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## The development of a new breast feeding assessment tool and the relationship with breast feeding self-efficacy



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### ABSTRACT

**Objective:** to develop a breast feeding assessment tool to facilitate improved targeting of optimum positioning and attachment advice and to describe the changes seen following the release of a tongue-tie. **Design:** development and validation of the Bristol Breastfeeding Assessment Tool (BBAT) and correlation with breast feeding self-efficacy.

**Setting:** maternity hospital in South West England.

**Participants:** 218 breast feeds (160 mother–infant dyads); seven midwife assessors.

**Findings:** the tool has more explanation than other tools to remind those supporting breast-feeding women about the components of an efficient breast feed. There was good internal reliability for the final 4-item BBAT (Cronbach's alpha=0.668) and the midwives who used it showed a high correlation in the consistency of its use (ICC=0.782).

Midwives were able to score a breast feed consistently using the BBAT and felt that it helped them with advice to mothers about improving positioning and attachment to make breast feeding less painful, particularly with a tongue-tied infant. The tool showed strong correlation with breast feeding self-efficacy, indicating that more efficient breast feeding technique is associated with increased confidence in breast feeding an infant.

**Conclusions:** the BBAT is a concise breast feeding assessment tool facilitating accurate, rapid breast feeding appraisal, and targeting breast feeding advice to mothers acquiring early breast feeding skills or for those experiencing problems with an older infant. Accurate assessment is essential to ensure enhanced breast feeding efficiency and increased maternal self-confidence.

**Implications for practice:** the BBAT could be used both clinically and in research to target advice to improve breast feeding efficacy. Further research is needed to establish its wider usefulness.

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### Introduction

Breast feeding rates in the UK remain below World Health Organisation guidelines and the most recent Infant Feeding Survey reported that around 55% of mothers were giving breast milk to their infants at six weeks, with only 34% still partially or exclusively breast feeding by six months (Infant Feeding Survey, 2010). Exclusive breast feeding rates are even lower at around 23% at six

weeks and only 1% by six months. The drop off in rates is mostly explained by early feeding difficulties causing introduction of bottles, with the highest levels of problems being experienced by those who used a combination of breast feeding and artificial milk in a bottle. The survey reported the most common reasons for introducing bottles and stopping breast feeding in the first week included the infant not latching on properly, mothers having painful breasts or nipples and feeling that they had 'insufficient milk' (Infant Feeding Survey, 2010).

Tongue-tie may be a contributing factor to mothers' experiencing breast feeding problems, as difficulties with both breast and bottle feeding have been reported in 25–44% of infants with this condition (Messner et al., 2000; Griffiths, 2004; Ricke et al., 2005;

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Segal et al., 2007). These studies noted a range of difficulties including poor latch, nipple trauma and inability to feed continuously, all problems which can contribute to mothers feeling that they have insufficient milk and consequently shortening the duration of breast feeding (Marmet et al., 1990; Notestine, 1990). The surgical division of tongue tie (frenotomy) in the early postnatal period aims to improve breast feeding and has become increasingly popular in the UK in recent years, however there is widespread controversy over its effectiveness (Messner and Lalakea, 2000).

Research addressing this issue is hampered by a lack of effective tools both to assess breast feeding and the severity of tongue-tie in sufficient detail. A systematic review (Webb et al., 2013) identified studies that reported the outcomes of frenotomy on breast feeding and documented the objective scoring tools that were used to assess breast feeding. LATCH and IBFAT were the main tools used. The LATCH tool (Jensen et al., 1994) was modelled on the Apgar score with five parameters (latch, audible swallowing, nipple type, comfort, hold) each scoring 0–2, and total scores have been shown to correlate positively with duration of breast feeding (Riordan et al., 2001). The 4-item Infant Breast Feeding Assessment Tool (IBFAT) was developed in 1988 to measure an infant's readiness to feed, rooting, fixing and sucking behaviours during a breast feed (Matthews, 1988). The LATCH score was used by four studies (Dollberg et al., 2006; Srinivasan et al., 2006; Geddes et al., 2008; Berry et al., 2012) in the Webb review to compare feeding before and after frenotomy and whilst two studies showed significant improvements post treatment, two did not. Buryk et al. (2011) used the IBFAT and reported significant improvement in breast feeding scores. However others have suggested that these assessment tools are too broad to show differences in pre- and post-frenotomy breast feeding scores and that other more subjective assessment should be used (Griffiths, 2004).

