

Title: Exclusive breastfeeding increased by an internet intervention in regional Western Australia

Running Title: Breastfeeding and the internet

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Word Count: Abstract 220 words. Main text: 2504words

Key Words: breastfeeding, internet, intervention, exclusive breastfeeding

Acknowledgements: The authors would like to sincerely thank Mrs Alison Lynton, a member of the ivec@curtin team. Mrs Lynton was a tireless web mistress for this project despite her own breastfeeding baby to attend to. Dr Giglia would like to acknowledge Healthway (Health Promotion Foundation of WA) for support as a Healthway Health Promotion Research Fellow and for funding part of this study through a Healthway Research Starter Grant. Mrs Kylee Cox is the recipient of an Australian Postgraduate Award scholarship for her PhD study.

Funding and Conflict of Interest

There are no potential conflicts of interest or competing financial interests to be reported.

Abstract

Background: Exclusive breastfeeding for six months is acknowledged universally as the optimum feeding method for infants in order to provide the greatest health and well-being gains for the infant and mother. Despite this many women stop short of attaining this desired outcome for their infant. With the permeation of the internet into most of society the aim of this study was to evaluate the effect of a breastfeeding support internet intervention on breastfeeding outcomes on women living in regional Western Australia (WA).

Materials and Methods: A nested intervention design within a longitudinal cohort titled the 'Regional Infant Feeding Study' (RIFS) examined the effect of an internet support website on the infant feeding practices of women living in regional Western Australia (WA).

Results: A total of 414 women participated in the internet study and were randomly assigned to the control group (207) and intervention group (207). Women enrolled in the intervention were significantly more likely to be exclusively breastfeeding at six months postpartum compared to control group participants. Those women experiencing breastfeeding problems were more likely to access the internet.

Conclusions: This breastfeeding support intervention study demonstrated a positive effect on longer term exclusive breastfeeding enrolled in the intervention group. Together with more traditional methods of support the internet provides another possible method for promoting positive long term breastfeeding outcomes.

Introduction

Supporting and providing breastfeeding education in the early postpartum days to help extend breastfeeding duration is paramount. Difficulty with breastfeeding in the early postpartum period is a significant risk factor for the early cessation of breastfeeding, particularly in the first four weeks.¹ The best and most effective way of supporting new mothers to achieve long term exclusive breastfeeding and minimise cessation is often debated. Outcomes of a 2012 Cochrane review examining the provision of extra support for breastfeeding mothers (when compared with providing standard maternity care breastfeeding support) found that all forms of extra support analysed together showed an increase in the length of time women continued to breastfeed and the length of time women breastfed without introducing any other types of liquids or foods. Both professional and lay support had a positive effect on breastfeeding outcomes and face-to-face support was associated with a larger treatment effect than telephone support.² This is not dissimilar to findings of previous research conducted by our team which also found that receiving individualised breastfeeding support positively impacted on breastfeeding outcomes.³ More recently a systematic review has shown that an extended period of postnatal contact with support persons (e.g. lactation consultant) were the most successful interventions for promoting exclusive duration of breastfeeding.⁴

The internet has the possibility of providing personalised support to breastfeeding mothers in the early postnatal period, particularly given that one-to-one breastfeeding support is time consuming, costly and unavailable, particularly in rural and remote areas. The advent of the internet in the early 1990s has provided this additional domain for the delivery of health professional services which has been able to overcome the barriers of cost and isolation.⁵

The internet provides support and education through “information provision”, “peer support”, “expert advice” and “activities to help the participants make decisions and plan behaviour”⁶(p714) and an internet intervention is often a mixture of these facets.

The objective of this research was to evaluate the effect of a breastfeeding support internet intervention on breastfeeding outcomes on women living in regional Western Australia (WA).

Subjects and Methods

Design

A nested intervention design within a longitudinal cohort titled the ‘Regional Infant Feeding Study’ (RIFS) **examined the effect** of an internet support website on infant feeding practices of women living in regional Western Australia (WA).⁷

Sample Selection

A sample of 489 mothers and their infants were recruited from hospitals with maternity service capacity from four regional areas of WA and followed for 12 months from birth.

