Population health strategies to maintain or increase breastfeeding rates: A review of systematic reviews

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Table of Contents

Contents

Executive Summary

Over the past few decades, the advantages of breastfeeding for the health of mothers and infants are widely represented in the scientific literature and strongly supported by the World Health Organization (WHO). Breastfeeding trends in Canada are typical of industrialized nations with high initiation rates and low exclusivity rates. Similarly, in Alberta, breastfeeding statistics reflect this trend with 94.6% of women initiating breastfeeding and 14.4% exclusively breastfeeding at 6 months [4].

The purpose of this systematic review of reviews is to provide a summary of the current literature on effective population health strategies aimed at maintaining and increasing breastfeeding initiation, duration and exclusivity rates in Canada. The evidence in this review is synthesized from 16 systematic reviews identified through a comprehensive database search and deemed eligible for inclusion based on pre-determined criteria. The reviews cover publications over the span of 10 years, from 2002 to 2012, and were appraised according to AMSTAR (A Measurement Tool to Assess Systematic Reviews).

Effective interventions identified in the literature and recommendations from the systematic reviews were framed within the Population Health Promotion (PHP) model [7]. However, within this review, the effective interventions identified were all under the reorienting health services and developing personal skills strategic areas.

The Baby Friendly Health Initiatives (BFHI) intervention was found to increase breastfeeding initiation and duration of exclusive breastfeeding when compared to routine care. Training of health care professionals and community based training also increased breastfeeding duration. Similarly, professional support interventions during pregnancy that were interactive in nature were found to be effective at increasing breastfeeding initiation and continuation. Peer support interventions had strong evidence of increasing initiation, duration and exclusive breastfeeding when they involved well-planned peer education, continuance of support from pregnancy to postpartum period and collaborations with professionals. Telephone support provided by well trained individuals and based on maternal need rather than standardized periods may be the most effective in increasing duration and exclusivity. Multi-faceted interventions appear to be more effective than single interventions and have a greater positive impact on breastfeeding outcomes. E-based interventions are promising in terms of increasing duration and

exclusivity but warrant further investigation. Similarly, there is little evidence for the impact of pacifier use on breastfeeding duration and exclusivity.

It is important to note that initiation rates in Canada are high, while exclusive breastfeeding rates gradually decline over time. Therefore, interventions should be developed strategically with the targeted population in mind.

Population health strategies to maintain or increase breastfeeding rates: A review of systematic reviews

Introduction

Purpose

The purpose of this systematic review of reviews is to provide a summary of the current literature on population health strategies aimed at maintaining and increasing breastfeeding initiation, duration and exclusivity in Canada and countries similar to Canada (including but not limited to USA, UK, Australia and New Zealand). Specifically, three research questions guided this review:

1. What are effective population health strategies to maintain or increase breastfeeding initiation rates?
2. What are effective population health strategies to maintain or increase breastfeeding duration breastfeeding rates?
3. What are effective population health strategies to maintain or increase exclusive breastfeeding rates?

Background

Breast milk has been recognized globally as the best food source for infants for its economic, immediate and long-term health benefits [1]. Breastfeeding is beneficial to the infant, mother, and family. It has been associated with decreased incidence and severity of bacterial meningitis, diarrhoea, respiratory conditions, and otitis media among infants [2]. In addition, breastfeeding provides many benefits to the mother and family including increased birth spacing through delayed ovulation, decreased postpartum bleeding, and an earlier return to pre-pregnancy weight[2]. Breastfeeding has been linked to reduced risk of ovarian and breast cancer. Despite these benefits, current breastfeeding duration among Canadian women is below the WHO's target goal of Exclusive Breast Feeding (EBF) for the first 6 months of life. Although the prevalence of breastfeeding in Canada has risen and three-quarters of Canadian mothers now initiate breastfeeding, the proportion of breastfeeding mothers (exclusive and partial) at 6 months remains short of the recommended WHO target of EBF, as only 30 to 40% of Canadian mothers continue any form of breastfeeding until this time [3]. According to the Canadian Maternity

Experiences Survey, 94.6% of women surveyed in Alberta reported initiating breastfeeding in 2009, but only 16% reported exclusively breastfeeding at 6 months [4]. Rates in Alberta were higher than the average for Canada for initiating breastfeeding at 90.6%, but lower for exclusivity at 6 months at 14.4% [4].

Methods

Inclusion and Exclusion Criteria

Review articles were eligible for inclusion on the basis of pre-determined criteria pertaining to population, intervention, method and outcomes (PIMO). The criteria are described below and are presented in Table 1.

Population

Review articles on population health strategies on breastfeeding were eligible if they included pregnant women, postpartum women, women at preconception, women in developed countries comparable to Canada, healthy or near term infants, or singleton births. Articles on women with chronic or serious illness, non-singleton births, infants with congenital abnormalities, or NICU-admitted infants were excluded, as well as articles on women in developing countries.

Interventions

Reviews were included if the interventions were public policy-based, guidelines, group education programs geared at patients or health care providers, health marketing campaigns, or multifaceted programs comprising of some or all of the aforementioned. Any interventions that addressed breastfeeding problems were excluded.

Methodology

Systematic reviews, with or without meta-analyses were included. Single research observational studies, RCTs, commentaries, editorials, and expert opinions were excluded.

Outcomes

Reviews with outcomes of breastfeeding initiation, duration, and exclusivity were included. Outcomes related to change in maternal and health care provider attitude or knowledge of breastfeeding were excluded.

Limits

Only review articles published in the last 10 years, from 2002 to present were eligible for inclusion, however, articles included in the review could have been published prior to 2002. The search was limited to publications in the English language only.

Search strategy

Relevant reviews between 2002 and September 2012 were identified by searching four major electronic databases (CINHAL, Medline, EMBASE and PubMed). In addition, the Cochrane database of systematic review, Joanna Briggs Institute, Campbell Institute, and Google Scholar were also searched. In order to ensure all relevant reviews were found, broad key words were used ("breastfeeding" OR "lactation") and filters (language, study design, year restrictions) were added. Hand-searching for grey literature and reference lists of included articles were also conducted.

Screening of articles

The literature search identified a total of 2515 articles pertaining to the relevant population, exposure, outcomes of interest. After the initial screening based on abstracts and titles, 22 papers remained for full-text review. Articles were excluded largely because they did assess interventions. Hand-searching of bibliographic references of these articles identified 3 additional articles. After full-text review, 9 articles were excluded, leaving 15 articles for final inclusion. There were 7 studies on interventions to improve breastfeeding initiation, 11 on duration and 9 on exclusive breastfeeding, as outlined in Figure 1. Most studies assessed reported on more than one outcome.

Quality assessment

The 15 reviews identified were assessed for quality using the critical appraisal instrument, AMSTAR (A Measurement Tool to Assess Systematic Reviews). This tool was developed to assess the methodological quality of systematic reviews, and was found to have good agreement, reliability and construct validity [5, 6]. The AMSTAR evaluates systematic reviews based on 11 criteria, and quality scores can range from 0 to 11. All but one of the included reviews scored greater than 7 on AMSTAR, indicative of good quality reviews. Detailed summary of the critical appraisal outcomes for identified reviews are provided in Table 2.

Data extraction

A data extraction table was developed to collect relevant information from the included reviews including details of participants, inclusion/exclusion criteria, definition of breastfeeding, number and date range of studies included in the review, details about population health strategies/interventions, outcome measures and overall results of the review. Some reviews had multiple outcomes, and in such cases, only data relevant to the outcomes of interest were extracted.

Population health approach

The effective interventions identified in the literature and recommendations from the systematic reviews were framed within the Population Health Promotion (PHP) model, developed by the Public Health Agency of Canada (PHAC) [7]. This model shows how a population health approach can be implemented through action on the full range of health determinants utilizing the means of PHP health promotion strategies. The model emphasizes five broad areas for strategic action: reorienting health services; creating supportive environments; building healthy public policy; developing personal skills; and strengthening community action. The breastfeeding interventions identified in this review fall under reorienting health services and developing personal skills.

