British Association of Perinatal Medicine

The Prevention, Assessment and Management of in-Hospital Newborn Falls and Drops

A Framework for Practice

For Consultation –

Consultation period 22 Jan – 4 March 2020

Contents

Executive Summary

The findings of the working Group recommend that:

1. All Trusts should have a system in place for the prevention, assessment and management of in-hospital newborn falls.

2. The mothers-baby dyad at risk of accidental in-hospital fall should undergo appropriate surveillance.

3. Parents should be provided with information to prevent baby falls.

4. Following an in-hospital fall all babies should
    a. Be monitored for apparent/evolving signs of intracranial injury that warrant imaging by CT
    b. Undergo surveillance using enhanced observations for at least 12 hours in an appropriate care location.

5. Appropriate escalation pathways should be in place to ensure senior clinicians are involved in management decisions.

6. Trusts should undertake adverse event review of all accidental in-hospital falls.

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Introduction

This Framework for Practice provides guidance for the prevention, assessment and management of babies who by accident have been dropped or sustain a fall whilst in a hospital setting. Trusts with multiple units caring for babies as inpatients may need tailored guidance for each setting (e.g. maternity units on main hospital sites, neonatal units, standalone community midwifery units, paediatric wards etc).

This guidance is not intended for babies who are not inpatients, as standard pathways for accessing emergency care should be applied. It is not intended for toddlers and older children who fall in the hospital, as clinical considerations and risks of injury are very different.

Definition

A newborn fall is defined as "a fall in which a baby being held or carried by a health care professional, parent, family member, or visitor falls or slips from that person's hands, arms, lap, etc. This can occur when a child is being transferred from one person to another. The fall is counted regardless of the surface on which the child lands and regardless of whether or not the fall resulted in injury" [1].
For practical purposes 'fall' and 'drop' are used interchangeably in this document.

Target users

All professionals involved in the care of the newborn in healthcare settings.

Process

The Framework for Practice provides recommendations based on

- Literature review including existing guidelines from various hospitals
- Local audits on in-hospital falls and learning points from reported incidents
- Data from national reporting and learning system
- Clinical experience and multi-professional group consensus

Members of the group met to identify key areas of practice concerning the risk factors and management of in-hospital newborn fall and drops. Members were tasked with undertaking a literature search around specified topic areas using Medline and PubMed. Telephone conferences were held to agree practice points based either on published evidence or, when evidence was lacking, professional consensus. The group met by telephone conference to respond to comments raised during consultation and to agree the final version of the Framework.

Rationale

The NICE Head Injury guideline includes current best practice advice for the care of infants (under one year) who present with suspected or confirmed traumatic head injury with or without other major trauma[2]. This BAPM Framework for Practice complies with all the requirements of the NICE Head Injury guideline but provides additional information and support on prevention and the safe

assessment and management of newborn babies following a drop within a hospital setting. Accidentally dropped babies have been reported in settings from postnatal wards to neonatal intensive care units and paediatric wards. Newborn babies are especially vulnerable to head injury because of the relative weight of the head[3,4]. The younger the child, the greater the likelihood of head injury. Other injuries such as bruises, abdominal and long bone injuries are less common than head injuries but have been described[5,6.]

The number of babies who are accidentally dropped is low and with limited literature available it is difficult to draw evidence-based guidelines. Nevertheless, with all these limitations, BAPM has endeavoured to provide a pragmatic and safe approach for the prevention and management of these babies through a multi-professional group consensus, from the evidence available and from existing professional recommendations[2].

Prevention[7-14]

This guidance aims to support units in providing a safe postnatal environment for babies whilst promoting beneficial practices such as breastfeeding, skin to skincare and rooming-in.

Prevalence

The true prevalence of newborn falls and drops is not known since events are commonly under-reported or can be misreported using a variety of other diagnoses. The following estimates are taken from the existing literature.

- Newborn drops and falls: 16-41/100,000 live births (regional data)[7]
- National reporting and learning system (NRLS) identified a total of 250 reports of babies being accidentally dropped between September 2017 and August 2018[8]. 227 (91%) occurred when the baby was in the care of parents or visiting family members, 11 (4%) during precipitate birth, 3 (1%) during delivery when staff were present and 3 (1%) when the baby was being cared for by staff. Remaining reports (3%) were unclear on who had been holding the baby.

