

**DOCTOR OF PHILOSOPHY**

**The development and evaluation of a breastfeeding training programme for healthcare professionals in China**

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# **The development and evaluation of a breastfeeding training programme for healthcare professionals in China**

By

**YUANYING MA**

**PHD**

**MAY 2015**



# **The development and evaluation of a breastfeeding training programme for healthcare professionals in China**

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**MAY 2015**

*A thesis submitted in partial fulfilment of the University's requirements  
for the Degree of Doctor of philosophy*



## **Abstract**

Breastfeeding is widely considered the healthiest way to feed an infant. Promoting breastfeeding and increasing breastfeeding rates has become a global strategy to improve children's health. However the latest rate of exclusive breastfeeding at six months in 2014 in China was 30% in rural areas and 16% in urban areas. Support from skilled practitioners can positively influence breastfeeding initiation rates, duration and women's breastfeeding experience.

This research aims to develop and evaluate a new breastfeeding training programme for professionals to improve support for breastfeeding mothers in China. Mixed research methods were used in the research which included qualitative and quantitative studies. Two qualitative studies provided the evidence for the importance of training professionals in two essential skills of positioning and attachment (P & A) and hand expression (HE). This study further applied a 15-minute breastfeeding DVD training intervention to train Chinese professionals in P & A and HE. At the meantime, the research developed two valid breastfeeding assessment tools, including knowledge assessment tool and confidence assessment tool. Two quantitative studies of the pilot study and RCT study evaluated the effectiveness of DVD training intervention on improving professionals' knowledge and confidence before and after DVD training by the two breastfeeding assessment tools. The findings in both studies indicated that the DVD training intervention significantly improve the professionals' knowledge and confidence in P & A and HE with a big effect size. The semi-structured interviews conducted after the RCT study showed the feasibility and applicability of DVD training for professionals in China.

This first evidence-based new training programme is likely to be widely implemented in China due to its effectiveness, convenience and ease of access. However, the long-term effectiveness of the DVD training at improving professionals' knowledge, confidence and breastfeeding outcome needs to be further examined in the future.

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## **Glossary of terms and acronyms**

**AICR** American Institute for Cancer Research

**ANOVA** Analysis of variance

**BFHI** Baby Friendly Hospital Initiative

**BSES** Breastfeeding Support Self-Efficacy Scale

**BMD** Bone mineral density

**BMI** Body mass index

**BfN** Breastfeeding Network

**CG** Control Group

**CGA** Control Group A

**CGB** Control Group B

**CI** Confidence interval

**CASP** Critical Appraisal Skills Programme

**CUBA** Coventry University Breastfeeding Assessment

**CU-BSES** Coventry University Breastfeeding Support Self Efficacy Scale

**DXY** Ting Ting Group

**EMS** Extended midwifery support

**GPs** General practitioners

**HCC** Health care center

**HBR** Health Behaviour Research Limited

**HE** Hand expression

**HELP** Hospital Education in Lactation Practices

**IBEED** Integrating Breastfeeding Education Eliminate Disparities

**IBCLCs** International Board-Certified Lactation Consultants

**IG** Intervention Group

**LAP** Lactation Advisor Program

**MOH** Ministry of Health of People's Republic of China

**MRC** Medical Research Council

**NEC** Necrotising enterocolitis

**NHFPC** National Health and Family Planning Commission

**NICU** Neonatal intensive-care unit

**NUCAT** Neonatal Unit Clinician Assessment Tool

**OR** Odds ratios

**PIS** Participants information sheet

**P & A** Positioning and attachment

**RCT** Randomized Controlled Trial

**RRs** Relative risks

**SPSS** Statistical Package for Social Science

**SSIs** Semi-structured interviews

**SMS** Standard midwifery support

**UNICEF** United Nations Children's Fund

**WCRF** World Cancer Research Fund

**WHO** World Health Organization

**WIC** Special Supplemental Nutrition



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# **Chapter 1 Literature review**

## **1.1 Introduction to the importance of breastfeeding for health**

### **1.1.1 Benefits for infants' health**

Breastfeeding is regarded as the best source of nourishment for the healthy growth and development of infants (World Health Organization and UNICEF 2003). There are immediate short- and long-term benefits for the breastfeeding infant based on strong, global evidence; therefore, breastfeeding has been regarded as one of the most important infant-feeding strategy by the WHO and UNICEF. It recommends initiating breastfeeding within an hour after birth, exclusively breastfeeding in the first six months and continuing breastfeeding up to two years old or longer (World Health Organization and UNICEF 2003). Since the 1960s there have been many publications worldwide related to the benefits of breastfeeding for infants' health. This review searched for keywords via CINAHL, MEDLINE, PsycINFO, Cochrane and Google Scholar. The key words included in the search were: breastfeeding, breast-feeding, infant feeding, infant fed, formula fed, formula feeding, bottle fed, bottle feeding, bottle fed and weaning, combining the different terms with outcomes (mortality, infective diseases, short-term benefits, long-term benefits, type-2 diabetes, blood pressure, intellectual performance, obesity and serum cholesterol).

To provide the best reliable evidence, this literature review was limited to include meta-analysis, systematic reviews and well-designed studies to describe the association between breastfeeding and health. Randomised controlled trials are recommended to provide the best evidence because they control the association between the exposure and outcomes and are less affected by the confounding variables (Chalmers 1998). Randomised controlled trials were rarely found in the review due to the ethics implications of controlling breastfeeding or not breastfeeding. Therefore, most studies are case-control studies and observational cohort studies, which meet scientific validity according to four important criteria for non-randomised studies set out by Bauchner et al. (Bauchner, Leventhal and Shapiro 1986). The criteria consisted of prospective

study, having a clear definition of breastfeeding, controlling for confounding variables and measuring the outcomes clearly. The strength of the protective effect of breastfeeding was associated with the length of exclusive breastfeeding (Duijts et al. 2010, Ladomenou et al. 2010, Quigley, Kelly and Sacker 2007).

Firstly, strong evidence was found in the literature that suggests breastfeeding reduces the risk of infant mortality. The latest meta-analysis of 11 studies from Khan et al. (2014) reported that both initiation of breastfeeding and exclusive breastfeeding were associated with the reduction of neonatal mortality in the first month. The risk of neonatal mortality for infants who initiated breastfeeding after one hour of birth was twice the risk compared to infants who initiated within one hour of birth. A significant lower risk of mortality was found for neonates who were exclusively breastfed in the first month compared with those who were partially breastfed (Khan et al. 2014). The negative correlation between breastfeeding within the first hour of birth and neonatal mortality was also reported in a health survey based on secondary data from 67 countries (Boccolini et al. 2013). One study explored the correlation between breastfeeding and risk of neonatal death for 1204 infants who died between 28 days and one year and 7740 children who were alive at one year as a control in the US. The findings showed that infants who had ever breastfed had a 21% lower risk of death in the first year compared with infants who had never been breastfed. If 70% of infants were ever breastfed in the US, it may avoid about 720 post-neonatal infant deaths each year (Chen and Rogan 2004). It is estimated that globally approximately 800,000 child lives would be saved each year if all children were fed according to the recommendation of the WHO and UNICEF (World Health Organization 2014).

A number of meta-analyses and systematic reviews have provided robust evidence for a negative correlation between breastfeeding and morbidity of infectious diseases. A number of studies have shown associations between breastfeeding and reduced gastro-intestinal infection (Duijts et al. 2010, Klement et al. 2004, Popkin et al. 1990, World Health Organization 2000), necrotising enterocolitis (NEC) (Klement et al. 2004, Minekawa et al. 2004), respiratory

infections (Ladomenou et al. 2010, Oddy et al. 2003, Wright et al. 1989), late onset sepsis in preterm babies (Khan et al. 2014), urinary tract infections (Hanson 2004, Levy et al. 2009, Mårild et al. 2004) and ear infections (Aniansson et al. 1994, Duncan et al. 1993, Ip et al. 2007). Globally, pneumonia is the leading cause of death among children under five years (with 1.384 million deaths) and diarrhoea the second leading cause of death (800,000) a year (Liu et al. 2012). The following paragraphs will discuss the evidence-base for the relationship between breastfeeding and reduced risk of gastrointestinal and respiratory infection (Abbott, Renfrew and McFadden 2006).

The United Kingdom Millennium Cohort Study explored the effect of breastfeeding on hospitalisation for diarrhoea and lower respiratory tract infection among 15,890 infants aged 0–8 months during 2000 and 2002. It was estimated that 53% of diarrhoea hospitalisations and 27% of lower respiratory tract infection hospitalisations could have been prevented by exclusive breastfeeding. The protective effect of breastfeeding disappeared after breastfeeding cessation. It suggested that exclusive breastfeeding in the first six months and prolonging breastfeeding plays a substantial role in the decline of hospital admissions (Quigley, Kelly and Sacker 2007).

Breastfeeding promotion is regarded as one of the most cost-effective interventions against death from diarrhoea among children under five years, based on the Lancet Child Survival series in 2003 (Jones et al. 2003). The components of breast milk, including anti-inflammatory factors, growth modulators, digestive enzymes and lactoferrin account for the protective effect from diarrhoea (Hayani et al. 1992). Antibodies (IgA) in the breast milk protected the infants who were exposed to pathogens against developing infection (Nathavitharana, Catty and McNeish 1994). The strength of the protective effect of breastfeeding against diarrhoea was associated with the length of exclusive breastfeeding (Duijts et al. 2010, Ladomenou et al. 2010, Quigley, Kelly and Sacker 2007). This is consistent with the finding from an observational cohort study that was one part of a large cluster-randomised controlled trial in Belarus that there was significantly lower morbidity of

gastrointestinal infection in 621 infants who were exclusively breastfeeding at six months compared to the morbidity of 2862 infants exclusively breastfeeding at three months (Kramer et al. 2003).

NEC is a gastrointestinal disease that mainly occurs among preterm infants. A prospective multicentre study analysed the risk factors of 51 preterm infants with NEC among 926 preterm infants with the same 28–36 weeks' gestation. The results suggested that preterm infants that were formula fed had 6–10 times the risk compared with preterms that were breastfed. A retrospective study compared the morbidity of NEC among three groups of preterm infants who were fed by exclusive breast milk (n=44), banked human milk (n=224) and formula (n=93) respectively (Huston et al. 2014). The findings reported that the rate of NEC in the exclusive breast milk group was significantly lower than in the formula feeding group. The morbidity of NEC plus significant gastrointestinal bleeding decreased for infants of exclusive breastfeeding compared with the other groups. Minekawa et al. (2004) investigated the reason for the protective and therapeutic effect of breast milk on preterms with NEC. It was found that the breast milk dramatically suppressed activation of IL-8, which is a pro-inflammatory cytokine that is known to play a crucial role in the pathophysiology of NEC (Minekawa et al. 2004).

A meta-analysis based on nine studies in developed countries found that infants who were formula fed were more than three times more likely to get severe respiratory tract illnesses resulting in hospitalisations than those who were exclusively breastfeeding for four months. It provided strong evidence of an association between breastfeeding and decreased incidence of respiratory illnesses by controlling the confounding factors of socioeconomic status and smoking (Bachrach, Schwarz and Bachrach 2003). Wright et al. (1989) reported that the duration of any breastfeeding was associated with a decreased morbidity of respiratory tract illness in the first year among 879 infants in the US by prospective data collection (Wright et al. 1989). The negative association between predominant breastfeeding within six months and hospital admission

for lower respiratory illness was also confirmed in a prospective birth cohort study of 2602 infants in Australia (Oddy et al. 2003).

The evidence described above presented the short-term benefits of breastfeeding for child health, mainly by showing the reduction in the mortality of infants and the morbidity of common infections. There are also potential long-term benefits of breastfeeding for the health of children. The WHO explored the long-term effects of breastfeeding on infants' health using two systematic reviews and meta-analyses based on the related literature published since 1966. Both the reviews tried to provide the most reliable evidence by controlling for various confounding factors and publication bias, assessing the heterogeneity of outcomes and using fixed or random-effects models.

In 2007, the review reported the long-term benefits for those who were breastfed, including lower total cholesterol and lower mean blood pressure, lower morbidity of type-2 diabetes and overweight/obesity and higher performance in intelligence tests, although the protective impact of breastfeeding on blood pressure was small (World Health Organization 2007). In 2013, the review of the WHO, using the same method, updated the evidence on the long-term health outcomes of breastfeeding for infants. It reported that there was no protection against total cholesterol level in the overall meta-analyses and that further studies were needed to identify the effect on diabetes. However, there was a significant impact of breastfeeding on reducing blood pressure, reducing overweight/obesity and increasing performance in intelligence tests, which were similar to the review in 2007 (World Health Organization 2013). Although small influences on decreasing blood pressure were reported in the two reviews above, another review from the US suggested the impact on the health outcome of this influence based on pre-2006 studies in developed countries. The effect of breastfeeding on blood pressure, although small, is vital for public health because 2 mmHg lower blood pressure can reduce the morbidity of hypertension by 17%, coronary heart disease by 6% and stroke by 15% (Ip et al. 2007).

The reviews for the long-term benefits of breastfeeding shown above were almost always based on observational studies. A large cluster-randomised controlled trial called “The Promotion of Breastfeeding Intervention Trial (PROBIT)” provided the most robust evidence for the long-term health outcomes of breastfeeding duration and exclusive breastfeeding by employing a randomised design, which is rare in the breastfeeding research (Patel et al. 2014). The study aimed to explore the effect of Baby-friendly Initiative (BFI) training on breastfeeding duration and exclusive breastfeeding and the long-term health outcomes in Belarus. It recruited 17,046 healthy mother-infant pairs in 31 hospitals, which were divided randomly into the experiment group of 16 hospitals with BFI training and the control group of 15 hospitals with routine breastfeeding training during 1996 and 1997 and included a long-term follow-up of 11.5 years. The results showed an increase in exclusive breastfeeding and breastfeeding duration in the BFI hospitals, which were associated with higher IQ scores achieved. However, there were no significant differences in BMI, dental health or blood pressure at 6.5 years old between the BFI and non-BFI hospitals (Kramer et al. 2007).

Likewise, no significant differences were found in the outcome measurements of obesity, insulin-like growth factor (IGF-1) level, which regulates growth, or cardiometabolic risk factors between BFI hospitals and non-BFI hospitals (Martin et al. 2014, Martin et al. 2013). The findings suggest that the increase in breastfeeding duration and exclusive breastfeeding did not significantly impact on the long-term health outcomes except IQ, when controlling for confounding factors such as birth weight and length, geographic region, hospital of birth, urban or rural living situations, number of siblings and maternal education.

In 2013, the WHO updated the results of the review of the long-term benefits of breastfeeding on children’s health, which showed no protective effect against total cholesterol (World Health Organization 2013). However, the study did not compare the differences between the breastfeeding children and non-breastfeeding children or any breastfeeding children because the study excluded all non-breastfed infants. Also, the initiation of breastfeeding was 95%

in Belarus, which makes it difficult to provide evidence for the long-term health benefits for breastfeeding children compared with non-breastfeeding children (Martens 2012). The long-term protective effects of breastfeeding may therefore have been underestimated in the study. It is still necessary to develop more studies to rigorously compare the health outcomes of breastfeeding compared with non-breastfeeding.

Although breastfeeding has been shown to have strong short-term effects on declining the morbidity of infections for infants, few studies have explored its long-term impact on infectious diseases. A prospective longitudinal study from the USA provides evidence for long-term effects, based on 1281 children from birth to six years old during 2005 and 2007. The study explored the risk of common infections including throat, respiratory tract, ear, urinary, pneumonia/lung and sinus infections among children with different initiation, exclusivity and duration of breastfeeding. The results by multivariable logistic regression reported no associations between breastfeeding and urinary tract, upper respiratory tract and lung infections when controlling for socio-demographic variables. But the possible protective effect existed for sinus, throat and ear infections for children beyond infancy who were breastfed (Li et al. 2014). It is still difficult to draw a conclusion for the long-term reduction of infectious diseases by breastfeeding.

The reliable results of a study are based on an appropriate sample size to identify the relationships and correlations and a well-designed methodology with effective controlling for various putative or substantial confounding. The effect of breastfeeding on reducing the risk of neonatal mortality, morbidity of infections and having long-term protective benefits for infants are more significant for a population than a small sample (UNICEF 2014). In the future, reliable studies need to be developed to further confirm the potential benefits of breastfeeding, such as reduction of cardiovascular disease in later life and childhood cancers, protective effects for dental health, regulating blood pressure, keeping good cholesterol levels and aiding neurological development.



### **1.1.2 Benefits for mothers' health**

The association of breastfeeding mothers with the reduction of breast cancer were first reported more than twenty years ago. Layde et al. (1989) found the evidence for a correlation between breastfeeding and reduction of the risk of breast cancer whilst controlling for the age of pregnancy and other potentially confounding factors (Layde et al. 1989). Another multi-centre trial in the USA explored the association between duration of breastfeeding and reduction of breast cancer among 14,000 women. The breast cancer risk was reduced by 11% among pre-menopausal women who breastfed their children for 4–12 months and reduced by 25% for those breastfeeding 20 months or longer (Newcomb et al. 1994). The protective effect of breastfeeding against breast cancer was also reported in a review based on 47 studies of breast cancer, controlling 15 various confounding factors that may affect the incidence of breast cancer. These studies covered 50,302 women with breast cancer and 96,973 women without the disease in 30 countries. The results confirmed the evidence of reducing the risk of breast cancer for women who breastfed their children and further explored the mechanism for the protective effect. Some hormones related to breast cancer were lower in breastfeeding mothers, which may account for the reduction in the risk of breast cancer. Moreover, breastfeeding is helpful in clearing the cells of DNA damage, which increases the risk of breast cancer in the body. Additionally, breastfeeding decreases the risk by decreasing the morbidity of obesity, which was one of the important risk factor for breast cancer (Hamajima et al. 2002). Therefore, exclusively breastfeeding within the first six months and continuing breastfeeding with complementary foods up to two years or longer is one of ten recommendations against breast cancer made by the American Institute for Cancer Research (AICR) and the World Cancer Research Fund (WCRF) in 2007 (Vergnaud et al. 2013). A recent review of existing studies from González-Jiménez et al. (2014) supports the evidence that more than six months of breastfeeding is beneficial to prevent breast cancer (González-Jiménez et al. 2014).

A strong association between duration of breastfeeding and reduced ovarian cancer incidence was reported in a population-based case control with 1092

cases and 1288 controls between 2001 and 2005 in Australia (Jordan et al. 2010). A case-control study during 1993-1999 in Hawaii and Los Angeles showed that breastfeeding reduced the morbidity of ovarian cancer and some classes of ovarian cancer (Tung et al. 2003). Most recent meta-analysis has reported an inverse linear relationship between breastfeeding duration and risk of ovarian cancer based on 19 studies. Odds ratios (OR) will decrease 0.98 for each increase of one month of breastfeeding duration and the highest decrease of OR was found in the breastfeeding duration of 8–10 months. Although the review controlled for confounding and publication bias, it did not compare the different effects of breastfeeding types, such as exclusive breastfeeding and mixed breastfeeding, against risk of ovarian cancer (Feng, Chen and Shen 2014).

There is still controversy surrounding the association between breastfeeding duration and the change of bone density. Sowers et al. (1993) explored the changes of bone density for 98 healthy breastfeeding mothers. The findings indicated that bone mineral density (BMD) in women who breastfed six months or longer was lower than the level of baseline of mothers at two weeks postpartum. Longer breastfeeding duration was associated with greater bone density loss. However, the level of BMD returned to baseline after 12 months postpartum. However, there is a limitation in the study, as it does not control other confounding variables, such as age, body size, physical activity and diet (Sowers et al. 1993).

Another study reported that no association was found between breastfeeding duration and bone density loss after adjusting for age. On the contrary, it was positively associated with higher bone density for breastfeeding mothers that breastfed for over eight months (Melton et al. 1993). A bigger sample of 308 mothers who exclusively breastfed their children and were followed up for one month after they stopped breastfeeding indicated a significant decrease of bone density in breastfeeding mothers in the first six months but this returned to higher levels than the baseline at 18 months (Polatti et al. 1999).

A recent prospective cohort study reported that pre-gestational BMI, contraceptive use, age and years of schooling were associated with the level of bone mineral density postpartum. There was a trend to bone loss in the first six months and recovery at 12 months postpartum when controlling the above confounding factors (Costa et al. 2012). In conclusion, although different measurements for outcomes were used, it is consistently seen that bone mineral density decreases in the first six months for breastfeeding mothers but it will recover to the baseline level later. However, there is insufficient evidence to conclude the time taken to recover bone density or if a higher level of bone density is achieved after weaning. More reliable studies and meta-analyses are necessary to provide more robust evidence.

## **1.2 Introduction to breastfeeding in China**

### **1.2.1 Breastfeeding in ancient and modern society**

#### **1.2.1.1 The importance of breastfeeding in traditional Chinese culture**

There has been more than 5000 years of history recorded in China. In this long history, breast milk was one of the most important forms of nutrition to bring up generations of Chinese children. The ancient medical books of China introduced the importance of breastfeeding and guidelines for breastfeeding duration. Sun Simiao was a notable doctor in the Tang Dynasty (AD 652) who wrote two medical books named “The Essential Recipes worth a Thousand Gold” and “A Supplement to Recipes worth a Thousand Gold”, which had a great impact on later generations’ health even after the Tang Dynasty. In the two books, breast milk was regarded as the best food for infants because he thought that breast milk’s nutritional elements were the same as a mother’s blood. If a baby was breastfed for a longer period, his personality would be affected by his mother. The baby who was breastfed by a healthy mother would be healthy and inherit his mother’s good personality including spirit, nature, virtue, emotion, mood, spirit and humour. Therefore, it was recommended that infants be fed on demand and at least 7–8 times a day in the first 1–2 months. Then, the frequency of breastfeeding could be every 3–4 hours and mothers may begin to consider weaning at 10–12 months old (Sun 1956). The physician Gong Ting

Xian (1522–1619), during the Ming Dynasty, suggested that the best time period for exclusive breastfeeding for a baby was 4–5 months. If a mother did not achieve enough breast milk, she should breastfeed her baby more frequently or gain breast milk from other mothers (Wen and Pan 2010).

As an agricultural country, breast milk was the unique safe food for infants without other substitutes being available in ancient society. If a mother could not provide breast milk for some reason, the infant would be at risk of malnourishment or death in poor and middle-class families. However, if it were born into a wealthy family, the infant would usually be fed by hiring a wet nurse. In the emperors' and aristocratic families, infants were more likely to be fed by wet nurses, as mothers hoped to avoid the contraceptive effects of breastfeeding and had as many infants as possible (Segawa 2008). The status of wet nurses was high and respected, especially if hired by the emperors' and aristocratic families. Therefore, it was not only an honour for women from poor families to be wet nurses but also a good chance to make money and frequently receive gifts for her family. Wet nurses became more and more popular and were a sign of wealth in the Min and Qing Dynasties (1400–1900) (Li and Zhu 2005). Wet nurses had been the main method of feeding infants whose mothers could not provide sufficient breast milk until the 1970s when formula was produced in China (Chang et al. 2000).

#### **1.2.1.2 Formula influenced the traditional feeding methods in modern society**

Formula began to be produced in the 1970s and has been widely spread both in rural areas and cities in China. Not only did it change the status of wet nurses, but also the wet nurses almost disappeared after the 1980s (Xu et al. 2009). Also, the breastfeeding rate had a rapid decline because a number of mothers had incorrect perceptions of formula nutrition. In a survey of infant-feeding methods of 2001 mothers with infants aged one year old from ten communities randomly selected in five provinces of China, 32% of mothers argued that the nutrition of formula was better than breast milk (Zhang, Hao and Wang 2004). Although the International Code of Marketing of Breastmilk Substitutes prohibits

any promotional activity by the manufacturers, 25% of mothers received gifts and 40% of mothers were given free samples, even in hospitals and BFI (Baby-friendly Initiative) hospitals (Yeong et al. 2014). An online report said that 40% of mothers in hospitals had been contacted by formula sellers directly and told the benefits of formula, such as helping children become much smarter and stronger (Tang 2013). The variety of advertisements for formula, such as enlarging the benefits of formula by calls for mothers, and offering samples and gifts all had an adverse influence on mothers' attitudes and the breastfeeding rate (Sun 2014, Wang et al. 2002).

However, a serious unsafe event regarding formula quality happened in China in 2008. Melamine-tainted milk powder led to six infant deaths and more than 300,000 infants suffered illness. Since then, mothers have increasingly realised the benefits of breast milk and the potential risks of formula to infants' health (Arnold 2014). Also, a rapidly increasing number of mothers are choosing to breastfeed their children and the number of wet nurses has been on the rise, with increases of approximately 20% each year in Shenzhen city, for mothers who cannot provide breast milk for their infants (Tang 2013). Still, a number of mothers who have had difficulties with breastfeeding choose formula feeding. The formula market has increased from about US\$1 billion in 2002 to US\$9 billion in 2013 according to UNICEF China (Chen and Lauria 2013). To buy much safer formula, imported formula has become increasingly popular in China in recent years, even leading to a shortage in Europe and the US. In 2013, Hong Kong had to set up a law for buying a maximum of two cans of formula to control the high demands from mainland China. If the people violate the regulation, they are fined US\$64,000 and are sentenced to two years in jail (Yeong et al. 2014). However, confidence in the quality of imported formula has been shaken after a 2013 recall of imported formula from New Zealand, which may have been contaminated by bacteria that can cause botulism (Anon 2013). There has been an increasing trend for breastfeeding infants due to worry about formula quality and the safety of infants.

### **1.2.2 Breastfeeding rate in modern China**

The People's Republic of China has a land area of about 9.6 million sq km with a population of 1.36 billion in 2013, making it the largest population in the world (National Bureau of Statistics of China 2014). The administrative division of China consists of 31 provinces with various economy levels and differences in culture. Generally, the people who are in the east of China are much wealthier than those in the west of China. Living standards in urban areas are higher than in rural areas. Thus, breastfeeding practices differ across China due to the geographic differences. Unfortunately, there have not been regular and reliable national surveys or reports of the breastfeeding rate published in China by the government. The breastfeeding rate in China has not been reported to the WHO's Global Data Bank on Infant and Young Child Feeding, which was developed in 1991 to monitor breastfeeding activities (World Health Organization 1991). A search including keywords breastfeeding rate, breast-feeding rate, infant feeding rate and China via CINAHL, MEDLINE, PsycINFO and Cochrane produced literature that mostly consisted of regional surveys. Also, very few studies in English were found and many were written in Mandarin. Furthermore, there are few studies published before 1990 because research papers are included in the Chinese database only after 1990 (Xu et al. 2009). Three Chinese academic journal databases – CNKI, Wanfang Data and Weipu Data – were used to search for supplementary references regarding the breastfeeding rate, factors influencing the breastfeeding rate and breastfeeding policy in China. Acknowledging these restrictions, the data based on national sample surveys or cohort studies shows a great change in the breastfeeding rate over the last forty years. Most studies explored the breastfeeding rate by dividing into rural and urban areas because of the diversity of economy and culture between rural and urban areas. Table 1.1 introduces the breastfeeding rates based on national sample surveys in China during 1983–2013.

It is important to introduce breastfeeding definitions applied in the following cited literature. In general, the definitions are consistent with criteria established by the WHO (World Health Organization 2008) as follows:

- *Exclusive breastfeeding*: Breastfeeding with no other food or liquid, other than medicine, vitamins and mineral supplements;
- *Full breastfeeding or predominant breastfeeding*: Infant is mainly breastfed but receives a small number of other foods, such as formula, liquids water or culturally valued supplements;
- *Any breastfeeding*: The infant has received breast milk with or without other formula liquids, or other solid food;
- *Formula feeding or bottle feeding*: Infant is only fed by formula and/or other supplements.

In the 1950s and 1960s, any breastfeeding rates were more than 80% both in rural and urban areas (Chen and Ji 1991). However, breastfeeding rates began to decrease due to the availability of formula in the 1970s, especially in large cities. This trend was described based on two studies, which were limited to the two big cities of Beijing and Tianjin, but the actual proportion of breastfeeding rate was not reported in the paper (Wang, Zhu and Tong 1991, Xu et al. 2009). The evidence of the change in breastfeeding rate was also cited by the latest review introduced the breastfeeding from 1950s to 2008 (Xu et al. 2009). There was no national survey regarding the breastfeeding rate published before the 1970s.

During 1983–1985, a national assessment of breastfeeding rates was conducted by the Ministry of Health in China, which was one of the projects launched by the WHO among nine countries to investigate breastfeeding patterns in 1970. The survey explored 42 items of breastfeeding, including feeding methods and factors influencing breastfeeding success, among 95,578 infants aged 0–6 months with 62,167 in urban areas and 33,411 in rural areas in 20 provinces across China. The findings reported that the rate of exclusive breastfeeding was 42.5% in urban areas and 69.9% in rural areas at four months, and 34.4% in urban areas and 60.4% in rural areas at six months. The rate of exclusive breastfeeding in rural areas was significantly higher than urban areas both at four months and six months. The rate of formula feeding in infants under six months old was 15.0% in urban areas and 1.8% in rural areas,

showing a significant difference (Yun et al. 1989).

There have been more national surveys and regional research developed to investigate the breastfeeding rate since the 1990s. A national cross-sectional survey in 1992 of 177,163 infants aged 0–3 months reported the rate of full breastfeeding was 21.1% and 37.6% at one month in urban areas and rural areas respectively. The rate of full breastfeeding at three months decreased to 14.3% in urban areas and 24.3% in rural areas (Chang et al. 2000). A large-scale survey was conducted by UNICEF and the Chinese Ministry of Health in 1998, aiming to investigate the feeding practices of China and develop strategies for child malnutrition in rural areas. The survey reported the rate of any breastfeeding and exclusive breastfeeding was 98.22% and 24.35% respectively at four months among 20,915 children aged 0–24 months. The highest rate of exclusive breastfeeding was Shanxi Province with 37.65% and the lowest rate was in Xinjiang Province with 9.95%. It indicated a range of breastfeeding rates in China due to the diversity of economy, ethnicity and culture (Wang, Wang and Kang 2005).

The breastfeeding rate has been still at a low level similar to the 1990s since 2000. In 2001, a cross-sectional study by Kang et al. explored the breastfeeding status of 14,077 children aged 0–3 years old in rural areas of western China (Kang et al. 2007). The findings showed that, under six months old, the rate of any breastfeeding, exclusive breastfeeding and predominant breastfeeding was 96.5%, 11.4% and 22.0% respectively. However, there may be recall bias in this study because the survey was completed by mothers' memory, which may be unreliable, especially with children aged three years old. In 2002, a cross-sectional study aimed to investigate Chinese national nutrition and health for 6858 children aged 0–3 years old across 31 provinces in China. It was reported that the full breastfeeding rate under four months was 71.6% with 65.5% in urban areas and 74.4% in rural areas. The any breastfeeding rate was 94.6% with 92.5% in urban areas and 95.6% in rural areas at four months. However, the study did not explore the rate of exclusive breastfeeding (Lai et al. 2006). A recent cross-sectional survey based on communities in 26 poor and rural



counties in 12 western provinces explored the breastfeeding practices among 2354 children aged 0–2 years in 2010. The rate of any breastfeeding and exclusive breastfeeding was 98.3% and 28.7% respectively. The early initiation breastfeeding rate within one hour after birth was 59.4%, which was the first reporting of the initiation rate within the first hour in a national survey of China (Guo et al. 2013). The latest report for the rate of exclusive breastfeeding at six months was 30% in rural areas and 16% in urban areas, according to the data from the National Health and Family Planning Commission (NHFPC) in 2014 (Arnold 2014).

As the current study was mainly undertaken in Zhejiang Province, it is necessary to introduce the breastfeeding rate in Zhejiang Province. It is located in the southeast of China with an area of 101,800 sq km and a population of 54 million. It has been a developed province in the past thirty years since the reform and opening-up policy in 1978. In 2013, the per capita GDP was US\$11,054, which ranked it the fifth most economically successful province of China (Zhejiang Provincial Bureau of Statistics 2014). In 1998, the rate of any breastfeeding and exclusive breastfeeding was 97.51% and 19.02% respectively at four months in Zhejiang Province, according to the national survey described above (Wang, Wang and Kang 2005). Qiu et al. (2009) conducted a series of studies regarding breastfeeding practices in the city of Hangzhou, in a suburban area of Fuyang, and in the rural area of Jinyun all in Zhejiang Province (Qiu et al. 2009). A longitudinal cohort study among 1520 infants reported that 96.9% of mothers in Zhejiang breastfed their infants in hospital, with 33.4% of infants being breastfed within 30 minutes after birth during 2004 and 2005. The exclusive breastfeeding rate at discharge from hospital was 50.3% (38% in the city, 63.4% in the suburban area and 61.0% in the rural area). However, the rates of exclusive breastfeeding had a rapid decrease during 1–6 months. At one month, the rate of exclusive breastfeeding was 24.4%, 47.0% and 42.7% in the city, suburban area and rural area respectively, 5.5%, 16.1% and 18.3% at four months, and 0.2%, 0.5% and 7.2% at six months. At six months, the any breastfeeding rate was 62.8% in the city, 76.9% in the suburban area and 83.6% in the rural area (Qiu et al. 2008b).

Generally, the breastfeeding rate in the rural area was higher than in the city in Zhejiang Province. The most recent retrospective study reported the rate of exclusive breastfeeding to be 23% at six months among 1277 infants in 12 cities of Zhejiang Province, China. This indicates that an increase in the breastfeeding rate has occurred over the past ten years (Qiu et al. 2014).

There has been a rapid decline in the breastfeeding rate since the 1950s, which has stabilised at a low breastfeeding rate not only in the Zhejiang Province but also across China. The rate of change was shown in three national cross-sectional surveys aiming to investigate the feeding practices and growth of children under seven years of age in nine cities representing the north, middle and south of China conducted in 1985, 1995 and 2005 respectively. The rate of exclusive breastfeeding at 1–6 months was 33.6% in 1985, 53.5% in 1995 and 32.8% in 2005 in urban areas, and 60.2% in 1985, 63.1% in 1995 and 42.5% in 2005 in rural areas. The rate of any breastfeeding at 1–6 months was 77.0% in 1985, 86.2% in 1995 and 79.9% in 2005 in urban areas, and 93.3% in 1985, 88.7% in 1995 and 84.4% in 2005 in rural areas. The results showed a decreasing trend for breastfeeding, but there was a higher rate of exclusive breastfeeding and a lower any breastfeeding rate compared with the other studies above. Also, it suggested that both the breastfeeding rates were the highest in 1995 and there was a higher rate of exclusive breastfeeding in urban areas than in rural areas (Zhang, Li and Xia 2008).

In conclusion, the rate of exclusive breastfeeding in China at six months of age has decreased significantly from over 80% in the 1960s into 30% in 2014, although there are variations in the breastfeeding rate due to marked regional diversity and the different samples recruited in the studies in China. Generally, there is a higher rate of exclusive breastfeeding in rural areas than in urban areas for infants under six months. The any breastfeeding rate ranged from 62.8% to 98.22% based on the above studies over the past forty years. However, the rate of exclusive breastfeeding at six months was low. Therefore, it is important to look for the factors that influence the rate of exclusive breastfeeding. Also, it is necessary to investigate the regional factors influencing the breastfeeding rate

in order to establish effective interventions to suit the geographic diversity in culture and economy in China.

**Table 1.1 Breastfeeding rates in China during 1983–2013**

Study year	Study method	Study samples	Breastfeeding Rates	
			Rural areas	Urban areas
1983–1985 (Yun YP 1989)	Prospective survey	95,578 at 0–6 months in 20 provinces	Exclusive BF: 69.9% at four months; 60.4% at six months	Exclusive BF: 42.54% at four months; 34.4% at six months
1992 (Chang et al. 2000)	Cross- sectional survey	177,163 at 0–3 months	Full BF: 37.6% at one month; 24.3% at three months	Full BF: 21.1% at one month; 14.3% at three months
1998 (Wang, Wang and Kang 2005)	Retrospective study	20,915 at 0–24 months in 105 counties of rural areas	Exclusive BF: 24.35% at four months Any BF: 98.22% at four months	
2001 (Kang et al. 2007)	Cross- sectional survey	14,077 at 0–3 years old in western of China	Exclusive BF: 11.4% at six months Predominant BF: 22.0% at six months Any BF: 96.5% at six months;	

**Table 1.1 Breastfeeding rates in China during 1983–2013 (continued)**

Study year	Study method	Study samples	Breastfeeding Rates	
			Rural areas	Urban areas
2002 (Lai et al. 2006)	Cross-sectional survey	6858 at 0–3 years in 31 provinces	Predominant BF: 74.4% at four months Any BF: 95.6% at four months	Predominant BF: 65.5% at four months Any BF: 92.5% at four months
2004–2005 (Qiu et al. 2008b)	Longitudinal cohort study	1520 infants at 0–6 months in Zhejiang Province	Exclusive BF: 61.0% at discharge from hospital; 42.7% at one month; 18.3% at four months; 7.2% at six months Any BF: 83.6% at six months	Exclusive BF: 38.0% at discharge from hospital; 24.4% at one month; 5.5% at four months; 0.2% at six months Any BF: 62.8% at six months

**Table 1.1 Breastfeeding rates in China during 1983–2013 (continued)**

Study year	Study method	Study samples	Breastfeeding Rates	
			Rural areas	Urban areas
1985, 1995, 2005 (Zhang, Li and Xia 2008)	Cross-sectional survey	49,903 at 1–6 months in 9 cities in 2005*	Exclusive BF at 1–6 months: 60.2% in 1985; 63.1% in 1995; 42.5% in 2005; Any BF at 1–6 months: 93.3% in 1985; 88.7% in 1995; 84.4% in 2005	Exclusive BF at 1–6 months: 33.6% in 1985; 53.5% in 1995; 32.8% in 2005; Any BF at 1–6 months: 77.0% in 1985; 86.2% in 1995; 79.9% in 2005
2010 (Guo et al. 2013)	Cross-sectional survey	2354 at 0–2 years old in 26 poor counties of 12 western provinces	Exclusive BF: 28.7% at 0–6 months Any BF: 98.3% at 0–6 months	
2013 (Qiu et al. 2014)	Retrospective study	1277 infants in 12 cities of Zhejiang Province	Exclusive BF: 23% within six months**	

\*There was no number described in the literature for the 1985 and 1995 samples.

\*\* The rate of exclusive breastfeeding was for both rural and urban areas. The study did not divide into two groups

### **1.2.3 Government policy regarding breastfeeding in China**

In response to the rapid decline in the breastfeeding rate described in the previous section, the Ministry of Health of the People's Republic of China (MOH) has paid attention to the importance of the nutrition of children and has set targets for increasing the breastfeeding rate. The National Program of Action for Child Development in China (1992) set the first national breastfeeding target, which was for 80% of infants to be exclusively breastfeeding at 4–6 months in each province by 2000 (Ministry of Health of People's Republic of China 1992). This programme was also a promotion to achieve the global aims developed in the “World Declaration on the Survival, Protection and Development of Children” in 1990 by the United Nations (UNICEF n.d.). Since then, the MOH has set new aims for the development of children every ten years. In 2002, the aim for the breastfeeding rate was 85% by 2010 in the National Program of Action for Child Development in China (2001–2010) (Ministry of Health of People's Republic of China 2002). However, the type and time for this breastfeeding rate was not explained specifically in the programme. In 2011, the latest National Program of Action for Child Development in China (2011–2020) set the target of 50% exclusive breastfeeding at 0–6 months by 2020 (The State Council of People's Republic of China 2011). The target for the breastfeeding rate set up by the government in China shows a declining trend due to the difficulty in achieving high rates.

The key strategy adopted by the Chinese government to achieve the breastfeeding targets was to introduce Baby-friendly Hospital Initiative (BFHI) accreditation to China in 1992 (Huang 1994). The BFHI (also known as Baby-friendly Initiative or BFI) is a global effort launched in 1991 by the WHO and UNICEF to implement practices that protect, promote and support breastfeeding. The “Ten Steps” are the main regulations that the BFI hospital should abide by, which consist of various strategies, including a policy of promoting breastfeeding in the hospitals, supporting breastfeeding mothers, training staff on the knowledge and skills of breastfeeding, and having no formula, feeding bottles or teats in hospitals. More than 15,000 hospitals in 134 countries have been

awarded the BFI status, and more than 7,300 BFI hospitals are in China, accounting for almost half the total accredited hospitals (The National Health and Family Planning Commission of the People's Republic of China 2014, UNICEF. 2005). In Zhejiang Province, the Health Bureau encouraged more hospitals to be awarded BFI accreditation by making this a precondition for applying for secondary hospital or higher-level hospital status. In China, hospitals are divided into three levels, first-class hospital, second-class hospital and tertiary hospital, and a higher class represents a higher quality of clinic (Yang and Lin 1995). The total number of BFI hospitals in Zhejiang Province has not been reported by the government.

For the promotion and protection of breastfeeding, “The International Code of Marketing of Breast milk Substitutes” was established in 1981 in the 34th World Health Assembly (World Health Organization 1981). It stated that the governments should set up legislation to prohibit the advertisement of breast milk substitutes and promotional activities in public and maternity services systems. In 1995, the Ministry of Health of the People’s Republic of China published the “Breast Milk Substitutes Sales Management Regulation”, according to the international standards. The legislation prohibits activities to promote formula sales, including any advertisement of formula in public areas and in hospitals, contacting the mothers directly, any promotional activities, such as gifts and free samples to mothers, and giving misleading information to mothers. The relevant departments have done a lot of work to apply the legislation, including advocating for the policy by radio, newspapers and television, controlling promotional activities of formula sales in hospitals, and auditing the substitutes’ manufacturers if they violate the regulations (Ministry of Health of People's Republic of China 2004). The “Strategy for Infant and Child Feeding” was published in 2007 to provide scientific feeding guidance for professionals and mothers in China. The strategy is consistent with the guidelines of the “Global Strategy for Infant and Young Child Feeding” (Saadeh 2003). Additionally, the government broadcasts the benefits of breastfeeding via radio, television and newspapers during “World Breastfeeding Week” (1st–7th August) each year across China (Ministry of Health of People's Republic of



China 2007).

#### **1.2.4 Factors influencing breastfeeding rate in China**

This section of the review aims to explore the main factors influencing the historical changes in breastfeeding rates in China. In the 1970s, the breastfeeding rate decreased due to the widespread introduction of formula (Wang, Zhu and Tong 1991). In the 1980s, many women had more chance to go to work, especially in the city, since the reform and opening-up policy, which was the most important policy in China to promote economic by free market principles and open up the country to foreign investment. Working women had limited time to feed their children, which led to lower milk production as a result of less frequent infant sucking and stimulation. This was also a reason for the higher rate of exclusive breastfeeding in rural areas because more women in cities worked than in rural areas. Secondly, mothers who lacked knowledge about the advantages of breast milk chose formula feeding because they disliked or felt uncomfortable breastfeeding (Liu, Lin and Liang 1999).

The main reasons for the low rate of exclusive breastfeeding in the 1990s were different from the 1980s, because the BFHI supporting breastfeeding was introduced in 1992. Accredited BFI hospitals are required to adopt rooming-in of mothers and infants, which is crucial to support breastfeeding. Before the BFI policy was applied in China, it was routine practice in many hospitals that mothers were separated from infants after birth, which reduced their chances to breastfeed and meant mothers could not feed on demand (Yun et al. 1989). Mothers now receive more education on breastfeeding from professionals than before and improve their knowledge about the benefits (Ministry of Health of People's Republic of China 1992, UNICEF 2005). In Beijing, the proportion of mothers who ceased breastfeeding because they disliked it decreased from 32–35% before the BFI (1989–1991) to 13.5% after the initiation of BFI standards (1995–1998) (Liao 2000, Liu, Lin and Liang 1999).

Since the 1990s, a number of studies have explored the factors associated with mothers' reasons for not breastfeeding or stopping breastfeeding early. The

factors were different in rural and urban areas, as expected given the differences in breastfeeding rate. The main reasons included insufficient breast milk, returning to work, traditional perceptions, delivery hospitals with different maternity services for mothers, and illness of mothers and infants. The following sections discuss these reasons in more depth.

***Insufficient breast milk:*** Insufficient breast milk is one of the main reasons given by mothers for shorter than intended duration of breastfeeding or not exclusively breastfeeding for the first six months (Lai et al. 2006, Liu et al. 2013, Qian et al. 2012, Wang et al. 2013). A review of the literature regarding breastfeeding practices in China before 2008 reported that insufficient milk was regarded as the most common reason for unsuccessful breastfeeding by mothers (Xu et al. 2009). Studies conducted in Tibet, Hubei Province and Xian city, Nanjing city all suggested that deficiency of breast milk is the main reason for discontinuing exclusive breastfeeding (Dang et al. 2001, Tian and Xie 2003, Wang, Xu and Mei 2000, Xiang et al. 2001, Xiang et al. 2001, Xiang et al. 2001). Another cohort study undertaken in Hangzhou, a city of Zhejiang Province, reported that 91% infants were “ever breastfed”, but the rate of exclusive breastfeeding was only 36% at discharge from hospital. This study also suggested insufficient breast milk is one of the crucial factors affecting the rate of exclusive breastfeeding before discharge (Qiu et al. 2007). A recent retrospective study of 1277 infants in the 12 cities of Zhejiang Province indicated the highest proportion of “topping up” with formula occurred in the third day after birth with 19% of mothers being afraid of insufficient breast milk without objective assessment (Qiu et al. 2014).

Physiological factors, psychological factors and the breastfeeding skills of positioning and attachment have been suggested to account for the phenomenon of insufficient breast milk (Maria 2012, World Health Organization and UNICEF 1989, Xu et al. 2009). Actually, according to the evidence of the WHO on promoting and supporting breastfeeding, true physiological failure to produce enough milk is rare; most insufficient breast milk is due to psychological factors, such as anxiety about inadequate breast milk (World Health

Organization and UNICEF 1989). Lack of confidence is one of the main reasons, according to the findings that 51.7% mothers in Hubei Province and 66% mothers in Kunming city added complementary foods due to worrying about their milk supply. Giving these foods, such as glucose, herbal teas, water and formula, to the infants also contributes to the decline of the supply of breast milk due to the decreased times of sucking and stimulation on the breasts, especially in the first days after birth (Chen and Hu 1998, Wang, Xu and Mei 2000). In a longitudinal study of infants' first feeds in Hangzhou, 26% of infants were given formula, water or other foods as their first feed (Qiu et al. 2007). Additionally, breastfeeding skills are important to achieve sufficient breast milk, including skin-to-skin contact in the first hour after birth, correct positioning and attachment to transfer breast milk efficiently and frequent feeding stimulating the secretion of prolactin (Maria 2012, World Health Organization and UNICEF 1989).

**Returning to work:** In China, the length of maternity leave is 98 days with an extra 15 days for dystocia and C-sections, according to administrative regulations of 2012 (The State Council of People's Republic of China 2012). The short duration of maternity leave was one of the main reasons contributing to working women failing to exclusively breastfeed in the first six months (Li 2014, Qiu et al. 2010, Wang, Zhu and Tong 1991, Wang et al. 2013, Yang et al. 2012, Zhang, Hao and Wang 2004). Furthermore, many companies in metropolitan cities provide less time for maternal leave than the legislation requires. In Zhongshan city, Guangdong Province, the average length of maternity leave is only 67 days by Gu (Gu 2003). The lack of private rooms to breastfeed and support for mothers with the skills of expressing breast milk also account for failure to continue breastfeeding after returning to work. Only 2.6% of companies provide breastfeeding rooms for working mothers in Guangdong Province. A recent cohort study of 368 working mothers who completed questionnaires about the reasons for stopping breastfeeding explored the factors associated with successful breastfeeding based on four communities in Shanghai (Huang et al. 2014). The mean time of exclusive breastfeeding was four months and the main reasons stated for ceasing breastfeeding after

returning to work were insufficient milk and work stress. This suggests that mothers lacked the opportunities or skills to maintain their milk supply by expressing breast milk when they were separated from their infants.

***Traditional perceptions:*** Traditional feeding practices, such as giving sugar water and herbs to neonates and adding complementary food within the first six months, still occur, especially in rural and poor areas. These incorrect perceptions of feeding and incorrect practices have had a strong adverse impact on the rate of exclusive breastfeeding (Hsiung 1995, Hua et al. 2010, Qiu et al. 2009, Wang, Wang and Kang 2005). The traditional practices were correlated with the demographic of mothers, such as education level, ethnicity and economic status. Those who had a lower level of education and lower income family were more likely to be affected by incorrect traditional perceptions (Shi et al. 2008, Zhao et al. 2006). The Chinese National Nutrition and Health survey reported that, in 2002, 53.1% of infants in rural areas and 38.8% in urban areas were fed with sugar water for their first feed (Lai et al. 2006). Mothers who had a higher education were more likely to be free from traditional beliefs and more likely to have up-to-date breastfeeding knowledge. Educating mothers about exclusive breastfeeding in the first six months of infancy and skills from professionals were recommended for mothers, especially in rural areas (Hua et al. 2010, Wang et al. 2013). One study reported that postpartum support for breastfeeding skills, including skin-to-skin contact, positioning and attachment, were positively correlated with the duration of exclusive breastfeeding when controlling for demographic confounding factors (Hua et al. 2010).

***Delivery hospitals:*** One study explored the impact of various factors on the rate of exclusive breastfeeding in poor areas of China by analysing 8673 infants in the system of nutrition and health monitoring of children under two years old, covering 30 counties in 13 provinces of China in 2007–2009. It suggested that the delivery hospital was one of the important influences on the success of exclusive breastfeeding in the first six months (Qian et al. 2012). A 2010 survey of 2354 children aged 0–2 years in 26 rural counties from 12 western provinces of China reported that the infants delivered in higher-level hospitals were more

likely to be successfully exclusively breastfed during the first six months (Guo et al. 2013). This was thought to be due to the different maternal services provided in the delivery hospitals, such as breastfeeding policy, breastfeeding practices on skin-to-skin contact and support with positioning and attachment (Guo et al. 2013, Qian et al. 2012, Wang, Gou and Zhang 2002). If a baby were born in a BFI-accredited hospital, it would be more likely to be breastfed exclusively. The “Ten Steps” policy of BFI hospitals supports mothers with breastfeeding, which makes them more likely to succeed in exclusive breastfeeding. Prohibiting the use of bottle and formula feeding without medical evidence in hospital were beneficial for achieving exclusive breastfeeding in BFI hospitals (Wang et al. 2002). Additionally, there were different level of skills among professionals in supporting mothers to overcome various problems during breastfeeding, which would affect the exclusive breastfeeding rate in different hospitals (Qiu et al. 2008b).

The rate of caesarean sections (C-sections) in hospitals influenced the breastfeeding rate. A higher rate of C-sections in a hospital leads to a lower rate of exclusive breastfeeding at discharge (Qiu, Lu and Li 2004). The rate of C-sections in China has increased from 0.9% in 1971–1980 to 20.2% in 2001–2002 and to 46.2% in 2007–2008 (Guo et al. 2005, Lumbiganon et al. 2010). The high rate was reported in a cohort study among 1517 mothers in Zhejiang Province in 2004–2005 with 76% being in the cities and 53% in the rural areas (Qiu et al. 2008a). Having a C-section was one of important factors contributing to increased formula use in the first days after giving birth.

A prospective study explored the difference in breastfeeding rates and prolactin levels 6–24 hours after delivery of 301 mothers that had had C-Section deliveries and 301 mothers that had had vaginal deliveries (Wang et al. 2006). The results suggested the mean prolactin level in the C-section group was significantly lower than in the vaginal group. The median time from delivery until breastfeeding initiation was 2 hours in the vaginal group and 12 hours in the C-section group. Also, the rate of exclusive breastfeeding in the C-section group was significantly lower compared with the vaginal group at both one month and

six months.

Other studies have consistently shown that having a C-section is a risk factor for reducing the breastfeeding rate (Guo et al. 2013, Ma et al. 2009, Zhang and Wang 2000, Zhang, Wan and Pu 1998). A cohort study in Zhejiang Province reported significant lower rate with 35.8% of exclusive breastfeeding at discharge from hospital among women who had had a C-section, compared to 45% for those that had a vaginal delivery. The study explored the reasons for the effect of a C-section on breastfeeding practice and indicated that mothers' discomfort, including wound pain and difficult movement due to catheterisation, resulted in late initiation of breastfeeding and topping up with formula. It suggested that encouraging mothers to have skin-to-skin contact with infants as soon as possible and initiating breastfeeding with support from professionals on positioning and attachment is helpful for successful exclusive breastfeeding in the first days after a C-section.

Additionally, mothers are worried about the effects of medicine on breast milk because they are routinely treated by medicines, such as antibiotics to prevent from infection, in China (Qiu et al. 2008a). It is indicated that professionals should try to choose medicine that is safe during breastfeeding according to the guidelines about breastfeeding and mothers' medication from the WHO in 2002; mothers should also be informed about the safety of the medication for breastfeeding at the same time (World Health Organization and UNICEF 2002).

***Illness of mothers and infants:*** A number of surveys have reported on how the health of mothers and infants is associated with the rate of exclusive breastfeeding, based on the views of mothers. The illness of mothers or infants ranked the second reason in Shanghai (Shen 2001, Wu, Zhou and Zhu 2001, Zhou 2001), Kunming (Chen and Hu 1998) and third reason in Beijing (Liao 2000, Liu, Lin and Liang 1999) and Jiangsu for ceasing breastfeeding or using substitutes during treatments. The main illnesses of mothers included hepatitis B, various infections, HIV and common breastfeeding problems of sore nipples, mastitis and abscesses (Wang et al. 2013, Xu et al. 2009). Infants' illness

included diarrhoea and respiratory diseases. Premature and low birth-weight neonates in NICUs are mainly fed by formula in China (Qiu et al. 2007). Actually, there are few medicines that require mothers to stop breastfeeding, with the main exceptions being anticancer drugs and radioactive substances. Most medicines, such as antibiotics, analgesics and antipyretics, are commonly used and mothers can continue to breastfeed safely (World Health Organization and UNICEF 2002). In most cases, mothers with diseases can achieve breastfeeding success if they are provided with knowledge on the safety of medicines and are encouraged to continue breastfeeding (Li 2014).

Overall, multiple factors were reported in all studies influencing the rate of exclusive breastfeeding before six months. Different factors exist in rural and urban areas, which is similar to the differences in breastfeeding rate. In urban areas, insufficient breast milk, returning to work and illness of mothers and infants are the main reasons for failure to exclusively breastfeed. However, in rural areas, traditional incorrect perceptions and incorrect complementary solid foods before six months were reported as the key reasons. Severe events of unsafety formula reported since 2008 makes more mothers to choose breastfeeding.

### **1.2.5 Breastfeeding challenges in China**

There have been variety strategies established by the government in China to increase the rate of breastfeeding, notably the wide BFI accreditation of hospitals, which has had a positive impact in some areas of China. UNICEF reported that the rate of exclusive breastfeeding increased between 1992 and 1994 from 29% to 68% in rural areas and from 10% to 48% in urban areas, but the report did not describe the original data source or the age of infants (UNICEF 2005). Although the short-term positive influences of BFI hospitals have been reported in some studies in China (Huang 1995, Zheng 1993), there has been no prospective study to explore their long-term impact on the breastfeeding rate. The latest rate of exclusive breastfeeding reported by UNICEF China online was only 28% at six months (Tang 2013). Therefore, it is still a big challenge to achieve the goal of 50% of exclusive breastfeeding at six

months by 2020, which was set by the Ministry of Health of China (The State Council of People's Republic of China 2011).

In contrast, the promotional strategies of BFI hospital did not enhance the breastfeeding rate in other regions. One cross-sectional survey aimed to explore the change in breastfeeding rate based on 1123 mothers in seven cities of China in 2000. The rate of exclusive breastfeeding was 16% at four months and there was no significant increase found compared with the rates reported in previous studies before the BFI programme was introduced in 1992. The reasons for this were investigated and it was found that the regulations of BFI hospitals were not applied strictly. Bottle feeding and formula were being used in the BFI hospitals and mothers were being given advertisements of formula or samples by the sellers. The study indicated that it was necessary to strengthen the surveillance of the implementation of strategies in the BFI hospitals and that a self-monitoring tool should be introduced to BFI hospitals. The results also strongly suggested the government should undertake reassessments for the accreditation of some BFI hospitals (Guo and Wang 2001). The cohort study from Qiu et al. revealed that it was difficult to apply the “ten steps” strictly in BFI hospitals because a mother can easily access formula from her family or it is provided by the hospital if she feels she has insufficient breast milk for her baby (Qiu et al. 2009).

There are very few studies reporting the results of reassessment of BFI hospitals in China, although it is required that all the BFI hospitals should be reassessed according to BFI standards (UNICEF 2005). Li reported that the decision makers did not pay attention to BFI strategies which meant the “Ten steps” were not implemented strictly (Li X 1999). Wang reported the existing problems among the 7 BFI hospitals which were awarded the accreditation of BFI hospital in the 1990s in Baokang county, China by reassessment in 2010 (Wang HC 2010). The first problem reported by the local government is only one hospital out of seven hospitals retrained professionals on breastfeeding. Professionals could not answer breastfeeding knowledge tests correctly. But the report did not provide the details about the reassessment method on



breastfeeding knowledge and did not analyze which areas of breastfeeding knowledge are poor among the professionals. The second problem is all seven hospitals did not carry out prenatal education for pregnant women. Therefore, the pregnant women who were tested in the seven hospitals showed poor breastfeeding knowledge. In conclusion, the “Ten steps” of BFI were not implemented strictly in seven BFI hospitals. The study advised that all the BFI hospitals should be reassessed to ensure that promotion strategies are implemented well.

The Ministry of Health of China realised the poor practices in BFI hospitals and revised the standards of assessment for BFI hospitals in 2014. Each province was required to reassess all the accreditation of BFI hospitals strictly according to the new standards and undertake reassessment every three years. The government is also welcoming public monitoring by opening a supervision telephone, which is used to report a variety of violations of BFI policy. The accreditation of a BFI hospital will be cancelled if the hospital is shown to have violated the “Ten Steps”; and formula companies will be punished if they violate the “Breast Milk Substitutes Sales Management Regulation”. The government also advocates breastfeeding by controlling the rate of C-sections and strengthening support for mothers by trained professionals regarding the knowledge and skills of breastfeeding (The National Health and Family Planning Commission of the People's Republic of China 2014).

Furthermore, almost all the factors described in this section affecting the breastfeeding rate in China are associated with poor breastfeeding practices in hospitals. Firstly, although insufficient breast milk is one of the main factors reported to affect the success of breastfeeding, this is always based on mothers' perceptions of their milk supply and may not reflect an objective measure of actual milk supply. Actually, the most common reasons for insufficient breast milk are poor breastfeeding practices and lack of confidence, apart from a very few women with a physiological failure to produce enough milk (World Health Organization and UNICEF 1989). Secondly, lack of education on the breastfeeding benefits, the safety of breastfeeding for some types of diseases

and medication, and the importance of exclusive breastfeeding in the first six months contributes to these impact factors, including traditional perceptions and illness of mothers and infants, on unsuccessful exclusive breastfeeding and ceasing breastfeeding. The correct facts about breastfeeding should be taught to mothers by antenatal and postnatal education for mothers in line with the “Ten Steps” in BFI hospitals, especially in rural areas (UNICEF 2005). Thirdly, insufficient support with breastfeeding skills by professionals, including skin-to-skin contact, positioning and attachment, especially for women after C-sections, account for many breast problems, such as mastitis and sore nipples (Maria 2012). Furthermore, a lack of training in hospitals in the skill of expressing breast milk was one of the reasons for women ceasing breastfeeding after returning to work. Additionally, professionals who have better knowledge of and skills to support breastfeeding will be more likely to change the incorrect perceptions of mothers and support mothers who are having breastfeeding difficulty, in order to achieve exclusive breastfeeding. However, there is still an absence of efficient support systems to satisfy an emerging group of women in China who are eager to breastfeed, according to a spokesman from UNICEF China (Arnold 2014). Although some pregnant women are educated on breastfeeding knowledge in the hospitals as prenatal education, many mothers do not access such education. They lack knowledge of the correct techniques of breastfeeding which result in various breastfeeding problems, such as insufficient breastmilk, sore nipples and mastitis. When the breastfeeding mothers suffer these breastfeeding problems, it is difficult to get efficient guidance from professionals by telephone consultation which is the most popular service in BFI hospitals in China. Because it has been lack of breastfeeding professionals to provide effectient support services for breastfeeding mothers.

Overall, the BFI strategy has been applied as a policy to promote breastfeeding practices for more than 20 years in China and there is the biggest number of BFI hospitals in the world. However, breastfeeding practice is still poor, even in BFI hospitals, due to the lack of auditing the implementation of the “Ten Steps”. New strict standards will be applied in reassessment of the accreditation of BFI

hospitals, which is expected to improve maternity services in 2014. Good knowledge and skills in supporting breastfeeding among professionals will be the precondition for hospitals to provide efficient support for breastfeeding practices and pass the reassessment for the BFHI. Also, it is necessary and emergent to train professionals in supporting the skills of breastfeeding to meet the high demands, as an increasing number of breastfeeding mothers in China are eager to get support to succeed in exclusive breastfeeding for the first six month.

## **Chapter 2 A literature review of the impact of education and evidence-based practice interventions with professionals on duration of breastfeeding**

### **2.1 Introduction**

Support from skilled professionals has a positive effect on the initiation of breastfeeding after birth and breastfeeding duration (UNICEF UK 2013). Staff training merits are particularly important especially for the healthcare professionals who directly care for breastfeeding mothers. Improving professionals' knowledge of and skills in breastfeeding is essential on effectively supporting breastfeeding mothers with objective and consistent advice (World Health Organization and UNICEF 1989). This literature review aims to explore the effects of various breastfeeding training interventions with healthcare professionals on breastfeeding duration.

The Baby-friendly Hospital Initiative (BFHI) was launched in 1991 by the WHO and UNICEF to protect, support and promote breastfeeding as a global strategy (UNICEF 2005). The "Ten Steps" is the main standard of accreditation for BFHI (or BFI) hospitals (UNICEF 2005, World Health Organization and UNICEF 1989). The second step of the "Ten Steps" is "Train all health care staff in skills necessary to implement this policy" (UNICEF 2005). The WHO and UNICEF recommend that professionals who are involved in the care and treatment of mothers and infants should be trained in knowledge of breastfeeding for at least 18 hours and practice the skills of breastfeeding for a minimum of 3 hours under the guidance of senior staff (World Health Organization and UNICEF 2009b). A cross-sectional survey explored the support needs in relation to breastfeeding among 1064 mothers of children under 6 years old using a stratified random sample in Canada. Of 395 respondents, 95.8% reflected that the breastfeeding support from staff was one of the most important services they preferred (Devolin et al. 2013). One review explored breastfeeding practices and factors affecting the breastfeeding rate, based on previous studies since 1985. Mothers

reported the great value of advice and support from health professionals in making a decision about whether to breastfeed (Wambach et al. 2005).

Inconsistent advice, especial conflicting information from professionals, was found to confuse mothers and was perceived as unhelpful for their breastfeeding success (Dennis 2002, Wambach et al. 2005). Women frequently reported that they felt professionals lacked knowledge on resolving breastfeeding problems (Dodgson et al. 2002, Spear 2006). An infant feeding survey in the UK in 2010 revealed that 60% of mothers reported stopping breastfeeding earlier than they planned due to inadequate support from skilled professionals to overcome breastfeeding problems (McAndrew et al. 2012). Wallace and Kosmala-Anderson conducted two surveys in the UK in 2005 to explore the training needs of healthcare practitioners who work with breastfeeding mothers in terms of breastfeeding support skills (Wallace and Kosmala-Anderson 2006, Wallace and Kosmala-Anderson 2007).

Another survey conducted in the UK in 2005, explored the training needs of 549 healthcare practitioners, including midwives, health visitors in public health and voluntary-sector breastfeeding support staff, using self-report questionnaires (Wallace and Kosmala-Anderson 2007). They rated their levels of competence in 26 breastfeeding support skills, including management of specific problems, antenatal education skills, practice skills support and socio-cultural aspects of breastfeeding support. The results reflected that participants were not confident in their knowledge of policy and guidance regarding breastfeeding. Only 51% participants out of 284 respondents had accessed breastfeeding policy and 90.2% of respondents did not know WHO recommendations regarding duration of exclusive breastfeeding. Moreover, 64% participants out of 543 respondents felt incompetent in giving advice for engorgement problems, 44% participants out of 544 respondents were not confident in supporting skin-to-skin contact and 46% participants out of 544 respondents did not feel competent in the techniques of positioning and attachment. Skill deficits were reported by more than half of all respondents in all areas, which might result in professionals giving inaccurate advice to mothers. Also, an analysis of sub-group job types found no significant

difference in the self-assessed competence of 26 breastfeeding support skills. This may indicate that all healthcare practitioners would benefit from training in key support skills.

Another survey by Wallace and Kosmala-Anderson examined 23 breastfeeding support skills in a sample of 120 paediatricians and 57 GPs (general practitioners) by self-report questionnaires in the UK in 2005 (Wallace and Kosmala-Anderson 2006). Differences in self-reported competence levels in clinical skills and educative skills were reported between GPs and paediatricians. In clinical skills, paediatricians (mean score=2.95) assessed themselves as more competent than GPs (mean score=2.52), especially in giving advice about positioning and attachment (P & A) (competent 59.2% vs 39.3%), prescribing to breastfeeding mothers (competent 56.8% vs 33.9%) and supporting mothers in recovery from a Caesarean section (competent 50.5% vs 25.9%). However, in each of the nine aspects of breastfeeding skills, GPs (mean score=2.69) assessed themselves as more competent than paediatricians (mean score=2.36), for example encouraging mothers to initiate breastfeeding (competent 82.5% vs 31.6%), advising about breast and formula feeding (competent 82.1% vs 32.6%) and understanding physiology of lactation (competent 73.2% vs 38.5%). These findings suggest that both GPs and paediatricians are lacking in competence in clinical skills, which might lead to inefficient support and even undermine the efforts of other practitioners.

A low level of competence in clinical skills for supporting breastfeeding was identified among various healthcare practitioners in both studies above. This indicates that training in practical skills is necessary to enhance their self-efficacy. However, the self-assessment of participants' confidence in breastfeeding support skills in both studies may alternatively indicate a gap between confidence and actual practical skill level. It is necessary and recommended to objectively assess the knowledge and practical skills of professionals to target the most needed training. In addition, response bias might have contributed to the findings in two studies, as the self-report questionnaires may have been more likely to be completed by those who were

interested in breastfeeding. Such participants may be more likely to hold a more positive attitude or higher level of self-assessment of competence, leading to an overestimation in competence level.

In China, there have been few studies assessing the knowledge of maternity clinicians in relation to breastfeeding. Ouyang undertook the only survey to investigate the level of breastfeeding knowledge among Chinese female physicians and nurses with a cohort study conducted in 2009. For this study, 367 professionals were recruited from 10 randomly selected Baby-friendly Hospital Initiative (BFHI) hospitals in Hubei Province, China. The assessment of knowledge consisted of the benefits of breastfeeding, reliable signs of adequate breast milk, demand feeding and recommended duration of breastfeeding. Although the assessment was simple using True or False response options (where the chance level of getting the correct answer is 50%), the staff had surprisingly poor knowledge, with less than 30% correct for the following items, including reductions in morbidity of maternal ovarian cancer, lower likelihood of obesity, preventing rickets, signs of adequate breast milk based on the daily urine amount, a good contraceptive method, demand breastfeeding and the importance of exclusive breastfeeding in the first six months. Also, 79.3% of clinicians had had no breastfeeding training since starting work in hospitals (Ouyang, Xu and Zhang 2012).

Recognising the importance of breastfeeding training for professionals, a range of training programmes have been developed, such as the WHO's 18-hour or 20-hour BFHI training course, breastfeeding workshops, structured or non-structured training interventions, and process-oriented counselling training. Their effectiveness was examined in improving professionals' attitudes towards, knowledge and skills of supporting breastfeeding (Bernaix et al. 2010, Ekström, Widström and Nissen 2005, Watkins and Dodgson 2010) or improving breastfeeding outcomes (Grossman et al. 2009, Shinwell et al. 2006, Vittoz et al. 2004), including breastfeeding duration, the rate of breastfeeding initiation and the rate of exclusive breastfeeding in the first six months. Also, related systematic reviews were developed to summarise a wide range of evidence by

collating individual studies and critically appraising the methodologies.

