Appendix 8: Analysis of BAPM NEWTT - Health Professional Survey

Authors

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Methods

Survey questionnaire was designed and created using the online survey dashboard available at jisc.ac.uk (Jisc, Bristol, UK). The questionnaire was co-created by the BAPM NEWTT review team. Pilot questionnaire was tested by 3 members in January 2021. The final survey was released on 2 March 2021. There were no limits to the number of responses that could be received. The survey was sent, as personal emails, to 62 health care professionals who had previously agreed to participate in the survey. In addition, the survey link was shared via the BAPM official Twitter account on 03 Marc 2021. This tweet was re-tweeted 85 times and received 54 likes. Further re-tweets were sent on 17 March 2021 and from the individual accounts of the group members. The survey closed on 30 March 2021.

Results were analysed using Microsoft excel (Microsoft Inc.) and Stata 16.1 (Stata Corps, Texas, USA). Responses to question are presented as counts and percentages. The respondents were classified into health professional categories as indicated by them in the response. The free text responses were analysed and categorised into themes. Themes that recurred in five or more response were extracted and analysed. Representative quotations were extracted as typed by the respondents and are quoted verbatim.

Results

A total of 432 responses were received. 57/62 (92%) health care professionals emailed directly responded.

There were two blank responses that were excluded from analyses. A total of 430 responses were analysed. **Error! Reference source not found.** shows the professional category and the level of the neonatal unit at the place of work of the respondents.

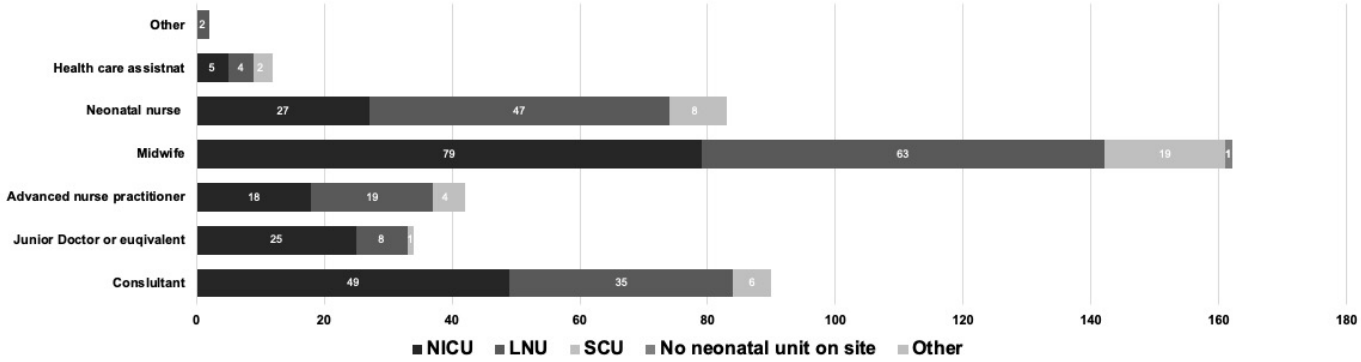

Figure 1. Professional category of respondents and neonatal unit level at their place of work (one response was from a group of neonatal consultants from a NICU, two respondents did not specify their professional category or neonatal unit specification)

The current NEWTT chart includes the following:

1. List of criteria used for routine NEWTT observations
2. Vital signs and physiological parameters that need monitoring

3. Criteria for at risk infants: sepsis
4. Criteria for at risk infants: Intrapartum
5. Criteria for at risk infants: Metabolic: blood sugar monitoring
6. Criteria for at risk infants: Other
7. Criteria for infants that need immediate review by Doctor/ANNP

For each of these, we asked if the respondent would like any of the listed criteria to be removed from the list in the revised version of NEWTT. Each of these questions included a response to indicate that the respondent agreed with all the current criteria and did not want any removed. **For each of these,**

