≤2 seconds (normal) enter Dot •<br>If >2 seconds (abnormal) enter numerical value |

### 3. Blood Pressure (Additional)

| How to assess                                                                                                                                                                                     | How to record                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Perform blood pressure measurement according to age/size/condition<br><br>Systolic blood pressure is scored<br><br><i>Note:</i> Record both systolic and diastolic readings as per local practice | Symbol $\updownarrow$<br><br>Enter systolic value in BP number line<br><br>Mean blood pressure readings may be recorded with an x $\updownarrow$ |

If BP is triggering PEWS then seek evidence of end organ effects, e.g. signs of poor perfusion, evidence of headache or signs to indicate raised intracranial pressure. If the blood pressure reading corresponds with a clinical concern then action should be taken immediately to deal with this, i.e. manage clinically evident hypotension or hypertension. If there is no immediate concern then review the following features:

- Is the correct cuff size being used?
- Is the machine set to the correct setting (adult, child, infant)?
- Presence of potentially influential factors such as anxiety, crying or pain?

If the above are addressed do measurements continue to trigger over time? Are they trending up or down?



If Blood Pressure readings remain abnormal then discussion should take place with senior clinical staff

#### 4. Skin Colour (Non-Scoring)

| How to assess                                 | How to record                                          |
|-----------------------------------------------|--------------------------------------------------------|
| Observe the child's skin and mucous membranes | Refer to skin colour code and enter relevant letter(s) |

#### 5. Temperature (Non-Scoring)

| How to assess                       | How to record |
|-------------------------------------|---------------|
| Refer to local policy/RCN Standards | Dot ● — ●     |

Where possible, during assessment, include the parent/carer in determining what is normal for their child and what may have changed. This will be of particular importance in determining the child's baseline respiratory effort, skin colour and temperature for example.

### Observations during Blood Transfusion

Children undergoing blood or blood product transfusion should have their observations recorded on the PEWS charts as required by legal obligation and clinical condition. Words to reflect the reason for the observations (e.g. 'blood baseline', 'blood 15 minutes', 'post blood') may be recorded vertically to assist with clarity of observations and adherence to core parameter recording. A local decision may be made to additionally complete an observation chart included within the blood traceability document.

### Four-Limb Blood Pressure Measurements

Occasionally, a child may require BP measurement on all four limbs. In this instance, it may be acceptable to denote on the PEWS chart that this has occurred and the 6 core parameters will not require recording each time the BP is measured.

### End of Life Care

A child with a valid 'Do Not Attempt Resuscitation' order or equivalent should have a clear plan for frequency of observations. A decision not to attempt cardiopulmonary resuscitation (CPR) applies only to CPR. All other treatments and care that are appropriate to the individual child should continue. Palliative care is different for every child and PEWS may assist the child's care in prompting a review of symptom management for example.

### How to calculate the score

1. Complete and record the observations
2. Enter individual parameter scores according to the colour code into the grey score line
3. Calculate the total PEWS score by adding the scores for each core parameter
4. Record the Total PEWS Score in the Total PEWS Score line



Using the escalation guide as a prompt, the total score and clinical judgement are used to determine the appropriate response to the clinical findings including need for immediate intervention, level of escalation required and appropriate timeframe for reassessment.

The **Event Record** is completed when there is a PEWS Score of 6 or more. This section assists the clinician with handover and audit of significant events and supports the child's record of care.

### Section 3. ESCALATION

This section addresses the clinical decision-making required for any PEWS score

- Escalation guide
- Communication using ISBAR structure
- Management plans
- Paediatric Sepsis 6
- Permitted variance
  - Special situations
  - Parameter Amendments
  - Medical Escalation Suspension
  - Troubleshooting advice for Escalation Suspension

### Escalation



Clinical judgement is essential for safe use of the Escalation Guide. Clear lines of responsibility are provided to support escalation of PEWS Triggers and clinical concern. It is important to note that the guide should never be used as a tool or prompt to step down care or to reassure.