Risk factors

The following factors are frequently reported in association with newborn falls/drops in hospital settings (Table 1). Preventative interventions should focus on modifiable risk factors, improving awareness and vigilance[9,10].

Table 1. Risk factors commonly associated with newborn fall in hospital settings[7,9,10,11]

Co-bedding/co-sleeping while breastfeeding
Impaired awareness of mother (e.g. fatigue/sedation/mobile phones/dim lighting)
Impaired mobility of mother (e.g. epidural, post-surgery, disability)
Primiparous mother
Underlying maternal medical conditions (e.g. epilepsy, diabetes, disability, anaemia, high BMI)
Social issues (e.g. young mother, single mother, drug misuse, language barriers)
Time of day (e.g. night-time, limited family support outside visiting hours)

Recommendations

A. Safety guidelines

All Trusts should have guidelines in place which support safety in the following areas:

- Skin to skin care
- Safe sleep policy
- Breastfeeding

- Transportation of baby

These guidelines should acknowledge the risks of the baby falls and drops during these practices and should include risk assessment tools for mothers.

B. Risk assessment and monitoring

BAPM recommends that all Trusts develop mechanisms to risk assess every mother-baby dyad for potential falls throughout the hospital stay based on individual risk discussed above. All or some of the following measures may be found useful by Trusts aiming to develop such mechanisms to assess and monitor risk.
A sample risk assessment tool is given at the end of this document (Appendix 1), based on published articles and existing hospital guidelines but with limited evidence and validation[11].
BAPM acknowledges the lack of evidence that exists in this area and welcomes research into the effectiveness and efficacy of preventive measures such as the use of side-cots and soft-type flooring [12].

Education and awareness measures [9,10,11,12]

Staff

i. Increase awareness in midwives, including training about the value of risk assessment

ii. Perform a risk assessment on each mother after delivery with updates if risk factors change

iii. Ensure provision of an appropriate level of supervision for the level of risk and for the time of day e.g. night rounding, curtains open, lights on[9,10]

iv. Communicate assessment of risk between caregivers

v. Ensure process of communication of risk to parents

vi. Ensure mothers can use and reach equipment e.g. buzzers are in easy reach, side-rails, side-cots if available[12]

Family

Reiterate written information supported by verbal messages at each care encounter to reinforce safe feeding positions and safe sleep locations. These may include:

i. After delivery: midwifery discussion about safe positions to feed baby and risks of co-sleeping

ii. A daily reminder at postnatal checks

iii. Visual aids: postnatal ward posters and cot cards (Figure 1)

Figure 1. Example of parent information poster or cot card[10]

- ✓ It is easy to fall asleep while cuddling or feeding your baby
- ✓ This increases the risk of your baby falling off the bed
- ✓ Lower your bed to the 'super-low' setting to reduce the risk of any injury if your baby was to fall
- ✓ Try lying down rather than sitting up when holding your baby in bed
- ✓ Call staff for help to move your baby to the cot when finished feeding or if you are feeling tired
- ✓ If you accidentally fall asleep while feeding, staff will move your baby to the cot without disturbing your rest

Key messages for parents

- Mothers and babies should not sleep in the same bed together[13]
- The height of the bed should be lowered to the lowest possible level before bringing a baby into bed with mother
- If a mother has limited mobility, she should call for help when moving baby to and from the cot
- The safest position to feed the baby in bed is on mother's side facing baby [14]
- Cot-sides (if available) should be raised when the baby is in bed with mother
- If so tired that she may fall asleep whilst the baby is in bed with her, a mother should move baby to the cot or call for help if she cannot do so safely
- Parents and visitors should not carry baby between postnatal areas without using a cot

C. Reporting

i. Every Trust should have a local system for adverse event reporting including categories under which falls and drops can be reliably recorded and tracked

ii. Each infant suffering a fall or drop should undergo a case review with a standardised reporting tool.

iii. There should be a mechanism in place by which learning from such events can be implemented and disseminated through the service.

iv. There should be a standardised debriefing tool to support staff in the event of a fall or drop.

Assessment and Management[15-35]

This guidance aims to support units in assessing and managing babies safely following an in-hospital fall or drop specifically in relation to potential head injury.