Reorienting health services

Baby-friendly hospital initiatives

The health care system has a pivotal role in promoting and supporting breastfeeding, as the hospital-stay upon delivery is a critical period in establishing lactation. Given this knowledge, in 1989, WHO/UNICEF jointly launched the Baby Friendly Hospital Initiative (BFHI), a global 10-step programme that includes specific practice and organizational recommendations for maternity units to ensure that all women and their babies receive the health and social benefits of breastfeeding (WHO, 1992). The ten steps to successful breastfeeding as outlined by BFHI (WHO/UNICEF, 1989) include (1) a written breastfeeding policy that is routinely communicated to health care staff, (2) train health care staff in skills necessary to implement this policy, (3) inform all pregnant women about the benefits and management of

breastfeeding, (4) help mothers initiate breastfeeding within half an hour of birth, (5) show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants, (6) give newborn infants no food or drink other than breast milk, unless medically indicated, (7) practice rooming-in (8) encourage breastfeeding on demand, (9) give no artificial teats or pacifiers to breastfeeding infants, and (10) foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic [8]. The BFHI has been adapted and modified to Baby Friendly Initiative (BFI) in Canada which supports the continuum of care between hospital and community services. Hospitals and community health facilities that integrate and adhere by 7 of the10 steps in practice receive the BFI designation, which is led by provincial and territorial governments in collaboration with the Breastfeeding Committee for Canada [9]. There were 2 reviews that assessed BFHIs on breastfeeding outcomes. The first review by Hannula et al (2008) assessed how breastfeeding is supported during pregnancy and how effective interventions are [10]. The second review by Beake et al. (2012) reviewed 9 studies to examine whether system-level support, particularly BFHI implemented in maternity acute care settings, had an effect on increasing breastfeeding initiation rates [11]. Neither of the reviews provided meta-analysis of their findings, citing incomparable data, and instead provided a narrative summary of each included study.

Initiation

Hannula et al (2008) found that the likelihood of breastfeeding continuation was better when mothers gave birth in a Baby-Friendly hospital and hospitals with stricter compliance to BFHI guidelines including restriction to supplementary fluids increased breastfeeding rates among women [10]. Beake et al. (2012) reported that seven of the nine studies found an improvement in initiation following the introduction of structured programmes in comparison to no programmes [11]. Three of the seven studies (Bartington *et al*. 2006; Philipp *et al*. 2001; Weng *et al*. 2003 in Beake et al, 2012) compared initiation rates of women from BFHI-accredited unit to women from standard unit, and all three found increased breastfeeding initiation rates among women in the accredited unit, whereas Wright et al, 1996 (in Beake et al. 2012) compared initiation rates between units that introduced BFHI steps (not accredited; details as to how many steps were introduced was not provided) and found no difference. The authors reached the conclusion that structured programmes to support the initiation implemented in the hospital setting have an overall positive influence in breastfeeding outcomes, despite the

variation in effect size found, limited confounders controlled for and poor overall study quality [11]. Many of the studies failed to report on potential confounders adjusted for and had variations in breastfeeding definitions, as well as lacked details regarding interventions assessed. Future studies should address cost-effectiveness of program implementations.

Exclusive

Beake et al (2012) found an increase in the duration of EBF after the introduction of a structured programme involving BFHI training. Five studies in Beake et al (2012) (Caldeira & Goncalves, 2007; Cattaneo & Buzzetti, 2001; Merten *et al*. 2005; Kramer et al, 2001) reported increased duration of EBF up to 5 months among women receiving care within accredited BFHI unit or units implementing BFHI models (not accredited), or BFHI training of health care providers compared to standard care unit, or non-BFHI training. The authors concluded that the introducing a structured programme might have a positive influence on EBF [11]. Such programmes may have a greater benefit especially in health care settings with low breastfeeding rates.

Recommendations

In general, it appears that BFHI works well in health care settings with low rates to begin with. Given breastfeeding rates in Alberta are fairly high, the effectiveness of implementing BFHIs may not be substantial. The influence of BFI implemented in community health facilities warrants further investigation.

Training health-care professionals

One review examined the effects of training, education and practice-change interventions with health professionals on duration of breastfeeding [12]. The authors identified 9 studies that reported interventions targeted at health professionals, and provided narrative reviews of each study. Some of the interventions included an 18-hour UNICEF training to prepare for the BFHI process, an education program based on the 10 steps in a maternity facility and evidence based guidelines focusing on antenatal discussion of breastfeeding and skin-to-skin contact promotion.

Duration

Spiby et al (2009) reported that most of the interventions aimed to increase knowledge and change professional practice in support of breastfeeding. In particular, the 18-hour UNICEF

training increased breastfeeding duration, and the combination of both hospital- based and community-based BFI training and support increased duration and exclusivity up to 6 months. However, there were methodological limitations with several studies and the authors were unable to identify one single approach that consistently positively affected breastfeeding duration.

Recommendations

Based on the available evidence, it appears that the combination of both hospital and community-based training based on BFI principles and practices is essential in increasing breastfeeding duration. In addition, increasing practitioners' knowledge of breastfeeding and developing counseling skills is also important. Future research into whether the education and training of health-care professionals relates to breastfeeding practices of patients is highly encouraged.

Developing personal skills

Professional support

Three reviews assessed different types of professional support interventions on improving breastfeeding outcomes. The first review by Hannula et al (2008) assessed the effect that different methods of professional support interventions had on varying outcomes on breastfeeding duration [10]. The second review by Guise et al (2003) examined eight RCTs on primary care-based interventions involving consultations and home visits by lactation consultants, nurses, and telephone support to improve breastfeeding outcomes [13]. The third review by Sikorski et al (2003) examined how interventions that provide extra support for mothers wanting to breastfeed impacted breastfeeding duration and exclusivity [14]. They compared standard care with extra breastfeeding support (contact with women, lay or professional, that was supplementary to standard care) and evaluated the effect on rates of cessation of any breastfeeding [14].

Duration

During pregnancy, interventions that were interactive in nature were effective at increasing breastfeeding initiation and continuation, while interventions based on lecturing or demonstrations were ineffective [10]. Effective interventions during pregnancy included technical hands-off teaching methods with professional support while postnatal effective

interventions included home visits, telephone support and combined professional and peer support[10]. Guise et al (2003) assessed short- and long-term breastfeeding duration as outcomes in their review and found receiving support significantly increased short (3 months) and long-term (6 months) duration [13]. Sikorski et al (2003) performed a meta-analysis on 15 trials and found that all forms of extra support reduced the cessation of breastfeeding before 6 months (RR: 0.88; 95% CI: 0.81-0.95) [14].

Recommendations

Based on the above summary of reviews, it appears that professional support could be effective for breastfeeding success. Professionals need appropriate breastfeeding education so they can support mothers as well as act as advocates in their organizations. Further high-quality RCTs are needed to evaluate the effectiveness of professional support on long-term breastfeeding outcomes.

Peer support

There were 5 reviews that assessed the effect of peer support interventions on breastfeeding outcomes. Firstly, Ingram et al (2010) reviewed 11 studies to examine the effect of antenatal peer support on rates of breastfeeding initiation, 7 studies evaluated universal peer support while 4 evaluated targeted peer support. Peer support was defined as support offered by women who had breastfeeding experiences and were of similar economic status; universal peer support was offered to all women while targeted peer support was offered only to women who were considering breastfeeding [15]. Secondly, Kaunonen et al (2012) evaluated breastfeeding support interventions during pregnancy, in hospital and during the postnatal period on various outcomes including breastfeeding initiation [16]. Peer support during pregnancy consisted of interventions delivered through individual support, education sessions, and teaching materials (brochures and written materials). Peer support at maternity hospitals involved individual support provided to mothers, BFHI practices, WIC or peer counselor programmes. During the postnatal period, peer support included individual and telephone support. Thirdly, a review by Jolly et al (2012) identified 17 studies that examined the effectiveness of peer support on breastfeeding duration [17]. Peer support was defined as support offered by trained women or those with breastfeeding experience or of similar socioeconomic background and ethnicity. The effect of peer support interventions on breastfeeding was assessed based on setting, intensity and timing

of support [17]. Fourthly, Sikorski et al (2003) also compared lay support with usual care in preventing the cessation of any breastfeeding [14]. Lay support was contact with an individual or individuals offering support that was supplementary to standard care with the purpose of facilitating continued breastfeeding. Finally, Renfrew et al (2012) assessed supportive interventions for breastfeeding mothers (those which include elements of reassurance, praise, information, opportunities to discuss mothers' needs, staff training to improve supportive care given to women) offered by health professionals or lay people in hospital and community settings to groups of women or one-to-one, either face-to-face or over the telephone [18].

