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Paediatric, Monitoring and Observation

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Key Amendments

Date	Amendment	Approved by
19th Nov 2020	Document extended for 1 year	Dr J West/Paediatric QIM
26th March 2021	Approved with no amendments	Paediatric QIM
9TH February 24	Approved with no amendments	Paediatric Guideline review

Introduction

This is the guideline for monitoring and observation of children and young people, including, Paediatric Early Warning System (PEWS), Pain management, GCS scoring, transfer requirements and the need for High Dependency care.

Monitoring and Observation

The assessment, measurement and monitoring of vital signs are important basic skills for all practitioners working with infants, children and young people. (RCN 2013).

A systematic approach is paramount when assessing measuring and recording vital signs.

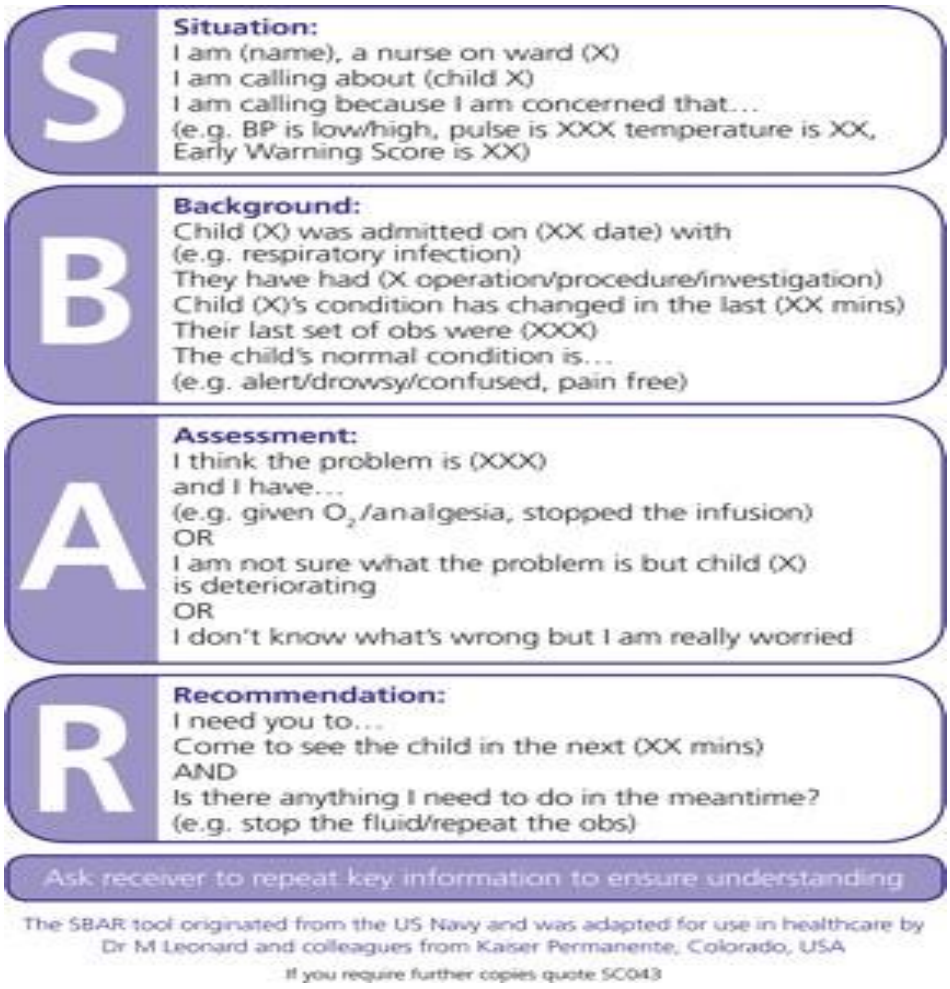
Vital signs are defined as temperature, heart/pulse rate, respiratory rate and effort and blood pressure. By measuring and recording these vital signs, important information is gained and indicates child's or young person's condition (RCN 2013). Oxygen Saturation monitoring also form part of the assessment of the Child. Visual observation is a very important tool/skill, which should be used in conjunction with and never separate from recording vital signs.

A holistic attitude should be adopted when measuring vital signs. Parents, children and young people's views should be taken into consideration at all times. (RCN 2013)

In addition to the assessment of vital signs this must then be followed by clear documentation. Good record keeping is essential for effective monitoring and interpretation of vital signs. The NMC (2009) states that "good record keeping is an integral part of nursing and midwifery practice and is essential to the provision of safe and effective care."

The RCN (2013) views standardising assessment, measuring and monitoring as a key aspect of patient care, but not in isolation.
The other components of early deterioration and recognition are:

1. A recognised early detection tool such as PEWS
2. A multidisciplinary approach to care (CEMACH 2008, McCabe 2009)
3. A system which allows clear communication of findings and concerns, such as SBAR (Situation, Background, Assessment and Recommendation)



Vital Signs Monitoring:

Vital signs of all children are initially assessed on admission to hospital, and then at varying frequencies from then on. Frequency of observations should be based on the child's clinical condition. If Children are receiving Observations less frequently than 4 hourly this must be documented in the nursing notes.

