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ABSTRACT

Breastfeeding and kangaroo care rates in neonatal units across the United Kingdom vary despite evidence for the clinical benefits. Clinicians have reported a need for evidence-based training to support parents with these practices. The aim of this study was to evaluate the Small Wonders Change Programme (SWCP), an intervention that aims to increase clinician knowledge and confidence to support parents in neonatal units to undertake breastfeeding and kangaroo care. Two neonatal intensive care units participated and 47 clinicians completed the Neonatal Unit Assessment Tool (NUCAT) pre and post-intervention. 18 of these clinicians also participated in a semi-structured interview to further explore the impact of the intervention on clinician's practice. Both clinician knowledge ($t(46)=4.61$, $p<=0.000$) and confidence ($t(46)=4.82$, $p<.000$) significantly increased following the intervention**.** Analysis of the interviews revealed that clinicians directly attributed subsequent individual and unit-wide change in practice to an increase in knowledge and confidence as a result of the intervention. This study suggests that a clinician focussed intervention can lead to positive changes in clinician confidence, knowledge and practice in supporting parents to undertake breastfeeding and kangaroo care in neonatal units.

Keywords: Intervention, knowledge, confidence, breastfeeding, kangaroo care, neonatal, positive touch, clinician

Introduction

Each year, 15 million births worldwide are preterm (World Health Organisation, 2015) and in the UK, over 80,000 infants are admitted to neonatal units due to prematurity or sickness (Bliss, 2015). Neonatal Intensive Care Units (NICU) are optimally designed to promote survival of critically ill, premature infants. Hospitalization of premature neonates in NICUs may lead to the family feeling isolated from their child, which can impact on parental-neonatal attachment (especially for mothers). Furthermore, factors, such as the technological complexity of facilities within NICUs and the neonates' appearance may lead to hesitation in family members and a lack of confidence in participating in feeding and caring for their baby while in the NICU (Cockcroft 2012; Riper 2001). Moreover, parents report that they would like more information and support with non-clinical issues like breastfeeding, breast milk expression and kangaroo care (POPPY Steering Group, 2009).

Formula feeding remains common despite significant evidence supporting substantial benefits of breast milk feeding for premature and sick infants. Breast milk can reduce the risk of; infection (Levy et al, 2009; Ip et al 2007; Schanler et al, 2011), suboptimal neurodevelopment (Roze et al, 2012) cognitive deficits (Anderson et al, 1999; Beaino et al, 2011), and developing type 2 diabetes (Horta et al., 2007). Breast milk feeding can also lead to earlier discharge from hospital (Shah et al 2006) and improve security of attachment, greater interaction and well-being (Tharner et al 2012) and has been linked to verbal IQ (Isaacs et al, 2010). Infants admitted to neonatal intensive care units may not experience kangaroo care, a method of caring for premature babies outside of the incubator. Kangaroo care has been shown to enhance parent-child attachment (Athanasopoulou & Fox, 2014) and is associated with reduced risk of mortality, nosocomial infection/sepsis and hypothermia, reduced length of hospital stay (Conde-Agudelo and Diaz-Rosello, 2014) and longer and more exclusive breastfeeding (Hake-Brooks and Anderson, 2008).

Despite evidence for improved outcomes among pre-term infants receiving breast milk and skin-to-skin contact, the rates of breastfeeding and kangaroo care in neonatal units in the UK vary. 46% to 80% of infants reported to receive some breast milk at discharge from hospital (Neonatal Audit Programme, 2014). In addition, around half of parents report having as much kangaroo care as they wanted although this ranged from 22% to 79% across units (Howell and Graham, 2011). Within the UK there is a strong emphasis on the family centred care within NICUs. Family centred care focuses on placing the needs of the infant in the context of the family and acknowledging the parents role in care provision, planning and decision making (Higman and Shaw, 2008). It is recognised that appropriately skilled clinicians within neonatal units have a key role to play in the provision of family centred care and more specifically in supporting parents to initiate and maintain breastfeeding and kangaroo care (Renfew et al, 2012). Recent studies have highlighted that nursing staff recognise that supporting breastfeeding is central to their role, and recognise breastfeeding as positive for both mother and baby (Myers and Rubarth, 2013; Wallace et al, 2013). However they report a poor understanding of the evidence base behind best practice and low confidence to support parents to breastfeed (Wallace et al, 2013). Similarly, lack of evidence based staff education (Higman et al, 2015) and clear guidance (Seidman et al, 2015) have been reported as key barriers for clinicians to support kangaroo care.

