



British Association of
Perinatal Medicine



Deterioration of the Newborn (NEWTT 2)

**A Framework for Practice
DRAFT for Consultation
March 2022**

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Working group

(Alphabetical order)

Sara Abdula	Advanced Neonatal Nurse Practitioner, Chelsea & Westminster Hospital
Annette Ballard	Matron, Ipswich Hospital, ESNEFT
Amarpal Bilkhu	Trainee, Neonatal Special Interest SPIN, West of Scotland Deanery
Patrick Blundell	Paediatric Trainee, University Hospital of Wales, Cardiff
Susan Broster	Consultant Neonatologist, Addenbrookes, Cambridge
Elisabeth Corlett	Parent representative, NeoMates and School Nurse
Gemma Finch	Advanced Neonatal Nurse Practitioner, St Peter's Hospital, Chertsey
Tony Kelly	National Clinical Advisor for National Maternity and Neonatal Safety Improvement Programme, NHS England and NHS Improvement
John Madar	Consultant Neonatologist, Plymouth
Kathryn Macallister	Neonatal GRID Trainee, BAPM Trainee EC Representative, Co-Chair NEWTT2 working group
Shalini Ojha	Consultant Neonatologist, University Hospitals of Derby and Burton
Kelly Phizaclea	Parent representative, NeoMates
Oliver Rackham	Consultant Neonatologist, Glan Clwyd Hospital, North Wales
Hannah Rutter	Senior Improvement Manager Maternity and Neonatal Safety Improvement Programme NHS England and NHS Improvement
Wendy Tyler	Consultant Neonatologist, BAPM Honorary Treasurer, Chair NEWTT2 working group

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Summary: Deterioration of the Newborn

1. This framework is designed for use in postnatal care settings including the delivery suite, postnatal ward and transitional care unit.
2. The framework describes at risk groups of newborns and provides an updated [Newborn Early Warning Trigger and Track \(NEWTT2\) chart](#).
3. The NEWTT2 chart and framework encompass parental concern to acknowledge the importance of the opinion of the family in addition to the wider multi-disciplinary team.
4. This extended framework provides an [escalation tool](#) and a [standard response and review tool](#) for the multidisciplinary team to use jointly.
5. The framework uses the PIER principles adopted by the National Patient Safety Improvement Programme.
6. Recommendations for assessment and monitoring are given for all newborn infants ([Table 1](#)) and for at risk groups ([Table 2](#)).
7. Frequency of observations are determined by national guidance and frameworks for practice where available.
8. Numerical values are assigned to **amber** (a score of 1) and **red** (a score of 2) triggers to permit a total NEWTT2 score to be calculated and documented.
9. The total NEWTT2 score informs the escalation response including who is responsible and the timing of a review and supports further escalation if indicated.
10. The escalation and response tools use standardised language to minimise the potential for errors in communication and encourage joint multi-disciplinary team working.

Introduction

Every newborn infant should be provided with the environment and healthcare professional support required to enable the transition of their physiology following delivery, the establishment of infant feeding, and the early development of the family. Additionally, they should be protected to prevent avoidable morbidity and mortality during this phase of adaptation. While the majority of newborn infants require only short-term surveillance there are groups at risk of developing complications particular to the perinatal period (1-10). By planning and preparing for these at risk newborn infants we aspire to prevent morbidity that could have life-long consequences for their health and wellbeing.

There is no clear evidence of the effectiveness of any specific system or set of observations in the newborn. The National Reporting and Learning System (NRLS) does however identify delays in response to deteriorating observations as contributory to the morbidity of hospitalised patients and NHSE is promoting the development of early warning systems across all disciplines (11).

This framework is designed for use in postnatal care settings including the delivery suite, postnatal ward and transitional care unit. In the rare event that a baby is deteriorating or at risk of deterioration in a community setting (home or midwifery-led unit (MLU)) the NEWTT2 chart can be used to support monitoring of the baby while transfer to the consultant unit is undertaken without delay (12). The NEWTT2 working group advise immediate contact with the neonatal team and urgent transfer into the consultant unit from community settings for infants with any observations outside the acceptable normal range. NEWTT2 is not designed to be used for patients being cared for on a paediatric ward.