Children should have a set of observations carried out within 2 hours of discharge.

Frequency of post-operative vital sign monitoring is linked with the complexity of the operation performed.

Following a simple procedure vital signs should be recorded every 30mins for 2 hours then hourly for 2-4 hourly until the child is fully awake. Temperature should be recorded at intervals of 1, 2 or 4 hourly according to the Childs general condition. A further set of observations should be recorded prior to discharge.

In the case of some day surgery where the child is discharged more quickly, a full set of observations must be undertaken on discharge, regardless of when last set of observations where undertaken.

Following Adeno/tonsillectomy observations should be carried out every 30mins for 4 hours or more frequently if there is any evidence of bleeding

Following complex procedures or:

- Theatre time over 6 hours
- Significant fluid loss
- Physiological instability pre- op (including Sepsis and Insulin Dependent Diabetes Mellitus)
- Physiological instability during recovery

Continuous cardio respiratory monitoring and pulse oximetery should be in place for a minimum of 4 hours In addition to usual vital signs monitoring. (RNC 2013).

Temperature:

- Body temperature is measured by the oral, axilla or tympanic route.
- Oral temperature should not be routinely taken in children aged 0-5 years (NICE 2013)
- Electronic or chemical thermometers should be used in the axilla of infants aged 4 weeks- 5 years.
- In infants under the age of 4weeks, temperature should be measured with an electronic thermometer in the axilla (NICE 2007b)
- Thermometers should be left in place for sufficient time to allow accurate results (refer to manufacturer's instructions) (RCN 2013)

Heart Rate/Pulse:

- A stethoscope should be used to auscultate the heart rate of children less than 2 years of age.
- Electronic data should be cross checked by auscultation or palpitation of the heart/pulse rate.
- Electronic leads and electrodes should be placed in appropriate positions and changed at a minimum of 4 hourly in order to minimise the risk of damage to the infant, child, and young person's skin.
- Heart/pulse rates should be counted for one minute.
- The pulse rate should be consistent with the apex beat.(RCN 2013)

Respirations:

- The pattern effort and rate of breathing should be observed.
- In infants and children less than 7years of age, abdominal movements should be counted as they are predominately abdominal breathers.
- Signs of respiratory distress, e.g., nasal flaring, grunting, wheezing, dyspnoea, recession, use of accessory muscles, chest shape and movement should be noted by looking and listening.
- Respirations should be counted for one minute.
- During opiate infusions or any other infusions that may affect respiratory drive, assessment and measurement of respirations should be performed **at least hourly**, in a high dependency care environment. (RCN 2013)
- Where oxygen saturations monitoring is indicated, respiratory assessment and measurement should be made and recorded, simultaneously in order to give a complete respiratory assessment.

Blood Pressure:

- The arm should be used for measuring BP, but when this is not possible in infants the lower leg can be used.
- The arm should be placed at the level of the heart and well supported.
- The correct size of cuff is essential for gaining an accurate recording.
- The cuff should cover the whole circumference of the arm and cover 2/3 length of upper arm. The artery marker should be placed appropriately to cover the brachial artery.
- Movement, suckling, crying and eating can influence BP measurements and these should be noted.
- Where possible the first BP generated by an automated monitor should be disregarded, however, if this causes the child distress then it is up to the professional to make a clinical judgement re: the need to repeat reading.
- If BP is constantly high on an automated monitor over a period of time it should be re-measured using a manual sphygmomanometer. (RCN 2013)

Capillary refill:

- Apply pressure with a fore finger sufficient enough to blanch the skin on the centre of the sternum for children of all ages. (Resuscitation council, EPLS 2011)
- The pressure should be maintained for 5 seconds then released.
- Capillary refill should occur 'within 2 seconds'. (Resuscitation Council, EPLS 2011)
- A slower refill time than this indicates poor perfusion. (RCN 2007, Resuscitation Council 2005)

AVPU:

- A rapid assessment of conscious level can be made by assigning the patient to one of the categories shows in the box below:

A = Alert V= Responds to Voice P= Responds to Pain U = Unresponsive

- A child who scores P or U, has an equivalent GCS of <8.

If a Child needs regular elevation of conscious level, GCS measurement should be commenced in addition to AVPU assessment

If a Child is receiving high dependency care GCS should be performed once per shift

Paediatric Early Warning Score - PEWS

Introduction

PEWS are now a common place concept that is present in most Paediatric settings. Over the last 10 years there have been vast amounts of work carried out to show that the implementation of validated PEWS can detect early deterioration in children.