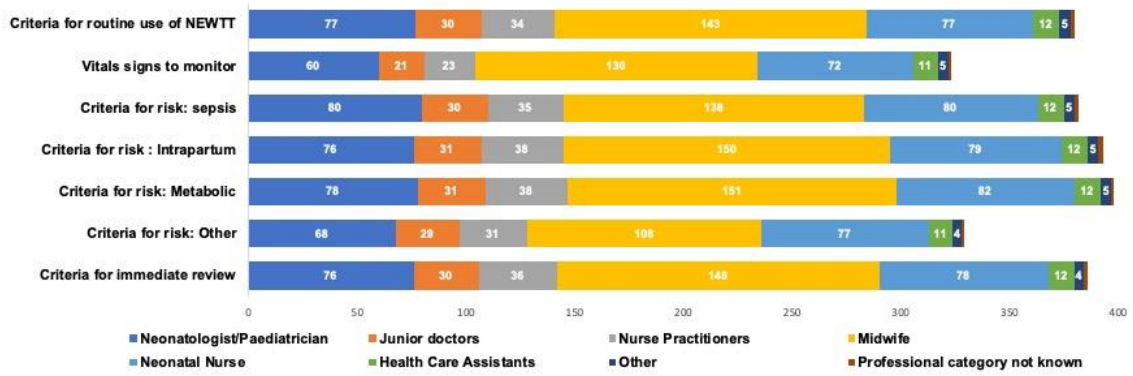

Figure 2. Number of respondents (by professional category) who agreed with all the current criteria listed in the NEWTT guidance and did not want any to be shows the count of respondents (by professional category) who agree with all the criteria and do not want any removed.

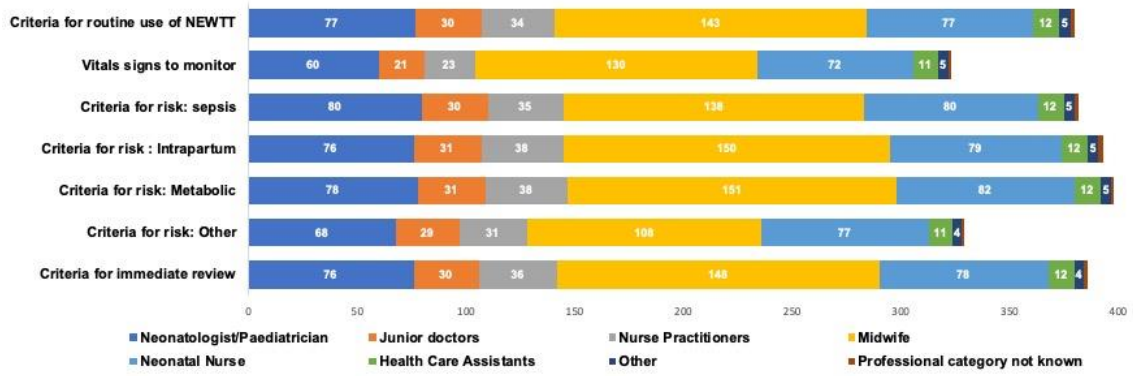

Figure 2. Number of respondents (by professional category) who agreed with all the current criteria listed in the NEWTT guidance and did not want any to be remove.

For each of the lists, the question also asked which of the criterion/criteria, if any, would the respondent want to see removed from the revised version of the list. **Error! Reference source not found.** gives a summary of the count of the respondents (by professional category) and the specific criterion in each group that they would like to see reviewed (removed or modified).