NEWTT2

The revised deterioration of the newborn framework for practice describes at risk groups and provides an updated [Newborn Early Warning Trigger and Track \(NEWTT2\) chart](#) aligning to current recommendations for newborn care and acknowledging feedback from healthcare professionals. The chart encompasses parental concern to acknowledge the importance of the opinion of the family in addition to the wider multi-disciplinary team. The inclusion of parental concern supports Essential Action 2: Listening to Women and Families, described in the first Ockenden report (13).

When to escalate and call for assistance using the NEWTT tool has been described previously and this update builds on this advice. The extended framework provides an [escalation tool](#) and a [standard response and review tool](#) for the multidisciplinary team to promote consistency between healthcare professionals and ensure that the team and family are involved in and fully informed of the actions required for a baby to receive safe and quality care. The response tool facilitates the documentation of the response taken and subsequent actions required.

PIER principles

This framework was developed using the PIER principles adopted by the National Patient Safety Improvement Programme (Figure 1):

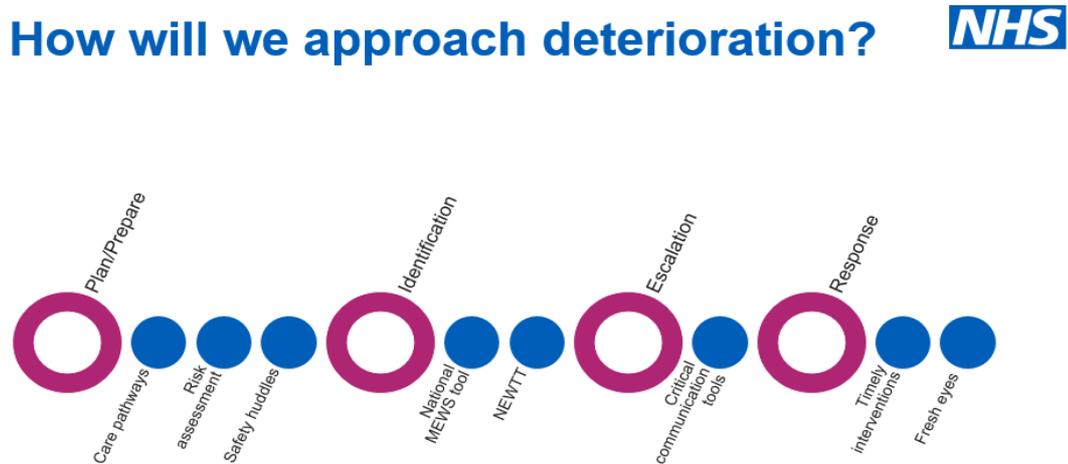
P: Planning, preparation and prevention ensure that all newborn infants at risk of deterioration after birth are identified, have their risks clearly communicated and that actions are taken to minimise these and intervene where required.

I: Identification of any change in their physiological parameters, clinical examination, or behaviour, as well as any concerns raised by their parents or caregivers facilitates early escalation for intervention where indicated.

E: Escalation ensures appropriate involvement of the multi-disciplinary team in a timely manner that is standardised

R: Response tools promote a consistent approach by providing a data set for multidisciplinary team assessment and management of a neonate with triggers on the NEWTT2 chart.

Figure 1: NHS National Patient Safety Improvement Programme PIER principles applied to NEWTT2



Surveys

Two national surveys were conducted to inform the development of this framework. The results of the first survey revealed that the majority of UK units were using a neonatal early warning score, and that 79% of these were using the NEWTT tool or a modified version. Adaptations made locally included enhanced instruction for when a neonate would trigger a medical review, adding guidance around timescales for escalation and including details of the frequency and duration of observations for different risk factors. Whilst certain elements of the framework will need to be determined at an individual Trust level, depending on local factors such as staffing skill mix and environment, the NEWTT2 framework supports a consistent approach to the identification and observation of at risk newborn infants, and to the escalation and response when a trigger level is reached.