A systematic review explored the impact of breastfeeding education for midwives and nurses on knowledge or breastfeeding rates in nine countries based on 15 studies published during 1995–2007 (Ward and Byrne 2011). Eight studies directly measured knowledge by pre- and post-intervention tests and all reported a positive impact on knowledge of breastfeeding. A number of techniques were used, including various education programmes, including the WHO's 18-hour BFHI training course, validated Breastfeeding Support Skills Tool (Moran et al. 2000) and counselling skills. Four out of five studies reported increased scores in clinical skills and practices for midwives and nurses, post-training. Six studies examined the impact of training education on breastfeeding rates, but the results were not consistent. Significant increases were reported in the rate of exclusive breastfeeding at discharge from hospital, duration of exclusive breastfeeding and duration of full breastfeeding but no significant difference was found in the duration of any breastfeeding in two studies (Ekström, Widström and Nissen 2006, Taddei et al. 2000). Therefore, it was not enough to determine their effectiveness on the breastfeeding rate by stand-alone education intervention, due to the inconsistent results, diverse outcome measurements for the breastfeeding rate and different definitions of exclusive breastfeeding. The review recommended continuing education to maintain positive changes, especially the WHO's 18-hour training course.

Spiby et al. carried out a systematic review of studies published during 1980–2003 to evaluate the effects of training, education and practice change interventions with health professionals on the outcome of breastfeeding (Spiby et al. 2009). Nine studies were included with before and after designs in developed countries, but no randomised controlled trials were identified and no studies involving breastfeeding counsellors were identified. In one of the reviewed studies, Cattaneo and Buzzetti explored the effect on breastfeeding outcomes of the WHO's 18-hour training course delivered to 571 health workers who served 2669 mother-infant pairs during 1996 and 1998 in eight hospitals in Italy. They reported that significant increases were seen in the proportion of



exclusive breastfeeding at discharge from hospital, full breastfeeding rates at three months and any breastfeeding at six months (Cattaneo and Buzzetti 2001). In another study reviewed by Spiby et al., Ingram et al. examined the effectiveness of a 45-minute training workshop using the “hands off” technique to teach midwives and health professionals regarding positioning and attachment in South Bristol between 1996 and 1998. The results showed a significant rise in the rate of exclusive breastfeeding and any breastfeeding at two weeks, but no significant increase at six weeks (Ingram, Johnson and Greenwood 2002). Hartley and O’Connor demonstrated that the rate of breastfeeding at discharge from hospital increased significantly but not at two weeks, following the “Best Start” education programme for health and clerical staff. However, it did not describe measurement outcome on the type of breastfeeding rate (Hartley and O’Connor 1996). Three studies reviewed demonstrated no significant difference in breastfeeding duration or the rate of exclusive breastfeeding between pre- and post-training (Durand et al. 2003, Grant, Fletcher and Warwick 2000, Stokoe 1994). The remaining three studies showed an increase in exclusive breastfeeding but no statistical analysis was examined (Anon.1982, Gianni et al. 2013, Matilla-Mont and Ríos-Jiménez 1999). Therefore, Spiby et al.’s review concluded that it was not possible to conclusively endorse the benefits of education programmes, due to the lack of comparability based on the varied settings and a range of time points measured regarding duration of breastfeeding and diversity in training approaches. No single training intervention can achieve continuing change in improving breastfeeding outcomes based on the studies included in this review.

Although methodological limitations in the recruited studies exist through the use of pre- and post-test designs and the review did not determine the total impact on breastfeeding outcomes due to inconsistent results, the review provided filled a gap in the evidence about the effect of training interventions on the duration of breastfeeding.

## **2.2 Aims**

The literature review aims to assess the evidence regarding the effectiveness of education intervention and evidence-based practice interventions with healthcare professionals on breastfeeding duration or the rate of breastfeeding initiation or the rate of exclusive breastfeeding since 2004, based on Spiby et al.'s systematic review.

## **2.3 Method**

### **2.3.1 Eligibility criteria**

*Types of study:* Randomised controlled trials, non-randomised controlled trials with concurrent controls and before-and-after studies (cohort or cross-sectional), in English in developed or developing countries were included. The publication date is during the period 2004–2014.

*Types of participant:* Training intervention was conducted on the professionals who care and treat breastfeeding mothers including midwives, nurses in prenatal or postpartum departments, educators in breastfeeding and breastfeeding counsellors.

*Types of outcome measure:* Studies examined breastfeeding duration and/or any breastfeeding rate and/or the rate of exclusive breastfeeding. All studies were required to provide at least one of these outcomes.

### **2.3.2 Exclusion criteria**

*Publication type:* non-peer reviewed articles (e.g. letters) or conference literature that were reports of training interventions for mothers were excluded.

*Intervention type:* Intervention was mainly for mothers.

*Outcome measures:* The knowledge, attitude, confidence and skills among professionals or breastfeeding mothers following training intervention. Women's experiences of support were provided by professionals after training intervention.

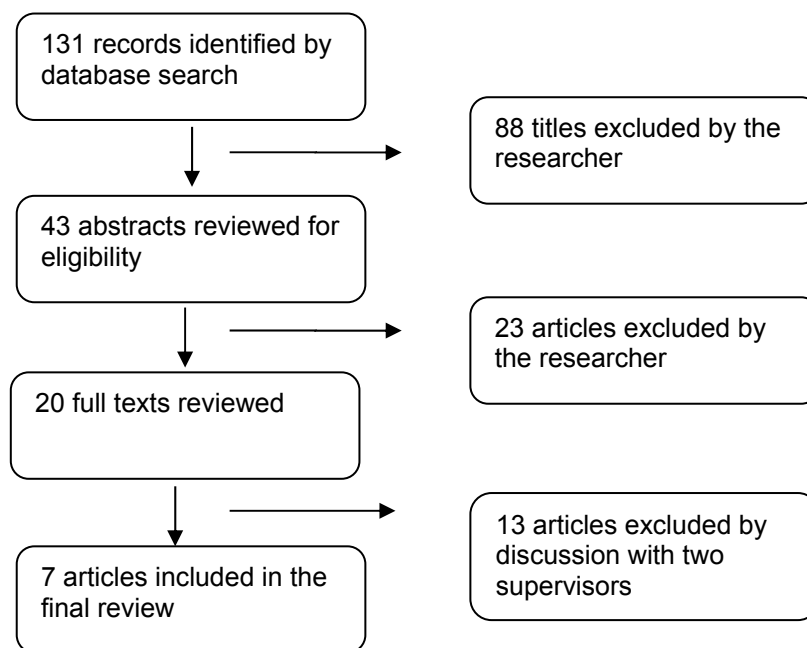
### **2.3.3 Search strategy**

The electronic searches were undertaken by one researcher, discussed with two supervisors and contacted experts. The databases, including Medline, CINAHL, PsycINFO, PsycARTICLES, Scopus and Cochrane library, were used to search from January 2004 to December 2014 based on Spiby et al.'s systematic review. Three journals were hand searched and experts were contacted, including Journal of Human Lactation, Health Promotion International and Health Education Quarterly. Four sets of key words, consisting of breastfeeding or breast-feeding or breast feeding or infant feeding or breast milk, linked with combining training intervention or intervention or education intervention, linked with combining professionals or clinician or health counsellor or health personnel, linked with combining breastfeeding outcomes or breastfeeding duration or breastfeeding rate or breastfeeding initiation or exclusive breastfeeding or any breastfeeding rate. The last search was run on 14 April 2015. All identified studies were assessed for relevance using the title and abstract. Quality of eligible studies was assessed using Critical Appraisal Skills Programme tool (CASP) (Singh 2013).

## **2.4 Results**

There were 131 studies initially identified from the database searches. Firstly, the researcher scanned the titles of the identified studies and 88 articles were excluded for not meeting the inclusion criteria. The abstracts of 43 articles were reviewed and 23 articles of those were further excluded as not meeting the inclusion criteria. The full texts of 20 articles were reviewed by the researcher and discussed with two supervisors. Seven articles were finally identified: two RCT studies and five before-and-after studies (see Figure 2.1). Five studies were excluded due to them relating to training interventions for mothers. Four studies with training interventions for professionals were excluded due to lack of breastfeeding outcome. Three systematic reviews were excluded as measuring outcome were knowledge, with one study measuring mothers' knowledge and two studies measuring professionals' knowledge and skills. One study was excluded by discussion as the study training intervention was mainly for 849 mothers and measured the impact on the breastfeeding outcome of extended

support for mothers compared with standard support, although four midwives were also trained in the study (McDonald et al. 2010). These included studies covered seven different countries, of which one was a developing country and six were developed countries. The details of the research method, setting and participants in the included studies are displayed in Table 2.1. The intervention, time point of measurement and breastfeeding duration outcomes are described in Table 2.2. The results of the quality assessment using the CASP tool are shown in Table 2.3 (All tables can be found later in this chapter).



**Figure 2.1 Search strategy flow diagram**

Coutinho et al. explored the impact of breastfeeding counselling skills training for community health workers in Brazil by comparing the rate of exclusive breastfeeding at the age of 0–5.9 months before and after training (Coutinho et al. 2013). Community health workers who worked in 1449 community health agencies from six administrative districts participated in a 20-hour BFHI training course in counselling skills and practical management of breastfeeding between 2003 and 2008. Two cross-sectional surveys were carried out to investigate the breastfeeding rate among 1266 mother-infant pairs before training and 1245

mother-infant pairs after ten months of training. It showed a significant difference in the rate of exclusive breastfeeding, 45.6% pre- and 50.4% post-training (Chi square  $p=0.02$ ) for infants aged 0–5.9 months. However, there was no significant difference for any breastfeeding, with 82.8% pre- and 85.1% post-training intervention ( $p=0.13$ ) for infants aged 0–5.9 months. The training intervention regarding counselling skills and practical management, using a more interactive style compared to pre-intervention training, significantly increased the rate of exclusive breastfeeding. However, the rate of exclusive breastfeeding was not high at 50.4% under six months of age. More strategies were recommended to promote breastfeeding rates, including extended training for a wide range of healthcare professionals, various services such as use of mass media and e-messages to reinforce community involvement for breastfeeding mothers. The study had a large sample and mother-infants pairs were randomly selected in each of six districts, which indicated a good representative sample in the study. However, the districts were not randomly allocated to intervention and control groups. Another particularly relevant factor was the long period between pre- and post-data collection, meaning there may have been many other changes in services apart from the training intervention that could account for the results.

Ekström, Kylberg and Nissen explored the impact of process-oriented training regarding breastfeeding counselling skills for midwives and postnatal nurses on the rate of breastfeeding initiation, introduction of breast milk substitutes in the first week of birth and the duration of breastfeeding during 2000 in ten municipalities, in southwest of Sweden (Ekström, Kylberg and Nissen 2012). The intervention programme consisted of evidence-based lectures in the practical skills of breastfeeding support, addressing breastfeeding problems, academic discussions and reflective processes. A randomised controlled trial (RCT) was performed with five municipalities in the intervention group (IG) and five municipalities as a control (CGA and CGB) group. Data of CGA was collected before the intervention in 2000 and data of CGB and IG was collected during 2001–2002, after the training. Prenatal midwives, postnatal nurses and mothers were allocated to the intervention or control groups depending on the

municipality in which they worked or lived. The response rate was 65.8% (372/565) with 131 mothers in IG, 116 mothers in CGA and 125 mothers in CGB. The rate of breastfeeding initiation within 24 hours was high in all groups (IG 100%; CGA 97%; CGB 97%), but there were low rates within the first two hours (IG 40%; CGA 45%; CGB 40%). There were no significant differences between IG, CGA and CGB. A significant longer mean number of months of exclusive breastfeeding was found in IG (mean=3.9, SD=2.2 months) compared to CGA (mean=3.2, SD=1.7 months),  $p = 0.02$ ; but this was not significant compared to CGB (mean=3.5, SD=2.0 months). No significant difference was found in the duration of any breastfeeding among IG (mean=7.5, SD=4.7 months), CGA (mean=7.1, SD=4.6 months) and CGB (mean=7.0, SD=4.5 months). There were significant differences in receiving substitutes without medical reasons in the first week between IG (10%), CGA (20%) and CGB (14%) ( $p = 0.01$ , for all three groups).

There were two control groups in the study, a pre-intervention group and a control group running parallel with the intervention, which was valuable to evaluate the intervention from a time perspective. A significant difference between IG and CGA but not between IG and CGB in the duration of exclusive breastfeeding indicated that other possible changes to maternal services existed during 2000–2002, which may account for the increase in exclusive breastfeeding in addition to the training intervention. Another essential factor explained in the study was that the knowledge of process-oriented training might have been shared by networks among the professionals of IG and CGB, which would have weakened the effect. The training showed a positive effect on reduction in the proportion using and introducing breast milk substitutes in the first week, which indicated mothers in IG might have been offered better advice about breastfeeding than the other two groups. Three surveys were conducted during the study at three days, three months and nine months, but the results did not describe the rate of breastfeeding for the three time points. The study did not report how many professionals were included in the intervention group, which might influence the effectiveness of breastfeeding promotion.

Gianni et al. conducted a prospective cohort study with a non-randomised intervention to investigate the efficacy of a multidisciplinary intervention for NICU staff on the rate of any breastfeeding in 2011, in a level III hospital, which is a high-level hospital in Italy (Gianni et al. 2013). WHO/UNICEF 20-hour course regarding breastfeeding promotion and support in a BFI hospital, with 15.5 hours of theory and 4.5 hours of practical training, was the main intervention. Further training in the problem-solving process and counselling skills were offered to all recruited NICU staff. There were 232 mother-infant pairs enrolled, 122 pre-training and 110 post-training. The findings showed that the rate of any breastfeeding at discharge in the post-training group was significantly higher than in the pre-training group (70% vs 52%,  $p=0.03$ ). Regression analysis was applied to explore if a range of factors contributed to this difference, including pre- and post-training groups, twins, stress factors and extra uterine growth retardation. The analysis showed that stress during pregnancy was independently associated with the rate of any breastfeeding at discharge, but the association disappeared when controlling for multiple pregnancies. Therefore, the study indicated that multidisciplinary intervention was beneficial for increasing the rate of breastfeeding initiation in NICU by supporting mothers who had emotional challenges due to pregnancy difficulties or fears for the infants' health during pregnancy. The study had a single and small sample selected from one hospital, which may not be representative of all NICUs and thus constitutes weaker evidence than had the study utilised a broader sample. Other factors were not controlled when analysed, such as prenatal feeding intentions, maternal obesity and prenatal education, all of which could potentially affect the findings of the study.

Grossman et al. examined the effect of Project HELP (Hospital Education in Lactation Practices) among healthcare practitioners on the rate of breastfeeding initiation and exclusive breastfeeding in four community hospitals in Massachusetts, USA during 2005 and 2006 (Grossman et al. 2009). Project HELP consisted of three 4-hour teaching sessions, covering a broad range of breastfeeding knowledge and techniques, including breastfeeding and

medication, counselling strategies, problem solving and continuing breastfeeding at work. Demographic and feeding data was obtained from the medical records of infants born before and after the teaching intervention in the hospital. There were 1347 medical records with 668 pre-training and 679 post-training selected randomly in the four recruiting hospitals. The results showed that rates of breastfeeding initiation increased significantly from 59% pre-training to 65% post-training ( $p=0.02$ ). No significant increase was found in the rates of exclusive breastfeeding at discharge from hospital in the individual hospitals or across all four hospitals combined (31% vs 32%,  $p=0.62$ ). The study revealed that intensive breastfeeding education for healthcare practitioners had a positive impact on increasing the rates of breastfeeding initiation using multivariate logistic regression analysis. The analysis is helpful to identify the impact of different breastfeeding practices. Eliminating pacifier use in one hospital and revising breastfeeding policy in another hospital were both positively associated with breastfeeding initiation. As all the data was from reliable medical records in hospitals, the rates of exclusive breastfeeding only reflected breastfeeding before discharge from hospital. It may have been possible to find significant differences between pre- and post-training in the rate of exclusive breastfeeding with a longer time for follow-up. The study did not report how many staff were trained in the recruited hospitals, which might affect the impact of the breastfeeding training intervention.

Shinwell et al. investigated the effect of a 32-hour breastfeeding training course for professionals on the duration of breastfeeding in the departments of neonatology and obstetrics at Kaplan Medical Center, Rehovot, Israel from 1999 to 2004 (Shinwell et al. 2006). The 32-hour breastfeeding training intervention consisted of: the policy of “Ten Steps for Successful Breastfeeding” by the WHO; theory knowledge, including advantages of breastfeeding, physiology of lactation and human milk for premature infants; and practical skills, including breastfeeding with infectious diseases and contraindications to breastfeeding, lactation counselling skills and troubleshooting. The recruited staff were trained during 2001–2002, including nurses and physicians in the newborn nursery and postnatal wards, midwives in the delivery room and lactation consultants. Two



prospective studies were conducted in 1999–2000 with 471 mother-infants before training and in 2003–2004 with 364 mother-infants after training. The rate of breastfeeding initiation in the delivery room significantly increased from 3% in 1999–2000 to 37% in 2003–2004 ( $p=0.0001$ , ERR=12.5 95% CI). The rate of exclusive breastfeeding at six months rose significantly from 26% in 1999–2000 to 47% in 2003–2004 ( $p=0.0001$ , ERR=1.81 95% CI). A significant increase was found in the mean duration of exclusive breastfeeding ( $3.7\pm3.7$  months in 1999–2000 and  $5.6\pm4.3$  months in 2003–2004;  $p=0.0001$ ). The findings suggest that the 32-hour breastfeeding training course for a wide range of staff increased the rate of breastfeeding initiation and exclusive breastfeeding at six months. Further multivariate linear regression analysis reflected that the training intervention was the most powerful independent predictor for duration of exclusive breastfeeding. However, the study did not describe the response rate of mothers and how many staff were trained in the two cohort studies. There was a long interval between cohort 1 (1999–2000) and cohort 2 (2003–2004). It is possible that the breastfeeding rate may have been affected by other interventions, such as changes to breastfeeding awareness, other breastfeeding support and policy changes during 2000–2003.

Vittoz and Labarere (Vittoz et al. 2004) explored an evaluation of a 3-day training programme for professionals on the duration of any breastfeeding in a level 3 maternity ward in a university hospital in France. The training programme consisted of the benefits of breastfeeding, perceived barriers, physiology, initiation of lactation (assessment of position, latch-on), maternal medication use while breastfeeding, management of common lactation problems (cracked or sore nipple, use of breast pump), sources of support, and maintenance of lactation after return to employment. All 73 staff in the maternity ward attended the training programme during 1998–2000 in the hospital. There were 169 mothers recruited pre-training in 1997 and 178 mothers recruited post-training in 2000. The results showed there was no significant difference in the rate of breastfeeding initiation between pre- and post-training, with 77.5% in the pre-training period and 82.6% post-training ( $p=0.24$ ). However, significant differences occurred in the median duration of any breastfeeding: 13 weeks pre-

intervention and 16 weeks post-intervention ( $\chi^2$  log-rank test=5.8,  $p=0.02$ ). The main reasons for stopping breastfeeding reported by mothers included “insufficient lactation” (pre-training 35.9% vs post-training 25.2%) and “return to work” (25.9% vs 33.3%). No statistical analysis was undertaken to explore any differences in reasons for ceasing breastfeeding between pre- and post-training. The moderate impact suggested that the training intervention was likely to be less important compared with various other barriers such as psychosocial factors, insufficient support after discharge from hospital and returning to work. Promoting the rate of breastfeeding initiation should not be limited to professionals in maternity wards but should include a wide range of clinicians in other settings. In the study, the response rate of postal questionnaires was good (56.3%), which might represent mothers’ general breastfeeding practice. Another potential weakness of the retrospective study is recall bias because follow-up questionnaires were sent to mothers up to two years after birth.

Wallace et al. undertook an RCT study to explore the effect of a new training method of “hands off” care among midwives concerning the skill of positioning and attachment to improve the duration of exclusive breastfeeding (Wallace et al. 2006). A total of 245 midwives were randomly allocated to an experimental intervention group of 124 and a control group of 121 in four National Health Service hospitals in the UK during 2001 and 2002. Four hours of training workshops for midwives in the experimental intervention group covered the skills of the “hands off” approach, which involves giving only verbal advice on the method of positioning and attachment, breastfeeding initiation, explanation of the mechanism of breast milk supply and removal from mothers’ breast. There were 188 mothers in the experimental intervention and 182 mothers in the control group served by the corresponding midwives, who were followed up at 6 and 17 weeks. No significant increases in the rate of exclusive breastfeeding in the experimental intervention group were found at either 6 weeks (24%) or 17 weeks (4%) compared to the control group at 6 weeks (23%) and 17 weeks (4%). Possible reasons for the non-significant findings are that the training was a single event, with insufficient repetitions of midwives’ advice and lack of feedback from mothers about their experience of learning. The findings suggest

that “hands on” care might be more efficient than “hands off” to train mothers in the skills of positioning and attachment. In addition, insufficient support might have been offered to mothers before the study. Professionals might pay more attention on support services for the mothers in the control group due to carrying out the study. The more possible care for mothers in the control group minimised the difference between the intervention and control groups. Further, the main reasons for ceasing breastfeeding were sore or cracked nipples (30.3%) and insufficient milk (30.3%), as reported by mothers, and no significant differences between the two groups were evident in this regard, which indicates the training intervention was not efficient to prevent these breastfeeding problem. Wallace et al. suggested that future studies should develop effective interventions for mothers to achieve success in breastfeeding, targeted at the care needs of mothers in more areas of breastfeeding by a wider range of healthcare professionals. The study was high quality due to its large sample size, blinding of mothers and the researcher and RCT design.

Three studies explored the main reasons given by mothers for ceasing breastfeeding (Shinwell et al. 2006, Vittoz et al. 2004, Wallace et al. 2006). Wallace et al. reported that 68.8% of mothers experienced at least one problem by six weeks. Insufficient breast milk (30.3%) and sore or cracked nipples (30.3%) were the most common problems reported by mothers at a six-week interview (Wallace et al. 2006). Shinwell et al. and Vittoz et al. reflected that inadequate milk supply and returning to work were the most common reasons for breastfeeding cessation after discharge from hospital (Shinwell et al. 2006, Vittoz et al. 2004).

**Table 2.1 Methods of education interventions**

Author, year and country	Research methods	Setting	Participants (n)
Coutinho et al. (2013), Brazil	Two cross-sectional surveys with one before-after training intervention	1449 community health agents of six administrative districts in Recife	Community health workers; 1266 mother-infant pairs before and 1245 after training intervention
Ekström et al. (2012), Sweden	RCT study	Ten maternity clinics from ten municipalities	Midwives and postnatal nurses; 172 mothers in intervention group (IG), 148 mothers in control group A (CGA) and 160 mothers in control group B (CGB)
Gianni et al. (2013), Italy	Prospective cohort study with two surveys with one before-after training intervention	One NICU in Milan	All staff in NICU; 122 mother-preterm pairs before training and 110 mother-preterm pairs after training
Grossman et al. (2009), USA	Data collection from medical records before-after training intervention	Four hospitals in Massachusetts	Healthcare practitioners; 668 mothers pre-intervention and 679 mothers post-intervention.

**Table 2.1 Methods of education interventions (continued)**

Author, year and country	Research methods	Setting	Participants (n)
Shinwell et al. (2006), Israel	Prospective cohort study with two surveys with one before-after training intervention	In the departments of neonatology and obstetrics at Kaplan Medical Center	All nurses, midwives and physicians; 471 mothers in 1999–2000 before training and 364 mothers in 2003–2004 after training
Vittoz, et al. (2004), France	Before-after design study with two retrospective surveys	A level-3 maternity ward in a university hospital	All 73 professionals of the maternity ward staff; 169 mother-infant pairs in pre-intervention group and 178 mother-infant pairs in post-intervention group
Wallace et al. (2006), UK	RCT study	Four National Health Service hospitals in the UK	Midwives with IG group of 124 and CG group of 121; 188 mothers in IG group and 182 mothers in CG group

**Table 2.2 Impact of education interventions with professionals on breastfeeding outcome**

Author, year and country	Intervention	Time measured	Breastfeeding duration outcomes
Coutinho et al. (2013), Brazil	20-hour breastfeeding training on counselling and practical skills; one book "Helping Mothers to Breastfeed"	From birth to 5.9 months before and after training intervention during 2003 and 2008	Significant difference in the rate of exclusive breastfeeding, 45.6% pre- and 50.4% post-training ( $p=0.02$ ); no significant difference for any breastfeeding, 82.8% pre- and 85.1% post-training intervention ( $p=0.13$ )
Ekström et al. (2012), Sweden	A process-oriented training programme in breastfeeding counselling	Three days, three months and six months	Significant difference in mean time of exclusive breastfeeding between IG and CGA (IG: mean=3.9, SD=2.2 months; CGA: mean=3.2, SD=1.7 months; $p=0.02$ ); no significant difference between IG and CGB ( $p>0.05$ ); no significant difference among the groups in the rate of stopping breastfeeding at nine months (IG, 29%; CGA, 22%; CGB, 17%)
Gianni et al. (2013), Italy	20-hour training programme on problem-solving processes , practical skills and counselling	Any breastfeeding rate at discharge before and after training intervention	Rate of any breastfeeding after intervention significantly higher than before intervention (70% versus 52%, $p=0.03$ ) at discharge from hospital

**Table 2.2 Impact of education interventions with professionals on breastfeeding outcome (continued)**

Author, year and country	Intervention	Time measured	Breastfeeding duration outcomes
Grossman et al. (2009), USA	Three, 4-hour sessions of Integrating Breastfeeding Education to Eliminate Disparities (IBEED)	Rate of breastfeeding initiation and exclusive breastfeeding in hospital	Breastfeeding initiation rates increased significantly from 59% to 65% ( $p=0.02$ ); no significant increase occurred in exclusive breastfeeding (31% to 32%, $p=0.62$ )
Shinwell et al. (2006), Israel	32-hour course in theoretical and practical skills of breastfeeding	The rate of breastfeeding initiation and the mean duration of exclusively breastfeeding	Rate of breastfeeding initiation rose from 84% pre-training to 93% post-training ( $p=0.0001$ ) and the mean duration of exclusively breastfeeding rose from $3.7\pm 3.7$ to $5.6\pm 4.3$ months ( $p=0.0001$ ).
Vittoz, et al. (2004), France	3-day training course including theory, knowledge and practical skills, common lactation problems, and maintenance of lactation after returning to work	Initiation of breastfeeding and duration of any breastfeeding pre- (1997) and post-intervention (2000)	No significant difference in the rate of breastfeeding initiation with 77.5% (70.5-83.6%) pre-intervention and 82.6% (76.2-87.8%) post-intervention ( $p=0.24$ ); significantly longer median duration (number of week) of any breastfeeding in the post-intervention group than pre-intervention group ( $p=0.02$ )
Wallace et al. (2006), UK	4-hour training session for midwives in "hands off" care in positioning and attachment	The rate of exclusive breastfeeding at 6 weeks and 17 weeks during 2001–2002	No significant differences in the rate of exclusive breastfeeding between the experimental intervention group at 6 weeks (24%) and 17 weeks (4%) and the control group at 6 weeks (23%) and 17 weeks (4%)

**Table 2.3 Quality assessment for the recruited studies**

Author, year and country	Quality assessment
Coutinho et al. (2013), Brazil	<ul style="list-style-type: none"> <li>● Before-after training intervention</li> <li>● Representative sample with a large number of sample and mother-infants pairs were randomly selected in each of six districts</li> <li>● The results may be affected by other changes in services during long period between pre- and post-intervention data collection</li> </ul>
Ekström et al. (2012), Sweden	<ul style="list-style-type: none"> <li>● RCT study</li> <li>● Two control groups including a pre-intervention group and a control group running parallel with the intervention. Evaluate the intervention effect from a time perspective</li> <li>● No number of intervention sample</li> <li>● No report for the rate of breastfeeding at three days, three months and six months</li> </ul>



**Table 2.3 Quality assessment for the recruited studies (continued)**

Author, year and country	Quality assessment
Gianni et al. (2013), Italy	<ul style="list-style-type: none"><li>● Before-after training intervention</li><li>● Non-randomised sample may have introduced bias</li><li>● A single, small sample from NICU in one hospital. Lack of representative</li><li>● Other factors were not controlled when analysed, such as prenatal feeding intentions, maternal obesity and prenatal education</li></ul>
Grossman et al. (2009), USA	<ul style="list-style-type: none"><li>● Before-after training intervention</li><li>● Data from reliable medical records in hospitals</li><li>● Breastfeeding rates only reflected in the hospital. It cannot reflect the long effect on breastfeeding rate</li><li>● The number of trained staff by the intervention were not reported</li></ul>

**Table 2.3 Quality assessment for the recruited studies (continued)**

Author, year and country	Quality assessment
Shinwell et al. (2006), Israel	<ul style="list-style-type: none"><li>● Before-after training intervention</li><li>● Non-randomised sample may have introduced bias</li><li>● Multivariate linear regression analysis control for demographic differences and strengthened the value of intervention.</li><li>● No report for the response rate of mothers and the number of trained staff.</li><li>● The results may affected by other changes during the long interval period between cohort 1(1999–2000) and cohort 2 (2003–2004).</li></ul>
Vittoz, et al. (2004), France	<ul style="list-style-type: none"><li>● Good response rate</li><li>● Retrospective study may have recall bias</li><li>● Multiple training intervention increase the effect of training</li></ul>
Wallace et al. (2006), UK	<ul style="list-style-type: none"><li>● RCT design</li><li>● Blinding of mothers and the researcher</li><li>● Large sample size</li><li>● Intervention is single on P and A and relative short time training</li><li>● Continual support for mothers was unknown at discharge of hospital</li></ul>

## 2.5 Discussion

The papers included in the review vary in design, sample, intervention method, intervention period, outcome measurement and quality which limited the opportunity to combine these heterogeneous studies. The period of breastfeeding training intervention varies from 4 hours to three days. The content of breastfeeding training intervention are different in the included studies (see Table 2.2). The sample is diverse from NICU, community service, maternity clinic, hospital and obstetrics ward. Also, the sample size in NICU is small which cannot represent the total effect (Gianni et al. 2013). Still, these studies provided the evidence for various training interventions among the different professionals in different country.

However, diverse research designs provided different quality in the review. Two RCT studies and five studies with before-and-after designs were included to explore the impact of educational programmes for professionals on the outcome of breastfeeding. There were methodology limitations in the included studies. Before-and-after study designs provide a lower level of evidence compared with RCT studies as they have a risk of bias in participant selection, confounding factors and assessment, which makes it difficult to attribute observed changes to the intervention. The two before-and-after studies of Coutinho et al. and Vittoz et al. were conducted over a long period of five years, during which other changes in practice in the settings might have happened and affected the findings. The three studies by Coutinho et al., Ekström et al. and Grossman et al. recruited samples in more than one setting (Coutinho et al. 2013, Ekström, Kylberg and Nissen 2012, Grossman et al. 2009) but the differences in the conditions and services at the recruitment settings were not reported, which might have affected the outcome of the training intervention. Two studies did not include a sample size calculation, which makes it difficult to assess whether the sample was large enough to identify any differences (Gianni et al. 2013, Shinwell et al. 2006).

None of studies objectively reported or assessed the change in knowledge and

skills among healthcare professionals before and after training interventions. Improvement of knowledge and skills could be an important factor influencing support for breastfeeding mothers, thereby affecting breastfeeding rates. Self-reported questionnaires were used in all the studies, which are potential at risk of bias. Although there were positive effects on the outcome of breastfeeding in several studies, repeated measurement was not used to identify whether these effects were sustained over time. In addition, the cost of the training interventions was not reported in all the studies, which is important information in health education intervention.

The findings showed that the impacts of different training interventions on increasing breastfeeding outcomes were inconsistent. Two RCT studies revealed that the interventions failed to increase the rate of breastfeeding duration and explored different reasons for the findings (Ekström, Kylberg and Nissen 2012, Wallace et al. 2006). Wallace et al. suggested that a “hands off” training intervention concerning positioning and attachment was insufficient to prevent the main factors for ceasing breastfeeding, including cracked nipples and insufficient milk. Future studies of training intervention should differentiate the care needs of mothers (Wallace et al. 2006). Another RCT study carried out by Ekström et al. designed two control groups to explore the effect of time and the training intervention, respectively, on the outcome of breastfeeding (Ekström, Kylberg and Nissen 2012). The results reported a significant difference in the mean duration of exclusive breastfeeding between IG and CGA (before intervention), but no significant difference between IG and CGB (parallel with intervention), which revealed that other changes to maternal services during the period of the study could have been the cause of the significant increase, rather than the training education.

Five other before-and-after studies reported positive associations between the training intervention and breastfeeding outcomes. Significant increases were seen in the following outcomes, including the rate of exclusive breastfeeding in the study of Coutinho et al. (Coutinho et al. 2013), the mean duration of exclusive breastfeeding in the study of Shinwell et al. (Shinwell et al. 2006), the

rate of any breastfeeding at discharge from hospital in the study of Gianni et al. (Gianni et al. 2013), the rate of breastfeeding initiation in the two studies of Shinwell et al. (Shinwell et al. 2006) and Grossman et al. (Grossman et al. 2009). However, no significant increases were found in the rate of exclusive breastfeeding in the study of Grossman et al. (Grossman et al. 2009) or the rate of any breastfeeding in the study of Coutinho et al. (Coutinho et al. 2013). The 32-hour training course was positively impacted both the rate of breastfeeding initiation and breastfeeding duration in the study of Shinwell et al. (Shinwell et al. 2006). These studies suggest that training education covering a wide range of staff, including neonatal nurses, midwives, nurses in postnatal wards and physicians, and using a multidisciplinary intervention were beneficial for increasing breastfeeding outcomes.

The main reason for the inconsistent breastfeeding outcomes was that the training interventions varied in terms of training components, amount of contents, educational model, the professionals being trained, assessment strategy and length of time (from four hours to three days). The majority of studies undertook the training interventions based on current evidence-based practice rather than an educational theory model. The study of Wallace et al. developed the intervention on P&A, which is a key skill of breastfeeding and offered the shortest length of training course in the included studies (Wallace et al. 2006). Only the study of Coutinho and Lira (Coutinho et al. 2013) carried out WHO/UNICEF 20-hour training course, which has been regarded as a gold standard educational course and appropriate globally.

Using the WHO/UNICEF 20-hour training course as a structured programme, that is a multifaceted approach, has been proved to have a positive impact on increasing initiation and duration of exclusive and any breastfeeding compared to non-structured programmes, according to a systematic review (Beake et al. 2012). In Beake's review, there were 21 primary studies eligible based on the criteria and recruited during 1992–2010, including 15 studies that applied WHO/UNICEF BFHI policies and 6 studies that used practice-based training interventions. The rates of breastfeeding initiation, exclusive breastfeeding and

any breastfeeding within one week of birth reported significant increases in all studies that had measured these outcomes. Only four studies explored the rate of exclusive breastfeeding at six months of age, including three studies with significant increases and one study with no significant increase. It indicated that training intervention in hospitals is more likely to enhance breastfeeding outcomes in hospitals but has less influence on breastfeeding practices after discharge from hospital.

Continued support for mothers after discharge from hospital is an essential positive factor that increases breastfeeding outcomes (Bechara Coutinho et al. 2005). Only one study, that of Coutinho et al., examined the impact of training interventions in counselling skills for home visitors in the community and revealed that increased skills of home visitors were positively associated with increased rates of exclusive breastfeeding at 3–5.9 months (Coutinho et al. 2013). In 2005, Coutinho et al. reported evidence that support from professionals both in hospital and the community achieved a significant increase in the rate of exclusive breastfeeding compared with only hospital-based support (Bechara Coutinho et al. 2005). This research consisted of three stages, which were conducted during 1998 and 2001. In the first stage of the study, one cohort survey on infant feeding was conducted among 318 infants of 0–5.9 months before the training intervention in 1998. Next, 90% of health professionals in two hospitals, where 350 infants were born and recruited in 2001, were trained using the WHO/UNICEF 20-hour BFHI training. In the third stage, 350 recruited infants were allocated randomly into two groups; the intervention group of 175 received ten home visits and the control group of 175 received no home visits. All the professionals conducting home visits had received the same 20-hour BFHI training. A significant increase in the rate of exclusive breastfeeding was found in the two hospitals, from 21% in 1998 to 70% in 2001 ( $p < 0.0001$ ). However, the positive impacts on breastfeeding practices were not sustained and the rate of exclusive breastfeeding at ten days after birth decreased to 30% (53/175) for those who received no home visits. Home visits from BFHI-trained professionals contributed to a sustained positive effect on the duration of exclusive breastfeeding at home. The rate of exclusive breastfeeding in the home visits

group aged 10–108 days was significantly higher than the no home visits group (13%,  $p < 0.0001$ ). Home visit support is especially crucial for mothers who have only a short stay in hospital (Bechara Coutinho et al. 2005). The methodology of the study was robust, using a randomised home-visiting intervention and prospective follow-up, which controlled confounds factors. It not only highlighted the importance of BFHI training for professionals in terms of increasing the breastfeeding rate in hospitals, but it also provided an evidence base for the value of home visits and continual support in increasing the rate of exclusive breastfeeding.

Multifaceted approaches to training and sustainable support by professionals who have been trained and are skilled and knowledgeable about breastfeeding are the crucial positive factors in improving breastfeeding outcomes based on the above evidence. The following studies reported other various factors influencing the effectiveness of training interventions. Haynes and Haines reflected that training interventions using only educational materials and didactic approaches were usually inefficient in changing clinicians' practices (Haynes and Haines 1998). The study of Coutinho, using a thorough and interactive style of training, achieved a positive impact on the rate of exclusive breastfeeding for infants aged 0–5.9 months (Coutinho et al. 2013). Bero et al. suggested that an interactive educational programme is more likely to be effective at increasing the practical skills of professionals (Bero et al. 1998). Also, efficient training interventions must be mandatory for all professionals, supported by a strong policy and senior staff. If training is voluntary, it will only attract those motivated and willing to change, and to adopt and implement new, evidence-based breastfeeding practices (UNICEF UK 2013). In addition, education programmes should consider changing incorrect perceptions regarding breastfeeding practices due to mothers' cultural and social influences (Fairbank et al. 2000). Although, various training interventions have been used in the included studies, none of studies examined how professionals' knowledge changed between pre- and post-training. The practical knowledge level after attending training was unknown and cannot be compared among studies.

We have discussed the influencing factors regarding training interventions in terms of inconsistent breastfeeding outcomes in the recruited studies above. Next, we will discuss the reasons for breastfeeding cessation after discharge from hospital, which affect breastfeeding duration. Three studies (Shinwell et al. 2006, Vittoz et al. 2004, Wallace et al. 2006) consistently reported that insufficient breast milk was the most common reason for ceasing breastfeeding, which is consistent with the findings in the Chinese breastfeeding review (Xu et al. 2009). The reasons for insufficient breast milk have been explained in Chapter 1. The most common reasons were incorrect positioning and attachment, resulting in the inefficient transfer of breast milk and lack of self-efficacy. Healthcare professionals are a more important support for mothers, to provide evidence-based information and proficient skills for solving problems, than peer supporters, as reported in a systematic review by Bevan and Brown (Bevan and Brown 2014). Another systematic review by Meedya, Fahy and Kable suggested that professionals' interventions might be efficient in prolonging breastfeeding duration by overcoming breastfeeding problems and enhancing mothers' breastfeeding self-efficacy (Meedya, Fahy and Kable 2010).

Sustainable support by healthcare professionals, helping mothers to overcome breastfeeding problems, is essential to increase breastfeeding duration. Hannula, Kaunonen and Tarkka, in their systematic review, reported that breastfeeding encouragement and guidance by professionals potentially improved mothers' self-efficacy and addressed breastfeeding problems (Hannula, Kaunonen and Tarkka 2008). Telephone support, home visits and breastfeeding centres were the main approaches used to offer effective support from healthcare professionals. Thus, professionals should be empowered and supported by their organisations to be breastfeeding supporters and trained in support skills to maintain breastfeeding at home, which might be an efficient strategy to increase breastfeeding rates.

## **2.6 Conclusion**

In conclusion, it is still difficult to generalise the total effect of training interventions on breastfeeding outcomes due to the inconsistent changes in



breastfeeding rate, diverse training methods, different site locations and sample sizes in the studies identified in the review. The review indicates that an effective training programme to increase the breastfeeding rate should consider the factors influencing the breastfeeding rate, provide targeted training and cover a wide range of professionals. Efficient educational content should involve multidisciplinary knowledge as well as considering the cultural and social factors that influence mothers' choices. A structured training programme is most likely to be beneficial, such as the 20-hour BFHI training course. An interactive style of training intervention might be most effective in increasing professionals' skills in breastfeeding support. Feedback and objective assessment after a training intervention are necessary to explore whether the education intervention has improved practical knowledge and skills. Furthermore, sustainable support at home, such as home visits, was found to play an essential role in increasing breastfeeding duration and the rate of exclusive breastfeeding. Still, more studies need to be developed to examine the impact of improving the support skills of professionals in hospitals, combined with continued support at home, on breastfeeding outcomes in the future.

# **Chapter 3 A qualitative study of the views of health professionals on policies and practices of breastfeeding support in Zhejiang Province, China**

## **3.1 Background**

The evidence regarding the importance of breast milk for children's health was discussed in Chapter 1.1.1. Breastfeeding is a simple and cost-effective way to improve infant's nutrition and reduce infant's mortality (World Health Organization and UNICEF 2003). Promoting breastfeeding has been considered as the most important part of infant feeding strategies by the WHO and UNICEF. Increasing the rate of breastfeeding initiation within the first hour after birth and the rate of exclusive breastfeeding in the first six months has been a key target to promote the children's health and decrease the financial cost of medical care of children by the governments both in developing and developed countries (UNICEF 2005, World Health Organization 2014).

An efficient and specific policy with guidance in the maternity services is beneficial to achieve sustainable improvement in breastfeeding practices. Also, the effectiveness of behavior change depends on the effective implementation and audit of the policy (UNICEF UK 2013). Previous studies reported that the implementation of "Ten Steps" on promoting breastfeeding in the Baby Friendly Hospital Initiative (BFHI) hospitals was not applied strictly in China. A cohort study of Qiu et al (2009) aimed to explore the influence factors on the rate of breastfeeding initiation and exclusive breastfeeding at discharge from BFHI hospitals in Zhejiang Province, China. The finding suggested that formula and bottles were easily accessible for mothers in BFHI hospitals, although formula and feeding-bottle was prohibited in BFI hospitals. It is likely to supplement with formula when mothers are unsure whether or not they produce sufficient breast milk. To some extent, the no strict implementation of BFI strategy affected the rate of exclusive breastfeeding in the first six months (Qiu et al. 2009). Guo and Wang (2001) explored the breastfeeding practices and influence factors on the breastfeeding rate in urban areas of China. They reported that mothers

accepted free samples of formula and gifts from formula companies negatively affected the full breastfeeding rate at 0-4 months (Guo and Wang 2001). Also, offering formula samples to mothers by the company violated the rule of the International Code of Marketing of Breast-milk Substitutes (World Health Organization 1981).

A few studies provided limited evidence for no strict implementation of breastfeeding policies influencing on breastfeeding rate in China by exploring factors influencing breastfeeding rate (Guo et al. 2013, Qiu et al. 2009, Wang et al. 2002). It is not sufficient to determine the impact of current breastfeeding policies on improvement of breastfeeding outcomes, including breastfeeding duration, the rate of breastfeeding initiation and exclusive breastfeeding. Exploring the actual current breastfeeding policy and breastfeeding practices by healthcare professionals is essential to provide evidence for developing an effective breastfeeding training programme, including the implementation of the breastfeeding support policy, support needs for breastfeeding mothers and suggests on improving breastfeeding outcome.

### **3.2 Aims**

1. Establish how breastfeeding policies and practices are applied in a large tertiary BFI accredited maternity hospital
2. Examine healthcare professionals views of the reasons for early breastfeeding cessation, mothers educational needs in relation to breastfeeding, breastfeeding support offered to mothers in the hospital and after discharge from hospital
3. Establish the contents of breastfeeding training currently offered to healthcare professionals, training approaches and training evaluation
4. Examine healthcare professionals' views of how breastfeeding support provided in the hospital can be improved

### **3.3 Ethics**

The study was approved by Research Ethics Committees both at Coventry University, UK (ref: P5842) and Zhejiang University, China (ref: 20120002) (See Appendix A and B). All the participants were told why the study was being conducted and what it would involve. The researcher went through the information sheet with participants and answered any questions that participants had. The researcher asked them if there is anything that is not clear or if the participants would like more information.

The participants are given time to decide whether or not they wish to take part. If they chose to take part in the study, the researcher made an appointment with the participants when they were free, ensures they understood the purpose of the study, and any potential risks (See Appendix I). The participants were asked to sign a consent form (See Appendix I). Participation was entirely voluntary. If they did not wish to take part for any reason, participants did not need to give any reason. They needed to sign the refusal form and return it in the envelope provided or speak to the researcher. If the participant changes their mind about taking part in the study s/he can withdraw at any time. If s/he does decide to withdraw, all their data would be destroyed and will not be used in the study.

If the participants were not happy with any part of the study at any time, they could contact the researcher (Dr Yuanying Ma), Dr Rui jing Wu (Assistant Chancellor) in Women's Hospital, School of Medicine, Zhejiang University. At Coventry University they can contact Professor Ian Marshall (Pro Vice Chancellor-Research) by the provided contact details in the participant information sheet (PIS).

This study was conducted as part of a PhD programme at Coventry University, UK. The study procedures comply with the UK Data Protection Act 1998 and participation will be kept confidential. All the data provided by the participants will be kept confidential unless the researchers believe that the participants or

someone else is at risk of serious harm in which case the researcher would tell the participants before the information is passed on to somebody who can help.

The results will enable the researcher to understand the participants' knowledge and experiences in supporting breastfeeding practices. The results will also be presented at academic conferences and/or written up for publication in peer reviewed academic journals. If the participants wished to be kept informed of the findings and benefits the researcher agreed to send them a summary of the report's findings.

### **3.4 Materials and methods**

#### **3.4.1 Research site**

This study was conducted in Women's Hospital, School of Medicine, Zhejiang University in Zhejiang province, China. This tertiary hospital was established in 1951 and is the largest women's hospital currently in Zhejiang province. It is a provincial maternity service centre which offers major advances in gynecology, obstetrics service, clinical teaching and innovation. In 2013, 15,000 babies were delivered in the hospital. The hospital achieved BFI (UNICEF Baby Friendly Initiative) hospital accreditation in 1992 and the hospital set up breastfeeding policy. It also provides breastfeeding training courses for professionals and breastfeeding support for mothers in Zhejiang province.

#### **3.4.2 Recruitment**

Study participants were recruited amongst healthcare professionals who worked with breastfeeding mothers in the hospital. Nurses, doctors, midwives and paediatricians were invited to participate in the study in five departments, including two obstetrics departments, delivery department, healthcare department and NICU. The director of each department invited two or three healthcare professionals to take part in the study. One breastfeeding trainer and one breastfeeding counsellor were purposively selected to participate in the study.

### **3.4.3 Measures**

A semi-structured interview (SSIs) for clinicians covered the following aspects, including policies on supporting breastfeeding, ongoing BFI hospital policy, implementation influence factors on breastfeeding rates, support offered to mothers after discharge from hospital, current breastfeeding training on professionals, ways to improve training, feasibility of self study, perceptions on key knowledge and techniques of breastfeeding.

### **3.4.4 Procedure**

Thirteen professionals were invited to undertake the study by five directors of departments according to the inclusion criteria; additionally one breastfeeding trainer and one breastfeeding counselor were invited. Face to face interview was conducted in Women's Hospital, School of Medicine, Zhejiang University on November and December in 2012. All participants were asked to read the participant information sheet and then to sign consent form to before the study. Each interview took approximately 30 minutes and was undertaken by the researcher in a private office. All interviews were audio taped and the researcher took notes at the same time. Interviews were conducted in Mandarin, then transcribed anonymously and translated to English. A senior doctor checked the accuracy for all the translation of the transcription.

### **3.4.5 Data analysis**

A thematic analysis is used to describe the qualitative data by identifying, depicting and discussing the main themes. Six steps of thematic analysis as illustrated by Braun and Clarke were used to explore the perceptions and narratives of staff in the SSIs (Braun and Clarke 2006). Firstly, the researcher transcribed all recorded interviews and then translated Mandarin transcripts into English. Then, each interview was coded by capital letters according to the order of appearing in the interview. The procedure of developing the main themes is showed as following. The thematic networks were applied according to the structure of thematic networks established by Attride-Stirling (Attride-Stirling 2001).

- 1. Familiarisation with the data:** The researcher familiarised the data by listening to audio-recorded data, reading the transcription and having preliminary observations and getting a feel for the total data.
- 2. Coding:** The initial codes consisting of Capital with small extracts were developed manually by identifying the similar topics. Write initial codes on the margins of transcripts. Basic Themes were developed consisting of the initial codes. These Basic Themes depicted lowest-order premises evidence from the textual data.
- 3. Searching for themes:** Initial thematic map consisting of Basic Themes was developed with initial codes. Explore the relationship between Basic Themes, category them grouped together to summarize more abstract principles and develop Organizing Themes. Global Themes were developed by collating, refining and discarding the Organizing Themes. Web-like maps described the main themes at each of the three levels and illustrated the relationships between them. Cut and paste extracts out of the original context and put them together with other examples of data on the Global Theme.
- 4. Reviewing themes:** The researcher checked the Global Themes in relation to both coded extracts and the full data-set. The Global Themes were edited again by combining or discarding them.
- 5. Defining and naming themes:** The researcher wrote each theme which was concise, informative and fit for the whole story about the data.
- 6. Describe and discuss the findings:** The Global Themes were described by analytic narrative with sufficient data extracts according to the original research questions. Vivid extracts were particularly chosen to represent the essence of the point and develop a coherent story about the data. Discuss and test the results in relation to existing literature by referring to external evidence, including previous quantitative studies and qualitative studies. The potential bias, influence, credibility of the findings, including the number of analyst and respondent validation were discussed during analysis.

## **3.5 Results**

### **3.5.1 Characteristics of respondents**

All 15 invited professionals agreed to participate in the study. The sample included six nurses in postpartum ward, two nurses in NICU, two midwives in delivery department, one healthcare doctor working in healthcare department, two pediatricians in NICU, one breastfeeding trainer, one breastfeeding counselor. Recruited staff covered a range of job titles, including junior, attending and senior titles. Participants' mean age was 41.5 years old, (SD=10.3, 24-58 years old). On average respondents have been working in healthcare for 20.2 years, (SD=10.2, 4-37 years). See table 3.1.



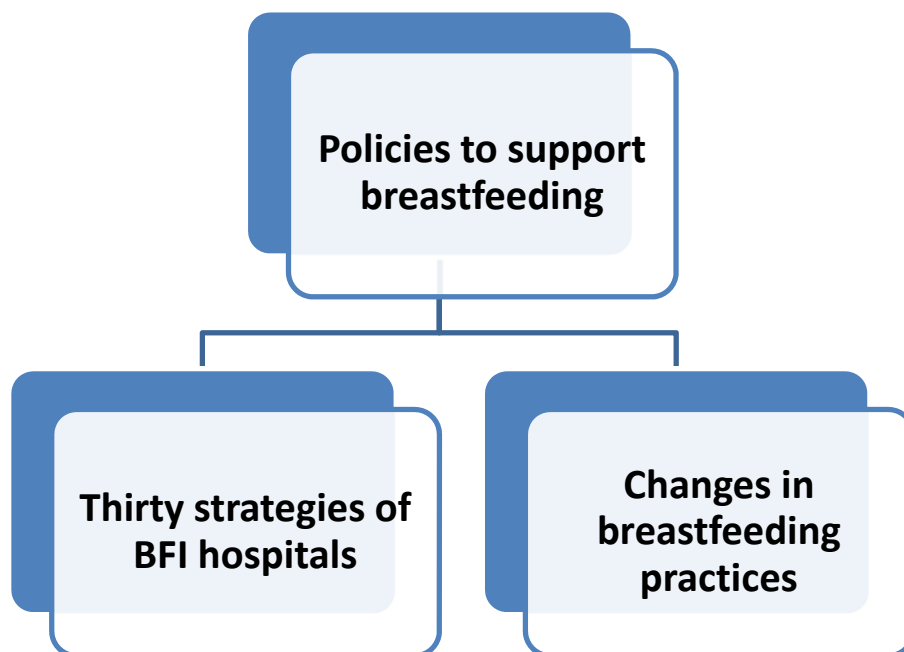
**Table 3.1 Characteristics of participants (N=15)**

Code	Age	Job Type	Job level	Years working in healthcare
(A)	>50	Health doctor	Senior doctor	28 Years
(B)	>50	Breastfeeding trainer	Vice-senior nurse	37 Years
(C)	41-50	Nurse (postpartum ward)	Vice-senior nurse	25 Years
(D)	>50	Nurse (postpartum ward)	Mid-grade nurse	30 Years
(E)	>50	Breastfeeding counsellor	Vice-senior nurse	31 Years
(F)	30-40	Nurse (postpartum ward)	Primary nurse	10 Years
(G)	<30	Nurse (postpartum ward)	Primary nurse	4 Years
(H)	<30	Nurse (postpartum ward)	Primary nurse	7 Years
(I)	30-40	Nurse (postpartum ward)	Mid-grade nurse	20 Years
(J)	30-40	Midwife	Mid-grade midwife	20 Years
(K)	30-40	Midwife	Mid-grade midwife	9 Years
(L)	41-50	Nurse (NICU)	Mid-grade nurse	25 Years
(M)	30-40	Nurse (NICU)	Mid-grade nurse	16 Years
(N)	>50	Pediatrician	Vice-senior doctor	30 Years
(O)	30-40	Pediatrician	Vice-senior doctor	11 Years

### 3.5.2 Main themes emerging from the interviews

Five major themes emerged from transcript data: (1) Policies to support breastfeeding; (2) Actions to promote breastfeeding; (3) Factors influencing breastfeeding rate; (4) Breastfeeding training; (5) Key breastfeeding knowledge and skills.

#### Theme 1: Policies to support breastfeeding



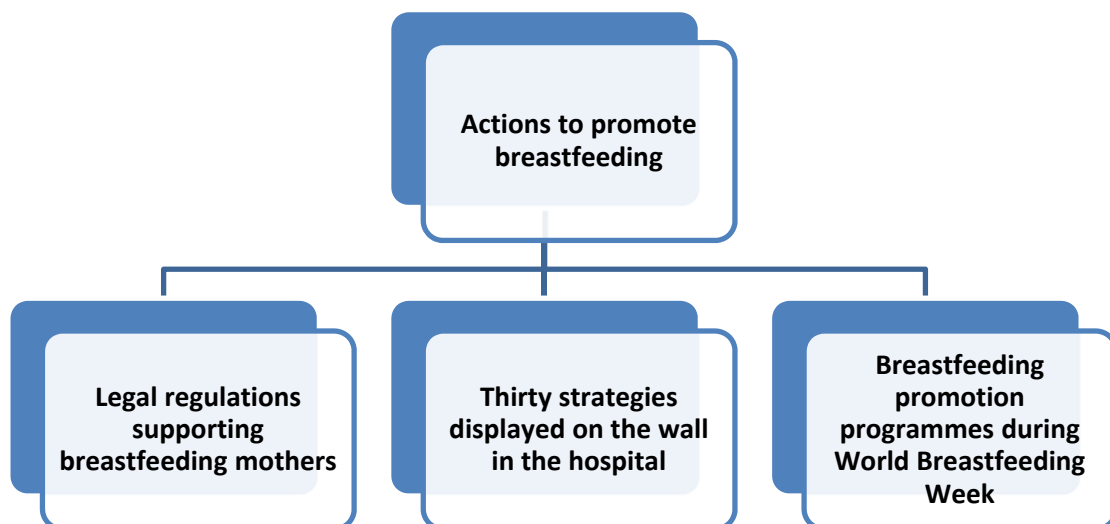
**Figure 3.1 Policies to support breastfeeding**

The recruited hospital achieved BFI accreditation in 1992. Thirty strategies that BFI hospitals are required to follow include “Ten Steps” (UNICEF 2005), “The International Code of Marketing of Breast milk Substitutes” (World Health Organization 1981) and “Ten regulations on promoting breastfeeding” set up by the policy-makers of the hospital. Significant changes in breastfeeding practices and support policies have been made since the implementation of the strategies of BFI hospital. In accordance with BFI standards, rooming-in for mothers and healthy infants is required to facilitate breastfeeding. Initiation of breastfeeding and feeding on demand are encouraged rather than fixed feeding every three hours. All promoting policies increased the breastfeeding rate. A breastfeeding trainer stated: *“The biggest change is the rate of breastfeeding; in my hospital*

*this has increased a lot since we got BFI accreditation. Before this, mothers and their babies were separated. The babies were always given fixed feeding times, every three hours. The babies were not breastfed at night. Initiation of breastfeeding was not soon after birth. But when we got accreditation, the hospital paid attention to breastfeeding and there are regulations to support breastfeeding, such as initiation of breastfeeding, rooming-in, and prohibiting bottle feeding” (B).*

However, BFI standards are difficult to be applied in NICU due to mother-infant separation, inability to suck mother’s breast for some premature. It needed more monitor for breastfeeding premature whether having the risk of low blood glucose due to insufficient intake of breast milk. One Pediatrician stated: *“On one hand, BFI strategies emphasizes the importance of breastfeeding. On the other hand, it is difficult to breastfeed premature babies according to the requirement of BFI hospital, it may even bring risks. We have to monitor blood glucose frequently for the safety of premature babies” (O).*

## **Theme 2: Actions to promote breastfeeding**



**Figure 3.2** Actions to promote breastfeeding

### **Legal regulations supporting breastfeeding mothers**

According to the law outlined in the “*Maternal and Infant Health Care*”, breastfeeding mothers are entitled to three months of maternity leave, one hour of breastfeeding during work and they are not expected to work nightshifts until their baby turns one. These strategies are quite beneficial to support breastfeeding. A breastfeeding trainer stated: “.....*The nation has a law ‘Maternal and Infant Health Care’, to support breastfeeding. Mothers don’t have to work at night or on call until the baby is one year old. There is maternity leave of three months and when they return to work they have one hour to breastfeed their baby every day until the baby is one year old.....*” (B).

### **Thirty strategies displayed on the wall in the hospital**

To facilitate learning breastfeeding support policies by staff, thirty strategies of BFI hospital were displayed on the hospital’s wall in the maternity ward. Also, mothers acknowledged the crucial breastfeeding supporting policies on the wall which increases parents’ awareness what support they can expect from professionals. What’s more, displaying the policy on the wall makes a wide range of professionals and mothers know and understand the policy and rules they need to adhere. Therefore, it improves the implementation of supporting strategies. For instance, both professionals and mothers understand why mothers are not allowed to use formula feeding and feeding-bottles in the hospital. One health doctor said: “*Everybody knows the benefits of breast milk and the feeding bottles and teats cannot be found in the hospital.....*” (A).

### **Breastfeeding promotion programmes during World Breastfeeding Week**

World Breastfeeding Week (1st-7th Aug) is an important chance to circulate the benefits of breastfeeding. Every year the Chinese Ministry of Health requires every maternity hospital to carry out various activities to promote breastfeeding during World Breastfeeding Week. A breastfeeding counsellor said: “*The nation celebrates World Breastfeeding Week to broadcast the benefits of breastfeeding every year. The nation has many projects to support breastfeeding such as breastfeeding consultant rooms.....*” (E).

### Theme 3: Factors influencing breastfeeding rate

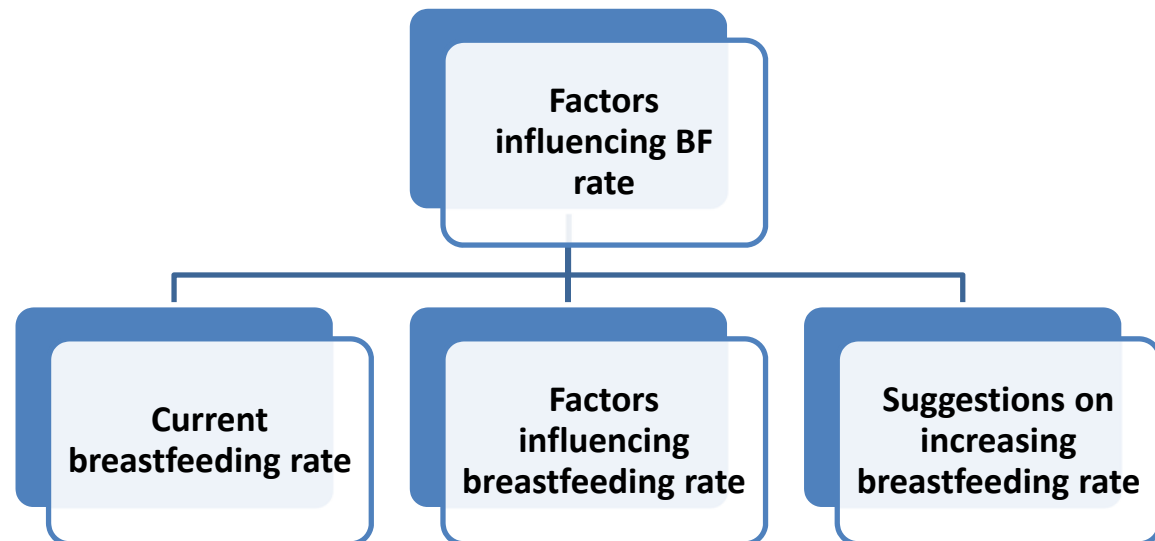


Figure 3.3 Factors influencing breastfeeding rate

#### Current breastfeeding rate

All respondents in the postpartum ward reported the rate of breastfeeding initiation and breastfeeding rate at discharge of the hospital were nearly 100%. A nurse in postpartum ward said: *“Now in my ward, I think the rate of breastfeeding initiation is near 100% except in special circumstances and the rate of any breastfeeding on discharge is also nearly 100%”* (D). The reasons for feeding babies with formula included mother’s medical conditions that could affect the baby (e.g. hepatitis B) or severe complications during labour resulting in separation from their babies. A nurse in postpartum ward stated: *“Nearly 100% but special reasons, such as mothers with hepatitis B or severe complication of mother. They choose formula feeding.....”* (I). In contrast, four respondents working in the NICU reflected the breastfeeding initiation rate in their ward in the first hour after birth was under 5% and increased by around 20%-60% at discharge from hospital. A nurse in NICU stated: *“It is really low rate of early initiation of breastfeeding, under 5% because of mother-baby separation and*

*high-risk infant who can't be fed because of diseases. But the breastfeeding rate is around 50%-60% at discharge from NICU" (M).*

### **Factors influencing breastfeeding rate**

Three months of maternity leave was one of the government's strategies to support breastfeeding mothers. However, the most common reason for breastfeeding cessation was short period of maternity leave and returning work after three months of delivery as reported by 9 respondents. Inadequate skills to maintain breastfeeding, lack of facilities to store breast milk and insufficient time for breastfeeding at work contributed to the failure of maintaining breastfeeding after returning work. A nurse in postpartum department said: *".....Mothers have to return to work after three months and we should teach mothers how to express and how to store breast milk" (D).* A nurse in NICU stated: *"Three months of maternity leave is too short time for breastfeeding. When mothers return to work, it is not convenient to breastfeed at work due to lack of time" (M).*

Seven respondents named professionals' lack of skills to support mothers with milk insufficiency, addressing breastfeeding problems, mothers or babies being unwell as the reasons for early cessation. A breastfeeding trainer stated: *"..... Another reason I think is that the support services are not adequate for mothers. Some staff should be trained in skills and knowledge of breastfeeding, especially how to evaluate insufficient breast milk. Most mothers give up breastfeeding earlier because of insufficient breast milk" (B).* A nurse in postpartum department said: *"..... The third reason is cracked nipple and breast engorgement and the staff should guide the mothers how to position and attach correctly" (F).*

Respondents described various support services that are offered to breastfeeding mothers at discharge from hospital. Eleven respondents said that telephone consultation after discharge was offered to most new mothers in the hospital. Ten respondents mentioned routine postpartum visits provided by community services. Six respondents thought that mothers could get help from the breastfeeding consultants when they are discharged. Four respondents

reported that older generation and friends who had breastfeeding experience helped mothers to breastfeed successfully. In addition, some mothers got supports from outpatient services in hospitals or searched internet for information on breastfeeding. However, few of these services were assessed for its effectiveness in supporting breastfeeding mothers. The postpartum visits conducted by professionals in community services provided the possible chance to support breastfeeding after discharge of hospital. However, a nurse in NICU argued that professionals in communities lack sufficient skills to support breastfeeding. She said: *“.....They can get help from older generation, by telephone consultation and from community services. But the professionals in community services lack of knowledge and skills to support breastfeeding.....”* (M). A Pediatrician said: *“To be honest, there is lack of efficient organizations to support breastfeeding after mothers’ hospital discharge. Many mothers tackle with breastfeeding problems with the help of older generation and nanny”* (O).

Two respondents indicated that mothers’ incorrect beliefs about nutritional value of formula often caused them to cease breastfeeding. Those beliefs are often promoted by formula companies and older generation. A breastfeeding counsellor stated: *“..... The second reason is that old ideas from the old generation such as ‘formula is good’ and that ‘baby is hungry’. We should broadcast the benefits of breastfeeding to public. The third one is the advertisements of formula companies on TV, in magazines and this will confuse the mothers.....”* (E).

### **Suggestions on increasing breastfeeding rate**

Respondents made a number of suggestions about support that should be provided for mothers who wish to maintain breastfeeding after returning to work. They suggested the period of maternity leave should be extended to support breastfeeding. Before returning to work women should be taught the skill of hand expression (HE) and storage method by experienced professionals. More breastfeeding time and safe storage facilities for breast milk were beneficial to maintain breast milk feeding after returning work. A nurse in NICU: *“Extend the*

*maternity leave to six months, give breastfeeding time at work and provide storage facilities for breast milk” (L).*

Professionals should be strengthened how to support breastfeeding, including key skill of positioning and attachment (P & A) and techniques to manage common breastfeeding problems, such as insufficient breast milk. Breastfeeding support training for professionals should be followed by an objective assessment of breastfeeding knowledge and skills. A Health doctor said: *“Some staff should be trained in skills and knowledge of breastfeeding, especially how to evaluate insufficient breastmilk, correct or incorrect positioning and attachment” (A).* A paediatrician stated: *“.....After being trained, their knowledge and skills should be assessed” (N).*

Mothers should receive clear, objective information from professionals to understand the risks and benefits associated with choosing different infant feeding methods. Advertising formula in media and giving out formula samples to new mothers should be strictly prohibited. A breastfeeding counselor stated: *“.....We should broadcast the benefits of breastfeeding for the public. The government should prohibit any advertisements of formula on TV and in magazines.” (E).*



## Theme 4: Breastfeeding training in China

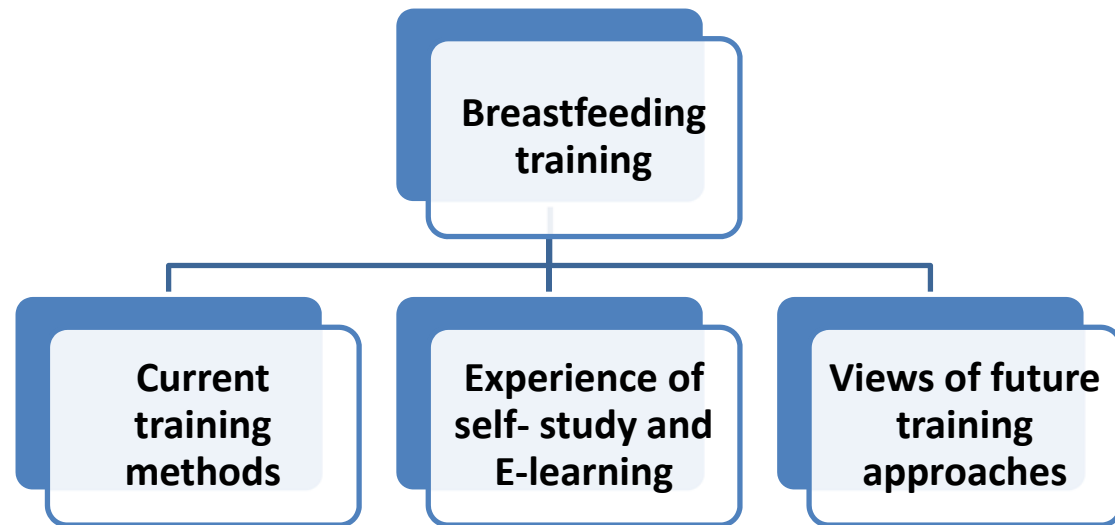


Figure 3.4 Breastfeeding training in China

### Current training methods

All healthcare professionals working in the hospital are required to attend breastfeeding training courses to understand the importance of breastfeeding and improve both theoretical knowledge and practical skills to support breastfeeding. One midwife said: *“Since we achieved the accreditation BFI hospital, all the staff should be trained on the knowledge of breastfeeding. I learned the “Ten Steps” and the advantages of breastfeeding and the duration of exclusive breastfeeding.....”* (J). A nurse in postpartum ward said: *“.....Now we all know the advantages of breastfeeding, benefits for babies. The theoretical knowledge and breastfeeding support skills among professionals have been improved by training”* (D).