The Confidential Enquiry into Maternal and Child Health (2008) and NICE (2007) Guidelines on acutely ill patients in hospital recommend the use of Early Warning Systems or Scores to aid with the early detection of critical illness.

Duncan (2008) identified that children show signs of deterioration in their respiratory and cardiac rates prior to a cardiac arrest. Failure to recognise or respond appropriately to clinical deterioration can lead to life threatening events (Duncan et al 2006, McCabe 2009) The outcome following Paediatric Cardiac arrest is poor (APLS 2005) therefore early detection, recognition and escalation is essential.

Early detection of deteriorating clinical signs and observation leads to optimal care in the most appropriate place HDU/ITU and has been linked to decreased mortality and morbidity. (Duncan et al 2006)

PEWS must be completed with an ABC assessment as part of Triage on arrival to the wards and within 15 minutes of arrival to the ward by a qualified nurse.

Using the PEWS can give more junior members of staff or staff that do not routinely work with children confidence in assessing sick children and escalating concerns as appropriate. (Adshed and Thomson 2009)

PEWS Charts

The PEWS charts are separated into 4 age bands:

- 0 month – 11 months
- 1years – 4 years
- 5 years – 12 years
- 13 years – 18 years

The charts are arranged to mirror an ABCDE assessment and include parental/professional concern. The following denote the areas that make the 6 parameters that generate the PEWS

1. **Dr/Nurse/Family Concern**

Nurse concerns may include:

- ½ hourly bronchodilators
- Unstable metabolic condition, i.e. DKA
  unstable condition: unrecordable BP / CPAP
- Underlying malignant disease
- Continuous Post Op vomiting

Please document on the PEWS Chart if there is no concern. If there is a concern, the person who has the concern must be identified on the PEWS chart, using the relevant initial:

N- Nurse, F- Family, Dr- Doctor

A/B: Respiratory rate

2. **A/B: Respiratory distress**

None/Mild – Nasal Flaring, intercostal recession
Moderate/Severe – Head bobbing, Subcostal recession, Inspiratory noises, Tracheal tug, Sternal recession, Exhaustion, Impending respiratory arrest.

3. **A/B: O2 Requirement**

Oxygen should be given to maintain adequate saturations for the Child. Please be aware that in some Children normal Oxygen saturations can be lower if the Child has a known Cardiac condition this could impact Oxygen levels.

4. **C: Heart Rate**

5. **D: Conscious level**

(E: Temperature: Not used to contribute towards score)

Each age range of chart works in the same way.

Each time an entry is made in a shaded box results in a score of 1. The number of shaded boxes marked for one set of observations is totalled and this gives the PEWS

Action for the PEW and recommended frequency of PEWS monitoring is on the reverse of the chart and is as follows:

PEWS SCORE	Action & Frequency of observations
0-1	Continue monitoring – 4 hourly
2	Nurse in charge must review – 2 hourly
3	Nurse in charge must review and Dr must review – 1-2 hourly
4	Nurse in charge and Dr must review Consultant informed – Hourly, continuous monitoring (minimum of saturations monitor)
5-6	Nurse in charge and Cons must review – hourly + continuous monitoring

Escalation of concerns - SBAR

Although the PEWS score is designed to identify those children who need medical review, there may be other situations where you are concerned about the management plan.

When you are escalating your concerns we encourage you to do so using the SBAR tool outlined above.

If you are a nurse, you should escalate your concerns to the senior nurse in charge and to medical staff. If their response does not alleviate your concerns, it is your duty to escalate your concerns until you are happy that the right care is being provided.

If you are a junior doctor, the same duty applies. The General Medical Council requires you to recognise and work within the limits of your competence and to refer a patient to another practitioner when this is in their best interest. If you feel that any concerns have not been addressed by the next grade of doctor, you must escalate your concerns to the next level. If not addressed by the consultant please contact the clinical director.

Within the paediatric directorate everyone has a right to express their opinion and everyone's opinion is valued. This is the basis of the team working that allows us to deliver safe effective high quality care.

Remember that if you feel that you need more help at any time call for help – regardless of the PEWS.

Blood Pressure and Temperature are not used to calculate the PEWS but must still be undertaken. A drop in BP is a pre -terminal sign in children and children will show signs in other observations before this occurs. A drop in BP indicates imminent cardio-respiratory failure (EPLS 2008)
Only the above are used to calculate the PEWS. The other assessments on the chart are used to compliment the PEWS and provide a complete assessment of the child.

Further information required on the Charts:

Method of O2 delivery:

Appropriate abbreviations can be used i.e.
NC: Nasal Cannula
LNS: Litres Nasal Spec
FM: Face mask
FB: Flow by (wafting)
CPAP: Continuous Positive Airway Pressure
HF: High Flow
SIMV: Synchronised Intermittent Mandatory Ventilation

Sepsis 6:
Sepsis 6 is used to identify those children that are at risk for sepsis. This should be completed at each set of observations. The Sepsis criteria are on the reverse of each chart.