The second survey was distributed to health professionals to gather opinions relating to the current version of NEWTT and to suggest changes identified in practice. The electronic survey was disseminated via social media and BAPM and other organisational newsletters. 430 responses (162 midwives; 90 consultant paediatricians/neonatologists; 83 neonatal nurses; 42 nurse practitioners; 34 junior doctors; 12 health care assistants; and 5 others) were received. Users of the tool mostly agreed with current recommendations. Some key areas were identified as needing revision including aligning the revised NEWTT recommendations with current NICE and other national recommendations such as for management of infants at risk of sepsis and for neonatal hypoglycaemia. Many respondents suggested removing bilirubin levels from the chart. The survey, overall, suggested agreement with current recommendations and improved clarity of instructions, avoidance of unnecessary recordings, and aligning with national guidance and emerging practices.

A full analysis of all the responses is given in Appendix 7.

Parent information

Parents and caregivers have an important role to play in identifying any changes in their baby which should trigger a further review by the clinical teams responsible for their care. For parents/caregivers to be able to advocate for their child it is essential that clinical teams explain verbally what the purpose of the NEWTT2 Tool is and describe the signs/symptoms that the clinical team are using this tool to look for. This information should be supplemented by signposting parents/caregivers to appropriate written material e.g. NHS Illness in [Newborn Babies leaflet](#); [Neonatal Infection: antibiotics for prevention and treatment NH195](#).

In addition to outlining the purpose of the NEWTT2 Tool, it is important for clinical teams to maintain an open dialogue with parents/caregivers, ensuring that families are listened to, including when their concerns fall outside the immediate scope of this tool. Acknowledging these concerns and making a clear plan together with the parents/caregivers to keep their baby safe and well is an important part of shared care between the clinicians and the family supported by Ockenden report Immediate and Essential Action 2 (13). It is essential that all such conversations explaining the NEWTT2 Tool and/or raising concerns are clearly documented in the clinical records and should include the agreed plan and next steps.

Plan, Prepare, Prevent

Recommendations for assessment and monitoring are given for all newborn infants (Table 1) and for at risk groups (Table 2). Frequency of observations are determined by national guidance and frameworks for practice where available.

A summary quick reference version of Table 2 is available in Appendix 1.

Table 1: Assessments and monitoring recommended for every newborn baby

	Recommendation	Frequency
Immediately following birth and within the first hour of life	<p>Follow recommendations for recording observations given within national guidance (3, 4, 14)</p> <p>Identify any risk factors that require observations or intervention within the first hour of life such as management of early onset bacterial infection</p> <p>Perform the initial midwifery examination to detect any major physical abnormality and identify any problems that require referral</p>	<p>NICE postnatal care, NICE intrapartum care and RC (UK) NLS guidance</p> <p>Prior to and following birth to enable timely intervention</p> <p>Once</p>
During skin-to-skin contact Skin-to-skin contact is recommended for newborn infants within the first hour to promote thermoregulation, colonisation with maternal flora and biological nurturing	<p>For a significant minority of infants positioning for skin-to-skin contact may have contributed to sudden unexpected postnatal collapse and serious adverse outcome (7). The level of risk for sudden collapse during skin-to-skin contact is influenced by maternal body mass index, antenatal use of opiate medication, sedation and staff focus on other tasks.</p> <p>Airway and breathing - check the baby's position is such that a clear airway is maintained – observe respiratory rate and chest movement. Listen for unusual breathing sounds or absence of noise from the baby.</p> <p>Colour – the baby should be assessed by looking at the whole of the baby's body as the limbs can often be discoloured first. Subtle changes to colour indicate changes in the baby's condition.</p> <p>Tone – the baby should have a good tone and not be limp or unresponsive</p> <p>Temperature – ensure the baby is kept warm during skin contact</p>	Throughout every skin-to-skin contact
1-2 hour of age	Record body temperature soon after the first hour (3). Target the temperature range 36.5-37.5°C.	Until target reached
Feeding and excretion	<p>Follow UNICEF guidance providing information to assess infant feeding including frequency of feeds, wet and dirty nappies (15). Newborn infants considered suitable for early discharge should have a risk assessment completed by the maternity team that incorporates feeding establishment (3, 6). If there are any concerns regarding feeding, observations using the NEWTT2 tool are recommended with escalation for review as indicated.</p>	Continuous assessment with parent
Jaundice	<p>Examine all infants for jaundice at every opportunity especially within the first 72 hours; if jaundiced monitor bilirubin and use gestational age charts to guide treatment (5). At risk groups include gestation <38 weeks, previous sibling requiring treatment, male, low birth weight, multiple birth and Asian ethnicity (1, 5).</p>	At every contact