In the study, all participants received four hours training on breastfeeding knowledge delivered by experienced breastfeeding specialists before they began work. The training book is a mandarin version of the WHO/UNICEF 18-hour breastfeeding course book which is translated by the China’s Ministry of Health. However, the course is taught for four hours and professionals are advised to familiarize themselves with the remaining content that is not covered

during the training by self-study. The content of the four hours training course covers breastfeeding policy, “Ten Steps” of BFI hospitals (UNICEF 2005), benefits of breastfeeding, breastfeeding duration and brief introduction of basic breastfeeding skill of P & A. However, none of the respondents reported self-study of the remaining content of the 18-hour course that was not delivered during their four hours training. A nurse in postpartum said : *“When I began working, I took part in 4-hour breastfeeding training using 18-hour breastfeeding training course of WHO, including the Ten Steps and the regulations of my hospital, and how to cope with some breastfeeding problems. I also took part in the retraining and learned the latest knowledge of breastfeeding.”* (F).

One breastfeeding trainer and one breastfeeding counselor took part in more national breastfeeding training courses than other staff, including 72-hour National Breastfeeding training course as the provincial breastfeeding trainers, and Breastfeeding consultation skills in addition to the 18-hour training course. A Breastfeeding trainer stated: *“I took part as a provincial teacher in the national training, which was conducted by the ministry of health in 1992. The teaching materials were 72 hours (WHO). The second training I took part in was breastfeeding consultation including the techniques and skills to cope with some problems; this training was for three days. In 2008, I took part in a national discussion on breastfeeding including the communication skills, the skills to manage common breastfeeding problems and the assessment of techniques of correct positioning and attachment, sufficient breast milk”* (B).

Five nurses in the postpartum ward and one midwife said that they continued to be trained for four hours every year. The content of the yearly course varies every year and is focused more on practical skills comparing to the initial course. Skills that are being practiced during the yearly course include P & A, expressing breast milk, techniques to assess whether a mother produces enough breast milk, practical skills to deal with various breastfeeding problems, and ways to enhance mothers’ confidence. A midwife stated: *“..... every year I took part in 4 hours retraining. I learned the positioning and attachment and how to cope with breastfeeding problems and how to express milk.”* (K).

Two respondents in NICU continued their breastfeeding training by attending national infant feeding conference and National breastfeeding seminar which updated their knowledge of breastfeeding. But the updated knowledge was not described specifically. One pediatrician in NICU said: *“I learned the knowledge of breastfeeding in the training course of breastfeeding conducted by my hospital. I also updated my knowledge by communicating with specialists from other countries and participated in national infant feeding conference.”* (O). See table 3.2.

### **Experience of self- study and E-learning**

All staff previously self-studied to improve their knowledge of breastfeeding. This included reading articles describing the latest breastfeeding research findings or reading breastfeeding books. Eleven professionals improved their knowledge of breastfeeding by E-learning. A Nurse in postpartum ward stated: *“Yes, sometimes I learned about breastfeeding by self-study online, such as reading related journals”* (C). See table 3.2.

### **Professionals’ views of future training approaches**

Interviews’ data suggest that a wide range of professionals would benefit from participating in routine retraining, including nurses in postpartum ward, NICU, midwives and doctors. A breastfeeding counselor said *“I think not only the nurses and midwives should be trained, but also the doctors should be trained in breastfeeding. They all should be re-trained to be up to date with the latest knowledge and breastfeeding support skills”* (E).

According to respondents additional training should mainly focus on correct positioning and attachment, theoretical knowledge of breastfeeding mechanism and latest breastfeeding research guidelines. A Breastfeeding trainer stated: *“I think for the obstetrics nurses, they should be taught the knowledge of breastfeeding such as the mechanism, the principles of successful breastfeeding, positioning and attachment, the techniques in special circumstances and another important thing I think all the staff should practice how to position and attach”* (B).

Training courses should be carried out by well-trained and experienced clinicians. Various teaching approaches should be applied to improve the training effectiveness, such as scenarios analysis for common breastfeeding problems and multimedia or models practices to improve the skills of positioning and attachment and expressing breast milk. A nurse in NICU said: *“.....Staff should be trained in both theory of breastfeeding and practical skills by multimedia or training course. Cases analysis can be conducted among staff to improve the ability of solving problems.”* (M).

Computers with internet access are available in Chinese hospitals and are commonly used by staff. However, six respondents thought that breastfeeding e-learning, or finding out about breastfeeding guidelines and best practice while at work is inconvenient due to their busy schedule. A nurse in postpartum department stated: *“Now it is not convenient but maybe in the future. It is almost impossible to access computers to do other things at work due to time pressure.....”* (G). See table 3.2.

One respondent suggested that the effectiveness of training courses should be assessed by objective tests to learn further training needs and improve the effectiveness of the future training. A pediatrician stated: *“..... After being trained their knowledge and skills should be assessed by objective tests to learn the training needs in the future”* (N)

**Table 3.2 Completed training and views of training methods**

Code	Completed breastfeeding training	Experience of Self- study	Experience of E-learning	Views of training by computer at work
(A)	4-hour training using WHO/UNICEF 18-hour training course	Yes	Yes	Convenient
(B)	WHO training course (72 hours);Breastfeeding consultation course (72 hours);National breastfeeding seminar (one day)	Yes	A little	Convenient
(C)	4-hour training using WHO/UNICEF 18-hour training course and 4 hours re-training each year	Yes	Yes	Inconvenient
(D)	4-hour training using WHO/UNICEF 18-hour training course and 4 hours re-training each year	Yes	Yes	Convenient
(E)	National breastfeeding training (72 hours); National breastfeeding consultation training (72 hours)	Yes	Yes	Convenient
(F)	4-hour training using WHO/UNICEF 18-hour training course and 4 hours of re-training each year	Yes	Yes	Convenient
(G)	4-hour training using WHO/UNICEF 18-hour training course and 4 hours re-training each year	Yes	Yes	Inconvenient

**Table 3.2 Completed training and views of training methods (continued)**

Code	Completed breastfeeding training	Experience of Self- study	Experience of E-learning	Views of training by computer at work
(H)	4-hour training using WHO/UNICEF 18-hour training course and 4 hours re-training each year	Yes	No	Convenient
(I)	4-hour training using WHO/UNICEF 18-hour training course and National infant feeding seminar	Yes	Yes	Convenient
(J)	4-hour training using WHO/UNICEF 18-hour training course and 4 hour re-training each year	Yes	Yes	Inconvenient
(K)	4-hour training using WHO/UNICEF 18-hour training course and breastfeeding lecture	Yes	No	Inconvenient
(L)	4-hour training using WHO/UNICEF 18-hour training course	Yes	No	Convenient
(M)	4-hour training using WHO/UNICEF 18-hour training course	Yes	No	Inconvenient
(N)	4-hour training using WHO/UNICEF 18-hour training course	Yes	Yes	Convenient
(O)	4-hour training using WHO/UNICEF 18-hour training course and national infant feeding conference	Yes	Yes	Inconvenient

## Theme 5: Views on key breastfeeding knowledge and skills

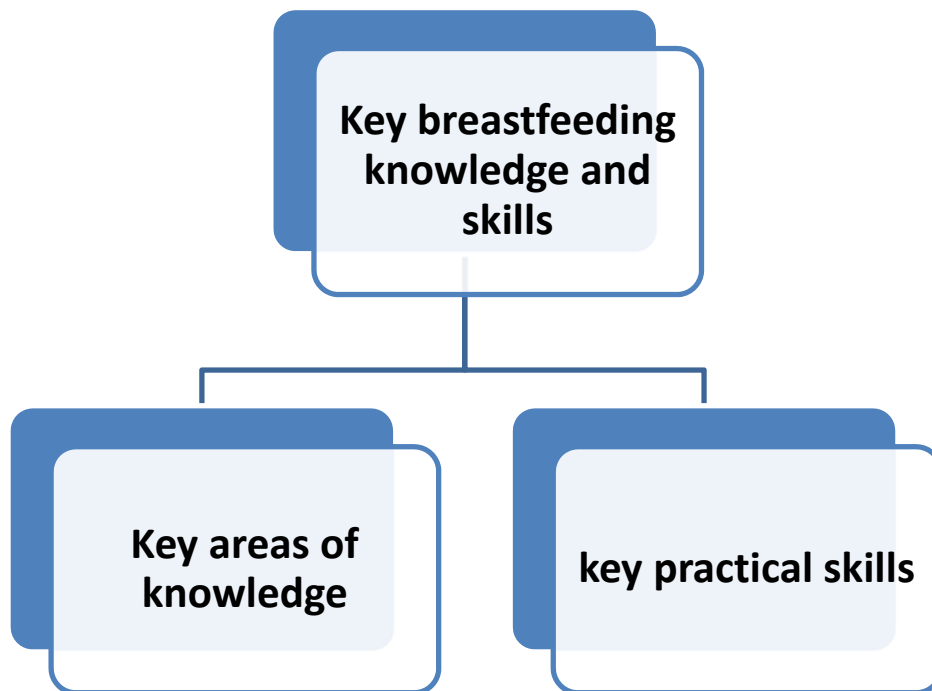


Figure 3.5 Key breastfeeding knowledge and skills

### Key areas of knowledge

Six professionals thought knowing the advantage of breastfeeding was the most important area of breastfeeding knowledge. One pediatrician said: *“Staff should be aware that breast milk is the best food for infants. They should acknowledge the advantages of breastfeeding and that it is better than formula.....”* (O).

Knowing how to cope with various breastfeeding problems, such as cracked nipples and breast engorgement, assessment of insufficient breast milk was regarded the most important knowledge by four respondents. One midwife stated: *“I think the most important breastfeeding knowledge is to know how to cope with of breastfeeding problems such as breast engorgement, inverted nipples, mothers’ taking medication”* (K). One member of staff thought that keeping up to date with latest research on breastfeeding was the most important area of breastfeeding knowledge. The health doctor said: *“I think the latest*

*breastfeeding knowledge and skills are most important for professional staff.....”*  
(A).

### **Key practical skills**

Seven staff members considered multiple skills were all crucial for effective breastfeeding support. Thirteen respondents considered P & A the most important skill for professionals who work with breastfeeding mothers. A nurse in postpartum ward said: *“I think teaching mothers good positioning and attachment is the most important skill to support them. Especially, mothers with nipple problem, such as flat nipple, inverted nipple.....”* (I). HE was described as one of the most important techniques by five respondents and practical skills to provide sufficient breast milk was named by three respondents. A pediatrician said: *“Tell mothers the correct breastfeeding methods, such as how to attach, feeding frequency and the skill of HE for separation mothers with their babies. In the first days after birth, mothers should breastfeed at least 12 times during 24 hours to enhance the volume of breast milk”* (N). Three interviewees indicated that knowing how to enhance mothers’ confidence to successfully breastfeed was the most important professional skill. A nurse in NICU stated: *“To my thinking, confidence is the most important thing for mothers. The skill of attachment is also crucial. In addition, the skill of assessment of sucking ability for premature babies is significant.”*

All but one respondent (paediatrician) were trained to support HE. All respondents thought teaching HE was essential skill for professionals working with breastfeeding mothers. Eight respondents indicated that HE was important to maintain breastfeeding when a mother was temporarily separated from her baby due to returning to work, or baby being born premature. A nurse in postpartum ward said: *“..... when mothers have engorgement breast and mother-baby separation, it is very important to express breast milk for baby.....”* (I). Three interviewees pointed out that correct method of HE helped in avoiding common problems associated with breastfeeding like engorgement and mastitis. A breastfeeding counselor stated: *“I am trained on the technique of expressing the breast milk. Expressing breast milk can promote milk production and avoid*



*breast engorgement.....” (E). Two respondents said that incorrect HE technique could cause breast pain or pollution of the breast milk. A nurse in NICU stated: “.....If the method of expressing milk is not correct, it can damage the breast or it may lead to breast engorgement. It can also pollute the breast milk” (L).*

### **3.6 Discussion**

The study provides valuable evidence on insufficient breastfeeding training for professionals, support needs for breastfeeding mothers and the importance of essential skills of P & A and HE for success breastfeeding which is beneficial for further developing a targeted breastfeeding training programme for professionals. The sample covered a spread range of participants with different ages, various job types and different professional levels. However, all respondents were from one hospital, the findings mainly reflected supporting policies, breastfeeding practices and factors influencing breastfeeding rate in this hospital. However, the hospital is the biggest maternity service and education centre that routinely organizes various training courses for clinicians including breastfeeding training courses in Zhejiang Province. Due to the hospital’s leading status, current breastfeeding policies implemented in the hospital represent strategies applied across all maternity services in Zhejiang Province. To some extent, the results represent widespread breastfeeding practices in Zhejiang Province.

Thirty strategies of BFI hospital are the main breastfeeding support policy in Zhejiang Province. It improves breastfeeding practices by rooming-in, education on the benefits of breastfeeding for a range of professionals and women in postpartum wards, improving the knowledge and skills of breastfeeding among professionals. Therefore, the policy positively impacts on increasing the rate of breastfeeding initiation and exclusive breastfeeding at discharge from hospital. Global research evidence demonstrates the effectiveness of BFHI policy in increasing the rate of breastfeeding initiation by significantly improving clinician attitudes towards breastfeeding, knowledge, skills of breastfeeding, techniques to address breastfeeding problems and providing consistent advice for mothers (Beake et al. 2012, Ingram, Johnson and Condon 2011, Isoyama Venancio et al.

2012, Kramer et al. 2001, Merten, Dratva and Ackermann-Liebrich 2005, Perrine et al. 2012).

Since the BFI policy has been implemented in the hospital, the rate of breastfeeding initiation and any breastfeeding at discharge from hospital were near 100% as reported by respondents. However, the rate of exclusive breastfeeding was 23% at six months according to a retrospective survey of 1277 mothers whose children were 3 years old in 11 counties, Zhejiang Province, China (Qiu et al. 2014). In this study highest number of respondents (60%) thought returning to work the most common reason for breastfeeding cessation. It was different from the results of a breastfeeding review of China (Xu et al. 2009) in which insufficient breast milk was the most common reason reported by mothers. It might be due to different views between mothers and professionals on early breastfeeding cessation, variety of outcome measures and diverse samples recruited in different studies. In the current study, the respondents highlighted that the government should address the social problem of short maternity leave and its negative impact on the rate of exclusive breastfeeding. Significant impact of short maternity leave on breastfeeding rate has raised the government's concern and led to possibility of setting up legislation to prolong maternity leave in the future (Arnold 2014). One staff reflected that a law had been set up on supporting breastfeeding by providing one hour of breastfeeding time during work in China. However, according to a recent report on breastfeeding challenges in China, many companies do not comply with this regulation (Arnold 2014). The health authorities should audit and guarantee these supporting policies to be implemented strictly and punish the companies that violate the law.

Another common reason for early breastfeeding cessation is professionals' lack of skills to address breastfeeding problems such as insufficient breast milk or mothers' or infants' illness after discharge from hospitals. Postpartum visits were regarded as the best opportunity to support mothers on successful breastfeeding. However, one respondent recognized that inadequate knowledge and skills among professionals in community services affected the effectiveness

of breastfeeding support. Therefore, it is necessary to further examine training needs of professionals in community services by testing their breastfeeding knowledge and skills and design targeted training programme to effectively improve their supporting skills for breastfeeding mothers.

The contents of breastfeeding training for staff should be updated as old version of 18-hour course developed by WHO and UNICEF in 1993 is still the main resource for healthcare professionals (World Health Organization and UNICEF 1993). However, WHO and UNICEF revised, expanded and updated the old version of 18-hour course into a new version 20-hour training course based on the latest research findings in 2009, (World Health Organization and UNICEF 2009a). More practical knowledge and effective support skills in routine nursing breastfeeding mother are introduced for health workers in the new version. The recommendation for duration of exclusive breastfeeding is extended to 6 months after birth rather than 4-6 months in the 18 hours course (World Health Organization and UNICEF 1993, World Health Organization and UNICEF 2009a). WHO and UNICEF recommend replacing the 18-hour course using the new version of 20-hour course for all staff in hospitals. The finding of the study also showed that the respondents recognized the importance of learning latest knowledge and welcomed updating guidelines.

Although all the participants were trained on breastfeeding using the material of WHO and UNICEF 18-hour training course, the actual training time was four hours, which was far from the training standard. None of the respondents reported completing remaining training contents by self-study after attending four hours of routine training workshop for new starters. It was suggests the current training time was insufficient for all professionals. A critical review (Ward and Byrne 2011) examined the impact of continuing breastfeeding education on improving knowledge, skills and practices based on 15 studies in nine countries. It suggested that a minimum 18-20 hours training was necessary to achieve the best results. Self-study was preferred by professionals in a study by Renfrew (2006) which explored the strategies to address learning deficits in breastfeeding. It highlighted that self-study programme should be mandatory,

funded and multidisciplinary to improve the effectiveness of study (Renfrew et al. 2006).

The study suggested the importance of training skill on P & A among healthcare professionals. P & A was considered the most important breastfeeding support skill by 13 out of 15 respondents in our study. There was a number of evidence for importance of correct P & A in removing breast milk from breast efficiently (Maria 2012, Morland-Schultz and Hill 2005, Woolridge 1986). Many breastfeeding problems, such as sore nipple, insufficient breast milk and mastitis result from poor P & A (Escott 1989, Henderson, Stamp and Pincombe 2001).

Teaching mothers HE to maintain breastfeeding during separation with their infants, avoid breast pain, relief breast engorgement and mastitis was recommended by the respondents in the current study. It was reported that there has been an increasing trend to feed with expressed breast milk in Australia (Binns et al. 2006) and in Singapore (Hornbeak et al. 2010). Binns et al (2006) indicated that expression provided more options for mothers who work, study or experience breastfeeding difficulties and thus helped to maintain exclusive breastfeeding for six months after birth (Binns et al. 2006). It is required that all breastfeeding mothers should be taught the skill of HE by the professionals in BFI hospitals according to the “Ten Steps” of BFHI policy set up by WHO and UNICEF. In the current study, all respondents considered HE as a crucial training skill for professionals to support breastfeeding mothers, and 14 out of 15 staff were trained to support HE in the previous training. However, due to lack of assessment, it was still unknown whether the staff learned the skill correctly. It is necessary to train the professionals and assess their skill of HE objectively before they train breastfeeding mothers.

The study indicated the training needs on addressing breastfeeding problems among professionals. There was no staff reported its violations BFI hospital policy, such as formula feeding and bottle feeding in the hospital. It was different from the previous reports that actions promoting formula took place in the hospitals (Guo and Wang 2001) and mothers had easy access to formula (Qiu

et al. 2009). In contrast, the finding suggested that lack of practical skills to address breastfeeding difficulties among health professionals mainly influenced on effectiveness of breastfeeding supports.

In conclusion, implementing thirty strategies required in BFI hospitals increased the rate of breastfeeding initiation and any breastfeeding at discharge from hospital by improved breastfeeding practices. However, the rate of exclusive breastfeeding was still low due to lack of skill supports for mothers who returned to work and experienced breastfeeding problems. The insufficient training time and out of date of training materials resulted in professionals poor breastfeeding support skills. The study suggested the training needs for professional, including key skills of P & A, HE and the management of breastfeeding problems. What's more, respondents also reflected the knowledge of breastfeeding advantages and the skill of P & A were crucial training contents for professionals. HE was a key skill to help mothers to maintain breastfeeding after returning to work. Based on views of professionals on current breastfeeding training, developing an efficient breastfeeding training programme focused on advantages of breastfeeding, the skills of P & A, HE and addressing breastfeeding problems is necessary and crucial. It is likely to be an efficient way to increase the rate of exclusive breastfeeding at the age of six month by providing adequate support for an increasing number of breastfeeding mothers.

# **Chapter 4 Breastfeeding support needs: a qualitative study of the views of mothers in postpartum ward in Zhejiang Province, China**

## **4.1 Background**

Professional support is crucial for mothers to initiate breastfeeding, exclusively breastfeed in the first six months of baby's life and maintain breastfeeding until 2 years or more (Renfrew et al. 2012). As required by WHO and UNICEF every mother should have access to professional breastfeeding support within six hours after delivering the baby in the maternal services. She should be able to get advice on correct positioning and attachment (P & A), hand expression (HE) techniques and common breastfeeding problems (World Health Organization and UNICEF 2009b). However, professionals often give mothers inaccurate, inconsistent, or even conflicting breastfeeding advice. This can decrease mother's confidence to breastfeed resulting in breastfeeding failure (Simmons 2002b).

Perception of healthcare professionals in Chapter 3 indicated that mothers do not have access to adequate breastfeeding support, which often results in earlier breastfeeding cessation. Effective breastfeeding support is considered crucial for women who return to work to maintain breastfeeding or who experience various breastfeeding difficulties, such as insufficient breast milk. This study aims to further explore mothers' perception on support needs regarding breastfeeding education and practical help in the hospital and after discharge from hospital.

## **4.2 Aims**

1. Examine how mothers access breastfeeding information
2. Examine mothers' attitudes towards breastfeeding and breastfeeding knowledge

3. Explore mothers' views on reasons for ceasing breastfeeding, practical support in the hospital and after discharge and supports needs for success breastfeeding

## **4.3 Materials and methods**

### **4.3.1 Research site**

This study was conducted in Women's Hospital, School of Medicine, Zhejiang University in Zhejiang province, China.

### **4.3.2 Recruitment**

All healthy mothers who recently delivered full term, healthy babies at women's hospital, School of Medicine, Zhejiang University were eligible to participate in the study. Unwell mothers or mothers with premature or unwell babies were excluded from the study.

### **4.3.3 Measures**

Semi-structured interviews covered mothers' attitudes towards breastfeeding, breastfeeding education, perception of optimal breastfeeding duration and intended duration, reasons for ceasing breastfeeding and needs for practical support both in hospital and at home.

### **4.3.4 Procedure**

The study was approved by Research Ethics Committees both at Coventry University, UK (P5842) and Zhejiang University, China (20120002). The researcher selected two wards from total five postpartum wards in the hospital where two directors of wards agreed to conduct the study. Each new healthy mother currently staying at the two postpartum wards and eligible to participate in the study was allocated a unique number. Then, the blind-folded researcher picked ten numbered tags. Mothers whose allocated numbers were selected, were invited to take part in the study. The researcher discussed study aims and procedure with potential participants. Mothers were asked to read the participant information sheet and then to sign consent forms in order to take part in the study. Face-to-face interview were conducted in Mandarin and lasted

approximately 30 minutes in each interview. All interviews were audio taped and the researcher took notes at the same time. Interviews were transcribed anonymously and translated into English. A senior doctor checked the accuracy for all the translation of the transcription.

#### **4.3.5 Data analysis**

Thematic analysis was used to analyze the transcription data. Six steps of thematic analysis by Braun and Clarke was used to explore the perceptions and narratives of mothers in the SSIs (Braun and Clarke 2006). It includes (1) Familiarisation with the data; (2) Coding; (3) Searching for themes; (4) Reviewing themes; (5) Defining and naming themes; (6) Describe and discuss the findings. The detail of analysis was described in Chapter 3, section 3.4.5.

### **4.4 Results**

#### **4.4.1 Characteristics of respondents**

All ten recruited mothers agreed to participate in the study. The mean age of mothers was 30.7 years old (SD=3.8, 26-38 years old). The mean days of birth was 3 (SD=0.7, 2-4 days). Nine mothers were primiparae and one mother was multipara. Nine mothers were breastfed by their mothers and one was formula fed. Six mothers worked as office workers, two were teachers, one was saleswomen and one was bank worker. See table 4.1

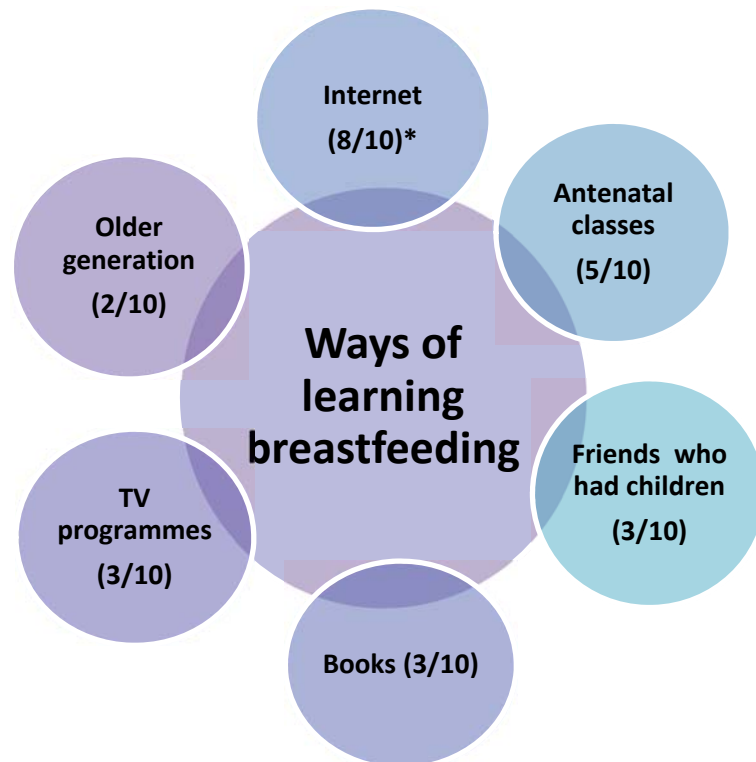


**Table 4.1 Characteristics of the study participants (N=10)**

Code	Age in years	Days since delivery	Occupation	Number of children
P	30-35	3	Office worker	1st
Q	30-35	3	Teacher	1st
R	<30	3	Office worker	1st
S	30-35	2	Office worker	1st
T	35-40	3	Saleswoman	2nd
U	<30	4	Office worker	1st
V	30-35	2	Office worker	1st
W	30-35	4	Teacher	1st
X	30-35	3	Bank worker	1st
Y	<30	3	Office worker	1st

## 4.4.2 Main themes emerging from the interviews

### Theme 1: Ways of learning breastfeeding



\*Number of respondents

**Figure 4.1 Ways of learning breastfeeding**

Looking for information on breastfeeding online was the main method of learning about breastfeeding as reported by 8 out of 10 respondents. *One mother said: "More and more mothers will search internet for useful information"* (R). Also, there has been a trend that more and more mothers communicate their experiences online. QQ group is one of the most popular instant messaging software to be used as group and voice chat in China. Two mothers considered QQ group as the main way of learning about breastfeeding by sharing experiences and breastfeeding materials with other mothers. One mother stated: *"Many mothers take part in the QQ group where they share experiences and get*

help from other mothers. It has been quite popular with mothers” (U). Six mothers thought antenatal classes offered at the hospital provided useful knowledge of breastfeeding. One mother stated: *“In the hospital, it is recommended to all pregnant women to take part in antenatal classes. Breastfeeding knowledge and skills are taught by professionals”* (Q). In addition, friends who have children, older generation, related books and TV also provide useful information for mothers. *“Old generation and experienced friends on breastfeeding will help us learn how to breastfeed”* (P).

## Theme 2: Knowledge and views of breastfeeding

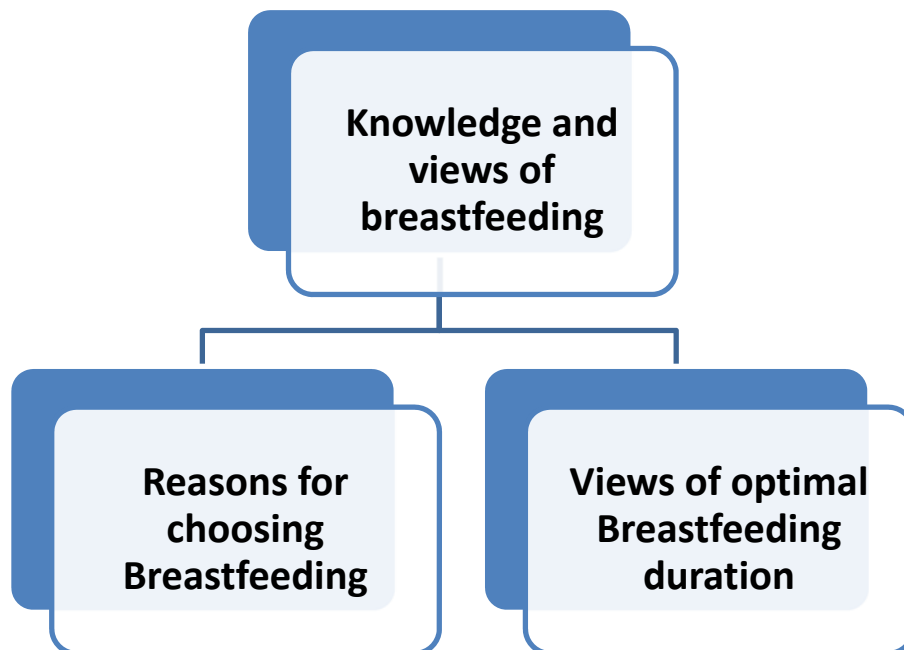


Figure 4.2 Knowledge and views of breastfeeding

### Reasons for choosing breastfeeding

All respondents reported the main reason for choosing breastfeeding was health benefits of breast milk, especially its positive impact on baby’s immune system. One mother said: *“There are many advantages of breastfeeding not only for my baby but also for myself. First of all, breastfeeding can increase baby’s*

*immunity.....*” (T). Another mother stated: *“There is antibody in breast milk which can increase baby’s immunity”*. The second reason stated by 9 out of 10 respondents was that breastfeeding helped mothers to recover after labour and delivery by promoting uterine contraction and weight lose. One mother said: *“..... it is helps to recover by promoting uterine contraction and weight lose”* (Q). Three respondents thought that breastfeeding had positive impact on child’s cognitive development. One mother stated: *“I believe my baby will be more intelligent if breastfed rather than formula fed”* (W). In addition, other advantages of breastfeeding were reported, including breast milk being the safest and cheapest food for infants, convenience of breastfeeding, belief that previous child was healthy as a result of breastfeeding, breastfeeding decreasing risk of cancer and helping to bond with the baby. One mother stated: *“Breast milk is the safest and the cheapest food for babies. Breastfeeding can also decrease the risk of breast cancer.”* (P). Another one said: *“Breastfeeding can promote affection between mothers and babies. Last but not least, my first baby was breastfed and she is healthy”* (T). Two respondents believed that formula feeding was associated with increased risk of allergy. One mothers said: *“Formula can potentially cause allergy.....”* (Q). Formula was also consider not to be safe since recently a number of fatal incidences were reported in China, such as bacterial contamination of formula and melamine-tainted milk powder. One mother stated: *“..... However, formula is not safe in China now. Several incidents of formula fed infants’ death were reported. Formula was contaminated by bacteria or contained melamine”* (X).

### **Views of optimal breastfeeding duration**

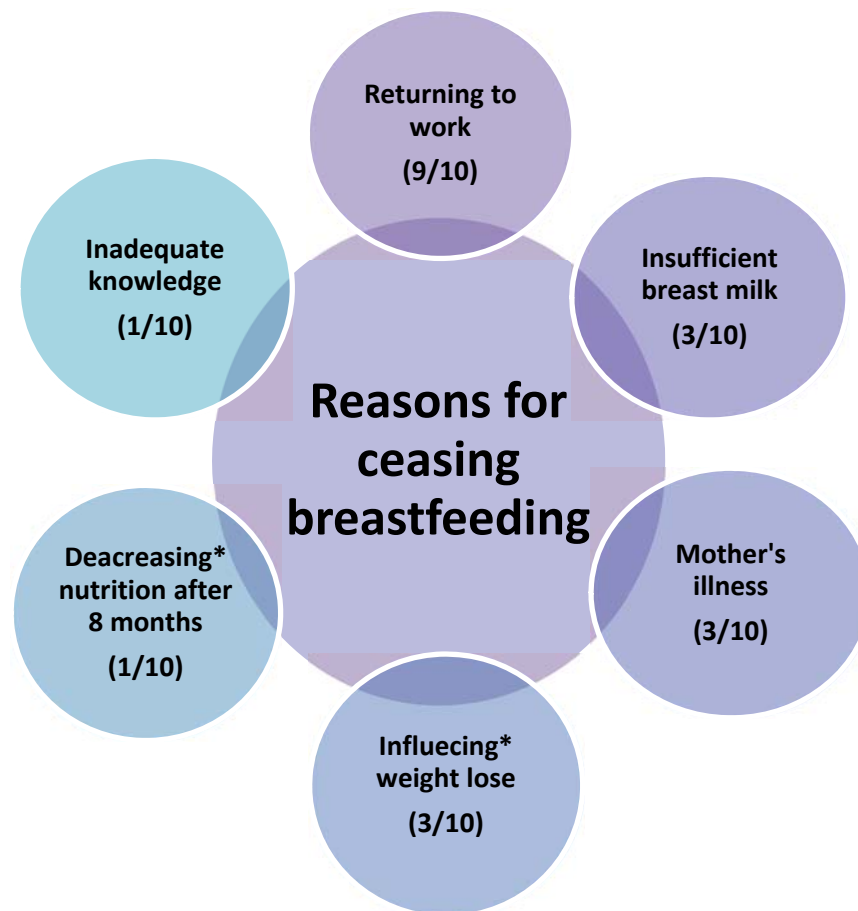
All recruited mothers breastfed their infants in the postpartum ward. Six mothers considered at least one year to be optimal breastfeeding duration. Three mothers reflected appropriate breastfeeding time was 6-12 months and one respondent believed that optimal breastfeeding duration was 2 years. One mother said: *“I think mothers should breastfeed their babies around one year”* (Y). Regarding mothers’ intended breastfeeding duration, all respondents planned to breastfeed for six months or more. Five mothers reported their intended duration of breastfeeding being consistent with their views of optimal

breastfeeding duration. Three mothers intended to breastfeed their babies for a period of time shorter than what in their view was optimal breastfeeding duration due to returning work. One mother said: *“I hope to breastfeed for 6-8 months. But to be honest, it will depend on the reality if it is possible to continue after three months of maternity leave”* (T). One mother would breastfeed longer than she believed was recommended. She said: *“I think mothers should breastfeed their babies at least six months. I plan to breastfeed my baby for one year or more. I think longer duration will be better for my baby’s health”* (S). See table 4.2

**Table 4.2 Views of breastfeeding**

Code	Were you breastfed	Intended duration of breastfeeding	Beliefs about optimal breastfeeding duration
P	Yes	One year	At least one year
Q	Yes	Eight months	At least one year
R	No	One year	One year
S	Yes	One year	One year
T	Yes	6-8 months	10-12 months
U	Yes	Six months	One year
V	Yes	One year or more	Six months
W	No	At least eight months	2 years
X	Yes	More than six months	six months to one year
Y	Yes	More than six months	About one year

### Theme 3: Reasons for ceasing breastfeeding



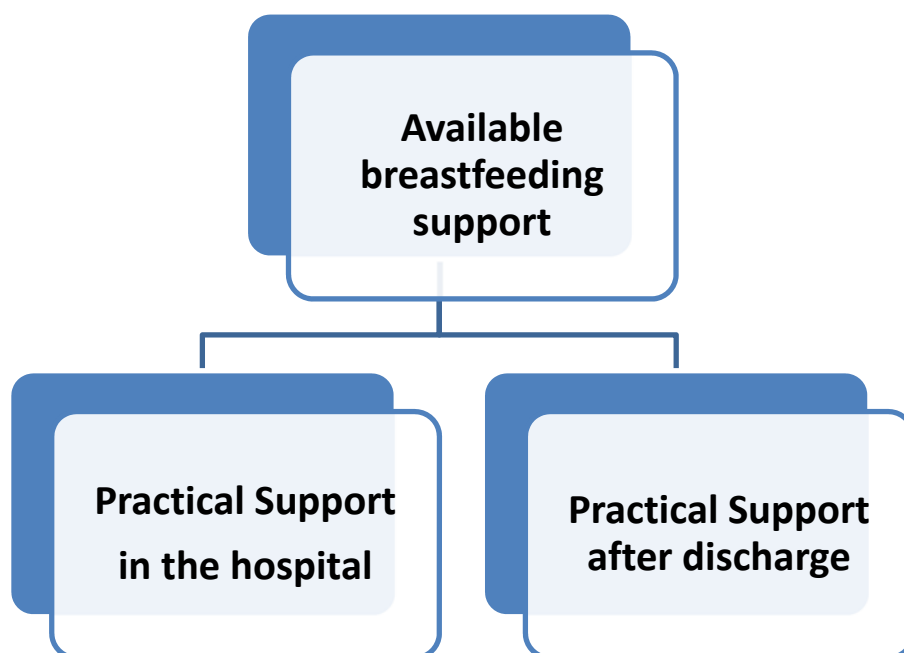
\*Mothers' misconceptions about breastfeeding

**Figure 4.3 Reasons for ceasing breastfeeding**

Returning to work after three months of maternity leave was the most common reason for ceasing breastfeeding as reported by nine out of ten mothers. One mother said: *"I think the first reason is that mothers have to return to work after three months. It is not convenient for them to express breast milk at work....."* (X). Three mothers considered insufficient breast milk and their illness main reasons for ceasing breastfeeding earlier than they planned. One mother said: *"Another reason is insufficient breast milk"* (S). *"Another reason is when mother is ill she stops breastfeeding her baby because of the medication she must take"*

(V). One respondent reflected that mothers' inadequate knowledge about advantages of breastfeeding can be a reason for early cessation. She said: *"..... some mothers don't know the benefits of breast milk for baby"* (R). In addition, mothers' misconceptions had negatively influenced on the breastfeeding duration. Three mothers thought breastfeeding made it more difficult to lose weight and one mother was convinced the nutritional value of breast milk decreased after eight months of breastfeeding. They said: *"Another reason is that mothers believe breastfeeding has negative influence on their body weight"* (S). *"..... mothers think the nutrition of breast milk decreases after eight months"* (U).

#### **Theme 4: Available breastfeeding support**



**Figure 4.4 Available breastfeeding support**

Healthcare professionals provided the main supports for mothers on overcoming common breastfeeding problems both in the hospitals and after discharge from hospitals. Nine respondents reported during mothers' hospital stay, nurses and assistant nurses provided practical breastfeeding support, especially in regard to

breastfeeding problems. One mother said: *“Nurses or assistant nurses in postpartum ward guided me how to breastfeed my baby”. “If I have difficulties on breastfeeding, I believe nurses will help me to tackle it.....”* (Q).

According to the views of nine respondents, telephone consultations offered by hospitals and breastfeeding consultation clinic by breastfeeding consultants could provide continuous breastfeeding support for mothers after discharge from hospitals. One mother said: *“The nurses told me there is a telephone number I can call when I have any problems. I also know there is a breastfeeding consultation clinic to provide help with breastfeeding”* (R). In addition, respondents reported other ways to obtain support, including looking for useful breastfeeding knowledge online, reading relevant book, getting help from friends who had children, advice from other breastfeeding mothers in QQ group, support offered by community services, support from older generation and nannies. One respondent stated: *“Now there are QQ groups where many experienced mothers discuss all kinds of problems. I think I can get much useful information from the QQ. If it can’t resolve my problem, I will go to hospital to get help”* (W).

## **4.5 Discussion**

This study provides evidence on breastfeeding education needs among breastfeeding mothers and skill supports needs provided by professionals on overcoming breastfeeding problems. There were some limitations in the study. Due to a small sample size, and the fact that mothers were interviewed when their babies were on average 3 days old, the results of this study may not adequately represent views and attitudes of new mothers. All mothers who participated in the study came from cities where, due to “One-Child policy”, mothers are allowed to have one child, except for couples who were 'only children' themselves and who are allowed to have two children (Fend, Poston Jr and Wand 2014). It contributed to the fact that nine out of 10 respondents were primiparae in the study. Thus, mothers’ views of getting practical help at home were based on mothers’ predictions rather than experience gathered with previous children. Previous studies indicated that breastfeeding rate varied in



China that there was higher rate of exclusive breastfeeding in rural and urban areas, although the measure time of breastfeeding rate were different (Huang et al. 2012, Qiu et al. 2009, Wang et al. 2013). Breastfeeding mothers in rural areas were not represented in this study, in that we cannot learn their perceptions on breastfeeding attitudes, breastfeeding supports needs and reasons for stopping breastfeeding. Although all ten recruited mothers were breastfeeding their babies at the time of interviews, they delivered their babies only 3 days before being interviews. It might mean that since giving birth they might have had a very few problems with breastfeeding and so far did not have to seek professional help.

Most respondents looked for breastfeeding knowledge by Internet. It indicates that Internet is currently popular among new mothers and developing internet-based education for mothers will be a new way to circulate the benefits of breastfeeding and teach breastfeeding skills. In Spanish study by Velillas et al (2007) a website for mothers was developed where breastfeeding advice was provided by pediatric residents. Pediatric residents estimated that approximately half of mothers needed breastfeeding support based on their clinical experience after discharge from hospitals and internet-based education was effective in providing practical supports for mothers (Velillas et al. 2007). Thus, internet-based education and support provided by professionals will be potentially an efficient support way in the future due to its popularity, flexibility and convenience.

Attending antenatal classes offered by hospital was one of the main sources of information on breastfeeding for expectant mothers as well as an opportunity to develop some practical skills. Interviewed mothers seek support of healthcare professionals to get practical support and help to overcome problems with breastfeeding, both during hospital stay and after discharge. Thus, the level of breastfeeding knowledge and skills among professionals, and the effectiveness of support they provided potentially influenced mothers' attitudes towards breastfeeding, as well as impacted on practices and breastfeeding duration. Previous studies suggested that inconsistent breastfeeding advice given by

healthcare professionals was confusing for mothers and had negative influence on mothers' breastfeeding practices (Bramhagen, Axelsson and Hallström 2006, Cronin 2003, Nelson 2007, Rajan 1993, Simmons 2002a). Higher level of breastfeeding knowledge among professionals was associated with their positive attitudes towards breastfeeding and giving consistent and accurate advice to mothers (Bernaix 2000, Simmons 2002b, Vittoz et al. 2004). It suggested that practical skills of professionals played crucial role in providing effective support for breastfeeding mothers.

Interviewed mothers had poor knowledge of optimal breastfeeding duration. Only one respondent was correct that the optimal breastfeeding duration is two years. According to the guideline of a global strategy for infant and young children feeding, exclusive breastfeeding is recommended for the first 6 months of baby's life, and then it is continued with complementary foods until 2 years or more (World Health Organization and UNICEF 2003). Based on the requirements of "Ten Steps" of BFI hospital, each mother should be taught the principles of breastfeeding by healthcare professionals (UNICEF 2005). However, mothers' poor knowledge of breastfeeding duration suggested that they might have not received correct information from healthcare professionals. What's more, the incorrect perception is likely to affect mothers actual breastfeeding duration, thereby influence on the breastfeeding outcomes. Thus, it is necessary to further explore the reasons why they do not know the crucial knowledge of breastfeeding duration and whether or not the professionals educate correct perceptions of breastfeeding to mothers.

The results of our study indicated that mothers were very well aware of the benefits of breast milk and the disadvantages associated with formula feeding. This recognition of the importance of breastfeeding among mothers contributed to the high rate of breastfeeding initiation in the hospital which was also reported by professionals in Chapter 3. Interviewed mothers reported an intention to breastfeed their babies for at least 6 months which indicated their positive attitudes towards breastfeeding. However, the results of national survey indicated that the rate of exclusive breastfeeding at six months was 30% in rural

areas and 16% in urban areas according to the data from the National Health and Family Planning Commission (NHFPC) in 2014 (Arnold 2014). In Zhejiang province, a retrospective study reflected that the rate of exclusive breastfeeding at six months was 23% (Qiu et al. 2014). It suggests many mothers cannot achieve their intended breastfeeding duration. Identifying the reasons for this low rate of exclusive breastfeeding at six months would be valuable to better support mothers to breastfeed longer in Zhejiang Province.

In the study, respondents reflected returning to work after three months of maternity leave was the most common reason for ceasing breastfeeding earlier than mother has planned, which was consistent with the perceptions of professionals in Chapter 3. Providing effective breastfeeding support for mothers who have returned to work has been challenge in China. Insufficient breast milk and breastfeeding difficulties often associated with mother's illness were considered the second reasons for early breastfeeding cessation as reported by study participants. Most of these problems can be solved by improving breastfeeding techniques, such as teaching correct P & A (Henderson, Stamp and Pincombe 2001, Maria 2012, Narramore 2007). A report about breastfeeding challenges in China indicates that an increasing number of mothers are eager to breastfeed. However, breastfeeding support currently offered to mothers is insufficient. The health organizations are developing websites to offer educational resources about breastfeeding and provide communication platform for mothers where they can share their experiences (Yu and Wang 2011).

In this study, very few mothers reported receiving practical breastfeeding support from community services after returning home with a new baby. It was different from the views of professionals in Chapter 3 in which community services was regarded as one of main sources of support for new mothers after leaving hospital. It indicates that the actual support offered by community services might be limited and has not been the main source of support by mothers. A number of randomised trials indicated that postnatal home visits by trained health professionals have positive effect on increasing the rate of

exclusive breastfeeding (Bechara Coutinho et al. 2005, Bhandari et al. 2003). Coutinho et al (2005) conducted a randomised controlled trial to determine the effect of postpartum home visit by trained professionals on the rate of exclusive breastfeeding in Brazil. 175 mothers in the intervention group received postpartum home visit and 175 mothers in the control group did not. The results showed that the rate of exclusive breastfeeding of babies 10-180 days old was significantly higher in the intervention group (45%) comparing to control group (13%) (Bechara Coutinho et al. 2005). Another randomised controlled trial by Bhandari et al (2003) explored whether an education intervention for health professionals affected the rate of exclusive breastfeeding in 4 intervention communities and 4 control communities (Bhandari et al. 2003). Professionals in intervention group participated in a breastfeeding training programme regarding teaching communication skills, detection of problems with P & A, and management of breastfeeding difficulties. Follow-up results from 1115 infants showed significant increase of the rate of exclusive breastfeeding in the intervention group at six months (42%) comparing to the control group (4%). It indicated that home visits conducted by skilled health professionals could be effective in supporting breastfeeding mothers after discharge from hospital (Bhandari et al. 2003). The finding in Chapter 3 also suggests that lack of sufficient breastfeeding support skills amongst healthcare professionals working in the community services hampers the effectiveness of support they provide to mothers. Therefore, improving breastfeeding support skills of professionals working in the community services is likely to be an efficient way to support mothers to maintain breastfeeding for longer.

In conclusion, this study reflects the education needs among breastfeeding mothers, especially regarding the correct perception of optimal breastfeeding duration. Professionals are regarded as the main supports by participants in overcoming breastfeeding problems both in the hospital and after discharge from hospital. It highlighted the importance of professionals' having adequate knowledge and skills to educate and support breastfeeding mothers. Enhancing professionals' breastfeeding skills is likely to be a potentially efficient way to improve breastfeeding outcome by improving support for mothers. As internet is

a most popular way of obtaining information among new mothers, Internet-based education and support provided by skilled professionals are likely to be an effective new method of supporting breastfeeding mothers in the future in China.

# **Chapter 5 Usability of breastfeeding assessment (mini-CUBA) in the key skills of positioning and attachment**

## **5.1 Background**

### **5.1.1 Implication of the studies in Chapter 3 and Chapter 4**

The findings of interviewing health professionals on policies and practices of breastfeeding support in Chapter 3 represented that the low rate of exclusive breastfeeding was due to lack of skill supports for mothers who returned to work and experienced breastfeeding problems. Respondents reflected the knowledge of breastfeeding advantages and the skill of positioning and attachment (P & A) were crucial training contents for professionals. Hand Expression (HE) was regarded as a key skill to help mothers to maintain breastfeeding after returning to work. However, the insufficient training time and out of date of training materials in P & A and HE resulted in professionals poor breastfeeding support skills. The study in Chapter 3 suggested the training needs for professional in P & A, HE and the management of breastfeeding problems. Therefore, developing an efficient breastfeeding training programme in the essential skills of P & A and HE is necessary to improve professionals' support for breastfeeding mothers.

In Chapter 4, this study reflected education needs of breastfeeding knowledge among breastfeeding mothers. Professionals are regarded as the main supports and education resource by the interviewed breastfeeding mothers in overcoming breastfeeding problems both in the hospital and after discharge from hospital. It highlighted the importance of professionals' having adequate knowledge and skills to educate and support breastfeeding mothers. The study further indicated that enhancing professionals' breastfeeding skills is likely to be a potentially

efficient way to improve breastfeeding outcome by improving support for mothers.

Based on the evidence of Chapter 3 and Chapter 4, the next studies aim to develop an efficient training intervention programme for professionals focused on the two essential skills of P & A and HE. The effect of training intervention programme will be evaluated by developing a valid breastfeeding assessment tool in the knowledge of P & A and HE.

### **5.1.2 Definition of P & A**

Historically, the technique of P & A was described in other terms. Positioning was described as “alignment” (Shrago and Bocar 1990) and “hold” was used in other research (Jensen, Wallace and Kelsay 1994). “Areolar grasp” (Nygqvist et al. 1996), “latch” (Henderson, Stamp and Pincombe 2001, Livingstone 1995) and “fixing” (Matthews 1988, Mulford 1992) all referred to “attachment”. The WHO and UNICEF have advised using consistent terminology for positioning and attachment in breastfeeding teaching to make the terms easily understood by professionals (World Health Organization and UNICEF 1993). The WHO definition was introduced in the “Breastfeeding counselling: a training course participant’s manual” (1993). Positioning is defined as the relationship between the baby’s body and the mother’s body. Attachment is defined as the relationship between the baby’s mouth and the mother’s breast (Inch et al. 2003, World Health Organization and UNICEF 1993).

### **5.1.3 Importance of P & A**

P & A was identified as a crucial technique to avoid nipple pains and to breastfeed successfully after a review of related literature from 1983 to 2004 (Morland-Schultz and Hill 2005). In the 1980s there was a seminal study by Woolridge, who described the importance of optimal P & A for removing breast

milk efficiently. Using the findings of early radiological and subsequent ultrasound studies, Woolridge described the normal process of transferring breast milk by the force of negative pressure and milk ejection reflexes with correct attachment. “Nutritive” sucking, a slow and deep sucking, occurs normally after non-nutritive sucking, which is short fast sucking that always occurs at the beginning of breastfeeding. The author argues that correct P & A assures that breast milk is removed from the breast effectively. However, incorrect attachment, such as inadequate breast tissue in the infant’s mouth and therefore inefficient removal of breast milk, will mean the negative pressure cannot be put on the nipple, which results in a sore nipple and inefficient transfer of milk (Woolridge 1986).

Ineffective removal of breast milk due to incorrect P & A will further lead to an increase in the feedback inhibitor of lactation (FIL), which is produced by the lactocytes and regulates the production of breast milk. As FIL increases, breast milk will decrease (Knight, Peaker and Wilde 1998, White 1995). Poor attachment also results in “nonnutritive sucking, which can lead to the baby not obtaining milk efficiently. Poor attachment can lead to sore nipples if the tongue is not placed over the lower gum and the gums placed over the lactiferous sinuses (Escott 1989).

There is other reliable evidence from randomised trials reporting that correct P & A can decrease breastfeeding problems including cracked nipples, sore nipples, engorgement, mastitis and poor weight gain (Henderson, Stamp and Pincombe 2001). Recently, an article relating to jaundice in breastfeeding infants conducted by Clark, aiming to update the knowledge of community practitioners, reported that promoting correct P & A may help to decrease early jaundice by providing sufficient breast milk (Clark 2013).



#### **5.1.4 Necessary support for mothers in the technique of P & A**

The key technique of P & A should be taught by skilled professionals to support mothers to breastfeed successfully, which may increase the breastfeeding rate (Duffy, Percival and Kershaw 1997, Woolridge 1986). A cross-sectional study from Libya during 2009 and 2010 examined the factors associated with poor P & A that lead to cracked nipples and mastitis. Parity was one key factor and young (<20 years) and primiparous mothers were more in need of support and guidance for appropriate breastfeeding techniques. The authors also recommended that each mother should be assessed on P & A at the beginning of breastfeeding and professionals should observe whether they need support on correct positioning and attachment by (Ram et al. 2011). Graffy and Taylor carried out a survey among 720 women to explore what information and support is needed for breastfeeding in London (Graffy and Taylor 2005). The result reported that positioning was regarded as one of the key components of breastfeeding in which mothers need support.

Another study from western Denmark explored the relationships between breastfeeding techniques, breastfeeding problems and duration of breastfeeding (Kronborg and Væth 2009). A total of 277 mothers out of 570 had ineffective breastfeeding technique at the first visit (at a mean 16 days after birth observed by health visitors), including 169 mothers and infants with ineffective positioning, 144 mothers and infants with ineffective attachment and 45 mothers and infants where the sucking was assessed as ineffective. In the study, using a logistic regression analysis, ineffective technique was significantly associated with mothers reporting early breastfeeding problems, which then influenced the breastfeeding duration.

A longitudinal quasi-experimental study examined the effect of support for breastfeeding mothers on breastfeeding outcomes, using checklists of diagrams

and demonstrating effective P & A in a postnatal ward in England. A total of 60 mothers were assigned to the intervention group and 62 to the control group. The intervention group achieved a higher rate of exclusive breastfeeding and less nipple pain at both seven days and six weeks postpartum compared to the control group, but there was no statistical difference (Woods, Dykes and Bramwell 2002).

Pannu et al. conducted a 12-month longitudinal survey to explore the effects of professional support in the skill of P & A among 587 mothers in the postnatal period during 2002–2003 in Perth, Western Australia (Pannu et al. 2011). The results showed mothers who received professional support achieved a significantly higher full breastfeeding rate at six months compared to those who had no support.

### **5.1.5 Necessary training for professionals on P & A**

Staff are required to educate breastfeeding mothers individually on how to conduct P & A after birth (UNICEF 2010). However, several studies indicated that staff have inadequate knowledge of P & A (Wallace and Kosmala-Anderson 2006, Wallace and Kosmala-Anderson 2007). Wallace and Kosmala-Anderson undertook a survey to identify the training needs of 549 clinicians on 26 breastfeeding support skills by self-report questionnaire in the UK. The results reported that only 54 out of 501 (10.8%) professionals, including midwives, health visitors and voluntary-sector clinicians, thought they were competent in the practical skill of P & A.

Another survey from Wallace and Kosmala-Anderson was carried out to explore the training needs of doctors. There were 120 paediatricians and 57 GPs participating in the study. They completed a self-report questionnaire assessing their competence in 23 areas of breastfeeding support skills, including advice on

P & A and other perceptions about breastfeeding barriers and policy. Only 59.2% paediatricians and 39.3% GPs thought they were competent in advising about P & A. The necessary training should focus on the staff who are less likely to be trained in breastfeeding and the effectiveness of training should be assessed.

In China, Ouyang undertook a survey to investigate the knowledge of breastfeeding among Chinese female physicians and nurses (Ouyang, Xu and Zhang 2012). There were 367 professionals from 10 randomly selected BFI hospitals in Hubei province, China. Knowledge of breastfeeding was assessed in relation to the benefits of breastfeeding, reliable signs of adequate breast milk, demand feeding and recommended time of breastfeeding. Although the assessment was simple, using the answers true or false (with a 50% chance of being correct), the staff had surprisingly poor knowledge of breastfeeding, and 79.3% of clinicians had had no breastfeeding training since working in hospitals. However, the study did not assess the staff's knowledge of positioning and attachment. In China, there have been no studies reported regarding the skill of P & A and the practical skill level among professionals is unknown.

#### **5.1.6 Breastfeeding assessment tool for professionals**

Objective breastfeeding knowledge assessment is predictive for improved skills, practices and supportive behaviour (Bernaix 2000, Khoury et al. 2002, OlaOlorun 2006). Various breastfeeding assessment tools have been developed to assess professionals' knowledge (Moran et al. 1999, Wallace 2008, Wallace et al. 2009, Wallace et al. 2013). This section aims to introduce three existing validated breastfeeding assessment tools using the theory of assessing construct validity by Cohen and Swerdlik (Cohen and Swerdlik 2002). The "method of contrasted groups" is one of the methods to provided evidence for the construct validity of a test tool. A validity test demonstrates that scores vary

in a predictable way and that the tool has an ability to distinguish differences between the groups.

Moran et al. (1999) developed a validated and reliable breastfeeding support skills tool (BeSST) (Moran et al. 1999). It consisted of four breastfeeding video clips regarding positioning, attachment, rapid sucking, sore nipples, breast refusal and possible mastitis, and an associated questionnaire with 20 open questions and 10 closed questions each with four responses. BeSST has a good internal reliability with a Cronbach's alpha coefficient of 0.89 and scoring for the open questions has good inter-rater reliability with Kappa 0.6 or exceed.

BeSST was applied to assess the effectiveness of breastfeeding training for professionals in several studies (Law et al. 2007, Moran et al. 2000, Moran et al. 2005). Moran et al. (2000) designed a between-subjects study to test the effectiveness of the 20-hour WHO/UNICEF breastfeeding course delivered to 15 midwives by comparing 13 other midwives who were not trained using BeSST in the UK (Moran et al. 2000). Significantly higher scores were seen in the training group compared to the no-training group, which indicates the 20-hour course was effective in improving midwives' support skills and suggests that BeSST might be transferred to other areas as an assessment tool to evaluate midwives' practices.

Another evaluation study by Moran et al. (2005) compared 15 midwives and 15 voluntary breastfeeding supporters in the Breastfeeding Network (BfN) using BeSST (Moran et al. 2005). Significantly higher scores were found in the BfN supporters compared with the midwife group. This study was the first to assess voluntary breastfeeding supporters objectively and it indicated that BfN supporters provide the required support to breastfeeding mothers. It suggested an interagency collaboration between midwives and BfN supporters could be

essential for developing an effective breastfeeding supporting system. Although the sample in both studies met the minimum of 13 participants for each group (80% power to identify differences), the small sample was insufficient to be representative of midwives or BfN supporters in the UK. A bigger sample and a more robust study design, such as an RCT, would be necessary to further confirm the effectiveness of training interventions using the validated BeSST.

Law et al. applied the BeSST to evaluate a 4-hour “hands off” training method on positioning and attachment among 108 midwives (experiment group) and 27 senior student midwives who were in the control group without training (Law et al. 2007). Baseline knowledge scores demonstrated no significant difference between midwives and student midwives. After completing the training, the repeated tests for participants showed that significantly higher scores were gained by the trained midwives than the student midwives. The objective assessment results suggest the breastfeeding training needs for midwives and the effectiveness of 4-hour “hands off” training on improving midwives’ knowledge of positioning and attachment. The study also provided an external validity of the BeSST as a significant difference was found in the baseline subgroup analysis. It presented a significantly lower breastfeeding knowledge score among midwives with longer practice in postnatal care compared to those with shorter experience.

The BeSST is a validated breastfeeding assessment tool that can be used to identify the training needs for various professionals and evaluate diverse breastfeeding training interventions. However, the BeSST is highly focused on P & A and does not address the wider breastfeeding knowledge needed to support breastfeeding mothers. Coventry University specifically developed an online breastfeeding assessment, CUBA (Coventry University Breastfeeding Assessment), to assess a wide range of knowledge and skills (Wallace 2008). It

consists of 50 multiple choice questions covering all the key topics of the BFI training standards for successful breastfeeding. Essential breastfeeding knowledge areas for healthcare professionals are measured in CUBA, including initiatives, breastfeeding policy, the value of breastfeeding, anatomy and physiology, positioning and attachment, management of problems, practices and challenges. Video clips of breastfeeding problems are used in CUBA to test observational and problem-solving skills. Participants watched clips and answered the corresponding questions in CUBA. The total assessment takes 45 minutes and gives instant feedback on the proportion of correct knowledge achieved in each section. It has the capacity to assess large numbers of participants with instant marking. For trusts assessing staff using CUBA, the research team will generate a summary of staff assessment results and recommendations for further focused training to meet the gaps identified.

Wallace et al. examined the validity of CUBA in a quantitative study (Wallace et al. 2009) and explored the usability of CUBA in a qualitative study (Wallace et al. 2011b). The first quantitative study aimed to assess the effectiveness of a 10–12 hour self-study breastfeeding workbook among 38 staff using CUBA in the West Midlands (Wallace et al. 2009). The baseline knowledge scores showed that the staff with the longer times since qualification achieved higher scores, which suggested CUBA was valid to discriminate the knowledge level. Wallace et al. undertook another study combining qualitative and quantitative methods to explore the feasibility and effectiveness of a self-study training programme among 322 practitioners in the UK (Wallace et al. 2011b). The new training programme developed by Coventry University consisted of a 10–12 hour self-study breastfeeding workbook, a DVD regarding two essential breastfeeding support skills and CUBA. The results showed that midwives had higher total knowledge scores at baseline than health visitors and other groups. Significantly

higher knowledge scores at baseline were found among participants who had worked for longer with breastfeeding mothers compared to those who worked with them for less time. The thematic analysis showed that participants welcomed the self-study programme. However, these comments related to the whole self-study programme, not CUBA. Participants reflected that sometimes the knowledge assessment using CUBA was difficult to finish due to being busy working and older staff members needing support to use the computer.

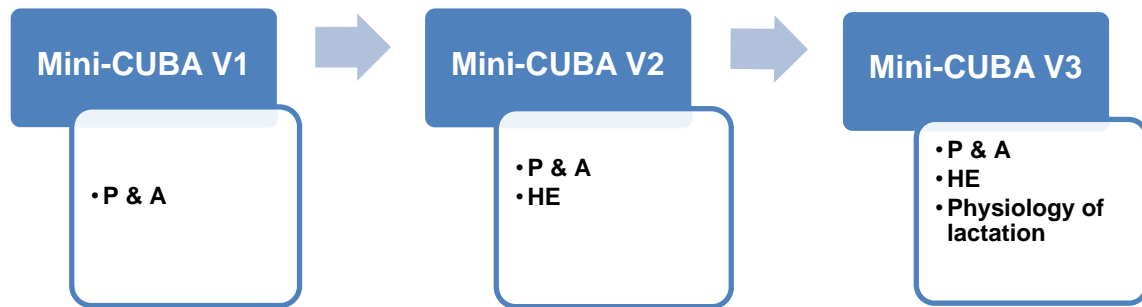
Wallace et al. developed the Neonatal Unit Clinician Assessment Tool (NUCAT) to assess 51 clinicians' breastfeeding knowledge in NICUs based on CUBA (Wallace et al. 2013). NUCAT consists of 66 multiple choice questions with four choices and only one correct choice covering six areas: breast milk expression, positioning and attachment, physiology of lactation, benefits of breastfeeding, positive touch and kangaroo care. The first four areas were consistent with CUBA. The total knowledge scores achieved by participants ranged from 29 to 53 (range 0–66), which indicated the assessment tool has a good variance. Also, the doctors achieved higher knowledge scores than nurses in the sub-section of benefits of breastfeeding, which showed its validity in distinguishing different knowledge levels. In interviews with 8 participants, they reported that NUCAT made them identify their knowledge gaps and further training resources, which suggests that NUCAT has good usability.

Overall, an evidence-based validation of a breastfeeding assessment tool is necessary and usability for evaluation of professionals' knowledge or the effectiveness of breastfeeding training. However, whether or not the validation of a breastfeeding assessment tool is feasible for different countries still needs to be examined, as diverse cultures and breastfeeding practices exist in different countries. CUBA covers comprehensive breastfeeding knowledge and meets BFHI standards, which is the global standard to promote breastfeeding. China

has the biggest number of BFHI hospitals in the world and big number of healthcare professionals (UNICEF 2005). Thus, CUBA might be a useful tool to evaluate practical breastfeeding knowledge with instant feedback among Chinese healthcare professionals or effectiveness of breastfeeding training intervention.

The main reasons for developing the breastfeeding assessment tool in P & A and HE have been depicted in section 5.1.1. The mechanism of lactation is closely associated with the skills of P & A and HE. Understanding the mechanism of lactation is essential and beneficial when applying the two essential skills into practice (Maria 2012). Therefore, in the research, three versions of breastfeeding assessment tool covering the three areas of breastfeeding will be developed step by step based on CUBA by the researcher. All the final version of mini-CUBA will be discussed and decided by the expert panel based on the results of usability and validity. The expert panel consisted of one psychologist, one senior midwife and one senior doctor. The higher version will cover more knowledge area of breastfeeding than the low version (See Figure 5.1). Mini-CUBA V1 tests the knowledge of P & A, mini-CUBA V2 evaluates the knowledge of P & A and HE and mini-CUBA V3 assesses the knowledge of P & A, HE and physiology of lactation. This study aims to develop the first breastfeeding assessment tool in P & A (mini-CUBA V1) based on CUBA and explore the usability. Mini-CUBA V2 and mini-CUBA V3 will be developed and tested their validities in Chapter 6 and Chapter 7 respectively.





**Figure 5.1** An overview of mini-CUBA

## 5.2 Aims of the study

1. Develop a Mandarin version of mini-CUBA V1, covering the knowledge of P & A
2. Assess the usability of the Mandarin mini-CUBA V1 among healthcare professionals in China
3. Examine the knowledge level in P & A among healthcare professionals in China using the Mandarin mini-CUBA V1

## 5.3 Materials and methods

### 5.3.1 Research site

This study was conducted during a provincial breastfeeding training course for 30 healthcare professionals from Maternal and Child Health (MCH) hospitals in Zhejiang Province.

### 5.3.2 Sample

*Inclusion criteria:* Qualified healthcare professionals who spend some of their working time interacting directly with breastfeeding mothers

*Exclusion criteria:* Staff working in maternity services but not directly working with breastfeeding mothers, including administrators and managers in maternity services

### **5.3.3 Measures**

There were 8 multiple choice questions on P & A in the original CUBA. The researcher chose 7 items from CUBA and developed three new items on P & A, which were essential knowledge items regarding good or poor attachment signs. One item of CUBA was not used due to the assessment of poor positioning using the video clip. Ten items were discussed by the research panel, which consisted of two breastfeeding experts and one psychologist. One item – “What is the best positioning for the premature or small baby?” – was deleted as more than one response out of four options was thought to be correct. The final version of mini-CUBA V1 consisted of 9 multiple choice questions on P & A, of which only one option was correct and the total score range was 0–9. The knowledge covered two items on positioning, six items on attachment and one item on normal sucking pattern. For each item, respondents were asked to provide comments about the difficulty to understand the item, the reasons for their answer, the relevance to practice and how important they felt it was to understand the knowledge in the questionnaire. The comments after each CUBA question were as follows:

- Which answer do you think is correct and why? Why are the other answers wrong?
- Is this question difficult to understand? If so, explain why.
- Is the question asking about practices and knowledge that are applicable to your work?
- How important is it that staff like you understand this type of information?