Recognition of a child at risk of sepsis:

If a child has a suspected or proven infection AND has at least **2** of the following criteria:

- Core temperature <36^{O}C or >38.5^{O}C (38^{O}C if immunocompromised)
- Inappropriate tachycardia
  - 0-11m >180
  - 1-4y >140
  - 5-12Y >130
  - 13-18y>110
- Altered mental state (including :sleepiness / irritability / lethargy / floppiness) VPU on AVPU scale
- Reduced peripheral perfusion / prolonged capillary refill

Lower threshold of suspicion for: <3months, chronic disease, recent surgery or immunocompromised

The Sepsis trigger must be completed at every set of observations and documented as Y/N.
If the Sepsis trigger is triggered, then how this has been escalated and what action taken must be documented on the back of the PEWS or on PEWS continuation sheet as required. Please see below for example.

Pain Score:
Pain score must be documented with each set of observations and each Pain score should be accompanied by a set of observation. Each pain score should be agreed with parent or Child if appropriate.

The 5- 12y and 13- 18y charts contain 2 tools for pain assessment; the tool used to score pain must be documented on the chart

If a pain score of 3 or above on any of the pain assessments is documented the action taken must be documented on the back of the PEWS or on PEWS continuation sheet if necessary.

Further information on pain assessment can be found later in this document.

Cap refill:
This should be recorded as the actual Capillary refill i.e. 2secs

Nausea score:
The Nausea score is on the reverse of the charts

No Nausea/vomiting	0
Nausea only	1
One episode of vomiting in last hour	2
More than one episode of retching/vomiting in one hour	3

The back of the PEWS charts and continuation sheets contain this table, Whenever PEWS is 3 or over, Pain score is 3 or over, or if sepsis 6 is triggered this table must be completed.

Date	Time	PEWS	Sepsis	Pain score	Agreed With parents	Plan	Print name
28/09/16	20:00			4/10	Y	Pain relief to be given, re-assessed in 1 hour	Sarah W
28/09/16	2100	4	Y			Consultant to review in 15mins, repeat observations in 15mins.	SarahW

High Dependency Care (HDC)
Introduction

HDC is described as a requirement for close observation, monitoring or intervention that cannot be delivered in a normal ward environment, but at the same time does not require admission to an intensive care unit (High dependency care for children : Time to move on 2014)

All hospitals which are 'open' to children should be able to:

- ✓ Receive, assess, resuscitate and stabilise a child and immediately refer to the High Dependency (HD) area or PICU on site **Or**
- ✓ Have the ability to initiate and maintain Paediatric Intensive Care until the retrieval team arrives. (West Midlands Strategic Commissioning Group 2004)

Riverbank is able to provide High Dependency Care and initiate intensive care with the support and directives of the emergency response team prior to retrieval to PICU. From the document 'Time to Move On' Riverbank is classified as a Level 1 unit:

Level 1: will be used to describe activities which should be delivered in any hospital which admits acutely ill children and will focus on the commoner acute presentations and clinical scenarios that require an enhanced level of observation, monitoring and intervention than can

be safely delivered on a normal ward.

Riverbank Unit are able to provide short term high dependency care with flexible use of inpatient children beds, with 3 designated cubicles. High dependency care requires staff to identify the increased support needed by the acutely ill child. Flexible allocation of nurse staffing within the paediatric areas should allow 1:1 care as needed. Nurse staffing will be escalated according to ward acuity.

High Dependency care is monitored and audited on a monthly basis. This is done by using Paediatric High Dependency data collection adapted from the original high Dependency data collection tool at the Perinatal Institute High Dependency data collection tool. Consent for this data collection is agreed by parents/ carers. For monitoring form and consent procedure see Appendix 2 and 3.

Medical Staffing

There is a nominated Paediatric consultant with lead responsibility for policies and procedures relating to High Dependency Care. There is a Paediatric Doctor who is competent and trained available 24 hours a day. This includes on site junior and senior doctors, including a Paediatric consultant who is accessible at all times.

Nursing Staff

There is a nominated lead nurse who is responsible for policies and procedures relating to High Dependency Care. This should be a trained nurse with appropriate qualifications or at least 5 years experience. (West Midlands Strategic Commissioning group 2004)

Children needing High Dependency care should be cared for by a trained children's nurse with PILS or equivalent. This nurse should also have HD training or at least 5 years experience in acute paediatric setting at experienced Band 5 or above.

It will be essential for all staff working in a Level 1 unit to keep up to date and refresh their knowledge and skills relating to care of the critically ill child. This includes medical staff (paediatric and anaesthetic) supporting the Ward as part of their on-call commitments.

There should be a minimum of one nurse on every shift who is directly involved with caring for the critically ill child, who must have completed a recognised paediatric resuscitation course, for example PILS/PLS/EPLS/APLS (Resuscitation Council UK, 2010/ALSG, 2011)

Nurse staffing for children needing HD care at WRH should be 1:1 when nursed in a cubicle.

