A Review of Instruments Used to Predict Early Breastfeeding Attrition

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ABSTRACT

Few women breastfeed for 6 months or longer, and many who stop breastfeeding do so in the early postpartum period. To increase the number of breastfeeding mothers, health-care providers need to identify women at greatest risk for early breastfeeding attrition. This integrative review describes instruments used to assess breastfeeding in the early postpartum period and reports the results of studies using these tools. The instruments are then evaluated for similarities in variables and usefulness for clinical practice.

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Keywords: breastfeeding, breastfeeding duration, breastfeeding instruments

It is well known that breastfeeding is healthier than formula-feeding for both mothers and infants (Dennis, 2002). Many influential organizations such as the World Health Organization, the American Academy of Pediatrics (AAP), and the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN) have issued statements recommending breastfeeding (AAP, 2005; AWHONN, 1999; Child and Adolescent Health and Development, 2000–2002). *Healthy People 2010* recommends a breastfeeding initiation rate of 75% and a 6-month breastfeeding rate of 50% (U.S. Department of Health and Human Services, 2000). The most recently available statistics show a breastfeeding initiation rate in the United States of 70%, which approaches the *Healthy People 2010* goal. Of more concern, however, is the 6-month breastfeeding duration rate, currently at only 33% (Abbott Laboratories, 2003).

Many women who initiate breastfeeding stop very early, often between 1 and 4 weeks (Matthews et al., 1998). Effective nursing interventions to reduce early breastfeeding attrition are sorely needed. In this time of brief maternity hospital stays and a nursing shortage, it would be most helpful to be able to identify during the postpartum hospitalization those women at greatest risk for early unplanned weaning, so they could be selected to receive targeted interventions. Although much research has been done on the topic of breastfeeding attrition, no synthesis of this literature has been assembled to enable practicing nurses, childbirth educators, and researchers to compare the instruments in order to determine which tools are more useful in the prediction of early attrition. Therefore, the purpose of this integrative review was to examine and evaluate measures used in recently published nursing research to attempt to predict early breastfeeding attrition.

METHOD

The Cumulative Index to Nursing and Allied Health Literature was searched on August 23, 2004, for the years 1994–2004, using the following key words: nursing, breastfeeding, duration, and research. A 10-year time span was chosen to capture measures currently being used. Although 243 articles were identified, only 16 articles met the criteria of being printed in English and reporting original nursing research that utilizes a measure to attempt to predict the likelihood of early breastfeeding attrition. Of the 227 articles excluded, 104 were not research studies; 93 were reports of studies that did not use any measures to attempt to predict breastfeeding attrition; 22 did not report original research and, instead, reported summaries of other studies; three were not written in English; three were in foreign journals and could not be obtained through inter-library loan; and one was not related to breastfeeding. Additionally, one article that reported a study of breastfeeding exclusively in multiple gestation was omitted because the challenges of breastfeeding multiples are different enough to make comparisons with studies of breastfeeding singletons difficult. However databases are not infallible (Barroso et al., 2003); so, in an attempt to be thorough, articles describing nine other instruments that were mentioned or referenced in the articles that met criteria were also included and are discussed here, for a total of 25 studies.

RESULTS

Numerous instruments have been used in the study of breastfeeding duration; many in an attempt to predict those at most risk for early weaning. Some are based on particular theoretical frameworks, some were developed using qualitative data gathered from breastfeeding women, and others were developed to meet the needs of the particular study in which they were used or created for use in documentation of nursing care in clinical practice. The instruments vary in their effectiveness in predicting early breastfeeding attrition and in their ease of use and scoring. See the Table for a summary of all the articles reviewed.