Women were recruited face-to-face at the maternity ward level by midwives and/or research staff, or through regional Child Health Nurses during a universal home visit to new mothers within the first week post discharge from the hospital. Further details are reported elsewhere.⁷

Intervention

Participants in the study were randomly assigned to the intervention or control group. The intervention was designed to provide best practice infant feeding information and the content of the website was developed using formative research with the target group,⁸ and the current evidence based infant feeding recommendations at the time^{9,10} The intervention group were able to ‘post’ on the discussion forums, initiate email conversations with other group

members, and contact a certified lactation consultant or the chief investigator online (and using webcam) with any questions.

The intervention group had access to the study website and control mothers accessed a website which redirected them to helpful parenting and infant feeding websites which had been assessed for accuracy of information. The allocation to control or intervention group was “without prejudice” and all mothers received normal postpartum maternity services available in the community.

Data Collection

Once consent to participate was received, mothers were asked to complete a baseline questionnaire to determine demographics and feeding practices whilst in hospital. For those mothers with internet access (87%), the provided login and password enabled them to complete the follow-up questionnaires online.

Mothers were recruited for a period of 21 months from March 2010 to December 2011 in an effort to obtain the required sample size. The data collection tool was based on that used in the Perth Infant Feeding Study Mark II¹¹ with additional questions included to ascertain geographical location, child health resources available in the regional area, and access to sources of information about infant feeding. The primary outcome measure was breastfeeding initiation and duration. Breastfeeding terms and definitions used were consistent with those used by the World Health Organization.¹² The modified tool was converted to an online survey and pilot tested with a group of rural mothers prior to it going live. Mothers were asked to complete an online survey at eight time points (at birth [baseline], then at 4, 10, 16,

26, 32, 40 and 52 weeks). Questions relating to accessing websites and the intervention website were introduced at the week 10 survey.

Data Analysis

Univariate summary statistics were produced to describe the characteristics of the study sample. Chi-square test (χ^2) (Fisher's exact test if applicable) were used to investigate the association between two categorical variables of interest; with emphasis on exploring the significant effect of intervention (access to study website) on exclusive breastfeeding outcomes. The proportion of women from the control and intervention groups exclusively breastfeeding at specified time points were identified and *P* values are presented.

Presented *P* values are two-sided, and a 10% significance level was used.

Ethics

Ethics approval for this study was granted by the Curtin University Human Research Ethics Committee, the WA Country Health Service Ethics Committee and the St John of God Healthcare Ethics Committee. This study is registered with Australian New Zealand Clinical Trials Registry (ANZCTR); Trial Id: ACTRN12610000062022.

Results

Of the 489 women who gave consent to participate in the study, 427 (88%) completed the baseline survey. A total of 414 (85%) women were enrolled in the internet study; 207 in the control group and 207 in the intervention group.

Participant demographic characteristics for each group did not differ significantly from each other. The majority of mothers were from the Midwest region (67%), were over thirty years of age (54.8%) and 61.1% were considered to be living in an 'accessible' area, as deemed using the Accessibility/Remoteness Index of Australia (ARIA) classification. The ARIA methodology produces index values, between 0 and 12, with index values of 0 having the highest levels of access to goods and services, and areas with an ARIA index value of 12 having the highest level of remoteness. The score is based on road distance to regional service centres, using service centre population size as a proxy for availability of services (i.e. retail, health and education).¹³

Figures 1 outline the website utilisation of the intervention group throughout the 12 months of the study. From week 10 onwards mothers were asked to list the top five websites they had mostly accessed since completing the last survey. The first listed websites were grouped into seven categories; (i) Australian Breastfeeding Association (ABA). Not for profit organisation supporting breastfeeding women; (ii) NurturingTogether. The intervention website; (iii) Ngala and other government sites. Not for profit, providing a range of parenting and infant feeding information; (iv) Commercial websites. Hosted by an organisation and/or containing

commercial advertisements e.g. Huggies; (v) Individual and not for profit websites. Sites primarily developed by an individual and or small organisation e.g. Pinky McKay; (vi) Google web search; and (vii) Don't know. Where mothers could not remember the name of the website(s) visited.

The majority of women from both groups visited the commercial websites most often and consistently throughout the duration of the study. The ABA website was the second most visited website, however this was more popular in the early postpartum stage whereas the commercial sites maintained their popularity with all the participants. There was no significant differences between the websites visited by the intervention group or the control group with the exception of week 32 when the intervention group reported visiting the ABA website more often than the control group; and the control group visited commercial sites more often than the intervention group (*Fisher's exact test, p=0.090*).