Each item of mini-CUBA V1 was decided its feasibility, applicability and validity based on the comments for each item and the variance of correct proportion. Whether the item would be applied in the future study would be decided by the breastfeeding expert panel based on these results. Eight demographic and job-related questions were covered, including name, age, job title, working department, years since qualification, breastfeeding training experience and the proportion of working with breastfeeding mothers per week. Gender was not included in the questionnaire due to the fact that mostly females work with breastfeeding mothers in China.

#### **5.3.4 Procedure**

The study was approved by the research ethics committees at both Coventry University, UK (ref: P5842) and Zhejiang University, China (ref: 20120002). The researcher obtained agreement from the training organisers to conduct the study after the breastfeeding training course. The participants were recruited after their attendance at a provincial breastfeeding training course for 30 professionals from Maternal and Child Health (MCH) hospitals in Zhejiang Province on 24–26th March 2013. Eligible staff members attending the training course were invited to take part in the study. The researcher explained the aims and methods of the study to the staff in person.

The researcher organised the eligible professionals who agreed to take part in the study in a room after the breastfeeding training course, which aimed to improve professionals' knowledge and practical skills of breastfeeding. The participants were given the participant information sheet (PIS), consent form, and mini-CUBA V1. The researcher explained how to complete the questionnaire and the study time was 40 minutes. Participants were asked to answer each question and expected to elaborate on their response to each question by describing why they chose an option. Participants were asked not to

discuss their responses with each other or refer to other sources of information. They were instructed that there was only one correct answer and so only one response was to be selected for each question. The researcher was available to answer questions about the procedure and remained present until the participants finished the forms and handed them in. All responses were translated into English. Another senior Chinese doctor checked all the translations to ensure their accuracy. Transcriptions did not include personally identifiable data and stored on a password-protected PC and/or on paper in a locked filing cabinet.

### **5.3.5 Analysis**

SPSS for Windows package version 22.0 was used for quantitative analysis. Characteristics of participants and the correct and incorrect proportion for each item were calculated using descriptive statistics. The relationship between demographics and mean total scores was explored to distinguish the ability of different participants. The correlation between job-related variables and mean score was calculated by bivariate correlation (Pearson correlation). The mean total knowledge scores were compared in sub-groups of demographics and job-related variables using an independent samples T-test (for two categories) or one-way ANOVA (for three or more categories). The statistical significance level was set at  $p < 0.05$ .

The reasons for answers to each item of mini-CUBA were analysed by two researchers in four categories: a correct answer given with the correct reason; a correct answer given with an incorrect reason; a correct answer with no reason and an incorrect answer with an incorrect reason. It is helpful to learn if the participants really understand the knowledge. The items that were commented on as being difficult to understand will be modified to be much easier for professionals to understand. The items with positive comments about

applicability to work and importance for practice will be maintained. Conversely, the items commented on as being not applicable to work or not important to practices will be removed.

## **5.4 Results**

### **5.4.1 Characteristics of samples**

There were 25 eligible professionals from Maternal and Child Health (MCH) hospitals in Zhejiang Province invited to the study and 20 professionals undertook the study. Five professionals had to go home immediately after the breastfeeding training course due to train times and had no time to undertake the study. The response rate was 80%. The mean age of the participants was 39 (SD=8.42). Fourteen nurses, three doctors and three midwives were recruited for the study. All the participants worked with breastfeeding mothers. Of these, 13 staff worked in an obstetrics department, 3 staff in a delivery department and 4 staff in a healthcare department. The sample covered a wide range of job titles, including one senior doctor, two attending doctors, three senior nurses, ten chief nurses, three chief midwives and one primary nurse. Of the 20 staff, 16 (80%) had had prior breastfeeding training. The mean amount of time since qualification was 18 years (SD=8.44, Min=6, Max=37). The proportion of working time spent supporting breastfeeding mothers each week was less than 25% for 11 (55%) participants and more than 25% for 9 (45%) participants (see Table 5.1)

**Table 5.1 Characteristics of participants**

	Items	n	Frequency (%)
Department	Obstetrics department	13	65
	Delivery department	3	15
	Healthcare department	4	20
Job type	Doctor	3	15
	Nurse	14	70
	Midwife	3	15
Job title	Senior	4	20
	Mid-grade	15	75
	Primary	1	5
Time since qualification	Less than 15 years	9	45
	15 years or more	11	55
Previous training on breastfeeding	Yes	18	90
	No	2	10
Working proportion*	Less than 25%	11	55
	25% or more	9	45

\* Working proportion with breastfeeding mothers each week

#### 5.4.2 Knowledge scores in P & A

Thirteen participants completed the questionnaires immediately after the breastfeeding training course. Seven participants took the questionnaires away because they could not complete the questionnaires in the fixed 40 minutes. Those who took away the questionnaires were asked to finish them individually when they were free and all the remaining questionnaires were collected by the researcher the next week.

There were 9 items in the mini-CUBA V1 assessing the knowledge of positioning and attachment (range 0–9). The mean score was 7.4 (SD=1.23, Min=5, Max=9). The mean score showed participants had good knowledge of positioning and attachment. For three items, 100% of respondents provided the correct answer, which indicated poor variance, these were: *“The scenario of a 3-week-old baby with poor weight gain”*, *“How mother knows her baby is not well attached in first week (A)”* and *“Signs of poor attachment in the mother”*. Therefore, the three items were removed for the next stage of the research due to lack of variance. Furthermore, 95% of participants were correct in the item of *“How mother knows her baby is not well attached in first week (B)”*. The two items of *“Signs of poor attachment in the baby”* and *“Normal sucking pattern during breastfeeding”* achieved 90% correct answers. Three items achieved a low correct proportion with 66.7% for *“Definition of positioning”*, 55.6% for *“Essential element of effective positioning”* and 55.0% for *“Direction of mother’s nipple when attaching her baby to her breast”*. (See Table 5.2)

**Table 5.2 Correct and incorrect proportion of answers to mini-CUBA V1**

Mini-CUBA item	Correct n (%)	Incorrect n (%)
1 Definition of positioning	12 (66.7)	6 (33.3)
2 Essential element of effective positioning	10 (55.6)	8 (44.4)
3 Direction of mother's nipple when attaching her baby to her breast	11 (55.0)	9 (45.0)
4 The scenario of a 3-week-old baby with poor weight gain	20 (100.0)	0 (0.0)
6 How mother knows her baby is not well attached in first week (A)	20 (100.0)	0 (0.0)
7 Signs of poor attachment in the baby	18 (90.0)	2 (10.0)
8 Signs of poor attachment in the mother	20 (100.0)	0 (0.0)
9 Normal sucking pattern during breastfeeding	18 (90.0)	2 (10.0)
10 How mother knows her baby is not well attached in first week (B)	19 (95.0)	1 (5.0)

Note: The fifth item was deleted in the initial development phase due to two correct choices.



The results showed that age was not significantly correlated with total score  $r=0.17$ ,  $p=0.49$ . All the sub-groups of job-related variables showed no significant differences in mean knowledge scores as follows. There were no significant differences in mean total knowledge scores among staff from Obstetrics Department, Delivery Department and Healthcare Department (Obstetrics Department:  $M=7.46$ ,  $SD=1.45$ ; Delivery Department:  $M=6.67$ ,  $SD=0.58$ ; Healthcare Department:  $M=7.75$ ,  $SD=0.50$ ;  $F(2)=0.69$ ,  $p=0.52$ ). No significant difference in total knowledge scores were found among midwives, doctors and nurses (doctor:  $M=7.67$ ,  $SD=0.58$ ; midwife:  $M=6.67$ ,  $SD=0.58$ ; nurse:  $M=7.50$ ,  $SD=1.40$ ;  $F(2)=0.62$ ,  $p=0.55$ ). No significant differences were found between staff with senior and mid-grade job titles (senior:  $M=7.50$ ,  $SD=1.73$ ; mid-grade:  $M=7.27$ ,  $SD=1.10$ ;  $t(17)=0.34$ ,  $p=0.74$ ). Similarly, the mean total score did not associate significantly with the proportion of time spent working with breastfeeding mothers each week (less than 25%:  $M=7.36$ ,  $SD=1.12$ ; 25% or more:  $M=7.44$ ,  $SD=1.42$ ;  $t(18)=-1.42$ ,  $p=0.89$ ) (see Table 5.3).

**Table 5.3 Difference in mean total scores in sub-groups**

	Items	n	Mean score (SD)	df	F/t	p
Department	Obstetrics Department	13	7.46 (1.45)	2	0.69	0.52
	Delivery Department	3	6.67 (0.58)			
	Healthcare Department	4	7.75 (0.50)			
Job type	Doctor	14	7.67 (0.58)	2	0.62	0.55
	Nurse	3	7.50 (1.40)			
	Midwife	3	6.67 (0.58)			
Job title	Senior	4	7.50 (1.73)	17	0.34	0.74
	Mid-grade	15	7.27 (1.10)			
Qualification	Less than 15 years	8	7.50 (1.73)	18	0.29	0.78
	15 years or more	12	7.27 (1.10)			
Working proportion *	Less than 25%	11	7.36 (1.12)	18	-1.42	0.89
	25% or more	9	7.44 (1.42)			

\* Working proportion with breastfeeding mother each week

### 5.4.3 Comments on mini-CUBA V1

#### 5.4.3.1 Reasons for correct answer in each item of mini-CUBA V1

The open questions about the reasons for correct answer for each item provided limited useful information due to high rate of no reasons for correct answers range from 44.4% to 66.7%. The results make it difficult to judge if they have really mastered the skill. The proportion of correct reasons with correct answer is very low with the highest rate 40% (8/20) and the lowest rate 8.3%. The rate of incorrect reason with correct answer is range from 0 to 25%. Their incorrect

reasons reflected that they are lack of related breastfeeding knowledge or misunderstand the key point of breastfeeding skills, or confused the definition between positioning and attachment. (see Table 5.4).

**Table 5.4 Reasons for correct answers to each item of mini-CUBA V1**

CUBA item	Correct number/ response (n)	Correct reason (n)	No reason (n)	Incorrect reason (n)
1 Definition of positioning	12/18	1	8	3
2 Essential element of effective positioning	10/18	4	6	0
3 Direction of mother's nipple when attaching her baby to her breast	11/20	3	5	2
4 The scenario of a 3-week-old baby with poor weight gain	20/20	5	13	2
6 How mother knows her baby is not well attached in first week (A)	20/20	8	11	1
7 Signs of poor attachment in the baby	18/20	8	8	2
8 Signs of poor attachment in the mother	20/20	8	10	1
9 Normal sucking pattern during breastfeeding	18/20	4	14	0
10 How mother knows her baby is not well attached in first week (B)	19/20	8	10	1

#### **5.4.3.2 Usability of mini-CUBA V1 in practice**

All the comments regarding difficulty in understanding, familiarity to work and importance to practice were simple Yes/No answers, such as “No, it is not difficult to understand”, “Yes, it is important”, “Yes, it is familiar”. Therefore, Table 5.4 shows the total comments for each item based on respondents’ replies of “Yes” or “No”. The general findings suggested that nine items of P & A were not difficult to understand, applicable with their work and important for their work based on participants’ comments on each item (see Table 5.5).

**Difficulty:** More than 80% of participants reported that the nine items on P & A were not difficult to understand. The definition of positioning was difficult for two participants and the key points of effective positioning were difficult for three participants. Four items relating to poor attachment were easy to understand for all participants. The direction of the nipple for good attachment and signs of poor attachment by observing mothers were thought to be difficult to understand by two participants respectively (see Table 5.5).

**Applicability:** All the participants reported that six of the items were applicable to their work. More than 90% of the clinicians thought the other three items were applicable to their work.

**Importance:** Seven items were considered to be important items for their work by all the clinicians. Two staff (out of 18) (11.1%) of the clinicians thought the item of aiming the mother’s nipple when attaching her baby to her breast was not important for their work.

**Table 5.5 Comments on usability of each item**

Item	Difficulty to understand (Yes)/ responses n (%)	Applicability to work (Yes)/ responses n (%)	Importance for work (Yes)/ responses n (%)
1 Definition of positioning	2/18(11.1)	20/20(100.0)	19/19(100.0)
2 Essential element of effective positioning	3/19(15.8)	20/20(100.0)	18/18(100.0)
3 Direction of mother's nipple when attaching her baby to her breast	2/20(10.0)	18/20(90.0)	16/18(88.9)
4 The scenario of 3-week-old baby with poor weight gain	0/19(10.0)	20/20(100.0)	18/18(100.0)
6 How mother knows her baby is not well attached in first week (A)	0/20(0.0)	20/20(100.0)	18/18(100.0)
7 Signs of poor attachment in the baby	2/19(10.5)	19/20(95.0)	18/18(100.0)
8 Signs of poor attachment in the mother	0/20(0.0)	19/20(95.0)	17/17(100.0)
9 Normal sucking pattern during breastfeeding	1/19(5.3)	20/20(100.0)	17/18(94.4)
10 How mother knows her baby is not well attached in first week (B)	0/20(0.0)	20/20(100.0)	18/18(100.0)

#### **5.4.4 Developing items of P & A**

Based on the above variance of scores and comments for each item, the breastfeeding expert panel confirmed six appropriate items to be used in the subsequent study. Three items with 100% correct responses were deleted due to lack of variance, these were: *“The scenario of 3-week-old baby with poor weight gain”*, *“How mother knows her baby is not well attached in first week” (A)* and *“Signs of poor attachment in the mother”*. Two items – *“Definition of positioning”* and *“Essential element of effective positioning”* – were modified to be better understood. Less variance scores were shown in the three items of *“How mother knows her baby is not well attached in first week (B)”* (95% correct answer), *“Normal sucking pattern during breastfeeding”* (90% correct answers) and *“Signs of poor attachment in the baby”* (90% correct answers). The possible reason was the effect of breastfeeding training before the study which decreased the variance. The expert panel discussed and kept the three items because the three items were essential knowledge and they thought it was necessary to be further tested the variance in the next studies. One item – *“Direction of mother’s nipple when attaching her baby to her breast”* – was maintained for the next study for feasibility and applicability based on comments and good variance of scores. Six new items of P & A will also be used to assess professionals’ knowledge and the validity will be further examined in the next study.

### **5.5 Discussion**

#### **5.5.1 Methodology**

The study used mixed research methods; quantitative methods showed the score variance for each item and qualitative methods investigated the usability of mini-CUBA V1. Six items were included in final mini-CUBA based on score

variance and comments on the usability of the initial mini-CUBA V1. Mini-CUBA V1 used multiple choice questions with only one correct option out of four (25% chance level). The reasons for the answers to each item are valuable to identify whether the participants really understood the knowledge. Correct answers with correct reasons show the participants understood the item. However, correct answers with incorrect reasons indicate the participants have not learned the knowledge well, they have guessed the correct response or their knowledge is really basic and superficial. Correct answers with no reasons given may mean the participants do not know the reasons. Incorrect answers with incorrect reasons indicate the participants do not have this knowledge.

The sample covered a wide range of ages, job titles, time working with breastfeeding mothers and time since qualification, which is beneficial to achieve useful perceptions on the usability of mini-CUBA V1 from different professionals. All the participants had worked with breastfeeding mothers since qualification, for an average of 18 years (Min=6, Max=37). This indicates participants were likely to provide valuable views based on their good experiences of breastfeeding practices.

There are four limitations to the study. Firstly, the study was conducted among professionals who had attended a breastfeeding training course. The knowledge of P & A had recently been refreshed for all the participants. Therefore, this improved knowledge contributed to the high proportion of correct answers and narrowed the differences between participants in the study. Secondly, the sample of 20 participants for the quantitative method is small, which may be another main reason for no significant differences being found between knowledge scores and job-related variables. Thirdly, sample participants had a mean age of 39 years old and at least five years since qualification. Thus, the study cannot assess the usability of mini-CUBA V1 on young, inexperienced



professionals. Finally, the comments regarding reasons for choice, difficulty in understanding, familiarity with work and importance to practice for each item were simple. A high percentage of staff did not provide reasons for their choices in the qualitative research. It is therefore difficult to learn the real reasons they did not give answers because the qualitative study was undertaken by survey and not face-to-face interview.

One of the ways to improve the research in future is that the instructions to participants should emphasise the importance of giving more explanation for each open question. In addition, participants should be given more time to finish the questionnaire. Open questions with detailed prompts should also be developed in the next qualitative study to obtain participants' deeper perceptions. Face-to-face interviews might be more useful to explore the views of participants compared with questionnaires with open questions.

### **5.5.2 Knowledge level in P & A among participants**

The findings showed a high mean score of P & A knowledge, with 7.4 for the whole sample. The main reason for this might be that the participants had attended a breastfeeding training course before the study and improved their knowledge in P & A. Another reason might be that 19 of the 20 participants had good practical experience as they have mid-grade or senior job titles, a mean of 18 years since professional qualification and 80% had been trained in breastfeeding. The scenario related to breastfeeding practices achieved 100% correct answers. This is consistent with the finding by Wallace et al. that clinicians in NICUs achieved higher knowledge scores in breastfeeding practices compared with the knowledge of breastfeeding benefits and physiology of lactation (Wallace et al. 2013). However, a low proportion of correct answers with correct reasons for all items was found among participants who had just completed the breastfeeding training course, which suggests

professionals learn the knowledge superficially and need to be further trained. The effectiveness of breastfeeding training courses in the essential knowledge of P & A needs to be improved. This indicates that an effective training programme regarding P & A is necessary and valuable for Chinese professionals.

### **Positioning knowledge**

Good positioning ensures correct attachment. Conversely, poor positioning leads to poor attachment, which means the baby cannot obtain milk effectively. Insufficient milk leads to frequent crying and mothers can then believe they have insufficient milk. A relatively low correction proportion was seen in the "*Definition of positioning*" item, which suggests the definition of P & A is not understood well by participants. Similarly, poor knowledge was found for the item of "*Essential element of effective positioning*", with 55.6% (10/18) correct answers and 22.2% (4/18) correct reasons. This indicates that training is necessary for professionals in the knowledge of positioning and it should highlight the different definitions of P & A used by healthcare professionals.

The highest percentage of participants (15.8%, 3/19) thought the "*Essential element of effective positioning*" item was difficult to understand. The second highest percentage of participants (11.1%, 2/18) stated that it was difficult to understand the "*Definition of positioning*". Inch stated that positioning was historically used to describe both positioning and attachment, which still causes confusion for staff in the UK, although the precise terminology of P & A was developed more than ten years ago by the WHO (Inch et al. 2003). Training on the definition of P & A is strongly recommended for professionals in breastfeeding training programmes. In this study, it is clear that one staff member confuses positioning with attachment based on her reason given in the item of "*Definition of positioning*".

### **Attachment knowledge**

Poor knowledge was found in the item of *“Direction of mother’s nipple when attaching her baby to her breast”* with 55.0% (11/20) correct answers and 15% (3/20) correct reasons. The correct direction of the nipple is crucial for good attachment, which means ensuring the baby’s mouth is open as far as possible and the nipple is at the optimal location of the baby’s mouth (Woolridge 1986). Optimal location of nipple in the baby’s mouth is essential as it makes her tongue lie underneath a long stretch of breast. This position protects the nipple during the process of removal of breast milk with the effect of the negative suction pressure from the infant and positive ductal pressure from the milk ejection reflex. Therefore, it is essential for healthcare professionals to recognise the importance of the direction of the nipple and understand the mechanism of sucking with correct attachment.

### **The difference in scores of sub-groups**

No significant differences were seen in any job-related sub-groups. The main reason for this might be that the sample was too small to find significant differences. Previous studies have reported inconsistent findings regarding the relationship between knowledge level and job-related variables. Wallace et al. reported that those who were senior and recently qualified had higher scores on “breastfeeding benefits” and “physiological bases of breastfeeding” among 51 clinicians in NICUs using the breastfeeding assessment tool of NUCAT. Doctors also achieved higher scores on “breastfeeding benefits” than neonatal nurses. No significant differences in knowledge score were seen among clinicians in terms of the variable of number of years working (Wallace et al. 2013). However, Law et al. reported that midwives with longer working experience had a lower mean knowledge score than those with less experience among 108 registered midwives using BeSST (Law et al. 2007). Therefore, P & A training is still

essential even for experienced staff. In China, Ouyang, Xu and Zhang reported that working years were positively associated with breastfeeding knowledge among 367 Chinese clinicians (Ouyang, Xu and Zhang 2012).

Inconsistent findings in the knowledge level in regards to job-related variables indicate that differences in breastfeeding knowledge might exist in various settings and different countries. An objective breastfeeding assessment tool is necessary to explore actual knowledge and develop effective breastfeeding training interventions for diverse healthcare professionals. This suggests a big sample covering a wide range of professionals will be valuable to represent different professionals and reflect their actual breastfeeding knowledge levels.

### **5.5.3 Conclusion**

This study developed a Mandarin version of mini-CUBA V1, a breastfeeding assessment tool in knowledge of P & A, consisting of six items using four multiple choices with one correct option. The correction proportion achieved by healthcare professionals was used to assess the score variance of each item. The comments regarding difficulty in understanding, applicability to practice and importance to work provide evidence for the feasibility of each item. The final version of the Mandarin mini-CUBA V1 was established based on the results of score variance and feasibility for each item. The mini-CUBA V1 will be used to assess the effectiveness of a breastfeeding training programme in improving the knowledge of P & A in the next studies. As the sample is too small to identify the differences in job-related sub-groups, a bigger sample will be recruited to reflect actual P & A knowledge levels among diverse healthcare professionals. The validity and usability of the Mandarin mini-CUBA V1 will be further assessed in the next study. Based on the feasibility of the Mandarin mini-CUBA V1 in this study, a wider knowledge assessment using multiple choice questions will be

further developed to evaluate Chinese healthcare professionals' knowledge based on CUBA.

Although participants completed a breastfeeding training course, the study shows poor knowledge of P & A in the low proportion of correct reasons, especially in the definition of P & A and nipple direction when infants attach. The effectiveness of the current breastfeeding training course on the knowledge of P & A needs to be improved. An effective training programme in P & A is necessary and will be valuable to fill knowledge gaps among Chinese professionals. Therefore the next study will aim to develop a new training programme for healthcare professionals to improve the support skills in P & A and the effectiveness will be assessed using the Mandarin min-CUBA V1 in the next study.

# **Chapter 6 A pilot study of the effectiveness of a breastfeeding training DVD on improving knowledge and confidence among healthcare professionals in China**

## **6.1 Background**

### **6.1.1 Positioning and attachment**

Chapter 3 introduced the importance of positioning and attachment (P & A), necessary support for mothers, and the training needs of healthcare professionals on the skill of P & A (see Chapter 3.1).

### **6.1.2 Hand expression**

#### **6.1.2.1 Importance of the skill of hand expression**

Teaching all mothers the skill of hand expression (HE) is required in the “Ten Steps to Successful Breastfeeding” for the Baby-friendly Hospital Initiative, which was developed by WHO/UNICEF in 1991 to support successful breastfeeding (UNICEF 2005). It is recommended that this fundamental technique is taught within 24 hours of birth to increase mothers’ confidence to deal with any breastfeeding problems. HE is an essential skill for mothers who cannot breastfeed their infants directly due to illness of mother or baby, infants’ separation from mothers or preterm birth. The technique is crucial for mothers of premature babies separated from them during their stay at a neonatal unit, or low birth weight babies who cannot suck well, to provide the colostrum for the baby. It has been recommended that mothers who cannot directly breastfeed after birth hand express breast milk within six hours. The recommended frequency of HE is 8–12 times per 24 hours until the baby is able to attach to the

breast and feed. Expressing breast milk in the night, when the prolactin levels are highest, is crucial to expressing sufficient breast milk and maintaining continual milk production (Becker, Cooney and Smith 2011, Binns et al. 2006, Clemons and Amir 2010).

UNICEF in the UK recommends that mothers express colostrum by hand rather than using a pump, due to the specific benefits of hand expression in the first few days. Colostrum expressed by hand has a higher fat content than colostrum expressed using a breast pump (UNICEF UK 2010a). Ohyama et al carried out a sequential cross-over study to compare the benefits of hand expression and pump expression in a tertiary prenatal centre in Japan (Ohyama, Watabe and Hayasaka 2010). The volume of expressed milk and breast pain level was measured during expressing using a validated pain scale (Wong and Baker 1988) among 11 mothers of premature babies in the first 48 hours after birth. The volume of breast milk achieved by hand expression (median 2.0 ml, range: 0–12.6 ml) was significantly higher than by using an electric pump (median 0.6ml, range: 0–7.2 ml). However, researchers found that only 36% of mothers experienced pain when using an electric pump, while 90% of hand-expressing mothers reported experiencing pain during expressing. It was suggested that the pain is associated with mothers' lack of skill at massaging the breast before expressing. The study supports UNICEF's recommendation that HE is the best way to obtain colostrum in the early period (UNICEF UK 2010a). However, the sample was small and further studies with larger samples are necessary to establish the differences in breast milk volume and comfort associated with hand expression and electric pumping.

HE is also used to stimulate breast milk production when the amount of breast milk seems to be insufficient. A prospective observational cohort study by Morton et al. showed that hand expression of colostrum is associated with the

amount of milk produced in the first two weeks. More effective removal of colostrum by hand expression may stimulate subsequent milk production in the first days after birth. Study results also suggested that mothers of preterm infants can attain and sustain high milk production by combining the use of electrical pumps with hand expression (Morton et al. 2009). Massaging and the skin contact of the hand to the breast stimulate releasing hormones, increasing milk production and ejection (Lu 2006). Mothers who produce more breast milk than their baby needs can hand express and store extra breast milk. In a survey of 836 breastfeeding mothers in Australia, 57% of participants regarded storing extra breast milk as the most common reason for expressing milk (Clemons and Amir 2010). In addition, HE can be used to measure the volume of breast milk to evaluate if breast milk production is sufficient (Binns et al. 2006, Dykes and Williams 1999).

When a mother returns to work or is temporarily away from her baby, HE contributes to sustaining breastfeeding as the baby can be fed with breast milk (Labiner-Wolfe et al. 2008). In China, the main reason for the low rate of exclusive breastfeeding is that mothers have to return to work after three months of maternity leave (Xu et al. 2009). Binns demonstrated that breast milk expression is an essential strategy to maintain exclusive breastfeeding for women returning to work and this has been widely applied in Australia (Binns et al. 2006).

For mothers suffering engorgement, blocked ducts or mastitis, and nipple pain, HE may help resolve these problems and maintain breastfeeding. UNICEF in the UK recommends that mothers to deal with engorged breasts by HE, as it is more effective than using an electrical pump. Especially in the early days of birth, mothers usually experience engorged breasts. HE is far more successful than using a pump, as colostrum is much easier to express by stimulating hormones



(UNICEF UK 2010a). Maria explained that mothers can compress the specific parts more accurately to release the blockages in the breast by hand than by using pumps (Maria 2012).

Additionally, HE helps infant to attach effectively to full breasts, which are more difficult to attach to. Mothers will master the skill of attachment well by understanding the process of removing breast milk from the breast using HE (UNICEF UK 2010a). Thus, the skill of HE is crucial for mothers and professionals and it must be mandatory training for mothers by experienced breastfeeding trainers.

#### **6.1.2.1 Prevalence of HE**

Expressing breast milk has become increasingly common, not only for preterm babies but also for healthy infants in developed countries (Johns et al. 2013). In the United States, 85% of breastfeeding women feed children with expressed human milk (Flaherman and Lee 2013). Recent research in Singapore reported an increasing trend amongst new mothers to express breast milk to feed their healthy infants. Hornbeak et al. (2010) conducted a population-based survey to investigate the prevalence and patterns of breastfeeding for 3009 Singaporean-Chinese mothers with six-month-old infants in south-western Singapore. The authors reported that 22% of respondents in 2006–2008 expressed breast milk to feed using a bottle. This was a large increase compared to the 9% of respondents in 2000–2001 who expressed milk (Hornbeak et al. 2010). Two Perth Infant Feeding Studies were conducted during 1992–1993 and 2002–2003 to explore the changes in breast milk expression patterns among Australian mothers. The rate of mothers expressing breast milk was significantly higher with 69% (556 mothers) expressing in 2002–2003 compared to 38% (587 mothers) in 1992–1993. The increasing trend for expressing breast milk indicates the importance and necessity of teaching hand expression (Binns et al. 2006).

Although UNICEF, based on research evidence, recommends HE over pump expression, the prevalence of HE among mothers has not been reported by now. Oliveira et al. reflected that the practical support from professionals was insufficient, according to their cross-sectional study (Oliveira et al. 2014). It was conducted to assess the effect of support with hand expression provided for 79 mothers with preterm infants at 3–7 days postpartum in a tertiary neonatal unit of a UK hospital. The results showed that 90% of participants received help in the skill of hand expression but only 11% expressed breast milk within six hours of birth due to lack of support from professionals. This indicates that the proportion of mothers expressing breast milk within six hours of birth is still quite low due to lack of professional support for mothers in NICUs.

#### **6.1.2.2 The impact of HE on breastfeeding outcomes**

Johns et al. undertook a systematic review to explore the prevalence and outcomes of expressing breast milk (Johns et al. 2013). However, none of the studies reviewed by Johns et al. considered the impact of skill support in HE on breastfeeding outcomes by comparing no skill support. Of the total of 22 included studies, four studies involved pump expression and only one study compared the impacts of pump expression and HE on breastfeeding outcomes (Flaherman et al. 2012). The author designed a randomised controlled trial with a sample of 68 mothers of term infants who were healthy but had poor attachment or sucking at 12–36 hours after birth. Of these, 35 mothers were assigned HE and 33 mothers pump expression. Both groups were provided with 15 minutes of support on the skill of HE and pump expression respectively. The results reported a significantly higher breastfeeding rate (96.1%, 26 mothers) in the HE group compared with the pump expression group (72.7%, 22 mothers) at follow-up two months later. The two groups were balanced in terms of demographics and the number of mothers at the two-month follow-up, which

indicates a good control of select bias. However, the intervention method was simple, lasting only 15 minutes, and the practical skill after intervention was not assessed. The rate of exclusive breastfeeding at two months was not explored, which was a crucial indicator in assessing breastfeeding outcomes and the small sample size might affect evidence reliability.

Overweight and obese women were reported in a systematic review to be less likely to breastfeed than normal-weight women due to the physical difficulty in attaching the baby to large breasts (Amir and Donath 2007). A longitudinal study investigated the relationship between expressing breast milk and the duration of breastfeeding among overweight or obese women (Leonard et al. 2011). It was reported that those who never expressed breast milk breastfed for shorter periods of time compared to those who expressed breast milk. However, the main limitation of the study was that other factors known to influence breastfeeding duration were not examined, including mothers' breastfeeding intentions, suffering breastfeeding problems, different support professionals and returning to work after maternity leave (Brown and Jordan 2013, Li et al. 2008, Odom et al. 2013, Worobey 2011). Expressing breast milk was considered a possible strategy that might reduce differences between overweight or obese women and healthy-weight women in terms of breastfeeding duration (Leonard et al. 2011).

There is no evidence about the prevalence and impact of HE on breastfeeding outcomes in China. Ding designed a randomised controlled trial to investigate the impact of a community breastfeeding support intervention on breastfeeding outcomes (Ding 2012). The intervention included knowledge of breastfeeding benefits, breastfeeding techniques and hand expression in four communities in China. Although the any breastfeeding rate of the experimental group at 28 days was 89.04% (73 mothers), significantly higher compared with the 79.03% of the

control group (78 mothers), the independent impact of HE support was not examined and is still unknown.

### **6.1.3 Breastfeeding knowledge assessment tool**

The two skills of P & A and HE have been highlighted above as key mandatory training skills for professionals. Developing a knowledge assessment tool for the two skills is essential to evaluate professionals' practical skill after training courses. The research developed the mini-CUBA V1 tool based on the validated Coventry University Breastfeeding Assessment (CUBA) which covers key topics from the BFI training standards for successful breastfeeding (Wallace et al. 2009, Wallace et al. 2011a, Wallace et al. 2011b). The usability of P & A in mini-CUBA V1 was explored via a semi-structured interview in Chapter 5. A total of 20 healthcare professionals reported that the nine items regarding assessment of P & A were essential, relevant to their work and easy to understand, which suggests that the mini-CUBA V1 is feasible as an assessment tool in the area of P & A. Although participants were good at the multiple choice questions, with more than 50% correct for each item, the rate of correct reasons for the correct choices was still very low, below 50%, which indicates the training needs in P & A. However, the knowledge assessment of 20 participants was insufficient to reflect the practical knowledge levels of healthcare professionals. A bigger sample will be recruited to examine the knowledge of P & A in the study. The knowledge of HE was not assessed in mini-CUBA V1 in Chapter 5. A new mini-CUBA V2 tool will be developed, including the assessment of P & A and HE, based on an existing validated CUBA.

### **6.1.4 Breastfeeding training DVD in two essential skills of P & A and HE**

The Breastfeeding: Essential Support Skills DVD (*Breastfeeding: Essential Support Skills DVD* 2009) was developed by Coventry University using clinical footage. It focuses on the two key skills of P & A and HE using four educational

sessions, including optimal P & A, the process of a satisfying feed showed by a baby of three months, hand expression demonstrated by a mother, and baby-led feeding demonstrated by an experienced baby of ten months.

Wallace et al. reported on the usability of the DVD in a qualitative study aiming to explore the usability of a breastfeeding self-study training programme for 36 professionals consisting of a breastfeeding workbook, the DVD and CUBA (Wallace et al. 2011a). The participants reflected that the DVD was valuable and helpful in improving their skills in P & A and HE and in decreasing the amount of inconsistent advice given to mothers. Also, participants reported that the increased knowledge had enhanced their confidence and they welcomed the new training method. However, the study did not report on the objective assessment of participants' knowledge levels using CUBA. The DVD training was only one part of the training intervention programme. Participants reflected on their positive perceptions towards the whole training programme but not specifically the DVD.

Similarly, the impact of the same breastfeeding self-study training programme among 322 community practitioners in the UK was examined by Wallace et al. (Wallace et al. 2011b). Significant increased knowledge between pre- and post-training using CUBA was seen among community practitioners. However, the knowledge assessment covered many areas of breastfeeding, and the independent change of knowledge level in P & A and HE between pre- and post-training was not reported. Interviews among participants also reported that the DVD had been helpful for their practical work in the two skills of P & A and HE.

The skill of HE in the Breastfeeding: Essential Support Skills DVD has been applied as a training and skill support video for professionals and breastfeeding

mothers in the UK by UNICEF UK (UNICEF UK 2010b). It is unknown if the Breastfeeding Essential Support Skills DVD is effective on improving the knowledge and confidence among healthcare professionals in China. This study aims to explore the effectiveness and feasibility of the Breastfeeding Essential Support Skills DVD. Breastfeeding knowledge assessment tool of mini-CUBA V2 and breastfeeding confidence assessment tool covering the two areas of knowledge of P & A and HE will be developed. The two assessment tools will be used to assess the effectiveness of the Breastfeeding Essential Support Skills DVD.

## **6.2 Aims of the study**

1. To develop and examine the validity of breastfeeding knowledge assessment tool (mini-CUBA V2) and the internal reliability of Coventry University Breastfeeding Support Self Efficacy Scale (CU-BSSES)
2. To test the effectiveness of the breastfeeding training DVD in improving professionals' knowledge of P & A and HE via mini-CUBA V2
3. To test the effectiveness of the breastfeeding training DVD in improving professionals' confidence in supporting P & A and teaching HE via CU-BSSES
4. To examine the impact of the breastfeeding training DVD on knowledge and confidence in relation to P & A and HE for different professional groups via mini-CUBA V2 and CU-BSSES
5. To explore the correlation between the confidence score and knowledge score for P & A and HE pre- and post-DVD training
6. To evaluate the usability and feasibility of the breastfeeding training DVD in improving professionals' knowledge and practices in the two skills of P & A and HE

## **6.3 Materials and methods**

### **6.3.1 Research site**

This research was conducted during two breastfeeding training courses in China. One training course was conducted by the National Center for Women and Children's Health (China CDC) in November 2013. It was a high quality breastfeeding training course in China for provincial breastfeeding trainers who were from different hospitals throughout China's 31 provinces. These professionals were regarded as expert breastfeeding trainers who were responsible for training other healthcare professionals in breastfeeding support in their provinces. The other breastfeeding training course has been delivered once every year to re-train and update breastfeeding knowledge for clinicians in the Ninghai Women and Children's Health Hospital. The Ninghai hospital is a county hospital in Zhejiang province, which has around 5000 deliveries each year and has achieved breastfeeding hospital accreditation.

### **6.3.2 Sample**

A total of 250 professionals who worked with breastfeeding mothers and attended the courses were invited to participate in the study. The sample covered a range of healthcare professionals, including nurses, midwives and doctors. Participants differed in age, job title, time spent working with breastfeeding mothers and previous breastfeeding training. We excluded participants with three or more unanswered knowledge items in the pre- or post-DVD questionnaire. Uncompleted confidence items in the questionnaires were still included in the analysis sample.

### **6.3.3 Educational intervention**

The breastfeeding training DVD developed by Coventry University includes four educational sessions, including optimal positioning and attachment, hand

expression shown by a mother, the process of a satisfying feed demonstrated by three-month-old baby and baby-led feeding demonstrated by a ten-month-old baby. The total length of the DVD is 14 minutes 32 seconds.

***Positioning and attachment:*** Firstly, the definitions of positioning and attachment are introduced. Breastfeeding problems associating with poor attachment, such as nipple pain, insufficient breast milk and breast engorgement, are discussed. Three signs of good positioning are discussed, followed by three signs of good attachment for the mother, and five signs of good attachment that would be visible to someone else. The knowledge of a normal sucking pattern was also taught in the session.

***Hand expression:*** The skill is introduced to be applied in many situations, such as breast engorgement, or when a mother is separated from her preterm or sick baby or is returning to work. Specific techniques are demonstrated by a mother. It also emphasises correct massage of the breast.

***A satisfying feed:*** This session introduces the process of a satisfying feed, demonstrated in a baby of three months. The principles and signs of good positioning and attachment are shown again. The sucking rhythm changes during the whole feeding and ends with shorter sucks. It shows a satisfying feed with the baby closing its eyes and being relaxed.

***Baby-led feeding:*** This is demonstrated with a ten-month-old baby to show baby-led breastfeeding.

The script of the breastfeeding training DVD developed by Coventry University was translated into Mandarin by the researcher. Two experts in the area of breastfeeding research and one professional translator confirmed the translation. One expert and one translator who were proficient in both Mandarin and English



checked the translated content and reached agreement about the translation by discussing inconsistent contents with the third expert.

#### **6.3.4 Measures**

**Knowledge:** The level of knowledge of breastfeeding was assessed by establishing a Mandarin version of mini-CUBA V2 for pre- and post-training covering two areas of P & A and HE based on CUBA at Coventry University (Wallace et al. 2011b, Wallace et al. 2011). The items of the Mandarin version of mini-CUBA V2 were multiple-choice questions, where only one of four options was correct. The pre-DVD questionnaire in mini-CUBA V2 comprised seven items covering demographic and job-related variables, eight items regarding personal information and job-related information, six items regarding P & A knowledge (range 0–6), and six items covering HE knowledge (range 0–6). Personal information included work site, job type, job title, years of qualification, length of time working with breastfeeding mothers and previous breastfeeding training. The perceptions of participants on the best way to learn the knowledge and skill of breastfeeding were explored in the pre-DVD questionnaire. The same tool was used post-training but without the demographic items, i.e. just the knowledge assessment tool.

**Confidence:** The confidence of healthcare professionals to support breastfeeding mothers was measured using the Mandarin version of Coventry University Breastfeeding Support Self Efficacy Scale (CU-BSSES). This was developed by a panel of breastfeeding experts at Coventry University and translated by the researcher based on the Breastfeeding Self-Efficacy Scale, which is a widely used confidence assessment tool for mothers (Dennis and Faux 1999). CU-BSSES comprises six items regarding confidence in supporting P & A, and two items regarding teaching HE. Participants answered using a 10-

point Likert scale (1=not at all confident, 10=completely confident). The Cronbach's alpha coefficient was calculated to test the internal consistency of CU-BSES by reliability analysis which normally ranges between 0 and 1. The closer Cronbach's alpha coefficient is to 1, the greater internal consistency of the scale. The Cronbach's alpha exceeds 0.7 which indicates a good internal consistency. George and Mallery (2003) provide the rules of thumb: ">0.9 – Excellent, >0.8 – Good, >0.7 – Acceptable, >0.6 – Questionable, >0.5 – Poor, and <0.5 – Unacceptable" (p. 231). The confidence in each knowledge item in mini-CUBA V2 was examined by participants in response to the question "choosing your choice whether by guessing or not" for each item. The choice of "not guessing" was regarded as being confident in the corresponding knowledge and "guessing" was seen as not being confident about the item of knowledge.

***Evaluation of DVD:*** The post-DVD questionnaire contained comments for DVD and evaluation of the value of the DVD, including usefulness of P & A and HE information and overall usefulness to professionals' practice, with a range of 1–10 (1=not at all useful, 10=very useful).

### ***Establishing validity of mini-CUBA V2***

Construct validity has been viewed as the unifying concept for the validity evidence (Cohen and Swerdlik 2002). The definition of construct validity by Cohen and Swerdlik states it is "a judgment about the appropriateness of inferences drawn from test scores regarding individual standings on a variable called a 'construct' (Cohen and Swerdlik 2002). There are various methods to provide evidence of construct validity, including using homogeneity, changes with age, pre-test/post-test changes, method of contrasted groups, convergent evidence, discriminant evidence and factor analysis. In the research, pre-test/post-test changes and method of contrasted groups are used to evaluate the construct validity. 'Method of contrasted groups' refers to scores on the test

that vary in a predictable way between different participants and is validated to distinguish difference between groups. 'Pre-test/post-test changes' is a method to provide evidence of construct validity by discriminating the test scores significant change between pre- and post-test.

### **6.3.5 Procedure**

The study was approved by the research ethics committees at both Coventry University, UK (ref: P5842), and Zhejiang University, China (ref: 20120002). The researcher obtained agreement from the training organisers to conduct a pilot study of the breastfeeding training DVD during the two training courses. The study was conducted in two places and at different times, and the procedure was a little different for each location. The study of the expert breastfeeding staff was conducted **after** the national breastfeeding training course because it was not possible for the researcher to access the participants before the training course. However, the study of the staff in Ninghai county was carried out **before** the county breastfeeding training course.

All the professionals who were participating in the two breastfeeding training courses were invited to watch the breastfeeding training DVD before or after their training courses. The researcher talked to participants about the information sheet (PIS), including the aims, methods and use of their data, and obtained signed, informed consent. A refusal form was signed by those professionals who decided not to participate. The pre-DVD questionnaire was coded by the researcher, who emphasised to the participants that they should remember their codes for the post-DVD questionnaire. This was used to pair the data for each person anonymously. The DVD was played and the voice was turned off because most of the participating staff cannot understand English. The researcher gave an oral translation according to the transcription agreed with three experts. Afterwards, they completed the post-DVD questionnaire. It

took around 15 minutes each for the pre- and post-DVD questionnaires. The total time of each session was around 45 minutes.

### 6.3.6 Analysis

**Quantitative data analysis:** The internal reliability of Cronbach's alpha for the sub-scales of confidence was calculated using reliability analysis. The characteristics of participants in the study were described by descriptive statistics. Personal and job relevant information, including age, work setting, job type, job title, length of time working with breastfeeding mothers and previous breastfeeding training, were independent variables. The mean confidence and knowledge scores were calculated as dependent variables. Analyses of the differences of mean knowledge score and confidence score between pre- and post-DVD in each group were conducted using a Paired-Sample T-test. The differences between mean knowledge and confidence scores between the two groups were examined pre-DVD and post-DVD using Independent-Samples T-test. One-way repeated measures ANOVA was conducted to explore the change of mean score in knowledge and confidence between pre- and post-DVD for different sub-groups. The change in proportion of "no confidence" ratings for each item of knowledge between pre- and post-DVD training was examined using the Chi-Square test. Effect size statistics were calculated according to the guidelines of Pallant. According to the guidelines by Cohen, eta squared 0.01=small effect, 0.06=moderate effect, 0.14=large effect (Cohen 1988b, Pallant 2013). The relationship between knowledge and confidence was investigated for pre- and post-DVD respectively by Bivariate Correlations and was reported using a Pearson product-moment correlation coefficient. The statistical significance level was set at  $p < 0.05$ .

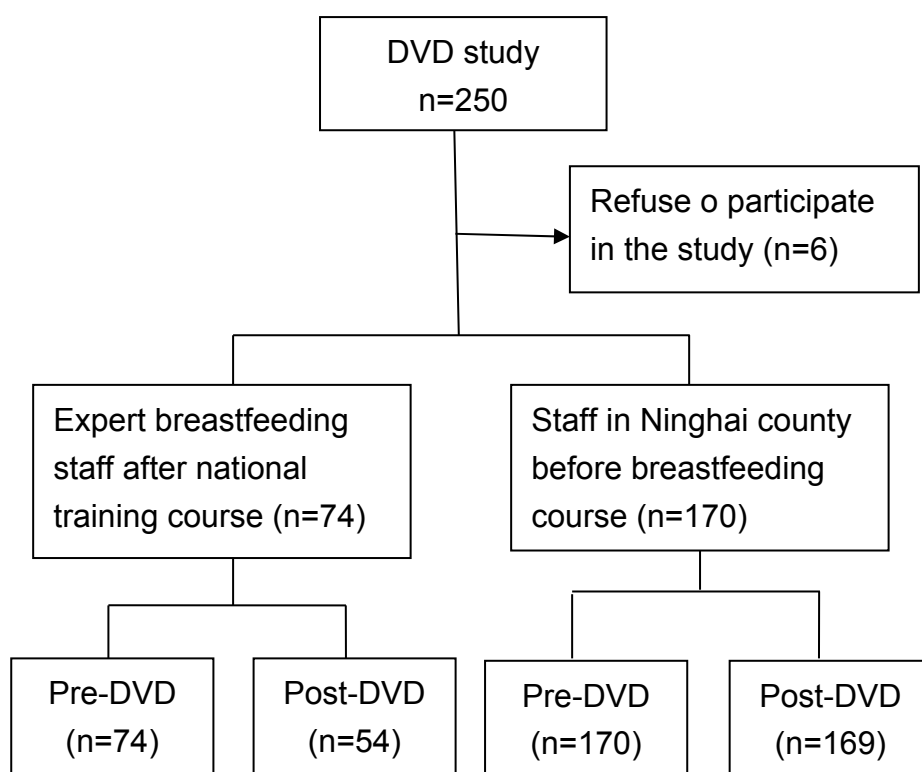
**Qualitative data analysis:** The comments on the feasibility and usability of the breastfeeding training DVD for enhancing professionals' practical skills were

analysed using thematic analysis. The researcher transcribed all recorded interviews. Transcripts were translated into English and the accuracy of the translated transcripts was checked by a senior doctor. Six steps of thematic analysis, as described by Braun and Clarke, were used to explore the perceptions and the detailed process of the analysis was described in Chapter 3, section 3.3.5 (Braun and Clarke 2006).

## **6.4 Results**

### **6.4.1 Characteristics of samples**

This study was carried out among 250 professionals from different areas of China during the period of two breastfeeding training courses. A total of 244 participants were recruited for the study. The response rate was 97.6%. There were a total of 223 participants that completed both the pre- and post-DVD knowledge questionnaires and 21 participants completed the pre-DVD knowledge questionnaire (see Figure 6.1)



**Figure 6.1 Flow chart of pilot study**

For the national breastfeeding training course, 80 expert breastfeeding trainers (National Group) took part in the study after their breastfeeding training course; 74 expert trainers took part in the study and completed the pre-DVD knowledge questionnaire and 6 expert trainers refused to participate due to lack of interest. A total of 54 expert trainers completed the pre-DVD and post-DVD knowledge questionnaires and 20 expert trainers completed only the pre-DVD knowledge questionnaire.

In the second setting, 170 general professionals from Ninghai Women and Children's Health Hospital, Zhejiang province, China (Ninghai Group) were invited to participate in the study before their recent breastfeeding training course. A total of 169 completed the pre- and post-DVD knowledge

questionnaires and 21 participants completed only the pre-DVD knowledge questionnaire.

Of the recruited 244 participants, 186 participants completed the confidence assessment section in both the pre- and post-DVD questionnaires, with 41 expert trainers from the National Group and 145 general professionals from the Ninghai Group. A total of 216 participants (National Group=65; Ninghai Group=151) completed the pre-DVD confidence assessment and 198 participants (National Group=45; Ninghai Group=153) conducted the post-DVD confidence assessment.

For the total sample, 41.39% of participants (101/244) were aged 30 or under, 38.93% (95/244) were aged 30–39 and 19.67% (48/244) were aged 39 or older. Nurses were the main participants, accounting for 75.82% (185/244) of the sample. A further 16.39% (40/244) were midwives and 7.38% (18/244) were doctors and administrators. All the participants worked with breastfeeding mothers and the length of working time ranged from 1 year or under to 10 years or more. Of the participants, 93.44% (228/244) had had previous breastfeeding training (see Table 6.1).

The two groups of participants represented different level hospitals. Most expert breastfeeding staff in the National Group came from municipal or provincial hospitals, which are high level hospitals providing high quality maternity services in China, accounting for 85.14% (63/74) of the sample. The Ninghai Group consisted of staff from a county hospital, which is a lower level hospital providing lower quality maternity services compared to those of the National Group. In terms of job title, the largest proportion was primary title accounting for 58.61% (143/244) of the total sample, with 89.51% (128/143) of these being from the Ninghai Group and 10.49% (15/143) from the National Group. A further 101 staff

out of 244 (41.39%) were senior or mid-grade, 59 (58.40%) of these participants were from the National Group and 42 (41.60%) were from the Ninghai Group.

Additionally, the best method of breastfeeding training was explored in this study and 78.69% (192/244) of participants considered a face-to-face training course to be their most preferred method. The second most popular method was a workbook with DVD, chosen by 13.50% (33/244) of clinicians. In addition, 17 professionals thought a book, online learning or learning from others were the best ways for them to learn. See Table 6.1 for the characteristics of participants.



**Table 6.1 Characteristics of participants completing pre-DVD questionnaire**

	Items	Number	Percentage (%)
Age	< 30 years	101	41.39
	30–39 years	95	38.93
	> 39 years	48	19.67
Working hospital	Provincial hospital	37	15.48
	Municipal hospital	31	12.97
	County hospital	171	71.55
Job type	Nurse	185	75.82
	Midwife	40	16.39
	Doctor and administrator	18	7.38
Job title	Senior	21	8.61
	Mid-grade	80	32.79
	Primary or no qualification	143	58.61
Working with breastfeeding mothers	0–1 years	51	21.07
	2–5 years	82	33.88
	6–10 years	33	13.64
	>10 years	76	31.40
Previous training on breastfeeding	Yes	228	94.21
	No	14	5.79
Best way to be trained	Training course	192	79.34
	Other training methods	50	20.66

#### 6.4.2 Analysis of the knowledge scores

The knowledge assessment analysis was firstly conducted on the whole sample using Paired-Samples T-test. Then further analysis was done of the differences in mean knowledge score of P & A, HE and total for the National Group and Ninghai Group between pre- and post-DVD training. A total of 223 participants was analysed for paired tests of knowledge pre- and post-DVD (see Table 6.2). There were 242 participants for the pre-DVD questionnaire and 223 participants for the post-DVD questionnaire and the analysis compared the differences in confidence of pre-DVD between the National Group and the Ninghai Group. The knowledge score of P & A had a range of 0–6, the HE score range was 0–6, and the total score range was 0–12.

For the whole sample, the P & A knowledge score post-DVD training was significantly higher than pre-DVD training, with a big effect size of 0.26 (pre-DVD:  $M=3.60$ ,  $SD=1.30$ ; post-DVD:  $M=4.34$ ,  $SD=0.98$ ;  $t(222)=-8.93$ ,  $p<0.01$ ,  $d=0.26$ ). A statistically significant increase was found between pre- and post-DVD in the HE knowledge score with a big effect size of 0.41 (pre-DVD:  $M=3.35$ ,  $SD=1.25$ ; post-DVD:  $M=4.45$ ,  $SD=0.93$ ;  $t(222)=-12.45$ ,  $p<0.01$ ,  $d=0.41$ ). There was a significant improvement in the total knowledge score between pre- and post-training with a big effect size of 0.43 (pre-DVD:  $M=6.82$ ,  $SD=2.05$ ; post-DVD:  $M=8.83$ ,  $SD=1.46$ ;  $t(222)=-13.00$ ,  $p<0.01$ ,  $d=0.43$ ) (see Table 6.2).

In the Ninghai Group, there were significant increases in the P & A knowledge score in post-DVD compared to pre-DVD with a big effect size of 0.40 (pre-DVD:  $M=3.21$ ,  $SD=1.21$ ; post-DVD:  $M=4.30$ ,  $SD=1.01$ ;  $t(168)=-10.49$ ,  $p<0.01$ ,  $d=0.40$ ). Similarly, a significant increase in the HE knowledge score was found in post-DVD compared to pre-DVD in the Ninghai Group, with a big effect size of 0.52 (pre-DVD:  $M=3.22$ ,  $SD=1.25$ ; post-DVD:  $M=4.63$ ,  $SD=0.79$ ;  $t(168)=-13.52$ ,  $p<0.01$ ,  $d=0.52$ ). There was a significant improvement in the total knowledge

score for the Ninghai Group between pre- and post-DVD training, with a big effect size of 0.57 (pre-DVD:  $M=6.43$ ,  $SD=2.01$ ; post-DVD:  $M=8.98$ ,  $SD=1.36$ ;  $t(168)=-14.76$ ,  $p<0.01$ ,  $d=0.57$ ) (see Table 6.2).

However, in the National Group, there was no significant difference in the P & A knowledge score between pre- and post-DVD training (pre-DVD:  $M=4.44$ ,  $SD=1.02$ ; post-DVD:  $M=4.46$ ,  $SD=0.86$ ;  $t(53)=-0.11$ ,  $p=0.91$ ). There was a significant increase in the HE knowledge score in the National Group between pre- and post-DVD, with a moderate effect size of 0.08 (pre-DVD:  $M=3.59$ ,  $SD=1.24$ ; post-DVD:  $M=3.90$ ,  $SD=1.12$ ;  $t(53)=-2.15$ ,  $p=0.04$ ,  $d=0.08$ ). There was no significant difference in total the knowledge score for the National Group between pre-DVD and post-DVD (pre-DVD:  $M=8.04$ ,  $SD=1.66$ ; post-DVD:  $M=8.37$ ,  $SD=1.66$ ;  $t(53)=-1.52$ ,  $p=0.14$ ) (see Table 6.2).

**Table 6.2 Comparison of breastfeeding knowledge scores between pre- and post-DVD training in the two groups and whole sample**

Knowledge type	Group	n	Mean score		df	t	p
			Pre SD	Post SD			
P & A (range 0–6)	National	54	4.44 (1.02)	4.46 (0.86)	53	-0.11	0.91
	Ninghai	169	3.21 (1.21)	4.30 (1.01)	168	-10.49	<0.01
	Total	223	3.60 (1.30)	4.34 (0.98)	222	-8.93	<0.01
HE (range 0–6)	National	54	3.59 (1.24)	3.90 (1.12)	53	-2.15	0.04
	Ninghai	169	3.22 (1.25)	4.63 (0.79)	168	-13.52	<0.01
	Total	223	3.35 (1.25)	4.45 (0.93)	222	-12.45	<0.01
Total (range 0–12)	National	54	8.04 (1.66)	8.37 (1.66)	53	-1.52	0.14
	Ninghai	169	6.43 (2.01)	8.98 (1.36)	168	-14.76	<0.01
	Total	223	6.82 (2.05)	8.83 (1.46)	222	-13.00	<0.01

The differences in knowledge scores for P & A, HE and total were examined between the National Group and Ninghai Group pre- and post-DVD using an Independent-Samples T-test. The result showed the P & A knowledge score of National Group pre-DVD training was significantly higher than the Ninghai Group, with a big effect size of 0.21 (National Group:  $M=4.51$ ,  $SD=0.98$ ; Ninghai Group:  $M=3.22$ ,  $SD=1.22$ ;  $t(241)=7.96$ ,  $p<0.01$ ,  $d=0.21$ ). A significantly higher HE knowledge score was found in the National Group compared to the Ninghai Group in the pre-DVD training questionnaire, with a small effect size of 0.02 (National Group:  $M=3.64$ ,  $SD=1.21$ ; Ninghai Group:  $M=3.23$ ,  $SD=1.25$ ;  $t(240)=2.35$ ,  $p=0.02$ ,  $d=0.02$ ). The total knowledge score for the National Group was significantly higher than the Ninghai Group pre-DVD training, with a big effect size of 0.14 (National Group:  $M=8.14$ ,  $SD=1.65$ ; Ninghai Group:  $M=6.45$ ,  $SD=2.01$ ,  $t(240)=6.30$ ,  $p<0.01$ ,  $d=0.14$ ) (see Table 6.3).

After the DVD training, no significant difference was seen in the P & A knowledge score of the National Group and Ninghai Group (National Group:  $M=4.46$ ,  $SD=0.86$ ; Ninghai Group:  $M=4.30$ ,  $SD=1.01$ ;  $t(221)=1.10$ ,  $p=0.28$ ). Most importantly, the HE knowledge score for the Ninghai Group ( $M=4.69$ ,  $SD=0.87$ ) was significantly higher than for the National Group post-DVD training, with a moderate effect size of 0.11 (National Group:  $M=3.91$ ,  $SD=1.12$ ; Ninghai Group:  $M=4.69$ ,  $SD=0.87$ ;  $t(221)=-5.33$ ,  $p<0.01$ ,  $d=0.11$ ). The total knowledge score for the Ninghai Group was significantly higher than for the National Group post-DVD, with a small effect size of 0.03 (National Group:  $M=8.37$ ,  $SD=1.66$ ; Ninghai Group:  $M=8.98$ ,  $SD=1.36$ ;  $t(221)=-2.71$ ,  $p=0.01$ ,  $d=0.03$ ) (see Table 6.3).

**Table 6.3 Comparison of the mean knowledge score of breastfeeding between National Group and Ninghai Group pre- and post-DVD**

Knowledge type			National	Ninghai	df	t	<i>p</i>
P & A (range 0–6)	Pre-DVD	Mean	4.51	3.22	241	7.96	<0.01
		SD	0.98	1.22			
		N	73	170			
	Post-DVD	Mean	4.46	4.30	221	1.10	0.28
		SD	0.86	1.01			
		N	54	169			
HE (range 0–6)	Pre-DVD	Mean	3.64	3.23	240	2.35	0.02
		SD	1.21	1.25			
		N	72	170			
	Post-DVD	Mean	3.91	4.69	221	-5.33	<0.01
		SD	1.12	0.87			
		N	54	169			
Total (range 0–12)	Pre-DVD	Mean	8.14	6.45	240	6.30	<0.01
		SD	1.65	2.01			
		N	72	170			
	Post-DVD	Mean	8.37	8.98	221	-2.71	0.01
		SD	1.66	1.36			
		N	54	169			

A repeated measure ANOVA was conducted to investigate the change in the total knowledge score for the whole sample between pre-DVD and post-DVD sub-groups. Significant increases in total knowledge scores were found in all sub-groups between pre- and post-DVD questionnaires (see Table 6.4 for within-subject effect). Younger participants aged <30 years improved their knowledge more than the older participants aged 30 years or older in terms of total knowledge scores pre- and post-DVD:  $F(2,220)=16.33, p<0.01$ . The mean knowledge score of participants from county hospitals improved more than respondents from higher-level hospitals after watching the DVD:  $F(1,221)=31.39, p<0.01$ . Participants with a primary title improved their knowledge more than those with higher title, i.e. senior and mid-grade:  $F(1,221)=14.64, p<0.01$ . Professionals who had spent less time working with breastfeeding mothers showed greater improvement in mean knowledge score than those with more experience:  $F(1,219)=15.10, p<0.01$ . No significant difference in knowledge scores pre- and post-training was found between participants who had had previous breastfeeding training and those that had no previous breastfeeding training:  $F(1,219)=0.04, p=0.83$  (see Table 6.4).

**Table 6.4 Differences in the total knowledge score in breastfeeding knowledge between pre- and post-DVD training in sub-groups**

	Items	N	Pre (SD) (range 0–12)	Post (SD) (range 0–12)	ANOVA (interaction effect)	ANOVA (within-subject effect)
Age	<30 years	100	6.23 (2.04)	9.09 (1.18)	F(2,220) =16.33 $p<0.01$	F(1,220) =123.62 $p<0.01$
	30–39 years	82	7.04 (2.00)	8.67 (1.82)		
	> 39 years	41	7.83 (1.66)	8.54 (1.19)		
Working hospital	Provincial or municipal hospital	50	7.88 (1.72)	8.38 (1.74)	F(1,221) =31.39 $p<0.01$	F(1,221) =71.80 $p<0.01$
	County hospital	173	6.51 (2.03)	8.97 (1.35)		
Job type*	Nurse	170	6.65 (2.04)	8.80 (1.45)	F(1,206) =0.84 $p=0.36$	F(1,206) =87.33 $p<0.01$
	Midwife	38	7.21 (1.96)	8.97 (1.42)		
Job title	Primary	139	6.38 (2.03)	8.84 (1.52)	F(1,221) =14.64 $p<0.01$	F(1,221) =144.94 $p<0.01$
	Senior or mid- grade	84	7.55 (1.87)	8.82 (1.37)		
Working time with BF** mothers	≤5 years	125	6.41 (2.04)	8.91 (1.26)	F(1,219) =15.10 $p<0.01$	F(1,219) =158.58 $p<0.01$
	>5 years	96	7.44 (1.82)	8.76 (1.68)		
Previous training on BF	Yes	207	6.86 (2.07)	8.86 (1.44)	F(1,219) =0.04 $p=0.83$	F(1,219) =42.63 $p<0.01$
	No	14	6.50 (1.65)	8.64 (1.55)		

\*Doctor and administrator were excluded due to small number

\*\* BF: breastfeeding



### 6.4.3 Analysis of confidence among participants pre- and post-DVD

The confidence assessment analysis was firstly conducted on the whole sample using Paired-Samples T-test. Then further analysis was conducted of the differences in the mean confidence scores of P & A, HE and total in the National Group and Ninghai Group pre- and post-DVD training. A total of 186 participants was analysed for paired tests of confidence in the pre- and post-DVD questionnaires (see Table 6.5). There were 216 participants pre-DVD and 198 participants post-DVD and the analysis compared the differences in confidence in pre-DVD between the National Group and the Ninghai Group. The confidence score of P & A had a range of 0–60, the range for HE was 0–20, and the total score range was 0–80.

For the total sample, a significant increase in P & A confidence score was found post-DVD compared to pre-DVD, with a large effect size of 0.29 (pre-DVD:  $M=48.92$ ,  $SD=10.99$ ; post-DVD:  $M=55.23$ ,  $SD=8.73$ ;  $t(185)=-8.64$ ,  $p<0.01$ ,  $d=0.29$ ). A significant difference in HE confidence score was also seen between pre-DVD and post-DVD, with a large effect size of 0.15 (pre-DVD:  $M=16.52$ ,  $SD=5.10$ ; post-DVD:  $M=18.32$ ,  $SD=2.01$ ;  $t(187)=-5.78$ ,  $p<0.01$ ,  $d=0.15$ ). Total confidence score post-DVD was significantly higher than pre-DVD, with a large effect size of 0.38 (pre-DVD:  $M=65.17$ ,  $SD=14.63$ ; post-DVD:  $M=73.03$ ,  $SD=7.91$ ;  $t(185)=-10.65$ ,  $p<0.01$ ,  $d=0.38$ ) (see Table 6.5).

In the National Group, a significant increase in P & A confidence score was found post-DVD compared to pre-DVD, with a moderate effect size of 0.10 (pre-DVD:  $M=56.98$ ,  $SD=4.00$ ; post-DVD:  $M=57.93$ ,  $SD=3.28$ ;  $t(40)=-2.08$ ,  $p=0.04$ ,  $d=0.10$ ). A significant difference in HE confidence score was seen between pre-DVD and post-DVD, with a small effect size of 0.09 (pre-DVD:  $M=18.70$ ,  $SD=1.78$ ; post-DVD:  $M=19.09$ ,  $SD=1.46$ ;  $t(42)=-2.00$ ,  $p=0.05$ ,  $d=0.09$ ). The total confidence score post-DVD was statistically higher than pre-DVD, with a large

effect size of 0.14 (pre-DVD:  $M=75.71$ ,  $SD=5.48$ ; post-DVD:  $M=77.17$ ,  $SD=4.44$ ,  $t(40)=-2.57$ ,  $p=0.01$ ,  $d=0.14$ ) (see Table 6.5).

In the Ninghai Group, a significant increase in P & A confidence score was found post-DVD compared to pre-DVD, with a large effect size of 0.35 (pre-DVD:  $M=46.65$ ,  $SD=11.28$ ; post-DVD:  $M=54.46$ ,  $SD=9.61$ ;  $t(144)=-8.80$ ,  $p<0.01$ ,  $d=0.35$ ). Similarly, a significant difference in HE confidence score was seen between pre-DVD and post-DVD, with a large effect size of 0.18 (pre-DVD:  $M=15.87$ ,  $SD=5.56$ ; post-DVD:  $M=18.10$ ,  $SD=2.10$ ;  $t(144)=-5.63$ ,  $p<0.01$ ,  $d=0.18$ ). The total confidence score post-DVD was statistically higher than pre-DVD, with a large effect size of 0.14 (pre-DVD:  $M=75.71$ ,  $SD=5.48$ ; post-DVD:  $M=77.17$ ,  $SD=4.44$ ;  $t(40)=-2.57$ ,  $p=0.01$ ,  $d=0.14$ ) (see Table 6.5).

**Table 6.5 Comparison of confidence scores pre- and post-DVD in two groups and whole sample**

Knowledge type	Group	n	Mean score		df	t	p
			Pre SD	Post SD			
P & A (range 0–60)	National	41	56.98 (4.00)	57.93 (3.28)	40	-2.08	0.04
	Ninghai	145	46.65 (11.28)	54.46 (9.61)	144	-8.80	<0.01
	Total	186	48.92 (10.99)	55.23 (8.73)	185	-8.64	<0.01
HE (range 0–20)	National	43	18.70 (1.78)	19.09 (1.46)	42	-2.00	0.05
	Ninghai	145	15.87 (5.56)	18.10 (2.10)	144	-5.63	<0.01
	Total	188	16.52 (5.10)	18.32 (2.01)	187	-5.78	<0.01
Total (range 0–80)	National	41	75.71 (5.48)	77.17 (4.44)	40	-2.57	0.01
	Ninghai	145	62.19 (15.04)	71.86 (8.28)	144	-11.03	<0.01
	Total	186	65.17 (14.63)	73.03 (7.91)	185	-10.65	<0.01

Table 6.6 presents the differences in mean confidence scores for P & A and HE between the National Group and the Ninghai Group pre-DVD and post-DVD. Pre-DVD, the P & A confidence score for the National Group was significantly higher compared to the Ninghai Group, with a large effect size of 0.18 (National Group:  $M=56.65$ ,  $SD=4.17$ ; Ninghai Group:  $M=46.85$ ,  $SD=11.18$ ;  $t(214)=6.85$ ,  $p<0.01$ ,  $d=0.18$ ). Similarly, the HE confidence score pre-DVD for the National Group was significantly higher compared to the Ninghai Group, with a moderate effect size of 0.07 (National Group:  $M=18.77$ ,  $SD=1.69$ ; Ninghai Group:  $M=15.94$ ,  $SD=5.49$ ;  $t(215)=4.10$ ,  $p<0.01$ ,  $d=0.07$ ). The total confidence score pre-DVD showed a significant difference between the National Group and the Ninghai Group, with a large effect size of 0.18 (National Group:  $M=75.46$ ,  $SD=5.50$ ; Ninghai Group:  $M=62.48$ ,  $SD=14.92$ ;  $t(214)=6.81$ ,  $p<0.01$ ,  $d=0.18$ ) (see Table 6.6).

