

# Assessing the knowledge and confidence to perform breastfeeding practices in the neonatal unit – A case study of the use of the Neonatal Unit Clinician Assessment Tool (NUCAT) in Coventry, England

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***Best Beginnings and Coventry University have collaboratively developed the Neonatal Unit Clinician Assessment Tool (NUCAT Best Beginnings commissioned Coventry University and Health Behaviour Research Limited to create NUCAT as part of a larger evaluation that Best Beginnings commissioned Coventry University to do of the Small Wonders Change Programme. NUCAT is jointly owned by Best Beginnings and Health Behaviour Research Limited.***

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**Key words:** Breastfeeding, breast milk expression, lactation, training needs, supporting parents.

**Abstract:** The evidence that breast milk feeding reduces mortality and morbidity among premature and small babies is well established, but breastfeeding rates in neonatal units in the UK remain low. We present a case study of how a tertiary hospital unit in Coventry, England assessed staff training by interviews and undertaking the Neonatal Unit Clinician Assessment Tool (NUCAT), an on line objective knowledge test with ratings of confidence and knowledge in breastfeeding support skills. Fifty-one medical and nursing clinicians completed NUCAT. More staff scored better on the practical than knowledge domains. Doctors, those with more neonatal experience and more years since qualifying were not more knowledgeable than other clinicians overall. But senior clinicians knew more about physiology of lactation and why breastfeeding is beneficial. As prior training and experience, self assessed knowledge and confidence in practice, are not reliable predictors of knowledge, we recommend objective assessment is used to target training to individual needs.

**PAPER:** Assessing the knowledge and confidence to perform breastfeeding practices in the neonatal unit - a case study of the use of the Neonatal Unit Clinician Assessment Tool (NUCAT) in Coventry, England.

## INTRODUCTION

Whilst there is evidence that breast milk feeding reduces mortality and short and long-term morbidity among premature and small babies born in the UK (Morley et al, 2004 and Schack-Nielsen, 2006), breastfeeding rates in neonatal units in the UK remain low (Renfrew et al. 2009). This may be due to the high demands of patient care and because it is often difficult for NICU nurses to provide consistent breast-feeding support (Nelson, 2007).

The importance of initiating breastfeeding and supporting breast milk expression within NICU is well known (Jones & Spencer, 2007), and for clinically stable, very low birthweight babies, kangaroo care has also been shown to influence the duration of breastfeeding (Renfrew et al, 2009, Nyqvist, 2008). Importantly, involving parents in these practices is also an opportunity for staff to discuss any other problems parents may be experiencing and offer support and advice. Clear communication skills and good relationships between staff and parents are key to promoting a culture of breastfeeding on NICU; and increasing maternal self-confidence has been shown as an important predictor for breastfeeding duration (Weimers et al, 2006 & Isler 2007).

Moreover, the specialised knowledge needed to provide support to parents and babies in NICU might not have been part of a nurse's education or their NICU training. Educational interventions designed to improve knowledge, attitudes and beliefs of NICU nurses have been designed to empower nurses thereby enabling them to better support lactation. However, studies of training interventions in neonatal units have not provided robust assessment of clinician's knowledge and skills. For example a study by Siddell et al (2003) measured attitudes rather than knowledge, and only post training. Jones (2004) conducted a pre-post training knowledge survey but provided no information on how the knowledge was tested. Pineda (2006) provided an educational intervention for clinicians but did not test their knowledge. A study in the USA used a non-validated knowledge test before and after a four hour breastfeeding training programme for neonatal nurses and achieved significant improvements in knowledge, although these were not sustained 3 months later (Bernaix et al, 2008).

In maternity and community services there is an objective assessment of clinicians' knowledge, the Coventry University Breastfeeding Assessment (CUBA), (Wallace et al, 2009; Wallace et al 2011; Wallace et al 2011) which has been used to assess training interventions and to establish training needs. The child health charity Best Beginnings commissioned Coventry University and Health Behaviour Research Limited to create NUCAT as part of a larger evaluation that Best Beginnings commissioned Coventry University to do of the Small Wonders Change Programme, (Farnworth and Baum, 2012 ). This study reports the first use of this tool; a new method of assessing both knowledge and confidence in four skills to engage parents in the care of their baby in neonatal units.

The aims of the study were to:

1. Objectively assess the knowledge and measure self assessed confidence in knowledge and practice in kangaroo care, positive touch, breast milk expression and establishing breastfeeding in the neonate, along with underpinning knowledge of the physiology of lactation and the benefits of breastfeeding sick and premature neonates. This paper reports on the breastfeeding knowledge domains.
2. Assess if the confidence in knowledge and practice changes as result of completing knowledge test and receiving their resulting scores.
3. Evaluate the response of clinical staff to the NUCAT system as a means of assessing their knowledge and training needs.