| Escalation guide                           |                      |                                                               |                                                                                       |
|--------------------------------------------|----------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|
| PEWS does not replace an emergency call    |                      |                                                               |                                                                                       |
| Score                                      | Minimum observations | Minimum Alert                                                 | Minimum Response                                                                      |
| 1                                          | 4 hourly             | Nurse in Charge                                               | Any trigger should prompt increase in observation frequency as clinically appropriate |
| 2                                          | 2-4 hourly           |                                                               |                                                                                       |
| 3*                                         | 1 hourly             | Nurse in Charge + Doctor on call                              | Nurse in Charge review                                                                |
| 4-5                                        | 30 minutes           |                                                               | Urgent medical review                                                                 |
| 6                                          | Continuous           | Nurse in Charge + Doctor on call + Senior Doctor + Consultant | Urgent SENIOR medical review                                                          |
| 7+                                         | Continuous           | <b>URGENT PEWS CALL</b>                                       | Immediate local response team                                                         |
| *Pink score in any parameter merits review |                      |                                                               |                                                                                       |
| PEWS does not replace clinical concern     |                      |                                                               |                                                                                       |

The level of clinician requested to review should be reflective of the condition of the child



It is advised that the responsible consultant is informed about a PEWS score of 6 and above and when another service is to be consulted

## Urgent PEWS Call

If a score of  $\geq 7$  is triggered then the locally determined PEWS Response pathway must be activated and appropriate immediate clinical interventions commenced

## Communication



Infants and children may deteriorate more rapidly than adults and it is imperative that senior nursing and medical staff are involved early

## ISBAR

**Identify, Situation, Background, Assessment and Recommendation (ISBAR)** is the recommended tool to frame communication relating to clinical concerns and call for assistance or review.

| Identify       | <i>You</i><br><i>Recipient of information Child</i>               |                                                                                           |
|----------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Situation      | <i>'The situation is...'</i><br>Why are you calling?              | Identify your concerns, PEWS score and parameter triggers                                 |
| Background     | <i>'The background is...'</i><br>What is the relevant background? | Age, reason for admission, relevant medical or surgical history and current interventions |
| Assessment     | <i>'My assessment is...'</i><br>What do you think is the problem? | Give relevant ABCDE assessment information                                                |
| Recommendation | <i>'My recommendation is...'</i><br>What do you want them to do?  |                                                                                           |

Adapted from National Clinical Guideline No.11 Communication (Clinical Handover) in Acute and Children's Services (2015)

### ISBAR example: Nurse request for medical review

**Hello my name is** Sarah Murphy, staff nurse, from the paediatric ward. I am calling about David Jones. Is this Dr. Brown, Paediatric Registrar?

**The situation is** David is 8 months old admitted with significant gastroenteritis and dehydration. His Total PEWS Score is 6, with tachypnoea (70) and tachycardia (175) with CRT delayed to 3 seconds.

**The background is** he is normally fit and well. He is currently on maintenance fluids.

**My assessment is** I think he is getting worse. His vital signs are RR 70, HR 175 with cool peripheries, central CRT 3 seconds and BP 82/60. He is quite unsettled.

**My recommendation is** he needs an urgent review. Can you come within 15 minutes? Is there anything I should do in the meantime?

#### ISBAR example: Doctor referral to colleague for advice / review

**Hello my name is** Dr. Brown, paediatric registrar on-call. I am calling about Rebecca Allen on the children's ward. Is this Dr. Donnelly, the Surgical Registrar?

**The situation is** Rebecca is 7 years old with acute abdominal pain predominantly on her right side. She is tachypnoeic at 38 and tachycardic at 132. Her BP is 118/84. The total PEWS score is 4.

**The background is** otherwise fit and well. Her abdominal pain was sudden onset in the last 6 hrs.

**My assessment is** Rebecca has vomited once since arrival in ED and has had no diarrhea. She is scoring her pain at 7 and appears distressed. Her abdomen is soft, bowel sounds are normal but there is widespread tenderness with increased pain on the right side. She is afebrile.

**My recommendation is** I think we need to outrule appendicitis. I have requested bloods. Can you review within 30 minutes?



<http://health.gov.ie/wp-content/uploads/2015/12/NCG-No-11-Clinical-Handover-Acuteand-Childrens-Hospital-Services-Full-Report.pdf>

### Management plans

Any child who is reviewed should have a management plan recorded. Documentation of medical and nursing care has a two-fold purpose:

1. It helps the flow of information between clinicians and often helps to clarify thought processes
2. It provides a record of events to assist in care planning, after-action case review or in cases of medico-legal report requirement

A management plan should include:

- Clinical impression
- Plan for action/intervention
- Planned frequency of observations and review
- Criteria for escalation

