The Implementation of a Paediatric Early Warning Tool for use within the Emergency Department and on Acute Paediatric wards

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Aims:

- To introduce the concept of PEWS
- To highlight the evidence
- To demonstrate SHH approach to choosing, implementing and evaluating a PEWS
- To discuss the challenges
- To propose plans for the future

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National Recommendations

- **DH (2000)** Comprehensive Critical Care: *A review of adult critical care services.*
- **NICE (2007)** Acutely Ill Patients in Hospital: *NICE guidance*
- **NPSA (2007)** Safer care for the acutely ill patient: *learning from serious incidents.*
- **CEMACH (2008)** Why Children Die: *A pilot Study*
    - Failure to recognise
    - Failure to act

An Early Warning Score is a set of simple algorithms relating to the findings of physiological parameters. These parameters are given numbers depending on the range of severity within which they fall into, the total number added at the end of the observations taken is the score given.

(Sterling 2002)

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“Basic” Observations

Airway

Breathing

Circulation

Disability

Exposure

- Respiratory rate and effort of breathing
- Oxygen saturations
- Heart rate
- Blood pressure and/or capillary refill time
- Conscious level
- Temperature

Resuscitation Council (2005)
Meningitis Research Foundation (2007)
NICE (2007)
Royal Collage of Nursing (2007)

Literature Review: *Key Findings*

- PEWS fairly new phenomenon
- Little robust evidence
- PEWS is not a modification of adult EWS
- Limited number of validated PEWS (especially within the ED)
- Relationship between PEWS and Critical Care outreach teams

Benefits of PEWS

- Ensure a full set of Observations are recorded and repeated as necessary
- Empower staff
- Aid recognition of sick/deteriorating children
- Documented trends of patient improvement or deterioration
- Reduce the amount of unexpected PICU admissions.
- Reduce the number or 'unexpected' (undetected) Cardiorespiratory arrests

PEWS Project Group

- Interdepartmental
- Multidisciplinary
- Representative from all paediatric areas

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Ideal SHH PEWS Tool

- Validated
- Ease of Use
- Practical
- Generic
- One Document
- Tailored to each Department

Validation

- Sensitivity
  - Ability to detect disease when it is present
    - true +ve
- Specificity
  - Ability to identify non-disease in healthy individuals
    - true –ve

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Ideal SHH PEWS Tool

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Finding the RIGHT TOOL

- Monaghan, A (2005)
  - Used in conjunction with Critical Care Outreach – Validation in progress
- Tibbals, J et al (2005)
  - Criteria for activation of a MET – No validation
- Duncan,H et al (2006)
  - 78% Detection of deterioration and 5% false +ve
- Haines, C et al (2006)
  - Claims 100% sensitivity
- Egdell, L et al (2008)
  - Sensitivity of 70% and a specificity of 90%

Implementation Decisions

- Who needs a PEWS?
  - Pragmatic approach
- Who will the PEWS affect?
  - Assess impact prior to introduction
- Which tool meets our needs?
  - Basic assessment of physiological parameters

Brighton Paediatric Early Warning Score

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	0	1	2	3
Respiratory (R)	• Within normal parameters AND • No recession or tracheal tug.	• RR >10 above upper limit of normal OR • Accessory muscle use OR • 30%+ FiO2 or 4+ L/min.	• RR >20 above upper limit of normal OR • Recessing OR • Tracheal tug • 40%+ FiO2 or 6+ L/min.	• RR 5 below lower limit of normal with sternal recession, tracheal tug or grunting OR • 50% FiO2 or 8+ litres/min.
Cardiovascular (C)	• Pink AND • Capillary refill 1-2 seconds	• Pale OR • Capillary refill 3 seconds	• Grey OR • Capillary refill 4 seconds OR • Tachycardia of 20 above normal rate.	• Grey & mottled OR capillary refill ≥5 seconds OR • Tachycardia of 30 above normal rate OR bradycardia.
Behaviour (B)	Playing AND Appropriate AVPU	Sleeping AVPU	Irritable AVPU	• Lethargic/ confused OR • Reduced response to pain AVPU

Score 2 extra for 1/4 hourly nebulisers, persistent vomiting following surgery

Monaghan (2005) The Royal Alexandra Children's Hospital, Brighton

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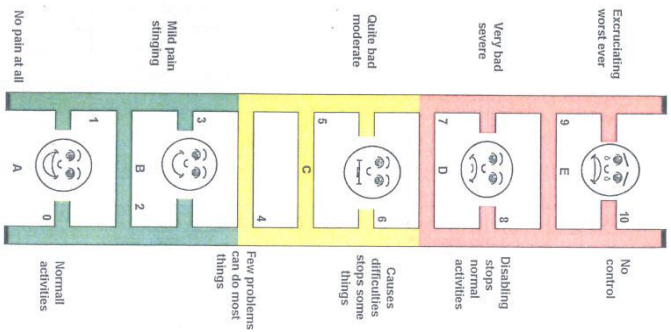
PAEDIATRIC EARLY WARNING SCORE TOOL