1. Care pathway - Immediate action

Physical examination and ongoing assessment of a child with possible traumatic brain injury must be quick and safe, and consists of key steps:

- Assessment of airway breathing and circulation.
- Evaluation of level of consciousness, and pupillary size and reaction to light
- Assessment of local traumatic injuries
- Full neurological examination and enhanced observations

All infants who are found following a drop should be moved carefully to a surface with good lighting and heat source e.g resuscitaire for a full assessment.

i. **"Crash" call for an urgent paediatric review if**
   - The baby is unresponsive or
   - The baby appears to be having a seizure or
   - The baby has any obvious signs of external injury (any swelling over scalp /new bruise/suspected limb fracture/ clear fluid draining from nose or ear)

ii. **If the baby is responsive, active or crying with no obvious signs of external injury**
   - A midwife should perform immediate assessment including NEWTT observations, with additional comments on the level of alertness and responsiveness.
   - If assessor is trained and competent, complete neurological examination with modified paediatric Glasgow Coma Scale (Appendix -2) can be used for assessment and further management plan. Otherwise the following table can be used to guide immediate action plan (Table 2).
   - If baby is in a setting with no paediatric support and needs ongoing assessment, the baby will need transfer to the nearest paediatric unit.
   - Management of all babies following a fall and management should be discussed with the consultant after assessment by the paediatric team

Table 2. Immediate assessment and actions

Assessment	Action
Unresponsive Abnormal movements or posturing Seizures Floppy/no movements Only opens one eye with or without new bruise/swelling Pupils asymmetrical New external injury	"Crash" call 2222 for paediatric team to review urgently Start assessment and stabilisation as per UK Newborn Life Support algorithm[15] Admit to neonatal unit for further investigation and assessment
Alert and normal movements Sleepy, but wakes on handling Poor feeding/not interested Irritable/but consolable Both eyelids open equally Pupils equal and reactive	Inform paediatric team to review within 15 mins Babies can usually remain on postnatal ward Start enhanced observations* and continue for 12 hours If changes in enhanced observations, call for immediate Paediatric review

*Enhanced observations = NEWTT+ modified paediatric Glasgow Coma Scale (Appendix-3)

2. Care pathway - Detailed Assessment

The paediatric team (Tier 2 or above)

i. **Obtain a detailed history of**
   a. Fall including time, details of the fall, estimated height of fall. Document if the fall was witnessed (and by whom) or unwitnessed. It may be helpful to have a proforma (Appendix-2).
   b. The majority of drops are unwitnessed with limited history available to explain mechanism of injury. The vast majority are accidental. However clinical staff need to be alert to the possibility of non-accidental injury or an element of neglect in accidental drops. As such attention ot be given to ensuring consistency of history, consistency between injury and the proposed mechanism of injury, any other associated injuries, and the wider social situation, safeguarding risk factors and information known by other agencies.
   c. Birth, mode of delivery and any injuries attributed to birth
   d. Vitamin K[18,19,20,21]
      i. Review the history of Vitamin K administration. If not given or administered orally, offer IM Vitamin K if no medical contraindications and document administration.
      After reviewing the history and risk of potential intracranial bleeding, administering IM Vitamin K may be in the baby's best interest even where parents decline.

ii. **Complete a thorough medical and neurological examination checking for signs of injury**
   a. Use body maps to document any bruises, erythema, swelling, or skin marks.
   b. Perform neurological assessment and enhanced observations (NEWTT+

Modified GCS) (Appendix -3). Check anterior fontanelle and sutures, pupil size, symmetry and response to light, tone, power, primitive reflexes, measure head circumference and plot[4,516,17,22].

c. Decisions about severity of brain injury, management or prognosis should not be based on Modified GCS scoring alone.
d. If any non-accidental injury (NAI) suspected, ensure baby is in a safe place, inform the attending consultant and agree management plan
e. Spinal immobilisation[6,17] is rarely useful, and is impractical.

iii. **Place of further care**[22,23]

a. Babies under who are responsive, active or crying with no obvious signs of external injury can be managed on the postnatal ward with enhanced observations and regular review by the paediatric team. All other babies (unresponsive, external injuries, abnormal neurological examination) must be admitted to a neonatal or paediatric unit for further assessment and management
b. Place of care will also be determined by the staff competency in undertaking enhanced observations.

iv. **Observation**[2,16]

Commence enhanced observations immediately and continue as below: There should be a minimum of 12 hours' observation prior to discharge and observations should be documented at the following frequency:

- ½ hourly for 2 hours
- 1 hourly for 4 hours
- 2 hourly for 6 hours

a. Discontinue formal observations at 12 hours if GCS is equal to 14. If well, the baby can be discharged after 12 hours of normal observations.
b. If there are abnormal enhanced observations at any point immediate review by a senior clinician is required to consider the need for admission and imaging, or whether return to ½ hourly observations is required.