NICE: National Institute Clinical Excellence; RC (UK): Resuscitation Council UK ; HSIB: Healthcare Safety Investigation Branch; UNICEF: United Nations Children's Fund; ATAIN: Avoiding Term

Table 2: Monitoring of at risk groups using NEWTT2 observations

At risk groups	Recommendation	Frequency
Risks identified intrapartum	<p>Fetal compromise (refer to hypoglycaemia)</p> <p>Meconium-stained amniotic fluid (MSAF) Newborns delivered in the presence of thick, particulate meconium should be observed for at least 12 hours as detailed in NICE intrapartum care guidance; such infants should be observed on a site with access to a resident neonatal team (4).</p> <p>For all other newborns where meconium is present observe for 2 hours in all care settings.</p>	<p>NICE intrapartum care guidance (2017) At 1 & 2h, then 2 hourly until 12 hours</p> <p>At 1 & 2 hours</p>
Risks associated with mode of delivery	<p>Elective pre-labour Caesarean section <39 weeks' gestation Evidence advises against pre-labour Caesarean section prior to 39 weeks' gestation to avoid adverse outcomes. Admission to a neonatal unit with respiratory distress is more likely (1, 16, 17).</p> <p>Newborns born before arrival of a healthcare professional (BBA) Rates of neonatal unit admission are increased in this cohort, with the most likely complications including hypothermia, suspected infection and respiratory distress (18, 19)</p>	Not set by national guidance*
Infants at risk of early onset infection	<p>Newborn infants with infection can deteriorate rapidly or insidiously and often after a period of apparent health. It is recommended that the following newborn infants are monitored using the NEWTT tool:</p> <p>Infants with risk factors for early-onset infection (2) Infants with clinical indicators for early-onset infection (2) Infants being treated with antibiotics for early-onset infection Other infants being treated with antivirals or alternative intravenous antibiotics for other indications in the newborn period</p>	<p>NICE neonatal infection guidance for risk factors and clinical indicators</p> <p>Not set by national guidance*</p>
Infants at risk of hypoglycaemia	<p>Significant hypoglycaemia can lead to irreversible brain injury. Monitoring newborn infants at risk of developing hypoglycaemia or those with concerning clinical signs, such as a reluctance to feed or any deterioration in feeding behaviour, has the potential to prevent the life-long impact of brain injury.</p> <p>Recommendations made are in line with national documents (1, 9): Small for gestational age ($\leq 2^{\text{nd}}$ centile plotted on gestational age and sex-specific charts) and/or evidence of clinical wasting in keeping with growth-restriction in utero The need for resuscitation and/or fetal compromise (IPPV at 5 min of age, low cord pH ≤ 7.1, low Apgar score ≤ 7@5 minutes, Base deficit ≥ 12.0) Maternal B-blocker medication Maternal diabetes mellitus Late preterm infants (34+0 – 36+6 weeks gestation) Hypothermia not improving with initial steps to provide thermal care (see NEWTT2 chart) Suspected/confirmed early onset infection Abnormal feeding behaviour including not waking for feeds, an ineffective suck, being unsettled and demanding very frequent feeds or a deterioration in feeding (10)</p>	BAPM Hypoglycaemia Framework for practice
Infants requiring	Consider observing infants using NEWTT2 who have not been described elsewhere and who are admitted to transitional care as described in the	BAPM Transitional Care Framework

