



Residency Curriculum Improves Breastfeeding Care

Lori Feldman-Winter, Lauren Barone, Barry Milcarek, Krystal Hunter, Joan Meek,
Jane Morton, Tara Williams, Audrey Naylor and Ruth A. Lawrence
Pediatrics 2010;126;289-297; originally published online Jul 5, 2010;
DOI: 10.1542/peds.2009-3250

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://www.pediatrics.org/cgi/content/full/126/2/289>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2010 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

Residency Curriculum Improves Breastfeeding Care

WHAT'S KNOWN ON THIS SUBJECT: Despite a rise in overall breastfeeding, lack of physician support has continued to undermine the practice of exclusive breastfeeding. Inadequacies exist in breastfeeding education during residency, and study results have suggested that support of breastfeeding is decreasing among practicing pediatricians.

WHAT THIS STUDY ADDS: The authors used an AAP curriculum to train a multispecialty group of primary care residents. This training on breastfeeding improved knowledge, confidence, and practice patterns related to breastfeeding care among residents and resulted in increased breastfeeding rates in their patients.

abstract

OBJECTIVES: Multiple studies have revealed inadequacies in breastfeeding education during residency, and results of recent studies have confirmed that attitudes of practicing pediatricians toward breastfeeding are deteriorating. In this we study evaluated whether a residency curriculum improved physician knowledge, practice patterns, and confidence in providing breastfeeding care and whether implementation of this curriculum was associated with increased breastfeeding rates in patients.

SUBJECTS AND METHODS: A prospective cohort of 417 residents was enrolled in a controlled trial of a novel curriculum developed by the American Academy of Pediatrics in conjunction with experts from the American College of Obstetricians and Gynecologists, American Academy of Family Physicians, and Association of Pediatric Program Directors. Six intervention residency programs implemented the curriculum, whereas 7 control programs did not. Residents completed pretests and posttests before and after implementation. Breastfeeding rates were derived from randomly selected medical charts in hospitals and clinics at which residents trained.

RESULTS: Trained residents were more likely to show improvements in knowledge (odds ratio [OR]: 2.8 [95% confidence interval (CI): 1.5–



gency programs. Additional site-selection criteria included sites that serve a diverse patient population, represent different geographical regions, lack a local Baby-Friendly Hospital Initiative certification, and have the ability to administer pretests and posttests and to collect breastfeeding data. Seven sites were selected for curriculum intervention, and 7 matched sites were selected as controls.

At each intervention site, personnel were expected to (1) implement the curriculum within 1 year with a participation level of at least 20 residents representing all 3 disciplines, (2) attend a preimplementation training meeting and a follow-up evaluation meeting, (3) host a site visit with a day of activities and lectures with a visiting professor for residents and other hospital staff, (4) administer an online pretest and posttest to all participating residents, and (5) collect data on breastfeeding rates at the initiation of the program and 6 months later. Each control site was expected to perform the data collection in items 4 and 5 and, at the completion of the study, was granted full access to the curriculum, which included site visits with visiting professors.

Resident Subjects and Procedures

The project was approved by the institutional review boards of the AAP, the institution of the overall project director, and at each intervention and control site. Residents who agreed to participate provided signed consent and were assigned an identifier that maintained subject blinding to investigators. Enrolled residents completed secure online pretests before implementation, which began in July 2006, and posttests after completion of the curriculum.

Curriculum Implementation

Two faculty members from each implementation site participated in a 2-day

curriculum-training program at the AAP, during which each developed a site-specific curriculum-implementation plan. Implementation overal8on4-234lfcmentaohe

ments (binary) in scale scores between groups were summarized as odds ratios (ORs) and tested for significance by using 2-tailed log-likelihood χ^2 .

Sample-Size Determination

On the basis of available resources, we determined that the study could include up to 14 sites. A minimum of 20 residents were chosen at each site to provide 80% power to detect an OR of 2.0 between groups on any increase in any of the 3 scales analyzed by using a 2-tailed log-likelihood χ^2 test at $\alpha = .05$ and allowing for an increase in up to 33% among control-group residents.