Post-DVD, the P & A confidence score for the National Group was significantly higher compared to the Ninghai Group, with a small effect size of 0.02 (National Group:  $M=57.69$ ,  $SD=3.57$ ; Ninghai Group:  $M=54.54$ ,  $SD=9.45$ ;  $t(196)=2.19$ ,  $p=0.03$ ,  $d=0.02$ ). Similarly, the HE confidence score post-DVD for the National Group was significantly higher compared to the Ninghai Group, with a small effect size of 0.04 (National Group:  $M=19.09$ ,  $SD=1.46$ ; Ninghai Group:  $M=18.13$ ,  $SD=2.08$ ;  $t(197)=2.91$ ,  $p<0.01$ ,  $d=0.04$ ). The total confidence score post-DVD showed a significant difference between the National Group and the Ninghai Group, with a moderate effect size of 0.07 (National Group:  $M=76.84$ ,  $SD=4.83$ ; Ninghai Group:  $M=72.00$ ,  $SD=8.26$ ;  $t(196)=3.75$ ,  $p<0.01$ ,  $d=0.07$ ) (see Table 6.6).

**Table 6.6 Comparison of mean confidence scores of National Group and Ninghai Group pre- and post-DVD**

Knowledge type			National	Ninghai	df	t	<i>p</i>
P & A (range 0–60)	Pre-DVD	Mean	56.65	46.85	214	6.85	<0.01
		SD	4.17	11.18			
		N	65	151			
	Post-DVD	Mean	57.69	54.54	196	2.19	0.03
		SD	3.57	9.45			
		N	45	153			
HE (range 0–20)	Pre-DVD	Mean	18.77	15.94	215	4.10	<0.01
		SD	1.69	5.49			
		N	66	151			
	Post-DVD	Mean	19.09	18.13	197	2.91	<0.01
		SD	1.46	2.08			
		N	46	153			
Total (range 0–80)	Pre-DVD	Mean	75.46	62.48	214	6.81	<0.01
		SD	5.50	14.92			
		N	65	151			
	Post-DVD	Mean	76.84	72.00	196	3.75	<0.01
		SD	4.83	8.26			
		N	45	153			

Table 6.7 presents the impact of the breastfeeding training DVD on the changes in total confidence score for whole sample in sub-groups using repeated measures ANOVA. Significant increased mean confidence scores were found in all sub-groups of variables between pre- and post-DVD (see Table 6.7 within-subject effect).

The younger participants (aged <30 years) improved more than the older participants (aged 30 years or older) in total confidence scores after attending the DVD training:  $F(2,183)=11.81, p<0.01$ . The total confidence score improved more in participants in county hospitals compared to those in provincial and municipal hospitals after engaging in the DVD training:  $F(1,184)=18.82, p<0.01$ . After completing the DVD training, nurses' total confidence improved significantly more than midwives' total confidence scores:  $F(1,172)=11.00, p<0.01$ . After engaging in the DVD training, the total confidence score of participants with a primary title increased significantly more than those with senior title or mid-grade title:  $F(1,184)=36.76, p<0.01$ . The confidence of professionals who have spent less time working with breastfeeding mothers improved significantly more after completing the DVD training than those with more experience:  $F(1,183)=13.65, p<0.01$ . Previous breastfeeding training was found to have no impact on changes in total confidence scores pre- and post-DVD:  $F(1,219)=0.04, p=0.83$  (see Table 6.7).

**Table 6.7 Change in total confidence scores in sub-groups of variables for the whole sample pre- and post-DVD**

	Items	n	Pre (SD) (range 0– 80)	Post (SD) (range 0–80)	ANOVA (Interaction effect)	ANOVA (within- subject effect)
Age	<30 years	86	60.00 (15.85)	71.08 (8.79)	F(2,183) =11.81 <i>p</i> <0.01	F(2,183) =73.37 <i>p</i> <0.01
	30–39 years	68	68.01 (13.92)	75.40 (12.68)		
	> 39 years	32	74.50 (7.90)	76.41 (4.77)		
Working hospital	Provincial and municipal hospital	39	73.79 (8.11)	75.72 (5.90)	F(1,184) =18.82 <i>p</i> <0.01	F(1,184) =43.05 <i>p</i> <0.01
	County hospital	147	62.89 (15.13)	72.31 (8.23)		
Job type	Nurse	139	62.67 (15.21)	72.22 (8.21)	F(1,172) =11.00 <i>p</i> <0.01	F(1,172) =46.77 <i>p</i> <0.01
	Midwife	35	72.63 (10.39)	75.94 (6.56)		
Job title	Primary	116	60.62 (15.65)	71.66 (8.42)	F(1,184) =36.76 <i>p</i> <0.01	F(1,184) =95.54 <i>p</i> <0.01
	Mid-grade or senior	70	72.71 (8.56)	75.30 (6.42)		
Working time with BF* mothers	≤ 5 years	106	61.38 (15.27)	71.49 (8.30)	F(1,183) =13.65 <i>p</i> <0.01	F(1,183) =105.37 <i>p</i> <0.01
	> 5 years	79	70.54 (11.79)	75.30 (6.59)		
Previous training on BF*	Yes	172	65.93 (13.92)	73.41 (7.41)	F(1,182) =2.59 <i>p</i> =0.11	F(1,182) =44.16 <i>p</i> <0.01
	No	12	54.33 (20.25)	66.58 (11.99)		

\*BF: Breastfeeding

#### 6.4.4 Confidence in each item of knowledge pre- and post-DVD

The difference in total confidence scores for the whole sample for each item of knowledge of P & A and HE pre- and post-DVD was examined using Chi-Square test. The results showed the proportion of “no confidence” responses for all items after engaging in the DVD training decreased significantly compared to pre-DVD (see Table 6.8). The biggest decrease in “no confidence” responses was from 38.9% (81/208) in pre-DVD to 3.0% (5/168) in post-DVD for item 10 regarding the type of hormones that need to be stimulated to facilitate hand expression. The second highest reduction in “no confidence” responses was seen in item 11 regarding the function of gentle massage before HE, from 30.8% (65/211) in pre-DVD to 6.5% (11/169) in post-DVD. The smallest decrease proportion of “no confidence” responses occurred for item 6, regarding signs of incorrect attachment, with 10.3% (21/204) in pre-DVD and 3.6% (6/166) in post-DVD (see Table 6.8).

**Table 6.8 Changes in “no confidence” responses to each item of knowledge pre- and post-DVD**

Item*	No confidence pre-DVD		No confidence post-DVD		Chi-square**
	N	%	N	%	
1	41	19.5(41/210)	8	4.7(8/172)	<i>p</i> <0.01
2	32	15.2(32/211)	4	2.3(4/172)	<i>p</i> <0.01
3	43	20.8(43/207)	14	8.3(14/168)	<i>p</i> <0.01
4	26	12.7(26/205)	6	3.5(6/170)	<i>p</i> <0.01
5	40	19.3(40/207)	4	2.3(4/172)	<i>p</i> <0.01
6	21	10.3(21/204)	6	3.6(6/166)	<i>p</i> <0.01
7	33	16.0(33/206)	8	4.7(8/171)	<i>p</i> <0.01
8	32	15.4(32/208)	13	7.6(13/170)	<i>p</i> <0.01
9	64	30.6(64/209)	12	6.9(12/173)	<i>p</i> <0.01
10	81	38.9(81/208)	5	3.0(5/168)	<i>p</i> <0.01
11	65	30.8(65/211)	11	6.5(11/169)	<i>p</i> <0.01
12	39	18.9(39/206)	3	1.7(3/172)	<i>p</i> <0.01

\* Item of knowledge relating to P & A and HE. See appendix F



\*\*McNemar's test (2-tailed)

### Relation between mean scores of knowledge and confidence

The change in total knowledge scores and total confidence scores for the whole sample between pre- and post-DVD training are reported using repeated measures ANOVA in Table 6.9. Significant increases were found in the total scores both for knowledge and confidence after completing the training (Knowledge:  $F(1,222)=1.69, p<0.01$ ; Confidence:  $F(1,185)=113.45, p<0.01$ ). The effect size of knowledge was 0.43 and confidence was 0.30, which suggests large effect sizes by multivariate partial eta squared (see Table 6.9).

**Table 6.9 Change in the mean score of confidence and knowledge for the whole sample pre- and post-DVD training**

Items	Range	n	Pre-DVD mean (SD)	Post-DVD mean (SD)	ANOVA (within-subject effect)
Knowledge	0–12	223	6.82 (2.05)	8.83 (1.46)	$F(1,222)=1.69$ $p<0.01$
Confidence	0–80	186	65.17 (14.63)	73.03 (7.91)	$F(1,185)=113.45$ $p<0.01$

The relationship between the total scores of knowledge and confidence pre- and post-DVD was investigated for three independent variables of P & A, HE and total using Spearman's rho value. Pre-DVD training, participants who had higher total knowledge scores were positively correlated with higher total confidence in each area of P & A, HE and total (see Table 6.10). In the area of P & A, a moderate positive correlation was found ( $r=0.33, p<0.01$ ). In the area of HE, a small correlation was found ( $r=0.22, p<0.01$ ) between the two groups. A moderate positive correlation was identified between total knowledge score and total confidence score ( $r=0.37, p<0.01$ ).

After attending the DVD training, in the area of P & A, there was no significant correlation between knowledge and confidence ( $r=-0.04$ ,  $p=0.56$ ). A significant negative correlation was found in HE between knowledge and confidence ( $r=-0.19$ ,  $p<0.01$ ), but the correlation was small. Between total knowledge and total confidence, no significant correlation was seen ( $r=-0.12$ ,  $p=0.09$ ) (see Table 6.11).

**Table 6.10 Correlation between knowledge and confidence scores for P & A and HE in pre-DVD**

Item	Knowledge mean SD	Confidence Mean SD	Correlation coefficient*
P & A	3.60 (1.30)	49.80 (10.62)	$r=0.33$ ; $p<0.01$
HE	3.35 (1.25)	16.80 (4.85)	$r=0.22$ ; $p<0.01$
Total	6.95 (2.06)	66.38 (14.14)	$r=0.37$ ; $p<0.01$

\* Pearson correlation coefficient (2-tailed)

**Table 6.11 Correlation between knowledge scores and confidence scores for P & A and HE in post-DVD**

Item	Knowledge mean SD	Confidence Mean SD	Correlation coefficient *
P & A	4.34 (0.98)	55.25 (8.57)	$r=-0.04$ ; $p=0.56$
HE	4.45 (0.93)	18.35 (1.99)	$r=-0.19$ ; $p<0.01$
Total	8.83 (1.46)	73.10 (7.87)	$r=-0.12$ ; $p=0.09$

\* Pearson correlation coefficient (2-tailed)

### **Analysis of the value of DVD training**

A total of 165 participants out of 243 participants provided their assessment of the usability of the breastfeeding training DVD in improving their practice skills. All respondents provided high assessment scores for P&A (M=9.10, SD=1.50, Min=3, Max=10), HE (M=9.00, SD=1.53, Min=2, Max=10) and overall usefulness to practice (M=9.24, SD=1.67, Min=3, Max=10), which indicates the

DVD training was overwhelming useful for improving professionals' breastfeeding skills (see Table 6.12).

**Table 6.12 Evaluation of effectiveness of breastfeeding training DVD on improving practical skills by participants**

Item	n	Mean score	SD	Min score	Max score
Teaching positioning and attachment (range 0–10)	165/243	9.10	1.50	3	10
Teaching hand expression (range 0–10)	165/243	9.00	1.53	2	10
Overall usefulness to your practice (range 0–10)	165/243	9.24	1.67	3	10

Table 6.13 compares the difference in mean scores of the effectiveness evaluation of the breastfeeding training DVD between the two groups. No significant differences in the assessment scores for P & A were found between the National Group and the Ninghai Group (National Group: M=8.79, SD=1.70; Ninghai Group: M=9.20, SD=1.43;  $t(163)=-1.48$ ,  $p=0.14$ ). However, participants from the Ninghai Group gave higher scores for the usefulness of the HE information compared to the National Group (National Group: M=8.39, SD=2.09; Ninghai Group: M=9.18, SD=1.28;  $t(163)=-2.83$ ,  $p<0.01$ ). No significant differences were found between the two groups in terms of overall usefulness to practice (National Group: M=9.08, SD=2.00; Ninghai Group: M=9.29, SD=1.56;  $t(163)=-0.69$ ,  $p=0.49$ ) (see Table 6.13).

**Table 6.13 Comparison of the difference in mean scores of evaluation of the effectiveness of the breastfeeding training DVD between the two groups**

Evaluation of DVD		National	Ninghai	df	t	p
P & A	Mean score	8.79	9.20	163	-1.48	0.14
	SD	1.70	1.43			
	N	38	127			
HE	Mean score	8.39	9.18	163	-2.83	< 0.01
	SD	2.09	1.28			
	N	38	127			
Overall usefulness to practice	Mean score	9.08	9.29	163	-0.69	0.49
	SD	2.00	1.56			
	N	38	127			

#### 6.4.5 Construct validity of mini-CUBA V2

The further evidence of construct validity of mini-CUBA V2 is found by distinguishing significant differences of knowledge scores in P & A, HE and total knowledge scores between National group and Ninghai group. The significant difference in knowledge scores between groups can be expected. The National group includes breastfeeding expert trainers who completed high quality national breastfeeding training course, while the Ninghai group includes general professionals who received no recent breastfeeding training. The total knowledge score as well as knowledge scores in P & A, HE increased significantly in participants from Ninghai group after attending the DVD training. It suggested the construct validity of mini-CUBA V2 and its ability to discriminate significant changes of knowledge scores between pre- and post-DVD training based on the theory of 'Pre-test/post-test changes' by Cohen and Swerdlik (Cohen and Swerdlik 2002).

#### 6.4.6 Internal reliability of CU-BSES

The internal reliability of the confidence sub-scales of CU-BSES measure was calculated using Cronbach's alpha (Cronbach 1990). Results showed the

measure has very good internal reliability with Cronbach alpha coefficient of 0.95. It indicates that CU-BSES is reliable to assess the impact of training intervention on Chinese professionals' confidence in P & A and HE

#### **6.4.7 Feasibility and usability of the BF DVD training**

A total of 95 participants (66 from the Ninghai Group and 29 from the National Group) commented on the usability of the DVD. Most comments expressed their views on the content most useful for their practice. Due to the limited time available to carry out the study, most comments were brief. A small number of participants described how the DVD helped them to understand the theory and master the core skills. These comments reflected the value of the DVD in helping them support mothers more accurately than before. The key findings with representative quotes are presented below.

- **Importance of P & A and HE**

Respondents considered the P & A and HE information on the DVD were most important and equally important for breastfeeding mothers and professionals.

*“Whether or not breastfeeding mothers having correct positioning and attachment are the most important skill for successful breastfeeding”* (30).

*“Positioning and attachment, and hand expressing are both important for us...”* (35).

- **Acceptability of breastfeeding training DVD**

Respondents reflected that the DVD was vivid and easy to understand, and they were impressed by the mother and baby demonstrating the skills. *“The training method is quite detailed, vivid and effective. We welcome the new training method and it makes it easy for us to remember the key points”* (45). The new training method helped them understand the theory and master the skills better than methods used in other training sessions they had attended:

*“It is very visual to show hand expression via DVD. This training method is more effective for improving practice” (58).*

- **Usefulness in improving knowledge and key skills**

The breastfeeding training DVD updated participants' knowledge. *“Hand expression updated our definition and makes us understand better” (135).* It improved participants' skills by correcting their methods of P & A and HE and giving them better understanding of the key points. *“The skills shown on the DVD are helpful us to correct previous poor practice of positioning and attachment, and hand expression” (198).* The key points and signs of correct P & A were useful to assess the practice accurately. *“The signs of correct positioning and attachment, these help us assess the practical skills of breastfeeding more accurately” (110).* It was especially helpful for respondents who had not been trained in HE. *“I have not been trained on the skill of hand expression, it is especially helpful for me” (68).* The DVD was useful to help professionals apply the theory to practices better than before:

*“The DVD relating to positioning and attachment and hand expression helps us to apply the theory to practice. It makes us master the skill of hand expression more proficiently” (09).*

- **Better support for mothers**

Respondents reported that they can now support mothers better with the improved skills in P & A and HE among professionals. *“Positioning and attachment is particularly useful to support breastfeeding. It is beneficial to guide mothers to achieve the optimal attachment” (92).* *“The method of hand expression made me realise my incorrect method in the past. Now I have learned correct and effective method, which is really helpful to support mothers” (176).*

## **6.5 Discussion**

### **6.5.1 Methodology assessment**

The pilot study provided evidence for the effectiveness of the breastfeeding training DVD in improving professionals' knowledge and confidence in the two key skills of P & A and HE by objective assessment. The study has five main strengths. Firstly, the response rate was high at 97.6%. Secondly, the sample was representative of professionals working with breastfeeding mothers in China because this study was undertaken during two breastfeeding training courses where the most core professionals working with breastfeeding mothers were trained. Thirdly, the sample covered a range of health professions, which enabled the exploration of the effect of the breastfeeding training DVD for different professionals in improving their knowledge and confidence.

The fourth strength is that the sample incorporated two different groups that represented two levels of breastfeeding knowledge in China. The expert staff in the National Group included professionals from all across China. It represented a high knowledge level of breastfeeding as they were the provincial breastfeeding trainers and had been trained in a high quality of national breastfeeding training in China. The participants in the Ninghai Group were general professionals in a county hospital in China, who could reflect on the practical effects of the breastfeeding training DVD due to undertaking the study before their breastfeeding training. Although, the effectiveness of the breastfeeding training DVD for the National Group cannot be reliably assessed due to them attending the national breastfeeding training course first, it provided the comparison group as the high knowledge level of breastfeeding for general professionals. The total knowledge scores of the Ninghai Group significantly improved after they attended the training and their post-DVD scores matched

the National Group, which included higher-level professionals who additionally were trained before completing the baseline data.

Finally, the baseline and post-training questionnaires were completed independently without discussion or access to any breastfeeding resources and with anonymous for assessment which reflected the actual level of knowledge and confidence among participants.

However, the methodology has four main limitations. Firstly, the post-DVD tests were conducted immediately after watching the DVD, so there was a lack of long-term assessment in the study. Secondly, the job types in sample were not balanced – 185 nurses, 40 midwives and only 18 doctors – which meant the sample size was not sufficient to reliably examine the effect of the DVD training in improving doctor and midwives' knowledge. Thirdly, respondents' comments on the feasibility and usability of the DVD were very simple due to the limited time available to conduct the study during the breastfeeding training courses. Also, fewer than half of participants provided their comments. Negative views or more in-depth comments were not presented. Conducting more in-depth interviews is necessary to explore comprehensive perceptions of the feasibility and usability of the DVD. Lastly, the total effect of the breastfeeding training DVD on improving professionals' knowledge might have been underestimated due to the previous national breastfeeding training courses received by the expert staff in the National Group. It is necessary to develop a RCT study to establish robust evidence of the effectiveness of the breastfeeding training DVD on professionals' knowledge and confidence by strict control of potential confounding factors.



### **6.5.2 Knowledge**

Mini-CUBA V2 is assessed to be a validated breastfeeding knowledge tool on evaluation of the effectiveness of a breastfeeding training intervention in P & A and HE. At baseline, the knowledge of P & A and HE was significantly better in participants from the National Group compared to the Ninghai Group. Three main reasons were considered for the significant differences of knowledge scores. Firstly, the National Group consisted of breastfeeding experts and the Ninghai Group included general professionals. Secondly, the expert staff in the National Group had been trained in P & A and HE on the national training course just before participating in the study, while participants in the Ninghai Group had not been recently trained. Thirdly, the expert staff in the National Group were mainly from provincial and municipal hospitals, but participants in the Ninghai Group were from a county hospital. In China, provincial and municipal hospitals represent a higher level of maternal services as they accepted higher quality training compared to county hospitals.

After attending the breastfeeding DVD training, significant increases in knowledge scores were found in the areas of P & A and HE and in total in the Ninghai Group. This indicates the breastfeeding training DVD was effective in increasing general professionals' knowledge. After completing the DVD training, the expert trainers in the National Group achieved significant improvements in knowledge scores for HE but not for P & A or in total. This suggests that the expert trainers still had room for improvement in HE knowledge before the DVD training, even though they had just completed the national breastfeeding training course. So the expert trainers also benefited from the DVD training.

Comparing the knowledge scores of the two groups after completing the DVD training, significantly higher HE and total knowledge scores were seen in the Ninghai Group compared to the National Group, and there was no difference in

the P & A knowledge scores of the two groups. These findings indicate that the breastfeeding training DVD was the same effective on improving professionals' knowledge of P & A and more effective in improving knowledge of HE and in total compared to the national breastfeeding training course. Thus, the breastfeeding training DVD is likely to be an effective tool in teaching the two key skills of P & A and HE to be applied in national breastfeeding training. Participants reported that the DVD was useful in improving knowledge of P & A and HE and was useful for practice overall, which also reflects the value of the DVD training and its accessibility for participants. This suggests the DVD was effective for professionals who had poor knowledge of these two skills.

Significant increases in total knowledge scores were seen between pre- and post-DVD training for all sub-groups of variables, which suggests the DVD has wide usability for a range of professionals in improving their knowledge of P & A and HE. Further, the findings showed that participants aged 30 years or under, who had a primary title and had worked for fewer than 5 years in county hospitals achieved significantly higher scores. This indicates that professionals who have less experience of breastfeeding are more likely to benefit from the DVD training compared with experienced professionals.

The difference of the impact of DVD between midwife and nurses was not significant due to unbalance sample size of the two groups. Only 18 doctors and administrators were recruited for the study. Verd et al. reported that paediatricians' breastfeeding knowledge was not sufficient to provide efficient support for mothers and was substituted by personal experiences in the survey of National Meeting of the Spanish Paediatric Association in 2007 (Verd et al. 2007). Lack of breastfeeding education in medical school was the main reason for inadequate knowledge, in turn affecting doctors' support for breastfeeding patients. Poor breastfeeding knowledge among 367 physicians in China was reported by

Ouyang, Xu and Zhang in 2012 in ten BFHI hospitals in Hubei Province (Ouyang, Xu and Zhang 2012). Future study is necessary to assess the knowledge and skills of breastfeeding and explore the training needs for doctors in Zhejiang Province. In this study, nurses were not divided into sub-groups according to their speciality. A review of breastfeeding training intervention among professionals by Watkins and Dodgson showed that paediatric nurses specifically need to be trained on breastfeeding knowledge (Watkins and Dodgson 2010). Besides, healthcare professionals who undertake postpartum visiting in the community were not recruited for the study. Those clinicians are crucial in supporting mothers to breastfeed longer, especially after discharge from hospital, therefore it is necessary to discover their training needs by assessing their knowledge objectively (Coutinho et al. 2013, Kronborg et al. 2008).

### **6.5.3 Confidence**

CU-BSES is able to reliably to assess the impact of training interventions on Chinese professionals' confidence in P & A and HE. The results showed a statistically significant increase in confidence scores in P & A and HE and in total for the whole sample after attending the DVD training. However, the effect size is moderate in the confidence of teaching P & A and small in HE which suggests the practical clinical difference is small between pre and post-training. Similarly, in National Group, the effect size of significant increase is moderate in the P & A confidence score and small in the HE confidence score which also indicated the limited clinical difference. Confidence in each knowledge item achieved a significant increase, which suggests the effectiveness of the breastfeeding training DVD in enhancing professionals' confidence. The findings revealed a significantly higher total confidence both pre- and post-DVD in the National Group compared to the Ninghai Group. A possible reason for this is that the expert trainers in the National Group had received more breastfeeding training, had updated their breastfeeding knowledge more often and were more likely to have self-studied breastfeeding knowledge as breastfeeding trainers.

The HE confidence score in the National Group did not increase significantly after completing the training. Also, after completing the DVD training, there was a significantly lower HE knowledge score for the National Group than the Ninghai Group, which suggests that the expert trainers in the National Group benefited less from the DVD in the area of HE than the Ninghai Group. The reason for this was not explored in the study. It is necessary to further investigate the impact of the DVD on improving different professionals' skills in HE. Exploring participants' views on the effectiveness of the DVD might be helpful to find the reasons for there being no significant increase in confidence in HE in the National Group.

The sub-groups analysis further revealed the participants who were aged 30 years or under, had a primary title and had worked fewer than 5 years in county hospitals and nurses increased their total confidence scores between pre- and post-DVD significantly more than other participants. This indicates that the DVD might be a universal education tool for a wide range of professionals, and may be especially effective for young professionals with poor breastfeeding knowledge in these two key skills.

#### **6.5.4 Knowledge and confidence**

The effectiveness of the breastfeeding training DVD in improving professionals' knowledge and confidence has been reported and discussed above. The results were consistent with the findings of previous studies that breastfeeding training intervention improves clinicians' knowledge and confidence (Hillenbrand and Larsen 2002, Kronborg et al. 2008). A randomised intervention study conducted by Kronborg et al. aimed to examine the effect on improving the knowledge and self-efficacy for health visitors in Denmark. There were 52 health visitors who undertook an 18-hour pre-study training course in the intervention group and 57 in the control group with routine practice. The results showed there was no difference between the two groups in the mean score of confidence at baseline. After the intervention training, the mean score of confidence and knowledge in the two items of P & A increased significantly in the intervention group compared to the control group (Kronborg et al. 2008). Similarly, improved knowledge and confidence were reported by Hillenbrand and Larsen after an interactive multimedia curricular intervention for 49 paediatric residents in Eastern Carolina (Hillenbrand and Larsen 2002). Still, these studies focused on homogenous groups of professionals and lack evidence comparing more types of professional to determine who benefits most from training interventions in terms of improved knowledge and confidence.

In the current study, a positive correlation was found for P & A and HE and in total between knowledge and confidence at baseline, but the correlation was moderate in P & A and small in HE and in total. After the DVD training, a significant negative correlation occurred between them with a small effect size for HE, but there was no significant correlation in P & A or in total. This indicates that the correlation between confidence and knowledge is not consistent. The small effect size indicates that confidence is not a reliable predictor of professionals' BF knowledge. This is consistent with the finding of Wallace et al. that confidence is not reliable as it can be affected by various factors (Wallace et al. 2013). In this study, professionals' confidence scores decreased significantly after the training intervention as the professional had received their feedback on their earlier poor breastfeeding knowledge score. One cross-sectional study conducted by Williams and Hammer reported the lack of correlation between knowledge and confidence. An objective assessment on breastfeeding knowledge is necessary and recommended for professionals to learn the practical skills (Williams and Hammer 1995b).

#### **6.5.5 Evaluating the usability of the DVD training**

Of the participants, 95 provided their views on the usability of the breastfeeding training DVD and reflected on the significant value of the DVD, although all the comments were brief and consisted of only one or two sentences. According to the comments, the DVD training helped the professionals to understand the theory well and they could learn the skills easily through the visual content. This was consistent with the high assessment score for the evaluation of the usefulness of the DVD to breastfeeding practice. The evaluation of the HE usefulness score in the Ninghai Group was significantly higher than for the National Group, which indicates that the skill of HE was accepted more by the Ninghai group. One possible reason could be that the expert staff in the National

Group had recently trained and improved in the skill of HE during the national breastfeeding training course, which may have decreased their satisfaction with the DVD to some extent. Still, other reasons for the expert staff evaluating of the usability with lower scores than the professionals in the Ninghai Group in the area of HE need to be further explored in the next study.

The study also explored the most welcome method for breastfeeding training and most participants reflected that they preferred the traditional approach of a breastfeeding training workshop. This is consistent with the study conducted by Kronborg et al., in which health visitors received most of their breastfeeding knowledge via breastfeeding training courses (Kronborg et al. 2008). A training DVD with breastfeeding workbook was regarded as the second most popular method by participants, which suggests the wide application prospects for DVD training for professionals due to its feasibility and flexibility.

#### **6.5.6 Conclusion**

In summary, mini-CUBA V2 is validity to evaluate breastfeeding knowledge and CU-BSES is reliable to assess breastfeeding confidence in P & A and HE. The findings in the study suggest that the breastfeeding training DVD was effective in improving professionals' knowledge and confidence. It achieved a similar effect in improving the skill of P & A for professionals as the national breastfeeding course, which is the highest quality breastfeeding training course in China. Furthermore, it was more effective in improving the knowledge of HE. The professionals who were aged 30 years or under, had a primary title, had been working time for less than 5 years and were working in county hospitals benefited most from the DVD training in terms of improved knowledge and confidence. However, the main limitation of the study is a lack of control group to compare the intervention effect on improving breastfeeding knowledge and

confidence. In the next study, we designed a randomised controlled trial study to provide further robust evidence for the breastfeeding training DVD being an effective new training tool to improve these two key skills. The breastfeeding training DVD was welcomed by professionals based on their high assessment scores and positive comments, although the comments were simple due to the limited research time. Face-to-face interviews are also helpful and necessary to further explore the comprehensive perceptions of the usefulness of the DVD and suggest improvements to the DVD training.



# **Chapter 7 A randomised controlled trial of the effectiveness of a breastfeeding training DVD on improving breastfeeding knowledge and confidence among healthcare professionals in China**

## **7.1 Background**

The importance of the two key breastfeeding support skills of positioning and attachment (P & A) (see Chapter 5, section 5.1) and hand expression (HE) (see Chapter 6, section 6.1.2) has been described in Chapters 5 and 6. The training needs of healthcare professionals in regard to breastfeeding support were also identified in a study of 20 staff by assessing their knowledge of P & A and HE (Chapter 5). A new DVD using clinical footage developed by Coventry University was effective in improving supportive practice-related breastfeeding knowledge in health visiting staff in the UK (Law et al. 2007). The effectiveness of the breastfeeding training DVD for healthcare professionals in China is unknown. We developed a pilot study described in Chapter 6 to examine the effect of the DVD on improving the knowledge of P & A and HE among 74 experts of breastfeeding and 170 healthcare professionals in China. Significant improvements were found in both knowledge and confidence in these two areas after the DVD training intervention. However, the sample in the pilot study lacked a control group, which limited the reliability of the evidence.

The two groups of participants, the National Group and the Ninghai Group, were quite varied in characteristics and job status and experience. Firstly, the National Group consisted of experienced experts who were breastfeeding trainers at a provincial level. They were from high-level hospitals across China and had access to up-to-date breastfeeding training prior to taking part in the

study. The professionals in the Ninghai Group came from a secondary level hospital in Zhejiang Province. The most significant difference compared to the National Group was that the participants in the Ninghai Group took part in the study before completing their breastfeeding training course. Thus, the results of the Ninghai Group more reliably reflect the practical impact of the DVD training on general healthcare professionals compared with the National Group.

We observed significantly greater improvements in both knowledge and confidence scores among healthcare professionals in the Ninghai Group in comparison to the National Group after completing the DVD training. The National Group achieved significant higher knowledge scores in HE in the post-DVD questionnaire than in the pre-DVD questionnaire, but not in P & A. The main reason for this was that there was less of a gap in knowledge among the expert staff in the National Group as they were likely to have received more training on breastfeeding than general clinicians and pay more attention to updating their breastfeeding knowledge. Also, the national breastfeeding training course before the study had an immediate impact on improving experts' knowledge and confidence in the two skills. The total positive effect of the DVD training on increasing the mean score of knowledge and confidence was underestimated in the pilot study. Thus, developing a study with a rigorous design is necessary to examine the practical effectiveness of DVD training on improving the breastfeeding skills of Chinese healthcare professionals. Additionally, the results of the pilot study revealed that confidence is not a reliable indicator to predict professionals' knowledge. The current study will further examine the evidence for the correlation between confidence and knowledge and the relationships with socio-demographic and job-related variables. A randomised controlled trial was developed to further examine the impact of the breastfeeding training DVD on improving professionals' knowledge

and confidence in the two skills of P & A and HE. After the RCT study, semi-structured interviews were conducted among some participants to further explore their views about the DVD in terms of usability, feasibility, accessibility, improvement suggestions. The feasibility of the knowledge assessment tool of mini-CUBA V3 in P & A, HE and physiology of lactation will be explored via semi-structured interviews.

## **7.2 Aims of the study**

1. To examine the impact of the breastfeeding training DVD on healthcare professionals' knowledge of P & A and HE using mini-CUBA V2
2. To examine the impact of the breastfeeding training DVD on healthcare professionals' confidence in supporting the practical skills of P & A and HE using mini-CUBA V2
3. To examine the impact of the breastfeeding training DVD on knowledge and confidence in relation to P & A and HE in different professional groups using mini-CUBA V2
4. To examine the correlation between confidence and knowledge scores on P & A and HE pre-training and post-training
5. To explore the views of professionals on the applicability and feasibility of the breastfeeding training DVD, as well as their suggested improvements and perceptions of the feasibility of mini-CUBA V3
6. To examine the validity of breastfeeding knowledge assessment tool (mandarin mini-CUBA V3) and the internal reliability of the confidence subscales (CU-BSSSES).

## **7.3 Materials and methods**

### **7.3.1 Intervention**

The breastfeeding training DVD developed by Coventry University was applied as an intervention for healthcare professionals in the study. It covered four educational sessions, including optimal P & A, the process of a satisfying feed shown by a baby of three months, hand expression demonstrated by a mother, and baby-led feeding demonstrated by an experienced baby of ten months. The total length of the DVD is around 14 minutes 32 seconds (Chapter 6, section 6.3.3). The Mandarin script of the breastfeeding training DVD was developed by the researcher based on the English script version and agreed with two breastfeeding experts and one professional translator (Chapter 6, section 6.3.3). Two staff in Zhejiang University of Media and Communications recorded and produced the Mandarin version of the breastfeeding training DVD according to the Mandarin script. See Figure 7.1-7.4.

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### **Figure 7.1 Correct Positioning**

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### **Figure 7.2 Correct attachment**

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### **Figure 7.3 Hand expression**

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### **Figure 7.4 Baby-led feeding**

### **7.3.2 Research site**

The study was conducted in Zhejiang Province, China. Participants were recruited from provincial, municipal and county maternal and child health care hospitals, general hospitals, health clinics in towns. The main three hospitals included in the study were the Women's Hospital, School of Medicine, Zhejiang University, Kaihua Maternal and Child Health Care Hospital and Kaihua People's Hospital. The Women's Hospital, School of Medicine, Zhejiang University is the biggest and highest level teaching tertiary hospital for maternal health care in Zhejiang Province (see Chapter 3, section 3.3.1). The two hospitals of Kaihua are secondary county hospitals and represent a high level of healthcare service provision in Kaihua County. All three hospitals are accredited BFI hospitals.

### **7.3.3 Inclusion and exclusion criteria**

Staff who fulfilled the following eligibility criteria were invited to participate in the study:

#### ***Inclusion criteria***

- Working directly with breastfeeding mothers
- Working in hospitals, clinics or communities
- Job types of nurses, midwives, doctors and paediatricians
- Qualified health professional

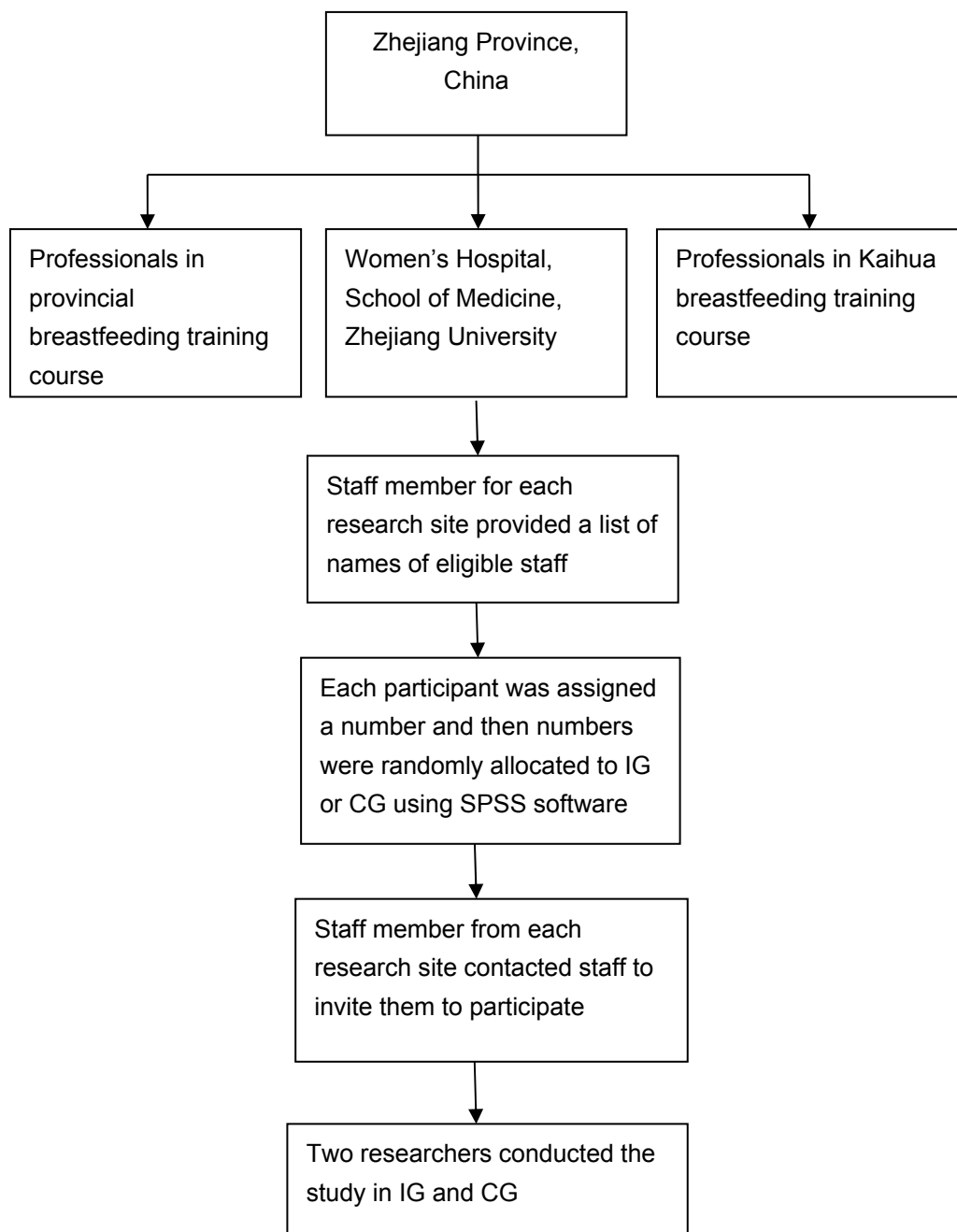
#### ***Exclusion criteria***

- Working in hospital or clinics or communities, but not directly caring for breastfeeding mothers
- Volunteer for supporting breastfeeding mothers without health professional qualification

#### **7.3.4 Recruitment**

Participants were recruited from three different sites: the Zhejiang Province breastfeeding training course, the Women's Hospital, School of Medicine, Zhejiang University and the Kaihua County breastfeeding training course. Healthcare professionals who took part in the Zhejiang Province breastfeeding training course were invited to take part in the study. The nurses who worked in postpartum wards in the Women's Hospital were also invited. The third part of the recruitment included the healthcare professionals who took part in the Kaihua County breastfeeding training course. One staff member was allocated to each site/setting to recruit and organise the healthcare professionals for the study. The researcher got the lists of names of all the participants who would take part in the provincial and county breastfeeding training courses and all the nurses in the postpartum wards in the Women's Hospital. Potential participants who met the eligibility criteria were randomly allocated to an intervention group (Group 1) and a control group (Group 2). Three sets of random numbers were generated independently using SPSS software by a computer professional in Zhejiang University. Potential participants were allocated to intervention and control groups based on the random numbers. The staff member got a list of names with corresponding group numbers (Group 1 or Group 2) and emailed potential participants with an invitation to take part in the study. Those professionals who had no email address or did not reply to the invitation email were invited by telephone. The reasons for decline were recorded by the staff member. See Figure 7.5.





**Figure 7.5 Recruitment procedure**

### 7.3.5 Sample

A power analysis was carried out to determine the required sample size in the study (Cohen 1988a). According to the results of pilot study, the mean score was 6.95 in pre-DVD (SD=2.06) and the mean score in post-DVD was 8.83 (SD=1.46). The two-tailed effect size was 1.05 for the above T-test between pre- and post-DVD. To provide 80% power of detecting this effect size with a two-tailed test at  $p < 0.05$ , a minimum sample size of each group is 16.

### 7.3.6 Measures

**Knowledge:** The level of knowledge of breastfeeding was assessed by developing a Mandarin version of mini-CUBA V3. The items of Mandarin version mini-CUBA V3 were multiple-choice questions with only one correct of four options, which had been agreed by a panel of three breastfeeding experts. Mini-CUBA V3 comprised eight items of physiology of lactation (range 0–8), six items of P & A knowledge (range 0–6) and six items of HE knowledge (range 0–6). A higher score indicated a higher knowledge level. The knowledge assessment of P & A and HE mini-CUBA V3 is the same as the mini-CUBA V2. The effectiveness of the breastfeeding training DVD was assessed using mini-CUBA V2.

**Confidence:** The confidence of healthcare professionals in supporting skills for breastfeeding mothers was measured using the Mandarin version of Coventry University Breastfeeding Support Self-Efficacy Scale (CU-BSSES). This was the same as described Chapter 6, measuring six items on self-efficacy in supporting P & A and two items on teaching HE, using a 10-point Likert scale (0=not at all confident; 10=completely confident). The Cronbach's alpha coefficient of CU-BSSES was 0.95, which indicates good internal consistency. CU-BSSES was used to assess the breastfeeding confidence among healthcare professionals in supporting the two skills of P & A and HE.

**Evaluation of DVD:** The evaluation of the effectiveness of the breastfeeding training DVD on improving the skills in P & A and HE, and overall usefulness to professionals' practice used a 10-point scale (0=not at all helpful; 10=completely helpful).

**Questionnaires:** The baseline questionnaire consisted of three parts: demographics, mini-CUBA V3 with physiology of lactation, P & A and HE, and CU-BSES. Demographics included seven items: work setting, job type, job title, years of qualification, working length with breastfeeding mothers, previous breastfeeding training and perception of best way to be training. The post-training questionnaire comprised three parts: mini-CUBA V2 with P & A and HE, CU-BSES and evaluation of DVD. The knowledge assessments of P & A and HE in the pre- and post-training questionnaires were the same using mini-CUBA V2. The scores of knowledge and confidence regarding the two skills of P & A and HE in pre- and post-training questionnaires were as the primary measure outcome to assess the effectiveness of the breastfeeding training DVD on improving the knowledge and confidence among healthcare professionals.

### **Establishing validity of mini-CUBA V3**

Construct validity was used to assess the validity of items in mini-CUBA V3 (The theory was seen in Chapter 6, section 6.3.4). Pre-test/post-test changes and method of contrasted groups are used to evaluate the construct validity (Cohen and Swerdlik 2002). 'Method of contrasted groups' refers to scores on the test that vary in a predictable way between different participants and is validated to distinguish difference between groups. 'Pre-test/post-test changes' is a method to provide evidence of construct validity by discriminating the test scores significant change between pre- and post-test.

**Interviews:** Semi-structured interviews with participants from the intervention group were conducted to evaluate the usability and accessibility of the DVD training. Questions were designed to elicit professionals' views on the clarity and difficulty of the training content, effectiveness of the training in improving knowledge and practical breastfeeding skills, relevance of the training content to professional practice, effectiveness of training in supporting breastfeeding mothers after training, suggestions for improvements to the DVD, and importance of CUBA assessment between pre- and post-training to improving training outcomes.

### **7.3.7 Procedures**

The study was approved by the research ethics committees at both Coventry University, UK (ref: P5842) and Zhejiang University, China (ref: 20120002). Also, the researcher obtained permission to carry out the study at the two breastfeeding training courses and at the Women's Hospital, School of Medicine, Zhejiang University, and assigned three staff as the contacts.

The study was conducted before the two breastfeeding training courses and before routine professional training in postpartum wards at the Women's Hospital during March and June 2014. All the participants received an a sealed envelope marked Group 1 or Group 2, in which were participants information sheet (PIS), consent form, pre-training questionnaire and post-training questionnaire, both with a coded number sequence. The two groups were allocated to different rooms and two researchers explained the aims, methods and use of their data in the PIS and obtained signed informed consents. Pre-training tests (baseline questionnaire) were carried out for all participants before they watched the DVD. The baseline questionnaires were collected by the researchers immediately after being completed. Next, the participants in the intervention group watched the Mandarin version of the breastfeeding training

DVD. Another DVD regarding vaginal delivery and unrelated to breastfeeding was shown to the control group for 15 minutes. After watching their respective DVDs, participants in both intervention and control groups completed the post-DVD questionnaire.

After that, 15 participants from the intervention group were interviewed by the researcher. Each interview took 20–30 minutes and was recorded on an iPhone. The researcher also took notes during the interview. All recordings were transcribed anonymously and translated into English. The accuracy of the translated transcriptions was confirmed by a senior doctor.

### **7.3.8 Analysis**

Epidata (3.1) was used for double entry of data by a student and the accuracy of entries was checked by establishing a checked file. Statistical Package for Social Science (SPSS version 22.0) was used to analyse the data and the level of statistical significance was set at  $p < 0.05$ . For statistically significant groups, the strength of association was assessed by effect size to provide the magnitude of the differences between groups (Pallant 2013). Effect size statistics were calculated according to the guidelines of Pallant. The formula  $\eta^2 = t^2 / (t^2 + N_1 + N_2 - 2)$  was used for the Independent-samples T-test. The formula  $\eta^2 = t^2 / (t^2 + N - 1)$  was used for the paired-samples T-test. For the ANOVA analysis, the formula  $\eta^2 = \text{sum of squares between groups} / \text{total sum of squares}$  was used. According to the guidelines by Cohen,  $\eta^2 = 0.01$  = small effect,  $\eta^2 = 0.06$  = moderate effect,  $\eta^2 = 0.14$  = large effect (Cohen 1988b, Pallant 2013). Dependent variables included breastfeeding knowledge score in the areas of physiology of lactation, P & A and HE, and confidence in supporting skills of P & A and HE. Independent variables included age, working department, job title, job type, length of time working with breastfeeding mothers, years since obtaining professional qualification and previous breastfeeding training.

Cronbach's alpha coefficient was examined and reported the internal consistency for the Breastfeeding Support Self-Efficacy Scale.

Descriptive statistics for each independent variable were calculated and differences between the intervention and control groups were compared using Chi-square tests. At baseline, the differences in the mean score of knowledge and confidence between the two groups were examined by Independent-Samples T Test. The changes in mean score of knowledge and confidence in the two skills in the intervention group and control group were assessed by repeated measures ANOVA test. Secondly, the sub-group analyses were performed to explore if there were differences of mean knowledge and confidence scores at baseline, and which professional group benefited most from the DVD training in the intervention group. Depending on the numbers of sub-groups, a T-test (two groups) or ANOVA (three or more groups) measured the differences for the variables of age, working department, job title, job type, length of time working with breastfeeding mothers, years since obtaining professional qualification and previous breastfeeding training. A post hoc test was applied for three or more sub-groups. Correlations between knowledge and confidence in the pre-training and post-training questionnaires were assessed for each group by Bivariate Correlation. The Pearson product-moment correlation coefficient was reported for the relationship between the mean score of knowledge and confidence.

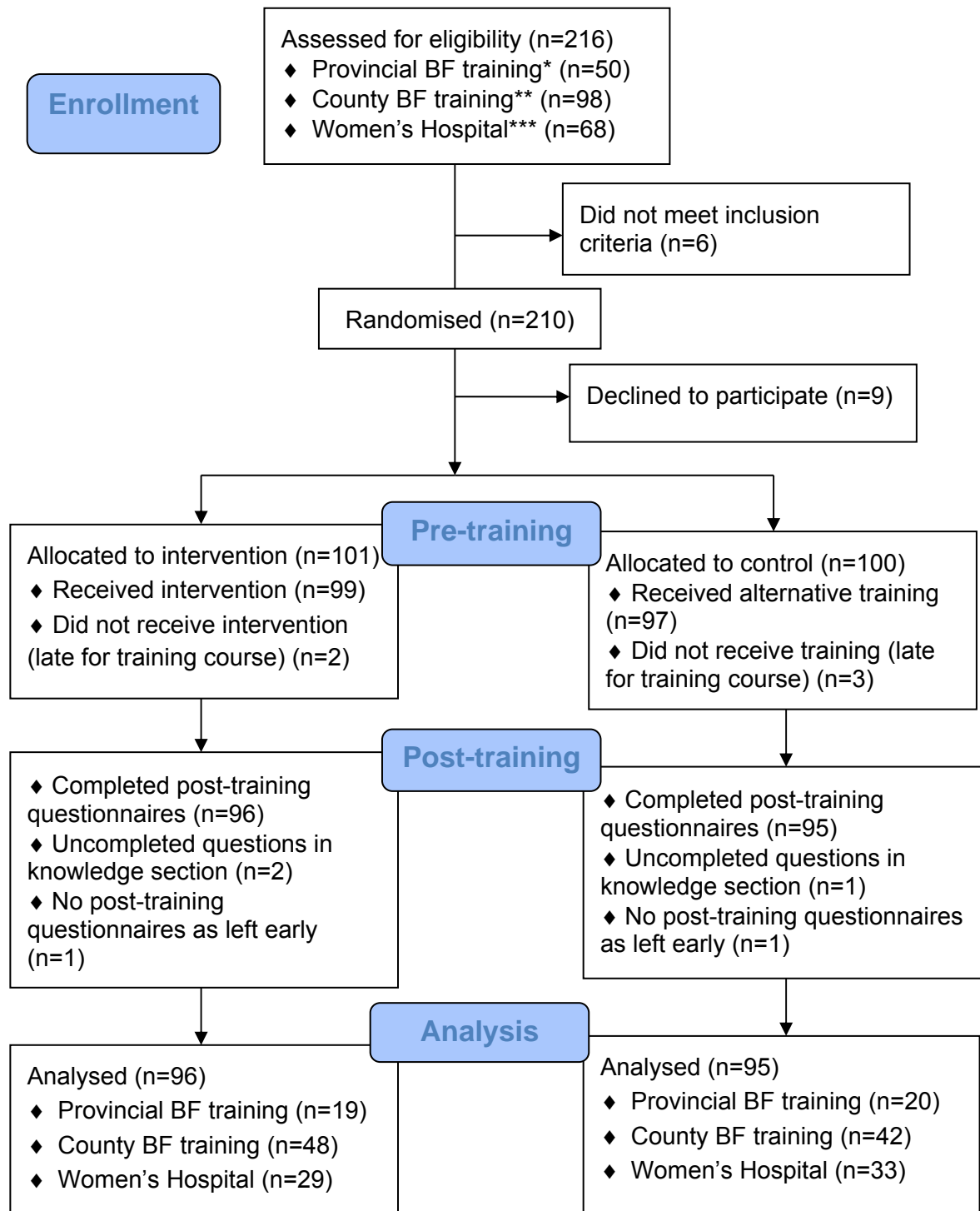
Thematic analysis was applied to explore the professionals' views on the usability of the DVD training for improving their skills in breastfeeding support. The researcher transcribed all recorded interviews. The transcription was confirmed by all the respondents, and then translated into English. The accuracy of the English version of the transcription was checked by a senior doctor. Each interview was coded with capital letters and numbers according to the order of

taking part in the interview. Six steps of thematic analysis, as described by Braun and Clarke, were used to explore the perceptions; the detailed process of this analysis was described in Chapter 3, section 3.3.5 (Braun and Clarke 2006).

## **7.4 Results**

### **7.4.1 Characteristics of participants**

Between March and June 2014, a total of 216 names were provided by the staff members at the research sites, including 50 professionals participating in Zhejiang Province breastfeeding training course, 98 clinicians participating in the county breastfeeding training course and 68 nurses working in postpartum wards in the Women's Hospital. Six professionals were not eligible and were excluded as they worked in an administrative department. The remaining 210 eligible staff were invited to take part in the study. Nine staff declined to participate in the study with two staff of no interest and seven staff of no time to participate in the study. Five professionals who were late for their breastfeeding training course did not participate in the study. Two clinicians did not complete the post-training questionnaires as they left early. Three post-training questionnaires were excluded during analysis due to too many uncompleted items. The final sample included 191 healthcare professionals who watched the breastfeeding DVD and completed the pre- and post-training questionnaires: 96 in the intervention group and 95 in the control group. Of these, 79.58% were from BFI hospitals. The response rate was 91.0% (See Figure 7.6).



\*Provincial BF training refers to healthcare professionals who participated in Zhejiang Province breastfeeding training course

\*\* County BF training refers to healthcare professionals who participated in Kaihua County breastfeeding training course

\*\*\*Women's Hospital refers to nurses in postpartum wards in the Women's Hospital, School of Medicine, Zhejiang University

**Figure 7.6 RCT Flow Diagram**



The 191 participants covered a spread of professions, including 91 (47.6%) nurses, 39 (20.4%) midwives, 61 (32.0%) doctors. Most professionals were female except five male doctors, as almost all professionals who work with breastfeeding mothers in China are female. These enrolled healthcare professionals had diverse demographics in terms of age, work setting, job title, job type, length of time working with breastfeeding mothers, years since obtaining professional qualification and previous breastfeeding training. The mean age of the participants was 33.51 years (SD=8.17). There were 69 (36.13%) working in provincial and municipal hospitals and 122 (63.87%) worked in county hospitals, which included 8 home visitors in community services. There were 94 (49.2%) professionals that had achieved mid-grade or higher titles and 97 (50.8%) professionals had primary titles. Furthermore, 158 (83.2%) participants had received their qualifications more than two years previously, 134 (71.7%) professionals had worked with breastfeeding mothers for more than two years, and 75 (40.1%) participants had worked for more than ten years. Of the study sample, 132 (69.5%) participants had had previous breastfeeding training and 58 (30.5%) participants had had no breastfeeding training (see Table 7.1). Before the DVD training, 124 (64.9%) participants thought a traditional training course was the most efficient training method, 58 (30.6%) participants considered training books with a DVD was most effective and 9 (4.5%) participants thought a breastfeeding book or internet learning was most efficient.

The two groups of the study were balanced for all demographics variables, including age, working department, job title, job type, length of time working with breastfeeding mothers, years since obtaining professional qualification and previous breastfeeding training using Chi-square (see Table 7.1).

**Table 7.1 Characteristics of the professionals participating in the evaluation of breastfeeding training DVD**

Characteristics		IG n=96 (%)	CG n=95 (%)	X <sup>2</sup> and <i>p</i> -value
Age	< 30 years	22 (31.9)	24 (33.8)	3.84 <i>p</i> =0.15
	30–39 years	35 (50.7)	26 (36.6)	
	> 39 years	12 (12.5)	21(29.6)	
Working hospital	Provincial or municipal hospital	35 (36.5)	34 (35.8)	0.01 <i>p</i> =0.92
	County hospital or below	61(64.5)	61(64.2)	
Job type	Nurse	46 (47.9)	45 (47.4)	0.38 <i>p</i> =0.83
	Midwife	32 (33.3)	29 (30.5)	
	Doctor	18 (18.8)	21 (22.1)	
Job title	Senior or mid-grade	48 (50.0)	46 (48.5)	0.05 <i>p</i> =0.83
	Primary	48 (50.0)	49 (51.5)	
Years since qualification	≤ 5 years	42 (44.2)	47 (49.5)	0.53 <i>p</i> =0.47
	> 5 years	53 (55.8)	48 (50.5)	
Year of working with breastfeeding mothers	≤ 2 years	23 (25.0)	30 (31.6)	0.44 <i>p</i> =0.80
	3–10 years	33 (35.9)	34 (25.3)	
	>10 years	36 (39.1)	39 (41.1)	
Previous training on breastfeeding	Yes	67 (69.8)	65 (68.4)	0.01 <i>p</i> =0.92
	No	29 (30.2)	29 (30.5)	

Note: Missing data was excluded

IG: intervention group

CG: control group

## **7.4.2 Baseline scores in IG and CG**

### **7.4.2.1 Baseline knowledge scores in IG and CG**

At baseline, the mean knowledge score for the whole sample was  $M=2.80$   $SD=1.39$  in P & A,  $M=2.73$   $SD=1.11$  in HE and  $M=5.53$   $SD=1.87$  in total. The area of physiology of lactation was  $M=3.76$   $SD=1.36$ . Table 7.2 shows no significant differences in mean score between the intervention group and control group in all three areas of knowledge and two skills of confidence using an Independent-Samples T-test.

There was no significant difference in the knowledge score of physiology of lactation between IG and CG (IG:  $M=3.78$ ,  $SD=1.38$ ; CG:  $M=3.75$ ,  $SD=1.35$ ;  $t(189)=0.09$ ,  $p=0.86$ ). No statistical difference in P & A knowledge score was seen between IG and CG (IG:  $M=2.73$ ,  $SD=1.41$ ; CG:  $M=2.86$ ,  $SD=1.37$ ;  $t(189)=0.08$ ,  $p=0.51$ ). For HE knowledge score, there were no significant differences between IG and CG (IG:  $M=2.66$ ,  $SD=1.09$ ; CG:  $M=2.81$ ,  $SD=1.13$ ;  $t(189)=0.28$ ,  $p=0.34$ ). The total knowledge score also shows no significant difference between IG and CG (IG:  $M=9.17$ ,  $SD=2.43$ ; CG:  $M=9.42$ ,  $SD=2.32$ ;  $t(189)=-0.74$ ,  $p=0.46$ ) (see Table 7.2).

### **Baseline confidence scores in IG and CG**

At baseline, P & A confidence scores showed no statistical difference between IG and CG in supporting P & A (IG:  $M=49.54$ ,  $SD=8.68$ ; CG:  $M=50.58$ ,  $SD=8.35$ ;  $t(143)=0.26$ ,  $p=0.46$ ). However, the HE confidence score at baseline was significantly higher in CG compared with IG (IG:  $M=16.44$ ,  $SD=3.33$ ; CG:  $M=17.45$ ,  $SD=2.79$ ;  $t(145)=5.06$ ,  $p=0.05$ ). The total confidence score at baseline showed no significant difference between IG and CG (IG:  $M=65.97$ ,  $SD=11.52$ ; CG:  $M=68.08$ ,  $SD=10.73$ ;  $t(143)=-1.14$ ,  $p=0.26$ ) (see Table 7.2).

**Table 7.2 Comparison of the differences in mean score of knowledge and confidence between two groups at baseline**

	Item	IG			CG			<i>p</i> -value
		n	Mean score	SD	n	Mean score	SD	
Knowledge	Physiology of lactation (range 0–8)	96	3.78	1.38	95	3.75	1.35	$t(189)=0.09$ $p=0.86$
	P & A (range 0–6)	96	2.73	1.41	95	2.86	1.37	$t(189)=0.08$ $p=0.51$
	HE (range 0–6)	96	2.66	1.09	95	2.81	1.13	$t(189)=0.28$ $p=0.34$
	Total (range 0–20)	96	9.17	2.43	95	9.42	2.32	$t(189)=-0.74$ $p=0.46$
Confidence	P & A (range 0–60)	71	49.54	8.68	74	50.58	8.35	$t(143)=0.26$ $p=0.46$
	HE (range 0–20)	71	16.44	3.33	76	17.45	2.79	$t(145)=5.06$ $p=0.05$
	Total (range 0–80)	71	65.97	11.52	74	68.08	10.73	$t(143)=-1.14$ $p=0.26$

### 7.4.3 Score changes between pre- and post-DVD in IG and CG

#### 7.4.3.1 Knowledge scores changes between pre- and post-DVD in IG and CG

The differences in knowledge scores in P & A and HE and in total were examined between pre- and post-DVD training in the intervention group and control group using a Paired-samples T-test. In the intervention group, there was a significant increase in P & A knowledge after completing the DVD training (pre-DVD:  $M=2.73$ ,  $SD=1.41$ ; post-DVD:  $M=4.04$ ,  $SD=1.16$ ;  $t(95)=-8.29$ ,  $p<0.01$ ,  $d=0.45$ ). The eta squared value of 0.45 suggests a substantial difference in the P & A knowledge score between pre- and post-DVD training. But there was no significant change in P & A knowledge pre- and post-DVD for the control group (pre-DVD:  $M=2.86$ ,  $SD=1.37$ ; post-DVD:  $M=2.83$ ,  $SD=1.19$ ;  $t(94)=0.28$ ,  $p=0.78$ ) (see Table 7.3).

In the intervention group, a significant increase in HE knowledge scores was found after watching the DVD (pre-DVD:  $M=2.66$ ,  $SD=1.09$ ; post-DVD:  $M=3.70$ ,  $SD=1.00$ ;  $t(95)=-8.13$ ,  $p<0.01$ ,  $d=0.41$ ). The eta squared value of 0.41 suggests

a substantial difference in the HE knowledge score between pre- and post-DVD training. However, in the control group, there was no significant increase in HE knowledge scores after watching the DVD (pre-DVD:  $M=2.81$ ,  $SD=1.13$ ; post-DVD:  $M=2.73$ ,  $SD=1.19$ ;  $t(94)=0.86$ ,  $p=0.39$ ) (see Table 7.3).

The total knowledge score significantly increased post-DVD for the intervention group (pre-DVD:  $M=5.39$ ,  $SD=2.03$ ; post-DVD:  $M=7.74$ ,  $SD=1.71$ ;  $t(95)=-10.95$ ,  $p<0.01$ ,  $d=0.56$ ). The eta squared value of 0.56 suggests a big effect size of difference in total knowledge score between pre- and post-DVD training. However, there was no significant change in total knowledge score for the control group between pre- and post-DVD (pre-DVD:  $M=5.67$ ,  $SD=1.70$ ; post-DVD:  $M=5.56$ ,  $SD=1.63$ ;  $t(94)=0.85$ ,  $p=0.40$ ) (see Table 7.3).

**Table 7.3 Comparison of the differences in knowledge scores between pre- and post-DVD in intervention group and control group**

Items	IG (n=96)			CG (n=95)		
	Pre-DVD mean (SD)	Post-DVD mean (SD)	<i>p</i> -value	Pre-DVD mean (SD)	Post-DVD mean (SD)	<i>p</i> -value
P & A (range 0–8)	2.73 (1.41)	4.04 (1.16)	t (95)=-8.29 <i>p</i> <0.01	2.86 (1.37)	2.83 (1.19)	t (94)=0.28 <i>p</i> =0.78
HE (range 0–8)	2.66 (1.09)	3.70 (1.00)	t (95)=-8.13 <i>p</i> <0.01	2.81 (1.13)	2.73 (1.19)	t (94)=0.86 <i>p</i> =0.39
Total (range 0–16)	5.39 (2.03)	7.74 (1.71)	t (95)=-10.95 <i>p</i> <0.01	5.67 (1.70)	5.56 (1.62)	t (94)=0.85 <i>p</i> =0.40

#### **7.4.3.2 Confidence scores changes between pre- and post-DVD in IG and CG**

The difference in confidence scores for P & A, HE and in total were examined between pre- and post-DVD training for the intervention group and control group using a Paired-samples T-test. In the intervention group, a significant increase in the P & A confidence scores was found post-DVD compared to pre-DVD (pre-DVD:  $M=49.93$ ,  $SD=8.48$ ; post-DVD:  $M=53.90$ ,  $SD=6.93$ ;  $t(68)=-4.79$ ,  $p<0.01$ ,  $d=0.26$ ). The eta squared value of 0.26 suggests a substantial difference in the P & A confidence score between pre- and post-DVD training. But there was no significant differences between the pre- and post-DVD P & A confidence scores in the control group (pre-DVD:  $M=50.68$ ,  $SD=8.62$ ; post-DVD:  $M=50.82$ ,  $SD=8.89$ ;  $t(65)=-0.36$ ,  $p=0.72$ ) (see Table 7.4).

In the intervention group, significant higher HE confidence scores were found post-DVD compared to pre-DVD (pre-DVD:  $M=16.57$ ,  $SD=3.29$ ; post-DVD:  $M=17.91$ ,  $SD=2.51$ ;  $t(68)=-4.12$ ,  $p<0.01$ ,  $d=0.20$ ). The eta squared value of 0.20 suggests a substantial difference in HE confidence score between pre- and post-DVD training. However, in the control group, no significant differences were seen between pre- and post-DVD HE confidence scores (pre-DVD:  $M=17.59$ ,  $SD=2.85$ ; post-DVD:  $M=17.49$ ,  $SD=2.77$ ;  $t(67)=0.49$ ,  $p=0.62$ ) (see Table 7.4).

The total confidence scores were significantly higher in post-DVD than pre-DVD in the intervention group (pre-DVD:  $M=66.49$ ,  $SD=11.27$ ; post-DVD:  $M=71.81$ ,  $SD=9.33$ ;  $t(68)=-4.92$ ,  $p<0.01$ ,  $d=0.26$ ). The eta squared value of 0.26 suggests a substantial difference in total confidence score between pre- and post-DVD training. No significant difference was seen in the control group between pre- and post-DVD total confidence scores (pre-DVD:  $M=68.33$ ,  $SD=11.08$ ; post-DVD:  $M=68.35$ ,  $SD=11.40$ ;  $t(65)=-0.25$ ,  $p=0.98$ ).

**Table 7.4 Comparison of differences in confidence scores between pre- and post-DVD in intervention group and control group**

Items	IG (n=69)			CG (n=66)		
	Pre-DVD mean (SD)	Post-DVD mean (SD)	<i>p</i> -value	Pre-DVD mean (SD)	Post-DVD mean (SD)	<i>p</i> -value
P & A (range 0–60)	49.93 (8.48)	53.90 (6.93)	t (68)=-4.79 <i>p</i> <0.01	50.68 (8.62)	50.82 (8.89)	t (65)=-0.36 <i>p</i> =0.72
HE (range 0–20)	16.57 (3.29)	17.91 (2.51)	t (68)=-4.12 <i>p</i> <0.01	17.59 (2.85)	17.49 (2.77)	t (67)=0.49 <i>p</i> =0.62
Total (range 0–80)	66.49 (11.27)	71.81 (9.33)	t (68)=-4.92 <i>p</i> <0.01	68.33 (11.08)	68.35 (11.40)	t (65)=-0.25 <i>p</i> =0.98



## **7.4.4 Comparison of the differences in total scores for knowledge and confidence in sub-groups**

### **7.4.4.1 Comparison of knowledge scores in sub-groups**

Table 7.5 shows the differences in baseline total knowledge scores among sub-groups regarding personal and job-related variables using a T-test/One-way ANOVA. The professionals from provincial and municipal hospitals ( $M=6.16$ ,  $SD=1.77$ ) had significantly higher total knowledge scores compared to those from county hospitals or below ( $M=5.17$ ,  $SD=1.85$ ;  $t(188)=3.62$ ,  $p<0.01$ ,  $d=0.07$ ). The eta squared was 0.07, which indicates a moderate effect size. There were significantly higher total knowledge scores for professionals who had had previous breastfeeding training ( $M=5.92$ ,  $SD=1.84$ ) compared to professionals who had had no breastfeeding training ( $M=4.66$ ,  $SD=1.66$ ;  $t(187)=4.50$ ,  $p<0.01$ ,  $d=0.10$ ). The effect size was moderate. However, there were no statistical differences in total knowledge scores in the sub-groups of age, job type, job title, length of time working with breastfeeding mothers and years since obtaining professional qualification (see Table 7.5).

**Table 7.5 Comparison of total knowledge scores in sub-groups at baseline for the whole sample**

Characteristics		n	Mean score (SD) (range 0–12)	p-value
Age	< 30 years	46	5.52 (1.59)	F(2)=1.28 p=0.28
	30–39 years	61	5.89 (1.98)	
	> 39 years	33	5.27 (1.93)	
Working hospital	Provincial or municipal hospital	69	6.16 (1.77)	t (188)=3.62 p<0.01
	County hospital or below	121	5.17 (1.85)	
Job type	Nurse	91	5.65 (1.91)	F(2)=1.71 p=0.18
	Midwife	39	5.79 (1.88)	
	Doctor	60	5.17 (1.80)	
Job title	Senior or mid-grade	97	5.65 (1.99)	t (188)=-0.85 p=0.39
	Primary	93	5.41(1.76)	
Years since qualification	≤ 5 years	89	5.70 (1.72)	t (187)=1.19 p=0.23
	> 5 years	100	5.37 (2.01)	
Year of working with breastfeeding mothers	≤ 2 years	53	5.47 (1.68)	F(2)=0.15 p=0.86
	3–10 years	59	5.53 (1.97)	
	> 10 years	74	5.65 (1.96)	
Previous training on breastfeeding	Yes	131	5.92 (1.84)	t (187)= 4.50 p<0.01
	No	58	4.66 (1.66)	

Table 7.6 shows that all personal and job-related variables showed no significant differences in total knowledge scores in sub-groups of intervention group post-training. The significant differences in baseline knowledge scores in the two variables of working hospital and previous breastfeeding training disappeared after the breastfeeding training (see Table 7.6).