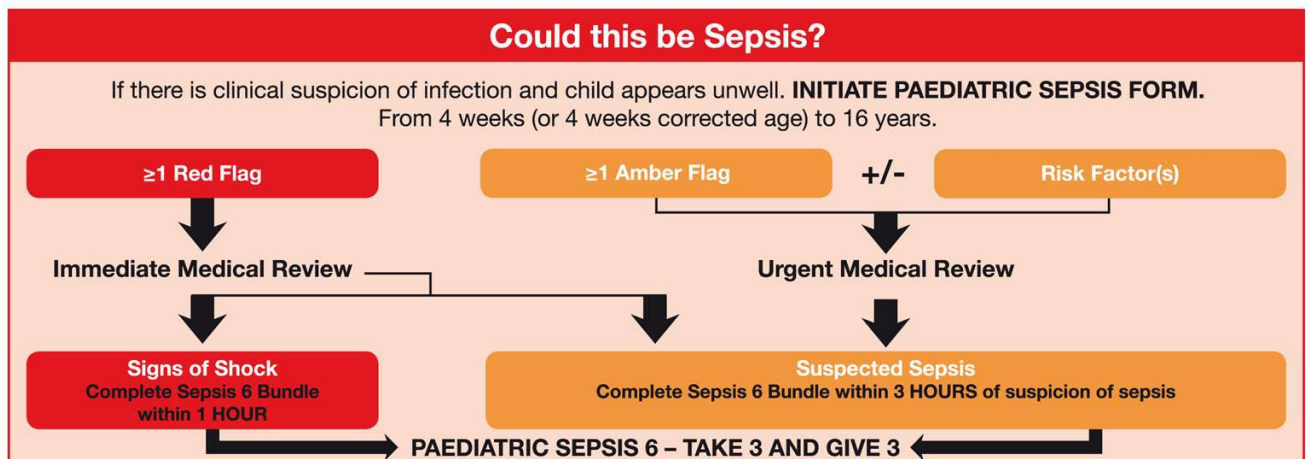
Standards for documentation of clinical care are governed by the HSE Standards and Recommended Practices for Healthcare Records Management (2011).

<https://www.hse.ie/eng/about/who/qid/quality-and-patient-safety-documents/v3.pdf>



## Paediatric Sepsis

If there is a clinical suspicion of infection and the child appears unwell, the Paediatric Sepsis Form should be initiated. Broad categorisations of high risk criteria (red flags) and intermediate risk criteria (amber flags & risk factors) are displayed algorithmically, to empower the clinician to act promptly.



## 3



Early input from senior paediatric medical staff is essential in the management of childhood sepsis.

In addition to clinical support at the bedside early involvement of Paediatric Intensive Care support is encouraged where warranted. Where this support is not on site, a national 24-hour service is available for urgent referrals, providing advice and arranging transfer (**1800222378**).



International Guidelines for the Management of Septic Shock & Sepsis-Associated Organ Dysfunction in Children (SSCGC) National Implementation Plan (2021)

<https://www.hse.ie/eng/about/who/cspd/ncps/sepsis/resources/international-guidelines-for-the-management-of-septic-shock-and-sepsis-associated-organ-dysfunction-in-children-sscg-c-national-implementation-plan-2021-.pdf>

Users of this NIP must ensure they have the current version (hardcopy or softcopy) by checking the relevant section in the HSE National Sepsis Programme website:

<https://www.hse.ie/eng/about/who/cspd/ncps/sepsis/resources/>

## Permitted Variance

**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 Parameter Amendment and/or Medical Escalation Suspension option in use.**

Success of the PEWS is dependent on how well it integrates with and supports the judgement of experienced clinical staff. There is currently no early warning score that will detect every deteriorating child, all of the time. The PEWS score is recognised as being sensitive at times towards certain situations and clinical conditions. The scoring is weighted towards a child with physiological signs of haemodynamic or respiratory instability but some deteriorating children will only display subtle signs or may not show any signs until very late. To compensate for these limitations, **the Irish PEWS promotes the application of experience and clinical judgement alongside the scoring and the escalation guide.** Conversely, there may be situations where escalation to review may not be clinically necessary. In these circumstances, a senior clinician may decide that a variance order is appropriate.

There are 3 levels of adjustment (variance) possible:

1. Special situations (senior or experienced nurse)
2. Amended parameters (registrar or above instruction only)
3. Medical escalation suspension/agreement (registrar or above instruction only)



The level of variance permitted is decided by the local PEWS Governance Group

Variances to escalation may be made only by SENIOR members of the clinical team

## 1. Special Situation for ward-level decisions not to escalate

There may be occasions when an experienced nurse may continue observing a child without recourse to medical intervention, consultation or review. This is termed a **special situation**.