Breastfeeding Rates

Each site collected rates of breastfeeding at study initiation and 6 months later by randomly selecting 100 medical records at specific intervals. Each site determined its baseline breastfeeding rates by selecting newborn and residency continuity-clinic medical records for a 3-month interval (July through September 2006). Sites derived their postintervention rates from charts that were dated after completion of the curriculum and after residents completed their posttests. Breastfeeding-initiation data were collected May through July 2007, and 6-month breastfeeding data were collected December 2007 through January 2008. Site coordinators were instructed to record feeding in 1 of 3 categories: exclusive breastfeeding, nonexclusive breastfeeding (breastfeeding plus feeding of formula or other foods and/or fluids), and exclusive formula feeding. Sites were asked to define "exclusive breastfeeding" as an infant's consumption of human milk with no supplementation of any type (water, juice, nonhuman milk, or foods) except for vitamins, minerals, and medications. "Overall breastfeeding" was defined for the purpose of analysis as the sum of nonexclusive breastfeeding and exclusive breast-

feeding. Breastfeeding rates between intervention and control groups were compared in the preintervention and postintervention periods by using Pearson's χ^2 or Fischer's exact test depending on expected values. The odds of increased breastfeeding rates at birth and 6 months (overall and exclusive) were calculated by using the percentage of exclusive or overall breastfeeding at each point in time and tested for significance as a ratio. A sample of 450 charts in all sites combined provided 82% power to detect an OR of 1.5 between the exclusive breastfeeding rates before and after the intervention by using a 2-tailed log-likelihood χ^2 test at $\alpha = .05$, allowing for baseline preintervention rates up to 25%.

RESULTS

A total of 417 residents were enrolled from 13 sites (6 interventions and 7 controls) (Fig 1). One intervention site was unable to obtain institutional review board approval. Resident characteristics are listed in Table 1. There were 157 residents who completed pretests but did not complete posttests (noncompleters), which resulted in 260 residents who completed both pretests and posttests (completers). Completers and non-

completers were similar except for a higher rate of exclusive breastfeeding among completers. This difference was not observed in comparisons between intervention and control residents in the completers group.

Resident Knowledge, Confidence, and PPs

Residents at the intervention sites improved significantly in knowledge, PPs, and confidence (Table 2). Residents who completed the curriculum were Rem control complete377(com.7(resuk/T1__377(co

TABLE 1 Resident Demographics: Completers Versus Noncompleters and Intervention Versus Control Sites

	Completer	Noncompleter	P	Completers Only		P
				Intervention	Control	
Age, <i>n</i> (median, y)	254 (30)	150 (30)	.24	148 (30)	106 (30)	.590
Race	256	153		150	106	
Asian, %	29.6	22.2	.11	30.7	28.3	.78
Black, %	6.3	7.8	.69	8.0	3.8	.20
Hispanic, %	8.6	7.9	.85	5.3	13.2	.04
Native Hawaiian, %	0.8	0.6	.99	0.7	0.9	.99
American Indian, %	0.4	0.0	.99	0.0	0.9	
White, %	54.3	61.4	.31	52.8	55.3	.70
Gender	256	154		150	106	
Female, %	70.3	77.3		70.7	69.8	
Male, %	29.7	22.7	.13	29.3	30.2	.88
Other demographics						
Speaks other language, <i>n</i> (%)	256 (66.4)	153 (61.4)	.31	150 (73.3)	106 (56.6)	.01
Have children, <i>n</i> (%)	257 (25.3)	154 (26.6)	.77	150 (27.3)	107 (22.4)	.39
Any breastfeeding, exclusive and combined, <i>n</i> (%)	65 (92.3)	41 (80.5)	.07	41 (92.7)	24 (91.7)	.99
Exclusive breastfeeding, all, <i>n</i> (%) ^a	65 (86.2)	41 (65.9)	.01	41 (82.9)	24 (91.7)	.47
Exclusive breastfeeding, 6 mo, <i>n</i> (%) ^b	65 (46.2)	41 (39)	.47	41 (43.9)	24 (50.0)	.80
Exclusive formula feeding, <i>n</i> (%)	65 (7.6)	41 (14)	.33	41 (7.3)	24 (8.3)	.99

^a Exclusive breastfeeding (human milk without other food or fluids) for any amount of time by resident or spouse.

^b Exclusive breastfeeding of all children for at least 6 months by resident or spouse.

TABLE 2 Changes in Resident Knowledge, Confidence, and PPs

	Intervention					Control					P ^c
	<i>n</i>	Mean Pretest Score	Mean Posttest Score	Mean Score Difference	P ^a	<i>n</i>	Mean Pretest Score	Mean Posttest Score	Mean Score Difference	P ^b	
Knowledge ^d	154	64.8	80.7	15.9	<.001	106	68.2	76.3	8.1	<.001	.022
Confidence ^e	154	2.770	3.895	1.125	<.001	103	3.146	3.665	.519	<.001	.013
PPs ^f	154	1.796	2.239	.443	<.001	103	1.822	2.148	.326	<.001	NS

96.j/T1__01Tf[(,001)-1551m3Mean Pretest2.23m3

Improvements in knowledge, confidence, and PP were analyzed according to the size of the residency program, to determine if effects were

shared equally, by using the weighted number of residents who completed the study at each site (Table 4). After adjustments were made

for size, mean improvements remained significant.

Knowledge, PP, and confidence were examined according to gender among residents in the intervention group who completed the study (Table 5). Despite baseline and posttest differences in PP, mean improvements did not differ between genders.