Possible Conditions requiring HD care

Prolonged convulsions

Meningitis

GCS 8-12

DKA

PCA/NCA

IV fluid resuscitation (>20ml/kg)

Recurrent apnoeas

Upper airway obstruction i.e. croup

Hourly nebulisers for more than 6 hours

Exacerbations of asthma requiring IV drugs

Poison and substance misuse e.g. Parvolex- ECG monitoring

Pre and Post op patients requiring complex fluid management, analgesia, bleeding (e.g. post op tonsil bleed) complex surgery emergency or booked.

Cardiac Arrhythmias responding to first line treatment e.g. SVT/VT.

Bronchiolitis requiring >60% Head box oxygen, potential for High flow/CPAP.

On Riverbank there is the facility to have one patient on CPAP at any one time. We are also able to deliver high flow on the ward. The acuity of the ward and staffing needs to be assessed each shift to ensure high dependency work load is manageable with the available resources over the 24 hour period. This is regularly assessed by the nurse in charge of the shift and communicated to management and the medical team to ensure safety at all times.

Transfer
Introduction

Children/ young people who are admitted to hospital may require transfer to another department within the hospital, or transfer to another hospital. Safety is paramount for all parties involved in transfer. Please refer to Transfer contingency plan and the WAHT-ANA-009 Paediatric resuscitation, retrieval and transfer guideline.

Off Site transfer

Each child or young person that requires transfer to another unit, needs individual assessment to achieve safety at all times.

Each child or young person should be clinically assessed prior to transfer. The clinical assessment should be carried out by the person accompanying the child.

It is a joint decision between the nursing and medical staff to decide the level of escort required if an urgent transfer is required. The Consultant must give approval for a 'blue light' transfer and document this in the notes.

The Child or young person should have a nursing transfer letter to go to the accepting hospital. This can be in the form of the EDS (electronic discharge summary). When using the EDS as a transfer letter ensure that all fluids, drugs and care received to date are documented. A photocopy of the inpatient notes and nursing charts must also accompany the child on transfer.

Inter-departmental transfer

As with off-site transfers, the child should be clinically assessed before transferring them to another department within the hospital.

Safety equipment such as transfer bags, grab bags, oxygen and suction is readily available Children with significant PEWS, i.e. >3, should be transferred with a qualified member of staff, who has PILS training.

Children and young people with a GCS of 8, less than 8 or score P/U in the AVPU algorithm should only be transferred within the hospital when accompanied by a nurse and Doctor/ anaesthetist.

Children who are sedated (with conscious or unconscious sedation) and are being transferred to other departments should have a qualified nurse or medical staff escort with a minimum of PILS training. Please refer to sedation guideline. WAHT-PAE -040

Transfer of critically ill child- contingency plan.

Critically ill children who require stabilisation transfer or retrieval should be accompanied by the advance paediatric resuscitation trolley and transfer ventilator from critical care Ext 30561 / 39551. See also Trust guidelines for Paediatric resuscitation, stabilisation, retrieval and transfer (WAHTANA-009), which also includes the pathway for time critical transfer.

Kids Intensive Care and Decision Support (KIDS) is based at Birmingham Childrens Hospital. They provide transfer to any PICU that has a bed. The Number is **0300 200 1100.**

The KIDS team will require some specific information for transfer. See Appendix 5 for information regarding transfer to PICU using KIDS.

KIDS have a website that is very useful when caring for a sick child in the District General Hospital. They have policies, procedures and guidelines to follow.

There is a drug calculator to aid with the stabilisation process to ensure all medications are prescribed and administered according to their policy.

There is an app you can download to make information more accessible directly next to the patient, where ever you may be with a sick child.

Arrangements should be in place for situations where retrieval is clinically inappropriate or time critical. The referring consultant should judge the appropriateness of the medical and nursing escort. (West Midlands Strategic Commissioning Group 2004).

Pain Management
Introduction

It is every child's right to have appropriate prevention, assessment and control of their pain. Pain delays recovery and can make any illness, procedure or injury extremely traumatic for the child. Historically, children's pain has always been underestimated and pain control has been insufficient. Even today, evidence proves that pain is still being inadequately dealt with requiring better prevention, assessment and treatment (DOH, 2009).

The ability to assess a patient's pain is a crucial nursing function. In order for a child's pain to be treated adequately, it is essential that a thorough pain assessment is performed. Verbal and behavioural assessments can be used, and it is important that children who cannot express their pain because they are too young, or have speech impairment, communication difficulties, illness or disability are not overlooked or undertreated. It is now a requirement of the trust that all staff caring for children and young people are assessed and deemed competent in their ability to prevent, assess and treat the child in pain.