v. **Analgesia**

Consider the need for analgesia as per local guidelines

vi. **Investigations**

a. For babies in whom enhanced observations remain stable, no further investigations are required
b. All babies who require neonatal unit admission for clinical concern should have the following investigations undertaken (see Appendix-3)
   (i) FBC, U+E's, group and save, blood gas, clotting and blood glucose
   (ii) Urgent CT head scan[2] if intracranial bleed/fracture is suspected (Table 3). If CT imaging is indicated this should be performed and reported within an hour of suspicion of intracranial injury after stabilisation has taken place. Do not delay CT scan by performing CrUSS unless there is high level of expertise likely to identify midline

shift and intracranial bleed with a high level of certainty. Neonatal clinicians should be aware of the poor sensitivity of CrUSS in identifying small and large extra-axial fluid collections.

Table 3: Indications for CT head imaging[2,3,23,]

Absolute indications: any one of the following Seizures Focal neurological deficit including asymmetric pupils, ptosis, unilateral weakness or posturing Loss of consciousness or unresponsive episodes Infant Coma score < 14- on first assessment Any soft tissue injury (bruise, swelling or laceration) not present prior to fall Suspicion of non-accidental injury Suspected open or depressed skull fracture Tense/bulging fontanelle Any sign of basal skull fracture (haemotympanum, 'panda' eyes, cerebrospinal fluid leakage from the ear or nose, Battle's sign- a large bruise that extends across the entire backside of the ear, and it may also extend out to the upper part of the neck Relative indications (urgent review and consider CT): Two or more of the following risk factors: Vomiting ≥ 3 episodes in 1 hour that is forceful/projectile Abnormal drowsiness or irritability >5 minutes Fall from height ≥ 90 cm If there is clinical suspicion of spinal injury, consider MRI head and spine instead of CT spine after discussion with specialist services

vii. **Communication**

a. Parents: Ensure communication with parents includes the provision of emotional support for mother, immediate caregiver and information about the immediate plan of management
b. Staff: Debrief with staff involved as soon as possible after the event when baby assessed as stable. Ensure staff know to seek support from their line manager or other identified staff member.

3. Care pathway - Ongoing management

i. **Evidence of injury on imaging**

Any abnormality identified following CT scan should be referred for specialist advice as per local care pathways. This includes neurosurgical referral as well as to determine the optimal location for ongoing care and management. Contact details should be made available in local guidelines.

ii. **No evidence of injury on imaging or no indication for imaging**

a. If radiographic imaging is not performed, the baby should undergo enhanced observations for a minimum of 12 hours post-injury, as even with no apparent

signs or extra risk factors, the risk of having or developing an intracranial injury is not zero[4,16]. Place of observation should be decided based on local expertise and resources

b. If enhanced observations become abnormal, specific management and indications for CT scanning should be followed as above.

c. Infants who have a normal CT head with no other clinical concerns should be considered for observation on the postnatal ward or transitional care rather than NICU / SCBU if staff are competent to perform enhanced observations. Separation of mother and baby should be avoided.

d. The paediatric consultant should be informed of all falls and drops, and a DATIX/adverse event form should be completed.

4. Care pathway - Discharge and follow up

i. Criteria

a. If observations are normal for 12 hours, the Tier 2 paediatric trainee, ANNP or Consultant should review whether it is appropriate to discontinue observations and discharge. When relevant, after further evaluation, with imaging and/or neurosurgical consultation as indicated, discharge should be appropriate if there are

   i. No significant extracranial injuries

   ii. No safeguarding concerns

b. If either of the above are present, the timing of discharge may be delayed while further information is sought, or management is undertaken

ii. Parent information[2]

Give parents advice on preventing further falls.

iii. Professional information

a. Community midwife and/or health visitor should be informed before discharge. Ensure a full discharge summary is sent to all professionals involved, GP, community midwife, and health visitor. Enter this episode in the child health record if available.
b. If there are any social concerns discuss with social services prior to discharge.
c. All infants who have had abnormalities on CT imaging:
   i. Neurosurgical follow-up should be as per the advice of the neurosurgical team
   ii. If no neurosurgical follow up required, arrange follow up under a named consultant to monitor progress.