When compared among the 3 medical specialties, pediatric residents improved most in their confidence, whereas residents in obstetrics/gynecology and family medicine improved most in knowledge (Table 6).

TABLE 4 Weighted Averages of Mean Differences in Scores Based on Size of Residency Program

	<i>N</i>	Mean Score (SD) Difference Intervention (Unweighted/Weighted)	Mean Score (SD) Difference Control (Unweighted/Weighted)	<i>P</i> , Unweighted	<i>P</i> , Weighted
Knowledge	154	15.9 (15.6)	8.1 (9.1)	<.001	.003
Confidence	154	1.125 (1.07)	0.519 (.550)	<.001	<.001
PPs	154	0.443 (.431)	0.326 (.322)	.173	.198
PPs, excluding cultural questions ^a	152	0.440 (.435)	0.226 (.220)	.023	.022

^a Adjusted for PPs related to cultural competency (see "Methods").

Impact of Curriculum on Breastfeeding Initiation and Continuation at 6 Months

Twelve sites (5 intervention and 7 control programs) provided data at baseline (initiation and 6-month rates) and breastfeeding initiation after intervention, and 8 sites (3 intervention and 5 control programs) provided 6-month data. Breastfeeding of infants was more likely to be initiated and contin-

ued at intervention sites after curriculum implementation (Table 7). The curriculum had the most significant effect on increasing exclusive breastfeeding at intervention sites (OR: 4.1 [95% confidence interval: 1.8–9.7]), whereas among control sites, 6-month-old infants were half as likely (OR: 0.53 [95% confidence interval: 0.32–0.78]) to be exclusively breastfeeding after the intervention period.

DISCUSSION

Previous studies have revealed that neither residents nor practicing physicians believe that they received adequate training in clinical breastfeeding management.⁴ Our study results demonstrate that a targeted breastfeeding curriculum can improve breastfeeding knowledge, PPs, and resident confidence in managing breastfeeding. Because general knowledge about breastfeeding is increasing among health care professionals, more institutions are improving their breastfeeding practices.^{6,7,15} In addition, breastfeeding rates have increased in most populations and geographic areas over the past decade and driven needed improvements in professional care.¹⁶ It was important, therefore, to include control sites to reduce back-

TABLE 5 Knowledge, PPs, and Confidence Scores According to Gender-Intervention Group

	Baseline			After Intervention			Mean Score Differences		
	Male (<i>n</i> = 79)	Female (<i>n</i> = 175)	<i>P</i>	Male (<i>n</i> = 79)	Female (<i>n</i> = 175)	<i>P</i>	Male (<i>n</i> = 79)	Female (<i>n</i> = 175)	<i>P</i>
Knowledge	65 (14)	68 (13)	.079	77 (14)	80 (16)	.116	12	12	.665
Confidence	3.1 (.99)	2.91 (.96)	.230	3.9 (.68)	3.75 (.69)	.158	0.8	0.84	.590
PPs	1.69 (.65)	1.9 (.53)	.028	2.15 (.68)	2.2 (.59)	.444	0.46	0.3	.167
PPs, excluding cultural questions ^a	1.76 (.64)	2.13 (.64)	.000	2.2 (.68)	2.4 (.64)	.015	0.44	0.27	.060

Scores are mean (SD).

^a Adjusted for PPs related to cultural competency (see "Methods").

TABLE 6 Improvements According to Specialty

	Intervention			Control			<i>P</i> ^a
	Before Intervention	After Intervention	Difference	Before Intervention	After Intervention	Difference	
Pediatrics (<i>N</i> = 166), <i>n</i>							
Knowledge		84			82		
PPs	68 (12)	82 (17)	14	71 (13)	80 (14)	9	.057
PPs, excluding cultural questions ^b	1.74 (0.51)	2.21 (0.64)	0.47	1.81 (0.63)	2.15 (0.62)	0.34	.208
Confidence	1.87 (0.54)	2.35 (0.64)	0.48	1.95 (0.66)	2.30 (0.62)	0.35	.277
Obstetrics and gynecology (<i>N</i> = 48), <i>n</i>							
Knowledge		35			13		
PPs	2.76 (0.89)	3.76 (0.87)	1.00	3.27 (1.02)	3.85 (0.63)	0.58	.015
PPs, excluding cultural questions ^b	2.07 (0.56)	2.42 (0.59)	0.34	2.08 (0.52)	2.13 (0.50)	0.05	.062
Confidence	2.34 (0.58)	2.7 (0.59)	0.36	2.49 (0.63)	2.44 (0.52)	−0.05	.063
Family medicine (<i>N</i> = 46), <i>n</i>							
Knowledge		35			11		
PPs	59 (14)	77 (13)	18	56 (14)	58 (17)	2	.009
PPs, excluding cultural questions ^b	1.64 (0.52)	2.18 (0.58)	0.54	1.58 (0.67)	1.86 (0.81)	0.28	.279
Confidence	1.83 (0.60)	2.42 (0.60)	0.59	1.72 (0.77)	2.02 (0.84)	0.30	.302
Confidence	2.95 (0.88)	3.97 (0.59)	1.22	2.95 (0.88)	3.45 (0.96)	0.5	.072

Scores are mean (SD).