To effectively manage an individual's pain, clinical assessment of their pain experience must be performed and a systematic process of assessment, measurement and re-assessment must be carried out regularly. By doing this the individual's pain experience will be reduced, increasing comfort, and in turn improving physiological, psychological and physical function (Wood, 2008). Nursing staff

performing a pain assessment must be knowledgeable about factors that may influence a patients experience and expression of pain (McCaffery and Pasero, 1999).

They must be able to interpret descriptions of pain including its location, type and duration, and have an in-depth knowledge about how pain can affect an individuals' mood and ability to function and sleep (Palliative Care Victoria, 2005). Furthermore, nursing staff should have the ability to identify the barriers to assessing and managing pain. These may be due to misconceptions about pain and its management (McCaffery et al, 2006) or because there is poor documentation of a patient's pain experience, assessment, management and re-evaluation by nursing staff.

Pain assessment tools

There are a number of behavioural and self-report pain assessment tools available to assess the child/young person in pain. A combination of both verbal (questions and answers) and physical (behaviour) assessments are useful to achieve adequate pain control. There are a number of pain assessment tools available (Eustice et al, 2009). These include:

- Faces Pain Scale (self-report assessment tool)
- Verbal/Visual Self Report Scale (self-report assessment tool) *
- NIPS (Neonatal/Infant Pain Scale) – (behavioural pain assessment tool)
- CHEOPS (Childrens Hospital Eastern Ontario Pain Scale) – (behavioural pain assessment

  tool)
- FLACC Score (behavioural pain assessment tool) *
- Paediatric Pain Profile

NB * pain assessment tools currently used on Riverbank, Emergency Department and Theatres

Although self-report of pain may be the most accurate form of pain assessment, it is not always reliable as some individuals may not be truthful about the amount of pain they are experiencing. This may be because they are worried that their discharge home will be delayed by their admittance of pain or because they do not want analgesia. Self report tools are recommended for children over 4 years of age as they are only accurate if the individual has some idea of relative size or number. They are also only useful if the patient is awake (Royal College of Paediatrics and Child Health, 1997).

Verbal/Visual Self-Report Scale

Riverbank, A&E (Alex and WRH), and theatres use a verbal self - report score for patients over 8 years of age. However, when self report is not possible, the FLACC score should be used. The verbal/visual self – report pain scale requires patients to verbally report the amount of pain they are experiencing. However, if they are not able to communicate through speech, their pain score can be obtained by the patient pointing to the number on the scale which best depicts the level of pain they are experiencing (Jacques, 2009). Pain scores range from 0 – 10, 0 = **NO PAIN**, 1 – 3 = **MILD pain**, 4 - 7 = **MODERATE pain**, 8 - 10 **= SEVERE pain**. Analgesia is then given depending on the severity of pain the patient reports they are experiencing. Please see appendix 8 for Verbal/Visual Self-Report Scale.

FLACC Score

The FLACC Score is the preferred pain assessment tool used on Riverbank, A&E (Alex and WRH), and theatres for children under 8 years of age (as per PEWS observation chart), although it can be used to assess pain in the young person over 8 years of age. The FLACC Score is a behavioural tool, chosen

because it is simple and consistent, and can be used to assess pain in infants/children/young people that are unable or reluctant to report their pain. Behavioural observation is the principal method in patients' with limited verbal and cognitive ability therefore the FLACC score is an ideal tool to use to assess pain in these patients (VoepelLewis; Zanotti; Dammeyer; Merkel, 2010).
The FLACC Score facilitates assessment and re-evaluation of pain, treatment and documentation, which in turn helps to improve patient outcome and experience (Macdonald and Simons, 2002).

The FLACC Score is an interval scale that measures pain by quantifying pain behaviours with scores ranging from 0-2. Pain scores are determined by a cumulative score based on 5 categories, (F) face, (L) legs, (A) activity, (C) cry and (C) consolability. The overall cumulative score ranges between 0-10, the higher the score is indicates the severity of the pain the patient is experiencing (Merkel, 1997). Therefore, if the patients' overall cumulative pain score is 0 they are considered to be PAIN FREE. However, if their pain score is between 1-3 they are deemed to have MILD pain, a pain score of 4-7 is suggestive of MODERATE pain and a pain score between 8-10 indicates that the patient is experiencing SEVERE pain (as per Worcester Acute Hospitals NHS Trust: Guidelines for the Management of Acute Pain in Children). Please see appendix 7 for FLACC score.

Frequency of pain assessment

Pain should be assessed regularly and pain scores should be recorded at least every 4 hours (in conjunction with routine PEWS observations). Appropriate analgesia or alternative pain relieving methods should be used if required. Pain and pain scores should then be reassessed within one hour and must include a documented PEWS. The frequency of pain assessment should be increased for patients who are on a PCA or NCA (record at least hourly), post-operative patients; major surgery - record hourly or more frequently in conjunction with post-operative observations and 2-4 hourly after intermediate or minor surgery, and patients admitted with a pain score of 1-3 (record 2-4 hourly) (as per Worcester Acute Hospitals NHS Trust: Guidelines for the Management of Acute Pain in Children).