## METHOD

Setting: The Neonatal unit in the Coventry and Warwickshire Hospitals NHS Trust is a tertiary centre with around 600 admissions per year and approximately 100 clinical staff. In the year 2011-2012 53% of the total babies admitted to the unit were breastfeeding at discharge, whilst the figure for those born before 33 weeks gestation is lower at 35%.

The study was approved by Coventry University Ethics Committee and the Research Governance team of the NHS Trust.

Measures: The Neonatal Unit Clinician Assessment Tool (NUCAT) in the form used in this study consisted of an on line measure with 11 personal descriptive questions covering gender, job type, qualifications, recent relevant training. There are 8 confidence items using a 10 point scale covering confidence in knowledge and confidence in practice related to the topics assessed in the knowledge section. The confidence items were presented twice, once before and once after the feedback of the knowledge results had been given to the learner. The knowledge items consist of 66 multiple choice questions where only one of four options is correct. Questions cover factual knowledge as well as observation of clinical scenarios (using still clinical photographs and video clips from Best Beginnings' Small Wonders DVD, and Health Behaviour Research Essential Skills DVD). The knowledge areas have several items to create coverage of key topics: Five items of Positive Touch (PT), 10 items of Kangaroo Care (KM), 20 items of Breast Milk Expression (BE), 10 items of Breastfeeding Practices – mainly Positioning and Attachment (PA), 14 items of the Physiology of Lactation (PL), and seven items of the Benefits of Breastfeeding (BF). The two breastfeeding scales (Positioning and Attachment, Physiology of Lactation) and some items within the Benefits of Breastfeeding and Breast milk Expression, were developed using items from an existing validated breastfeeding knowledge test (CUBA) referred to above. The new items for Breast Milk Expression and Benefits of Breastfeeding were mainly new items developed by a panel of experts. Piloting was conducted on a small number of clinical staff prior to the study to test the ease of understanding the questions and the usability of the on line system. The internal reliabilities of the sub scales (Cronbach's alphas) were above 0.7. The questions contained a comment section on each page, four open questions that asked about barriers and good practice they experience in their unit and the usability of NUCAT. Feedback of the percentage scores correct in each sub section and overall is given within the NUCAT session. We will report on the sub scales related to Kangaroo Care and Positive Touch in a subsequent paper.

Planned analyses of the NUCAT results were descriptive statistics, and paired t tests for pre-post knowledge test confidence items, and difference statistics (Chi squared and t tests or one way

ANOVAs) for establishing differences in knowledge and confidence (Dependent Variables) on personal descriptive variables (Independent Variables).

Interviews: The interviews were designed to elicit opinions and experiences of a range of staff in relation to questions posed by the researcher, using questions based on a contemporary theory of implementation science-normalisation process theory (May, 2006). Analyses were conducted using thematic analysis.

Samples: All 100 clinicians were invited to undertake NUCAT in the period (30th November 2011 to 13<sup>th</sup> February 2012). Ten staff, who varied in job type and prior experience, were interviewed by the research nurse.

Procedure: All clinical staff were briefed and received an e mail invitation to complete NUCAT along with a participant information sheet and consent form, which were also a required part of accessing the NUCAT. Clinicians were approached by the research nurse (WH) to be interviewed once they had completed NUCAT.

## RESULTS

### Who completed NUCAT

Of an approximate workforce of 100 clinicians, 51 (half) completed NUCAT. There was a good spread of all types of clinician including 6 medical and 3 auxiliary staff, with the majority being neonatal nurses. Most (90.2%) were women, with a spread of ages, and experience since qualification and in neonatal care. Most clinicians spend at least 86.2% or more (N=44) of their working week spent in the direct care of babies and parents in the neonatal unit. Most had had some training in breastfeeding but mainly in-house, and 6% had had no breastfeeding training. Ease of completing the NUCAT as an on line assessment was rated on a five point scale and all participants found it easy (49%) or very easy to use (23.5%).

### NUCAT Confidence scores

Within NUCAT, clinicians rated their confidence before and after completing the knowledge test element with the post-test confidence rating happening after they have received their scores. Clinicians were most confident in knowledge about the Benefits of Breastfeeding and least confident in the Physiology of Lactation at both times. See table 1.