^a *P* value of the difference between mean score differences intervention versus control.

^b Adjusted for PPs related to cultural competency (see "Methods").

ground improvements in breastfeeding training and care from changes that were measured as a result of the targeted intervention with the AAP breastfeeding curriculum.

Intervention-group residents showed significant improvements in knowledge over control-group residents, and these differences were most striking in the obstetrics/gynecology and family medicine residents. Improvements in knowledge were also independent of the size of the residency program, suggesting that programs of all sizes can benefit from the use of these materials. Residents at the intervention sites indicated a change in their PPs (ie, they were more likely to perform bedside assessment of breastfeeding, counsel mothers about breastfeeding issues, or teach breastfeeding techniques than they were before implementing the curriculum). When comparing PPs of residents who received the intervention to those who did not, however, there was no significant difference before adjusting for items relating to cultural competency. One explanation for the lack of difference may have been an emphasis on

cultural competency training at the control sites coincidental to the implementation of the breastfeeding curriculum at the intervention sites.

13. World Health Organization/United Nations Children's Fund. Ten Steps to Successful Breastfeeding. New York, NY: United Nations Children's Fund; 2004. Available at: www.unicef.org/newsline/tensteps.htm. Accessed May 13, 2010
14. Academy of Breastfeeding Medicine. What every physician needs to know about breastfeeding [pre-conference course program]. Presented at: 14th annual international meeting of the Academy of Breastfeeding Medicine; November 5, 2009; Williamsburg, VA
15. DiGirolamo AM, Grummer-Strawn LM, Fein SB. Effect of maternity-care practices on breastfeeding. *Pediatrics*. 2008;122(suppl 2):S43–S49
16. Centers for Disease Control and Prevention. Breastfeeding Among U.S. Children Born 1999–2006, CDC National Immunization Survey. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2006. Available at: www.cdc.gov/breastfeeding/data/nis_data. Accessed May 9, 2010
17. Rogers EM. *Diffusion of Innovations*. 5th ed. New York, NY: Free Press; 2003

What Will Be the Second Disease Eliminated Worldwide after Smallpox and Not Require a Vaccine? Guinea Worms!

It is hard to believe that a quarter century ago, there were 3.5 million cases of guinea worm reported in 20 countries and now there are fewer than 3200 cases in four countries. According to an article in The New York Times (Kristof ND, April 28, 2010), thanks to efforts spear-headed by former President Jimmy Carter, the cases of Guinea worms now remain only in Sudan (primarily) and in Ethiopia, Ghana and Mali. This parasite, which grows up to a yard long inside the body and eventually pokes out of the skin with burning pain, is propagated when larva from the open skin where the worm has burrowed are deposited in unclean water that others then drink. Treatment involves keeping those with a guinea worm out of water—a campaign that has been successful, not because of a vaccine or a medicine, but due to behavioral change—because villagers themselves volunteer to inspect other villagers for signs of a blister suggestive of the worm and then keep an infected person out of the water while the worm is pulled out slowly an inch or two a day. Former President Carter, age 85, has stated that he is determined to outlive the Guinea worm and recently stated, “If I can survive two more years, I’ll meet my goal.” He is certainly close!

Noted by JFL, MD

Residency Curriculum Improves Breastfeeding Care

Lori Feldman-Winter, Lauren Barone, Barry Milcarek, Krystal Hunter, Joan Meek,
Jane Morton, Tara Williams, Audrey Naylor and Ruth A. Lawrence
Pediatrics 2010;126;289-297; originally published online Jul 5, 2010;
DOI: 10.1542/peds.2009-3250

Updated Information & Services

including high-resolution figures, can be found at:
<http://www.pediatrics.org/cgi/content/full/126/2/289>

References

This article cites 9 articles, 7 of which you can access for free at:
<http://www.pediatrics.org/cgi/content/full/126/2/289#BIBL>

Post-Publication Peer Reviews (P³Rs)

One P³R has been posted to this article:
<http://www.pediatrics.org/cgi/eletters/126/2/289>

Permissions & Licensing

Information about reproducing this article in parts (figures,
tables) or in its entirety can be found online at:
<http://www.pediatrics.org/misc/Permissions.shtml>

Reprints

Information about ordering reprints can be found online:
<http://www.pediatrics.org/misc/reprints.shtml>