PCA/NCA

Patient controlled analgesia (PCA) and nurse controlled analgesia (NCA) are used to manage moderate to severe pain. They are an excellent form of pain relief when oral medication is unsuitable or cannot provide an adequate analgesic effect (The Royal Children's Hospital, 2008). PCA and NCA are a safe and effective way of providing pain relief for the child through the administration of intravenous opiates (Bruce, 2005).

Morphine is the usual drug of choice for both PCA and NCA. Morphine relieves pain by acting on the spinal cord to decrease the transmission of painful stimuli from body to brain, and its action within the brain itself. Although morphine can provide excellent pain relief, it can have many side effects (Kestin, 1993). Therefore, the patient's pain score should be recorded hourly, and the PCA or NCA should be discontinued as early as the patient's pain allows.

Side effects and monitoring

There are a number of side effects associated with morphine, however the most dangerous is RESPIRATORY DEPRESSION combined with a significant INCREASE IN SEDATION (Kestin, 1993). Furthermore, extra care should be taken with a child who is receiving additional sedating medication such as antihistamines, benzodiazepines or anticonvulsants as they have an even greater risk of sedation and respiratory depression whilst also receiving morphine (The Royal Children's Hospital, 2008). Therefore, it is essential that continuous monitoring, with hourly recordings of respiratory rate, level of sedation, oxygen saturation and heart rate is undertaken for any child using a PCA or receiving NCA. Hourly pump readings to record the total dose administered since reset, the number of demands made and administered, and the volume of solution left in the syringe should also be documented hourly to determine how well the PCA or NCA is controlling the patient's pain and to prevent drug administration error due to pump malfunction.

Additional, more common side effects of morphine include nausea and vomiting (morphine can stimulate the chemotactic trigger zone – one of the centres in the brain concerned with vomiting), constipation (morphine can affect the muscle of the bowel causing contraction of the sphincter and reducing peristalsis), urinary retention, dizziness, insomnia, itching, and flushing of the skin (morphine can cause histamine release). It is therefore important to monitor and record the patients' nausea score, urine output, and phlebitis score and document any pruritus every hour.
The side effects of morphine are usually mild and can be treated with anti-emetics, laxatives and antihistamine drugs. However, it is vital that all staff caring for a child using a PCA, or who are administering NCA, are knowledgeable about potential side effects which may occur, and are competent in administering naloxone when respiratory depression due to overdose or allergic reaction is suspected

Monitoring and Compliance

This section should identify how the Trusts plan to monitor compliance with and the effectiveness of this Treatment pathway. It should include auditable standards and/or key performance indicators (KPIs) and details on the methods for monitoring compliance.

WHAT?	HOW?	WHO?	WHERE?	WHEN?
These are the 'key' parts of the process that we are relying on to manage risk.	*What are we going to do to make sure the key parts of the process we have identified are being followed?*	*Who is responsible for the check?*	*Who will receive the monitoring results?*	*Set achievable frequencies.*
	Clinical Audit	Paediatric Clinical Governance Committee		Every 12 months
	Staff Electronic Record system	Local Managers/Staff		8-10 weeks
	Clinical Audit/Observation	Paediatric Clinical Governance Committee		
		S Weale, K Haley & R Delves		Yearly
	Review of Datix and completed "escalation trigger list"	Nursing Staff		
	6 Monthly Audit	CYP Nursing and Medical Staff		6 monthly
Viewing Arrangements	Spot checks	Children's wards or Emergency Departments	CYP Standards Committee, escalating to Trust Children's Board if required	Three times a year
Documentation – Completion of Checklist: Following the death of a CYP in hospital. Professional Contact List	Audit of checklists via CYP medical records	Children's Wards or Emergency Departments	CYP Standards Committee, escalating to Trust Children's Board if required	Three times a year

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Appendix 1

24 Hour Fluid Requirement Calculation and Fluid Balance Chart

IV Full Maintenance

1st 10kg X 100ml = …….

2nd 10 kg X 50ml = ……..

3rd subsequent kg X 20ml =……

= Total Input 24hrs…….

Hourly rate = Total input/24 hours

Enteral Requirement

Weight of child X ml = Amount 24hrs (enteral)

Weight X 100ml/kg =Total/24 hours

Weight X 120ml/kg =Total/24 hours

Weight X 150ml/kg =Total/24 hours

Total requirement/ 12 = 2 hourly amount
Total Requirement/8 = 3 hourly amount
Total Requirement/ 6= 4 hourly amount

Urine output calculation ml/kg/hr

Total of urine (in ml) /weight (in kg) /24 = ml/kg/hr

Appendix 2- Paediatric High Dependency Data Collection

Paediatric High Dependency Data Collection

Demographic Data

Hospital Number	
NHS Number	
Last Name	
First Name	
Address	
Postcode	
D.O.B.	
Gender	
GP Name & Address	

Care Details

Commencement of HDU care	
Diagnosis on admission to HDU	
PEWS Score on admission to HDU	
Consent form given to parents	
Does patient require 1:1 nursing care?	
If yes is patient receiving 1:1 nursing care?	
If No please state reason why.	