Appendix 1 - Sample Risk Assessment Tool for Preventing Baby Falls[11]

Patient Addressograph Label

Mode of delivery		**Conscious level**	
Normal Vaginal	0	Alert	0
Instrumental	2	Drowsy	2
Caesarean Section	4	Unresponsive	4
Mobility		**Additional factors**	
Independent	0		
Restricted	2	Medical history eg diabetes,	
Immobile	4	epilepsy, physical disability	2
Pain relief in labour		Hb 9.5g/dl or less	2
Nil	0	BMI 40 or more	2
Entonox	1	Language barrier	2
Opiates in last 12h	2		
Spinal or GA	4	Known substance	2
Other (specify)	1-4	abuse/methadone use	
		Sedative medications	2

Patient Risk level

The higher the total score the higher the risk of an infant fall
Provide appropriate surveillance for level of risk
Reassess level of risk where circumstances change
Ensure awareness of level of risk by providing information for parents

Date and time	Score	Risk	Additional comments	Staff Signature

Appendix 2 - Sample proforma for history and assessment of newborn following in-hospital fall or drop

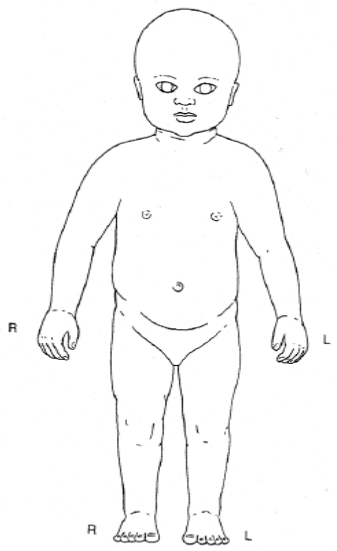
Patient Addressograph Label

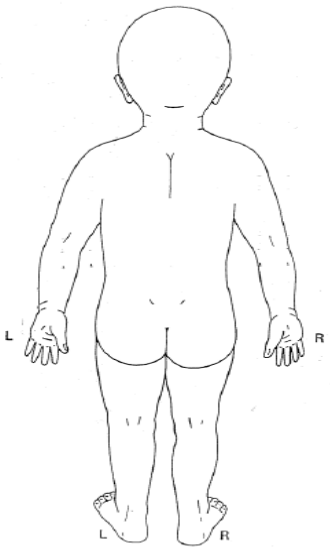
Date and time of event		**Gestation (wk)**	
Age at time of event (h)		**Birthweight (g)**	
Date and time paediatric team informed		**Head circumference at birth (cm)**	
Maternal history BMI Underlying medical conditions Known substance misuse Known sedative medications at time of event Any known social concerns		**Delivery** Parity Type of delivery Medications during labour Maternal Hb post delivery Did PPH occur?	
Circumstances of fall Who was caring for baby at time of fall? What happened? When was baby last known to be safe and well? Who found baby after fall? What was estimated height from where baby fell to floor? What was height of bed from floor? Were the side rails raised? Type of surface baby was found on? Had parents received information about preventing falls on admission to ward? What and when was the last risk assessment of mother undertaken? What and when were the last observations of mother undertaken?			

Initial assessment of Newborn (document injuries on body map below)

Basics Airway Breathing Circulation	
Neurology Head circumference Level of consciousness Tone Primitive reflexes Anterior fontanelle Extracranial trauma Pupillary size, symmetry and reaction	
Feeding Adequacy Vomiting	
Any other injuries	

Management plan:





Signed:	Print Name:	Grade:
Date:		

Appendix -3: Pathway for management of in-hospital newborn fall or drop

Witnessed or unwitnessed fall or drop

Immediate management -midwife/neonatal nurse

- Move baby carefully to resuscitaire for full assessment- ensure good light
- Perform baseline observations and assess baby for injuries and responsiveness
- Inform parents if not aware

Spinal immobilisation is rarely useful/indicated and is

- Baby looks unwell, not responsive, seizure or obvious head injury
- Crash Call and request urgent paediatric review
- State location of baby

- Baby looks well with no visible injuries
- Crying but easily consoled
- NEWTT Observations normal
- Paediatric team to review baby within 15min

Paediatric Team

- Obtain a detailed history from parents/witnesses and midwifery team (Appendix -2)
- Complete a thorough medical and neurological examination – note any birth related injuries
- Document Injuries clearly – bruises, erythema, swelling or skin marks (use Body Map Appendix -2)
- Review history of Vitamin K, if not given or given orally – offer IM if no medical contraindications.
- Perform Enhanced Observations
- Notify on-call Consultant