***Table 1 Clinicians' ratings of their knowledge and confidence in practices to support breastfeeding and parental engagement.***

	<b>Pre- Knowledge Confidence mean score</b>	Standard Deviation for Pre- Knowledge test confidence mean score	<b>Post- Knowledge Confidence mean score</b>	Standard Deviation for Post- Knowledge test confidence mean score
How <b>confident</b> are you to support women to breastfeed?	<b>6.08</b>	2.15	<b>5.76</b>	1.97
How much do you feel you <b>know</b> about supporting women to breastfeed?	<b>6.61</b>	1.81	<b>5.94</b>	1.83
How much do you feel you <b>know</b> about breast milk expression?	<b>6.29</b>	2.11	<b>5.63</b>	1.95
How much do you feel you <b>know</b> about the physiology of breast milk production, expression and breastfeeding?	<b>5.84</b>	1.93	<b>5.25</b>	1.83
How much do you feel you <b>know</b> about the benefits of breast milk feeding for babies and mothers?	<b>7.47</b>	1.45	<b>6.24</b>	1.69

Paired T-tests allowed exploration of which items on the knowledge and confidence test showed statistically significant differences between pre and post knowledge test confidence scores. Clinicians' results showed statistically significant decreases in confidence in knowledge for all four areas, although confidence in breastfeeding support practices was not significantly reduced.

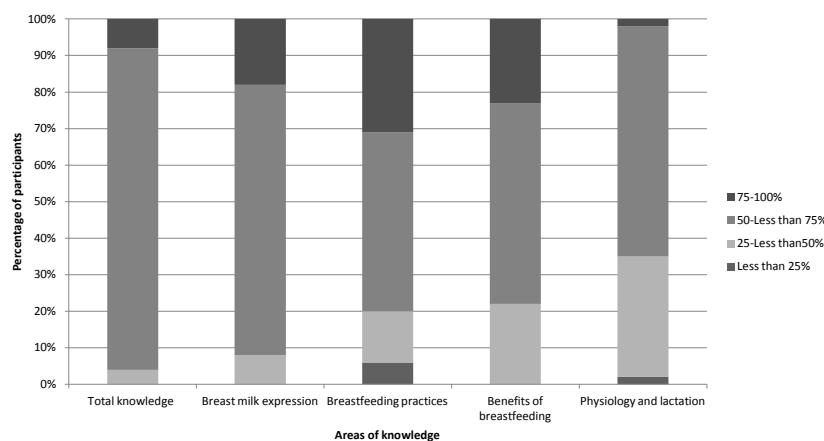
- *How much do you feel you know about supporting women to breastfeed?*( $t(50)=3.688$ ,  $p<0.001$ ,  $r=.0.5$ )
- *How much do you feel you know about breast milk expression?*( $t(50)=4.165$ ,  $p<0.001$ ,  $r=.50$ )
- *How much do you know about the physiology of breast milk production, expression and breastfeeding?*( $t(50)=3.091$ ,  $p<0.003$ ,  $r=.40$ )
- *How much do you feel you know about the benefits of breast milk feeding for babies and mothers?*( $t(50)=6.681$ ,  $p<0.001$ ,  $r=.70$ )



## NUCAT Knowledge scores:

We present the data in Figure 1 as the proportion of clinicians who scored in each quartile for the total score and for each of the four knowledge areas related to breastfeeding.

Figure 1 Percentage of participants with correct scores for breastfeeding practices and knowledge



Knowledge scores across all 66 items show that most clinicians (94.2%, n=48) scored above 50% correct (where 25% is a chance level), while 4 scored above 75% correct. The mean overall knowledge score for individuals was 42/66 and the median was 43. The lowest score for knowledge was 29 and the highest was 53. Figure 1 shows that for Breastfeeding Practices, 41 people (80.4%) scored at least half or more correctly, although 3 people (5.9%) scored below chance. Scores for Breastfeeding Expression showed 47 people (92.22%) scoring half or more correctly. On the core knowledge underpinning the support for feeding breast milk and breastfeeding in neonatal units, 40 (78.4%) scored half or more correctly on Benefits of Breastfeeding, but only 33 (64.7%) scored half or more correctly on the Physiology of Lactation, with one scoring below chance levels.