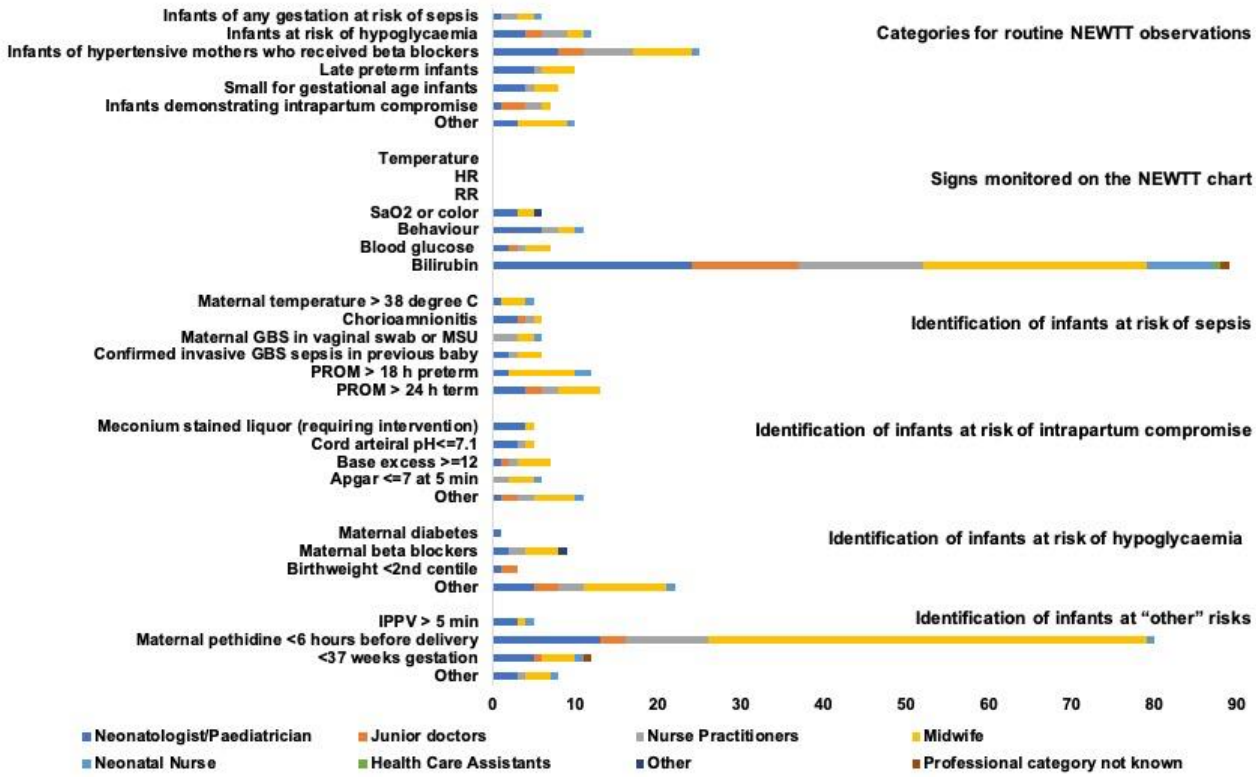

Figure 3. Count of respondents (by professional category) who indicated that a criterion should be removed from the list of those who need Newborn Early Warning Trigger and Track (NEWTT) monitoring.

Analyses of the free text responses of those who want the current recommendations to change

At risk categories for routine NEWTT monitoring

Question one asked about the list of criteria used to select babies for routine use of NEWTT and if the respondent wanted one or more removed, they were asked why they wanted those criteria to be removed. 45/430 respondents wanted to see one or more categories to be changed or removed of which 25 choose infants of hypertensive mothers who received beta blockers as the unnecessary criteria. Thematic analysis of their views are given in Table 1. Next respondents were asked to if they wanted an additional criterion and if so, what it would be. 141 (33%) of respondents said they would like to add a new category. Suggested categories (by theme) identified from the free-text responses are given in Table 1. This excludes the 17 responses that suggested categories that are already include in NEWTT guidance.

Table 1. Thematic analysis of response to questions about risk categories for routine use of the BAPM Newborn Early Warning Trigger and Track charts

Thematic analysis of reasons to exclude categories that are currently included			
Risk category	**Themes**	**Number of responses**	**Example quote**
Infants at risk of hypoglycaemia	NEWTT is not a suitable tool for hypoglycaemia	6/12	"They need temp and BGL monitoring but do they need full obs?" (Consultant) "I understand these babies are at risk of hypoglycaemia but does 24 hours of NEWTT add anything additional?" (Consultant)
	Need blood glucose monitoring. Full NEWTT observations are unnecessary.	7/12	
Infants of hypertensive mothers who have received beta blockers	Include with those at risk of hypoglycaemia and do not need to be a separate category	17/25	"These infants are at risk of hypoglycaemia so already fall into that category, they do not need a separate category." (Midwife)
Late preterm infants	Include only if other risks	8/10	
	May need different cut-off for vital signs	3/10	
Small for gestational age infants	Include only if other risks	6/8	
Infants demonstrating intrapartum compromise	Need to be picked up early. NEWTT observations will not add to neurological assessment	2/7	
Infants at risk of sepsis	-	0/6	-
"Other" categories	Too non-specific	7/10	""Other" leaves room for error (and possible unnecessary use of observations leading to further interventions)." (ANNP) "Do not have an "other" category. By all means add more but stop doctors putting babies on observations for non evidenced based reasons" (Midwife)