Baby looks unwell, not responsive, seizure or obvious head injury

- Admit to neonatal unit
- Continue enhanced observations
- Complete investigations- FBC, U&Es, Cogulation, Blood glucose, Group and save.
- Urgent CT head within hour (see Table)
- Consider Analgesia

Well baby, no injuries

- Can remain on postnatal ward
- Continue enhanced observations for 12 hours
- If changes in enhanced observations for immediate Paediatric review, consider admission and further investigations

Discharge

- Babies who require admission should be discharged when clinically well
- Babies who remain on PNW should be reviewed by Tier 2 doctor/ANNP prior to discharge.
- Discharge details should include all observations, imaging results and neurosurgical consultations
- Head Injury advice and patient information leaflet for parents
- Inform before discharge and send discharge letter to community Midwife, health visitor and GP.
- Arrange paediatric or neurosurgical follow up for baby who has abnormalities on imaging

Appendix 4 - Paediatric Neurological Observation Chart with Modified GCS for infants less than 4 months

Name:						DOB:				Ward:								
Hospital Number:						Consultant:												
Date																		
Time																		
Frequency of Observations																		
Dot the response of the Glasgow Coma Scale																		
Modified Glasgow Coma Scale	Eyes Open	Alert and awake or gentle stimulus =4																Eyes closed due to swelling = C
		To rocking /startle response =3																
		Response to painful stimuli =2																
		None =1																
	Best Vocal or Grimace Response	Alert/normal cry =5																
		Less than usual/irritable but consolable =4																
		Abnormal high pitch /inconsolable cry =3																
		Weak cry/moans or grunts to pain =2																
		None =1																
	Best motor response	Spontaneous movement, normal primitive reflexes = 5																Record the best limb's response
		Responds only to touch or stimulus moves limb/ change in face expression, weak primitive reflexes =4																
		Withdraw to pain =3																
		Abnormal posturing to pain =2																
		None =1																
		Total Score																
Pupils	Right	Size																+ reaction - nil reaction S reacts sluggish C eyes closed
		Reaction																
	Left	Size																
		Reaction																
		1 •	2 •	3 •	4 •	5 •	6 •	7 •	8 •									Pupil Scale (mm)
Limb Movement	Arms	Normal power																Record right (R) and Left (L) separately if there is a difference
		Hypertonic																
		Hypotonic																
		No response/ flaccid																
	Legs	Normal power																
		Hypertonic																
		Hypotonic																
		No response/ flaccid																
		Assessor's Initials																

References: [2,23,24,25,26,27,28,29,30,31,32,33,34,35]

Eye Opening	
4	**Spontaneous eye opening.** Alert and spontaneous eye movement or opens eyes on gentle stimulus. If the infant is sleeping they may not open eyes but will have some motor response to touch or gentle stimulus
3	**Eyes open on rocking movement:** If baby's eyes do not open eyes on gentle stimulus, perform gentle rocking motion of the head to see the response. Also observe facial expression and motor response.
2	**Eyes open to painful stimuli.** If the infant does not respond to verbal stimuli, use tactile stimulus by touching the infant's hand/shoulder and gently shaking. If no response, then painful stimulus can be applied by applying pressure to the side of the 3rd or 4th finger to evoke the eye open response.
1	**No eye opening to painful stimuli.** No response to pain stimulus
C	If Infant's eyes are closed – document clearly due to swelling or puffy as normal after birth or swollen and not opening due to injury/trauma score C.
Vocal or grimace response	
5	**Alert/normal cry.** Spontaneous normal facial / oromotor activity.
4	**Less than usual ability and / or spontaneous irritable cry.** Less than usual spontaneous grimace or infant has a spontaneous irritable cry which is consolable.
3	**Abnormal high pitch inconsolable cry.** Infant has an abnormal cry and cannot be consoled.
2	**Weak cry, moans or grunts to pain.** Infant moans or grunts or has weak cry in response to pain.
1	**None.** There is no vocal or grimace response to pain.
Motor Response	
5	**Infant has normal spontaneous movements and normal primitive reflexes.** Includes suck, gag and grasp.
4	**Withdraws to painful stimuli/normal flexion.** The infant flexes arm at elbow without wrist rotation in response to painful stimulus. Best motor response is spontaneous and reflex flexion.
3	**Withdraws to pain.** Only responds to strong painful stimuli – weak withdrawal to pain/ abnormal flexion of arm and wrist with clenched fist and extended legs
2	**Abnormal posturing to pain.** Abnormal flexion (decorticate) or extension (decerebrate) to pain. Response to pain is slow with flexion of the arms with wrist rotation, clenched fists and extended legs **and/or** arms rolled inward on the body with wrist and fingers bent and held on chest **and/or** rigid extension of the arms at the elbow with the inward rotation and extended leg.
1	**No response to pain.**