### Key Points:

- Transient, identifiable and clear cause for PEWS score increase
- Decision not to escalate made with senior nurse

- Clear documentation within the child's record to reflect rationale for decision not to escalate
- Reassessment must occur within a short and defined timeframe (complete reassess within), appropriate to the child's condition and triggering parameter(s)

Engage with the parent/carer to agree a management plan and escalation criteria



If the PEWS score remains elevated, or there is any uncertainty, it is best to proceed according to the escalation guideline

**Special Situation Example 1: A child with pain or fever who may benefit from pain relief / antipyretics / comfort measures- from nursing notes of a 10 month old female infant with febrile illness:**

13-05-16 10-25

*Amber is febrile to 39.1, RR 53, HR 155, mottled skin and unsettled. Total PEWS Score 2. PRN paracetamol given 10-20. No parental concerns so plan agreed with mother to apply cooling techniques as discussed and re-evaluate in 20-30 minutes. Mother to alert staff if concerned in the meantime. SN ##*

**Special Situation Example 2: A 6 year old child triggering abnormal physiological values due to the presenting illness but the senior nurse present is satisfied that there is no requirement for a medical consultation or review**

03-06-16 19-45

*Observations are RR 42, RE mild wheeze with intercostal recession, SpO<sub>2</sub> 94%. Total PEWS Score 3. Last nebuliser 2 hours ago. Discussed with CNM ## and mother. Decision made not to escalate. PRN salbutamol STAT. Reassess post nebuliser and if no symptom relief will refer to medical team for review. SN ##*

## 2. Parameter Amendment for chronic conditions

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.

### 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)

| Parameter Amendment |              |
|---------------------|--------------|
| How to document     | How to score |

|                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Use the Parameter Amendment box<br>2. Assign a range to the selected parameter<br>3. Document rationale in the healthcare record | <ul style="list-style-type: none"> <li>Record the value of the observation in the correct position on the chart</li> <li><b>If the value falls within the amended range, the PEWS score for that parameter is 0</b></li> <li><b>Outliers to the amended range for that parameter score 3 and urgent medical review is required</b></li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### Parameter Amendment Example 1: a 4 week old infant with cyanotic cardiac disease

| Parameter Amendment for Chronic Conditions | Date/Time | Clinical Parameters | New Acceptable Range | Next medical Review | Doctor<br><small>Signature/Print name/MCRN</small> |
|--------------------------------------------|-----------|---------------------|----------------------|---------------------|----------------------------------------------------|
|                                            | 12.04.16  | SpO <sub>2</sub>    | 75-95%               | 1/52                | Dr ###                                             |
|                                            |           |                     |                      |                     |                                                    |
|                                            |           |                     |                      |                     |                                                    |

#### Parameter Amendment Example 2: an 8-month old infant with unrepaired AVSD

| Parameter Amendment for Chronic Conditions | Date/Time | Clinical Parameters | New Acceptable Range | Next medical Review | Doctor<br><small>Signature/Print name/MCRN</small> |
|--------------------------------------------|-----------|---------------------|----------------------|---------------------|----------------------------------------------------|
|                                            | 30.05.16  | RR                  | 50-80                | 1/52                | Dr ###                                             |
|                                            |           |                     |                      |                     |                                                    |
|                                            |           |                     |                      |                     |                                                    |

In both examples, a ranged value is provided that reflects the individual characteristics of each infant's underlying condition, including in Example 1, providing an upper SpO<sub>2</sub> value that is lower than normal (to prevent harm from over oxygenation and consequent pulmonary over-circulation) and in Example 2, raising the lower acceptable RR value above the zero score range for that age (to reflect what is normal for this child).



**In any child, Parameter Amendments should be carefully considered for safety and clinical need. Senior colleagues and specialists should be consulted as appropriate for advice.**

### 3. Medical Escalation Suspension /Agreement for acute management

This is intended for children who are experiencing an acute episode of illness, with observations that deviate from expected normal limits, and are triggering 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 (agreement)** may be ordered by a senior doctor.