Thematic analysis of additional categories that should be included	
Category of infants	**Number of responses**
Infants born with "thick" or "significant" meconium-stained amniotic fluid	41
Infants with neonatal abstinence syndrome	22
Infants of mothers on antidepressants or other medications that may cause withdrawal including neonatal abstinence syndrome	13
Known antenatal risks such as congenital anomalies	11

Reluctant feeders	8
Infants with jaundice on double phototherapy	8
Maternal hyperthyroidism	7
Infants on sepsis risk not recommended antibiotics by the sepsis risk calculator	5
Birth trauma or postnatal fall	5
Other themes: all infants (4); infants discharged from neonatal unit (3); Elective C-section (2); Large for gestational age infants (2); low birth weight infants (2); social concerns (2); infant of mother with COVID19 (2); parental concern (1)	

Signs monitored on the NEWTT chart

Next two questions referred to the vital signs and physiological parameters that are monitored as part of NEWTT. We asked if the respondent would like any of the current signs removed and if yes, why. 323/430 (76%) respondents did not want to change any of the vital signs. There were 7 missing responses and the remaining 100/430 (23%) wanted to exclude one or more currently included signs. All agreed that heart rate, respiratory rate, and temperature should be included. Next, respondents were asked if they would include any additional sign or measure and if so what would they like to add. 123/430 (29%) said they wanted a measure added or changed. There were 2 missing responses. The thematic analysis of the responses to these two questions are given in Table 2.

Table 2. Thematic analysis of responses to questions about vital signs and/or physiological measures on the BAPM Newborn Early Warning Trigger and Track (NEWTT) chart

Sign or measure	Theme of reason to remove from NEWTT	Number of responses	Example quote
Thematic analysis of reasons to exclude those that are currently on the NEWTT chart			
Jaundice	Plotted on gestational age specific NICE charts – no need to duplicate	65/89	"Not relevant for all babies on chart, and should be clearly charted on a phototherapy chart anyway." (Junior Doctor) "Bilirubin is usually not included in the immediate observations?" (Midwife))
	Not needed for all infants who require NEWTT	15/89	
Behaviour	Non-specific and unclear what to record	10/11	"Not sure what Behaviour actually reflects. " (Neonatal nurse) "The space would be too small to note anything meaningful and is very subjective" |(ANNP)
SaO2 or color	Not routinely done on postnatal wards or by midwives	4/6	"there is not routine saturation monitoring on most postnatal wards so tis could cause confusion for the nursery nurses and MSWs doing the observations." (Health care assistant)
	Colour assessment is subjective and prone to error	4/6	"Colour criteria says Pink, Dusky and pale. This is not in line with skin colour depending on ethnicity. A baby of a darker skin colour will not be pink, probably dusky (dark) and score on the chart." (other – infant feeding co-ordinator)
Blood glucose	Not needed for all infants on NEWTT	4/7	"While oxygen saturation, blood glucose and bilirubin are important they should not

			be part of the routine observations…. . Would need clear instruction on the chart and/or education" (Consultant) "These do not need to be tested at every set of NEWT obs as long as the others are normal" (Midwife)
Thematic analysis of suggestions for additional signs/measures to be included on the NEWTT chart.			
Clinical sign or measurement		**Number of responses**	**Example quotes**
Signs of respiratory distress		31/128	"Respiratory assessment (normal / grunting / nasal flare / recession)" (Consultant) "Why is grunting the only sign of respiratory distress mentioned? Many babies who we are asked to review for grunting are actually moaning. Could ask for signs of respiratory distress instead?" (Junior doctor)
Feeding pattern/behaviour		31/128	"Behaviour is very non specific but I feel feeding should be included" (Midwife)
Muscle tone		10/128	
Parental concerns		7/128	
Urine and bowel		5/128	"feeding and output as these are indications of wellbeing" (Midwife)"
Pre-and-post ductal saturations		5/128	"I would also like to see an actual saturation number too not a tick within a range. It gives a more accurate picture. Were the sats 99% 1st set of ob's then 91% 2nd set or 95% then 94% because the same boxes would be ticked but varying differences." (Neonatal nurse)
Other suggestions that received fewer than 5 counts: blood pressure (4); pain score (4); capillary refill time (2); health care professional concern (2); medications (1); "does the infant look well" (1)			