**Table 7.6 Comparison of the knowledge scores in sub-groups of intervention group post-training**

Characteristics		n	Mean score (SD) (range 0–16)	<i>p</i> -value
Age	< 30 years	22	7.18 (1.40)	F(2)=1.60 <i>p</i> =0.21
	30–39 years	35	7.94 (1.73)	
	> 39 years	12	7.33 (1.88)	
Working hospital	Provincial or municipal hospital	35	7.94 (1.64)	t (94)=0.88 <i>p</i> =0.38
	County hospital or below	61	7.62 (1.74)	
Job type	Nurse	46	7.67 (1.52)	F(2)=0.26 <i>p</i> =0.78
	Midwife	18	8.00 (2.17)	
	Doctor	32	7.69 (1.71)	
Job title	Senior or mid-grade	48	8.06 (1.93)	t (94)=-1.88 <i>p</i> =0.06
	Primary	48	7.42 (1.40)	
Years since qualification	≤ 5 years	42	7.43 (1.53)	t (93)=-1.52 <i>p</i> =0.13
	> 5 years	53	7.96 (1.82)	
Years working with breastfeeding mothers	≤ 2 years	23	7.22 (1.57)	t (2)=2.07 <i>p</i> =0.13
	3–10 years	33	7.70 (1.69)	
	>10 years	36	8.14 (1.81)	
Previous training on breastfeeding	Yes	67	7.96 (1.75)	t (94)=1.91 <i>p</i> =0.06
	No	29	7.24 (1.53)	

Table 7.7 demonstrates the change in total knowledge scores in terms of the sub-group variables of the intervention group between pre- and post-training using One-way repeated measures ANOVA. All the sub-groups achieved significant increased total knowledge scores post-DVD compared to pre-DVD. A significantly higher increase in total knowledge score was seen among the participants working in county hospitals or lower-level hospitals (pre-DVD:  $M=4.85$ ,  $SD=1.97$ ; post-DVD:  $M=7.62$ ,  $SD=1.74$ ) compared to participants in provincial or municipal hospitals (pre-DVD:  $M=6.31$ ,  $SD=1.81$ ; post-DVD:  $M=7.94$ ,  $SD=1.64$ ;  $F(1, 94)=6.94$ ,  $p=0.01$ ). The sub-group of job type presents a significant difference in total knowledge scores. Doctors achieved a higher increase in total knowledge score (pre-DVD:  $M=4.63$ ,  $SD=1.90$ ; post-DVD:  $M=7.69$ ,  $SD=1.71$ ) compared to midwives (pre-DVD:  $M=6.28$ ,  $SD=2.05$ ; post-DVD:  $M=8.00$ ,  $SD=2.17$ ) and nurses (pre-DVD:  $M=5.57$ ,  $SD=1.97$ ; post-DVD:  $M=7.67$ ,  $SD=1.52$ ;  $F(2, 93)=3.06$ ,  $p=0.05$ ). However, the Post Hoc Test showed no significant differences in increased total knowledge scores between doctor and midwife, or doctor and nurse, or nurse and midwife. There were no significant differences in the change in knowledge scores for other sub-group variables, including age, job title, length of time working with breastfeeding mothers, years since obtaining professional qualification and previous breastfeeding training.

**Table 7.7 Change in the total knowledge scores in sub-group variables of intervention group between pre- and post-training**

Items		n	Pre-DVD mean (SD) (range 0–12)	Post-DVD mean (SD) (range 0–12)	ANOVA (interaction effect)	ANOVA (within-subject effect)
Age	< 30 years	22	5.55 (1.57)	7.18 (1.40)	F(2,66)=0.80 <i>p</i> =0.45	F(1,66)=64.33 <i>p</i> <0.01
	30–39 years	35	5.66 (2.16)	7.94 (1.73)		
	> 39 years	12	5.25 (2.53)	7.33 (1.88)		
Working hospital	Provincial or municipal hospital	35	6.31 (1.81)	7.94 (1.64)	F(1,94)=6.94 <i>p</i> =0.01	F(1,94)=102.95 <i>p</i> <0.01
	County hospital or below	61	4.85 (1.97)	7.62 (1.74)		
Job type	Nurse	46	5.57 (1.97)	7.67 (1.52)	F(2,93)=3.06 <i>p</i> =0.05	F(1,93)=102.83 <i>p</i> <0.01
	Midwife	18	6.28 (2.05)	8.00 (2.17)		
	Doctor	32	4.63 (1.90)	7.69 (1.71)		
Job title	Senior or mid-grade	48	5.71 (2.25)	8.06 (1.93)	F(1,94)=0.00 <i>p</i> =1.00	F(1,94)=118.52 <i>p</i> <0.01
	Primary	48	5.06 (1.76)	7.42 (1.40)		
Years since qualification	≤ 5 years	42	5.48 (1.71)	7.43 (1.53)	F(1,93)=2.67 <i>p</i> =0.11	F(1,93)=113.15 <i>p</i> <0.01
	> 5 years	53	5.30 (2.28)	7.96 (1.82)		
Years working with BF mothers	≤ 2 years	23	5.39 (1.85)	7.22 (1.57)	F(2,89)=0.93 <i>p</i> =0.40	F(1,89)=100.48 <i>p</i> <0.01
	3–10 years	33	5.09 (1.93)	7.70 (1.69)		
	>10 years	36	5.81 (2.27)	8.14 (1.81)		
Previous training on breastfeeding	Yes	67	5.87 (1.95)	7.96 (1.75)	F(1,94)=3.59 <i>p</i> =0.06	F(1,94)=119.62 <i>p</i> <0.01
	No	29	4.28 (1.81)	7.24 (1.53)		

#### 7.4.4.2 Comparison of confidence scores in sub-groups

Table 7.8 shows significant differences in total confidence scores at baseline were found in the sub-groups of age, job title, years since qualification, years working with breastfeeding mothers and previous breastfeeding training.

Participants of more than 39 years had higher confidence ( $M=73.17$ ,  $SD=9.26$ ) compared to the groups aged 30–39 years ( $M=69.28$ ,  $SD=10.12$ ) and under 30 years ( $M=63.09$ ,  $SD=10.16$ ;  $F(2)=7.52$ ,  $p<0.01$ ,  $d=0.12$ ). The effect size of 0.12 was moderate. Professionals who had senior or mid-grade titles gained higher confidence scores ( $M=69.30$ ,  $SD=11.17$ ) than primary professionals ( $M=64.50$ ,  $SD=10.62$ ;  $t(143)=-2.64$ ,  $p=0.01$ ,  $d=0.05$ ). The effect size was small with eta squared of 0.05. Professionals who had more years of working with breastfeeding mothers obtained higher confidence scores: >10 years:  $M=69.47$ ,  $SD=10.95$ ; 3–10 years:  $M=66.91$ ,  $SD=10.49$ ;  $\leq 2$  years:  $M=63.44$ ,  $SD=11.31$ ;  $F(2)=3.45$ ,  $p=0.04$ ,  $d=0.05$ ). The effect size was small with eta squared of 0.05. There were significant differences between participants with previous breastfeeding training ( $M=68.75$ ,  $SD=10.20$ ) and no previous training ( $M=63.10$ ,  $SD=12.39$ ;  $t(142)=2.82$ ,  $p<0.01$ ,  $d=0.05$ ). A small effect size was found with Eta Squared of 0.05.

**Table 7.8 Baseline comparison of total confidence scores in sub-groups for whole sample**

Characteristics		n	Mean score (SD) (range 0–80)	p-value
Age	< 30 years	33	63.09 (10.16)	F(2)=7.52 p<0.01
	30–39 years	53	69.28 (10.12)	
	> 39 years	23	73.17 (9.26)	
Working hospital	Provincial or municipal hospital	56	67.93 (10.53)	t (143)=0.75 p=0.45
	County hospital or below	89	66.49 (11.53)	
Job type	Nurse	72	68.22 (10.22)	F(2)=1.21 p=0.30
	Midwife	30	67.30 (10.24)	
	Doctor	43	64.91 (13.00)	
Job title	Senior or mid-grade	77	69.30 (11.17)	t (143)=-2.64 p=0.01
	Primary	68	64.50 (10.62)	
Years since qualification	≤ 5 years	65	65.72 (10.36)	t (142)=-1.26 p=0.21
	> 5 years	79	68.08 (11.76)	
Year of working with breastfeeding mothers	≤ 2 years	36	63.44 (11.31)	F(2)=3.45 p=0.04
	3–10 years	46	66.91 (10.49)	
	>10 years	60	69.47 (10.95)	
Previous training on breastfeeding	Yes	103	68.75 (10.20)	t (142)= 2.82 p<0.01
	No	41	63.10 (12.39)	

Table 7.9 shows that, after the breastfeeding training DVD, a significant difference in mean confidence score was seen in the intervention group between participants with previous breastfeeding training ( $M=72.34$ ,  $SD=8.50$ ) and those with no training ( $M=67.07$ ,  $SD=12.43$ ;  $t(90)=2.36$ ,  $p=0.02$ ,  $d=0.06$ ). The Eta Squared of 0.06 shows a moderate effect size. A new significant difference in total confidence score for age was found in the intervention group with moderate effect size (Eta Squared=0.11;  $F(2)=3.89$ ,  $p=0.03$ ). Post-hoc comparisons using the Tukey HSD test suggest the total confidence score for older participants (more than 39 years) ( $M=75.75$ ,  $SD=6.59$ ) was significantly higher than for younger respondents (less than 30 years) ( $M=66.86$ ,  $SD=10.15$ ,  $p=0.02$ ). The total confidence score for participants aged 30–39 years ( $M=71.27$ ,  $SD=9.07$ ) did not differ significantly from those aged less than 30 years ( $p=0.19$ ) or those aged more than 39 years ( $p=0.32$ ). No significant differences in total confidence scores were found for the variables of working hospital, job type, job title, years since qualification and years working with breastfeeding mothers (see Table 7.9).



**Table 7.9 Comparison of the mean score of confidence in sub-groups in intervention group post-training**

Characteristics		n	Mean score (SD) (range 0–80)	p-value
Age	< 30 years	22	66.86 (10.15)	F(2)=3.89 p=0.03
	30–39 years	33	71.27 (9.07)	
	> 39 years	12	75.75 (6.59)	
Working hospital	Provincial or municipal hospital	35	71.17 (9.21)	t (90)=0.32 p=0.75
	County hospital or below	57	70.47 (10.67)	
Job type	Nurse	44	68.86 (10.43)	F(2)=2.24 p=0.11
	Midwife	18	74.72 (6.86)	
	Doctor	30	71.10 (10.74)	
Job title	Senior or mid-grade	47	72.38 (8.91)	t (90)=-1.61 p=0.11
	Primary	45	69.02 (11.04)	
Years since qualification	≤ 5 years	40	69.10 (9.57)	t (89)=-1.36 p=0.18
	> 5 years	51	72.00 (10.49)	
Years working with breastfeeding mothers	≤ 2 years	22	66.18 (9.46)	t (2)=3.05 p=0.05
	3–10 years	31	70.77 (9.35)	
	>10 years	36	72.78 (10.61)	
Previous training on breastfeeding	Yes	64	72.34 (8.50)	t (90)=2.36 p=0.02
	No	28	67.07 (12.43)	

Table 7.10 shows the impact of the breastfeeding training DVD on the change of mean confidence scores in the sub-groups of the intervention group from pre-training to post-training using One-way repeated measures ANOVA. All the sub-groups obtained significantly increased total confidence scores post-DVD compared to pre-DVD. No significant differences in mean confidence scores were found for any sub-groups of personal and job-related variables (see Table 7.10).

**Table 7.10 Change in total confidence scores in sub-groups of intervention group between pre- and post-training**

Items		n	Pre-DVD mean (SD) (range 0–80)	Post-DVD mean (SD) (range 0–80)	ANOVA (interaction effect)	ANOVA (within-subject effect)
Age	< 30	14	68.43 (11.01)	69.36 (9.10)	F(2,48) =1.25 p=0.30	F(1,48) =23.63 p<0.01
	30–39	30	69.63 (9.35)	72.73 (7.33)		
	> 39	7	69.00 (13.42)	73.43 (8.00)		
Working hospital	Provincial or municipal hospital	30	68.67 (10.38)	72.10 (8.58)	F(1,67) =2.39 p=0.13	F(1,67) =22.31 p<0.01
	County hospital or below	39	64.82 (11.76)	71.59 (9.97)		
Job type	Nurse	35	68.57 (9.73)	71.43 (8.50)	F(2,66) =2.97 p=0.06	F(1,66) =29.91 p<0.01
	Midwife	15	67.00 (11.09)	73.93 (7.27)		
	Doctor	19	62.26 (13.32)	70.84 (12.09)		
Job title	Senior or mid-grade	32	68.35 (11.11)	73.19 (7.49)	F(1,67) =0.23 P=0.64	F(1,67) =24.12 p<0.01
	Primary	37	64.34 (11.24)	70.22 (11.00)		
Years since qualification	≤ 5 years	28	65.89 (11.45)	71.11 (7.63)	F(1,66) =0.02 p=0.89	F(1,66) =22.97 p<0.01
	> 5 years	40	66.77 (11.38)	72.30 (10.53)		
Years working with BF* mothers	≤ 2 years	14	60.50 (12.79)	68.43 (8.29)	F(2,64) =0.89 p=0.42	F(1,64) =24.43 p<0.01
	3–10 years	24	67.21 (10.26)	72.46 (7.35)		
	>10 years	29	68.41 (10.81)	72.41 (11.17)		
Previous training on BF	Yes	51	68.47 (10.01)	73.08 (7.34)	F(1,67) =1.23 p=0.27	F(1,67) =23.58 p<0.01
	No	18	60.89 (12.97)	68.22 (12.39)		

\*BF: breastfeeding

#### 7.4.5 Correlation between knowledge and confidence in intervention group pre- and post-DVD training

There was no significant correlation between knowledge scores and confidence scores in P & A ( $r=0.15$ ,  $p=0.21$ ) or HE ( $r=0.05$ ,  $p=0.70$ ) or in total ( $r=0.09$ ,  $p=0.47$ ) in the pre-training questionnaires using Spearman's rho in the intervention group. In the post-DVD training questionnaires, no significant correlation was found between knowledge scores and confidence scores in P & A ( $r=0.03$ ,  $p=0.78$ ) or HE ( $r=0.11$ ,  $p=0.29$ ) or in total ( $r=0.07$ ,  $p=0.50$ ).

**Table 7.11 Correlation between knowledge and confidence scores in intervention group in pre and post-DVD**

	Pre-DVD			Post-DVD		
	Knowledge mean SD	Confidence mean SD	Correlation coefficient*	Knowledge mean SD	Confidence mean SD	Correlation coefficient *
P & A	2.73 (1.41)	49.54 (8.68)	$r=0.15$ $p=0.21$	4.04 (1.16)	52.99 (7.63)	$r=0.03$ $p=0.78$
HE	2.66 (1.09)	16.44 (3.33)	$r=0.05$ $p=0.70$	3.70 (1.00)	17.75 (2.59)	$r=0.11$ $p=0.29$
Total	5.39 (2.03)	65.97 (11.52)	$r=0.09$ $p=0.47$	7.74 (1.71)	70.74 (10.09)	$r=0.07$ $p=0.50$

\*Pearson correlation (2-tailed)

#### 7.4.6 Evaluation of usability of breastfeeding training DVD

There were 83 participants in the intervention group that provided their views on the usability of the breastfeeding training DVD in terms of improving their practice skills. High mean assessment scores were given by participants for the usefulness of P & A (M=9.18, SD=1.30, Min=5, Max=10), HE (M=9.16, SD=1.33, Min=5, Max=10) and overall usefulness to practice (M=9.04, SD=1.40, Min=3, Max=10) (see Table 7.12).

**Table 7.12 Evaluation of usability of breastfeeding training DVD by intervention group**

Item	n	Mean score	SD	Min score	Max score
Good positioning and attachment (range 0–10)	83	9.18	1.30	5	10
Teaching hand expression (range 0–10)	83	9.16	1.33	5	10
Overall usefulness to practice (range 0–10)	83	9.04	1.40	3	10

#### 7.4.7 Construct validity of mini-CUBA V3

Mini-CUBA V3, besides the knowledge of P & A and HE (mini-CUBA V2), additionally covers the physiology of lactation. Results of the RCT study provide further evidence for validity of mini-CUBA V2. Significant increase of knowledge scores in P & A and HE was observed in intervention group after completing breastfeeding training DVD. It reflected the construct validity of mini-CUBA V2 in distinguishing significant changes of knowledge scores pre- and post-DVD training, using the test method of 'pre-test/post-test changes' by Cohen and Swerdlik (Cohen and Swerdlik 2002). As it was assumed the knowledge scores in control group did not change pre-post intervention. It showed the validity of mini-CUBA V2, as the change scores varied in a predictable way between intervention group and control group.

The section of physiology of lactation was only tested pre-DVD training among all participants. The results showed professionals with mid-grade and senior

titles achieved significantly higher knowledge scores compared to professionals with primary title (primary title:  $M=3.48$ ,  $SD=1.43$ ; mid-grade and senior titles:  $M=4.05$ ,  $SD=1.23$ ;  $t(189)=-2.90$ ,  $p<0.01$ ). It reflects the construct validity on discriminating the difference between groups with different knowledge levels using the test method of 'Method of contrasted groups' (Cohen and Swerdlik 2002).

#### **7.4.8 Internal reliability of CU-BSSES**

The internal reliability of the confidence sub-scales (CU-BSSES) was assessed again to confirm good internal reliability using Cronbach's alpha in the current study (Cronbach 1990). Cronbach alpha coefficient value of 0.95 confirms a good internal reliability of CU-BSSES. It further indicates that CU-BSSES is a reliable measure to assess the impact of training intervention on Chinese professionals' confidence in P & A, HE.

#### **7.4.9 Thematic analysis**

A total of 18 participants in intervention group were interviewed and provided their perception on the usability of breastfeeding training DVD. Nine participants were from tertiary hospital, seven participants were from secondary hospital and two participants were from community. The titles of respondents consisted two senior, nine mid-grade and seven junior. Nine nurses, five midwives and four doctors were included in the interviews. Respondents had mean working years was 11.11,  $SD=8.86$ ,  $Min=1$ ,  $Max=35$  and working proportion with breastfeeding mothers each week was 41.67%,  $SD=22.30\%$ ,  $Min=10\%$ ,  $Max=80\%$ . Eight nurses and five midwives were trained on breastfeeding knowledge and skill within 1-2 years except one nurse trained in 2007. Two doctors could not remember the last breastfeeding training and two doctors were trained before 5 years. See Table 7.13.

The first ten interviewed participants gave their perceptions on usability of breastfeeding training DVD very simply. Thus, we modified each item of interview questions with more detailed prompts. Eight participants were interviewed using new interview structure and more useful information for future

research were obtained on improving DVD training, feasibility and application of breastfeeding training DVD.

**Table 7.13 Characteristics of interviewees**

Coded number	Level of working setting	Job title	Working years with BF mothers	Working proportion for BF mothers each week (%)	Date of last BF training
1A	Tertiary	Mid-grade nurse	19	50	2014
2B	Tertiary	Mid-grade nurse	15	60	2014
3C	Tertiary	Senior nurse	35	50	2013
4D	Tertiary	Mid-grade midwife	1	30	2014
5E	Tertiary	Junior midwife	2	40	2013
6F	Tertiary	Junior nurse	1	30	2013
7G	Tertiary	Mid-grade nurse	7	80	2014
8H	Tertiary	Mid-grade Doctor	6	30	2008
9I	Tertiary	Senior doctor	20	20	2005
10J	Secondary	Mid-grade midwife	15	30	2013
11K	Secondary	Junior nurse	2	80	2014
12L	Secondary	Junior midwife	3	50	2014
13M	Secondary	Mid-grade nurse	12	80	2014
14N	Secondary	Junior nurse	10	50	2014
15O	Community service	Junior doctor	20	20	Can't remember
16P	Secondary	Mid-grade midwife	10	20	2012
17Q	Community service	Junior doctor	15	10	Can't remember
18R	Secondary	Mid-grade nurse	7	20	2007

## Theme 1: Evaluation of the Breastfeeding training DVD

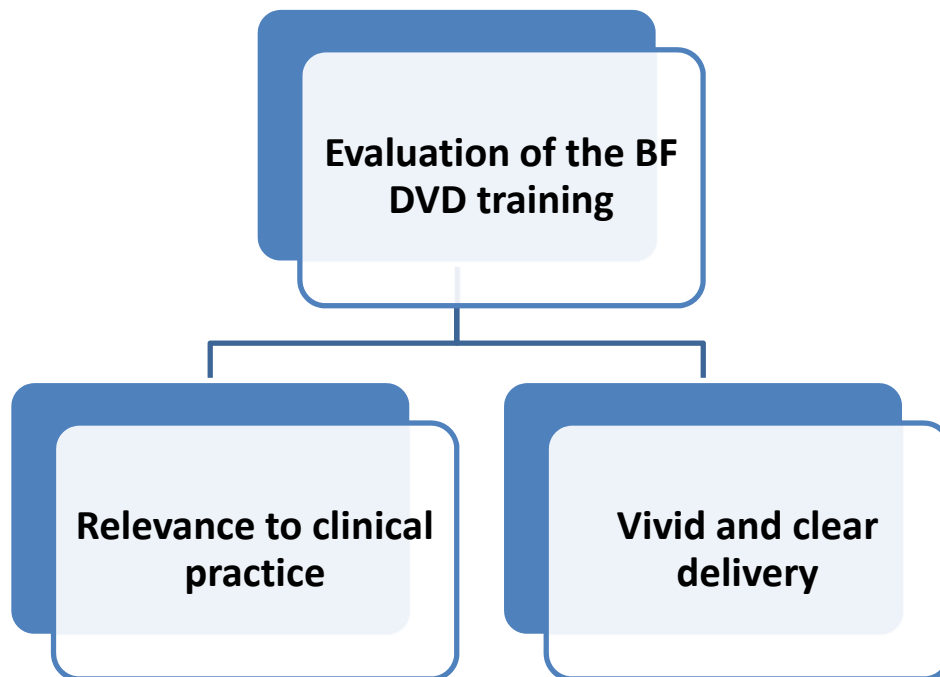


Figure 7.7 Evaluation of the Breastfeeding training DVD

### Effective educational tool for healthcare professionals

All respondents considered breastfeeding training DVD as an effective educational tool for healthcare professionals.

*“DVD is very relevant to our practical work and all contents can be used as a breastfeeding training tool for professionals and mothers. DVD is suitable to be widely implemented in China because most healthcare professionals should improve their knowledge of breastfeeding and breastfeeding support skills.” (91)*

### Relevance to clinical practice

Two key skills of P & A and HE covered in the breastfeeding DVD training were considered relevant to clinical practice by all respondents. All knowledge and skills were applicable to supporting breastfeeding mothers.



*“The skills are relevant to all my work both as a nurse in the postpartum in the past and as a postpartum visitor now..... I visited a mother whose baby was 3.5kg yesterday. However, she was 4kg at birth. She did not succeed in breastfeeding. Positioning and attachment was not correct..... It was very important to guide her correct positioning and attachment.” (16P).*

### **Vivid and clear delivery**

Breastfeeding training DVD was considered acceptable and useful by all 18 respondents due to the vivid demonstration. Respondents reflected that traditional breastfeeding training they previously attended was delivered as lectures which are abstract, not easy to understand and taught skills were difficult to deliver in practice due to lack of demonstration. DVD makes the training interesting and trainees reported having positive learning experience.

*“DVD is an intuitional instruction tool which is easy to learn by imitating, especially the techniques of positioning and attachment, expressing breast milk. We always learn the theory of breastfeeding techniques by narrative which is really abstract. DVD makes it much easier to master the techniques and educate mothers on the knowledge of breastfeeding.” (9I).*

*“I think we should use the DVD frequently. Traditional training methods are usually boring. However, watching the DVD, was interesting and informative at the same time.” (11K)*

The crucial points of two skills are described in a clear and understandable way.

*“It is easy to understand because the main contents are related to breastfeeding practices. I think other non-professionals can understand it and help them acquire the knowledge of breastfeeding.” (3C)*

## Theme 2: Benefits associated with engaging in breastfeeding DVD training

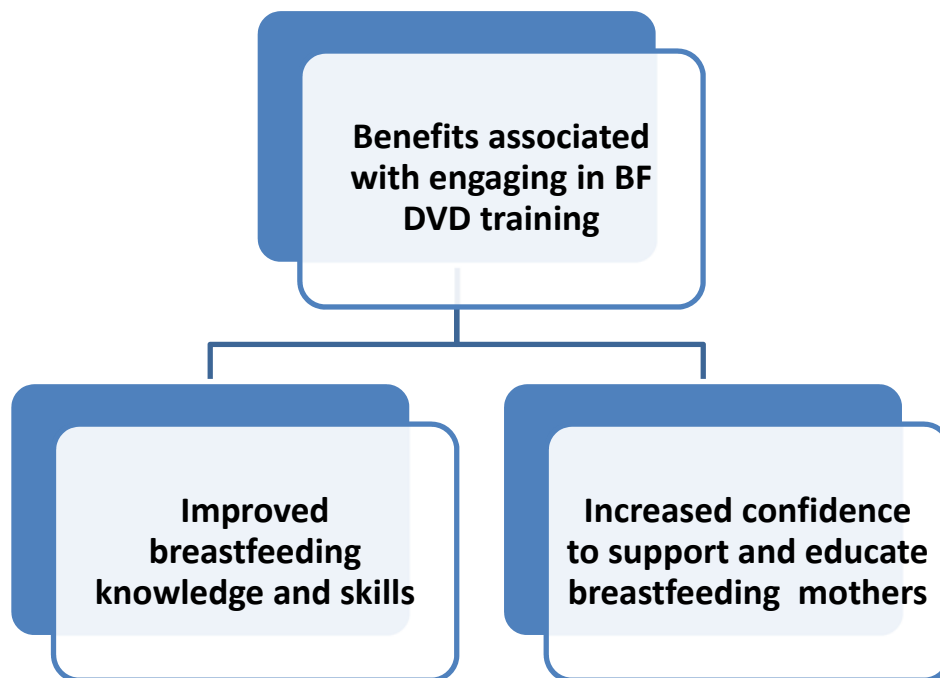


Figure 7.8 Benefits associated with engaging in breastfeeding DVD training

### Improved breastfeeding knowledge and skills

Breastfeeding training DVD was helpful in improving professionals' theoretical knowledge of breastfeeding. Three respondents stated the definition of positioning was explicit and as a result related skill was easier to use in practice.

*"Some definitions are more explicit. Especially the definition of positioning is very helpful for us to understand" (7G).*

*"Especially the positioning, I did not understand it very well before. Now I understand why it is important that head and the hip of the baby should be in line." (11K)*

Ten respondents reported that the signs of correct and incorrect attachment described in the breastfeeding training DVD help them establish if the baby is correctly positioned and attached to nipple.

*“It showed that correct attachment does not lead to deformation of nipple. In our breastfeeding practice, we found that the shape of many mothers’ nipples was not normal when the finished feeding. Now we know that it is a sign of an underlying problem” (1A).*

The DVD training helped one of respondents realize that additional intervention for attachment was not beneficial for breastfeeding. Baby has the ability to attach to mother’s breast well.

*“It provides me some new perception of the baby’s ability to attach to mother’s breast without an excessive help from professionals. In our practical work, professionals often give additional help with attachment. It sometimes makes mothers feel correct attachment is really difficult” (3C).*

Twelve respondents stated that their skill of hand expression was improved and their previous practice was incorrect.

*“In the past, we have been taught that the distance from the nipple root is 2cm in the picture book. Now it changes into 2.5- 4 cm. The distance is 2.5- 4 cm in the DVD. Actually, 2cm is too near in practice” (13M).*

### **Increased confidence to support and educate breastfeeding mothers**

Fifteen respondents felt their confidence to support breastfeeding mothers was enhanced by watching the DVD.

*“After watching the DVD, we are more confidence give advice or support mothers, mothers will feel more satisfied” (17Q). “Now we feel more confident to support mothers training is easy to understand method that increase confidence. I believe mothers or non-professionals would benefit from watching the DVD as well as being educated by professionals at the same time” (13M).*

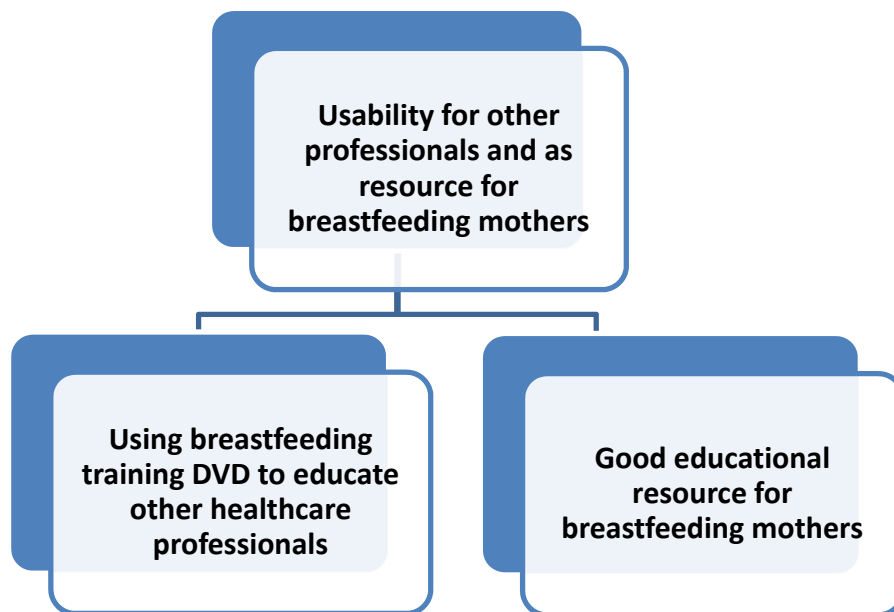
Eight respondents stated that improved professional’s breastfeeding knowledge and skills were believed to enhance the effectiveness of breastfeeding education for mothers.

*“When I teach mothers, I think it will be more effective and specific. I think the technique of positioning and attachment as taught on the DVD will help improve antenatal education” (12L).*

Engaging in breastfeeding training DVD helped professionals provide better support for mothers.

*“Learning the he method of attachment helped us guide mothers on attachment better. Learning the correct method of expressing milk helps preventing mastitis. All the contents are useful for staff to support breastfeeding mothers” (4D).*

### **Theme 3: Usability for other professionals who do not work with breastfeeding mothers and resource for breastfeeding mothers**



**Figure 7.9 Usability for other professionals who do not work with breastfeeding mothers and resource for breastfeeding mothers**

## **Using breastfeeding training DVD to educate other healthcare professionals**

Sixteen respondents highlighted the importance of engaging in breastfeeding training DVD for other professionals who do not work directly with breastfeeding mothers, including paediatricians, physicians and surgeons. Those professionals receive limited breastfeeding training and breastfeeding training DVD can help improving their knowledge and skills.

*“I think it is also helpful for other clinicians because they are not skilled at breastfeeding and rarely trained on breastfeeding. DVD can help improving their knowledge and techniques of breastfeeding, such as attachment.” (4d)*

Professionals with more knowledge of breastfeeding are more likely to have positive attitudes for breastfeeding.

*“Other professionals have less knowledge of breastfeeding as they do not work with breastfeeding mothers. DVD can help them increase their knowledge and make their attitude towards breastfeeding more positive” (7G).*

Understanding the key points of attachment is crucial for paediatricians in NICU as they need to evaluate preterm babies' ability to attach to nipple.

Paediatricians should encourage and guide mothers who were separated from their babies to hand express breast milk to feed their babies.

*“I think the DVD is valuable for paediatricians and nurses working in neonatal department..... In our hospital, high risk neonates are separated from their mothers so they need to be taught how to hand express to maintain breastfeeding. Mothers are evaluated on the skill of positioning and attachment by the professionals working in neonatal department before being discharged from hospital” (6F).*

Physicians and surgeons are likely to consult unwell women who are still breastfeeding. They are often asked whether or not to cease breastfeeding during treatment. Providing correct advice on drug safety for breastfeeding

mothers is crucial to make correct decision about ceasing or maintaining breastfeeding while a mother is unwell.

*“More doctors need to improve their breastfeeding knowledge and the DVD is a good resource for them. Surgeons often provide medical advice on galactostasis. Internist should have solid knowledge of breastfeeding because some breastfeeding mothers have to take medicine for disease for a short or long time. Internist should be able to advise unwell mothers how to maintain breastfeeding during treatment. Many mothers cease breastfeeding as they worry about medications being transferred to breast milk” (1A).*

*“In the rural areas, mothers might ask any doctor including internist or health care staff in community about breastfeeding. Many clinicians would benefit from engaging in the DVD training so they can better support breastfeeding mothers.” (17Q).*

### **Good educational resource for breastfeeding mothers**

Five respondents considered the breastfeeding training DVD an appropriate educational tool for expectant and breastfeeding mothers. Correct P & A and hand expression are crucial for success breastfeeding and those skills are presented on the DVD in an approachable manner appropriate for non-professionals.

*“It (DVD) would be quite helpful for young mothers to learn useful breastfeeding skills. Positioning, attachment, signs of correct attachment, dealing with sore nipples, are all important skills. If there is no good positioning, it is difficult to achieve good attachment. The DVD is audio-visual and young mothers can assess themselves whether or not they have they position their baby correctly.” (13M)*

The DVD can help mothers learn basic breastfeeding skills which in turn would increase their confidence and likelihood of successful breastfeeding.

*“Mothers are more likely to succeed in breastfeeding after watching DVD because it is quite vivid and easy to understand. They will be more confident”*

(14N)

## Theme 5: Suggested improvements of breastfeeding training DVD

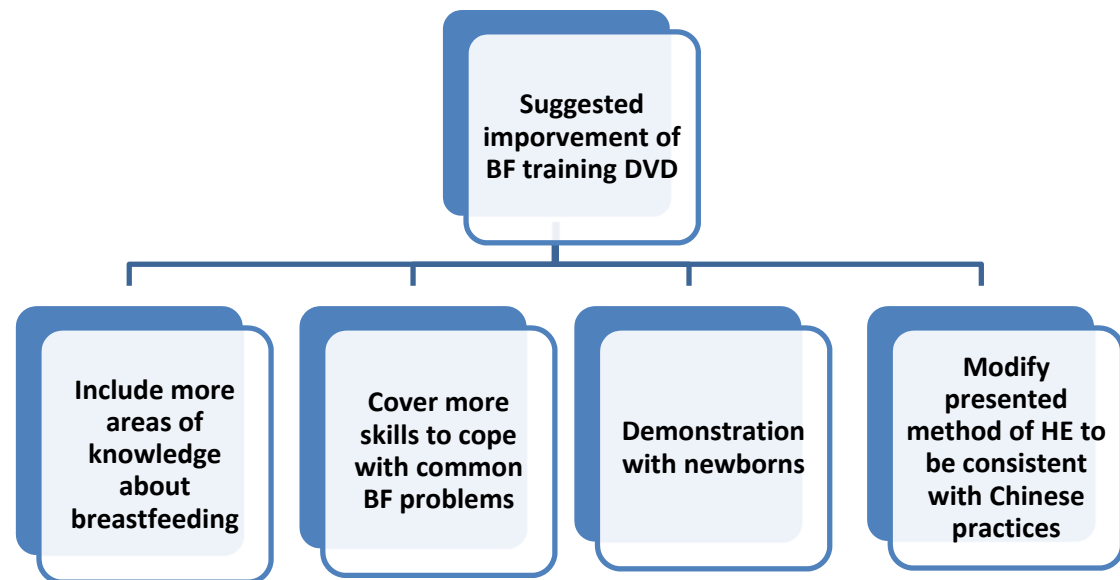


Figure 7.10 Suggested improvements of breastfeeding training DVD

### Include more areas of knowledge about breastfeeding

Respondents reflected that the contents of the DVD are insufficient to provide comprehensive breastfeeding training for healthcare professionals. They mainly referred to lack of information regarding physiology of breastfeeding in the DVD. However, this knowledge was tested in the CUBA assessment tool.

*".....there is no content corresponding with some items of the CUBA. For instance, physiology of breastfeeding is not included breastfeeding training DVD. Some terminology, for example placental lactogen, is difficult for us."*(13M)

Professionals in lower level hospitals have rare opportunities to be trained on breastfeeding and also hardly access to up-to-date resources on breastfeeding. DVD training involving up-to-date resources will be beneficial for professional in low level hospitals.

*“Our knowledge needs to be updated. We have no opportunities to access latest journal articles. If the DVD contents include new research finding, new guidelines, such as the reasons for maintaining breastfeeding until the baby is 2 years old would be helpful for us. In rural areas, mothers think that after one year of breastfeeding breast milk loses all its nutritional values ..... Sometimes, we are confused how long is the best for babies to be breastfed when we guide mothers and why we recommend this breastfeeding duration. ” (17q)*

Four respondents suggested that various positioning types and how to choose appropriate types for different babies should be discussed, especially for twins, preterm. *“.....more types of positioning should be introduced. Especially, what type of positioning is suitable for mothers with big breasts when milk flow is not smooth. What type of positioning is suitable for twins or mothers with mastitis.”* (20)

### **Cover more skills to cope with common breastfeeding problems**

Respondents hope more skills covered to cope with common breastfeeding problems which are also regarded as crucial breastfeeding training contents. Insufficient breast milk was one of the most common problems that professionals encounter.

*“In my hospital mothers find it really difficult to breastfeed exclusively one or two days after birth. Mothers often supplement babies with milk formula or water in the first one or two days after birth because they think they cannot provide sufficient breast milk. We do really hope to learn how to support them to produce sufficient breast milk” (14N).*

Other common problems include sore nipples, baby spitting milk excessively, galactostasis, mastitis. Thirteen professionals expressed their hope the breastfeeding training DVD will help them improve their abilities to resolve these common problems.



*“The DVD is about ‘normal breastfeeding’. We hope that it will include some abnormal cases, such as galactostasis and mastitis and so on. We can learn how to guide mothers when they have these problems.” (6F).*

Two respondents reflected that they find supporting breastfeeding for mothers of preterm babies challenging and need to improve their skills. Hand expression is recommended for mothers separated from their preterm. However, the DVD training does not explain how to store breast milk safely and how to defrost frozen breast milk.

*“.....Another aspect for breastfeeding is how to store expressed breast milk, including colostrum and how to defrost frozen breast milk.” (1A).*

### **Demonstration with newborns**

In the DVD, breastfeeding skills were demonstrated with infants three months and ten months old. Especially the demonstration of baby-led feeding with the ten month old baby was found not useful by six respondents.

*“Demonstrating breastfeeding skills with 10 months old baby is not helpful for our practices. Most older babies can breastfeed well. We really need the guidance for babies immediately after birth.” (10J).*

Six respondents said that the biggest challenge is to initiate early sucking after birth and introducing correct attachment in the first days after birth.

Demonstration with a newborn baby will be more relevant and more helpful for their practical work.

*“In DVD, the babies are older than babies we work with. It is more difficult for a newborn baby to correctly attach. Sometimes we help the baby to attach, and still they cannot succeed.” (16P)*

Infants are more likely to be successfully breastfed, if mothers learn correct attachment in the hospital. *“I think the early suckling is very important for successful breastfeeding. If the baby has a good skill at birth, all process of*

*breastfeeding after returning to ward or returning home will be more successful.”*

(10J)

### **Modify presented method of HE to be consistent with Chinese practices**

Five respondents observed that the method of hand expression presented on the DVD is not consistent with the way it is taught in China. Compressing breast to express breast milk as presented on the DVD training was not recommended other breastfeeding trainings attended by the respondents. There was a concern that compressing might cause breast pain. One experienced breastfeeding trainer stated:

*“The points of expressing breast milk are consistent with what we were taught. However, the method of hand expression showed on the DVD is different from our practices. On the DVD she compresses her breast between her thumb and forefinger. We don’t advise mothers to compress her breast too hardly because it will lead to breast pain. We always train staff and teach mothers to move her thumb and forefinger back towards the chest wall in a rolling movement. I am not sure if the obvious action of compressing is appropriate to demonstrate. Another reason may be that the mothers’ breast on the demonstration video is rather big and compressing is much easier to express milk. In my opinion, compressing can easily be overused by staff. Therefore, the methods of expressing should be modified to be consistent with our practices.” (9I)*

## Theme 6: Usability of CUBA

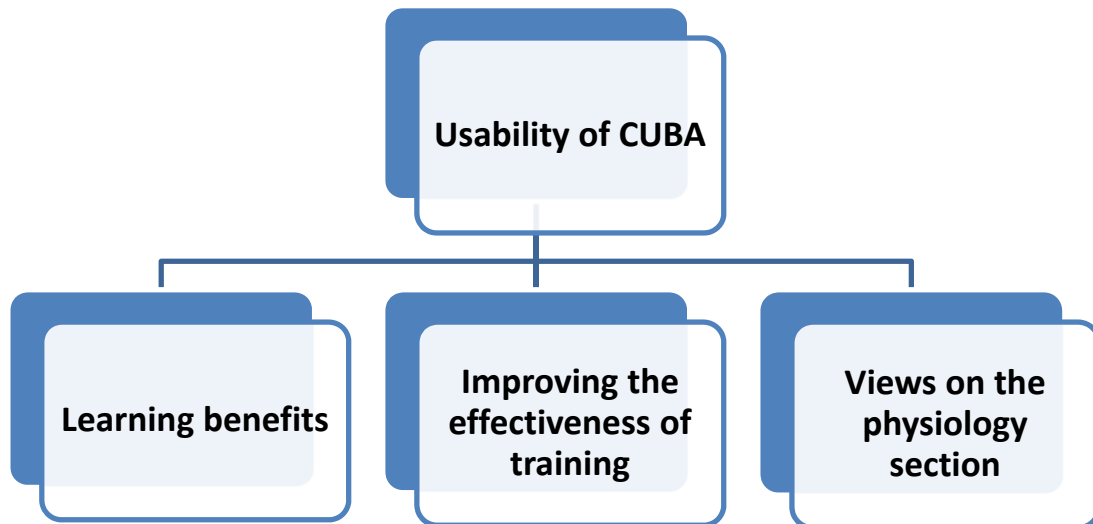


Figure 7.11 Usability of CUBA

### Learning benefits

Sixteen respondents reported that pre-training CUBA test was helpful for them to assess their knowledge and identify knowledge gaps.

*“It really made me realize that I don’t know the theory of breastfeeding very well, especially the items about physiology of lactation.” (4D)*

The items of CUBA are very specific and completing the test before training is beneficial as professional during subsequent training paid more attention to contents related to areas where their knowledge was insufficient .

*“There were some questions in CUBA I did not know the answers to. Then I would watch the DVD carefully and try to find the answers which improved my knowledge even more.” (7G)*

### **Improving the effectiveness of training**

Objective evaluation after training was considered an efficient method to improve the effectiveness of training.

*“It can reflect the effectiveness of watching the DVD immediately. Some items we really didn’t know before watching the DVD. However, it improved dramatically after watching the DVD. It really reflects the great effect of watching the DVD on improving our knowledge.” (12L)*

*“The CUBA is helpful in identifying what areas need to be improved in the future.” (11K)*

### **Views on the physiology section**

Physiology of lactation was considered the most difficult section by 12 respondents. They stated they were rarely trained and applied in that area. Two respondents thought the knowledge was not important for their practical work.

*“The physiology and mechanism of breastfeeding is quite difficult for us. It has not been included in our previous training. We cannot find the relevant sections in our breastfeeding books.” (18R)*

*“Regarding the physiology of breastfeeding, this is rarely included in breastfeeding training form mothers. The knowledge is less applicable in our practical work. It seems very difficult for us.” (13M)*

However, five respondents indicated that they were aware of the gap in this area and thought the theory was crucial knowledge for professionals working with breastfeeding mothers.

*“I think professionals like us should understand the physiology of breastfeeding. For any items I didn’t know in CUBA, I paid extra attention to, studied it, and I believe we can be improved.” (13M)*

## **7.5 Discussion**

### **7.5.1 Strength of methodology**

This is the first study to report the effectiveness, acceptability and feasibility of a DVD training programme on improving breastfeeding knowledge and confidence in the two key skills of P & A and HE among professionals in China. The research provided the validity of breastfeeding knowledge assessment tool mini-CUBA V3 by the methods of construct validity and confirmed the reliability of CU-BSES, with a high Cronbach's alpha coefficient again.

This randomised controlled trial provided reliable evidence for the effectiveness of the breastfeeding training DVD by having tight control over randomisation, allocation concealment and blinding of participants. At baseline, the intervention group and control group of the study were balanced for all demographic variables, including age, job title, job type, years since qualification, years working with breastfeeding mothers and experience of previous breastfeeding training. No significant differences in the mean score were found between the two groups in three areas of knowledge (physiology of lactation, P & A and HE) and in two areas of confidence (P & A and HE) at baseline. This indicated completely parallel randomisation in the study as selection biased had been controlled.

Participants came from two breastfeeding training courses and postpartum departments in a women's hospital, which ensured the most core professionals related to breastfeeding mothers were recruited. The sample is much bigger than the minimum sample size of 16 in each group. It covered different levels of hospital in Zhejiang Province with a spread range of personal and job-related information, including age, job title, job type, time working with breastfeeding mothers, time since obtaining professional qualification and having previous breastfeeding training or not. Thus, the sample was representative of the healthcare professionals supporting breastfeeding mothers in Zhejiang Province, with a high response rate and wide range of professionals.

Additionally, the interview for participants in the intervention group after the RCT study was more sensitive in gaining perceptions on the usability of the DVD and detecting problems than the questionnaires used in the pilot study. The anonymous assessment in the study was beneficial to reflect participants' practical level of knowledge and confidence.

### **7.5.2 Limitations**

There are four main weaknesses in the study. Firstly, the retest of the breastfeeding knowledge was conducted immediately after the DVD training intervention. It is possible that the participants have the best impression and memory of the training knowledge at this point. The effect of the DVD training intervention on professionals' knowledge and confidence may be optimal at this particular moment. It is necessary to learn about the long-term effect of the DVD training intervention by reassessment at a later time point. Downie, Rakic and Juliff reflected that the increased confidence after training in the Lactation and Adviser Programme decreased at the follow-up of six months. At six months, no significant difference was found between the intervention group and the control group, which suggests a long follow-up is necessary to examine the long-term effects (Downie, Rakic and Juliff 2002). Furthermore, the long-term follow up is beneficial to find out when will be appropriate to retrain the professionals to ensure their correct knowledge and skills is maintained. Secondly, the interview transcripts were only coded by one researcher, due to difficulty finding an eligible Mandarin coder. This might have caused some bias in the thematic analysis, although the initial code and themes were discussed with one senior doctor and one researcher (Lacey and Luff 2001). Thirdly, the study was only blind to participants but not to the researcher. Additionally, health visitors in community services who play an important role in supporting breastfeeding mothers at home were not recruited (Bechara Coutinho et al. 2005, Ingram, Johnson and Condon 2011). A bigger number of doctors were included in the current study than the pilot study, but doctors were not divided into types. There might be different training effectiveness for various doctors, including paediatricians, surgeons, internists and gynaecologists.

### 7.5.3 Knowledge

The effectiveness of breastfeeding training DVD was assessed by a validity tool of mini-CUBA V2. For the whole sample, the baseline knowledge score was low with a P & A knowledge score of 2.80 (SD=1.39) and HE knowledge score of 2.73 (SD=1.11), which suggests poor knowledge (range 0–6 of each area) in both areas and training needs among healthcare professionals.

Compared with the knowledge scores of the Ninghai Group in the pilot study (P & A: M=3.21, SD=1.21; HE: M=3.22, SD=1.25), the sample of the current study had a lower mean knowledge score both in P & A and HE. The participants in the Ninghai Group and in the current study were from different maternity services across Zhejiang Province. This indicates that the knowledge level varies in different settings in Zhejiang Province. Objective assessment is necessary and essential to identify the practical knowledge level of healthcare professionals.

Further sub-group analysis in the current study shows a significantly higher mean knowledge score was found in higher-level hospitals than in low-level hospital. This is consistent with the findings from the study by Wang et al., who reported the area of residency is one of the crucial factors influencing breastfeeding duration due to the different supporting services provided by professionals in different settings, based on 47,843 mother-infant pairs under two years of age in ten provinces of China (Wang et al. 2013). The infants born in BFI hospitals were more likely to be breastfed longer than non-BFI hospitals as they received more support from skilled professionals and higher quality of breastfeeding education for mothers (Wang, Gou and Zhang 2002, Zhang, Hao and Wang 2004).

However, in the current study, 80% participants were from BFI hospitals and the low knowledge level of participants indicates an insufficient level of skills in professionals in the BFI hospitals of Zhejiang Province, although all the healthcare professionals in BFI hospitals are required to be trained before beginning to work, based on the results in the study of Chapter 3. This

suggests that the current training is insufficient and healthcare professionals' poor breastfeeding knowledge affects their support for breastfeeding mothers. This is consistent with the finding in Chapter 3 that mothers cannot obtain the effective support from professionals after discharge from hospital due to professionals' insufficient knowledge and skill. Also the biggest number of BFI hospitals was accredited in China by the Chinese government (UNICEF 2005), but the rate of exclusive breastfeeding at six months is low, which suggests the implementation of BFI strategy is insufficient (Arnold 2014). Our findings suggest that healthcare professionals in BFI hospitals in China lack knowledge and strengthening training to update knowledge is necessary in the two key skills of P & A and HE. Watkins and Dodgson suggested that narrowing the gap between professionals' practical knowledge and required knowledge was one of the most efficient strategies for increasing breastfeeding duration and exclusive breastfeeding according to previous systematic reports (Watkins and Dodgson 2010).

Professionals who had received previous breastfeeding training achieved significant higher total knowledge scores than those with no breastfeeding training in both the pilot and current studies. But no differences were found in terms of age, time working with breastfeeding mothers, job type, years since qualification and job title. This is not consistent with the report of Wallace et al., which assessed breastfeeding knowledge among 51 clinicians in NICUs using a Neonatal Unit Clinician Assessment Tool (NUCAT) consisting of 66 items in seven areas of breastfeeding including P & A and physiology (Wallace et al. 2013). No significant differences were seen in job type, prior training, years since qualification and years working in NICU, which indicated all staff needed training to ensure they had updated knowledge.

The mean score of physiology of lactation was low ( $M=3.21$ ,  $SD=1.21$ , range 0–8) for the whole sample at baseline. However, we did not examine the physiology of lactation knowledge post-training, as the DVD training intervention did not include training on physiology of lactation. Participants' views revealed in subsequent interviews that this section of assessment was



quite difficult due to lack of training, they could not even find the answers in Chinese breastfeeding books. What's worse, two respondents reflected that the knowledge was not essential for their practice, which indicated that they did not recognise the importance of physiology of lactation for understanding P & A and HE. However, five respondents thought the contents were essential for their work. A similar poor knowledge of physiology of lactation was found among practitioners in the UK (Wallace et al. 2011b). Understanding the mechanism of lactation is essential and beneficial when applying the knowledge and skills into practice (Maria 2012). The respondents reflected on the lack of training on the mechanism of lactation in Zhejiang Province, therefore special training is necessary and essential for healthcare professionals in this area.

Significant increases in the mean score were perceived in both the knowledge and confidence scores in each area of P & A, HE and total between pre- and post-training in the intervention group, but not in the control group. The results were consistent with our pilot study (Chapter 6), which showed robust effectiveness of the breastfeeding training DVD on improving professionals' total knowledge and total confidence. The same DVD from our study was used in a breastfeeding training intervention study for community practitioners by Wallace et al. in the UK. Besides the DVD, the training programme also included a breastfeeding self-study workbook, which involved a wide range of breastfeeding knowledge (*Breastfeeding: Essential Support Skills DVD* 2009, Wallace et al. 2011b). Breastfeeding practice, knowledge and policy were assessed pre- and post-training. Significantly increased knowledge was seen among community practitioners. But the change in the level of knowledge related to P & A and HE were not reported individually. This current study is the first to focus on training in these two key skills and provides evidence for the effectiveness of the DVD by objective assessment in the knowledge of P & A and HE.

Law et al. reported a positive impact of 4-hour "hands off", verbal-only advice on P & A intervention on improving midwives' knowledge in P & A (Law et al.

2007). Wallace et al. further implemented the new method of “hands off” positioning and attachment care by trained midwives to support 370 postpartum mothers at their first feed and examined the impact on increasing breastfeeding duration in a randomised trial study (Wallace et al. 2006). The findings showed no significant differences were found in the rate of exclusive breastfeeding at 6 or 17 weeks between the intervention group and the control group. The reasons were that the first-feed support for mothers might have been insufficient, the care was lacking continual support after discharge from hospital and whether the mothers’ skills in P & A had been significantly increased by the “hands off” care was not assessed. The current study did not examine the effect of the DVD training on increasing breastfeeding duration. A future study is necessary to investigate whether the increased skills of healthcare professionals improve mothers’ skills in P & A and HE, thereby extending the breastfeeding duration.

The respondents reflected that the assessment in pre- and post-training by mini-CUBA V3 was helpful in improving the effectiveness of the training, as they paid more attention to items of knowledge they had not been sure of, and identified any training gaps. Sub-group analysis showed that the relationships between the knowledge scores and job-related/personal information were inconsistent between the pilot study and the current study. This suggests that different levels of knowledge exist in the various areas of Zhejiang Province. An objective assessment might be helpful in identifying the different training needs of professionals and providing targeting training. In the future, it is necessary and valuable to develop a valid Chinese breastfeeding assessment tool involving more areas of breastfeeding.

#### **7.5.4 Confidence**

The reliable confidence assessment tool of CU-BSES is used to evaluate the effectiveness of breastfeeding training DVD on the confidence scores among participants. Significantly increased total confidence scores were found in the intervention group between pre- and post-training, but not in the control group. The effectiveness of the breastfeeding training DVD on improving

professionals' confidence was consistent with the results of our pilot study. It was also consistent with previous studies that show breastfeeding education intervention for clinicians significantly increases their confidence in practice (Downie, Rakic and Juliff 2002, Hillenbrand and Larsen 2002, Khoury et al. 2002, Kronborg et al. 2008). Downie, Rakic and Juliff reported that the increased confidence among nurses and midwives continued after completing the intervention Lactation Advisor Program (LAP) (Downie, Rakic and Juliff 2002). An RCT study revealed that increased knowledge contributed to the improvement of confidence, and mothers reported they had received more support than before (Kronborg et al. 2008). Similarly, the professionals reflected increased confidence after BFI community training, which enabled them to take on a greater role in supporting breastfeeding mothers (Ingram, Johnson and Condon 2011). A synthesis of breastfeeding training interventions concludes that proficient skills and increased confidence in helping breastfeeding mothers among healthcare professionals has proved to have a positive effect on increasing the exclusive breastfeeding rate within six months as well as breastfeeding duration (Watkins and Dodgson 2010). In our study, we did not examine the effect of the breastfeeding training DVD on breastfeeding outcomes. A future study needs to further examine whether increased total confidence among healthcare professionals in China has a positive effect on improving mothers' breastfeeding skills, thereby increasing the breastfeeding duration and rate of exclusive breastfeeding.

The baseline total confidence scores revealed participants who were older than 39 years, with a senior or mid-grade title, who had more years of working with breastfeeding mothers and previous breastfeeding training had higher confidence scores than other professionals. After the DVD training, only participants who had had previous breastfeeding training and were aged more than 39 years had significantly higher total confidence scores than other participants. This indicates that previous breastfeeding training is an important factor in professionals' confidence. There were no significant differences in the change of total confidence scores in each sub-group between pre- and post-

training. This indicates that the DVD training had a similar effect for diverse professionals on increasing breastfeeding confidence in P & A and HE.

The results were not consistent with the pilot study. The findings of the pilot study showed that the participants who were aged 30 years or under, had a primary title, had working for fewer than 5 years, worked in county hospitals and were nurses benefited more from the DVD training in terms of confidence than other participants. Few studies have reported the different impacts of improving confidence through breastfeeding education intervention among diverse staff with different socio-demographic backgrounds. Khoury et al. revealed that administrative staff benefited most from the Special Supplemental Nutrition Program (WIC program) in terms of increased confidence in breastfeeding promotion and practices. This was explained as being due to administrative staff having less confidence compared to clinicians at baseline (Khoury et al. 2002).

No significant correlations were found between knowledge and confidence in the intervention group either pre- or post-DVD. This finding was consistent with the result in our pilot study. Other studies also reported the same evidence that knowledge and confidence were not correlated (Hillenbrand and Larsen 2002, Schanler, O'Connor and Lawrence 1999, Williams and Hammer 1995a). Hillenbrand and Larsen thought their sample of 49 paediatric resident physicians was too small to identify a significant correlation between knowledge and confidence. A bigger sample was recommended to provide more validated evidence (Hillenbrand and Larsen 2002). Williams and Hammer reported no significant correlation between knowledge and self-confidence, as knowledge alone was not sufficient to increase confidence. Practical experience working with breastfeeding mothers was reported as being an essential factor sufficient professionals' confidence (Williams and Hammer 1995a). This was consistent with our results of the sub-group analysis at baseline, which showed that professionals who had had more time working with breastfeeding mothers were more confident than participants who had had less time.

Overall, improved breastfeeding knowledge and confidence among healthcare professionals has a positive effect on increasing the breastfeeding duration and exclusive breastfeeding rate by enhancing the effectiveness of support given to mothers; but the independent impact of the breastfeeding confidence of professionals on breastfeeding outcomes is still unclear. The results of the pilot study and the RCT study suggest that more experience of working with breastfeeding mothers and having previous breastfeeding training were more likely the crucial factors impacting the confidence of professionals giving support to breastfeeding mothers. But confidence varied due to different socio-demographic factors and diverse working experience with breastfeeding mothers. Confidence cannot be a reliable predictor of knowledge level and an objective assessment of breastfeeding knowledge was valuable and necessary.

#### **7.5.5 Usability of the breastfeeding training DVD**

The process evaluation interviews with 18 participants reflected that the breastfeeding training DVD was overwhelmingly popular and extremely worthwhile. Respondents reported that the DVD effectively improved their skills in P & A and HE by correcting incorrect practices and teaching them the correct signs of P & A. Therefore, their confidence in supporting and educating breastfeeding mothers was improved due to their increased knowledge and skills in breastfeeding. These results were consistent with the findings of the quantitative study (RCT study), which showed significant increases in total knowledge and confidence scores between pre- and post-DVD training in the intervention group.

The reasons for the significant increases were identified during the respondents' reflective interviews, in which they stated that the breastfeeding training DVD was easy to understand through the vivid demonstrations by two babies and one mother, and the key points were delivered clearly and easy to remember. Participants had a happy experience during the learning process, as the new method was interesting. Wallace et al. examined the acceptability and feasibility using the same breastfeeding training DVD in two combined

qualitative and quantitative studies (Wallace et al. 2011a, Wallace et al. 2011b). One qualitative study was conducted among 10 practitioners in the West Midlands and the other was undertaken among 36 staff in community services. Both studies suggested that DVD was welcomed by participants and applicable as a new training method and continuing training resource for professionals.

Respondents highlighted the importance of breastfeeding training for other clinicians who do not directly work with breastfeeding mothers. Ingram stated that the advice and attitudes from these clinicians affect mothers' decisions. Positive attitudes from all professionals are more likely to support and encourage mothers to breastfeed (Ingram, Johnson and Condon 2011). However, even the doctors working directly with breastfeeding mothers in the current study showed a significantly lower level of knowledge than the nurses at baseline. Four doctors were interviewed from the intervention group, two of which can't remember when their last breastfeeding training was and two that had been trained more than five years previously. The lack of training among doctors was the main reason for them having a lower level of knowledge than nurses. Doctors' knowledge affects their recommendations and attitudes to breastfeeding, thereby directly affecting breastfeeding duration. In turn, a wide range of clinicians benefited from effective breastfeeding training would optimise the care of breastfeeding mothers (Pound et al. 2014). This also suggests that enhancing breastfeeding knowledge among a wide range of clinicians might be an efficient strategy to increase the breastfeeding rate in China.

The respondents demonstrated that the breastfeeding training DVD is appropriate to train a wide range of professionals. In our study, only 8 home visitors in community services were recruited, who were included in the county hospitals group. The impact of the DVD training for them is still unknown. Coutinho et al. developed a robust RCT study to compare a hospital-based support system and a combined hospital and community support system among 350 mother-infant pairs in Brazil in 2001. The rate of exclusive

breastfeeding in the combined support group (45%) was significantly higher than in the hospital-based support group (13%) during days 10–108 (Bechara Coutinho et al. 2005). The study indicated that home visits were essential in supporting mothers and that the reliance on BFHI (Baby-friendly Hospital Initiative) hospital-based support as a strategy for breastfeeding promotion needed to be reassessed. The study also highlighted the importance of breastfeeding training for home visitors in community services.

The participants in Chapter 3 reported inadequate support skills among home visitors, which negatively affected the effectiveness of support for breastfeeding mothers at discharge from hospital. This indicates the training needs of home visitors and exploring the impact of DVD training on improving their knowledge and confidence would be valuable.

Also, respondents thought the DVD could be directly used as an education tool for expectant and breastfeeding mothers due to the skills delivery being so clear and easy to understand. The results of the semi-structured interviews in Chapter 3 and 4 reported that returning to work after three months' maternity leave was the main reason for early stopping of breastfeeding, which is consistent with the breastfeeding review in China in 2009 (Xu et al. 2009). Binns demonstrated that breast milk expression was an essential strategy to maintain exclusive breastfeeding for women returning to work and has been widely applied in Australia (Binns et al. 2006). In the United States, 85% of breastfeeding women feed children through expressed human milk (Flaherman and Lee 2013). There has been no evidence reported showing whether mothers being taught and mastering the skill of HE increases the breastfeeding duration and the rate of exclusive breastfeeding in the first six months. Based on aforementioned importance of HE and the practical situation, it would be valuable to explore whether showing the breastfeeding training DVD to mothers prolongs breastfeeding duration for employed women and increases the rate of exclusive breastfeeding at six months.

The method of HE demonstrated on the DVD was identified as being inconsistent with Chinese practices by five respondents, including the expert

trainer with 35 years' experience of working with breastfeeding mothers. In China, compressing the breast to express breast milk, as presented on the breastfeeding training DVD, is considered incorrect. The guideline for hand expression from UNICEF UK demonstrates the key points: *"Gently press your thumb and fingers together, release your fingers and repeat in a rhythmic movement"* (UNICEF UK 2009). The other teaching resource for hand expression is an education resource developed by Stanford University: *"After you have expressed enough milk so that the breasts have softened, compress the breast with the 'U' hold described above so that your baby can latch on"* (Jane 2015). These guidelines suggest that the action of compressing or pressing between thumb and fingers is a key technique, which suggests that the method of hand expression taught by breastfeeding trainers in Zhejiang Province might be inefficient. The method of HE in the breastfeeding training DVD will be helpful to correct their incorrect perception and enhance the practical skill of breastfeeding.

Other crucial suggestions on improvements to the breastfeeding training DVD were provided by respondents. They anticipated that more areas of breastfeeding knowledge would be involved in the DVD training, including physiology of lactation, storing breast milk, defrosting frozen breast milk, various types of positioning and effective skills on coping with common breastfeeding problems. The professionals interviewed were especially concerned about the techniques including how to support mothers with insufficient breast milk, sore nipples, galactostasis, mastitis and preterm. The breastfeeding review in China reported that insufficient breast milk was the main reason for ceasing breastfeeding early (Xu et al. 2009). This suggests that further developing a targeting breastfeeding training programme involving wider areas of breastfeeding knowledge would be helpful and meet various training needs among healthcare professionals.

A great number of DVD learning resources involving a range of breastfeeding skills were provided for mothers and professionals by UNICEF UK (UNICEF UK 2015). In China, there are no breastfeeding training DVDs for



professionals. Our Mandarin breastfeeding DVD training was the first DVD applied in a breastfeeding training course and was popular with professionals. Limited evidence regarding the impact of DVD training for mothers and professionals on breastfeeding outcomes were identified. A pilot RCT study reported on the impact of an interactive computer agent on supporting breastfeeding in the US (Edwards et al. 2013). Seven mothers in the intervention group gained breastfeeding information and support prenatally and during their stay in hospital from an animated 'International Board-Certified Lactation Consultants (IBCLCs) in Computer Agent'. Eight mothers were in the control group. The results showed that the mothers in the intervention group had significantly greater intention to breastfeed exclusively for six months. But breastfeeding self-efficacy and attitudes to breastfeeding were not statistically different between the two groups. The mothers in the intervention group demonstrated great satisfaction and confidence in the helpfulness of the computer agent. Although the sample was too small to identify the differences between the two groups in terms of self-efficacy, it provided reference data for power analysis and calculation for sample size to identify differences in the further study. The pilot study suggested that computer-based support for breastfeeding mothers was feasible. Further, internet-based computer agents will be developed to provide continued support with breastfeeding during pregnancy and the first year of birth.

Computers have been commonly used in China, as reported by the respondents in Chapter 3. Before the DVD training, 30.6% (58/191) of participants in the current study and 13.5% (33/244) in the pilot study considered training books with a DVD to be the most effective training method, while most participants thought a traditional breastfeeding course was the most efficient method. This suggests that an increasing number of professionals recognise the feasibility and acceptability of DVD training. DVD training will be applicable to internet-based breastfeeding training in the future. Respondents in the current study reflected that professionals working in lower-level hospitals rarely had the chance to be trained in breastfeeding.

Thus, it is likely that a wide range of professionals in both high- and low-level hospitals will benefit from internet-based breastfeeding training.

### **7.5.6 Conclusion**

Overall, our breastfeeding training DVD was effective in improving professionals' knowledge and confidence via validity knowledge assessment tool of mini-CUBA V2 and reliable confidence assessment tool of CU-BSES. Mini-CUBA V3 is a validity and acceptability breastfeeding knowledge assessment tool in the physiology of lactation, P & A and HE. Mini-CUBA V3 is helpful in enhancing training effectiveness and identifying knowledge gaps after training intervention. The baseline scores reflected poor knowledge among participants, especially doctors, who lacked breastfeeding training. This study suggested training and updating knowledge in physiology of lactation, skills of P & A and HE were necessary and crucial for all participants in BFI hospitals. Developing a Mandarin breastfeeding assessment tool involving more areas of breastfeeding knowledge is necessary and valuable to identify training needs in other areas, including an assessment of skills for tackling common breastfeeding problems.

The breastfeeding DVD training was acceptable to participants and it significantly improved professionals' knowledge and confidence. The findings suggest that a DVD is a useful breastfeeding training and re-training tool for a wide range of clinicians and breastfeeding mothers. Future studies will examine the DVD's effectiveness in improving the knowledge and confidence of home visitors in community services, thereby having an impact on breastfeeding duration and the rate of exclusive breastfeeding at six months. We will further explore the impact of the DVD as an educational and continual support tool for breastfeeding mothers and examine whether or not the DVD prolongs breastfeeding duration, particularly focusing on HE training for employed mothers returning to work after maternity leave.

Confidence scores cannot predict knowledge levels due to multiple influencing factors, including time spent working with breastfeeding mothers and prior breastfeeding training. This suggests the importance of breastfeeding training

for all professionals to ensure they are confident and have positive attitudes towards breastfeeding, including those not directly working with breastfeeding mothers.

The skill of HE as demonstrated in the breastfeeding training DVD was identified to be inconsistent with Chinese practices. Evidences show that the respondents' incorrect perceptions about the skill of HE need to be updated, which is likely to improve their practical application of HE more effectively than before DVD training.

The study indicated that the breastfeeding training DVD was considered feasible and acceptable by participants. In the future, developing a Mandarin breastfeeding training DVD will be valuable to fill in the gap in available breastfeeding training education tools. It will also meet various training needs involving comprehensive knowledge and the various skills of breastfeeding. The future breastfeeding DVD training will include the physiology of lactation, which was a poor area of knowledge among professionals, and techniques used to tackle common breastfeeding problems which are the skills participants were most concerned.