transitional care	BAPM Transitional Care framework for practice (8).	
Infants with early jaundice within 24 hours of birth	Early jaundice in the first 24 hours mandates a bilirubin measurement and a clinical assessment. The use of the transcutaneous bilirubinometer is not recommended within 24 hours of birth (5).	NICE jaundice guidance
Infants demonstrating clinical signs that warrant additional monitoring	<p>Grunting respirations Newborn infants with transitional grunting commencing at birth without any respiratory distress are usually healthy and do not require escalation in care (1). The NEWTT2 observation chart can support assessment of these infants and guide escalation. <i>Any new grunting</i> developing following birth is not consistent with transitional grunting and warrants escalation to the neonatal team (2).</p> <p>Feeding concerns without other risks Any newborn infant with concerns regarding feeding should be observed using the NEWTT2 tool. Feed refusal or reluctance to feed are symptoms of concern for sepsis and/or hypoglycaemia and should trigger a neonatal team review (6, 10).</p> <p>Reduced tone or behaviour Newborn infants with altered behaviour or tone warrant observations using the NEWTT2 tool with escalation as indicated. Poor tone or inactivity can be signs of sepsis or hypoglycaemia and warrant escalation (1, 10).</p> <p>Elevated lactate identified on cord or neonate blood gas This can reflect concerns with fetal or neonatal wellbeing. Umbilical cord blood lactate of 4 mmol/L has been shown to predict adverse outcome (need for intubation, hypoxic-ischaemic encephalopathy, meconium aspiration syndrome) in term infants. Such elevated cord or early neonatal blood lactate levels should prompt a neonatal team assessment. A repeat blood lactate measurement in 4 to 6 hrs may be appropriate to ensure a falling or normal blood lactate (20-24).</p>	<p>Not set by national guidance*</p> <p>NICE early onset infection guidance</p> <p>NICE early onset infection guidance</p> <p>NICE early onset infection guidance</p> <p>Not set by national guidance*</p>
Maternal medications potentially impacting on newborn behaviour	<p>Maternal opiate pain relief <6 hours prior to delivery Due to the effect on respiratory drive and establishment of feeding, infants warrant monitoring using the NEWTT2 chart.</p> <p>Maternal drugs of addiction, prescribed or illicit Use of a neonatal withdrawal scoring chart is indicated as determined by local or regional guidelines</p> <p>Prescribed maternal SSRIs and SNRIs and other psychotropic medications within the 3rd trimester Assessment in the first few hours after birth to ensure effective transition and absence of clinically significant persistent pulmonary hypertension of the newborn, and ongoing assessment of infant behaviour including feeding is advised (25).</p>	Not set by national guidance*

Monitoring frequency

*For monitoring using NEWTT2 beyond 12 hours of age, or for those at risk groups where clear recommendations are not within national guidance, consider performing NEWTT2 observations at 4-hourly intervals. It is not possible to be prescriptive for each infant's unique situation and observations may need to be more or less frequent in order to ensure safe care and provide an appropriate balance between observations of, and interruptions to, the parent and baby.

Identification: The NEWTT2 chart

NEWTT2 is an evolution of the previous system and is based upon the ability to 'track' the behaviours and observations of infants deemed to justify observation over time to identify trends. When variables fall outside the defined 'normal' range then actions are 'triggered' based upon the degree/magnitude of the deviation. A progressive 'amber/red/purple' scale defines the extent of the change and guidance on the actions to be undertaken should variables move into the alert zones. At any single time point when observations are taken, values within the amber or red zone contribute to a 'score' for the infant which will either achieve the threshold for an action or indicate that the infant remains within the defined 'safe' zone. Even in the 'safe' zone, however, trends may be observed over time which indicate emerging instability, and even if thresholds are not crossed, trends might also prompt earlier review or more frequent observations. Scores within the purple zone warrant urgent neonatal review.