Identification of infants at risk of sepsis

382 /430 (91%) respondents indicated that they did not want any of the sepsis risk factors to be excluded. There were 11 missing responses. Responses from those who suggested changes showed that most comments pertained to the two different cut-offs for prolonged rupture of membranes and aligning the risk factors with those given in the relevant NICE guideline. For example:
"Two different categories of PROM in the same list causes confusion" (Consultant) and "Does not need excluding but emphasising pre-labour ROM, in line with current NICE guidance." (Consultant)
"Confusion at present between prolonged from categorised as 24 hours in obstetrics and 18 hours in neonatal" (Midwife).
The other themes that emerged related to the use of maternal temperature and chorioamnionitis as sepsis risk factors. Five responses indicated that these can be non-specific, e.g.,
"Maternal temp: This could be caused by a number of reasons = is it likely to be sepsis?" (Midwife)
"'Chorioamnionitis' is an overused term, will this be 'confirmed'?" (Midwife).
In addition, 5 respondents said that babies should not need observations if mother has received adequate intrapartum antibiotics.

"This should be dependent on whether Intrapartum Antibiotic Prophylaxis is given (in term babies" (Midwife)

When asked about additional risk factors for sepsis 95/430 (22%) respondents suggested other criteria. There were 6 missing responses. Most comments (32/95 responses) referred to adding the decision from the sepsis risk calculator to the criteria. Some of these (11/95) also referred to aligning the guidance to NICE recommendations for early onset sepsis including the sepsis risk calculator as per local practice.

"KP risk calculator – obviously" (Consultant)

"NEWTT should go parallel with the Kaiser permanente sepsis screen tool. As the new proposed NICE guidance gives an option of use for or not for KP sepsis screen tool." (Consultant).

In contrast to the responses to the previous question, 24/95 responses asked for maternal sepsis to be included as a risk factors particularly when mother is being treated with antibiotics.

Identification of infants at risk of intrapartum compromise

393/430 (93%) agree with all the criteria given as intrapartum risk factors and did not want to exclude any. There were 9 missing responses. Of the responses where a change was suggested most (8/28) asked for the criterion meconium-stained liquor (requiring intervention) to be removed e.g., *"This will confuse people and will increase unnecessary the number of babies who need observations."* (Consultant)

"Meconium liqour - requiring intervention. I think people don't know what this means and therefore just put babies on NEWTTs for thick Mec even when uncomplicated and no intervention." (Midwife).

In response to suggestions for adding any risk factors to this list 50/430 (12%) of respondents said they would like an addition criterion for assessing intrapartum risk. There were 8 missing responses. Most comments (18/50) referred to including intrapartum events such as fetal bradycardia, shoulder dystocia, maternal antepartum haemorrhage, or abruption in the risk factors. 8/50 responses indicated that high lactate levels on the cord blood gas or infant's first blood gas should also be considered a risk factor for intrapartum compromise. Several other comments (17/50) talked about other risks that are included under the categories of sepsis and were therefore not included in this analysis.

Identification of infants at risk of hypoglycaemia

398/430 (94.5%) agree with all criteria for identifying risks of hypoglycaemia. There were 9 missing responses. Several comments referred to the earlier themes that hypoglycaemia requires blood glucose monitoring and NEWTT may not be the appropriate tool for this or a full set of NEWTT observations are not required. Similarly, there were some mentions of infants with a family history of metabolic condition, and that infants whose mothers receive beta-blockers are generally well. 6/23 responses said large for gestational age infants should be included in the categories at risk of hypoglycaemia.

When asked if they would like to add any criterion to this list, 303 (72%) said no. 35/119 responses indicated large for gestational age babies should be included, e.g.,

"glycaemia in these infants, that I wonder might be due to un-diagnosed gestational diabetes." (Consultant).

The cut-off of <2nd centile of birth weight for defining small for gestational age infants was also questioned by a few respondents e.g.,

"If a trust uses GROW and calculating birth percentile BM's if under what birth weight should be" (midwife).