Insert Figure 1.

Table 1 indicates the proportion of women from each group exclusively breastfeeding at each time point and includes a sub-analysis of women only living in an area classified as moderately remote, remote and very remote. There was a significant difference between the number of women in the intervention group who were continuing to exclusively breastfeed at week 26 ($p=0.01$) compared to the control group. For week 16, the difference in the exclusively breastfeeding rate between the intervention and control groups is 10% with a p -value of 0.054, which falls slightly short of the conventional statistical significance level of 5%. Of all the women living in a remote area a higher proportion of those in the intervention group were exclusively breastfeeding at week 4, 10, 16 and 26 compared to the control group. The difference was statistically significant only for week 26 ($p=0.030$).

Insert Table 1 here.

Mothers were asked at each survey time point commencing at week 10 if in the previous weeks they had ‘accessed any online websites about infant feeding or parenting in an effort to find information to help support them in their new role as a parent’. There was a significant difference in the number of women accessing websites who had experienced breastfeeding problems at each time point with the exception of week 52, compared to women who had not experienced any problems with breastfeeding (see Table 2).

Insert Table 2 here.

Discussion

This study is the first to provide information about the effectiveness of an internet intervention intended solely for the support of breastfeeding mothers living in regional WA. In rural areas of WA health services are often less than those provided to metropolitan areas¹⁴ and it was proposed that the internet intervention may bridge the gap in maternal health services supporting breastfeeding outcomes.

This study positively demonstrated that an internet intervention specific to breastfeeding has the capacity to support regional women in their breastfeeding practice. Mothers enrolled in the internet intervention, and particularly those mothers living in a remote regional area were more likely to exclusively breastfeed than mothers in the control group. Maintaining exclusive breastfeeding to the recommended six months postpartum has been difficult to achieve in many populations^{15,16} however this intervention demonstrated the potential of the internet to provide support for the desired period of breastfeeding in a rural population. The internet in general was potentially able to provide support to those women experiencing breastfeeding problems as they were more likely to access the internet. Furthermore it appears that support is warranted throughout the entire period of lactation and up to the first year of life as women reported experiencing breastfeeding problems throughout this continuum. The univariate analysis conducted in this study gives rise to results supported by other research investigations¹⁷ and the strength of potential confounders is considered for future research.

In a systematic review of breastfeeding intervention delivery methods, Pate investigated the impact of *e*-based interventions compared to provider-based interventions¹⁸. A lack of face-to-face interaction and access to suitable technology to be enrolled in the intervention were

some of the associated disadvantages reported by participants in the intervention studies. The providers of the internet based interventions reported the regular professional maintenance and monitoring of the intervention to ensure the appropriateness of the content as disadvantages to delivering education and support through this medium.

It is evidenced from this intervention study that the commercial websites which contained breastfeeding information (amongst other topics) were the more popular sites and were accessed on a regular basis throughout the 12 month postpartum period. Commercial sites have the advantage of being corporately funded which enables the website to be dynamic and inviting with regular updates, competitions and giveaways. It is possible that an even greater effect from the intervention site could have been demonstrated if it had not been in competition with the abundance of commercial websites with all their ‘bells and whistles’. Concurrently at the time of recruitment to this study in March 2010, Facebook was taking to the world internet stage, and in the week ending March 13, 2010 more people visited Facebook than Google.¹⁹ Competition with Facebook and commercial websites, and being busy with a new baby and with the household (frequency analysis not reported) may all be factors limiting access to the intervention website and therefore reducing the effectiveness of the intervention. It is possible that breastfeeding education, support and advocacy through social media where information is ‘pushed’ out to users is more appealing to the younger generation of mothers than ‘pulling’ the information you require. Having breastfeeding information arrive in a social media ‘push’ maybe the way of the future.²⁰

In addition to these competing elements, is the effect of the many other factors that affect breastfeeding duration. Including but not limited to are fathers feeding preference²¹ and mothers attitude towards breastfeeding.²² There were opportunities for women in this study to utilise webcam technology to discuss or demonstrate their breastfeeding problems being

experienced. However despite the reporting of problems at each time point no women chose to take up this more personal option of interaction. This reluctance to use video technology has been reported by other researchers in a rural setting in Scotland who found that women were more likely to prefer face-to-face, telephone, email and text messaging support.²³