In our randomised trial of 107 women comparing breast feeding scores before and after frenotomy we also used both LATCH and IBFAT and found no differences in scores between the intervention (frenotomy performed) and comparison groups (Emond et al., 2013). We concluded that these tools were not sensitive enough to record the changes in breast feeding that might occur following frenotomy, particularly in the details of optimum positioning and attachment to the breast.

Psychosocial factors have been shown to have positive correlation with the duration of exclusive breast feeding. A review exploring the psychological correlates of exclusive breast feeding reported on eight studies (de Jager et al., 2013), several of which examined the effects of maternal self-efficacy on breast feeding. Theoretically based on Bandura's (1977) social cognitive theory, the Breast feeding Self-Efficacy Score (short-form) (BSES-SF) is an instrument that measures a mother's confidence in her ability to breast feed her new infant, which can be used clinically to identify those at high risk of discontinuing breast feeding (Dennis, 2003) and to assess breast feeding behaviour. The BSES-SF has good reliability and validity and has been translated into other languages and used in a range of populations (as reviewed by Ho and McGrath (2010)). It is important because mothers who feel self-confident about their ability to breast feed successfully are more able to overcome barriers to breast feeding (Entwistle et al., 2010). Studies exploring the ability of the BSES-SF to predict the duration of breast feeding, independently of other factors (Blyth et al., 2002; Baghurst et al., 2007) have found a strong association between high early scores and longer breast feeding duration.

During our trial study period we were able to develop and test a tool which we felt might more accurately reflect the effectiveness of a breast feed, the Bristol Breastfeeding Assessment Tool (BBAT). We used the BBAT alongside the LATCH and IBFAT and

compared the observed efficiency of breast feeding with how confident mothers' felt with breast feeding using the BSES-SF. This paper reports on the development of the BBAT and its comparison with the previous breast feeding assessment tools.

The study was approved by the Central Bristol Research Ethics Committee (South West).

## Methods

### *Development, analysis and validation of the Bristol Breastfeeding Assessment Tool (BBAT)*

In developing the BBAT, five infant feeding midwives/breast feeding experts discussed the elements of the existing breast feeding assessment tools and decided to use some elements that were similar to two LATCH items (swallowing, comfort) and one from the IBFAT (sucking) and added two new items to score positioning and attachment based on research evidence (Ingram et al., 2002) and WHO Baby Friendly Initiative breast feeding practice principles ([www.unicef.org/BabyFriendly/healthprofessionals/going-baby-friendly/basic\\_knowledge\\_and\\_skills](http://www.unicef.org/BabyFriendly/healthprofessionals/going-baby-friendly/basic_knowledge_and_skills)).

Fig. 1 shows the final version of the Breast feeding Assessment Tool with full description of the scoring. The tool elements included were:

- (1) **Positioning:** the infant should be well supported; tucked against mother's body; lying on his/her side /neck not twisted; nose opposite the nipple; and the mother confident in handling the infant. Achieving all of these and no advice being needed was scored as good (2).
- (2) **Attachment:** the infant showed positive rooting; had a wide open mouth; achieved a quick latch with a good amount of breast tissue in the mouth; and stayed attached with a good latch throughout feed. Achieving all of these points scored 2.
- (3) **Sucking:** able to establish effective sucking pattern on both breasts (initial rapid sucks then slower sucks with pauses); infant ends feed. A score of 2 was given if an effective sucking pattern was achieved.
- (4) **Swallowing:** audible, regular soft swallowing with no clicking was given a score of 2.
- (5) **Comfort:** mother reports breasts and nipples comfortable; no visible damage. This combination of mother report with visible inspection of the nipples was only scored as 2 if she reported complete comfort with no obvious damage. 1 was scored if the mother reported some discomfort and there was some damage or soreness to the nipple visible; 0 was scored if the mother reported severe discomfort and there was moderate or severe nipple damage visible.