Identification of infants at "other" risks

In the section on other risks, 329/430 (79%) agreed with all those listed. Among those who disagreed, 80/89 objections were about maternal pethidine <6 hours before delivery e.g.,

"I think this requires very close observation immediately after birth and for a few hours but not up to 12 hours. NEWTT does not recommend frequent enough observations to make it worthwhile so should have a separate recommendation for very close visual observation after birth" (Consultant)
"Pethidine affects neonates in different ways- birth assessment & transition should indicate further need for observations." (midwife).
373/430 (90%) respondents did not want any new criteria to be added. There were 16 missing responses. Among those who wanted an additional to the "other" criteria, 14/41 indicated neonatal abstinence syndrome or similar infants of mothers who may have taken drugs or medicines should be monitored using NEWTT, e.g.,
"Babies at risk of Neonatal abstinence syndrome usually have NEWTT observations along with the Abstinence chart, other maternal medications/conditions may warrant observations on the newborn but they can be added in the other category" (midwife). Other themes, previously mentioned, recurred with responses asking for NEWTT monitoring for infants with jaundice, traumatic delivery, maternal thyroid problems, and poor feeding.

Identification of infants who require immediate review or "red category"

391/430 (94%) agreed with all the "red" category conditions. There were 13 missing responses. Most (25/26) responses said that hypoglycaemia should not be included in this list. Several responses indicated that this would be acceptable for "symptomatic hypoglycaemia" but otherwise it does not require urgent review e.g.,
"If assymptomatic plan as per BAPM can be given without immediate review" (Consultant).
Similarly, 7/26 responses pointed out that jaundice at <24 hours does not require immediate review e.g.,
"? Jaundice - surely immediate SBR is needed, rather than just calling a doctor, who is then going to ask for an SBR" (midwife).
112/430 (26%) suggested additional categories for immediate review. Acutely unwell infants with significant respiratory distress, bradycardia, unresponsiveness, abnormal movements were most frequently flagged up (102/112).

Other notable comments and views

In addition to the responses analysed within the above-mentioned sections, some notable contrasting responses were picked up in the qualitative analysis. These include:

"I have profound concerns about the whole concept of the NEWTT chart. It is based on the idea that "tracking" variables that are outside the normal physiological range can add assurance to the well being of a baby. There is no scientific basis for the thinking, or the variables chosen as thresholds. I trained at a time when clinical judgement (though hard to obtain) and taking a history were more highly valued - this was not very long ago. I strongly support the idea that a given respiratory rate should trigger a review by a suitably qualified member of staff. Indeed performing these reviews will help to develop suitable skills among those who are asked to make such reviews. What concerns me is that "tracking" abnormal observations represents a problem - particularly in the hands of non registered or less experienced registered staff." (Consultant)
"All infants are at risk – everyone should be monitored to begin with and then decided if observations should continue or not" (midwife)

Summary of findings

Responses reflect that most health care professionals agreed with the current NEWTT guidelines. The area in which need for change were indicated by several respondents include:

1. Infants of hypertensive mothers who receive beta-blockers does not need to be a separate category for routine NEWTT observations as it is included under risks of hypoglycaemia.
2. Consider that full NEWTT observations may not be required for infants at risk of hypoglycaemia. Recording of feeding may be more important than other measures such as respiratory rate and heart rate in this group.
3. Responses suggest health care professionals would like to include infants of mothers who have drugs (both re-creational or medically prescribed) that may cause withdrawal in the infant should be included for NEWTT observations.
4. Several responses considered “thick or significant” meconium as a worrying factor but several others pointed out that this is not important.
5. Bilirubin should not be recorded on the NEWTT chart as it is not useful to record this result a number in a table.
6. Sign of respiratory distress (rather than just “grunting”) and feeding behaviour were suggested as additional features that should be monitored on NEWTT
7. Sepsis risk factors should be better defined, aligned with NICE and acknowledge those flagged up by Sepsis Risk Calculators are requiring observations.
8. A few responses suggested intrapartum adverse events and birth trauma should be considered as risk of intrapartum compromise.
9. Large for gestational age infants may be at risk of hypoglycaemia and should be monitored.
10. Maternal pethidine at <6hr before delivery should not require NEWTT observations. Closer assessment soon after birth may be more beneficial.
11. Hypoglycaemia (unless symptomatic) and jaundice should not be “red” criteria.
12. Acutely unwell infants should be included for immediate review.

The responses clearly demonstrate the wide differences in opinion among health care professionals and the lack of evidence to support most of the recommendations. Some strong opinions were expressed which further accentuate the differences. However, the results represent opinions and should not mandate change in NEWTT guidance where evidence or other scientific work suggest otherwise. The working group should take these views into consideration and make revisions where appropriate.