Initiation

Two reviews assessed initiation rates. Ingram et al (2010) found that universal antenatal peer support was ineffective for increasing initiation rates when it consisted of only one or two instances of contact between the peer supporter and pregnant women, however targeted peer support has a significant reduction in breastfeeding non-initiation [15]. However, the latter finding was pooled from two small RCTs and one nonrandomized study, and had significant overall heterogeneity. They concluded that antenatal peer support would be more effective if it were targeted specifically to women who were considering breastfeeding [15].

In the review by Kaunonen et al (2012), nine of the ten intervention studies included in the review found peer support to be effective in breastfeeding initiation [16]. The one intervention study that failed to increase initiation rates (Muirhead et al, 2006 in Kaunonen et al, 2012) consisted of organized and supervised peer support for the study group only in the postnatal period. The authors attributed the failure to the lack of support provided during pregnancy and hospitalization, that is postnatal support was not effective if no support existed earlier [16].

Duration

Three reviews assessed duration rates. A meta-analysis of 13 studies by Jolly et al (2012) that reported on any breastfeeding at the time of follow-up found that those in the peer support intervention group had a 15% lower risk of not breastfeeding at study follow-up compared to women receiving usual care [17]. Peer support had greater effect on any breastfeeding in low income countries reducing the risk of not breastfeeding by 30% (RR 0.70; 95% 0.60-0.82), but only 7% lower in high income countries. Support had greater effect on any breastfeeding when

given at a higher intensity. In addition, postnatal only interventions significantly reduced not breastfeeding.

Sikorski et al (2003) conducted a meta-analysis on 5 trials and found that lay support was not effective in reducing cessation [14]. This finding remained following the exclusion of methodologically weaker trials. Finally, Renfrew et al (2012) also conducted a meta-analysis on 40 trials and concluded that interventions to support breastfeeding appear to have a beneficial effect on the number of women continuing to breastfeed beyond 6 months [18]. A subgroup analysis was conducted to evaluate whether the same effect was found with different types of support [18]. They found that when support was provided by lay persons, the risk of breastfeeding cessation up to 6 months was lower in comparison to support provided by professionals. However, there was no difference in the influence of support providers on the cessation of breastfeeding at 4-6 weeks [18].

Exclusivity

Three reviews assessed exclusivity rates. Seven studies in the review by Kaunonen et al (2012) assessed peer-support interventions on EBF and all 7 studies found various forms of peer-support interventions to be effective in increasing EBF [16]. In the review by Jolly et al (2011), women in peer support intervention group had an 18% lower risk of not breastfeeding exclusively compared to usual care group [21]. Similarly, Renfrew et al (2012) found that women receiving support were less likely to stop EBF before 6 months, and cessation was lower if support was provided by lay persons [20]. A subgroup analysis of the type of support found that women receiving face-to-face support were 20% less likely to give up EBF up to 6 months compared to those receiving either telephone or a combination of telephone and face-to-face support [20]. There was no difference in EBF dependent on when the support was provided (antenatal or postnatal).

Recommendations

Through a synthesis of the reviews evaluating peer-support interventions on breastfeeding outcomes, there is strong evidence that suggest that such interventions will be effective in increasing breastfeeding rates. In particular, support should be provided frequently, and begin during the antenatal period and continue till after delivery. While one review did find that postnatal interventions could be effective, this has not been corroborated by other reviews.

In summation, peer support interventions should involve well-planned peer education, continuance of support from pregnancy to postpartum period and collaborations with professionals.

Telephone-based support

Only one review assessed the impact of telephone-based support on breastfeeding outcomes. Dennis & Kingston (2008) identified 3 trials to assess the effects of proactive telephone-based support on breastfeeding duration and exclusivity in comparison to usual antepartum or postpartum care [19].

Duration

A meta-analysis of three trials that assessed all types of telephone interventions found that the intervention group were more likely to continue any (definitions varied) breastfeeding (RR: 1.18; 95% CI: 1.05-1.33) [19]. A subgroup analysis was done to evaluate whether telephone support as a primary or secondary intervention had differential effect on breastfeeding duration. A meta-analysis of two trials where telephone support was the primary intervention showed an increased duration of breastfeeding compared to usual care (RR: 1.17; 95% CI: 1.04-1.31) [19]. On the other hand, when telephone support was an adjunct intervention (one trial; primary intervention was standard postpartum care with daily visits by nurse during hospitalization and home visits at 1, 2 and 4 weeks), it did not have a beneficial impact on breastfeeding duration. They also found that proactive telephone support where a lactation consultant or peer volunteers initiated contact with the mother could increase breastfeeding duration. In addition, telephone support provided by lay provider rather than health care professional had a greater impact on increasing duration [19].

Exclusivity

Dennis & Kingston (2008) also assessed EBF and through a meta-analysis of two trials, found that women in the telephone support intervention group were more likely to continue exclusive breastfeeding (RR: 1.45; 95% CI: 1.12-1.87) [19].

Recommendations

Based on the review findings, telephone support based on maternal need rather than standardized time periods may be the most effective, and peer volunteers/counselors play an important role in breastfeeding outcomes. However, Dennis et al (2008) states that training and support received by volunteers are critical factors that could affect the long-term success and sustainability of breastfeeding peer support programs [19]. It is difficult to make recommendations about whether telephone-based support will be effective since Dennis et al (2008)'s findings are only based on three trials, and further research evaluating the effect of telephone-based support among diverse samples is required.

Education

Educational interventions involve breastfeeding promotion packages, written materials, or programs/workshops about breastfeeding that are available to mothers, fathers and family members during the prenatal and/or postpartum period. There were three reviews that assessed the impact of educational interventions on breastfeeding outcomes. Guise et al (2003) reviewed 12 RCTs on the impact of individual and group education interventions conducted by lactation specialists or nurses during the antepartum period on breastfeeding initiation [13]. This review also assessed effect of written materials alone and written materials included pamphlets and detailed booklets on breastfeeding that varied in length and detail and did not increase breastfeeding rates [13]. Secondly, Dyson et al (2008)'s review, discussed above, also examined 5 studies that evaluated the effect that health education for pregnant women and their significant others has on breastfeeding initiation [20]. Health education interventions included formal education programmes (self-help manuals/written materials), Best Start health education programs (one-to-one counseling) and/or single formal antenatal health education. Finally, Lumbiganon et al (2011) assessed 17 studies to evaluate the effectiveness of antenatal breastfeeding education for increasing breastfeeding initiation and duration [21]. They were unable to perform meta-analysis because of lack of studies for comparisons of different educational interventions.

Initiation

Educational interventions that were assessed in the reviews to increase the initiation rates of breastfeeding were health education for pregnant women and their partners, educational

programmes conducted by health care providers, breastfeeding promotion packages, written materials (brochures/pamphlets), and breastfeeding workshops that targeted attitudes and knowledge. The review by Guise et al (2003) found that programs with educational components increased initiation rates (mean difference: 0.23; 95% CI: 0.12-0.34) [13]. Educational sessions found to have the greatest impact were those that reviewed the benefits of breastfeeding, principles of lactation, myths, common problems, solutions and skills training [13].

Dyson et al (2008) conducted a meta-analysis of all the studies and found that health education resulted in a statistically significant increase in the number of women starting to breastfeed (RR: 1.57; 95%CI: 1.15-2.15) [20]. It is important to note that the populations in the included studies were women of low-income in the USA. Educational interventions that include breastfeeding promotion packages provided in hospitals were found to be ineffective at increasing initiation rates (RR: 0.93; 95% CI: 0.80-1.08) when compared to formula-company produced materials about infant feeding among women of middle- or higher-income groups in USA [20]. Lumbiganon et al (2011) found no one intervention to be significantly more effective than any other interventions in increasing initiation or duration. The authors did not recommend any antenatal breastfeeding education because of significant methodological limitations and the small observed effect sizes [21].

Duration

Among women receiving programs with educational components, short-term duration of breastfeeding at 3 months (mean difference: 0.39; 95% CI: 0.27-0.50) increased [13].