However, analysis of variance revealed no significant differences in the prediction of total knowledge scores *between doctors, neonatal nurses, general nurses and nursery nurses, or according to their prior training, years since qualifying and years working in neonatal care, and intensity of clinical care in the current role. This suggests that clinician's knowledge may vary in important ways in their knowledge within the six domains of knowledge.* We therefore examined their scores on the four domains related to breastfeeding. To determine if there were differences in the staff groups on their sub scale scores, analyses of variance were performed to examine the effects of job type, prior training, years since qualifying and years working in neonatal care, and intensity of clinical care in the current role. There were some differences in the knowledge areas according to these variables. For example, *doctors scored significantly higher than neonatal nurses on the sub section 'Benefits of Breast Milk' domain (F (3, 47)=3.197, p<0.05).* The results suggest those with more senior roles, and those most recently qualified, had more knowledge in the evidence for breastfeeding benefits and

physiological bases, while there were no significant differences between staff groups in the areas of practical breastfeeding support skills.

### **Interviews:**

Sample: The interview sample consisted of 8 neonatal nurses of whom one was an Advanced Neonatal Nurse Practitioner, a nursery nurse and a junior paediatric doctor, with a range of NICU experience from 3 months to 36 years.

#### *Usability of NUCAT and views on being tested*

It was found that NUCAT enabled those interviewed to identify areas where they lacked specific knowledge in a positive and constructive way:

“Honest feedback, something I can work on, I need yeah, because I have got a lot of work to do but something I can go back and sort of point out where I need to have more, where my weaknesses are so I can strengthen them”. (Staff Nurse, 3 months NICU experience)

“I think it was good the way it fed back to show you the areas in your scores so you could see what you did well and what you could improve on”. (Sister, 9 years NICU experience)

Staff were also keen to have more feedback and felt that the test could provide an opportunity for identifying further training resources:

“It was good the way they gave you a percentage on the areas that you, what you got marked on. Maybe on the areas that you struggled on maybe some feedback on where you could look on getting further training.” (Sister, 11 years NICU experience)

The level of difficulty was commented upon in the open comments sections of NUCAT, and in the interviews. The comments reveal that clinicians felt difficulty was pitched at a fair level in all sections aside from the physiology of lactation, which was deemed to be more difficult. The more senior and experienced staff questioned the need for this level of depth, an example is given below:

“Extremely difficult questions, with all the hormones, I am not quite sure how much it benefits to have that knowledge for actually in practice, I’m not quite sure if that makes any difference. (Staff Nurse, 9 years NICU experience).

However, junior nursing clinicians were more accepting that this should be necessary:

“Yeah it’s all relevant; yeah it just shows the areas that you need to learn really”. (Staff Nurse 3 years NICU experience).

Interviews with clinicians showed evidence that they had insight and understanding of the importance of having this knowledge, and that they worked as a team and so needed to be able to provide consistent and cohesive information to parents:

“There was a lot of about the breast, I mean I hadn’t got a clue, I’ve never been taught that, and I feel if it is important to know that maybe then we should”. (Staff Nurse, 3 months NICU experience).

Those interviewed identified the relationship between knowledge and confidence and described how their understanding of breastfeeding would help them in the practical application of teaching and supporting parents:

“Mine would be more on the actual physiology of the breastfeeding and how you could teach parents making sure I was more confident in what I was teaching them”. (Sister, 11 years NICU experience).

Whilst staff identified a need for training in all areas tested in NUCAT, breastfeeding support skills was regarded as the most important area in which they could benefit from educational support. Those that were interviewed found that NUCAT was useful in identifying their weaknesses and also acknowledging their strengths. Practical and on-site training were identified as important adjuncts to formal training, though staff were aware of the financial implication of both time and training costs.

*Practical issues about practice- Breast Milk Expression and Breastfeeding.*

Key themes that arose in interviews regarding the practical issue of breastfeeding were *lack of confidence and inconsistency of advice given to mothers*, despite nursing staff acknowledging this was central to their role.

“I’m happy to do it; I wouldn’t say I was confident”. (Staff Nurse, 5 years NICU experience)

The theme of trust between staff and mothers arose as staff were aware of how helping mothers with breastfeeding built a positive relationship between them, and this enabled them to explore other areas of care and support that they could offer:

“I think that sort of links the bond where she was happy she would talk about all those subjects, I think one will always lead to another”. (Sister, 20 years NICU experience)

Whilst there was lack of knowledge regarding the evidence base behind this practice all staff identified breastfeeding as positive for both mother and baby:

“Breast milk is better for babies... it helps with anti bodies and is supposed to help with NEC... IQ and it is supposed to help with mum as well”. (Sister, 20 years NICU experience)

Only one member of staff interviewed felt that they could not identify any evidence for breastfeeding being clinically important in neonatal units. However, a comment from one participant showed that lack of understanding of the proven benefits may be part of the reason why not all staff will readily support breastfeeding and breast milk as the optimal nutrition.