#### Key points:

- Child has acute illness and is determined to be 'sick but stable'
- Only to be decided by a doctor of registrar level or above (consider discussion with consultant)
- 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 should be reviewed at least every 24 hours
- Planned review may occur sooner than planned expiry date/time

| Medical Escalation Suspension (Agreement)                                                                                                                                                   |                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| How to document                                                                                                                                                                             | How to score                                                                                                                                                                                                                                                          |
| 1. Use the Medical Escalation Suspension (Agreement) box<br>2. Record the impression/rationale for the new arrangement<br>3. Assign a safe, individualised range to the selected parameters | <ul style="list-style-type: none"> <li>• Record the value of the observations in the correct position on the chart</li> <li>• <b>The PEWS score should be calculated as usual</b></li> <li>• <b>Trends in the observations should be closely monitored</b></li> </ul> |

If the total PEWS score is increasing, if there are changes in any parameters other than improvement, or there are new concerns then further senior medical assessment is needed



Seek consultant and specialist advice where appropriate

#### Escalation Suspension Agreement Example 2: 8 week old infant with bronchiolitis, responding to care

| Medical Escalation Suspension (Agreement) |                                                                                                                         |                                         |                                                    |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------|
| Date / Time                               | Suspension Conditions                                                                                                   | Next Medical Review                     | Doctor<br><small>Signature/Print name/MCRN</small> |
| Start date: 16/05<br>Start time: 22.15    | Imp: bronchiolitis – newly admitted<br><b>Escalation not required for PEWS Score 4 provided:</b>                        | 6 hrs (04.00) or sooner if any concerns | Dr. ###                                            |
| End date: 17/05<br>End time: 04.00        | RR 30-70 RE Moderate HR 100-160<br>Supplemental O <sub>2</sub> up to 5LO <sub>2</sub> to maintain SpO <sub>2</sub> ≥94% |                                         |                                                    |

#### Escalation Suspension Agreement Example 1: 9 year old child with acute asthma exacerbation, responding to treatment

| Medical Escalation Suspension (Agreement) |                                                                                                             |                                     |                                                    |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------|
| Date / Time                               | Suspension Conditions                                                                                       | Next Medical Review                 | Doctor<br><small>Signature/Print name/MCRN</small> |
| Start date: 22/8<br>Start time: 03.30     | Imp: acute asthma – new admission<br><b>Escalation not required at PEWS 5-6 provided:</b>                   | 2 hrs (05.30) or sooner if concerns | Dr ###                                             |
| End date: 22/8<br>End time: 05.30         | RR 25-45 RE Moderate (wheeze, I/C recession)<br>SpO <sub>2</sub> ≥ 94% <b>Alert for change in condition</b> |                                     |                                                    |
| Start date: 22/8<br>Start time: 05.45     | Imp: acute asthma – responding to nebulisers <b>No escalation required at PEWS 3-4 provided:</b>            | 8 hours or sooner if concerns       | Dr ###                                             |
| End date: 22/8<br>End time: 14.45         | RR 15-35 RE Mild No oxygen requirement SpO <sub>2</sub> ≥ 98%                                               |                                     |                                                    |

In Example 1 the doctor chose to amend the RR, RE and O<sub>2</sub> saturations on the basis of knowing the child was stable. The first agreement was for a short period to allow monitoring for definite stability. The initial RR range did not include the full range of zero score for that child but a range which reflected the acute

asthma presentation of the child. In this case, a return to a lower rate in the short term may have represented deterioration. The longer arrangement was appropriate as the child continued to improve and included the full range of zero RR score for this age and a slightly higher upper limit.



The wording of Escalation Suspension/Agreement has been carefully considered. The standard should be **'no escalation required'** or **'escalation not required' provided there is continuing stability in named, ranged parameters** as per the examples above.

Escalation suspension/agreement will not always be appropriate. Each case should be considered individually and balanced with the need to ensure the safety of the child and appropriately monitor for deterioration. An agreed escalation criteria may be put in place for a short period or more frequent medical review may occur within the timeframe of the escalation. See prompts for safe practice below.