The main aim was to develop an assessment tool that could be used effectively and consistently by midwives, lactation consultants, breast feeding counsellors and others assessing breast feeding as a measure of breast feeding proficiency both for research studies and in practice more generally. We also wanted the tool to enable comparison before and after a procedure such as frenotomy, or to compare a breast feeding dyad at different time points, whilst keeping it simple and easy to use.

During the BBAT assessments, 218 breast feeds were documented. One hundred and six breast feeds were observations from 48 mother–infant dyads who were part of the feasibility trial (Emond et al., 2013) and 112 mother–infant dyads assessed after recruitment to the trial had been completed. Some of the assessments in the trial were for the same infant at different time points after frenotomy or several days later. These were considered to be independent as a subsequent observation was assessed 'blind' by a

	<b>0</b> <b>Poor</b>	<b>1</b> <b>Moderate</b>	<b>2</b> <b>Good</b>	<b>Score</b>
<b>POSITIONING</b>  <b>Baby well supported; Tucked against mother's body; Lying on side /neck not twisted; Nose to nipple; Mother confident handling baby</b>	No or few elements achieved  <b>Needs to be talked through positioning</b>	Achieving some elements  <b>Some positioning advice still needed</b>	Achieving all elements  <b>No positioning advice needed</b>	
<b>ATTACHMENT</b>  <b>Positive rooting; Wide open mouth; Baby achieving quick latch with a good amount of breast tissue in mouth; Baby stays attached with a good latch throughout feed</b>	Baby unable to latch onto breast or achieves poor latch. No/few elements achieved  <b>Needs to be talked through attachment</b>	Achieving some elements  <b>Some advice on attachment needed</b>	Achieving all elements  <b>No advice on attachment needed</b>	
<b>SUCKING</b>  <b>Able to establish effective sucking pattern on both breasts (initial rapid sucks then slower sucks with pauses). Baby ends feed.</b>	No effective sucking; no sucking pattern	Some effective sucking; no satisfactory sucking pattern; on and off the breast	Effective sucking pattern achieved	
<b>SWALLOWING</b>  <b>Audible, regular soft swallowing- no clicking</b>	No swallowing heard; clicking noises	Occasional swallowing heard; some swallows noisy or clicking	Regular, audible, quiet swallowing	

Fig. 1. Bristol Breastfeeding Assessment Tool.

different observer with the previous score not being available for comparison.

During the trial, infants who were under two weeks old and experiencing breast feeding difficulties thought to be due to tongue-tie were referred to the research team midwives (Emond et al., 2013). Breast feeding was assessed using the LATCH and IBFAT tools at baseline, five days later and when the infants were eight weeks old. Mothers also completed the self-efficacy BSES-SF at the three time points. The BBAT was developed and introduced part way through recruiting infants into the trial.

Forty-one paired assessments were obtained from seven midwives who had been taught the BBAT. These midwives (who routinely assessed tongue-tie and performed frenotomy within the Trust) assessed breast feeds jointly with one of those who developed the tool (so that each breast feed was assessed by two midwives giving 'paired assessments').

All statistical analysis was carried out in SPSS. Cronbach's alpha, as a measure of internal consistency, was used to estimate the reliability

of the items within the BBAT. Pearson's correlation coefficient was used to measure the strength of the association between the BBAT and BSES-SF. Mann Whitney non-parametric tests were used to test for differences between the groups in the trial.

An intraclass correlation coefficient was used to assess the consistency in BBAT scores obtained from pairs of assessors for 41 breast feeds carried out by 34 different mother–infant pairs. Seven different assessors were involved in these comparisons.

Midwives were interviewed to explore their views of using the tool in their clinical practice. A short telephone interview was conducted by the trial manager or senior researcher, recorded and transcribed. Content analysis methods (Julien, 2008) were used to code the text and the codes were grouped together under the categories of using the tool, teaching it to others and its use in daily practice. Two researchers coded the interviews and agreed the categories emerging from the texts. Comments made by the midwives are reported to illustrate views of the wider group of midwives and not just those who were involved in developing the tool.

Findings

The draft 5-item tool included the mother-reported ‘comfort’ element, but we found that sometimes the mother’s report seemed to be at odds with the midwife scored items in measurements of reliability and consistency. So after checking the internal consistency using Cronbach’s alpha we decided to remove it from the total score and record it separately linked to an assessment of pain (Table 1). The final version of the BBAT is shown in Fig. 1.