Name	
DOB	D[illegible]ker here
Hospital Number	



How to use PEWS in ED and The Treehouse

In ED

- All Children Triaged R1, O2 or Y3 using MTS must have a PEWS calcuated (exclude isolated limb problems)
- Prior to transfer the PEWS should be calculated and the Treehouse informed of a score which triggers and any actions taken
- Children with a score that "triggers" an orange or red response **MUST NOT** be transferred until a senior clinician has reviewed the child
- A repeat PEWS should be calculated prior to discharge and reported to the assessing clinician

In the Treehouse

- Calcuate a PEWS on admission
- Calculate the PEWS each time you undertake rountine vital signs or earlier if you have concerns

Use of PEWS

- In each catergory the child will score between 0-3
- To score "0" **ALL** the critieria in each caterogry must be met. For all other scores only 1 critiera is required
- Record the total score on the vital signs chart
- Follow escalation pathway for the total score
- The PEWS should be repeated according to the escalation pathway as a minimum
- If you are unable to obtain a full set of observations repeat within 30 mins and document the reasons in the notes
- A clear action plan must be documented by the assessing clinician when the child is reviewed indicating what actions are to be taken if the PEWS fails to improve or deteriorates further

PEWS 2008 (v5 final)
Adapted from Brighton PEWS Tool (2005)

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Paediatric Early Warning Score

	0	1	2	3
Respiratory (R)	• Within normal parameters AND • No recession or tracheal tug.	• RR >10 above upper limit of normal OR • Accessory muscle use OR • 30%+ FiO2 or 4+ L/min.	• RR >20 above upper limit of normal OR • Recessing OR • Tracheal tug • 40%+ FiO2 or 6+ L/min.	• RR 5 below lower limit of normal with sternal recession, tracheal tug or grunting OR • 50% FiO2 or 8+ litres/min.
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Behaviour (B)	Playing AND Appropriate **A**VPU	Sleeping A**V**PU	Irritable A**V**P**U**	• Lethargic/ confused OR • Reduced response to pain A**V**P**U**

Score 2 extra for 1/4 hourly nebulisers, persistent vomiting following surgery

(adapted from **APLS, 2007**)	**AGE**	Respiratory Rate	Heart Rate	Systolic BP mmHg
Neonate (<4weeks)		40-60	120-160	>60
Infant < 1 year		30-40	110-160	70-90
Toddler 1-2 years		25-35	100-150	75-95
Preschool 3-4 years		25-30	95-140	85-100
School 5-11years		20-25	80-120	90-110
Adolescent 12-16years		15-20	60-100	100-120

PEWS Escalation Pathway

Children with a PEWS of 0 should have PEWS repeated prior to discharge or if there is nurse concern

ED		Treehouse
• Repeat PEWS in 30 mins • Inform Co-ordinator • Consider need for bed • Re-assess Triage Score	1-2	• Repeat PEWS in 30mins • Implement any 1st line interventions • Contact 1st on-call for ward review
• Repeat PEWS in 15mins • Check BP and BM • Inform Co-ordinator • Implement any 1st line intervention • Doctor to see in 10mins • Inform Senior Doctor • Management plan agreed and documented	3 in mixed	• Repeat PEWS in 15 mins • Check BP & BM • Implement any 1st line interventions • 1st on-call to see in 10mins • 2nd on-call to be informed (1098) • Management plan agreed and documented
• Senior Doctor to review in 10 mins • Continuous observations • Move to Resus • Inform Co-ordinator • Consider Paediatrics (MG 1098. 1st on 1469, 1414 after 5pm) • Management plan agreed and documented	Single 3 or 4 mixed	• 2nd on-call to review in 10 mins (1098) • Consider HDU admission • Inform Consultant on-call • Inform Co-ordinator • Management plan agreed and documented
• Senior Doctor to review immediately • Move to Resus • Consider Paediatrics (Reg 1098. 1st on 1469, 1414 after 5pm) • Consider Anaesthetic support (1214) • Management plan agreed and documented	5 or more	• Continuous observations • 2nd on-call to review immediately (1098) • Inform Consultant on-call • Inform Co-ordinator • Consider HDU • Consider anaesthetic support (1214) • Management plan agreed and documented

PEWS EP (v2 08)

PEWS 2008 (Final v5)
Adapted from Brighton PEWS Tool (2005)