In Medical Escalation Suspension (Agreement) PEWS scoring is continued and trends in vital signs should be carefully monitored

### Troubleshooting (Medical) Escalation Suspension (Agreement)

#### Contraindications

- Chronic condition (see Parameter Amendment p21)
- Suspension of RE in active cardiac condition

#### Cautions

- Newly admitted (period of observation required to determine stability)
- Change to observed parameters in patient newly discharged from intensive care (as above)
- On-call suspension in unknown patient or unfamiliar condition
- Non-respiratory parameters
- Neuromuscular disease (may be unable to physically demonstrate increased effort)
- Specialist medications (e.g. beta antagonists, anti-hypertensive)



The admitting team should review variance orders daily to ensure that they are still clinically appropriate

## Section 4. SPECIAL CONSIDERATIONS IN PAEDIATRIC PHYSIOLOGY

This section provides a brief overview of key physiological considerations for infants and children

- Airway and breathing

- Circulation
- Disability

*Note: This section is intended only to summarise key physiological considerations in infants and children. Further reading is essential.*

## **Introduction**

Children vary in weight, size, shape, intellectual ability and emotional responses. Infants are particularly vulnerable to insult by illness or injury. Competent management of children in hospital requires knowledge of the anatomical, physiological and emotional differences in children as they grow, and a structured approach to assessment and recognition of illness.

In children, cardiorespiratory arrest is usually due to hypoxia. The child has the capacity to engage compensatory mechanisms to cope with underlying illness or injury for a period of time. Eventually, profound bradycardia typically deteriorates to pulseless electrical activity or asystole. Once a child is in cardiorespiratory arrest, outcomes are generally poor. The Paediatric Early Warning System (PEWS) aims to detect deterioration in these children at the early stages of worsening illness, and provide opportunity for timely medical intervention to prevent significant deterioration.

## **Airway & Breathing**

### **ANATOMICAL**

- High anterior larynx
- 'U' shaped epiglottis protrudes into the larynx
- Short, soft trachea can be compressed if the neck is hyper-extended
- Narrowest part of the airway is below the vocal chords at the cricoid cartilage (<8 years of age)
- Vocal chords are short and concave
- Proportionately larger tongue

### **PHYSIOLOGICAL**

- Smaller lower airways at greater risk from being obstructed by mucous, oedema or active constriction
- Minor decrease in the diameter of the small paediatric airway creates a large increase in the amount of resistance to airflow
- Cartilage supporting the ribs is more flexible allowing for paradoxical movement of the chest wall
- Higher respiratory rates, decreasing with age
- The higher metabolic rate alongside the lower residual lung capacity in children means that hypoxaemia can occur more rapidly

## **Circulation**

- Infants have a smaller stroke volume relative to size than children  $\geq 2$  years of age
- Blood pressure in children increases with growth and maturation
- Hypotension is a late sign in children due to their cardiovascular compensatory mechanisms
- Infants and children have a greater percentage of body water compared to body weight than adults

- They have the potential for greater insensible losses due to their relatively large surface area to volume ratio. This may result in more water loss and temperature loss.

## Disability

- It can be difficult to assess the early signs of neurological deterioration (reduced attention and dulled affect) in the infant/young child
- Often the parent is the best resource as they know their child best
- Assessment tool for level of consciousness will depend on developmental stage
- AVPU is the simplest tool for all ages but GCS may also be required
- Fontanelle should be examined in infants

## SUPPORTING LITERATURE & FURTHER LEARNING RESOURCES

Advanced Life Support Group (2011) *Advanced Paediatric Life Support 5<sup>th</sup> edition* Oxford: Blackwell Publishing

American Heart Association (2011) *Pediatric Advanced Life Support Provider Manual* United States: First American Heart Association Printing

ABA (2003) *Guidelines on the key points that may be considered when developing a quality clinical learning environment*, An Bord Altranais, Dublin.

Confidential Enquiry into Maternal and Child Health (CEMACH). (2008) *Why children die – a pilot study*. CEMACH, London.

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Department of Health (2015) *Communication (Clinical Handover) in Acute and Children's Hospital Services National Clinical Guideline No. 11*. Department of Health, Dublin

Department of Health (2015, updated 2016) *Paediatric Early Warning System (PEWS) National Clinical Guideline No. 12*. Department of Health, Dublin

Dublin City University. Lambert V. (2014) *A systematic literature review to support the development of a National Clinical Guideline – Paediatric Early Warning System (PEWS)*

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Health Service Executive (2011) *Health Service Executive Standards and Recommended Practices for Healthcare Records Management*.

Health Service Executive (2021) *International Guidelines for the Management of Septic Shock & Sepsis-Associated Organ Dysfunction in Children (SSCGC) National Implementation Plan*

Resuscitation Council UK (2007) *Paediatric Immediate Life Support 2<sup>nd</sup> edition* London: Resuscitation Council

Royal College of Nursing, UK (2013) *Standards for assessing, measuring and monitoring vital signs in infants children and young people* (due update Nov 2015) London, Royal College of Nursing