Recommendations

Overall educational interventions can have a positive impact on breastfeeding outcomes, but it should not be provided by a sole intervention. The impact of educational interventions have been inconsistent, and it is imperative that we must evaluate the different formats of how educational information can be distributed to women and their families.

Early maternal contact/Pacifier use

One review examined early maternal contact, and two reviews, including Chung et al (2008) and Jaafar et al (2012) assessed pacifier use on breastfeeding outcomes.

Duration

A meta-analysis of four studies in Guise et al (2003) also examined early maternal contact, defined as 10 to 45 minute periods of skin-to-skin contact between mother and infant soon after birth and found no significant increase in breastfeeding (OR:1.23; 95% CI: 0.65-2.05) [13]. In addition, pacifier use was also assessed to improve breastfeeding duration rates. One study (Howard et al, 2003) in Chung et al (2008) showed that delaying pacifier use until the infant was 4 weeks old was more effective at increasing breastfeeding duration than early pacifier use (within 2 to 5 days) [22]. In contrast, Jaafar et al (2012) found no significant difference between the pacifier use in the intervention group and the restricted pacifier use control group in the proportion of partially breastfed infants at 3 months or at 4 months (RR: 0.99; 95% CI: 0.92-1.06) [23].

Recommendations

No recommendations can be made due to the lack of studies available examining these interventions. There is a need for well-designed RCTs to assess the rates of breastfeeding duration and exclusivity among mothers and infants with pacifier use.

E-based Interventions

Pate (2009) conducted a meta-analysis of 21 studies to assess the effectiveness of e-based versus provider-based interventions on EBF and non-EBF initiation or duration [24]. Provider-based interventions ranged from peer counselors visits during hospitalizations, home visits, telephone calls by lactation consultants/midwives/nurses, practical breastfeeding skills session, and educations support programs. E-based interventions included prenatal web-based instructions, group prenatal care with computer-assisted audio, and online breastfeeding information and support [24].

Duration

Pate (2009) found that studies using e-based interventions had a moderate effect on breastfeeding (OR=2.2; 95%CI=1.9-2.7), whereas provider-based interventions had minimal effect (OR=1.1; 95% CI: 1.0-1.2) [24]. E-based methods to deliver breastfeeding and support were twice as effective as provider-based methods. The authors concluded that promotion programs delivered virtually should be considered as an alternative to provider-based education and support, and developing successful e-interventions requires tailoring them to the unique

characteristics of the targeted population [24]. However, there are several concerns regarding e-based interventions from the recipients' point of view including lacking access to technology to access intervention and minimal face-to-face interactions. Health care providers' concerns include the need for professional oversight to monitor intervention delivery and ensure adequacy. One limitation reported is that very few studies provided demographic characteristics of the population under study, making it difficult to assess the variability of women with increased or decreased rates of breastfeeding as a result of e-based and provider-based interventions. In addition, the pooled OR on e-based interventions was based on a small number of studies on e (n=3) [24].

Recommendations

While this review provides encouraging evidence that e-based interventions have the potential to improve breastfeeding, further research is required prior to recommending such interventions at a population level.

Multifaceted interventions

Individual interventions described above were often combined into a multifaceted breastfeeding intervention. There were two reviews that evaluated the impact of multifaceted breastfeeding interventions.

Initiation

First, Chung et al (2008) reviewed 18 RCTs to examine the effectiveness of primary care interventions to promote breastfeeding initiation, which included all three forms of support, including system-level, formal and informal support [22]. Primary care intervention in this review consisted of interventions provided by various providers (lactation consultants, nurses, peer counselor, midwives and physicians) in various settings (hospital, home, clinic, or elsewhere) originating from health care settings. They found that multifaceted breastfeeding promotion interventions (consisting of formal and informal support) increased initiation rates (RR 1.04; 95% CI: 1.00-1.08) compared with usual care. When the authors repeated the analysis after removing two studies done in developing countries, the results were no longer significant. They also conducted subgroup analysis on the effects of different components of breastfeeding interventions within a multifaceted intervention compared to usual care on breastfeeding

outcomes, They found that none of the specific types of support on their own significantly increased initiation rates, compared to the usual care received [22]. They also found that lay support significantly increased the rate of short-term breastfeeding (RR 1.22; 95% CI: 1.08-1.37; n=5) and EBF (RR 1.65; 95% CI: 1.03-2.63; n=4). Lay support varied from providing electric breast pumps to telephone-based support. However, this finding is based on indirect comparisons of different studies, and to better understand the effect of lay versus professional support, direct comparisons in the same populations are needed. In addition, the authors conducted a subgroup analysis according to the timing of intervention (prenatal, postnatal and combined) and found no clear pattern for the outcome of any breastfeeding [22].

Guise et al (2003) reviewed 4 RCTs that combined breastfeeding support with educational programs and found that such combined interventions produced larger increases in initiation (difference: 0.21; 95% CI: 0.07-0.35) when compared to support alone (difference: 0.06; 95% CI: 0.02-0.15)[13] and short-term duration at 3 months [13]. However, the increased rates were not significantly different from programmes with educational components alone.

Duration

Chung et al (2008) found that a multi-faceted breastfeeding promotion intervention (consisting of system-level, formal and informal support) resulted in increased short-term breastfeeding duration (RR: 1.10; 95% CI: 1.02-1.19) compared to usual care [22]. When the authors repeated the analysis after removing two studies done in developing countries, the results were no longer significant. Lay support significantly increased the rate of any breastfeeding by 22% [22].

Exclusive

Chung et al (2008) found that short-term EBF increased among women receiving breastfeeding promotion interventions (RR: 1.72; 95% CI: 1.00-2.97) [22].

Recommendations

When compared to single interventions, multi-faceted interventions appear to have greater positive impact on breastfeeding outcomes. In particular, professional support should be complemented with accessible lay support in multifaceted breastfeeding interventions that is provided over the span of antenatal and postnatal periods.

Summary

Reorienting health services and developing personal skills are two of five health promotion strategies. Reorienting health services is characterized as the need to identify opportunities in healthcare for addressing the determinants of health, while developing personal skills is about improving an individual's ability for adaptive and positive behavior enabling them to deal effectively with the demands and challenges of everyday life. The interventions examined in the reviews all fall within these two strategies. Developing personal skills is largely dependent on creating supportive environments for breastfeeding women. A supportive environment that actively promotes breastfeeding as the most optimal method of infant feeding is important to ensure that both mothers and infants receive complete benefits of breastfeeding. Peer support appears to be most effective if provided frequently (multiple contacts between mother and support personnel) and in collaboration with professional support that spans from the pregnancy to postpartum period. Such support should include well-planned educational materials.

It is important to note that initiation rates in Canada are high, while EBF rates gradually decline over time. Therefore, any intervention that aims to increase breastfeeding duration through increasing initiation rates will not be effective. Any successful population health approach will address multiple determinants of health across multiple levels and sectors. In the case of breastfeeding, identifying the interrelated factors and conditions that increase the risk of early breastfeeding cessation will inform policy development and population health strategies that are effective at reducing the risk of breastfeeding cessation. In conclusion, the population health benefits of increasing breastfeeding rates in developed countries are ample, considering both the short and long-term benefits to mothers and children, as well as the cost-saving benefits to the health care system. Interventions should be developed strategically with the targeted population in mind.

Limitations

One important limitation of the synthesized evidence is that terms such as breastfeeding and EBF were loosely defined; it was not clear whether babies were fed only breast milk or additional fluids as well. Another limitation is that many reviews did not account for potential confounders when evaluating breastfeeding (e.g. parity, gravidity, intention to breastfeed, etc). Lastly, the interventions described are defined specifically within the study's context, and

thereby becomes difficult to generalize to other settings. Other limitations specific to the present review include data being abstracted, evaluated and analyzed only by one reviewer and the exclusion of non-English publications and review articles published prior to 2002.