Mothers in the trial had a mean age of 33 years, 58% of the infants in the trial were first-born and they were recruited at a mean age of five days. Non-trial infants (n=112) had a wider age range (from one day to 10 weeks old) with a mean age of 17 days, but other characteristics were similar to those in the trial.

BBAT scores were recorded for 106 assessments within the trial and a further 112 not in the trial giving a total of 218 assessments. The internal consistency and correlations are shown in Table 1. All the mothers in the trial and 78 of the non-trial mothers completed the Breast feeding Self-efficacy tool (BSES-SF). For 106 of the BBAT assessments, self-efficacy was also recorded and 41 breast feeds were assessed by two midwives together.

There was good internal reliability for the final 4-item BBAT (Cronbach’s alpha=0.668) and the seven midwives who used it showed a high correlation in the consistency of its use (ICC=0.782). These scores were recorded after a short period of discussion between each midwife and the main assessor during which they agreed the interpretation of the levels of scoring.

The final BBAT showed a strong and significant correlation (0.57) with breast feeding self-efficacy (BSES), indicating that the better the technique the more confident a woman felt about breast feeding her infant.

In the trial of frenotomy for tongue-tie, we showed that mothers whose infants were randomised to the intervention group to have an immediate frenotomy had a significantly greater increase in self-efficacy (using the BSES-SF) over the following five days compared to the usual care group who did not have a frenotomy (Emond et al. (2013) and Table 2; p=0.002).

There were no differences between the LATCH or IBFAT scores in the trial or changes in the scores from baseline to five days later or to eight weeks, but BBAT scores (for those infants scored using the tool) from five days to eight weeks improved significantly more for those in intervention group compared to the comparison group (p=0.02 Mann Whitney; Table 2) indicating that the BBAT may be a more sensitive breast feeding assessment tool. In the trial, self-efficacy at 5-days after the baseline was also correlated with eight week BBAT (n=36, p=0.02). It was not possible to explore the longer relationships between BBAT and breast feeding self-efficacy in the non-trial mothers.

Interviews with midwives

All seven midwives who routinely used the BBAT in their daily practice were interviewed and their comments illustrate that they all found the elements of the tool self-explanatory, it was easy to

use and helped them with their advice to mothers, particularly around positioning and attachment:

I would use it for checking breastfeeding, perhaps if a baby was readmitted for weight loss and I would observe a breastfeed using the tool – to remind me about all the positioning and attachment points. (MW#1)

The positioning and attachment elements help me to clarify my advice, they help to trigger conversations about what to tell mothers to improve the feed. (MW#2)

We’ve had mothers come in with feeding problems, and we can improve the positioning and attachment with this advice. The mother feels the feed is more comfortable and so feels better. (MW#3)

It is good for evaluating general breastfeeding – good for Mums to look at to evaluate the breastfeed to work out what might be improved (MW#5)

They found it easy to teach to others and to achieve similar scores to other assessors when watching a breast feed together:

I found the tool easy to use; a fast learning process; my scores were similar to others using the tool. (MW#1)

I have also taught it to others and they like it – it is something that they can refer to. It confirms what you are thinking and seeing to make a confident decision. Feedback from other midwives about using the tool has been positive. (MW#2)

It’s not difficult to follow at all. I have taught it to my student and that was easy to teach (MW#6)

They found it quite easy to use in their daily practice and it was reported as being very useful:

It helps to remind multiparous mothers about early breastfeeding. I would go through the points with a mother. (MW#1)

It is easy to incorporate into practice and supports breastfeeding. It makes you check all those things and then feed it back to the mother. The tool is really useful. (MW#3)

It is particularly useful for babies with tongue-tie to help document what the problems are for those babies. Also when

**Table 2**  
Change in scores for Bristol Breastfeeding Assessment Tool for some trial participants and for Breast feeding Self-Efficacy for all trial participants. (medians and inter-quartile ranges).