The Small Wonders Change Programme (SWCP) is multi-faceted designed to support parents of premature and sick babies to engage in their baby's care. The intervention was designed to achieve this both through a component for parents and a component for clinicians. The focus of this paper is on the clinician component of the intervention; designed to increase knowledge and confidence among clinical staff working on neonatal units (including neonatal nurses, nursery nurses, midwives, support workers & consultants), with a focus on breastfeeding practices, kangaroo care and positive touch. The aim of this study was to evaluate whether the SWCP intervention increased

clinician knowledge, confidence in their knowledge and confidence in their practice to support parents to engage in these practices.

Method

Ethical approval

Ethical approval for the study was obtained (reference no P31784).

Setting

The evaluation was undertaken in two neonatal units; Liverpool Women's Hospital (LWH) and Guy's and St Thomas Foundation Trust (GSTT).

The Small Wonders Change Programme Intervention

The SWCP is a complex intervention designed to support parents of premature and sick babies to engage in their babies' care. The clinician intervention comprises a DVD, workshop and the involvement of a SWCP facilitator. The DVD content was developed with families and experts in neonatal care, child development and nutrition and comprised of a series of short films that follow fourteen families on their journey from birth to one year. Topics covered by the DVD include the birth, first hours, expressing breast milk, holding the infant, the hospital stay, feeding independently, preparing for home, first months at home, twins/triplets and bereavement. Expert advice and examples of practice were included to build parental confidence. The DVD acted as a source of reference for nursing, medical and midwifery clinicians within the neonatal unit and as an educational tool for supporting parental engagement with their infant's care.

The DVD also formed the basis of a clinical training workshop aimed at driving changes in practice. The one day workshop was developed to provide enhanced education for multi-disciplinary clinicians and clips from the DVD were shown to highlight key learning points around the evidence

for, and practicalities of, supporting parents to express, transition to the breast as well as undertake kangaroo-care and positive-touch. The workshop also involved a series of hands-on activities, whereby clinical participants had the opportunity to practice what they had observed on the DVD through role-play. The workshop was an evolution of a one-day workshop that had been developed by the Yorkshire and Humberside Health Innovation Education Cluster (HIEC) during the piloting of the Small Wonders DVD.

Each unit receiving the intervention also had a SWCP facilitator (a trained neonatal nurse). The facilitator's role was to cascade the learning following the workshops and to continually encourage clinicians to implement the knowledge and skills developed as well as distribute the core messages of the programme to current and new clinicians.

Design

The staff evaluation study was a pre-post cohort intervention study. The data presented in this paper uses a within group design (matched pairs). This study utilised a long term follow-up (3 years).

Procedure

The SWCP workshops were delivered to clinicians between April 2012 & November 2012. Pre-intervention data was collected between December 2011 and April 2012 and post-intervention data between March 2015 and June 2015. All clinical staff (estimated at 117 at GSTT and 171 at LWH) were invited to take part in the evaluation study by the SWCP facilitator based at each hospital site. Clinicians completed pre- and post-intervention (3 years later) assessment of knowledge and confidence using the web-based Neonatal Unit Clinician Assessment Tool (NUCAT). All participants at post-intervention were invited to take part in a semi-structured

interview to explore how clinicians had applied the practices supported by the intervention into routine practice as well as their personal experience of the programme.

Participants

This study relates to the Forty-seven clinicians (see Table 1) that completed both pre and post-intervention NUCAT and therefore remained in the SWCP environment for the duration of the study period. Of these 47 clinicians, eighteen also took part in a follow-up semi-structured interview.