Table 1: Literature Review Inclusion/Exclusion Criteria

Component	Inclusion	Exclusion
Population	Pregnant women, Postpartum women, Women at preconception, Women in developed countries similar to Canada, Healthy term/ (near term) Infant, Singleton births	Women with serious illness, Infants with congenital abnormalities, Infant admitted to NICU (e.g. preterm), Women in developing countries, Non singleton birth
Intervention (exposure)	Policy and Clinical Practice Guidelines for community care and hospital care, Public Policy, Group education programs (antenatal/postnatal classes), Effectiveness of educating health professionals, Health marketing, (social marketing), Multifaceted (WIC program, social services based programs)	Any intervention addressing breastfeeding problems, Clinical Trials
Method	Review Articles, Meta-analyses (Reviews assessed for quality using an appropriate critical appraisal tool e.g. AMSTAR tool) Years covered 2002 to 2012 (10 years) Language: English only	Single studies of any designs: Experimental Design: RCT Observational studies: Cohort studies, Case-Control, Cross-sectionals, Case Studies Qualitative designs: Expert opinion, Interviews, Commentaries Non systematic approaches Years not covered: 2001 and older Studies in developing countries Language: Non English language
Outcomes	**Initiation:** Increased initiation rates; Increased exclusive breastfeeding rates; Increased any breastfeeding rates,	Any change in maternal or health care provider, attitude or knowledge of breastfeeding; No breastfeeding outcome; Breastfeeding outcomes other

	Duration: Increased “any” breastfeeding duration; Increased “exclusive” breastfeeding duration; Increased breastfeeding rates beyond 6 months with supplementation of complementary foods; Maternal and Infant related outcomes (sore nipples, problems with milk supply, baby weight issues)	than duration, initiation and exclusivity
	Exclusive: Increased “exclusive” breastfeeding duration; Increased breastfeeding rates beyond 6 months with supplementation of foods/ liquids; Maternal and infant related outcomes (sore nipples, problems with milk supply, baby weight issues)	

Figure 1. Details of study selection for review

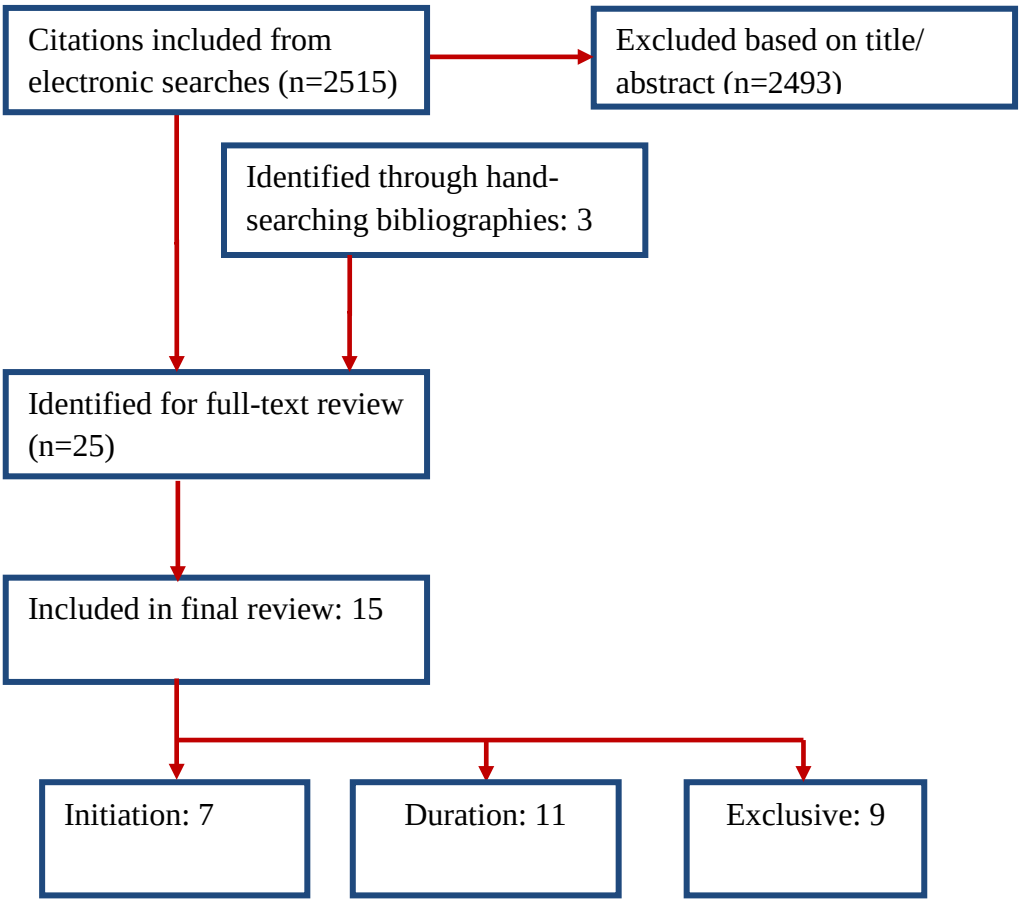

Table 2: Critical appraisal of systematic reviews using AMSTAR

AMSTAR question	Beake et al, 2012	Dennis & Kingston, 2008	Dyson, McCormick, & Renfrew, 2008	Hannula et al, 2008	Ingram et al, 2010	Jolly et a, 2011
1. 'A priori' design provided	✔	✔	✔	✔	X	✔
2. Duplicate study selection & data extraction	✔	✔	✔	✔	✔	✔
3. Comprehensive literature search	✔	✔	✔	✔	✔	✔
4. Status of publication as inclusion criterion	✔	✔	✔	✔	✔	✔
5. List of included studies provided	✔	✔	✔	✔	✔	✔
6. Characteristics of studies provided	✔	✔	✔	✔	✔	✔
7. Scientific quality of studies assessed & documented	✔	✔	✔	✔	✔	✔
8. Appropriate use of scientific quality of studies in formulating conclusions	✔	✔	✔	✔	✔	✔
9. Appropriate methods used to combine findings of studies[1]	N/A	✔	✔	N/A	✔	✔
10. Likelihood of publication bias assessed	X	X	X	X	X	X
11. Conflict of interest stated	✔	X	✔	X	✔	X
AMSTAR SCORE	**9**	**9**	**10**	**8**	**9**	**9**

AMSTAR question	**Kaunonen et al, 2012**	**Lumbiganon et al, 2011**	**Guise et al, 2003**	**Pate, 2009**	**Renfrew et al, 2012**	**Sikorski et al, 2003**	**Chung et al, 2008**
1. 'A priori' design provided	✔	✔	✔	✔	✔	✔	✔
2. Duplicate study selection & data extraction	✔	✔	✔	X	✔	✔	✔
3. Comprehensive literature search	✔	✔	✔	✔	✔	✔	✔
4. Status of publication as inclusion criterion	✔	✔	✔	X	✔	✔	✔
5. List of included studies provided	✔	✔	✔	✔	✔	✔	✔
6. Characteristics of studies provided	✔	✔	✔	✔	✔	✔	✔
7. Scientific quality of studies assessed & documented	✔	✔	✔	✔	✔	✔	✔
8. Appropriate use of scientific quality of studies in formulating conclusions	✔	✔	✔	✔	✔	✔	✔
9. Appropriate methods used to combine findings of studies[1]	N/A	N/A	✔	✔	✔	✔	✔
10. Likelihood of publication bias assessed	X	X	X	X	✔	✔	X
11. Conflict of interest stated	✔	X	✔	X	✔	X	✔
AMSTAR SCORE	**9**	**8**	**10**	**7**	**11**	**10**	**10**

AMSTAR question	**Spiby et al, 2009**	**Jaafar et al, 2012**
1. 'A priori' design provided	✔	✔
2. Duplicate study selection & data extraction	✔	✔
3. Comprehensive literature search	✔	✔
4. Status of publication as inclusion criterion	✔	✔
5. List of included studies provided	✔	✔
6. Characteristics of studies provided	✔	✔
7. Scientific quality of studies assessed & documented	✔	✔
8. Appropriate use of scientific quality of studies in formulating conclusions	✔	✔
9. Appropriate methods used to combine findings of studies[1]	N/A	✔
10. Likelihood of publication bias assessed	X	✔
11. Conflict of interest stated	X	✔
AMSTAR SCORE	**8**	**11**

Table 3: Characteristics of included systematic reviews on breastfeeding initiation