“No I don’t think I know about any particular evidence, I know we sometimes have quite a lot of problems with weight gain with breast fed babies but we do obviously try and use it where we can”. (Junior Doctor, 4 months NICU experience).

## DISCUSSION

Our interview findings are consistent with other published research. The comments of staff in interviews and in the open sections of NUCAT (not reported here) describe the many barriers to successful breastfeeding within a NICU environment. Clinicians in this unit were aware that mothers of babies admitted to NICU suffer from separation anxiety and stress, medical complications and a lack of privacy, which can result in difficulties establishing breast milk production (Sisk et al, 2010). There is little doubt that staff working in NICUs experience a heavy patient workload and that finding time to support and educate mothers and parents can be challenging. Alongside such barriers is the lack of staff confidence and knowledge in breast feeding practices. Our results showed that confidence in knowledge was significantly reduced in all four areas assessed when practitioners were fed back their results, this suggests that they over estimate their knowledge of breastfeeding. However, this feedback did not significantly affect their confidence in their practice. The impact on motivation to learn and improve knowledge as result of feedback has not been explored in this study but would be important to ascertain. If feedback of actual knowledge levels is combined with recommendations for immediate access to tailored training and practice development, we believe this may enhance uptake of training. This may be helpful also in over coming the prevalent problem that those who access training are often those with greater self-assessed knowledge, (Wallace and Kosmala-Anderson, 2007) which perpetuates the inequalities in knowledge of clinical staff and may contribute to the inconsistent practices that are experienced by parents.

One of the keys to successful breastfeeding is through providing mothers with consistent, accurate and evidenced based information (Miracle and Fredland, 2007; Ekström et al 2012). In this study clinicians' scores were lower in the knowledge area physiology of lactation where two thirds (n=33 (64.7%) scored half or more correctly, and on interview they described how this topic was not a focal part of the training that they had received. Clinicians should be able to describe the anatomy and physiology important to lactation because this knowledge will inform their skills to assess and facilitate effective breastfeeding and also to prevent and manage common problems. Likewise, positioning and attachment is recognised as one of the most important contributing factors to successful feeding (Morland-Schultz & Hill 2005) and there is evidence that professionals need skilled support on breastfeeding techniques (Wallace & Kosmala-Anderson. 2007). The Benefits of Breastfeeding domain was an area in which doctors scored significantly higher than nurses. This suggests that nurses may not have the necessary knowledge to provide consistent and accurate information to mothers, regarding the evidence for giving breast milk to their baby, and so is an area where they could further benefit from training and education.

The finding that total scores were unrelated to job type, training and experience supports the importance of ensuring all staff are updated on these knowledge areas regularly. An approach which may raise the awareness and knowledge of clinicians across all the domains, including kangaroo care and positive touch (to be reported elsewhere), would be to use the Best Beginnings Small Wonder Change Programme (Farnworth and Baum, 2012), which includes a one day workshop and tools for organisation wide change in policies and practice. In addition, where particular clinicians are shown to have job relevant gaps in knowledge, tailored approaches based on a training needs analysis using NUCAT would also allow a modular approach to attaining knowledge in this area and could be provided by self-directed learning such as through workbooks or e learning. The results are being used to plan education to address the training needs, with particular emphasis on addressing the

most evident needs, the knowledge and skills to support breast milk expression and breastfeeding. We recommend that an organisational plan should be created to address the policies to guide practice, manpower, collection and feedback of neonatal unit data on feeding outcomes, training and practice support. Once the plan is created, it will need to be reviewed and refreshed. It would then be possible to perform a further assessment using NUCAT to help ascertain the effectiveness of the training element of the plan. Monitoring and auditing feeding outcomes can also be a way of establishing how well practices are being applied.

Limitations of the study: While just over half the clinical staff undertook NUCAT, as the staff who did so are in similar proportions by job type to those who did not, we have a reasonable justification for suggesting their knowledge and confidence scores are likely to be representative of all the staff of the unit, but we cannot be sure of this without a total sample being tested. Similarly, those who agreed to be interviewed may have had more positive views about the topics than those who did not volunteer. These caveats lead us to suggest our analysis may give conservative estimates of training needs.

This study provides the first use of a new objective means of assessing neonatal unit clinician knowledge in breastfeeding knowledge and practice skills. The test will also be suitable for conducting trials of training interventions such as the Small Wonders Change Programme to address the training needs identified, which ideally, will also be conducted along side data collection of the impact on maternal and infant health outcomes including breast feeding outcomes.

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