An internet-based breastfeeding training course would be worth investigating due to the flexibility and widespread use of computers in China. The economic cost differences between an internet-based breastfeeding training course and a traditional breastfeeding training workshop need to be examined. Our Mandarin breastfeeding DVD training is likely to be applied as one crucial part of an internet-based breastfeeding training course in the future.

## **Chapter 8 Discussion**

### **8.1 Introduction**

In China, the National Programme of Action for Children's Development (NPA) has set national targets for exclusive breastfeeding rate at six months to improve children's health and development every ten years since 1990. The new target set by NPA for 2011–2020 is to increase the exclusive breastfeeding rate for infants aged 0–6 months to over 50% (The State Council of People's Republic of China 2011). However, the National Health and Family Planning Commission (NHFPC) reported the latest rate of exclusive breastfeeding at six months to be 30% in rural areas and 16% in urban areas in 2014 (Arnold 2014). Returning to work, breastfeeding problems and insufficient breast milk are reported by mothers to be the main reasons for ceasing breastfeeding early (Xu et al. 2009). Support from skilled practitioners can provide a positive influence on women's initiation, duration and experiences of breastfeeding (UNICEF UK 2013). Lack of breastfeeding knowledge among healthcare professionals and insufficient support for breastfeeding mothers in China has been reported (Ouyang, Xu and Zhang 2012). This research developed a breastfeeding training programme based on the new findings of training needs among healthcare practitioners in China. Although most of the participants were recruited in BFI hospitals, the breastfeeding training time is insufficient and the training materials need to be updated. The most essential skills that the professionals need to be improved are positioning and attachment (P & A) and hand expression (HE). A new training method used a breastfeeding DVD in two essential skills of P & A and HE applied among Chinese professionals. The evaluation showed the effectiveness of DVD training on improving professionals' knowledge and confidence by developing a new, objective breastfeeding knowledge assessment tool and confidence assessment tool.

### **8.2 Strengths of the research**

There are four main strengths of the research. Firstly, the research design and evaluation of the breastfeeding training programme in terms of improving professionals' knowledge used the mixed research methods recommended in

the Medical Research Council (MRC) guidelines (Craig et al. 2008). The first phase explored the possible effectiveness of the training intervention on improving professionals' knowledge based on the existing evidence. Then, mixed research methods, both qualitative and quantitative, were used to develop and evaluate the breastfeeding training programme for healthcare professionals. The mixed method has become increasingly popular in health research as it can address the research question more comprehensively than a qualitative or quantitative method alone (O'Cathain, Murphy and Nicholl 2007, Tariq and Woodman 2013). In the research, the qualitative studies guided the design of the quantitative studies. Two qualitative studies provided evidence of the lack of breastfeeding knowledge among healthcare professionals and insufficient support for breastfeeding mothers in China. Also, P & A and HE were found to be key important skills for healthcare professionals in supporting breastfeeding mothers.

Based on the two qualitative studies, the researcher developed a pilot study, which is recommended in MRC guidance to explore an uncertain research design and to develop a definitive evaluation (Craig et al. 2008). The pilot study of the research provides preliminary evidence of the effectiveness of DVD training among healthcare professionals in improving the knowledge of P & A and HE. Comments on the usability of DVD training via open questions in the questionnaire provided evidence of feasibility and acceptability.

Subsequently, an RCT study was developed, which is widely recommended to determine effectiveness and to be accepted for reliability (Campbell et al. 2000, Craig et al. 2008). An RCT study prevents selection bias by having tight control over randomisation, allocation concealment and blinding of participants. This study provides a robust evidence for the effectiveness of the breastfeeding training DVD on improving professionals' knowledge and confidence in two essential skills with a large effect size. The RCT study provides evidence of the general applicability of the DVD training among a wide range of healthcare professionals by sub-group analysis of job-related variables between pre- and post-DVD training.

Conducting a qualitative study after an RCT study is essential to further show the validity of findings (Bradley et al. 1999). In this research, semi-structured interviews after the RCT study further present the reasons for the effectiveness and perceptions of the usability of the breastfeeding training DVD and mini-CUBA. It also provides useful suggestions for developing a comprehensive breastfeeding training programme in the future. Overall, the research developed an effective and feasible breastfeeding training programme for Chinese professionals by applying the MRC guidance on developing and evaluating complex interventions.

Secondly, the sample is representative of healthcare professionals in China, as most core professionals working with breastfeeding mothers are recruited by breastfeeding training courses or in postpartum departments in maternity services. The sample covers a wide range of personal and job-related information, including age, job title, job type, diverse time of working with breastfeeding mothers, different times since obtaining professional qualification and having previous breastfeeding training or not. Various professionals represent different breastfeeding knowledge levels in China. It is helpful to explore the impact of DVD training on improving different professionals' knowledge. The findings suggest that the breastfeeding training DVD is applicable and effective in improving the knowledge and skills of a wide range of healthcare professionals.

The sample of breastfeeding expert trainers from across China represents a high level of breastfeeding knowledge (Chapter 6, section 6.3.2). It provides a comparison of the effectiveness of the breastfeeding training DVD on general healthcare professionals' knowledge compared to the expert trainers after attending a high-quality national breastfeeding training course. The findings suggest the effectiveness of DVD training on improving professionals' knowledge is similar to the high-quality national breastfeeding training course for expert breastfeeding trainers.

Thirdly, mandarin mini-CUBA V1, V2 and V3 were developed stage by stage based on the existing validated breastfeeding assessment tool of CUBA by the researcher. The research further examined the feasibility, applicability and

validity of mini-CUBA V1, V2 and V3 among Chinese healthcare professionals in three chapters (Chapter 5, Chapter 6 and Chapter 7). The feasibility and applicability of mini-CUBA V1 was assessed with 20 professionals in Chapter 5. The proportion of correct answers for each item was considered when deciding whether each would be used in the subsequent study. Based on the feasibility, applicability and proportion of correct answers for each item in the initial mini-CUBA V1, a breastfeeding expert panel developed six items of final mini-CUBA V1 regarding P & A to be used in mini-CUBA V2 and V3.

The ability to distinguish differences between groups and identify significant changes between pre- and post-DVD questionnaires was used to assess the validity of mini-CUBA V2 according to the test method of construct validity recommended by Cohen and Swerdlik (Cohen and Swerdlik 2002). Chapter 6 shows the validity of mini-CUBA V2 on examining significant differences between the National Group and the Ninghai Group in the baseline knowledge scores in P & A, HE and total. Chapter 7 reflects significant differences in knowledge scores between the intervention group and control group after DVD training, which also indicates that mini-CUBA V2 is able to distinguish significantly between different knowledge levels. Significant increases in total knowledge scores post-DVD training compared to pre-DVD both in Chapter 6 and Chapter 7 indicate the validity of mini-CUBA V2 to identify the changes between pre- and post-training.

The knowledge assessment tool of mini-CUBA V3 consists of physiology of lactation, P & A and HE. The validity of the items in P & A and HE are showed in the above mini-CUBA V2. The validity of the section in physiology of lactation is proved by discriminating the significant difference between professionals with mid-grade or senior titles and those with primary titles. Semi-structured interviews provided evidence of the feasibility and acceptability of mini-CUBA V3. Thus, this study provides reliable evidence of the validity and feasibility of mini-CUBA to evaluate Chinese healthcare professionals' knowledge.

Finally, the study developed the first confidence assessment tool, CU-BSSSES, based on the widely used Breastfeeding Self-Efficacy Scale for mothers (Dennis and Faux 1999). The good internal reliability of CU-BSSSES, with a Cronbach's

alpha coefficient 0.95, was seen in the two studies of Chapter 6 and Chapter 7. This indicates that CU-BSES is reliable for assessing the impact of the training intervention on Chinese professionals' confidence in P & A and HE.

### **8.3 Limitations of the research**

There are four limitations of the research. Firstly, there were limitations in the three qualitative studies in the research, as interviews and questionnaires were conducted in Mandarin, meaning all the transcripts had to be translated into English. Although all the translations were checked by a senior Chinese doctor to ensure the accuracy of the translation, the translation between Mandarin and English might to some extent effect accuracy between respondents' perceptions and later interpretations. Inter-rater reliability might be affected in the thematic analysis, as coding was only undertaken by one researcher. The researcher tried to find another researcher to code the transcripts. Unfortunately, the researcher could not find an eligible researcher who is familiar with qualitative studies, has the ability to code themes in thematic analysis and understands English in Zhejiang Province. The reason for this might be that few qualitative health research studies are undertaken in Zhejiang Province. Thus, thematic analysis was mainly coded by one researcher but the total analysis was discussed with two breastfeeding experts and two psychologists. The final results of the thematic analysis were agreed by all experts and psychologists.

Secondly, although we tried to recruit diverse samples reflecting a range of socio-demographic factors to represent all healthcare professionals as far as possible, there were limitations for sample recruitment in this study. The semi-structured interviews in Chapter 3 were conducted in a tertiary hospital with BFI accreditation. The findings mainly reflected the perceptions of professionals in this hospital. Support for this policy in other hospitals or those not awarded BFI status is unknown. However, as the hospital has a leading status in Zhejiang Province on promoting breastfeeding by establishing a provincial breastfeeding supporting strategy, the reported breastfeeding policies might be implemented across maternity services in Zhejiang Province. Although the exact number of BFHI accredited hospitals has not been reported in Zhejiang Province, most maternity services have been accredited with BFI awards based on the policy of



BFI accreditation as a precondition for applying to become a secondary hospital or higher-level hospital except community services (Yang and Lin 1995). Thus, the BFI strategy is likely to be implemented as the main support policy in the maternity services of Zhejiang Province.

The sample of mothers in Chapter 4 was small. All breastfeeding mothers were recruited postpartum in cities but not in rural areas. Nine out of ten respondents were primiparae and there was one multipara mother in the study. All the recruited mothers were mean 3 days after delivery. Thus the mothers' views on getting practical help at home were based on mothers' expectations rather than experience gained with previous children. The findings may not adequately reflect the views and attitudes of new mothers with breastfeeding support needs. Mothers in rural areas with a wide range of ages of infants recruited would be helpful to explore the comprehensive support needs of mothers in different stages of breastfeeding.

The third limitation was that post-DVD tests were conducted immediately after watching the DVD and so the study lacked longitudinal assessment. It was considered that immediate tests ensured a high response rate from the sample. As most samples in the study were recruited through national or local breastfeeding training courses, it is difficult to recruit and retest them after the breastfeeding training courses, especially the national sample in Chapter 6. Immediate tests for participants are likely to acquire the best scores due to ease of recall. Whether improved knowledge will be maintained six months or longer after the DVD training is unknown and needs to be further examined.

Whether the increased knowledge of professionals improved their support to breastfeeding mothers was also not examined in the research. The potential impact of the breastfeeding training DVD on breastfeeding duration, breastfeeding initiation and the rate of breastfeeding are not explored in the study. Wallace et al. reported no significant increase in breastfeeding duration after verbal-only advice for mothers in P & A (Wallace et al. 2006). In a systematic review of nine studies, Spiby et al. described inconsistent breastfeeding outcomes were reported after using training interventions with professionals (Spiby et al. 2009). Diverse training interventions, varied

measurement methods and inconsistent results make it difficult to be certain of the impact of the training intervention. We updated the review and included seven new studies, but it is still impossible to generalise the total effect of training interventions among professionals on breastfeeding outcomes (see Chapter 2).

However, factors impacting breastfeeding duration are varied across countries and complex. Wang et al. stated that breastfeeding support services, nationality, parents' education levels and family income were the main factors affecting breastfeeding duration based on a study of 47,843 infants under 2 years old in rural areas of ten provinces in China (Wang et al. 2013). Meedya, Fahy and Kable reported in a literature review in 2010 that modifiable factors are positively associated with breastfeeding duration within six months of birth, including breastfeeding intention, breastfeeding self-efficacy and social support. However, no interventional studies have been undertaken aiming at positively modifying all three factors simultaneously (Meedya, Fahy and Kable 2010). Targeted intervention programmes based on the actual influencing factors might be effective in improving breastfeeding outcomes.

The fourth limitation is that the open questions used in the study were not useful in exploring perceptions among professionals in depth. The research designed open questions in the questionnaires of Chapter 5 to explore the usability of mini-CUBA V1. Simple comments were provided about the difficulty of understanding the items, relevance to their work and importance for work. Similarly, the open questions of Chapter 6 were used to investigate the usefulness of the DVD training in supporting breastfeeding, but less than half of participants provided comments. Also, only positive perceptions were found regarding the usability of the DVD training to practice, without any negative views.

Semi-structured interviews were conducted in Chapter 7 after the RCT study, to more comprehensively investigate perceptions on the usability of the DVD training. However, the comments provided by respondents in the first ten interviews were still quite short and lacked depth. Furthermore, the researcher developed detailed prompts for each item in the interviews. Eight further

participants were subsequently interviewed and more useful information for future research was obtained about improving the DVD training, and the feasibility and application of the breastfeeding training DVD. This suggests that future semi-structured interviews with detailed prompts will be necessary and helpful to acquire respondents' detailed perceptions.

The final limitation to the research is lack of economic evaluation. Economic evaluation analysis is crucial to assess the effectiveness of healthcare interventions (Grimshaw et al. 2004). The cost-effectiveness of a training intervention can maximise the benefits of the research to policy makers. China is a developing country, so a low-cost and highly effective training intervention will be most beneficial for professionals, especially in poorer regions of western China, who would then be as likely to access high-quality training as the wealthy eastern regions. Wallace reported that three-day breastfeeding training course cost £380 per person and £680 for the trainer courses in the UK in 2011. A self-study breastfeeding training programme, consisting of a breastfeeding workbook, a breastfeeding support DVD and CUBA, is an alternative and cost-effective method for professionals (Wallace et al. 2011b).

## **8.4 Discussion of main findings**

### **8.4.1 Training needs P & A and HE among professionals**

Chapter 3 provided the evidence about what breastfeeding training programme for the professionals is necessary and appropriate, including the training contents and education method, using semi-structured interviews (SSIs) to interview the professionals in BFI hospitals. The findings reflected that BFI policy improves breastfeeding practices by rooming-in, offering breastfeeding training for a range of professionals and educating breastfeeding women as a main breastfeeding promoting policy. However, the results of the study suggested training needs among professionals. The practical breastfeeding training for professionals using 18-hour WHO training course is only four hours, which is far from the training standard. Although self-study is required to gain additional knowledge after training, none of the respondents reported completing the self-study component of the course. It indicated the necessity to assess their

knowledge using an objective knowledge assessment tool. At the same time, objective assessment is helpful to learn the level of professionals' knowledge.

There have been few reports about the knowledge level among professionals in China by objective assessment tools. Poor breastfeeding knowledge among 367 physicians in China was reported by Ouyang, Xu and Zhang in 2012 in ten BFHI hospitals in Hubei Province (Ouyang, Xu and Zhang 2012). However, this study did not include details of the knowledge assessment tool and no evidence about the validity of the assessment method. Actually, there has been no valid assessment tool for assessing breastfeeding knowledge in China. Therefore, developing a validity and objective knowledge assessment was necessary.

The findings in Chapter 3 showed that P & A and HE were the most important skills for healthcare professionals to support mothers in success with breastfeeding. It is consistent with a number of studies that the correct technique of P & A can avoid many common breastfeeding problems including insufficient breastmilk, cracked nipples, sore nipples, engorgement, mastitis and poor weight gain (Morland-Schultz and Hill 2005, Woolridge 1986, Henderson, Stamp and Pincombe 2001, Escott 1989). UNICEF requires that all mothers should be trained in the essential skill of P & A according to the "Ten Steps to Successful Breastfeeding" in the Baby-friendly Hospital Initiative (UNICEF 2005).

The results in Chapter 3 suggested that returning to work was regarded by professionals to be the most common reason for early breastfeeding cessation. HE is a recommended technique by the UNICEF to continue breastfeeding after returning to work or separate between mothers and infants (UNICEF 2005). It is a more efficient method than using a pump to cope with engorged breasts by stimulating hormones. Especially in the first days after birth, colostrum is much easier to express by HE (UNICEF UK 2010a, Maria 2012). HE is also used to stimulate breast milk production when the amount of breast milk seems to be insufficient (Morton et al. 2009). However, the interviewed professionals indicated the lack of continual effective support because the home visitors have insufficient skills in P & A and HE for supporting breastfeeding mothers at home.

Chapter 6 and Chapter 7 reflected poor breastfeeding knowledge in P & A and HE among the recruited professionals due to the low scores in the breastfeeding knowledge assessments before the DVD training. Several studies also indicated that staff have inadequate knowledge of P & A (Wallace and Kosmala-Anderson 2006, Wallace and Kosmala-Anderson 2007). However, very few studies assessed knowledge of HE. Midwife and health visitors showed that inconsistent advice confused breastfeeding mothers by a telephone survey in Scotland community (Chalmers 1991). Another survey for 189 healthcare visitors and 212 midwives from Wallace & Kosmala-Anderson reflected that only half professionals have had access to the breastfeeding guidance which led to conflicting advice to mothers (Wallace and Kosmala-Anderson 2007). WHO and UNICEF suggested that the professionals should improve their knowledge and skills to provide breastfeeding mothers with objective and consistent advice by training and retraining (World Health Organization and UNICEF 1989).

Chapter 4 explored the breastfeeding mothers' views about their support needs for successful breastfeeding from professionals, attitudes among the breastfeeding mothers towards breastfeeding and their knowledge of breastfeeding using Semi-structured interviews (SSIs) in BFI hospitals. The results revealed that the interviewed mothers had poor knowledge of optimal breastfeeding duration. Only one respondent was correct that the optimal breastfeeding duration is two years, which is consistent with the guidelines of the global strategy for feeding infants and young children. It indicated insufficient education in breastfeeding duration for mothers by professionals in BFI hospitals. Also, the incorrect perception of breastfeeding duration is likely to affect their actual breastfeeding duration.

The finding in Chapter 4 is consistent with Chapter 3 that returning to work after three months of maternity leave is regarded as the most common reason for ceasing breastfeeding early by interviewed mothers. Healthcare professionals' support with good breastfeeding skills was regarded as the most essential support to maintain breastfeeding after returning to work. These findings suggested the importance that professionals should have efficient supporting skills for breastfeeding mothers successfully.

Overall, all above evidences suggested that there are training needs among Chinese professionals in two essential skills of P & A and HE. Improving professionals' knowledge and skills is the precondition for supporting breastfeeding mothers effectively, including helping them avoid and overcome various breastfeeding problems.

## **8.4.2 Effectiveness and implication of the DVD training programme**

### **8.4.2.1 Knowledge**

Although the DVD has been applied and the usability was assessed as one part of breastfeeding training intervention in UK, it has not been assessed for the effectiveness of a single DVD (Wallace et al. 2011a, Wallace et al. 2011b, UNICEF UK 2010b). This is the first study to provide evidence of effectiveness of DVD training on improving knowledge and confidence by objective assessment. It is also the first study to apply the DVD training in breastfeeding training course among Chinese professionals.

Based on the evidence of the training needs and importance of breastfeeding knowledge in P & A and HE, Chapter 6 and Chapter 7 used the evidence-based efficient breastfeeding DVD developed by Coventry University to train Chinese professionals. The pilot study in Chapter 6 provided the preliminary evidence for the effectiveness of the breastfeeding training DVD. The results showed significant increase in the knowledge scores among Ninghai Group in pre-DVD training compared with post-DVD with a large effect size. Chapter 7 designed a RCT study and further provided the robust evidence of the effectiveness of DVD training in improving professionals' knowledge and confidence.

At baseline in Chapter 6, the knowledge scores of the National Group in P & A, HE and total were significantly higher than the Ninghai Group because the National Group had been trained before the DVD training. However, after completing the DVD training, significantly higher HE and total knowledge scores were seen in the Ninghai Group compared to the National Group and there was no difference in P & A knowledge score. This indicates that the breastfeeding training DVD is as effective in improving professionals' knowledge in P & A and

more effective in improving knowledge of HE and total knowledge than the national breastfeeding training course.

There are very few studies reported about breastfeeding DVD training intervention for professionals. Tender et al compared three time-efficient breastfeeding training methods for the first-year pediatric residents using a quasi-experimental design (Tender et al. 2014). There were 39 pediatric residents participated in the study, including 11 in the group 1 trained by an International Board Certified Lactation Consultant (IBCLC), 16 in the group 2 watching a 25-minute case-based breastfeeding DVD (DVD) and 12 in the group 3 observing a 3-hour prenatal parent breastfeeding (CLS). The results showed that the knowledge and confidence was increased significantly in all three groups. IBCLC group achieved the most improvement in the breastfeeding knowledge by objective assessment. The DVD is the most time-efficient method, the most consistent and controlled teaching method compared with the other two methods. Also, DVD can be used flexibly without schedule difficulties in a self-study manner. Therefore, the study suggested to combine the IBCLC and self-directed study of breastfeeding DVD in positioning and attachment to achieve the most time-efficient improvements by taking significantly less time, applying multimodal learning and mutually reinforcing breastfeeding management. However, the sample is small and a larger study using robust research design will be needed to provide evidence of superiority.

In the UK, a series of breastfeeding DVDs were developed for professionals and breastfeeding mothers who can access the resource freely by the website of UNICEF UK (UNICEF UK 2015). The series includes 17 videos covering skin-to-skin contact, positioning and attachment, first breastfeed, breastfeeding problems, introduction of solid food, baby-led weaning, hand expression and returning to work. It provides an additional supporting source for breastfeeding mothers. Jean W, infant feeding advisor in UK commented that breastfeeding DVD is a very popular format for professionals and breastfeeding mothers to look at breastfeeding by specific mothers (Anon. 2008). Knowles et al developed a "Trust Me, Trust My Tummy" video for health professionals (Knowles et al. 2015). The video promotes healthy infant-feeding skills, including exclusive

breastfeeding within the first six months, the timely introduction of solid foods and supporting toddlers healthy eating skills. The effectiveness of the video was tested by parents' feedback. The results showed that the video was a valuable educational tool for health professionals due to the improvements of supporting parents on feeding.

The breastfeeding training DVD can be used as an internet-based education tool. Internet-based education or e-learning is defined as using the internet to deliver learning resources for learners, and to enable learners to interact with other learners and to obtain support during the learning process (Wutoh, Boren and Balas 2004). Internet-based education interventions are increasingly applied in the healthcare field worldwide (Cook et al. 2008, Cook et al. 2010, Ruiz, Mintzer and Leipzig 2006, Wutoh, Boren and Balas 2004). However, few studies have used internet-based education in breastfeeding for healthcare professionals to date. Thus, it will be valuable to further explore the effectiveness and feasibility of DVD training delivered via the internet for improving professionals' knowledge and confidence.

In China, internet-based health education began in 1998 and four universities were officially accredited as internet-based health education pilot sites by the Ministry of Education (Peng et al. 2014). Peng et al. reported in their review of internet-based health education in China that PowerPoint slides and videos are the main learning formats. Nursing is the most popular discipline and nurses have obtained degrees via internet-based education in China (Peng et al. 2014). This suggests that internet-based breastfeeding education will be feasible in the future as it offers learning for those without limited time and geographical restrictions and allows users to control the pace of learning and to meet their personal learning objectives.

The effectiveness of internet-based healthcare education interventions has been reported in meta-analyses and systematic reviews (Cook et al. 2008, Cook et al. 2010, Lahti, Hätönen and Välimäki 2014). There were consistent conclusions that Internet-based healthcare education is as effective as traditional teaching methods and is more effective than no teaching. Lahti, Hätönen and Välimäki reflected that, based on 11 RCT studies, Internet-based education offers an



alternative approach for future healthcare education, although no statistical differences were discussed in knowledge, skills and satisfaction between Internet-based education and traditional education for nurses and student nurses (Lahti, Hätönen and Välimäki 2014). Cook et al. recommended internet-based education to be used in healthcare for continuing professional development, to update knowledge to meet the changing health demands and enhance competence (Cook et al. 2010).

Chapter 6 and Chapter 7 showed significant increases in total knowledge scores between pre- and post DVD training for all sub-groups of variables. It suggests that the DVD was widely applicable for a range of professionals in improving their knowledge in P & A and HE, including general professionals, new staff and expert breastfeeding trainers. Those participants who had low mean scores at baseline achieved a similar level to the professionals who had higher scores at baseline after completing the DVD training, which suggests the DVD was effective in professionals who had poor knowledge of the two skills. It can be used to train or retrain professionals, including new staff or professionals with poor breastfeeding knowledge.

The wide application of DVD training for professionals indicates that it is likely to be a good teaching resource for professionals working in lower-level hospitals or poor areas. This is particularly important as Chinese healthcare training resources are insufficient to cover training for all healthcare professionals due to a lack of funding, especially in poorer economic areas (Peng et al. 2014). Therefore, the health education resources and health services are unbalanced due to large economic differences in China. Generally, the eastern coast of China is more developed than other regions and people in city areas are much wealthier than those in rural areas (Peng et al. 2014). The professionals in poor areas or lower-level hospitals rarely have the chance to be trained in breastfeeding. Another important benefit of the breastfeeding training DVD is its flexibility and so it can be repeated as many times as necessary. It is cheap to deliver and does not require the presence of a trainer. Based on the results of the study in Chapter 6, the professionals in poor areas or lower-level hospitals are likely to achieve similar levels of effectiveness as the high-quality national

breastfeeding training. It suggested that the breastfeeding training DVD provides the opportunity for those who have not or cannot access high-quality training resources. The implementation of DVD training is likely to reduce the differences and inequalities between these areas and richer areas, by enhancing the practical knowledge and skills of healthcare professionals in low- and middle-income regions of China.

The respondents suggested that the breastfeeding training DVD was applicable to train breastfeeding mothers due to the skills delivery in the DVD being clear and easy to understand (Chapter 7). A pilot RCT study using computer-based breastfeeding support for seven mothers found that they had significantly greater intention to breastfeed, and greater satisfaction and confidence than eight mothers with routine care in the US (Edwards et al. 2013). Based on these positive results and the feasibility of computer-based breastfeeding support for mothers, a bigger sample should be used to assess the effectiveness of Internet-based breastfeeding support during pregnancy and the first year after birth on breastfeeding outcomes.

The findings in this research show that internet information has been regarded as the most popular way for most mothers to look for useful breastfeeding knowledge (Chapter 4). This is consistent with other studies, which showed that the internet is widely used by pregnant women to look for useful pregnancy-related information (Gao, Larsson and Luo 2013, Lima-Pereira, Bermúdez-Tamayo and Jasienska 2012). Gao, Larsson and Luo undertook a cross-sectional survey of 335 Chinese pregnant women who were at least 32 weeks pregnant to explore how women retrieve health information from the internet; 91.9% of women had accessed the internet and 88.7% had retrieved pregnancy-related information via the internet since becoming pregnant (Gao, Larsson and Luo 2013). This indicates that internet-based training for mothers using the breastfeeding training DVD might be feasible in China. What is more, internet-based training prevents inconsistent advice being given and provides sustainable information for mothers. It is likely to be an effective new method of supporting and educating breastfeeding mothers in China in the future.

Internet-based health services have been recognised as a prospective future method for China's healthcare industry. Tencent, the Chinese internet giant, has invested \$70 million in the Ting Ting Group (DXY) to develop the largest online healthcare services community in China (Shu 2014). The services will include access to a network of two million professional doctors, providing health-related information, communication and education platforms for tens of millions of users. Our breastfeeding training DVD, with its evidence-based effectiveness in improving breastfeeding knowledge and confidence, is likely to be applied in internet-based health services platforms. This will maximise the implementation of this high quality breastfeeding training resource and so benefit breastfeeding mothers in the future.

However, the DVD training does not cover all the areas of breastfeeding knowledge. Also, the effectiveness of DVD on increasing the exclusive breastfeeding rate within six months has not been assessed and reported. Wallace et al. suggested that a 4-hour of "hands off" training intervention in P & A failed to increase the exclusive breastfeeding rate as it was insufficient to prevent the main factors for ceasing breastfeeding. The study suggested that future studies of training intervention should differentiate the care needs of mothers (Wallace et al. 2006). It is consistent with the results of previous studies in China that multiple factors influenced the rate of exclusive breastfeeding before six months, including returning to work, traditional perception, education, supports for breastfeeding mothers in hospital and at home and health services (Qian et al. 2012, Wang et al. 2013, Xu et al. 2009, Shi et al. 2008, Zhao et al. 2006). Comprehensive strategies for supporting breastfeeding mothers may be efficient based on the factors on the breastfeeding rate.

#### **8.4.2.2 Confidence**

CU-BSES is the first breastfeeding confidence assessment tool in P & A and HE for professionals and firstly used among Chinese professionals. Both studies in Chapter 6 and Chapter 7 showed the professionals achieved significant higher confidence scores using the reliable CU-BSES. It was consistent with previous studies that the breastfeeding education intervention for clinicians significantly increased their confidence in practice (Downie, Rakic and Juliff

2002, Hillenbrand and Larsen 2002, Khoury et al. 2002, Kronborg et al. 2008). However, it is unknown whether increased total confidence among healthcare professionals in China has a positive effect on improving mothers' breastfeeding skills, thereby increasing the breastfeeding duration and rate of exclusive breastfeeding.

The base-line confidence scores among participants is variable due to different socio-demographic factors and diverse working experience with breastfeeding mothers. Chapter 6 and Chapter 7 both showed that participants who were older than 39 years, with a senior or mid-grade title, who had more years of working with breastfeeding mothers and previous breastfeeding training had higher confidence scores than other professionals. However, the increase of the total confidence in sub-groups between pre- and post-DVD is inconsistent between Chapter 6 and Chapter 7. It is still difficult to decide who benefited most from the DVD training in the terms of confidence. Further study is necessary to provide robust evidence about who benefits most by utilizing a bigger sample and rigorous design. Longer follow up time periods will be valuable to explore the optimal interval between training and retraining.

Although the participants showed a low level of breastfeeding knowledge by objective assessment, relatively higher confidence scores were found by self-evaluation of the participants. It indicated that the confidence scores cannot reflect the practical knowledge level among professionals. Also, no significant correlations were found between knowledge and confidence in pre- or post-DVD both in Chapter 7. This finding was consistent with other studies that knowledge and confidence were not correlated (Hillenbrand and Larsen 2002, Schanler, O'Connor and Lawrence 1999, Williams and Hammer 1995a). Williams and Hammer reported no significant correlation between knowledge and self-confidence, as knowledge alone was not sufficient to decide professionals' confidence. Practical experience working with breastfeeding mothers was reported as being an essential factor sufficient professionals' confidence (Williams and Hammer 1995a). This was consistent with our results of the sub-group analysis at baseline in Chapter 6 and Chapter 7, which showed that

professionals who had had more time working with breastfeeding mothers were more confident than participants who had had less time.

However in Chapter 6, a positive correlation was found for P & A and HE and in total between knowledge and confidence at baseline, the correlation was moderate. After the DVD training, a significant negative correlation occurred between them with a small effect size for HE, but there was no significant correlation in P & A or in total. This indicates that the correlation between confidence and knowledge is not consistent. The small effect size indicates that confidence is not a reliable predictor of professionals' BF knowledge. This is consistent with the finding of Wallace et al. that confidence is not reliable as it can be affected by various factors (Wallace et al. 2013).

Overall, CU-BSES is a validity breastfeeding assessment tool to evaluate and compare the confidence scores between pre- and post-DVD training among professionals. However, the confidence score cannot reflect the practical knowledge level and objective assessment on breastfeeding knowledge is necessary. Also, confidence cannot be a reliable predictor of knowledge level.

#### **8.4.3 Validity and implication of breastfeeding assessment tool**

The knowledge levels among healthcare professionals vary due to the geographical differences within China. An objective and valid assessment tool will be helpful in identifying the different training needs of professionals and in providing targeted training. Until now, there has been no objective breastfeeding assessment tool available in Zhejiang Province, China. The evidence-based validated and feasible breastfeeding assessment tool mini-CUBA is likely to be applied in China, including knowledge assessment of physiology of lactation, P & A and HE and confidence assessment via development of the CU-BSES. The tool is appealing for China's healthcare professionals as it is cheap to use, doesn't take much time to complete and gives instant feedback. The knowledge assessment tool can be applied to identify knowledge gaps as self-assessment, as well as recognise the training needs for managers in maternity services and assess the effectiveness of training.

A previous study in China reported that BFI hospitals needed to be reassessed due to poor breastfeeding practices, based on mothers' reports (Guo and Wang 2001). Reassessment for BFI accreditation in China was launched in 2014 by the Ministry of Health of China, as the Chinese government realised that the BFI strategy was not being strictly implemented in BFI-accredited hospitals (The National Health and Family Planning Commission of the People's Republic of China 2014). The assessment of breastfeeding knowledge and skill among healthcare professionals is an essential aspect of BFI standards (UNICEF 2005). Mini-CUBA is applicable as a breastfeeding assessment tool in reassessing or self-assessing BFI hospitals in Zhejiang Province. However, the knowledge assessment of mini-CUBA did not cover wide areas of breastfeeding in China. Developing a Mandarin version of CUBA to include comprehensive breastfeeding knowledge, skills and practice will be useful and applicable for BFI self-assessment in hospitals or for the government's reassessment.

Overall, the breastfeeding training DVD is applicable for a wide range of healthcare professionals as a training and retraining resource. It might reduce differences in knowledge levels among professionals, currently due to unbalanced education resource distribution in China. It also might be implemented as an education and support tool for breastfeeding mothers. The breastfeeding training DVD is appropriate to use in breastfeeding workshops, for self-learning and in breastfeeding training courses. It seems promising as an internet-based education resource for professionals and mothers in China in the future. Mini-CUBA can be used to identify training needs and assess breastfeeding training effectiveness in P & A, HE and physiology of lactation. It might be applied as an assessment tool for evaluation of BFI accreditation in China. CU-BSES is applicable to evaluate the impact of breastfeeding training in P & A and HE on healthcare professionals' confidence.

An effective breastfeeding training programme was developed for professionals, consisting of a breastfeeding training DVD, a validated breastfeeding assessment tool mini-CUBA (V1, V2 and V3) and a reliable breastfeeding confidence assessment tool CU- BSES, in the two essential breastfeeding support skills of P & A and HE. It is the first Mandarin breastfeeding training

DVD for healthcare professionals in China and the first to be used in Chinese breastfeeding training courses.

## **8.5 Future research**

Future research will continue to develop the breastfeeding training DVD series, covering more areas of knowledge and skills to meet the diverse training needs of professionals. Corresponding breastfeeding assessment tools for each theme will be developed. The effectiveness of these new breastfeeding training DVDs and the validity of new breastfeeding assessment tools will be further evaluated.

Although the breastfeeding training DVD was overwhelmingly welcomed by participants, they wanted more detailed content included in addition to P & A and HE. More content will be added to the current DVD covering various types of positioning, methods of storing and defrosting frozen expressed breast milk, and support skills for employee mothers returning to work after maternity leave.

A new theme within the breastfeeding training DVD will be developed to introduce knowledge and skills on skin-to-skin contact and early sucking demonstrated by new born babies. Respondents in Chapter 7 revealed that a big challenge of breastfeeding in routine work is to initiate early sucking after birth and to have correct attachment in the first days after birth. Demonstration with a newborn baby will be more relevant and more helpful for their practical work.

The evidence showed that most babies begin early sucking within an hour during skin-to-skin contact. Therefore, BFI criteria recommend mothers begin skin-to-skin contact within one hour after birth (UNICEF UK 2010d). UNICEF UK stated that skin-to-skin contact is the best way to help a new born baby adapt to its new environment and begin early sucking (UNICEF UK 2010c). With skin-to-skin contact, a new born baby's heartbeat and breathing will be better controlled and friendly bacteria from the mother will be picked up to protect the new born baby against infections. Skin-to-skin contact is helpful for mothers to produce breast milk by triggering the release of the hormones and is also helpful for bonding. Skin-to-skin contact also benefits infants' health and is likely to result in exclusive breastfeeding after discharge from hospital.

A systematic review regarding the benefits of skin-to-skin contact, based on 34 randomised studies involving 2177 mother-baby pairs, presented the benefits for breastfeeding outcomes (Moore 2013). Infants with skin-to-skin contact were more successful in their first feeding based on two trials with 54 participants. Significant increases in any breastfeeding at 1–4 months of age were found in 13 studies involving 702 participants. Additionally, decreased infant crying and cardio-respiratory stability appeared among infants with skin-to-skin contact. However, the included studies varied in intervention in terms of time spent having skin-to-skin contact. Therefore, developing new DVD content highlighting the importance of skin-to-skin contact and demonstrating early sucking by a new born baby will meet professionals' needs.

The next theme will involve the skills of avoiding and overcoming common breastfeeding problems, including supporting mothers with insufficient breast milk, sore nipples, galactostasis and mastitis, which are a particular concern and regarded as crucial content by the professionals that participated in the study. The review of breastfeeding in China reported that the most common reason for early breastfeeding cessation was insufficient breast milk (Xu et al. 2009). A spokesman in UNICEF China stated that there has been an emerging group of women who are eager to breastfeed, but there is still an absence of efficient support systems to meet mothers' needs in China (Arnold 2014). The new breastfeeding DVD might be effective in improving professionals' skills to support mothers and avoid and overcome various common problems.

An online Mandarin breastfeeding assessment tool will be developed, covering a comprehensive knowledge of breastfeeding, including breastfeeding policy, value of breastfeeding, anatomy and physiology, practices, and management of difficulties and challenges besides P & A and HE. The assessment content will be consistent with BFI standards and include the knowledge and skills introduction to the new breastfeeding training DVD. The online breastfeeding assessment tool for professionals can be totally or separately applied with instant feedback after the DVD training. The usability of the online breastfeeding assessment tool will be assessed by semi-structured interviews. This online breastfeeding assessment tool will fill the gap created by the lack of an objective



breastfeeding assessment tool in China. It is likely to be applied in assessing professionals' knowledge and evaluating the effectiveness of current breastfeeding training courses in China.

The effectiveness of the new breastfeeding training DVD for a range of professionals will be evaluated by the new breastfeeding assessment tool. Home visitors in community services were regarded as crucial supports for mothers after discharge from hospital (see Chapter 3). This research does not examine the assessment of knowledge levels among home visitors. Next, we will explore the effectiveness of the new breastfeeding training DVD for home visitors in improving knowledge both in the short term and long term. Mothers' satisfaction with support provided by trained home visitors will be investigated in the future using qualitative methods.

The effectiveness of the new breastfeeding training DVD series covering comprehensive breastfeeding knowledge will be explored by breastfeeding outcomes, including breastfeeding initiation, exclusive breastfeeding rate at 0–6 months and breastfeeding duration. Coutinho et al. reported that BFI training for professionals in hospital and home visitors in the community had a positive effect on increasing the rate of exclusive breastfeeding at 10–180 days after birth (Bechara Coutinho et al. 2005). It will be valuable to explore the impact of combining hospital-based and community-based support provided by trained healthcare professionals on promoting breastfeeding outcomes.

The breastfeeding training DVD supports the two essential skills of P & A and HE and was recommended by the respondents in Chapter 7 as a tool to train mothers directly. The skill of HE is recommended to mothers who are separated from their infants to maintain breastfeeding (UNICEF UK 2010a). In China, returning to work is the most common reason for stopping breastfeeding (Xu et al. 2009). Thus, it will be valuable to examine whether the HE training in the breastfeeding training DVD will prolong the breastfeeding duration for employee mothers after returning to work.

Overall, our future research will focus on developing the effectiveness of the breastfeeding training DVD series for professionals and the validated

breastfeeding assessment tool covering comprehensive knowledge and skills. A new breastfeeding training DVD series and assessment tool will be appropriate to use as an internet-based training course in the future. The short-term and long-term impact of the DVD series on increasing professionals' knowledge and its effectiveness at improving breastfeeding duration and exclusive breastfeeding rates at six months will be examined.

## **8.6 Conclusion**

The research developed a breastfeeding training programme for Chinese healthcare professionals consisting of a breastfeeding essential support skills DVD, breastfeeding assessment tool of mini-CUBA, and confidence assessment tool of CU-BSES. The new breastfeeding training programme was first evaluated in China and showed novelty, feasibility and acceptability, according to the perceptions of healthcare professionals. This study provided reliable evidences for the effectiveness of the new training programme on improving breastfeeding knowledge and confidence for a wide range of professionals in China. The training programme is likely to be widely implemented in China.

Although the DVD training is effective in improving professionals' knowledge, the training is only focused on the two essential skills of P & A and HE. It may not be sufficient to improve the comprehensive knowledge of breastfeeding and the exclusive breastfeeding rate within six months. Future research will develop the breastfeeding training DVD series to cover comprehensive areas, including various types of positioning, support skills for employee mothers returning to work after maternity leave, skin-to-skin contact and early sucking demonstrated by new born baby, and skills for avoiding and overcoming common breastfeeding problems. An online mandarin breastfeeding assessment tool corresponding to the DVD training series will be developed covering a comprehensive knowledge of breastfeeding, including breastfeeding policy, value of breastfeeding, anatomy and physiology, practices, and management of difficulties and challenges besides P & A and HE. The effectiveness of the new comprehensive breastfeeding training programme for professionals will be examined using more outcome measures including the long-term impact on professionals' knowledge and confidence and

breastfeeding outcomes. It will be used as an Internet-based training programme, which will be popular in China, and will maximise the benefits of the high quality breastfeeding training for healthcare professionals in China.

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## **Appendices**

Appendix A: Ethic approval form in Coventry University

Appendix B: Ethic approval form in Women's Hospital, School of Medicine, Zhejiang University

Appendix C: Study 1-Staff interview questionnaire

Appendix D: Study 2-Mother interview questionnaire

Appendix E: Study 3-Usability of mini-CUBA questionnaire

Appendix F: Study 4-Pilot study of questionnaires in Pre-DVD training and Post-DVD training

Appendix G: Study 5-RCT study of questionnaires in Pre-DVD training and Post- DVD training

Appendix H: Staff interview questionnaires after RCT study

Appendix I: Participant information sheet and consent forms

Appendix J: Reasons for correct answers in each item of mini-CUBA V1

Appendix K: Tests of Normality for data in Chapter 6

Appendix L: Tests of Normality for data in Chapter 7

## Appendix A: Ethic approval form in Coventry University



Professor Jane Coad  
Chair of Ethics Committee  
Tel: (024) 7679 3802  
Email: aa9737@coventry.ac.uk

23 October 2012

Dear Sir/Madam

**Re: Ethical Approval - P5842**

I am writing to confirm that **Dr Yuan Ying Ma** has received ethical approval for the research project: *Develop and test the effectiveness of a breastfeeding support training programme by objective tests of knowledge for Chinese healthcare professionals.*

The research project has addressed the main ethical issues appropriately and has been approved by a member of the Faculty of Health & Life Sciences, Ethics and Governance Committee at Coventry University.

If you have any further queries please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read "Jane Coad", written over a horizontal line.

Professor Jane Coad

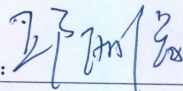

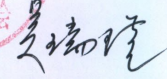


## Appendix B: Ethic approval form in Women's Hospital, School of Medicine, Zhejiang University (Mandarin Version)

20/20002

浙江大学医学院附属妇产科医院  
医学伦理委员会意见书

项目类型	1、临床科研 <input checked="" type="checkbox"/> 2、临床基础科研 3、药物验证 4、医疗仪器试剂验证 5、新技术开展				
项目名称	医务专职人员母乳喂养培训方案的开发和有效性评价			伦理审批号	20/20002
项目负责人	邱丽倩	职称	主任医师	所在科室	保健部
项目参与者	邱丽倩 马袁英 周杏仙 张纓 王桂娣				
项目实施的伦理学问题	<p>1、对受试者可能带来的心理、生理、生活、经济及其他损害和不利影响，防范和补救对策。</p> <p>2、对受试者可能带来的近、远期潜在危险及其防范</p> <p>3、其它伦理学问题（包括受试者个人、家庭、社会、人类等方面）</p> <p>本研究首先通过访谈医务人员来了解母乳喂养政策，实施情况。设计母乳喂养知识技能评估问卷，通过预调查检验评估问卷的有效性和实用性。并通过母乳喂养知识技能评估问卷衡量医务人员母乳喂养知识技能水平，如果医务人员得到分值太低可能会对其指导孕产妇母乳喂养信心有所打击。通过培训可以弥补医务人员对于母乳喂养知识技能不足之处，并通过再评估评价其知识水平。培训分为2组，实验组为新的培训方案，对照组为原有的培训方案。所有培训内容对医务人员都没有不利因素。</p> <p>本研究还需要通过访谈母亲，了解她们在母乳喂养方面的观点和计划。并且通过问卷调查法调查母亲母乳喂养的实际情况。这可能会涉及有关母亲的隐私，我们通过签署知情同意书告知母亲此研究的目的意义以及她对研究所做出的贡献，同时保证她的私人信息不外露。</p> <p>此外，母乳喂养的新培训方案可能会跟医务人员原有知识技能及母亲传统的母乳喂养理念有所冲突，我们将用科学的依据来说服医务人员，母亲及其家庭成员有关母乳喂养新理念的可靠性和安全性。</p>				

报 送 材 料	1、医学伦理委员会意见书 2、伦理委员会审核申请表 3、知情同意书 4、 5、 6、 7、 8、 9、 10、  申请者签名: 
伦 理 委 员 会 意 见	审查结果: <input checked="" type="checkbox"/> 同意 2、暂时同意 (根据审查意见作修改后同意) 3、延到下一次会议审查 (需要补充材料, 本次会议无法做出决定) 4、不同意 (必须在全会上做出, 超过 2/3 的委员投票表示不同意)   伦理委员会主任 (签名):   2012年11月27日



## Appendix C: Study 1-Staff interview questionnaire

### Study one: Staff interview questionnaire

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Name:            job title:            working time:            age:

1. In your profession, what is taught about breastfeeding when you are in training?
2. What do you think are the most important aspects of breastfeeding knowledge for professional staff at your level, and also for the staff you are responsible for?
3. What do you feel are the most important skills needed to help a mother to successfully breastfeed?
4. How does implementing the Baby Friendly Initiative change the practice of nurses and midwives?
5. Why do you think women in China give up breastfeeding earlier than they expected? How do you think this can be prevented?
6. Who helps with breastfeeding problems when the mother goes home from hospital?
7. How are staff like you, or those you are responsible for, trained?
8. Is any learning done by self study? Is there any E learning for breastfeeding- or any other skills?
9. How easy is it for you or your staff to access computers at work- for training or for finding out about guidelines or practice advice?
10. What are the policies to support breastfeeding- how will staff know about them?
11. What are the rates of breastfeeding initiation in the hospital/ ward/ NICU and how many have any breast milk before they are discharged?

## Appendix D: Study 2-Mother interview questionnaire

### Study two Mother interview questionnaire

---

Name:            work:            age:            Baby age:

1. Is this your first baby?
2. Why did you choose to breastfeed your baby?
3. How did you learn how to breastfeed?
4. Were you breastfed?
5. How long are you intending to breastfeed for?
6. How long do you think women do breastfeed for and why do they give up?
7. Do you ever see other women breastfeeding their babies? If so, is this only in their homes or is it also in public places?
8. Why do you think women give up breastfeeding early? What problems do they have?
9. Where can women obtain practical help with breastfeeding?
10. Where can women get information about breastfeeding?
11. Is any learning done by self-study? Is there any E learning for breastfeeding- or any other skills?

## Appendix E: Study 3-Usability of mini-CUBA V1 questionnaire

### Study three: Usability of mini-CUBA V1 questionnaire

---

1. Name:
2. Age:
3. Job title:
4. Working department
5. How long (in years) is it since you qualified as a practitioner?
6. Have you had any training in breastfeeding. Tick: Yes or No
7. If answer “yes”, when and what was trained on breastfeeding?
8. How much do you work with women who may breastfed in each working week (Please tick one)
  - ① 0-25%,
  - ② More than 25% but less than 50%,
  - ③ More than 50% but less that 75%,
  - ④ Over 75%.

### Items for mini-CUBA V1

Each respond to the following questions by selecting ONE answer only to each question. Then we ask you to comment on what you think about each question by answering 4 questions.

<b>1</b>	<b>Which of the following defines positioning in the context of breastfeeding?</b>	<b>Tick One</b>
A	Whether the mother is comfortable	
B	The relationship between the mother’s body and the baby’s body	
C	The mother cradling the baby in her arms	
D	The baby taking adequate breast tissue in his mouth	

Comments:

1. Which answer do you think is correct and why? Why are the other answers wrong?  
A:

B:

C:

D:

2. Is this question difficult to understand? If so, explain why?
3. Is the question asking about practices and knowledge you are familiar with in your work?
4. How important is it that staff like you understand this type of information?

<b>2</b>	<b>Which of the following is an essential element of effective positioning?</b>	Tick one
A	Mother's lap supports the baby's weight	
B	Mother turns the baby's body towards her	
C	Mother sitting comfortably in a chair	
D	Mother leans forward to feed	

Comments:

5. Which answer do you think is correct and why? Why are the other answers wrong?  
A:  
  
B:  
  
C:  
  
D:
6. Is this question difficult to understand? If so, explain why?
7. Is the question asking about practices and knowledge you are familiar with in your work?
8. How important is it that staff like you understand this type of information?

<b>3</b>	<b>Where should a mother aim her nipple when attaching her baby to her breast?</b>	Tick One
A	The roof of his mouth	
B	The back of his tongue	
C	The middle of his tongue	
D	His lower gum	

Comments:

9. Which answer do you think is correct and why? Why are the other answers wrong?  
 A:  
 B:  
 C:  
 D:
10. Is this question difficult to understand? If so, explain why?
11. Is the question asking about practices and knowledge you are familiar with in your work?
12. How important is it that staff like you understand this type of information?

<b>4</b>	<b>An experienced mother breastfeeding her three week old baby feels she has plenty of milk but is worried that he has not gained weight over the last two weeks. The baby has a "worried" expression but is otherwise alert and seems content. What would be your first course of action?</b>	
A	Recommend formula top-ups after feeds until he begins to gain weight	
B	Observe him breastfeeding and check attachment	
C	Refer to the general practitioner	
D	Advise her to stop feeding from the breast and give only expressed breast milk to check her supply	

Comments:

13. Which answer do you think is correct and why? Why are the other answers wrong?  
 A:  
 B:  
 C:  
 D:
14. Is this question difficult to understand? If so, explain why?
15. Is the question asking about practices and knowledge you are familiar with in your work?
16. How important is it that staff like you understand this type of information?

<b>5</b>	<b>What is the best positioning of the premature or small baby?</b>	<b>Tick one</b>
A	Cradle Hold	
B	Crossover Hold	
C	Football Hold	
D	Side Lying Position	

Comments:

17. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

18. Is this question difficult to understand? If so, explain why?

19. Is the question asking about practices and knowledge you are familiar with in your work?

20. How important is it that staff like you understand this type of information?

<b>6</b>	<b>During the first week, which of the following should indicate to the mother that her baby is not well attached during feeding?</b>	
A	Baby falls asleep while feeding	
B	Sucking becomes slower	
C	Baby wakes to feed every two to three hours	
D	Nipples are painful during feeds	

Comments:

21. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

22. Is this question difficult to understand? If so, explain why?

23. Is the question asking about practices and knowledge you are familiar with in your work?

24. How important is it that staff like you understand this type of information?

<b>7</b>	<b>What are signs of poor attachment for baby?</b>	
A	Baby's mouth is open wide	
B	His lips should be flanged and the lower lip may be folded back	
C	His chin should be close to the breast and his nose should be free	
D	There is gap between the baby's chin and the breast	

Comments:

25. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

26. Is this question difficult to understand? If so, explain why?

27. Is the question asking about practices and knowledge you are familiar with in your work?

28. How important is it that staff like you understand this type of information?

<b>8</b>	<b>What are signs of poor attachment for mother?</b>	
A	She has no pain in nipples	
B	The sucking rhythm changes during the feed	
C	The baby relaxed while feeding	
D	More areola is visible below the baby's mouth	

Comments:

29. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

30. Is this question difficult to understand? If so, explain why?

31. Is the question asking about practices and knowledge you are familiar with in your work?

32. How important is it that staff like you understand this type of information?

<b>9</b>	<b>What is the normal sucking pattern during a breastfeed?</b>	
A	Sucking begins slowly and steadily, then become more rapid and vigorous	
B	Sucking is slow and steady throughout the entire feed	
C	Sucking is rapid and vigorous throughout the entire feed	
D	Sucking is rapid and vigorous at the beginning, then becomes slower and steadier	

Comments:

33. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

34. Is this question difficult to understand? If so, explain why?

35. Is the question asking about practices and knowledge you are familiar with in your work?

36. How important is it that staff like you understand this type of information?

<b>10</b>	<b>Which of the following should alert a mother to her baby not being well attached during the first week?</b>	
A	Nipples sore while feeding	
B	Breasts feel full	
C	No "after-pains" while feeding	
D	Having to feed frequently	

Comments:

37. Which answer do you think is correct and why? Why are the other answers wrong?

A:

B:

C:

D:

38. Is this question difficult to understand? If so, explain why?

39. Is the question asking about practices and knowledge you are familiar with in your work?



40. How important is it that staff like you understand this type of information?

**ARE THERE ANY OTHER COMMENTS YOU WOULD LIKE TO ADD?**

## Appendix F: Study 4-Pilot study of questionnaires in Pre-DVD training and Post-DVD training

### Study four: Pilot study questionnaire in Pre-DVD training

---

ID:

District:

1. Age (Please tick one)

- |              |                          |
|--------------|--------------------------|
| ① Under 20   | <input type="checkbox"/> |
| ② 20 – 29    | <input type="checkbox"/> |
| ③ 30 – 39    | <input type="checkbox"/> |
| ④ 40 – 49    | <input type="checkbox"/> |
| ⑤ 50 – 59    | <input type="checkbox"/> |
| ⑥ 60 or over | <input type="checkbox"/> |

2. Working department (Please tick one)

- |   |                          |
|---|--------------------------|
| ① Provincial maternal and child care service centre | <input type="checkbox"/> |
| ② Municipal maternal and child care service centre  | <input type="checkbox"/> |
| ③ County maternal and child care service centre     | <input type="checkbox"/> |
| ④ General hospital                                  | <input type="checkbox"/> |
| ⑤ Health clinics in towns                           | <input type="checkbox"/> |
| ⑥ Community services                                | <input type="checkbox"/> |
| ⑦ Other (please explain below)                      | <input type="checkbox"/> |

3. What is your current job type within this organisation? (Please specify)

- |                    |                          |
|--------------------|--------------------------|
| ① Nurses           | <input type="checkbox"/> |
| ② Healthcare staff | <input type="checkbox"/> |
| ③ Midwife          | <input type="checkbox"/> |
| ④ Doctors          | <input type="checkbox"/> |
| ⑤ Pediatrician     | <input type="checkbox"/> |
| ⑥ Administration   | <input type="checkbox"/> |
| ⑦ Other            | <input type="checkbox"/> |

4. What is your current job title within this organisation? (Please specify)

- |                 |                          |
|-----------------|--------------------------|
| ① Primary       | <input type="checkbox"/> |
| ② Medium        | <input type="checkbox"/> |
| ③ Senior        | <input type="checkbox"/> |
| ④ Not qualified | <input type="checkbox"/> |

5. For how long have you been working with breastfeeding mothers? (Please tick one)

- |                 |                          |
|-----------------|--------------------------|
| ① 0 – 6 months  | <input type="checkbox"/> |
| ② 7 – 12 months | <input type="checkbox"/> |
| ③ 1 – 2 years   | <input type="checkbox"/> |
| ④ 3 – 5 years   | <input type="checkbox"/> |
| ⑤ 6 – 10 years  | <input type="checkbox"/> |

⑥ More than 10 years

6. Have you had any relevant training in breastfeeding support (Please tick one)

- ① Yes   
 ② No

7. Which is the best way for you to learn the knowledge and skill of breastfeeding?  
 (Please tick one)

- ① Training course   
 ② Book   
 ③ Learning by Internet   
 ④ Training book with DVD   
 ⑤ Other (please specify below)

8. How confident are you in your knowledge of breastfeeding support? (Tick one number)

Not at all confident           Very confident  
 1 2 3 4 5 6 7 8 9 10

9. How confident are you in your practical skills to support mothers to breastfeed?  
 (Tick one number)

Not at all confident           Very confident  
 1 2 3 4 5 6 7 8 9 10

## Items for mini-CUBA V2 - revised 24.6.10

**Please respond to the following questions by selecting ONE answer only.**

### Section 1 – Positioning and attachment (n=6)

<b>1</b>	<b>Which one of the following statements is true?</b>	
A	Optimal attachment will ensure that the baby is well positioned	
B	Good positioning will ensure that the baby is optimally attached	
C	Optimal attachment is more likely when the baby is well positioned	
D	Good positioning is more likely if the baby is optimally attached	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	
<b>2</b>	<b>Which one of the following is NOT a feature of effective positioning?</b>	
A	Baby's body turned towards mother	
B	Baby held close to mother	

C	Baby's head and body aligned	
D	Baby's head supported	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>3</b>	<b>Where should a mother aim her nipple when attaching her baby to her breast?</b>	
A	The middle of his tongue	
B	The roof of his mouth	
C	The back of his tongue	
D	His lower gum	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>4</b>	<b>Which one of the following is most likely to indicate optimal attachment?</b>	
A	Any visible areola is seen above the baby's mouth rather than below it	
B	Any visible areola is evenly distributed around the baby's mouth	
C	Any visible areola is seen below the baby's mouth rather than above it	
D	All of the mother's areola is in the baby's mouth	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>5</b>	<b>Which one of the following best describes the baby's normal sucking pattern when he is well attached?</b>	
A	Slow rhythmic sucking, becoming more rapid and vigorous	
B	Slow rhythmic sucking throughout the entire feed	
C	Rapid and vigorous sucking throughout the entire feed	
D	Rapid and vigorous sucking initially, becoming slow and rhythmic	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>6</b>	<b>Which one of the following should alert a mother to her baby <u>not</u> being well attached during the first week?</b>	
A	Nipples sore while feeding	
B	Breasts feel full	
C	No "after-pains" while feeding	
D	Having to feed frequently	
	Do you choose the choice of the question by guessing?	
	Yes	

No	
----	--

**Section 2 – Hand expression (n=6)**

<b>7</b>	<b>In which one of the following situations would you be most likely to recommend hand expression?</b>	
A	Nipple thrush	
B	Insufficient milk	
C	Cracked nipples	
D	Engorged breasts	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>8</b>	<b>In which one of the following situations would you <u>not</u> recommend hand expression?</b>	
A	Preterm baby	
B	Return to work	
C	Oversupply of milk	
D	Where attachment is difficult	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>9</b>	<b>How is milk removed during hand expression?</b>	
A	Ejection through hormone action	
B	Vacuum action	
C	Pressure on the alveoli	
D	Compression of the ducts	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>10</b>	<b>Which one of the following hormones needs to be stimulated to facilitate hand expression?</b>	
A	Lactoferrin	
B	Prolactin	
C	Oxytocin	
D	Placental lactogen	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>11</b>	<b>Why is gentle massage of the breast tissue recommended prior to commencing hand expression?</b>	
A	To elicit the milk ejection reflex	
B	To clear the ducts of colostrum	
C	To stimulate the release of prolactin	
D	To soften the breast tissue	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>12</b>	<b>How should the mother position her thumb and fingers when hand expressing?</b>	
A	Immediately behind the base of the nipple	
B	2.5cms - 3cms back from the base of the nipple	
C	5cms beyond the base of the nipple	
D	Immediately behind the areola	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

## Breastfeeding Support Self-Efficacy Scale (BSSES)

We would like to know how confident you feel in doing certain activities. For each of the following questions, please choose the number on the scale below that corresponds to how confidently you feel that you can do these tasks regularly at the present time. **Please tick one box only on each line.**

	<div style="display: flex; align-items: center; justify-content: space-between;"> <span>Not at all confident</span> <span>←—————→</span> <span>Completely confident</span> </div>										Does not apply
	1	2	3	4	5	6	7	8	9	10	
<b>I am confident that ...</b>											
1. I can <b>teach</b> a mother about the possible consequences of <b>poor positioning</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I can correctly identify the features of <b>effective positioning</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I can <b>teach</b> a mother to <b>position</b> her baby <b>correctly</b> at her breast?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I can correctly identify the signs that a baby is <b>poorly attached</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I can <b>teach</b> a mother to recognise the signs of <b>good attachment</b> with her baby?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I can <b>teach</b> a mother about the possible consequences of <b>poor attachment</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I can <b>teach</b> a mother about the benefits of hand <b>expression</b> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. I can **teach** a mother the correct technique for **hand expression**

- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



## Study four: Pilot study questionnaire in Post-DVD training

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**Code:**

### Items for mini-CUBA V2 - revised 24.6.10

Please respond to the following questions by selecting ONE answer only.

#### Section 1 – Positioning and attachment (n=6)

<b>1</b>	<b>Which one of the following statements is true?</b>	
A	Optimal attachment will ensure that the baby is well positioned	
B	Good positioning will ensure that the baby is optimally attached	
C	Optimal attachment is more likely when the baby is well positioned	
D	Good positioning is more likely if the baby is optimally attached	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>2</b>	<b>Which one of the following is NOT a feature of effective positioning?</b>	
A	Baby's body turned towards mother	
B	Baby held close to mother	
C	Baby's head and body aligned	
D	Baby's head supported	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>3</b>	<b>Where should a mother aim her nipple when attaching her baby to her breast?</b>	
A	The middle of his tongue	
B	The roof of his mouth	
C	The back of his tongue	
D	His lower gum	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>4</b>	<b>Which one of the following is most likely to indicate optimal attachment?</b>	
A	Any visible areola is seen above the baby's mouth rather than below it	
B	Any visible areola is evenly distributed around the baby's mouth	
C	Any visible areola is seen below the baby's mouth rather than above it	

D	All of the mother's areola is in the baby's mouth	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>5</b>	<b>Which one of the following best describes the baby's normal sucking pattern when he is well attached?</b>	
A	Slow rhythmic sucking, becoming more rapid and vigorous	
B	Slow rhythmic sucking throughout the entire feed	
C	Rapid and vigorous sucking throughout the entire feed	
D	Rapid and vigorous sucking initially, becoming slow and rhythmic	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>6</b>	<b>Which one of the following should alert a mother to her baby <u>not</u> being well attached during the first week?</b>	
A	Nipples sore while feeding	
B	Breasts feel full	
C	No "after-pains" while feeding	
D	Having to feed frequently	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

## Section 2 – Hand expression (n=6)

<b>7</b>	<b>In which one of the following situations would you be most likely to recommend hand expression?</b>	
A	Nipple thrush	
B	Insufficient milk	
C	Cracked nipples	
D	Engorged breasts	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>8</b>	<b>In which one of the following situations would you <u>not</u> recommend hand expression?</b>	
A	Preterm baby	
B	Return to work	
C	Oversupply of milk	
D	Where attachment is difficult	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>9</b>	<b>How is milk removed during hand expression?</b>	
A	Ejection through hormone action	
B	Vacuum action	
C	Pressure on the alveoli	
D	Compression of the ducts	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>10</b>	<b>Which one of the following hormones needs to be stimulated to facilitate hand expression?</b>	
A	Lactoferrin	
B	Prolactin	
C	Oxytocin	
D	Placental lactogen	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>11</b>	<b>Why is gentle massage of the breast tissue recommended prior to commencing hand expression?</b>	
A	To elicit the milk ejection reflex	
B	To clear the ducts of colostrum	
C	To stimulate the release of prolactin	
D	To soften the breast tissue	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	

<b>12</b>	<b>How should the mother position her thumb and fingers when hand expressing?</b>	
A	Immediately behind the base of the nipple	
B	2.5cms - 3cms back from the base of the nipple	
C	5cms beyond the base of the nipple	
D	Immediately behind the areola	
	Do you choose the choice of the question by guessing?	
	Yes	
	No	



of hand **expression**?

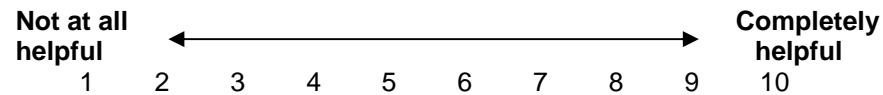
8. I can **teach** a mother the correct technique for **hand expression**

### Qualitative DVD items

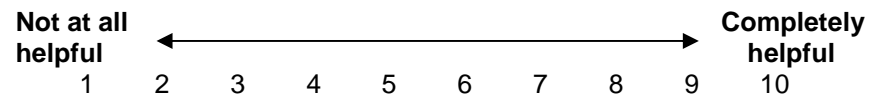
- What aspect of the DVD was most useful to your practice in supporting breastfeeding?
- Why was this?
- What aspect of the DVD was least useful to your practice in supporting breastfeeding?
- Why was this?

On a scale from 1 to 10, with 1 representing 'not at all helpful' to 10 representing 'excellent', please rate how helpful to your practice the DVD was regarding the practice skills required

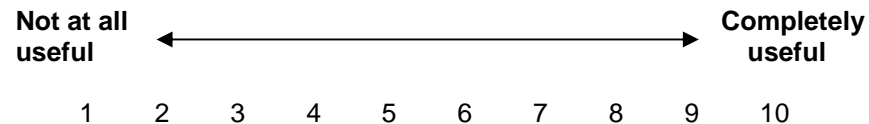
Skill of positioning and attachment:\_\_\_\_\_



Skill of Hand Expression:\_\_\_\_\_



Overall usefulness to your practice:\_\_\_\_\_



## Appendix G: Study 5-RCT study of questionnaires in Pre-DVD training and Post- DVD training

### Study five: RCT study of questionnaire in Pre-DVD training

Code:

Age:

Area:

#### Demographic items

1. Where do you work? (Please tick one)

- ① Provincial maternal and child care service centre
- ② Municipal maternal and child care service centre
- ③ County maternal and child care service centre
- ④ General hospital
- ⑤ Health clinics in towns
- ⑥ Community services
- ⑦ Other (please explain below)

2. What is your current job type within this organisation? (Please tick one)

- ① Nurses
- ② Healthcare staff
- ③ Midwife
- ④ Doctors
- ⑤ Paediatrician
- ⑥ Administration
- ⑦ Other

3. What is your current job title within this organisation? (Please tick one)

- ① Junior
- ② Medium
- ③ Senior

4. For how long have you been a qualified health professional or Junior title? (Please tick one)

- ① Not qualified
- ② Up to 2 years
- ③ 2 – 5 years
- ④ 6 – 10 years
- ⑤ 11 – 15 years
- ⑥ 16 – 20 years
- ⑦ More than 20 years

5. For how long have you been working with breastfeeding mothers? (Please tick one)

- ① 0 – 6 months
- ② 7 – 12 months
- ③ 1 – 2 years
- ④ 2 – 5 years
- ⑤ 5 – 10 years
- ⑥ More than 10 years

6. Have you had any relevant training in breastfeeding support (Please tick one)

- ① Yes
- ② No

7. Which is the best way for you to learn the knowledge and skill of breastfeeding? (Please tick one)

- ① Training course
- ② Book
- ③ Learning by Internet
- ④ Training book with DVD
- ⑤ Other (please specify below)

8. How confident are you in your knowledge of breastfeeding support? (Tick one number)

Not at all confident           Very confident  
1 2 3 4 5 6 7 8 9 10

9. How confident are you in your practical skills to support mothers to breastfeed? (Tick one number)

Not at all confident           Very confident  
1 2 3 4 5 6 7 8 9 10



## Items for mini-CUBA V3

Please respond to the following questions by selecting ONE answer only.