Triggers for Alerting Immediate Medical Review

Clinical Signs of raised intracranial pressure

- Early signs: Decrease in level of consciousness> 5 minutes (NICE, Sept 2019)
- Late signs: Fall in respiratory rate, decrease in heart rate, rise in blood pressure
- Pupil changes (dilated, unequal or non-reacting)
- Persistent vomiting
- New or evolving neurological signs e.g. pupil inequality, asymmetry of limbs, facial movements
- Abnormal posturing and /or Seizures
- Development of agitation or abnormal behaviour/irritability
- Tense bulging fontanelle

Practical tips:

1. Grading the severity of head injury: Minor head injury (GCS score = 13-14), moderate HI (GCS score = 9-12) and severe HI (GCS score ≤8).
2. For more accurate grading other important factors must be taken into consideration, like mechanism of injury (e.g. the height of fall, surface of fall etc.), loss of consciousness, vomiting, and posttraumatic seizures.
3. Request immediate Paediatric review if any drop of one or more points in the eye/ verbal (Grimace)/motor points.
4. Clinical management decisions should not be based solely on the GCS score in the acute setting.
5. There is limited evidence to validate use of GCS in this age group. However, this scale is adapted for use in this age group through multi-professional group consensus, from the evidence available and local guidelines from the units using GCS to monitor babies following neurosurgery.
6. With limited evidence and validity, use of modified GCS alone cannot be recommended, either as a means of assessing severity or prognosis of brain injury. However, it is a useful tool for monitoring and should supplement detailed neurological examination of newborn but not replace it.
7. Distinction between normal and abnormal flexion may be challenging, especially for the non-specialist. (Reilly 1991)

References

1. National Database for Nursing Quality Indicators. March 2018
2. Davis T, Ings A. Head injury: triage, assessment, investigation and early management of head injury in children, young people and adults (NICE guideline CG 176). Arch Dis Child Educ Pract Ed. 2015 Apr;100(2):97-100.
3. Quayle K, Jaffe D, Kupperman N. Diagnostic testing for acute head injury in children-when are head computed tomography and skull radiographs indicated? Pediatrics. 1997; 99:1
4. Greenes D, Schutzman S. Occult intracranial injury in infants. Ann Emerg Med.1998; 32:680–686
5. Gruskin K, Schutzman S. Head trauma in children younger than 2 years: are there predictors for complications? Arch PediatrAdolesc Med. 1999; 153:15–20
6. Greenes D, Schutzman S. Clinical indicators of intracranial injury in head-injured infants. Pediatrics. 1999; 104:861–867
7. Helsley L, McDonald JV, Stewart VT. Addressing in-hospital "falls" of newborn infants. Jt Comm J Qual Patient Saf. 2010 Jul;36(7):327-33.
8. Assessment and management of babies who are accidentally dropped in hospital. NHS improvement; Alert reference number: NHS/PSA/RE/2019/002
9. Lee galuska. Prevention of In-Hospital Newborn Falls. Nurs Womens Health. 2011 Feb-Mar;15(1):59-61.
10. Matteson T, Henderson-Williams A, Nelson J. Preventing in-hospital newborn falls: a literature review; MCN Am J Matern Child Nurs. 2013 Nov-Dec;38(6):359-66.
11. Abike F, Tiras S, Dünder I, Bahtiyar A. A new scale for evaluating the risks for in-hospital falls of newborn infants: a failure modes and effects analysis study. Int J Pediatr. 2010;2010.
12. Postnatal Unit Bassinet Types When Rooming-In After Cesarean Birth: Implications for Breastfeeding and Infant Safety; J Hum Lact. 2012 November; 28(4): 495–505.
13. Co-sleeping and SIDS. UNICEF; baby friendly resources; sleep and night-time resources, co-sleeping and sids, October 2019
14. Co-sleeping with your baby. lullabytrust-safer-sleep-advice/co-sleeping
15. Jonathan Wyllie**,** Sean Ainsworth, Robert Tinnion. Resuscitation council, UK. Resuscitation and support of transition of babies at birth. NLS 2015
16. Shane S, Fuchs S. Skull fracture in infants and predictors of associated intracranial injury. PediatrEmerg Care.1997;132:1–6
17. Katz JS, Oluigbo CO, Wilkinson CC, McNatt S, Handler MH.; Prevalence of cervical spine injury in infants with head trauma ; 2010 May;5(5):470-3
18. von Kries R. Vitamin K prophylaxis–a useful public health measure? Paediatr Perinat Epidemiol1992; 6(1): 7–13.
19. Busfield A, Samuel R, McNinch A, Tripp JH. Vitamin K deficiency bleeding after NICE guidance and withdrawal of Konakion Neonatal: British Paediatric Surveillance Unit study, 2006-2008. Arch Dis Child 2013; 98(1): 41–47.
20. McNinch AW, Tripp JH. Haemorrhagic disease of the newborn in the British Isles: two year prospective study. BMJ 1991; 303(6810): 1105–1109.
21. Puckett RM, Offringa M.(2000) Prophylactic vitamin K for vitamin K deficiency bleeding in neonates. Cochrane Database Syst Rev 2000; (4): CD002776