Healthcare professional concern can initiate a neonatal review at any time regardless of the zone colour of an observation or total score.

The tool draws upon previous experience including a review of existing tools (26-35). It is a consensus document in the absence of objective evidence on the precise nature of the key parameters and thresholds to guide escalation.

What changes have been made and why?

- Numerical values are assigned to **amber** (a score of 1) and **red** (a score of 2) triggers to permit a total score to be calculated and documented.
- The total score informs the escalation response including who is responsible and the timing of a review, and supports further escalation if indicated.
- The previous box for urgent referral has been incorporated into the NEWTT2 chart identified as **purple** coloured trigger boxes.
- Mild hypothermia requiring immediate intervention to prevent further deterioration is highlighted in **blue**.
- Respiratory rate ranges are aligned with NICE postnatal care guidance (3).
- Feeding and neurological behaviour assessments score separately for clarity and to support findings from HSIB (6).
- Blood glucose measurements (where taken) are aligned with the BAPM hypoglycaemia framework for practice (9).
- Parental concern is included to support the findings of the Ockenden report (13).
- Bilirubin is not within the NEWTT2 chart; please use the NICE Jaundice guidance charts to plot bilirubin values to guide treatment (5).
- The chart now permits, for any set of observations, a record of whether any threshold of concern has been reached and for any action taken.
- Guidance for completion of the NEWTT2 chart provides additional information for the health care professionals using the tool. Training to support the completion of the NEWTT2 tool, knowledge of escalation thresholds and the need for shared responsibility should be given to all healthcare staff prior to implementation and certainly prior to use for patient care.

NEWTT2 guidance for completion: see Appendix 2

NEWTT2 front of chart: see Appendix 3

Newborn Early Warning Trigger & Track 2 (NEWTT2)



How to use the NEWTT2 trigger and track tool to determine the level and timelines of escalation

Calculate and document the total NEWTT2 score for a set of observations by adding together the individual scores (0-2) for every individual observation entered in a single column of the chart.

Check the total against the NEWTT2 escalation tool and follow instructions in the escalation table for that set of observations.

For a score of zero continue routine care

Thresholds and Triggers

- The grade of team member indicated as the primary contact for each level of clinical concern is a guide and may need to be adapted depending on the local skill mix within that care setting or organisation.

	Score 1	Score 2-3	Score 4-5	Score ≥6	Any critical observation
	Inform shift leader - Consider SpO ₂ +/- blood glucose if not done already				
Primary escalation and response (use SBAR framework)	Repeat observations in <1 hour.	Refer to paediatric/neonatal Tier 1 doctor/ANNP.	Refer to paediatric/neonatal Tier 1 doctor/ANNP.	Refer to paediatric/neonatal Tier 1 doctor/ANNP. The Tier 2 doctor/ANNP should be informed.	Refer to paediatric/neonatal Tier 1 doctor/ANNP AND Tier 2 doctor/ANNP.
Review timings	Escalate as for score 2-3 if the repeat score remains 1.	Request a review within 1 hour.	Request a review within 15 minutes.	Request immediate review.	Immediate review and consider neonatal emergency call (2222).

Take steps to avoid any obvious concerns

Secondary contact	If no review within expected time frame, escalate to Tier 2 doctor/ANNP and inform shift leader.	If no review within expected time frame, escalate to consultant and inform shift leader.
	If still no response within required time frame, escalate to consultant.	

- When the primary team member(s) contacted is unable to attend or fails to attend within the expected time for the level of clinical concern, escalation to the secondary contact is required
- The secondary contact would be expected to attend within the initial review timing, calculated from the documented time of primary escalation.