### Section 1 – Physiology of lactation (n=8)

1	<b>Which of the following hormones governs the production of milk components?</b>	
A	Placental lactogen	
B	Prolactin	
C	Oxytocin	
D	Lactoferrin	

2	<b>Into which of the following structures are milk components directly secreted?</b>	
A	Alveoli	
B	Lactiferous ducts	
C	Myoepithelial cells	
D	Areolae	

3	<b>Which tissues within the breast are responsible for the secretion of milk components?</b>	
A	Myoepithelial cells	
B	Lactiferous ducts	
C	Montgomery's tubercles	
D	Acini	

4	<b>Which of the following is not a sign of the milk ejection reflex?</b>	
A	Feeling of relaxation	
B	Tingling in the breasts	
C	Feeling cooler	
D	Uterine contractions	

5	<b>Which of the following can inhibit the milk ejection reflex?</b>	
A	Poor fluid intake	
B	Stress	
C	Sexual intercourse	
D	Use of breast pumps	

6	<b>According to autocrine theory, what is FIL (feedback inhibitor of lactation)?</b>	
A	A hormone receptor	
B	A milk protein	
C	An enzyme	

D	An immunoglobulin	
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7	<b>According to autocrine theory, where is FIL (feedback inhibitor of lactation) thought to exist?</b>	
A	Within the milk	
B	Within the blood	
C	Within the acini	
D	Within the lactiferous ducts	

8	<b>How does the composition of milk vary in the breast during a typical feed?</b>	
A	High-volume, low-calorie milk gradually changing to low-volume, high-calorie milk	
B	Low-volume, high-calorie milk gradually changing to high-volume, low-calorie milk	
C	Low-volume, low-calorie milk gradually changing to high-volume, high-calorie milk	
D	High-volume, high-calorie milk gradually changing to low-volume, low-calorie milk	

**Section 2 – Positioning and attachment (n=6)**

8	Which one of the following statements is true?	
A	Optimal attachment will ensure that the baby is well positioned	
B	Good positioning will ensure that the baby is optimally attached	
C	Optimal attachment is more likely when the baby is well positioned	
D	Good positioning is more likely if the baby is optimally attached	

9	<b>Which one of the following is NOT a feature of effective positioning?</b>	
A	Baby's body turned towards mother	
B	Baby held close to mother	
C	Baby's head and body aligned	
D	Baby's head supported	

10	<b>Where should a mother aim her nipple when attaching her baby to her breast?</b>	
A	The middle of his tongue	
B	The roof of his mouth	
C	The back of his tongue	
D	His lower gum	

<b>11</b>	<b>Which one of the following is most likely to indicate optimal attachment?</b>	
A	Any visible areola is seen above the baby's mouth rather than below it	
B	Any visible areola is evenly distributed around the baby's mouth	
C	Any visible areola is seen below the baby's mouth rather than above it	
D	All of the mother's areola is in the baby's mouth	

<b>12</b>	<b>Which one of the following best describes the baby's normal sucking pattern when he is well attached?</b>	
A	Slow rhythmic sucking, becoming more rapid and vigorous	
B	Slow rhythmic sucking throughout the entire feed	
C	Rapid and vigorous sucking throughout the entire feed	
D	Rapid and vigorous sucking initially, becoming slow and rhythmic	

<b>13</b>	<b>Which one of the following should alert a mother to her baby <u>not</u> being well attached during the first week?</b>	
A	Nipples sore while feeding	
B	Breasts feel full	
C	No "after-pains" while feeding	
D	Having to feed frequently	

### Section 3 – Hand expression (n=6)

<b>14</b>	<b>In which one of the following situations would you be most likely to recommend hand expression?</b>	
A	Nipple thrush	
B	Insufficient milk	
C	Cracked nipples	
D	Engorged breasts	

<b>15</b>	<b>In which one of the following situations would you <u>not</u> recommend hand expression?</b>	
A	Preterm baby	
B	Return to work	
C	Oversupply of milk	
D	Where attachment is difficult	

<b>16</b>	<b>How is milk removed during hand expression?</b>	
A	Ejection through hormone action	
B	Vacuum action	

C	Pressure on the alveoli	
D	Compression of the ducts	

<b>17</b>	<b>Which one of the following hormones needs to be stimulated to facilitate hand expression?</b>	
A	Lactoferrin	
B	Prolactin	
C	Oxytocin	
D	Placental lactogen	

<b>18</b>	<b>Why is gentle massage of the breast tissue recommended prior to commencing hand expression?</b>	
A	To elicit the milk ejection reflex	
B	To clear the ducts of colostrum	
C	To stimulate the release of prolactin	
D	To soften the breast tissue	

<b>19</b>	<b>How should the mother position her thumb and fingers when hand expressing?</b>	
A	Immediately behind the base of the nipple	
B	2.5cms - 3cms back from the base of the nipple	
C	5cms beyond the base of the nipple	
D	Immediately behind the areola	



of hand **expression**?

8. I can **teach** a mother the correct technique for **hand expression**

## Study five: RCT study of questionnaire in Post-DVD training

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**Code:**

### Items for mini-CUBA V2

Please respond to the following questions by selecting ONE answer only.

#### Section 1 – Positioning and attachment (n=6)

<b>1</b>	<b>Which one of the following statements is true?</b>	
A	Optimal attachment will ensure that the baby is well positioned	
B	Good positioning will ensure that the baby is optimally attached	
C	Optimal attachment is more likely when the baby is well positioned	
D	Good positioning is more likely if the baby is optimally attached	

<b>2</b>	<b>Which one of the following is NOT a feature of effective positioning?</b>	
A	Baby's body turned towards mother	
B	Baby held close to mother	
C	Baby's head and body aligned	
D	Baby's head supported	

<b>3</b>	<b>Where should a mother aim her nipple when attaching her baby to her breast?</b>	
A	The middle of his tongue	
B	The roof of his mouth	
C	The back of his tongue	
D	His lower gum	

<b>4</b>	<b>Which one of the following is most likely to indicate optimal attachment?</b>	
A	Any visible areola is seen above the baby's mouth rather than below it	
B	Any visible areola is evenly distributed around the baby's mouth	
C	Any visible areola is seen below the baby's mouth rather than above it	
D	All of the mother's areola is in the baby's mouth	

<b>5</b>	<b>Which one of the following best describes the baby's normal sucking pattern when he is well attached?</b>	
A	Slow rhythmic sucking, becoming more rapid and vigorous	
B	Slow rhythmic sucking throughout the entire feed	
C	Rapid and vigorous sucking throughout the entire feed	
D	Rapid and vigorous sucking initially, becoming slow and rhythmic	

<b>6</b>	<b>Which one of the following should alert a mother to her baby <u>not</u> being well attached during the first week?</b>	
A	Nipples sore while feeding	

B	Breasts feel full	
C	No "after-pains" while feeding	
D	Having to feed frequently	

### Section 3 – Hand expression (n=6)

<b>7</b>	<b>In which one of the following situations would you be most likely to recommend hand expression?</b>	
A	Nipple thrush	
B	Insufficient milk	
C	Cracked nipples	
D	Engorged breasts	

<b>8</b>	<b>In which one of the following situations would you <u>not</u> recommend hand expression?</b>	
A	Preterm baby	
B	Return to work	
C	Oversupply of milk	
D	Where attachment is difficult	

<b>9</b>	<b>How is milk removed during hand expression?</b>	
A	Ejection through hormone action	
B	Vacuum action	
C	Pressure on the alveoli	
D	Compression of the ducts	

<b>10</b>	<b>Which one of the following hormones needs to be stimulated to facilitate hand expression?</b>	
A	Lactoferrin	
B	Prolactin	
C	Oxytocin	
D	Placental lactogen	

<b>11</b>	<b>Why is gentle massage of the breast tissue recommended prior to commencing hand expression?</b>	
A	To elicit the milk ejection reflex	
B	To clear the ducts of colostrum	
C	To stimulate the release of prolactin	
D	To soften the breast tissue	

<b>12</b>	<b>How should the mother position her thumb and fingers when hand expressing?</b>	
A	Immediately behind the base of the nipple	
B	2.5cms - 3cms back from the base of the nipple	
C	5cms beyond the base of the nipple	
D	Immediately behind the areola	



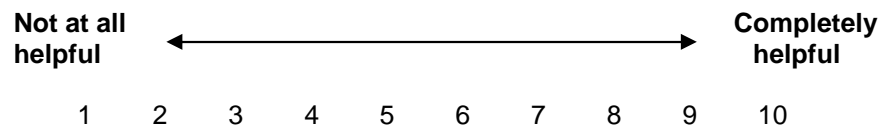


of hand **expression**?

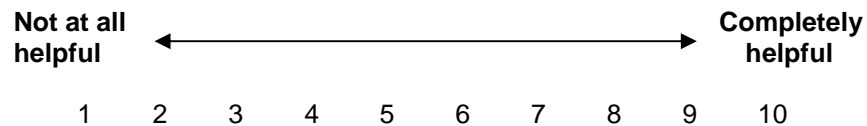
8. I can **teach** a mother the correct technique for **hand expression**

On a scale from 1 to 10, with 1 representing 'not at all helpful' to 10 representing 'excellent', please rate how helpful to your practice the DVD was regarding the practice skills required

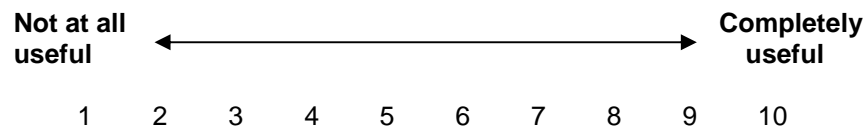
- Skill of positioning and attachment:\_\_\_\_\_



-Skill of Hand Expression:\_\_\_\_\_



- Overall usefulness to your practice:\_\_\_\_\_



Any Other comments

## **Appendix H: Staff interview questionnaires after RCT study**

### **Study five:**

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#### **Staff interview after RCT study (V1)**

##### **Demographics**

- Job title:
- Where do you work(Community services, secondary care maternity, specialist teaching maternity hospital):
- How long have you worked (in years) with breastfeeding mothers?
- How much of your working week is caring for breastfeeding mothers and babies? (Percentage of time approximately)
- Apart from the course you attended recently, when did you last receive any training on breastfeeding practice?

##### **Views for Breastfeeding DVD in supporting breastfeeding skills and feasibility of mini-CUBA V3**

1. How easy/difficult is it to understand the DVD?
2. How has watching the DVD helped/not helped you develop your knowledge and skills?
3. Are there aspects of the DVD that could be improved-if so how?
4. Please comment on how useful this DVD would be for other clinicians you work with?
5. Please comment on how useful it was to undertake CUBA before and after watching the DVD.
6. What aspects of breastfeeding support practice do you think you can apply in your work after viewing the DVD/ are there aspects that cannot be applied-if so why?

## Study five:

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### Staff interview after RCT study (V2)

- Job title:
- Where do you work(Community services, secondary care maternity, specialist teaching maternity hospital):
- How long have you worked (in years) with breastfeeding mothers?
- How much of your working week is caring for breastfeeding mothers and babies? (Percentage of time approximately)
- Apart from the course you attended recently, when did you last receive any training on breastfeeding practice?

### Views for Breastfeeding DVD in supporting breastfeeding skills and feasibility of mini-CUBA V3

#### **1.1 How easy/difficult is it to understand the DVD? (ASK THIS-the rest are prompts-if they answer the questions, do not use each prompt)**

-Were any parts difficult to understand-if so why?

-Were any parts of the DVD not relevant to your practice-if so why?

-Do you disagree with any of the practice shown on the DVD-if so why?

#### **2.1 How has watching the DVD helped you develop your knowledge and skills?**

-Has watching the DVD made confused you /made you less confident in your skills-if so what and why

- Are there any practices shown that you found particularly helpful?

#### **3.1 Are there aspects of the DVD that could be improved?**

- if so how to improve?

#### **4.1 Please comment on how useful this DVD would be for other**

**clinicians you work with?**

-clinicians like you?

-other clinicians you work with who may have different ways of supporting women to breastfeed

-are examples you can think of in your practice where you might apply the practices differently from before viewing the DVD?

**5.1 Please comment on how useful it was to undertake CUBA before and after watching the DVD.**

-Were there questions you found difficult- if so-what and why?

**6.1 What aspects of breastfeeding support practice do you think you can apply in your work after viewing the DVD?**

## **Appendix I: Participant information sheet and consent forms (Study 1)**

### **Participant Information Sheet – Clinicians (Study 1)**

Title of study: Develop and test the effectiveness of a breastfeeding support training programme by objective tests of knowledge for Chinese healthcare professionals

You are being invited to take part in a study. Before you decide it is important for you to understand why the study is being done and what it will involve. The researcher will go through this information sheet with you and answer any questions that you have. Ask us if there is anything that is not clear or if you would like more information.

Take time to decide whether or not you wish to take part. Talk to others about the study if you wish.

#### **Why have I been asked?**

You have been invited to participate because you are a health care professional working within Women's Hospital, School of Medicine, Zhejiang University, China.

#### **What am I being asked to do?**

You are being invited to take part in an interview, regarding breastfeeding practices. If you decide to participate, you will be asked to take part in an interview with the researcher. The interview will be conducted at work at a time that best suits you. Before you take part, the researcher will make sure you understand the purpose of the study, and will ask you to sign a consent form. The interview will take approximately 30 minutes and will be done in private.. If you do not wish to participate you will be able to decline indicate this by sending a form (included below) to the researcher.

#### **Do I have to take part?**

No. Participation is entirely voluntary. If you not wish to take part for any reason, and you do not need to give your reasons, please sign the refusal form at the end of this document and return it in the envelope provided or speak to the researcher. If you change your mind about taking part in the study you can withdraw at any time. If you do decide to withdraw all your data will be destroyed and will not be used in the study. There are no consequences to

deciding that you no longer wish to participate in the study. If you agree to take part please sign the consent form and return it to the researcher in the envelope provided.

### **What are the possible disadvantages and risks of taking part?**

We are not aware of any significant risks to you in taking part.

### **What are the possible benefits of taking part?**

It is hoped that the information we get from this study will give you the opportunity to highlight areas of some current practices to support breastfeeding that may require improvement. These findings will also be used to inform the way in which staff are trained to support breastfeeding in the future.

### **What if something goes wrong?**

You can contact the researcher (Dr Yuanying Ma) at any time during the project if you are not happy with being part of this study. If you are still not happy, you can contact Dr Rui jing Wu (Assistant Chancellor) in Women's Hospital, School of Medicine, Zhejiang University. At Coventry University please contact Professor Ian Marshall (Pro Vice Chancellor-Research) at Coventry University.

### **Will my taking part in this study be kept confidential?**

Yes. This study is conducted as part of a PhD programme at Coventry University, UK. The study procedures will comply with the UK Data Protection Act 1998 and your participation will be kept confidential. All the information you provide will be kept confidential unless we believe that you or someone else is at risk of serious harm in which case we would tell you before the information is passed on to somebody who can help.

The interview will be audio recorded to allow the researcher to analyse what you have said, and the recording will be kept for three years in order to comply with the Data Protection Act 1998. When what you have said is typed up, all your personal identification details will be removed other than job type and given a study number.

Only the research student and members of the Coventry University research team will have access to the interview data, which will be kept in a password protected folder. All the consent forms will be stored in a separate, secure (locked) location from the data itself.

### **What will happen to the results of the research study?**

The results will enable us to understand your knowledge and experiences in supporting breastfeeding practices. The results will also be presented at academic conferences and/or written up for publication in peer reviewed academic journals. If you wish to be kept informed of the findings and benefits we can send you a summary of the report's findings.



## **Who is organising and funding the research?**

This research is funded Coventry University and the company Health Behaviour Research Limited. At Coventry University the supervisors are Professor Louise Wallace, Director of the Applied Research Centre in Health and Lifestyle Interventions at Coventry University, and Mrs Susan Law (Senior Lecturer, Midwifery). The research is jointly supervised with Dr Li qian Qui.(Director of healthcare department, Women's Hospital, School of Medicine, Zhejiang University).

## **Who has reviewed the study?**

This project has been reviewed and approved by Coventry University and NHS ethics and approved by Women's Hospital, School of Medicine, Zhejiang University ethics.

## **Contact for further information**

If you would like any further information about this research, please get in touch with me at the address below:

Susan Law or Professor Louise Wallace  
Applied Research Centre in Health and  
Lifestyle Interventions  
Faculty of Health and Life Sciences  
Whitefriars 105, Whitefriars Street  
Coventry University  
Coventry  
CV1 5FB

Email: [l.wallace@coventry.ac.uk](mailto:l.wallace@coventry.ac.uk);  
[s.law@coventry.ac.uk](mailto:s.law@coventry.ac.uk)

Dr Li qian Qiu or Dr Yuan ying Ma  
Women's Hospital  
School of Medicine, Zhejiang University  
Xueshi Road #2  
Hangzhou, 310006  
China

Email: [qiulq@zju.edu.cn](mailto:qiulq@zju.edu.cn)  
[may10@uni.coventry.ac.uk](mailto:may10@uni.coventry.ac.uk)

Should you wish to make a complaint at any time, please contact:

Professor Ian Marshall  
Pro-Vice Chancellor of Research  
Alan Berry Building  
Coventry University  
Coventry  
CV1 5FB

Email:  
[I.Marshall@coventry.ac.uk](mailto:I.Marshall@coventry.ac.uk)  
Tel: 02476 795294

Dr Rui jing Wu  
Women's Hospital  
School of Medicine, Zhejiang University  
Xueshi Road #2  
Hangzhou, 310006  
China

Email:  
wurj@zju.edu.cn

FORM TO INDICATE YOUR WISH TO DECLINE PARTICIPATION:

Title of study: Develop and test the effectiveness of a breastfeeding support training programme by objective tests of knowledge for Chinese healthcare professionals (Study 1)

I do not wish to be part of this study:

Name

Date

RETURN address (to be completed by researcher)

## CONSENT FORM INTERVIEW – Clinicians (Study 1)

**Title:** Develop and test the effectiveness of a breastfeeding support training programme by objective tests of knowledge for Chinese healthcare professionals

**Researcher at Coventry University:** Dr YuanYing Ma, supervised by Professor Louise Wallace, Mrs Susan Law. Dr Liqian Qui

	Please initial here
I confirm that I have read and understand the information sheet (PIS-Clinician) for the above research and have had the opportunity to ask questions.	
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason	
I agree that the audio information I provide in the interview can be audio taped, transcribed, stored with my name removed from all records and my words used in the presentation of the research. My words will not be used to identify me.	
I agree to take part in the above study.	
I wish to have summary of results of this study- and agree to my contact details being kept for this purpose	

Name of Person	Date	Signature

Name of Person taking consent (If different from researcher)	Date	Signature

Researcher	Date	Signature

### **Question 1:**

#### **Which of the following defines positioning in the context of breastfeeding?**

There were 18 responses, one non-response and one invalid response because the staff member gave two answers to the item. Of the 18 responses, 12 (66.7%) professionals gave the correct answer of *“The relationship between the mother’s body and the baby’s body”*. Six staff (33.3%) gave incorrect answers, including 5 (27.8%) participants who selected *“Whether the mother is comfortable”*. In addition, 1 (5.6%) staff member chose the answer of *“The baby taking adequate breast tissue in his mouth”*.

#### Correct answer with correct reason given by 1 staff member

“The relationship of mother’s position and baby’s position”(015)

#### Correct answers with incorrect reasons given by 3 staff

“The good relationship between the mother’s body and the baby’s body is the premise for efficient sucking.”(014)

“Baby’s nose isn’t close to nipple and baby’s chin isn’t close to breast. It is not beneficial to suck.”(016)

“Only a correct positioning between the mother’s body and the baby’s body can have a correct attachment.”(020)

#### Correct answers with no reasons given by 8 staff

#### Incorrect answers with incorrect reasons given by 6 staff

“Not comprehensive.”(001)

“Parallel between the mother and baby body.”(004)

“Positioning is for mothers, but not for the relationship between the mother’s body and the baby’s body.”(005)

“The positioning including Football Hold, Cradle Hold, Side Lying Position is defined based on the mother’s position.”(008)

“Positioning is not the relationship between the mother’s body and the baby’s body.”(012)

“It is not the only evaluation index.”(013)

## Question 2:

### Which of the following is an essential element of effective positioning?

There were 18 responses, one non-response and one invalid response that gave two answers to the item. Of the 18 responses, 10 (55.6%) professionals made the correct choice of *“Mother turns the baby's body towards her”* and 8 staff (44.4%) made an incorrect choice of the same wrong answer of *“Mother sitting comfortably in a chair”*, as they thought the mother's comfort was the essential element. This reflects that many professionals held the same wrong perception in the knowledge of positioning.

#### Correct answers with correct reasons given by 4 staff

“Mother's body and baby's body should be close.”(006)

“During feeding it is the most important point that mother turns the baby's body towards her because it is beneficial for attachment.”(014)

“Mother should be relaxing and Mother turns the baby's body towards her which are the key points of positioning. Mother moves to the baby that is not right.”(015)

“Only mother turns the baby's body towards her, it is possible to do as following, tummy to mummy, nipple to nose and baby to breast.”(020)

#### Correct answers with incorrect reasons given by 4 staff

“It is correct.”(001)

“Correct.”(002)

“Correct.”(007)

“Correct.”(017)

#### Correct answers with no reasons given by 2 staff

#### Incorrect answers with incorrect reasons or no reasons given by 8 staff

“It is one point of positioning but it is not the essential element of effective positioning.”(003)

“Infant's head and body are both towards her.”(004)

“Mother turns the baby's body towards her which doesn't indicate getting milk.”(005)

“It is one essential element.”(008)

“Mother turns her body towards her baby”(012)

“It is not right.”(019)

### **Question 3:**

**Where should a mother aim her nipple when attaching her baby to her breast?**

There were 20 responses in this item: 11 (55.0%) professionals chose the correct answer of “*The roof of his mouth*”; 9 staff (45.0%) gave incorrect answers. Among the incorrect answers, 8 staff members chose “*The middle of his tongue*” and 1 chose “*The back of his tongue*”.

#### Correct answers with correct reasons given by 3 staff

“Nipple stimulates lips which can generate rooting reflex.”(006)

“A mother aims her nipple to the roof of his mouth, it is easy to contain the nipple and most of areola in his mouth.”(014)

“Stimulating is beneficial to open his mouth.”(020)

#### Correct answers with incorrect reasons given by 2 staff

“It can’t suck.”(001)

“Only when a mother aims her nipple to his roof can make infant’s nose to breathe freely.”(019)

#### Correct answers with no reasons given by 6 staff

#### Incorrect answers with incorrect reasons or no reason by 9 staff

“If mother aims her nipple to roof of his mouth, the nipple might be an improper position in mouth.”(004)

“Infant’s nose might be congestion by breast tissue”(010)

“The position is too high which is not beneficial for attachment”(017)

“It should aim her nipple to baby’s mouth.”(018)

### **Question 4:**

**An experienced mother breastfeeding her three-week-old baby feels she has plenty of milk but is worried that he has not gained weight over the**

**last two weeks. The baby has a “worried” expression but is otherwise alert and seems content. What would be your first course of action?**

All 20 staff made the correct choice of “*Observe him breastfeeding and check attachment*” among 20 responses. However, only 6 clinicians (30%) provided correct reasons and 13 (65%) staff gave no reason, which makes it difficult to judge if they have really mastered the skill.

Correct answers with correct reasons given by 6 staff

“Evaluate the effect of sucking by observing.”(008)

“The first thing is to evaluate the feeding situation. Adding formula or ceasing feeding will affect breastfeeding in the future.”(009)

“Observing the process of feeding is essential to find problems. If there are problems, it is important to correct and solve the problems which makes baby satisfied.”(014)

“Correct positioning and attachment is very important.”(018)

“The first thing is to evaluate infant’s positioning to find problems.”(019)

“Firstly, observing the methods of breastfeeding, such as attachment and efficient sucking. Another important thing is if the mother empties one breast before feeding the other side because it is advantage to feed both foremilk and hindmilk.”(020)

Correct answer with incorrect reason given by 1 staff member

“Correct. Observe whether the baby is just eating foremilk and doesn’t eat hindmilk which affects weight gain.”(004)

Correct answers with no reasons given by 13 staff

**Question 6:**

**During the first week, which of the following should indicate to the mother that her baby is not well attached during feeding?**

All 20 staff made the correct choice of “*Nipples are painful during feeds*”. One staff member gave an incorrect reason, “*If she has correct positioning, she will not feel sore nipple*”, which reflected that she misunderstood the definition of positioning and attachment.

Correct answers with correct reasons given by 8 staff

“This shows poor attachment.”(001)

“Correct. Attachment is not right because most of areola isn’t contained in baby’s mouth.”(004)

“Poor attachment.”(006)

“Poor attachment leads to sore nipple.”(008)

“Nipples aren’t painful if the baby has a good attachment.”(009)

“Baby’s mouth only contains the nipple without most of areola which leads to frequent feeding because of hunger.”(011)

“Poor attachment leads to sore nipple during feeding.”(014)

“Incorrect attachment leads to sore nipple because nipple is stimulated by negative pressure.”(020)

Correct answer with incorrect reason given by 1 staff member

“If she has correct positioning, she will not feel sore nipple.”(018)

Correct answers with no reasons given by 11 staff

**Question 7:**

**What are signs of poor attachment for baby?**

There were 18 (90%) participants who chose the correct answer of “*A gap between the baby’s chin and the breast shows poor attachment*”. Only 2 staff (10%) chose the incorrect choice “*His lips should be flanged and the lower lip may be folded back*”.

Correct answers with correct reasons given by 8 staff

“The baby’s chin should be close to mother’s breast.”(002)

“Incorrect. The baby’s chin close to the breast which is beneficial to attach well.”(004)

“Chin to the breast and nose to the nipple.”(006)

“A good attachment is that the baby’s chin should be close to the breast.”(009)

“When the baby’s chin isn’t close to the breast, it is easier to block the nose by the breast tissue which affects baby’s breathing.”(011)



“It suggests poor attachment. If the nipple and most of areola contained in her mouth, a gap can’t be found.”(014)

“The baby’s chin should be close to the breast.”(015)

“The baby’s chin should be close to the breast.”(018)

Correct answers with incorrect reasons given by 3 staff

“This shows attachment is incorrect.”(001)

“It is not beneficial to attachment and it is easy to cause nose congestion.”(008)

“If the baby’s chin is not close to breast, it is possible to lead to baby’s choking.” (010)

Correct answers with no reasons given by 7 staff

Incorrect answers with incorrect reasons given by 2 staff

“It is permitted.”(012)

“Not sure.”(013)

**Question 8:**

**What are signs of poor attachment for mother?**

There were 20 (100%) professionals who made the correct choice of “*More areola is visible below the baby’s mouth*”. The highest percentage of correct reasons of 50% (10/20) was found for this item. This suggests that participants have relatively good knowledge of “*signs of poor attachment in the mother*”. But 10 staff still did not give any reasons for the choice, which might indicate a training need.

Correct answers with correct reasons given by 10 staff

“It shows a poor attachment because there is not enough breast tissue contained in baby’s mouth.”(001)

“More areola should be visible above the baby’s mouth.”(002)

“Incorrect. Areola should be invisible below the baby’s mouth.”(004)

“Most of areola should be contained in baby’s mouth.”(006)

“Correct attachment should be more areola being visible above the baby’s mouth.”(008)

“A good attachment is the baby contains most of mother’s areola and areola below the baby’s mouth isn’t easy to find.”(009)

“A good attachment is more areola being visible above the baby’s mouth.”(010)

“The lower lip is everted and more areola is visible above the baby’s mouth.”(011)

“More areola is visible above the baby’s mouth.”(018)

“He doesn't contain most of areola in the mouth which leads to incorrect attachment.”(020)

Correct answer with invalid reason given by 1 staff member

“It suggests poor attachment.” (014)

Correct answers with no reasons given by 9 staff

**Question 9:**

**What is the normal sucking pattern during a breastfeed?**

Of the 20 responses, 18 (90%) professionals made the correct choice of “*Sucking is rapid and vigorous at the beginning, then becomes slower and steadier*”. Two staff (10.0%) made incorrect choices.

Correct answers with correct reasons given by 4 staff

“Rapid and vigorous sucking pattern stimulate hypophysis to product prolactin and oxytocin which establishes milk let down and milk ejection reflex.”(001)

“Rapid sucking is to establish milk ejection reflex.”(010)

“Rapid and vigorous sucking at the beginning launches the milk reflex. Then, it becomes slower and steadier.”(014)

“Rapid and vigorous sucking at the beginning is to establish milk ejection reflex.”(019)

Correct answers with invalid reasons given by 2 staff

“It is normal sucking pattern.”(008)

“It is normal sucking rhythm.”(018)

Correct answers with no reasons given by 12 staff

Incorrect answers with incorrect reasons given by 2 staff

“Incorrect.”(004)

“Reverse to A.”(020)

**Question 10:**

**Which of the following should alert a mother to her baby not being well attached during the first week?**

Among 20 responses, 19 (95.0%) professionals made the correct choice of “*Nipples sore while feeding*”. One staff member (5.0%) made the incorrect choice of “*No ‘after-pains’ while feeding*”. A relatively higher proportion of correct reasons was found for this item (8/20), which indicates the staff had better knowledge of recognising poor attachment compared to other items. Still, 50% participants did not give any reason, which made it difficult to know whether they really understood the reasons.

Correct answers with correct reasons given by 8 staff

“It shows containing inadequate breast tissue which affects the nipple.”(001)

“Sore nipple suggests poor attachment.”(004)

“When the nipple and most of areola are contained in baby’s mouth, mother will not feel pain on nipple.”(008)

“It has attachment problems.”(010)

“The attachment is poor because the baby’s mouth doesn’t contain most of areola.”(011)

“Correct attachment should take nipple and most of areola.”(016)

“If she has a good attachment, she will not feel pain.”(018)

“Correct attachment will not lead to sore nipple.”(019)

Correct answer with incorrect reason given by 1 staff member

“Negative pressure focusing on parts of breast leads to sore nipple.”(020)

Correct answers with no reasons given by 10 staff

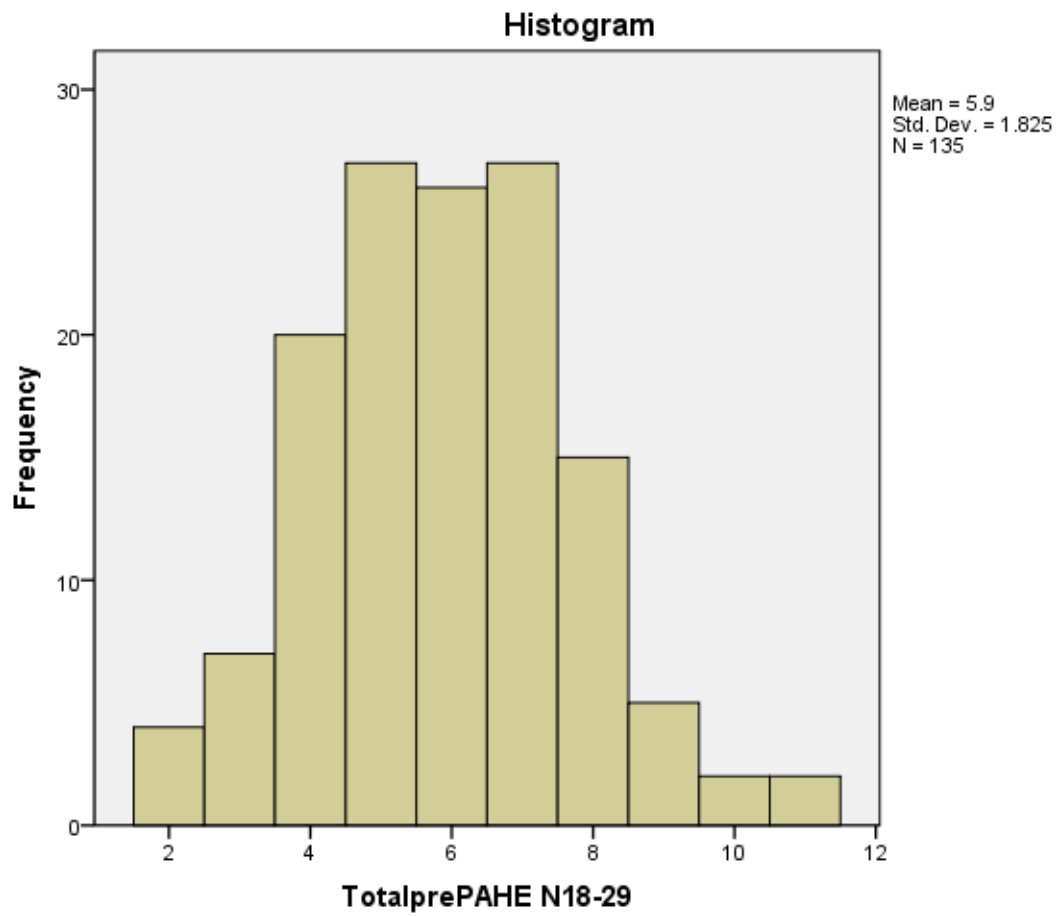
Incorrect answer with no reason given by 1 staff member

## Appendix K: Tests of Normality for data in Chapter 6

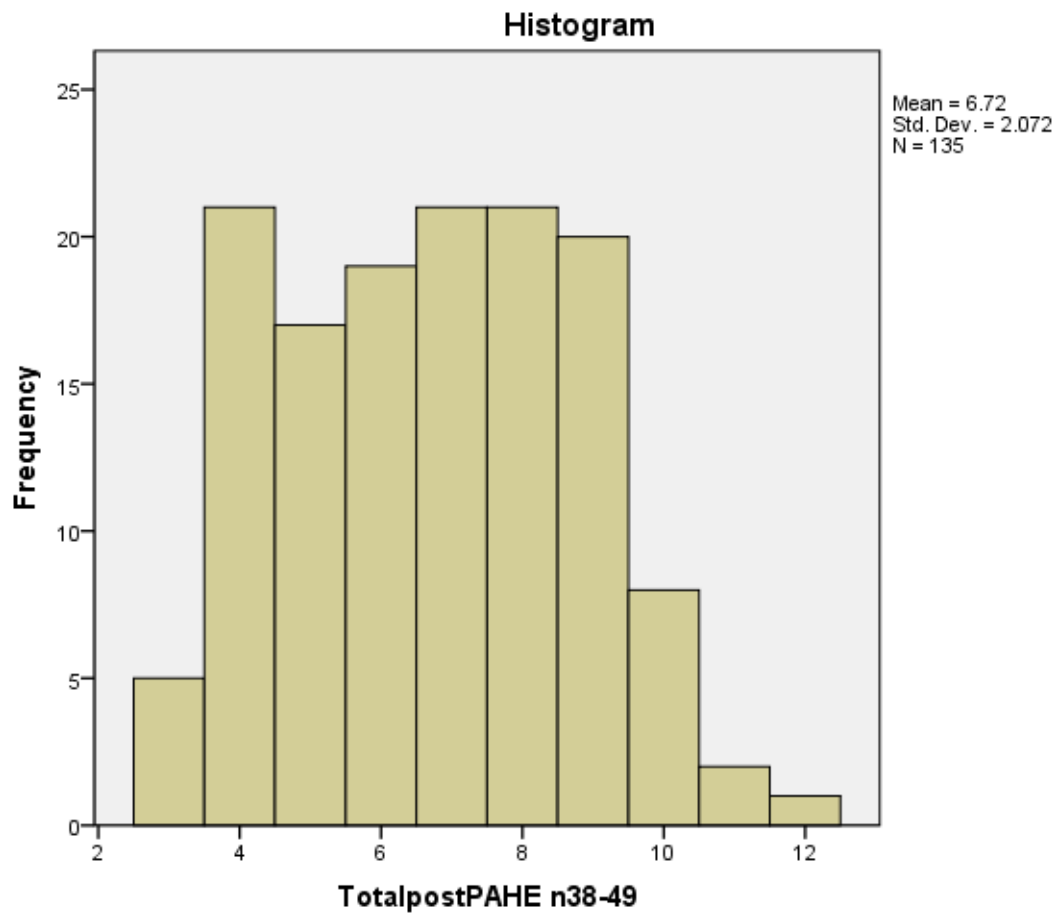
Table 1 Tests of Normality in Chapter 6

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total knowledge score(Pre-DVD)	.118	135	.000	.968	135	.003
Total knowledge score(Post-DVD)	.117	135	.000	.956	135	.000
Total confidence score(Pre-DVD)	.156	135	.000	.910	135	.000
Total confidence score(Post-DVD)	.173	135	.000	.853	135	.000

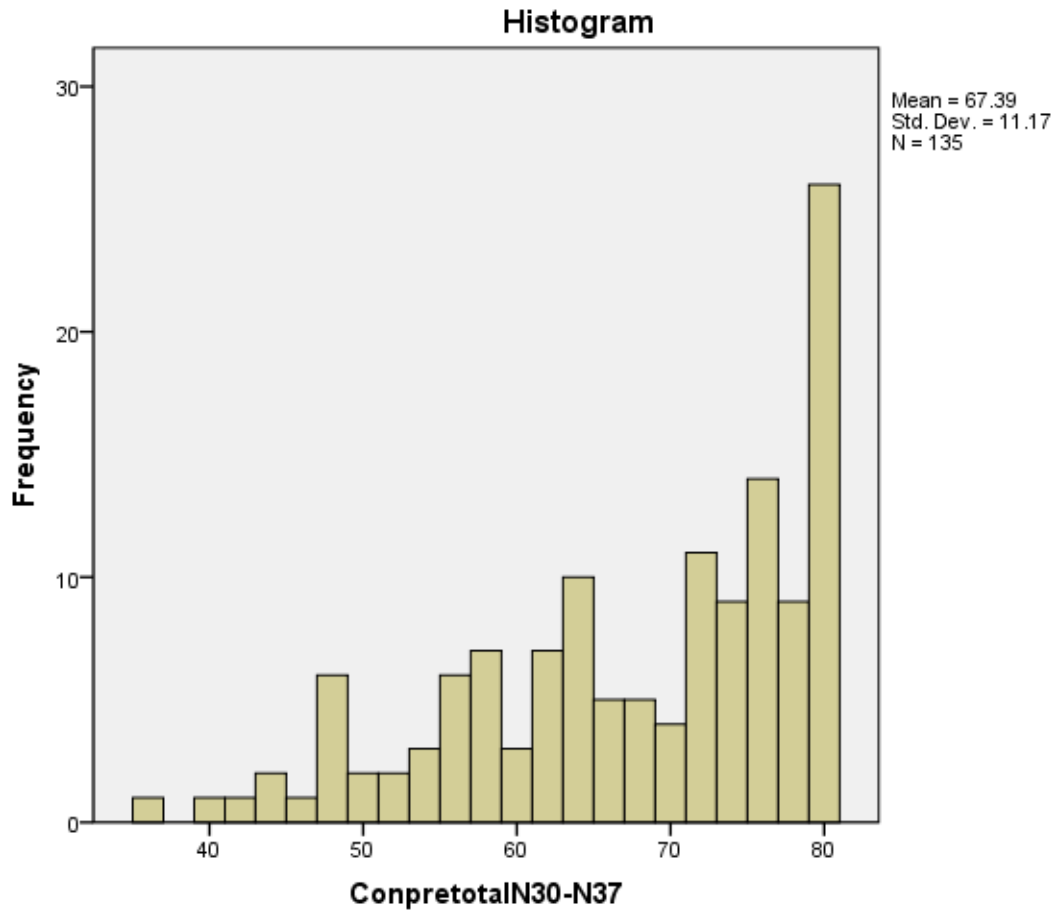
a. Lilliefors Significance Correction



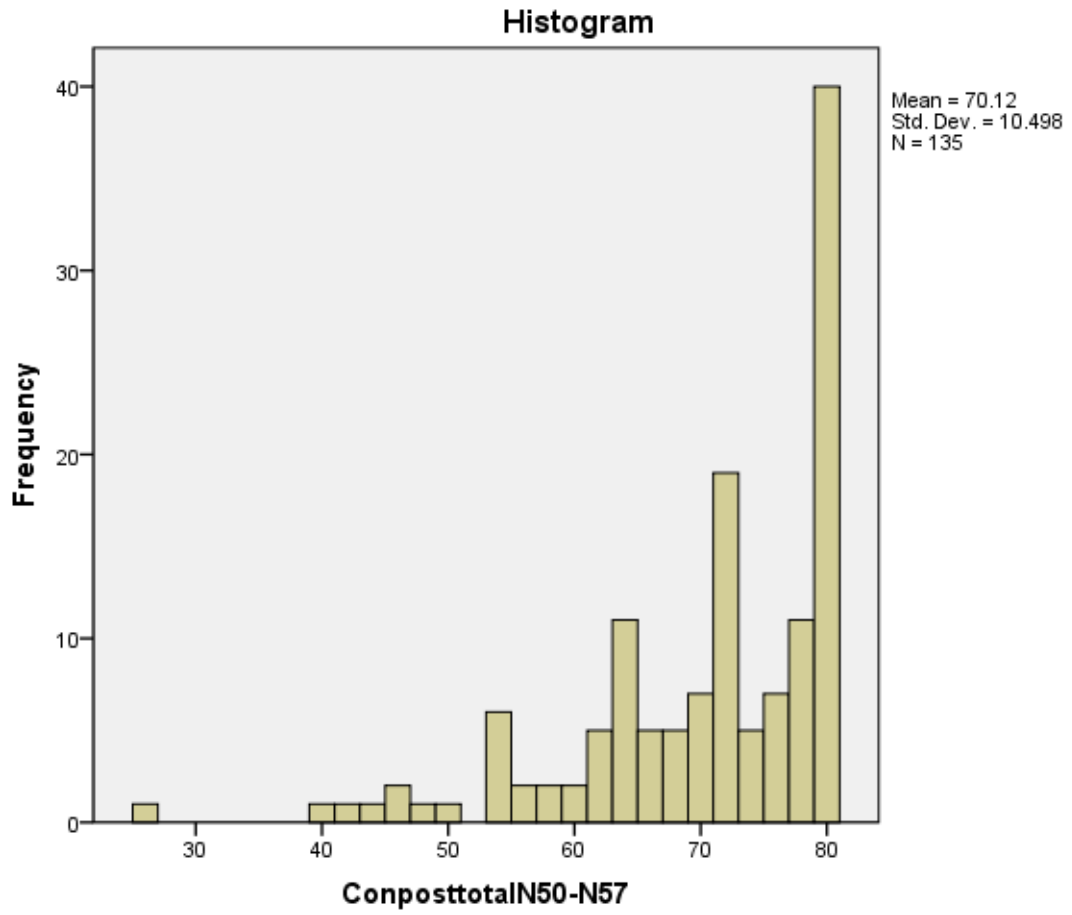
**Figure 1** Distribution of total knowledge score in Pre-DVD



**Figure 2** Distribution of total knowledge score in Post-DVD



**Figure 3 Distribution of total confidence score in PreDVD**



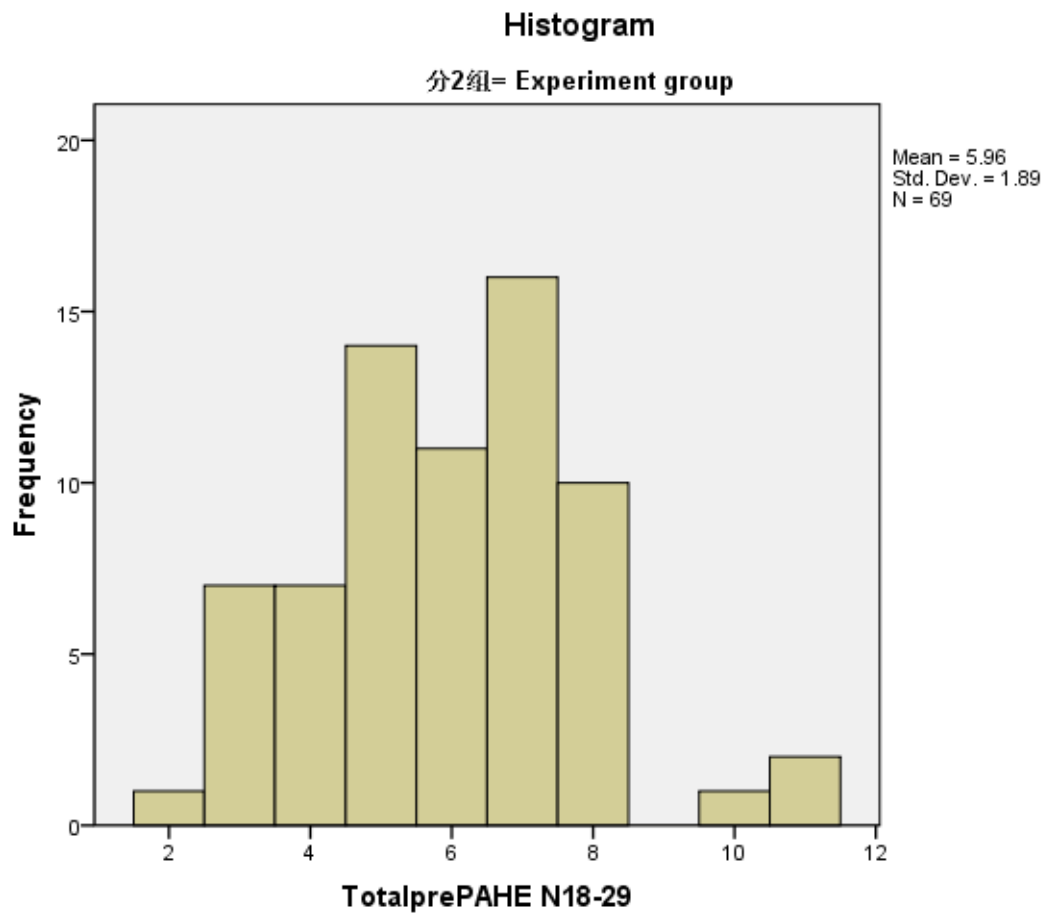
**Figure 4 Distribution of total confidence score in Post-DVD**



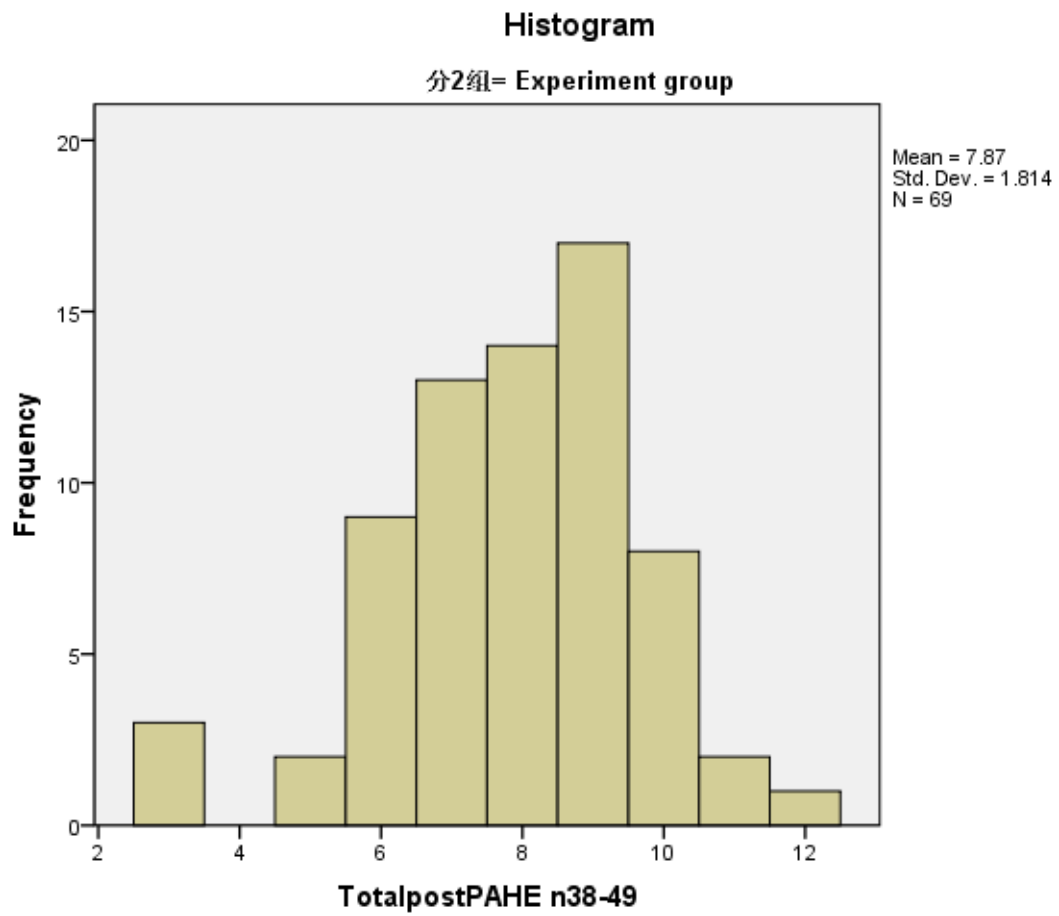
## Appendix L: Tests of Normality for data in Chapter 7

**Table 2 Tests of Normality in the experiment group in Chapter 7**

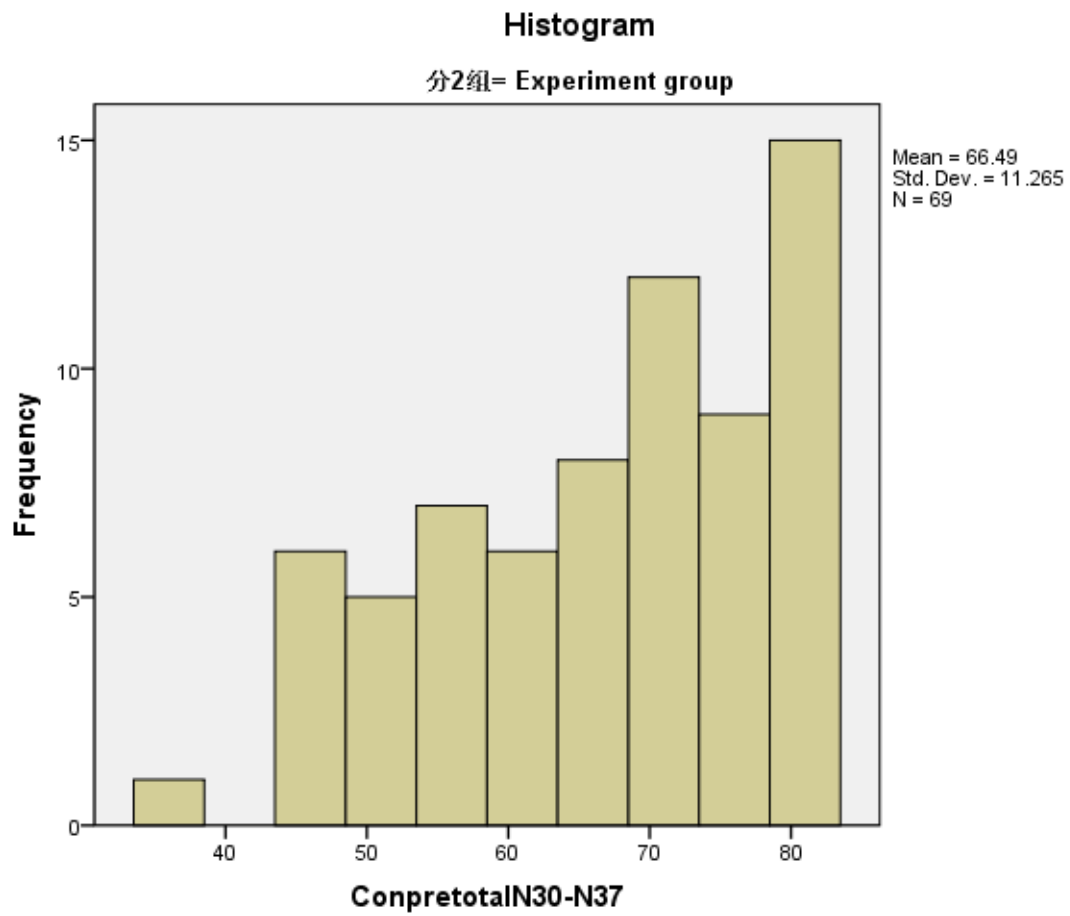
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total knowledge score(Pre-DVD)	.130	69	.006	.953	69	.011
Total knowledge score(Post-DVD)	.139	69	.002	.945	69	.004
Total confidence score(Pre-DVD)	.151	69	.000	.922	69	.000
Total confidence score(Post-DVD)	.190	69	.000	.798	69	.000
a. Lilliefors Significance Correction						



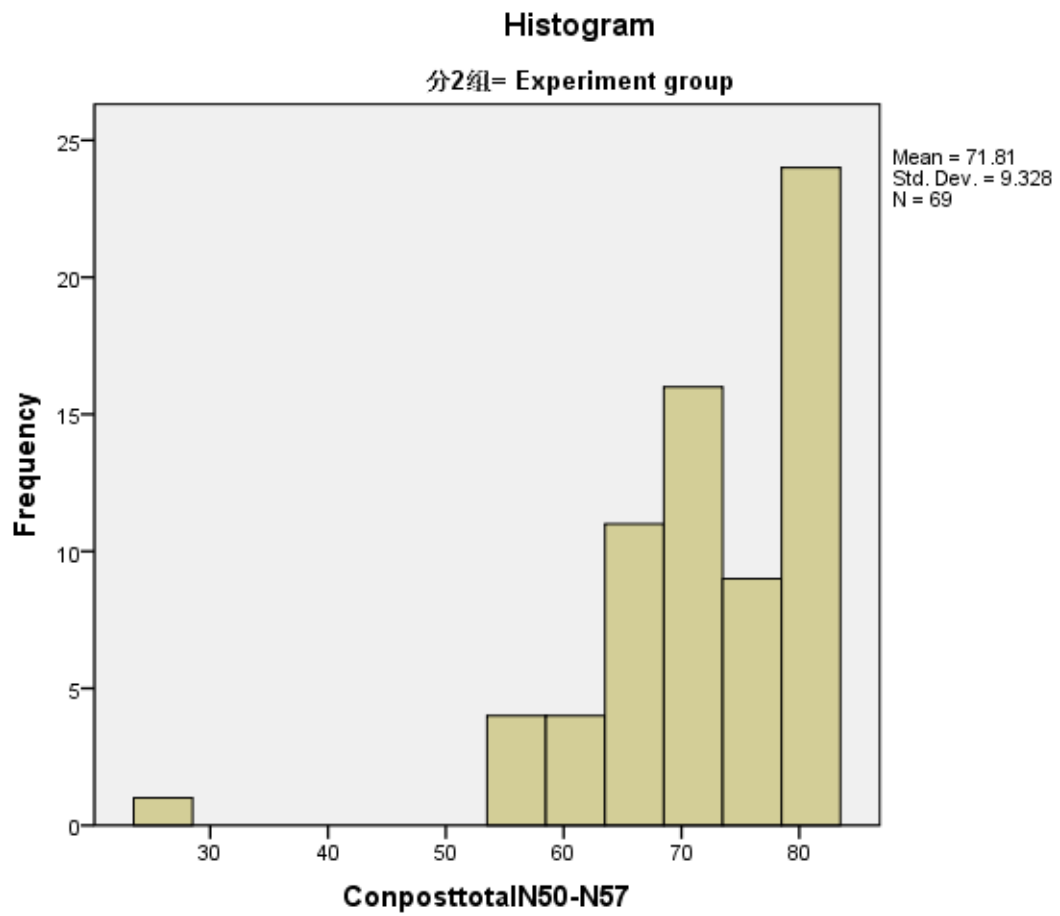
**Figure 5 Distribution of total knowledge score in Pre-DVD**



**Figure 6** Distribution of total knowledge score in Post-DVD



**Figure 7 Distribution of total confidence score in Pre-DVD**



**Figure 8 Distribution of total confidence score in Post-DVD**

**Table 3 Tests of Normality in the control group in Chapter 7**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total knowledge score(Pre-DVD)	.129	66	.008	.956	66	.020
Total knowledge score(Post-DVD)	.203	66	.000	.896	66	.000
Total confidence score(Pre-DVD)	.166	66	.000	.882	66	.000
Total confidence score(Post-DVD)	.156	66	.000	.880	66	.000

a. Lilliefors Significance Correction

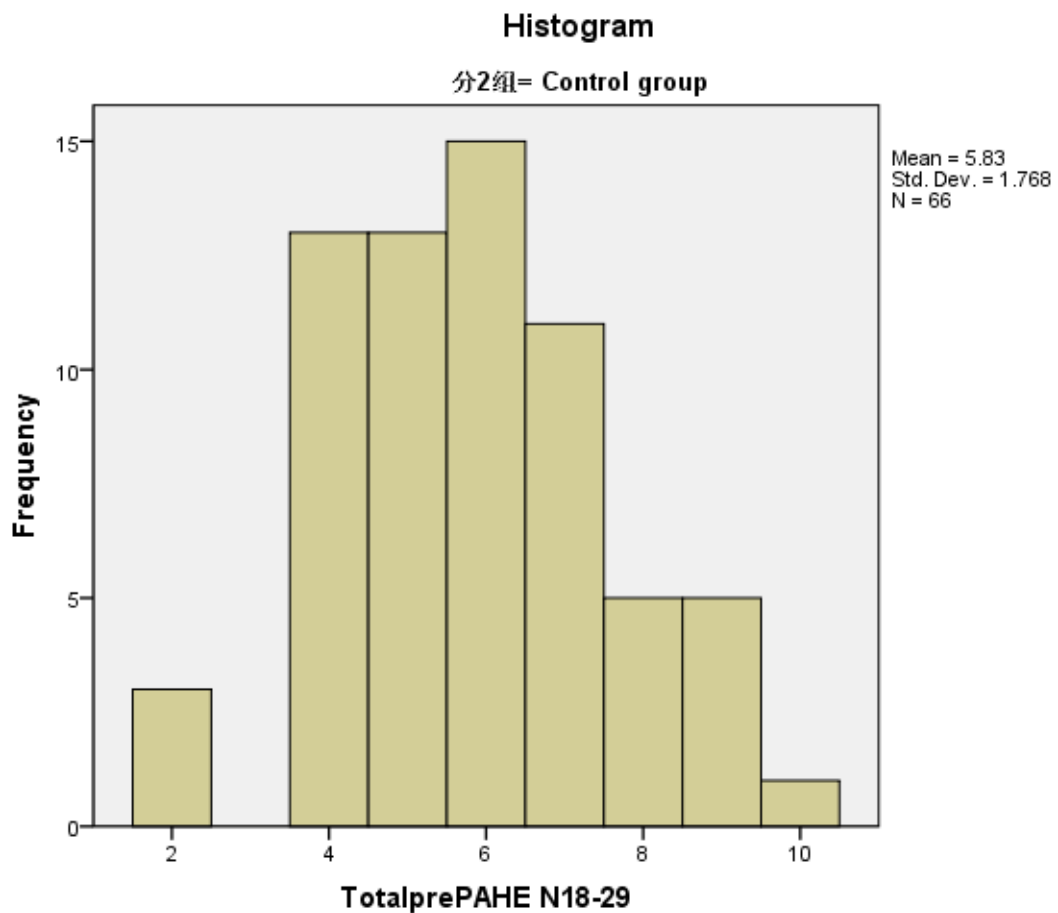


Figure 9 Distribution of total knowledge score in Pre-DVD

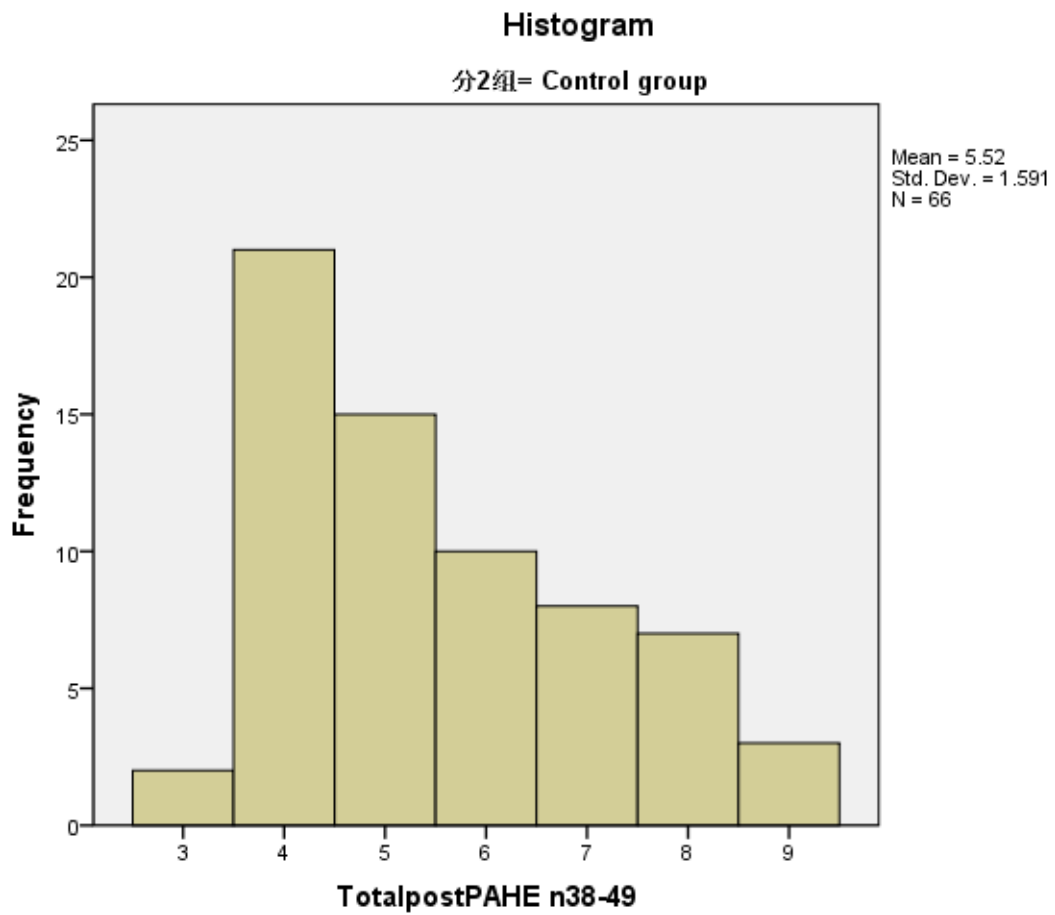
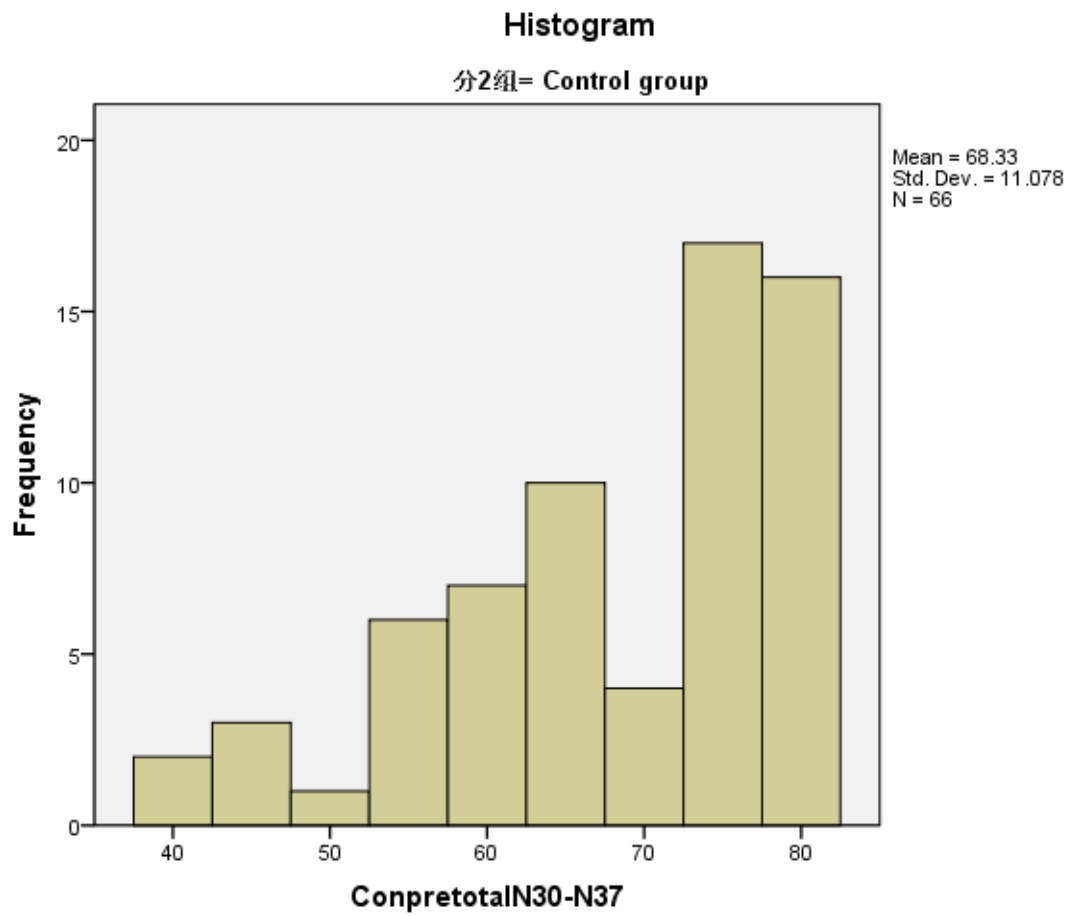
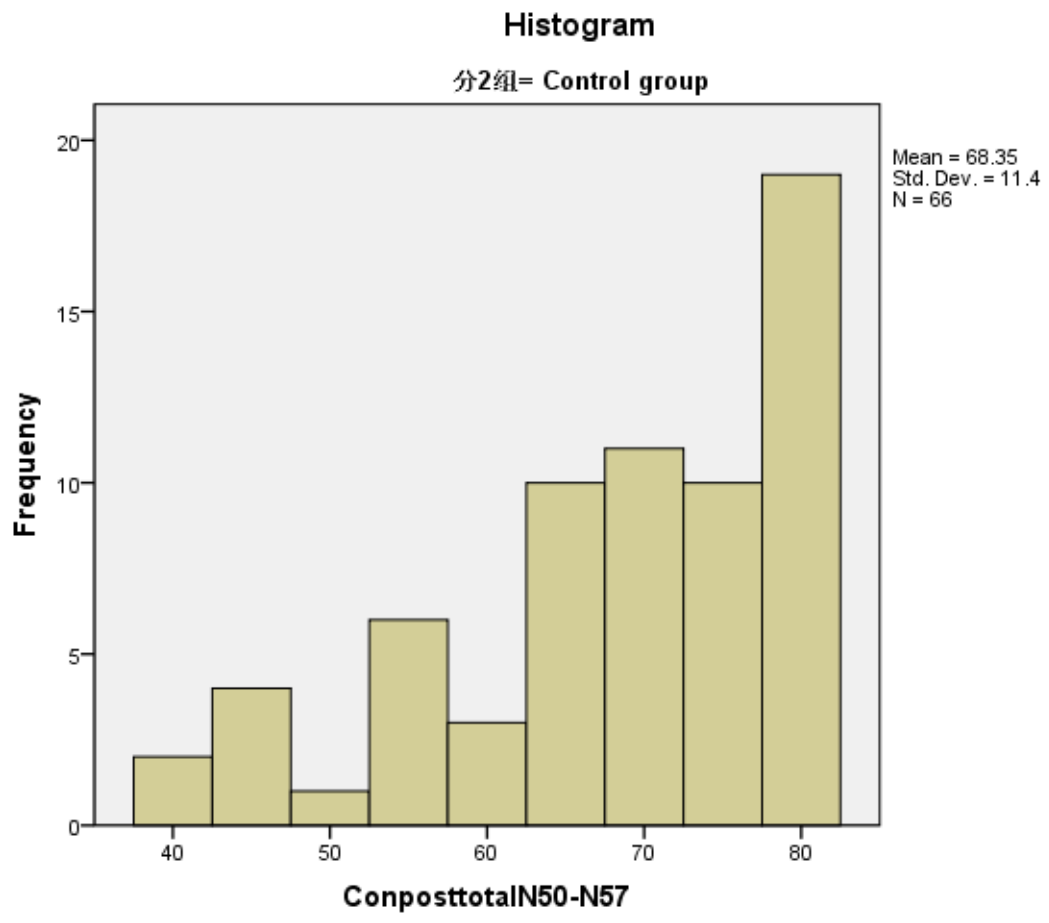


Figure 10 Distribution of total knowledge score in Post-DVD



**Figure 11** Distribution of total confidence score in Pre-DVD





**Figure 12** Distribution of total confidence score in Post-DVD