22. Ruddick, C., Platt, M. W., & Lazaro, C. (2010). Head trauma outcomes of verifiable falls in newborn babies. Archives of Disease in Childhood: Fetal Neonatal Edition, 95(2), F144-F145.
23. Greenes DS, Schutzman SA. Infants with isolated skull fracture: what are their clinical characteristics, and do they require hospitalization? Ann Emerg Med 1997; 30:253–9.
24. Ferguson-Clark, L., Williams, C. (1998). Neurological Assessment in Children. Paediatric Nursing. 10, (4), 29-35
25. James, H.E., Trauner, D.A., (1985). The Glasgow Coma Scale. In James, H.E., Anas, N.G., Perkin, R.M. (Eds). Brain Insults in Infants and Children: Pathophysiology and Management. P179-182. Grune and Stratton. Orlando, Florida.
26. National Institute of Health and Clinical Excellence (2007) Head Injury, Triage Assessment, Investigation and Early Management of Head Injury in Infants, Children and Adults (NICE).
27. Reilly, P.L., Simpson, D.A., Sprod, R., Thomas, L. (1988). Assessing the conscious level in infants and young children; a paediatric version of the Glasgow Coman Scale. Childs Nervous System. 4, 30-33
28. Yates, R., Crabtree, I., Woodward, J. Children's Division Manchester Children's Paediatric Early Warning Score (MANCHEWS) Policy. Version 2. Central Manchester University Hospitals NHS Foundation Trust, 2011
29. Robinson, G.M., Blakesley, H (2012) Paediatric Neurological Observation Incorporating Early Warning Coma Alert (EWCA) and MANCHEWS Policy. Central Manchester University Hospitals NHS Foundation Trust.
30. Sharma, A., Cockerill, H. (2008) Birth to Five Years. Children's Development Progress. 3rd Edition, Section 1, 3-50.
31. Tatman, A., Warren, A., Powell, J.E., Whitehouse, W. Development of a modified paediatric coma scale in intensive care clinical practice. Archives of Disease in Childhood. 1997, 77, (6), 519-521.
32. Teasdale G.M., Jennett B.Assessment and Diagnosis of coma after a Head Injury Acta Neurochir (Wien), 1976, 34, 45-54.
33. Wellington. Development of a guide for Neurological Observations. Nursing Times, 2005. 101, 39, 32-34.
34. Vlad Ciurea Alexandru, Mihaela Sandu Aurelia,Popescu Mihai,Mircea Iencean Stefan,*and Davidescu Bogdan, Journal of Medicine and Life Vol. 1, No.4, October-December 2008
35. Borgialli DA, Mahajan P, Hoyle JD Jr, Powell EC, Nadel FM[7], Tunik MG, Foerster A, Dong L, Miskin M, Dayan PS, Holmes JF, Kuppermann N Pediatric Emergency Care Applied Research Network (PECARN), Performance of the Pediatric Glasgow Coma Scale Score in the Evaluation of Children With Blunt Head Trauma, Acad Emerg Med. 2016 Aug;23(8):878-84.