Author/ year	Quality score	# of studies assessing outcome	Study types[1]	Country of origin	Date range	Interventions/strategies[2]	Results	Comments	Author(s) Conclusions
Beake et al, 2012	9	9	1 non-controlled randomized 7 cohort 1 descriptive	4 US 1 UK 1 Germany 1 Israel 1 Brazil 1 Taiwan	1992-2010	BFHI accredited unit vs. Standard unit BFHI high(> 5 steps) vs. Low (<5 steps) Low compliance with 10 Steps vs. High compliance Staff training vs. no staff training Staff training and parent training vs. no staff parent training BFHI model vs. no BFHI model	10% more likely to start BF No statistical difference at birth Increased BF % by day 2 (proxy to initiation) Increased BF rates 84% vs. 93% (P< 0.0001) Increased BF rates18.9% vs78.1 (P<0.001) No statistical difference	Large evaluation of BFHI cohort study No data available, self reported by a single person from each hospital 32-h course not BFHI course Training for all parents and staff (non BFHI) Introduced BFHI steps not accredited	Structured Bf programs increase initiation (statistically significantly) Poor over all study quality Cost effectiveness of program implementation not addressed and should be addressed in future research.
Chung et al, 2008	10	18	18 RCT	5 US 4 UK 1 Canada 3 Australia 2 New Zealand 1 Netherlands 1 Denmark 1 Sweden	2001-2008	BF promotion intervention: Formal or structured education; system-level professional support (BFHI); individual-level professional support; lay support	Increased rate of BF initiation RR 1.04; 95% CI (1.00-1.08) compared to usual care. No significant increased rate in BF initiation compared to usual care in subgroup analysis of specific interventions.		Interventions are more effective than usual care in increasing short and long-term BF rates. Combined prenatal and postnatal with lay support in multi-component is beneficial.
Dyson et al, 2005	10	11	1Randomisation by permuted block 6 RCT	6 US 1 Nicaragua	Till 2002	Health education: self help manual, formal education combined with literature, Best start,(repeated one-one), single formal health education delivered one time antenatal. Breastfeeding promotion packs Early mother and infant contact combined with minimal BF education.	Health education: significant increase RR 1,57, 95% CI: 1.15-2.15 BF promotion pack: no effect RR 093, 95% CI (080- 1.08) in contexts where formula was issued Early mother-infant contact followed by complete separation until discharge: no effect RR 1.05, CI (094, 1.17)		Education interventions were effective at increasing BF initiation among low income in the US. BF packages may be an inappropriate use of BF promotion.
Ingram et al, 2010	9	11	7 RCT 3 Observational 1 Quasi-experimental	6 US 4 UK 1 Mexico	Till 2009	Universal peer support (all women): Routine AN, AN support with peer counsellor; AN peer support ; home visits Targeted peer support (women considering BF): Routine AN, AN support with peer counsellor,	Universal peer support: Ineffective at increasing BF initiation rates RR 0.96, 95% CI (0.76–1.22) Targeted peer support: Pooled RCT results indicate significant reduction in non-initiation. RR 0.64, 95% CI	Targeted peer support increased - only in low-income Hispanic women in the US. Concurrent high quality evaluation should be present in future	

						home visits and telephone support	(0.41 – 0.99).	interventions related to peer support.	
Kaunonen et al, 2012	9	30 4 Lit Rev	17 quantitative 6 qualitative 7 mixed methods 4 literature reviews	Europe, North America, Australia, New Zealand	2000-2008	Pregnancy: individual -home visits and telephone support. Support Groups occasionally Brochures and written material. Combined individual support and education, education classes for partners/supporters. In hospital: individual support, BFHI practices, WIC, Peer counsellor, and evidence-based support during hospitalisation. Postnatal: Individual level peer support via telephone support, Support group meetings, clinic visits, Training peers and professionals, BFHI policy training.	2 hour BF course for fathers effective; peer support at pregnancy and pp period increase initiation; mothers with peer support 15 times more likely to BF throughout 3 months f/u. Support from partner/supporter effective. Combined support professionals and trained peers supporters effective at increasing initiation. Peer support not effective if no support existed in pregnancy /hospitalisation phase Mothers were more satisfied with trained peers than untrained peers	Professionally led group support increased confidence and satisfaction with bf. Well-planned peer support that range from pregnancy to postnatal in combination with professional and unprofessional support is advisable.	Continuous supports from pregnancy through to postnatal are ideal. Peer support most important in the postnatal period Trained professional and peer supports provide best results for BF.
Lumbiganon et al, 2011	8	19	16 RCT (data reported 3 RCT (no data reported on required outcomes but met criteria).	US, Canada, Australia, UK	Till 2011	Routine BF education, formal Bf education- group or individual setting, printed information, video, peer counselling and lactation consultation. Didactic teaching sessions, workshops, booklets and combination of these interventions	Routine care vs. Formal BF Ed.: No significant difference - BF workshop, BF practical skills, BF attitudes education, group training, structured group prenatal education Significant difference: peer counselling AN peer support vs. peer support -no significant difference. BF practical skills education vs. attitudes Ed -no significant difference LC+Routine BF Ed vs. Routine BF -no significant difference	Peer counselling significantly increases initiation. No one intervention was more effective than the other. Combined intervention was not effective than single intervention	Only in the antenatal period All significant results are based on findings from single studies
Guise et al, 2003	10	8	22 RCT 8 Non-RCT (interventions that had not been studied in RCT) 5 Systematic Reviews Cohort	Developed countries (English language papers)	1996-2001	Breastfeeding Education: Structured BF classes- individual or group. BF classes by LC. In antennal period: 0.50h to 2h Individual counselling In postpartum: 10 min- 40min Breastfeeding support (phone, in-person clinic visit, hospital or home visits by LC, RN or Peer Counsellor. Combined prearranged appointments and	Education: increased BF initiation [difference=0.23; 95% CI=0.12-0.34)] Support: no effect Education + support: increased BF initiation [difference=0.21; 95% CI=0.07-0.35)] Written materials: no effect Rooming-in: could not be ascertained Early maternal contact (skin-to-skin): no sign benefit	There appears to be greater effectiveness of educational sessions in populations where the pre-intervention breastfeeding rate is less than 50%. The combination of education and support, however, was not substantially different from that of education alone.	Educational programs were the most effective single intervention.

	unscheduled visits or telephone calls for problems). Timing of support: 3 antepartum and 3 postpartum; 2 both antepartum and postpartum Support and peer counselling (poor quality RCT) peer, video, peer+video, Timing of peer support – antepartum or postpartum Written materials, alone or in combination with other interventions Rooming-In, Early maternal contact (skin-to-skin) and Commercial Discharge packets (free coupons for baby items and formula)	[OR, 1.23; 95% CI, 0.65-2.05]

[1]RCT = Randomized controlled trial; [2]BF=breastfeeding; BFHI= Baby-Friendly Hospital Initiative

Table 4: Characteristics of included systematic reviews on breastfeeding duration

Author/ Year	Quality score	# of studies assessing outcome	Study type[1]	Country of origin	Date range	Interventions/strategies[2]	Results	Comments	Author(s) conclusion
Dennis & Kingston, 2008	9	14	RCT	US, Canada, Australia, UK	1986-2004	Standard pp care + individualised telephone based peer support initiated within 48 hours after hospital discharge. Standard pp care+ in-hospital BF counselling by LC, 8 phone calls after discharge over 12 weeks;24 hours support available vs. standard care. Standard care +daily visits by community health nurse/peer counsellor team during hospitalisation and home visits at 1,2 and 4 weeks pp. Telephone support provided by peer support twice weekly until 8 weeks pp. vs. standard care pp care (in hospital BF support+ access to hospital warm line and one hospital visit by LC on weekdays).	Any BF – an overall beneficial effect on the continuation of any bf for all types of telephone support [n= 618; RR= 1.18, 95% CI 1.05- 1.33]		
Chung et al, 2008	10	18	18 RCT	5 US 4 UK 1 Canada 3 Australia 2 New Zealand 1 Netherlands 1 Denmark 1 Sweden	2001-2008	BF promotion intervention: formal or structured education; system-level professional support (BFHI); individual-level professional support; lay support	Increased short-term duration [RR=1.10; 95% CI=1.02-1.19] compared to usual care. Pacifier use and postpartum skin-to-skin contact effective.		Interventions are more effective than usual care in increasing short and long term BF rates. Combined prenatal and postnatal with lay support in multi-component is beneficial.
Jaafar et al, 2012	11	3	2 RCT(provide data) 1 RCT (no data)	Switzerland, Canada	Till 2012	Pacifier use (intervention) vs. restricted pacifier use (control)	No effect at 3 months or 4 months in motivated mothers 3 months RR 1.00, 95% 0.98 -1.13 At 4 months RR 1.01, 95% 0.98 -1.03		There is insufficient evidence on the potential harm of pacifiers on infants and mothers.
Jolly et al, 2012	9	17	RCT	5 USA, 4 UK, 2 Canada, 2 Brazil, 1 Mexico,	Till 2011	Home based peer counselling 8 visits from day 3 to 5.5 months Home based BF counselling	Peer support had greater effect on any BF in low income countries reducing risk of not BF by 30% [RR 0.70, 95% 0.60-0.82] Only 7 % in high income countries		Peer support interventions increase BF in low or middle income countries especially EBF.