Table 1: Participant demographics and characteristics (n=47)

		Number (%)	*%*
Gender	Male	5	11
	Female	42	89
Age	20-29	6	13
	30-39	11	23
	40-49	18	38
	50 and over	12	12
Organisational role	Neonatal nurse	36	77
	Consultant	5	11
	Nursery nurse	3	6
	Midwife	2	4
	Clinical Support worker	1	2
Time as Registered Health Professional	Not registered	2	4
	2 - 5 years	6	13
	6 - 10 years	7	15
	11 - 15 years	6	13
	16 - 20 years	8	17
	More than 20 years	18	38
Worked in neonatal unit	2 years to less than 5 years	4	9
	5 years to less than 10 years	8	17
	10 years or more	35	74
Proportion of working week spent in direct care of babies & parents	0 to 24%	4	9
	25% to 49%	1	2
	50% to 74%	8	17
	75% or more	34	72
Most recent Neonatal Training	Never	2	4

	0-6 months	6	13
	6-12 months	14	30
	1-2 years	17	36
	2-5 years	7	15
	10 years or more	1	2
Most recent Breastfeeding	0-6 months	8	17
Training	6-12 months	20	42
	1-2 years	12	26
	2-5 years	7	15
Attended SWCP workshop	No	7	15
	Yes	40	85

Measures

The Neonatal Unit Clinician Assessment Tool (NUCAT, developed by Health Behaviour Research Limited in collaboration with Best beginnings) is an online tool that assesses clinician's knowledge and confidence to practice evidence based skills in breastfeeding, kangaroo-care, positive touch and the support of parents to engage in the care of their babies in the neonatal unit environment.

Knowledge was assessed through 36 multiple choice items focussed on the benefits of breastfeeding, physiology of lactation, breast milk expression, breastfeeding practices, kangaroo care and positive touch. A total knowledge score was calculated by the number of correct answers ranging from 0- 36. Individual subscales scores were also calculated.

Confidence was assessed using a nine item scale which assessed:

(a) *confidence in knowledge* of benefits of breastfeeding, physiology of lactation, breast milk expression, breastfeeding support, kangaroo care and positive touch.

(b) *confidence in practice* of breastfeeding support, kangaroo care and positive touch.

Rating scales from 1 (no confidence) to 10 (very confident) provided a total confidence score ranging from 9 to 90, as well as separate scores for confidence in knowledge (range from 6 to 60) and confidence in practice (range from 3 to 30).

Interview schedule

The semi-structured interviews aimed to further explore the impact of the SWCP on clinician's knowledge and confidence in practice amongst a subset of participants. Interviews were conducted over the telephone by research staff, audio recorded and transcribed verbatim. The mean duration of the interviews was 33 minutes (range 19 to 60 minutes).

Data analysis

NUCAT data was analysed using SPSS (Version 22) through a series of one-tailed paired sample t-tests based on the pre and post-intervention scores for (1) *Knowledge* - the total knowledge scores pre and post-intervention; each subsection of knowledge*;* and (2) *Confidence*- the total confidence scores; confidence in knowledge scores; confidence in practice score; each subsection of confidence in knowledge*;* each subsection of confidence in practice. Because of the large number of tests run Holm-Bonferroni sequential correction was applied (Holm, 1979).

Interview data was analysed using a ''Framework'' analysis approach (Ritchie and Lewis, 2003). The Framework approach was originally developed for applied qualitative research and the approach is now widely used within the UK. The name reflects the thematic framework, which is used to classify and organise data and which is individual to each study. The Framework approach has no allegiance to or is neither exclusively an inductive or deductive thematic analytical approach but rather dependent upon the research question (Gale et al 2013). In this analysis a deductive approach was taken that was guided by the content and purpose of the SWCP. Four transcripts (22%

of the transcripts) were analysed by three researchers independently and minor differences were resolved through discussion and mutual agreement. Once agreement was reached the remaining transcripts were analysed by one researcher.

Results

The majority of clinicians that took part in the research were female neonatal nurses (n=42, 89%), over one third had been a registered health professional for more than 20 years (n=18, 38%) and three-quarters had worked in neonatal units for 10 years or more (n=35, 74%). The majority (n=34, 72%) also spent 75% or more of their time in direct care of babies and their families. Forty participants had attended the SWCP workshops (85%).