Source of Referral

Home	
Riverbank	
Accident & Emergency	
Orchard Service	
GP/Primary Care	
Theatres	

Other Hospital	

Monitoring and Support Data

Advanced Respiratory Support

	YES	NO
Care of Intubated Patient		
Artificial Airway - NPA/Guedel		
High Flow Oxygen		
Mechanical Ventilation - CPAP		

Basic Respiratory Monitoring/Support

	YES	NO
Oxygen 60% or more at any time		
Oxygen 40% or more in a neonate <28/7		
Nebulised medication > 1 per hour for > 6hrs/ IV salbutamol		
4 Apnoeic Episodes in 12 hours req. stimulation		
Care of Chest Drain for first 24 hours		
Monitoring - ECG & Oxygen saturations		
Post-Op Tonsil/Adenoid Bleeds		

Circulatory Support

	YES	NO
Cardio Pulmonary Resuscitation in last 24 hours		
Intravenous Fluid Bolus > 20mls/kg		
Arterial Line Monitoring		
Central Venous Pressure Monitoring		
Inotropic Support (e.g. dobutamine, Dopamine, Adrenaline)		
Hourly Urine Output		
Hourly BP Monitoring/Close Observation		
Bleeding (e.g. concern over blood loss)		

Neurological Monitoring/Support

	YES	NO
Continuous Neuro Observations (hourly or more frequent)		
Continuous Seizures for >1 hour		
Intracranial pressure bolt monitoring		

Patient Receiving Patient Controlled Analgesia		

Renal Support

	YES	NO
Multiple Infusions		
Fluid Replacement (NGT Losses, Drain Losses, Insensible Losses)		
Multiple Blood Products		

HDU Outcome

Status at Conclusion of HDU Care

Alive	
Date of Discharge from HDU	
Discharge Destination	
Home	
Riverbank Unit	
Retrieved PICU/ITU or other ward.	
Other Hospital	
Diagnosis on Discharge from HDU	
PEWS on Discharge from HDU	

RIP	
Date and Time of Death	
Post Mortem Examination	
Cause of Death	

Appendix 3

High Dependency consent form for data collection

Your child needs the expert care of the medical and nursing team within the Paediatric High Dependency Area. We collect information about all the children who we look after.

Why do we need this information?

- Collect accurate details about the care of the children who need high dependency care
- Monitor paediatric high dependency care and ensure it's always up to date
- Plan and develop the service within your area
- Produce reports and audit that highlight areas of good practice

What information do we collect

- Your child's NHS Number
- Your child's hospital number
- Your child's date of birth
- Your GP details
- Your child's sex
- Your postcode
- Your child's condition, treatment and outcome
- The number of days your child has spent in High dependency Who Collects the Data?

The high dependency lead/link nurse will collect the data. It will then be stored on a secure system, within the trust.

How is the information collected?

We collect the information from the medical notes and nursing records.

Who will see the information?

Only the people who care for your child see all the details.

By law, everyone who works for the NHS must keep all personal information confidential.

No information of your child will be given to unauthorised people.

For any queries about this data collection, please ask the nurse in charge.

Appendix 4 Referral process to KIDS

REFERRAL PROCESS to KIDS

Step 1 – Phone call to the KIDS call centre

Any clinician can call the KIDS Call Centre 24 hours a day. Calls are free within the UK.

The KIDS referral documentation can be found **here**. It may be useful to refer to this document when referring a patient.

Phone number: 0300 200 1100

All telephone calls are recorded for audit, training and patient record purposes.

Step 2 – Initial details taken by the call centre operator

Reason for referral Name of child Child's date of birth
Child's address
Child's weight
Child's GP name
Child's GP address

Referring doctor's name
Referring consultant's name
Referring doctor's contact number
Referring hospital and ward
Clinician preference of receiving PICU

Step 3 – Conference call with KIDS consultant

The call centre operator will call back the referring clinician and connect them onto a conference call with the KIDS duty consultant. Any other relevant clinicians can also be added to the conference call.

Step 4 – Management plan

The KIDS consultant will give advice and agree an initial management plan with the referring clinicians. When a decision is made to retrieve the child, KIDS will mobilise a retrieval team.

Step 5 – Further advice

Whilst the retrieval team is travelling to the referring hospital, the KIDS consultant can give further advice regarding the patient's management if required.

Step 6 – PICU bed found for the patient

A paediatric intensive care bed will be found and the KIDS consultant will liaise with the receiving intensive care unit's consultant.

Step 7 – Referring hospital updated with progress

KIDS contacts the referring hospital to update them that a PICU bed has been found for the child.