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PEWS Observation Chart

Name	
DOB	ED sticker here
Hospital Number	

AGE	DATE																							
	TIME																							
BREATHING Respiratory Rate	80																							
	70																							
	60																							
	50																							
	40																							
	30																							
	20																							
	10																							
	<10																							
% O2 saturation																								
O2 concentration																								
Mode of delivery Headbox (H), Mask(M), Nasal Prongs (NP)																								
Effort of Breathing N-not increased, T-tracheal tug, I-Intercostal recession, S-subcostal recession, A-accessory muscles																								
PEW Score for Respiratory																								
CIRCULATION Heart Rate/ Blood Pressure *Score Systolic BP* *Document in "time" column if not carried out and why*	>180																							
	170																							
	160																							
	150																							
	140																							
	130																							
	120																							
	110																							
	105																							
	100																							
	95																							
	90																							
	85																							
	80																							
	75																							
	70																							
	65																							
	60																							
	55																							
	50																							
	<45																							
Capillary Refill Time (CRT)																								
PEW Score for Circulation																								
Temperature	>40																							
	39																							
	38																							
	37																							
	36																							
	35																							
	<35																							
BEHAVIOUR AVPU																								
PEW Score for Behaviour																								
Blood Sugar																								
TOTAL PEW SCORE R+C+B																								
Pain Score ?/10																								
Wound Site																								
Colour																								
Sensation																								
Movement																								
Practitioners Initial																								

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PAEDIATRIC NEUROLOGICAL OBSERVATION ASSESSMENT

(use if AVPU assessment V,P or U)

Date			
Time			
Initial			

Pre-verbal response is in brackets

COMA SCALE

Eyes Open	Spontaneously	4	
	To Speech	3	
	To Pain	2	
	None	1	
Best Verbal Response	Orientated (Smiles)	5	
	Disorientated (Cries)	4	
	Monosyllabic response (Inapp. Cries)	3	
	Incomprehensible sounds (Occasional whimper)	2	
	None	1	
Best Motor Response	Obeys/ spontaneous	6	
	Localise Pain	5	
	Normal flexion	4	
	Abnormal flexion	3	
	Extension	2	
	None	1	
	TOTAL GCS		

1 2 3 4 5 6 7 mm

GCS 15 = AVPU (A). GCS 14-9 = AVPU (V). GCS 8-5 = AVPU (P). GCS 3 or 4 (U)

PUPILS

+ reacts -no reaction C eye closed S Sluggish T ET/trachy	Right	Size
		Reaction
	Left	Size
		Reaction

LIMB MOVEMENT

Record Right (R) ans (L) separately if there is a difference between the 2 sides

Arms	Normal Power
	Mild Weakness
	Severe Weakness
	Spastic Flexion
	Extension
	No response
Legs	Normal Power
	Mild weakness
	Severe Weakness
	Extension
	No response

Limitation in use of GCS:

SLEEPING CHILDREN MUST BE WOKEN

- Explain the need for frequent observations (even through the night) to the child and parents.
- Neurological assessment should be performed by 2 nurses at hand over to ensure agreement about GCS.
- Painful stimuli should only be used if there is no response to other stimuli. Use supra orbital pressure. Take into account any fractures or skin damage.
- Observe for any fitting (document type and duration) plus CSF loss from nose or ears.
- Frightened children may be uncooperative, use parent/carers in the assessment.
- If you are in any doubt about a child's condition contact the senior nurse or doctor.

PEWS 2008 (v5 final)
Adapted from Brighton PEWS Tool (2005)

Implementation

- Publicise introduction of tool
  - Raise awareness
  - Address any concerns
- Teaching sessions
  - Use of real case studies
- Launch 1st September 2008
- Clinical Support
  - Project group representatives
- Continual feed back

Initial Ambitions and the Future

- Validate the tool for ED/In patient use
- Greater Manchester Children's Network
  - Development of regional PEWS tool
  - Validation for DGH use
  - Ensure reliability for DGH patient group
- Conduct local audit
  - full sets of observations
  - right children
  - following the escalation pathway

Final Thought

- Improved integrated paediatric care
- Improved departmental communications and working relations
- Empowered staff
- Positive experience

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The Focus Group

Emergency Department

- Paula Bennett – Nurse Consultant
- Lesley Watson – ED Paediatric Consultant
- Raynie Thomson – RN Adult
- Nicola Adshead – RN Adult
- Gemma Watkins – RN Child
- Nicola Davies – RGN
- Catherine Manion – RN Child
- Claire Williamson – RN Child

Treehouse

- Jane Kilpatrick – Nurse Clinician
- Jane Connell – Paediatric Consultant
- Natalie Cudlow – RN Child
- Karen Vernon – RN Child
- Francine Douglas – RN Child
- Janet Sidebottom – RN Child
- Paul Capey – RN Child