Knowledge

Overall *knowledge* about breastfeeding and parental engagement (kangaroo care & positive touch) significantly increased from pre-intervention (M=26.60, SD=3.2) to post-intervention **(**M=28.66, SD=.3.0, *t*(46)**=**4.61, p=<0.05, r=0.7)**.** Specifically, clinicians were more knowledgeable about the *physiology of lactation* (pre M=5.23, SD=1.2, post M=5.64, SD=1.1, *t*(46)=2.23, p<.05), *breast milk expression* (pre M=5.23, SD=1.3, post M=5.81, SD=1.3, *t*(46)=2.49, p<.05) *breastfeeding practices* (pre M= 5.30, SD=1.2, post M=5.66, SD=1.2, *t*(46)=2.03, p<.05), *kangaroo care* (pre M=4.66, SD=0.9, post M=5.09, SD=0.7, *t*(46)=2.76, p<.05), *and positive touch* (pre M=2.45, SD=0.6, post M=2.72, SD=0.6, *t*(46)=2.46, p<.05), post the SWCP intervention compared with before. There was no significant change in knowledge of the benefits of breastfeeding following the intervention (see table 2).

Table 2: Clinicians' ratings of their knowledge, and each individual subscale of knowledge

	Pre-intervention (N=47)		Post-intervention (N=47)		
Category	**Mean**	**SD**	**Mean**	**SD**	**Adjusted P value**
Total knowledge	26.6	3.2	28.7	3.0	0.000
Benefits of breastfeeding	3.7	0.7	3.7	0.8	0.432
Physiology of lactation	5.2	1.2	5.6	1.1	0.048
Breast milk expression	5.2	1.3	5.8	1.3	0.040
Breastfeeding practices	5.3	1.2	5.7	1.1	0.048
Kangaroo care	4.7	0.9	5.1	0.7	0.024
Positive touch	2.5	0.6	2.7	0.6	0.040

The interview data revealed a belief that the SWCP enhanced knowledge around breastfeeding, kangaroo care and positive touch, reminded clinicians of the importance of these practices and expanded their understanding around the evidence behind these topics.

"I think it sort of boosted my knowledge and confidence in it, certainly the breastfeeding aspect, because it's one thing I always struggle with. I always feel like I've had a bit of a limited knowledge in that" (Participant R- Senior Staff Nurse; 7 years of experience)

Clinicians reported that the knowledge and evidence gained through the intervention provided them with key skills to support parents and also the confidence to share this knowledge with parents and colleagues. This had the impact of distributing new knowledge more widely across

the neonatal unit. The provision of an evidence base behind the practice was key to promoting self-efficacy in clinicians' ability to support parents.

"I found it kind of formalised some of the things I was already doing but gave me sort of more of a rationale that I could explain to parents and a bit more background to the benefits of what they were doing" (Participant P- Neonatal Sister; 8 years of experience)

The SWCP also reminded clinicians of why these practices were important in a neonatal unit setting and offered motivation to start (or continue) to ensure the practices were carried out. Clinicians reported that improvements in their understanding of the evidence behind the practices had a direct impact on their care for babies and parents and supported the implementation of breastfeeding or kangaroo care.

"I said that I was implementing the practice but obviously it just made me more aware of how important it is to get breastfeeding off to, often the best possible start of life if you lose that initial expressing you know in 6 hours and obviously it can diminish the mum's positive … you know, she won't be able to produce the milk that she needs to produce." (Participant C- Neonatal Nurse; 6 years of experience)

Clinicians also discussed how their learning had changed the way that they, or their colleagues, undertook practice on the unit, for example, offering skin to skin support to all parents and not just the ones breastfeeding. Additionally, not only did the SWCP change the way some clinicians implemented these practices but one participant felt it had changed the way she felt about breastfeeding.

"Maybe my colleagues didn't have the knowledge of how to start the expressing process but now obviously with the DVD and that, they can obviously work with that and obviously show mums how to do it. Rather than leaving it to the midwife to do." (Participant C- Neonatal Nurse; 6 years of experience)

"It's changed the way I look at breastfeeding so for me it's changed my whole attitude towards it, I wish I had my kids breastfed, none of them were but it's just changed my whole education and knowledge." (Participant G – Neonatal Nurse; 9 years of experience)

Confidence about knowledge and practice

Clinicians overall confidence increased from pre-intervention (M=68.7, SD=11.7) to post-intervention (M=74.2, SD=9.5, $t(46)=4.82$, $p<.05$, r=0.5).