	Intervention group	Comparison group	p Values (Mann Whitney tests)
BBAT scores	n=15	n=16	
Five days to eight weeks	3 (2–4)	1.5 (1–2)	p=0.02
BSES self-efficacy scores	n=53	n=52	
0–5 days	9 (1.8–12.3)	1 (–4 to +7.5)	p=0.002
Five days to eight weeks	3 (0–13)	10 (2–18)	p=0.08

**Table 1**  
Internal consistency and correlations for Bristol Breastfeeding Assessment Tool (BBAT) and Breast feeding Self-Efficacy (BSES-SF).

	n	Cronbach’s alpha (95% CI)	Correlation (95% CI)	p Values
All BBATs for 5-item tool	206	0.558 (0.455, 0.647)		
All BBATs for final 4-item tool	206	0.668 (0.587, 0.736)		
BBATs for seven assessors	41		ICC: 0.782 (0.627, 0.877)	< 0.001
BBAT with BSES-SF	106		Pearson: 0.573	< 0.001



we have readmissions for weight loss the tool helps us with describing the problems during the assessment that we do (MW#7)

When asked about the comfort item of the tool they gave differing responses, which confirmed our decision to remove this item from the final tool and to recommend that discomfort and pain should be recorded separately:

The comfort element is slightly difficult as pain levels are different for different women. (MW#3)

## Discussion

A concise breast feeding assessment tool (BBAT) was developed and validated with a group of midwives. The tool has more explanation than other tools to remind those supporting breast-feeding women about the components of an efficient breast feed. Midwives were able to score a breast feed consistently and felt that it helped them with their advice to mothers about improving positioning and attachment to make breast feeding less painful, particularly with a tongue-tied infant.

The components of the tool are relevant for a wide age range of infants and are also sensitive to the subtle changes that are important for improving breast feeding following frenotomy. It is simple to use whilst giving details of positioning and attachment skills. The mother-reported comfort aspects of breast feeding are important, but less consistent results were shown when including them within the midwife-observed breast feeding assessment items of the tool, and we concluded that comfort should be recorded as a separate score linked to pain.

The BBAT showed strong correlation with breast feeding self-efficacy, indicating that a more efficient breast feeding technique is associated with increased confidence in breast feeding an infant. This suggests that those who get the technique correct when their infant is small may continue to breast feed exclusively for longer as it enhances their confidence. Blyth et al. (2002) and Baghurst et al. (2007) both showed that BSES at one week post partum was a strong predictor of breast feeding in first-time mothers. This was largely independent of other factors (intention, maternal education, smoking) which are usually indicative of breast feeding duration. They recommended that breast feeding self-efficacy should be used to identify women at risk of early cessation of breast feeding. Entwistle et al. (2010) also suggested that health professionals should take psychosocial aspects of breast feeding support that influence self-efficacy into account when counselling women.

Limitations of our study include the fairly small number of multiple comparisons between midwives, but these are similar in number to those reported by others in validating screening tools, including the LATCH and IBFAT (Riordan and Koehn, 1997). The relationships between BBAT and breast feeding duration and exclusivity should be explored in further research studies as our results were limited to those who had repeated observations within the frenotomy trial.

Lewallen (2006) reviewed instruments used to assess breast feeding in the early postpartum period that have been used to identify women at greatest risk of early breast feeding cessation. Many of the instruments were long and complicated to score; some were based on particular theoretical frameworks, on qualitative studies or derived from clinical care. She concluded that none of the questionnaires proved to be easy to use in the postpartum period to predict accurately which women needed breast feeding support and follow-up or to predict which women would stop breast feeding.

We suggest that the Bristol Breastfeeding Assessment Tool could be used generally by those observing breast feeding to

enable an accurate, rapid appraisal, and help to target breast feeding advice to those mothers acquiring early breast feeding skills or for those experiencing problems with an older infant. Accurate assessment is essential to ensure breast feeding efficiency is enhanced, and mother's self-confidence and exclusive breast feeding duration increased.

We also suggest that the BBAT could prove to be an effective tool for use in research studies where objective assessments of breast feeding may be required, especially when assessments might be performed by more than one assessor. However, further research should be done in a wider breast feeding population with larger numbers of multiple comparisons to establish its general usefulness.

## Conflict of interest

The authors declare no conflicts of interest.

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