				1 Bangladesh, 1 Philippines, 1 Sub-Saharan Africa		Peer counselling: three antenatal home visits, daily hospital visits and nine postnatal home visits Routine intervention plus peer counselling Multiple home visits postnatal Telephone peer support Hospital based BF clinic visit scheduled 3-7 days after birth Home based peer support: at least 4 visits: 1antenatal and 4 visits after discharge	Peer support had greater effect on any BF when given at a higher intensity and only delivered in the postnatal		Not in high income countries Peer support of low intensity not effective.
Lumbiganon et al, 2011	9	19	16 RCT (data used) 3 RCT(data not provided but met criteria)	US, Canada, Australia, UK	Till 2011	Routine BF education, formal Bf education- group or individual setting, printed information, video, peer counselling and lactation consultation. Didactic teaching sessions, workshops, booklets and combination of these interventions	Structured Group Prenatal Ed vs. Routine care -not significant difference Formal BF Ed. Vs. Routine BF Ed -not significant difference Formal BF Ed+baby quarantine vs. Routine BF Care -not significant difference Formal BF Ed+baby quarantine vs. Formal BF Ed. -no significant difference Lactation consultation+ incentive vs. Routine BF Ed. _ no significant difference.	No intervention was more effective than the other Combined intervention was not effective than single intervention	All significant results are based on findings from single studies
Guise et al, 2003	10	35	22 RCT 8 Non-RCT (interventions that had not been studied in RCT) 5 Systematic Reviews Cohort	1 Sweden 17 USA 5 UK 2 Canada 2 Australia 1 Italy 1 Ireland 1 Scotland (only English articles)	1996-2001	<u>Breastfeeding Education:</u> Structured BF classes- individual or group. BF classes by LC. In antennal period: 0.50h to 2h Individual counselling In postpartum: 10 min- 40min <u>Breastfeeding support</u> (phone, in-person clinic visit, hospital or home visits by LC, RN or Peer Counsellor. Combined prearranged appointments and unscheduled visits or telephone calls for problems). Timing of support: 3 antepartum and 3 postpartum; 2 both antepartum and postpartum <u>Support and peer counselling</u> (poor quality RCT) peer, video, peer video, Timing of peer support –	<u>Education</u>: increased short-term duration [difference=0.39; 95% CI=0.27-0.50), no effect on long-term duration <u>Support</u>: increased short [0.11 (95% CI, 0.03–0.19)]and long-term duration 0.08 (95% CI, 0.02–0.16)] Education + support: larger increase in short-term duration [difference=0.37; 95% CI=0.17-0.58), no effect on long-term duration Written materials: no effect		Education programs were most effective single intervention

						antepartum or postpartum Written materials, alone or in combination with other interventions Rooming-In, Early maternal contact (skin-to-skin) and Commercial Discharge packets (free coupons for baby items and formula)			
Hannula et al, 2007	8	36	31 RCT -27 Quantitative -4 Combination -0 Qualitative 5 Reviews	14 North American, 16 European, 4 Australian - New Zealand	2000-2006	Pregnancy interventions: Educational (groups or individual) Home visits by professionals, visits to hospitals or clinics and written material. Best start program, Starting out programme include counselling, videos, telephone support and written material. Maternity hospital interventions: BF attachment and positioning education. BF support on a cultural level, professional support for women with no BF experience, BFHI, written material Postnatal intervention: Peer support, home visits, telephone support, BF drop-in centre, individual counselling and written material.	Pregnancy: Interactive interventions involving mothers effective Lectures and demonstrations- not effective Special needs (youth, low income, immigrants) benefit most likely from intervention package that include peer support. Maternity hospitals: Practical hands off teaching when combined with support is effective Technical education without support-not effective BFHI was effective Postnatal intervention: Home visits, peer support, telephone support, BF drop-in centre and Home visit+telephone support+ breastfeeding centres were effective Overall: interventions that spanned from pregnancy throughout infancy were more effective than interventions in one period Interventions that used various methods of education and support from trained professionals and peers were more effective than one single method.	Group education most effective in prenatal period and needs to be interactive Professional role in BF promotion is crucial, therefore, they need evidence based BF education. Include peer element in future program to increase the success of the program.	
Pate, 2009	7	21	15 RCT, 6 non-RCT	Developed countries	2004-2008	Provider based prenatal/postpartum peer counsellor visits in context of BFHI Provider based-prenatal/postpartum home visits and telephone calls by LC E-based intervention -prenatal -group prenatal care with	Moderate effect on BF [OR=2.2; 95%CI=1.9-2.7], whereas provider-based interventions had very minimal effect OR= 1.1; 95% CI 1.0-1.2)	Limitations: Several studies lacked scientific rigor, only one fell in the good/great category Heterogeneity of the interventions and outcomes makes it impossible to compare their effectiveness	E interventions are promising in improving BF rates

						computer assisted audio -online BF information and support			
Renfrew et al, 2012	11	52	RCT	37 high income, 12 middle-income, 2 low-middle income, 2 low-income*	1979-2011	Face to face contact Telephone support Face to face contact and telephone contact	Increased BF continuation after 6 months [RR1.10; 95% CI (1.04-1.14) increase in duration before six months RR 0.91, 95% CI (0.88 - 0.96)	Support by both lay and professional had a positive impact on breastfeeding outcomes	All women should be offered support to breastfeed their babies to increase the duration and exclusivity of breastfeeding. Healthcare settings should provide such trained support as the routine support. Support is likely to be more effective in settings with high initiation rates, so efforts to increase the uptake of breastfeeding should be in place. Support that is only offered when women seek help is unlikely to be effective
Sikorski et al, 2003[23]	10	20	RCT	10 countries	Till 2001	Home support (nutritionist/social assistance) on days 5, 10,20 LC by telephone until one year Community health worker trained (WHO-18h course) support BF counsellor support (8 contacts) 5-days to 12 weeks Support (nutritionist) pp 10-15days; after 30days; monthly to 4 months. Home or lactation clinic (40h WHO training) LC and physician support (WHO/UNICEF training) Peer counselling, 15 home visits (2 in last trimester, 4 in months 1, 2 weekly)	Increased BF duration [RR=1.14; 95% CI=1.05-1.23] Professional support was effective overall in preventing cessation of any BF when compared to standard care. Lay support showed a non-significant trend towards reducing BF cessation.		Professional support effective on the duration of any BF Lay support effect on duration unclear
Spiby et al,	8	9	Before or After	2 US & Canada,	1980-	UNICEF 18h course+2h WHO	UNICEF 18h course+2h WHO counselling		UNICEF training is

2007	(Cohort or cross sectional)	3 UK, 4 Europe All languages	2003	counselling Evidence based guidelines supported by educational sessions, materials and feedback Best start- didactic education based on social marketing theory Hands off technique taught to midwives and healthcare assistance via workshops Seminars by professional societies e.g. paediatric society 11training sessions for midwives training held by hospital BF advisor	– Significant difference at discharge in exclusive and partial bf at 3 months and 6 months any bf -No significant effect Before 15%, After 31% duration at discharge (P< 0.03) 2 weeks significant increase in any BF (P= 0.005) and Exclusive Bf; 6 weeks no significant difference. No difference at discharge; 2 months significantly more in the urban (50%) than rural (36%) babies breastfed after intervention (p<0.05). EBF increased from 55.2% to 58.1%; mixed feeding decreased 23.8% to 19.1 %; discontinuation rate decreased from 19% to 14.4%	effective Many of the studies have methodological limitations