Clinician *confidence in their knowledge* increased from pre-intervention (M=45.9, SD=7.8) to post-intervention (M=49.3, SD=6.2, $t(46)=4.36$, $p<.05$). Specifically, clinicians reported greater confidence in knowledge around the *physiology of lactation* (pre M=7.0, SD=1.9, post M=7.6, SD=1.6, $t(46)=2.92$, $p<.05$)**,** *breast milk expression* (pre M=7.7, SD=1.5, post M=8.3, SD=1.2, $t(46)=3.12$, $p<.05$) *supporting mothers to breastfeed* (pre M=7.7, SD=1.6, post M=8.1, SD=1.4, $t(46)=3.48$, $p<.05$), *kangaroo care* (pre M=8.0, SD=1.5, post M= 8.6, SD=1.4, $t(46)=3.88$, $p<.05$), *positive touch* (pre M=7.3, SD=1.7, post M= 8.1, SD=1.4, $t(46)=4.14$, $p<.05$)**,** and *benefits of breastfeeding* (pre M=8.3, SD= 1.6, post M= 8.6, SD=1.2, $t(46)=1.97$, $p=<.05$) post the SWCP intervention compared to before.

Clinicians *confidence in their practice* increased from pre-intervention (M=22.7, SD=4.4) to post-intervention (M=24.9, SD=3.8, $t(46)=4.85$, $p<.05$). Specifically, clinicians reported greater confidence in their practice of *supporting women to breastfeed* (pre M= 7.4, SD=1.9, post M=8.0,

SD=1.6, *t*(46)=3.07, p<.05)**,** *kangaroo care* (pre M=8.0, SD=1.6, post M=8.6, SD=1.5, *t*(46)=3.61, p<.05)**,** and *positive touch* (pre M=7.4, SD=1.9, post M=8.2, SD=1.7, *t*(46)=4.35, p<.05) (see table 3).

Table 3: Clinicians' ratings of their confidence, and each individual subscale of confidence

	Pre-intervention (N=47)		**Post-intervention (N=47)**		
Category	**Mean**	**SD**	**Mean**	**SD**	**Adjusted P value**
Overall confidence	**68.7**	**11.7**	**74.2**	**9.5**	**0.000**
Confidence in knowledge	**45.9**	**7.8**	**49.3**	**6.2**	**0.000**
Benefits of breast milk	8.3	1.6	8.6	1.2	0.025
Physiology of lactation	7.0	1.9	7.6	1.6	0.008
Breast milk expression	7.7	1.5	8.3	1.2	0.008
Breastfeeding support	7.7	1.6	8.1	1.4	0.006
Kangaroo Care	8.0	1.5	8.6	1.4	0.000
Positive touch	7.3	1.7	8.1	1.4	0.000
Confidence in practice	**22.7**	**4.4**	**24.9**	**3.8**	**0.000**
Breastfeeding support	7.4	1.9	8.0	1.6	0.008
Positive touch	7.4	1.9	8.2	1.7	0.000
Kangaroo Care	8.0	1.6	8.6	1.5	0.006

The interview data supported this finding and highlighted that clinicians felt that the SWCP enhanced or had an impact on their confidence around their own knowledge and practice. The knowledge gained enabled them to not only be more confident in their own knowledge but also confident in sharing that knowledge with other clinicians.

"Teaching, it's helped me teach a lot more because we have a lot of students and new staff and as I say I'm now one of the champions so I'm helping teach the new staff the way I now feel about it." (Participant G- Neonatal Nurse; 9 years of experience)

When talking about confidence clinicians mainly referred to an increase in their confidence to engage in conversation about and carry out these practices. In some cases this would be about developing their confidence in a task they already did by harnessing the knowledge they had gained. In other cases this was gaining the confidence to support parents with a practice they would have ordinarily relied on another clinician to carry out/ support.