Limitations

In the small number of studies previously conducted in this area, the lack of scientific rigour in study designs, the lack of homogeneous interventions and outcomes; specifically the lack in defining breastfeeding outcomes, have been limitations which make it difficult to recommend internet interventions as the sole source of breastfeeding support.²⁴ This intervention study is the first to rigorously examine the role of a breastfeeding specific internet intervention on breastfeeding outcomes using clearly defined breastfeeding indicators.²⁵ Despite this rigor there were limitations to this research. First the long data collection period of 21 months as a result of a lower birth rate in regional areas contributed to the static nature of the website to ensure that all mothers were exposed to the same content at some time during their enrolment period. Utilisation of the intervention website by participants was not assessed and therefore the intensity of the effect of the intervention, that is true intervention fidelity could not be ascertained. Given the competing demands of Facebook and new baby it is likely that utilisation of the website was limited. A low response to questions relating to website access was problematic and coupled with breastfeeding cessation limited the data analysis. Future studies should consider making all questions relating to the intervention mandatory for all participants.

Conclusion

This intervention study is the first to methodically evaluate the effect of a breastfeeding internet intervention using clearly defined breastfeeding outcomes. This breastfeeding support internet intervention demonstrated a positive effect on longer term exclusive breastfeeding (5.9% versus 0.6%, $p=0.010$) of women enrolled in the intervention group. In combination with more traditional methods of breastfeeding education and support, the internet can play a role in supporting positive breastfeeding outcomes, particularly in regional areas. It is possible that the internet can favourably support the recommendation for exclusive breastfeeding for six months. Further research into other areas of online support is warranted to assess the effectiveness of online media in promoting positive breastfeeding outcomes and to achieve this important outcome.

References

1. Gerd A-T, Bergman S, Dahlgren J, Roswall J, Alm B. Factors associated with discontinuation of breastfeeding before 1 month of age. *Acta Paediatr* 2012;101:55-60.
2. Renfrew MJ, McCormick FM, Wade A, Quinn B, Dowswell T. Support for healthy breastfeeding mothers with healthy term babies. *Cochrane Database of Systematic Reviews* 2012; Art. No: CD001141.(Issue 5).
<http://onlinelibrary.wiley.com.dbgw.lis.curtin.edu.au/doi/10.1002/14651858.CD001141.pub4/abstract> (accessed 11 July 2013).
3. Pannu P, Giglia R, Binns C, Scott J, Oddy W. The effectiveness of health promotion materials and activities on breastfeeding outcomes *Acta Paediatr* 2011;100:534-537.
4. Skouteris H, Nagle C, Fowler M, Kent B, Sahota P, Morris H. Interventions designed to promote exclusive breastfeeding in high-income countries: a systematic review. *Breastfeed Med* 2014;9:113-127.
5. Daneback K, Plantin L. Research on parenthood and the internet: themes and trends. *Journal of Psychosocial Research on Cyberspace*. 2008;2:article 2.
www.cyberpsychology.eu/view.php?cisloclanku=2008110701 (accessed 18 April 2012).
6. Herman J, Mock K, Blackwell D, Hulsey T. Use of a Pregnancy Support Web Site by Low-Income African American Women. *J Obst Gynecol Neonatal Nurs* 2005;34:713–720.
7. Cox K, Giglia R, Binns C, Ym Z. Exclusive Breastfeeding at Discharge from Hospital in Regional Western *J Hum Lact* 2014 *in press*.

8. Giglia RC, Binns CW. Adopting and adapting an Internet intervention to support breastfeeding duration and breastfeeding research throughout regional Western Australia. 11th National Rural Health Conference; 13-16 March, 2011; Perth, Western Australia.
9. National Health and Medical Research Council. *Dietary Guidelines for Children and Adolescents in Australia*. Canberra, Commonwealth of Australia, 2003.
10. World Health Organization. *The optimal duration of exclusive breastfeeding. Report of an expert consultation*. World Health Organization, Geneva, 2001.
11. Graham KI, Scott JA, Binns CW, Oddy WH. National targets for breastfeeding at hospital discharge have been achieved in Perth. *Acta Paediatr* 2005;94:352-356.
12. World Health Organization. *Indicators for assessing infant and young child feeding practices. Part 1: definitions*. World Health Organization, Geneva, 2008.
13. Australian Institute of Health and Welfare. *Rural, regional and remote health: a guide to remoteness classifications*. Australian Institute of Health and Welfare, Canberra, 2004.
14. Australian Bureau of Statistics. Australian Social Trends, April 2013. *Catalogue No. 4102.0*
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/4102.0Main%20Features1April%202013?opendocument&tabname=Summary&prodno=4102.0&issue=April%202013&num=&view=> (accessed 5 December, 2013).
15. Dennis C-L. Breastfeeding initiation and duration: A 1990-2000 literature review *J Obst Gynecol Neonatal Nurs* 2002;31:12-32.
16. Australian Institute of Health and Welfare. *2010 Australian National Infant Feeding Survey: indicator results*. Australian Institute of Health and Welfare, Canberra, 2011.