SBAR Handover

S	Situation
B	Background
A	Action
R	Recommendation

Document all actions and discussions in patient record

Escalation and Response

This framework builds on the previous 2015 NEWTT framework, providing a standardised pathway for responding to infants who display abnormal observations and reach a trigger on the NEWTT2 tool. Experiences of the working group confirmed variation between units in how quickly infants with abnormal observations are reviewed and by whom, leaving some infants at risk of further deterioration if they are not seen and adequately assessed in a timely fashion.

A review of current literature did not identify relevant evidence to inform either the time frame or level of response; consequently, the recommendations produced are a consensus opinion. We recommend evaluation of the framework in order to review the escalation and response pathway.

A key feature is the use of standardised language to minimise the potential for errors in communication. The seniority of review required is described in terms of Tier 1, 2 or 3. We use simple, recognised, safety-critical language, including an assessment of whether the infant is 'well' or 'unwell' at the point a review is triggered. All escalation and handover should use an SBAR (Situation, Background, Assessment, Recommendation) structure, as this has been shown to reduce adverse clinical events and improve perception of effective communication (36).

A second key feature is the shared responsibility between all healthcare professionals and parents. The concept that involvement with a patient is complete once a review has been requested or performed is discouraged, and the concept of joint ownership and collaboration between all is promoted. The pathway mandates that parents are updated by the multi-disciplinary team after any review, and the NEWTT2 tool ensures 'parental concern' is documented as an abnormal observation.

Contemporaneous sharing of accurate information throughout the process including at the point of escalation, during and following review with the wider multidisciplinary team is essential (37).

The escalation and response pathway has been designed to align with current MEWS (Maternal Early Warning Score) and PEWS (Paediatric Early Warning Score) pathways to reduce error.

Escalation Tool

This is a decision support tool and designed as the reverse of the NEWTT2 chart. This guides healthcare professionals through the appropriate timeliness and level of response required.

Escalation Tool NEWTT2 reverse of chart: see Appendix 3

Response and Review Tools

We have produced several documents to standardise the response to infants who display abnormal observations on the NEWTT2 chart. These can be found in Appendices 5-7 and are designed to be used as paper documents or integrated into electronic systems to support decision-making.

NEWTT2 Escalation Record: see Appendix 4 ([hyperlink here](#)) – this is designed as a sticker, a separate document, or a dataset for electronic patient records to be completed by the person escalating when a baby triggers.

Response Record: see Appendix 5 ([hyperlink here](#)) – this can be used as a sticker, a separate document, or a dataset, to be completed by the doctor or ANNP reviewing the infant, prompting them to consider further investigation or review and providing a reminder to update the parents.

Joint Escalation and Response Record: see Appendix 6 ([hyperlink here](#)) – this incorporates the information from both Appendix 5 & 6 described above and is designed to document the entire process from trigger through to medical review, repeat medical review if required, to parent update and clinical care.

These documents seek to replace existing documentation to avoid additional workload. We anticipate that units will implement the escalation and response tools which best suit their needs, depending on the structure of their medical and nursing notes as well as the skill mix of the healthcare professionals using the NEWTT2 chart.

NEWTT2 Testing and Additional Recommendations

The NEWTT2 framework for practice has been tested prior to consultation using clinical observation data, and through prototype testing assessing accuracy of use and preference of layout for the escalation tool. Additional useability testing is to run alongside the framework's consultation.

Perinatal units should audit compliance with the NEWTT2 framework and all unexpected neonatal unit admissions should be formally reviewed, including adherence to recommended NEWTT2 monitoring. Awareness of frequency and category of admissions, coupled with thematic analysis of learning from reviews can support local perinatal teams target resources to improve.

National research should be planned to evaluate the utility of the NEWTT2 framework, including identification of at risk groups, physiological parameters, frequency of monitoring and the ability of the tool to identify early, or even to prevent, deterioration in health and improve longer-term outcomes.

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