*one study is counted twice as it was undertaken in three countries, two in the low-income and one in the upper middle

[1]RCT = Randomized controlled trial; [2]BF=breastfeeding; BFHI= Baby-Friendly Hospital Initiative

Table 5: Characteristics of included systematic reviews on exclusive breastfeeding

Author/ Year	Quality score	# Of studies assessing outcome	Study type[1]	Country of origin	Date range	Interventions/strategies[2]	Results	Comments	Author(s) conclusion
Beake et al, 2012	10	13	1 non-controlled randomized 7 cohort 1 descriptive	4 US 1 UK 1 Germany 1 Israel 1 Brazil 1 Taiwan	1992-2010	BFHI training vs. no BFHI training BFHI accredited vs. standard care BFHI accredited vs. standard care BFHI training vs. no BFHI training Education and support of mothers vs. no education and support of mothers BFHI model vs. no BFHI model Staff training vs. no staff training BF program vs. BF program	Increase in EBF70% vs. 21% (P<0.0001) Increase EBF rate 33.5% vs. 5.5 % Increase EBF rate 31% vs. 23% Significant increase. EBF –:77%, 73% vs. 41%, 23% Increase EBF 55% vs. 36% (P < 0.05) Increase EBF 30-50% vs. 22-25% (P<0.01) Increase EBF 35.2% vs. 15.8% (P<0.01) Increase EBF in 1 month 67.6% vs 59.4	Slightly adapted BFHI course Lactation intervention program based on BFHI – not fully; no response rate3 day training, no AN component. Not BFHI Program included: Rooming-in; early initiation of bf; BF assistance and talks during hospitalisation.	Structured Bf programs statistically significantly increases exclusive BF Poor over all study quality Cost effectiveness of program implementation not addressed and should be addressed in future research.
Dennis & Kingston, 2008	9	14	RCT	US, Canada, Australia, UK	1986-2004	Standard pp care + individualised telephone based peer support initiated within 48 hours after hospital discharge. Standard pp care+ in-hospital BF counselling by LC, 8 phone calls after discharge over 12 weeks;24 hours support available vs. standard care. Standard care +daily visits by community health nurse/peer counsellor team during hospitalisation and home visits at 1,2 and 4 weeks pp. Telephone support provided by peer support twice weekly until 8 weeks pp. vs. standard care pp care (in hospital BF support+ access to hospital warm line and one hospital visit by LC on weekdays).	EBF- an overall beneficial effect on the continuation of EBF [n= 295; RR: 1.45; 95% CI: 1.12-1.87]		
Chung et al, 2008	10	18	18 RCT	5 US 4 UK 1 Canada	2001-2008	BF promotion intervention: Formal or structured education; system-level professional support	Compared to usual care: Increase short-term EBF [RR=1.28; 95% CI=1.11-1.48]	Limitations – limited by clinical and	Interventions are more effective than usual care in increasing

				3 Australia 2 New Zealand 1 Netherlands 1 Denmark 1 Sweden		(BFHI); individual-level professional support; lay support	Increase in long term EBF [RR=1.44; 95% CI= 1.13 to 1.84]	methodological	short and long term BF rates. Combined prenatal and postnatal with lay support in multi-component is beneficial.
Jaafar et al, 2012	11	3	2 RCT(provide data) 1 RCT (no data)	Switzerland, Canada	Till 2012	Pacifier use (intervention) vs. restricted pacifier use (control)	No effect on EBF at 3 months RR 0.99, 95% 0.93-1.05 At 4 months RR 0.99, 95% 0.92 -1.06		There is insufficient evidence on the potential harm of pacifiers on infants and mothers.
Jolly et al, 2012	9	17	RCT	5 USA, 4 UK, 2 Canada, 2 Brazil, 1 Mexico, 1 Bangladesh, 1 Philippines, 1 Sub-Saharan Africa	Till 2011	Home based peer counselling 8 visits from day 3 to 5.5 months Home based BF counselling Peer counselling: three antenatal home visits, daily hospital visits and nine postnatal home visits Routine intervention plus peer counselling Multiple home visits postnatal Telephone peer support Hospital based BF clinic visit scheduled 3-7 days after birth Home based peer support: at least 4 visits: 1antenatal and 4 visits after discharge	Peer support effect on EBF lowers the risk of not EBF by 37% [0.63,95%, 0.52-0.78] Peer support at higher intensity no effect was observed on EBF 18% lower risk of not breastfeeding exclusively among group that received peer support	No effect was observed in UK studies	Peer support interventions increase BF in low or middle income countries especially EBF. Not in high income countries Peer support of low intensity not effective.
Kaunonen et al, 2012	10	30	17 quantitative 6 qualitative 7 mixed methods	Europe, North America, Australia, New Zealand	2000-2008	Formal support; informal support; combination of formal and informal support	Peer support effective in increasing EBF When not supported by hospital practices not effective by itself.		
Lumbiganon et al, 2011	9	19	16 RCT (data provided) 3 RCT (no data provided)	US, Canada, Australia, UK	Till 2011	Routine BF education, formal Bf education- group or individual setting, printed information, video, peer counselling and lactation consultation. Didactic teaching sessions, workshops, booklets and combination of these interventions	BF Ed. Workshop vs. Routine care -no sig difference Structured group prenatal ed vs. Routine care -no sig difference BF practical skills ed. Vs. Routine care -no sig difference Practical skills Ed vs. BF attitudes Ed. -no sig difference lactation consultation + a BF booklet vs. BF booklet alone	Marginally significant increase in EBF @ 6 - booklet + video + lactation consultation (LC) vs. booklet plus video group. A BF booklet + video + LC was significantly better than no formal BF education for exclusive	Due to significant methodological limitations and the observed effect sizes were small, it is not appropriate to recommend any specific antenatal BF education without further RCT with adequate power.

							-no sig difference @ 3months Booklet +video + lactation consultation vs. booklet + video only -sig difference (RR2.23, 95% CI 1.01 to 4.92) @ 6 months Booklet+video+LC vs. no formal education -sig increase in EBF (RR 2.02, 95% CI 1.16 to 3.49) @ 3 months	BF @ 3 months.	
Renfrew et al, 2012	11	52	RCTs	37 high income, 12 middle-income, 2 low-middle income, 2 low-income*	1979-2011	Face to face contact support Telephone support Combined face to face and telephone support Provided by lay and professional	Group receiving support less likely to stop EBF before 6 months At 6 months RR 0.86, 95% 0.82 -0.91 At four to six weeks RR 0.74, 95% CI (0.61 -.89). No sig treatment effect for telephone No sign treatment effect for combined support	EBF cessation face to face support was associated with greater positive treatment effect when compared to telephone or combined support	
Sikorski et al, 2003	10	20	RCTs	10 countries	Till 2001	Home support(nutritionist/social assistance) on days 5, 10,20 LC by telephone until one year Community health worker trained (WHO-18h course) support BF counsellor support (8 contacts) 5-days to 12 weeks Support (nutritionist) pp 10-15days; after 30days; monthly to 4 months. Home or lactation clinic (40h WHO training) LC and physician support (WHO/UNICEF training) Peer counselling, 15 home visits (2 in last trimester, 4 in months 1, 2 weekly)	Increased EBF [RR=1.28; 95% CI=1.12-1.45] Professional support did not achieve statistical significance. Except up to 2 months (RR before 4-6 weeks 0.50[0.27, 0.90]; RR before 2 months 0.76 [0.61, 0.94]) Lay support showed a significant trend towards reducing BF cessation. (RR 0.66 [0.49,0.89]) Trials using WHO/UNICEF training showed significant benefit in prolonging EBF but was highly heterogeneous. (RR 0.70 [0.53, 0.93]	Lay support is effective in promoting EBF	Supplementary BF support should be provided as part of the routine care. Clear evidence on the effect of duration of Bf although the strength of effect on EBF is uncertain.

[1]RCT = Randomized controlled trial; [2]BF=breastfeeding; BFHI= Baby-Friendly Hospital Initiation

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