17. Huang M, Kuo S, Avery M, Chen W, Lin K, Gau M. Evaluating effects of a prenatal web-based breastfeeding education programme Taiwan *Journal of Clinical Nursing*. 2007;16:1571-1579.
18. Pate B. A Systematic Review of the Effectiveness of Breastfeeding Intervention Delivery Methods *J Obstet Gynecol Neonatal Nurs* 2009;38:642-653.
19. Dougherty H. Facebook reaches top ranking in US. 2010. www.experian.com/hitwise/ (accessed 5 December, 2013).
20. Thaker D, Monypenny R, Olver I, Sabesan S. Cost savings from a telemedicine model of care in northern Queensland, Australia *Med J Aust* 2013;199:414-417.
21. Tohotoa J, Maycock B, Hauck YL, Howat P, Burns S, Binns CW. Dads make a difference: an exploratory study of paternal support for breastfeeding in Perth, Western Australia *Int Breastfeed J*. 2009;4:15.
22. Inoue M, Binns C, Katsuki Y, Ouchi M. Japanese mothers' breastfeeding knowledge and attitudes assessed by the Iowa Infant Feeding Attitudes Scale. *Asia Pacific Journal of Clinical Nutrition*. 2013;22:261-265.
23. Roberts A, Hoddinott P, Heaney D, Bryers H. The use of video support for infant feeding after hospital discharge: a study in remote and rural Scotland. *Matern Child Nutr*. 2009;5:347-357.
24. Giglia R, Binns C. The effectiveness of the internet in improving breastfeeding outcomes; a systematic review. *J Hum Lact* 2014;30:156-160.
25. Binns CW, Fraser ML, Lee AH, Scott J. Defining exclusive breastfeeding in Australia. *J Paediatr Child Health* 2009;45:174-180.

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Table 1. Percentage of women exclusive breastfeeding in the intervention and control groups at discharge, 4, 10, 16 and 26 weeks

Participant group					Remote participants ^a			
Time point	n	Intervention	Control	<i>p</i> value ^b	n	Intervention	Control	<i>p</i> value ^b
Discharge	345	82.1	84.5	0.510	116	79.4	84.9	0.317
4 weeks	233	66.9	61.5	0.291	76	61.9	56.4	0.771
10 weeks	187	57.8	50	0.145	58	49.2	44.4	0.866
16 weeks	142	48.5	38	0.054	42	37.5	34.4	0.865
26 weeks	10	5.9	0.6	0.010	6	10.9	0	0.030

^aIn ARIA classification of moderately remote, remote and very remote mothers only

^b χ^2 test

Table 2. Mothers who had experienced breastfeeding problems and accessed a parenting website in this time (%)

Period during which mother accessed a parenting website	Period during which mother experienced breastfeeding problems (n=total no of women experiencing breastfeeding problems)	Accessed website		
		Yes	No	<i>p</i> value ^a
Previous 10 weeks	Week 4 – 10 (n=83)	52 (62.7)	31 (37.3)	<0.001
Previous 16 weeks	Week 11 – 16 (n=61)	38 (62.3)	23 (37.7)	<0.001
Previous 26 weeks	Week 17 – 26 (n=39)	27 (69.2)	12 (30.8)	0.001
Previous 32 weeks	Week 27 – 32 (n=28)	17 (60.7)	11 (39.3)	0.068
Previous 40 weeks	Week 33 – 40 (n=25)	17 (68)	8 (32)	0.003
Previous 52 weeks	Week 32 – 40 (n=13)	5 (38.5)	8 (61.5)	0.361

^a χ^2 test