"I think certainly at the time made me feel a lot more confident in what I was doing and gave me different strategies to use at a time when I was perhaps struggling to get babies latched or feeding" (Participant R- Senior Staff Nurse; 7 years of experience)

Discussion

The aim of this study was to evaluate if the SWCP intervention increased clinician knowledge, confidence in their knowledge and confidence in their practice to support parents to engage in breastfeeding practices, kangaroo care and positive touch within the neonatal intensive care environment. In addition, the interview component of the study aimed to explore the impact of the SWCP on clinician's knowledge and confidence and how this impacted on individual and unit-wide change and embedding into practice.

This evaluation demonstrated a significant increase in both knowledge and confidence following the SWCP intervention at the three year follow- up. The improvement in both clinician's knowledge and confidence was related to a range of topics related to breastfeeding, kangaroo care and positive touch, all of which are important practices in a neonatal intensive care setting. Interviews revealed that this increase in knowledge and confidence had a direct impact on the encouragement and uptake of these practices within the unit. Given the recognised short- and long-term benefits of breast milk for infants it could be suggested that optimising this training for clinicians who provide advice and support to parents is essential for the clinical outcome of the babies residing on NICU. The only area in which the clinicians did not improve was their knowledge of the 'benefits of breastfeeding', however this may reflect a ceiling effect as clinicians reported high knowledge of the benefits of breast-feeding prior to the intervention. It is often the case that health professionals providing care to breastfeeding women and their infants can cite the benefits of breastfeeding (Radzyminski and Callister, 2015) and feel most confident in their knowledge about the benefits of breastfeeding (Wallace et al, 2013). However there remains a gap between their knowledge of the benefits and actual clinical practice in promoting breastfeeding (Radzyminski and Callister, 2015).

The intervention incorporated a number of components and as a consequence of the multi-faceted nature of the intervention it is difficult to establish which aspects of the interventions were most effective in increasing clinician knowledge and confidence (Craig et al, 2006). However the collection of qualitative data, offers some insight into the wider experience of clinicians relating to each aspect of the intervention.

It is not clear from the quantitative analysis of this study whether increases in knowledge and confidence had a direct impact on clinician behaviour in supporting parents to breastfeed and engaged in kangaroo care. However, it has previously been shown that increasing knowledge and confidence impacts on the intention (Bernaix et al, 2010) and behaviour of clinicians to initiate and support breastfeeding and skin-to-skin contact (Cooper et al, 2014). However, the mixed methods approach demonstrated that clinicians felt the knowledge and evidence gained through the intervention provided them with key skills to support parents to engage in these practices and also the confidence to share this knowledge with parents and colleagues and carry out practices such as support with breastfeeding and kangaroo care.

This paper only refers to a smaller sub section of clinicians (26% of a total of 183 clinicians involved in the study at different time points) that completed both the pre and post-intervention knowledge and confidence assessments. Those who opted to complete the knowledge and confidence assessment at both time points may have felt their knowledge levels were good. There is some evidence to suggest that those who access training often report greater self-assessed knowledge (Wallace and Kosmala Anderson, 2007).

The long follow-up period of this evaluation study is advantageous in allowing assessment of change over time and of the embedded effects of the intervention, rather than only short-term effects on knowledge and confidence. However, it could also act as a potential confounder as there is little or no control of other influences to the environment that may have had an impact on knowledge and confidence. One way this was addressed in part was to only analyse the data from the clinicians that completed both pre and post intervention measures and who therefore had remained within the SWCP environment throughout the duration of the study.

Conclusion

The evaluation of the SWCP confirms the importance of supporting clinicians to enhance their knowledge and confidence around these key topics related to supporting parents to be engaged in their baby's care, as this has the potential to increase breastfeeding and parental skin-to-skin contact. Considering the worldwide figure of babies born prematurely each year (15 million, WHO, 2015), and the varied rates of breastfeeding and skin-to-skin contact in neonatal units throughout the UK (Neonatal Audit Programme, 2014) there is a significant need for evidence based interventions such as the Small Wonders Change programme. The Small Wonders Change programme has the potential to be applicable and replicable within other neonatal care units both nationally and internationally.

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