Theory of Planned Behavior

Several instruments use some or all of the constructs found in the Theory of Planned Behavior (TPB) to attempt to predict breastfeeding intention or duration (Ajzen, 1988; Ajzen & Madden, 1986). Duckett and colleagues (1998) tested the TPB con-

structs to predict breastfeeding duration. They used a researcher-designed, 83-item questionnaire measuring the constructs of intention, attitudes toward breastfeeding and bottle-feeding, beliefs about outcomes of breastfeeding and bottle-feeding, subjective norm and normative beliefs, and perceived control and control beliefs. These constructs were measured with single questions, 7-point Likert scales, or 7-point semantic differential scales. Additionally, a 14-item Breastfeeding Knowledge Test was used to measure knowledge about breastfeeding. All instruments were completed by 602 healthy, breastfeeding, postpartum women prior to hospital discharge. Study participants were contacted by phone at 1, 3, 6, 9, and 12 months postpartum to determine breastfeeding status. *The variable of intention was found to be highly correlated with duration, as was perceived insufficient milk supply (measured after hospital discharge).** Interestingly, none of the other variables in the model, all measured in the very early postpartum period, predicted the occurrence of perceived insufficient milk supply. Also *significantly related to duration were breastfeeding knowledge, the mother's education level, and attitudes toward breastfeeding and bottle-feeding.*

One of the other outcomes of Duckett and colleagues' (1998) study was to use the results to create a modification of the TPB specific to breastfeeding that proposed different variable relationships among women who worked more than 20 hours per week. Dodgson, Henly, Duckett, and Tarrant (2003) tested this modified version of the TPB with 209 women in Hong Kong. They used the Minnesota Infant Feeding Questionnaire, which measured the TPB variables without the "weighting" variables (such as importance). The participants completed an 84-item scale, with most responses using a 7-point Likert scale, during their postpartum hospitalization. Internal consistency, where applicable, ranged from .80 to .92. Actual breastfeeding duration and other variables (such as employment status) were measured by postpartum phone calls. The model used in this study significantly predicted breastfeeding duration. *Significant correlations were found between actual breastfeeding duration and early postpartum intention, perceived control, and a breastfeeding difficulty index, which was constructed after data collection*

* Editor's note: In order to highlight their significance, important outcomes of each reviewed study are indicated in italics throughout this article.

TABLE
Summary of Articles Reviewed (listed in chronological order)

Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
Jensen, Wallace, & Kelsay (1994)	LATCH – 5 parameters	None	N/A	<ul style="list-style-type: none"> • Infant's ability to latch on • Presence of audible swallowing • Mother's nipple type • Help required in holding infant • Breastfeeding position used by mother 	Not a research study.
Leff, Jefferis, & Gagne (1994)	Maternal Breastfeeding Evaluation Scale (MBES) – 30 items in three subscales	None	442 women in northern New England, within a year postdelivery	<ul style="list-style-type: none"> • Maternal enjoyment and role attainment • Infant Satisfaction and growth • Lifestyle/Maternal body image 	<p>Sixteen items discriminated between those who breastfed less than and greater than 6 weeks ($p < .001$):</p> <ul style="list-style-type: none"> • "felt wonderful" • "nurturing, maternal experience" • "felt inner contentment" • "enjoyed nursing" • "special time with baby" • "baby and I worked together" • "felt very relaxed" • "comfortable" • "baby gained weight well" • "baby did not gain weight fast enough" • "baby not interested" • "baby's growth excellent" • "baby did not relax" • "baby loved to nurse" • "baby was happy" • "did not help baby settle"
Lawson & Tulloch (1995)	Breastfeeding intention, confidence in feeding method; coping; confidence	None	80 prenatal primiparas in Australia	<ul style="list-style-type: none"> • Breastfeeding intention • Confidence in feeding method • Coping, confidence 	<p>The following predicted a longer actual breastfeeding duration ($p < .01$):</p> <ul style="list-style-type: none"> • Earlier decision to breastfeed • longer intended duration • higher education • negative attitude toward formula-feeding
Hill & Humenick (1996)	H & H Lactation Scale – 20 items in three subscales retained after testing	Insufficient Milk Supply Framework	Term sample: 120 mothers completed survey at Weeks 1-6. Feeding patterns measured Weeks 2, 4, 6, 8, 12, 16, and 20	<ul style="list-style-type: none"> • Maternal • Confidence/Commitment, • Maternal-Infant breastfeeding • Satisfaction, perceived infant breastfeeding satiety 	<ul style="list-style-type: none"> • $r = .34$ between 1 week postpartum Confidence/Commitment subscale and level of breastfeeding at 8 weeks in low-birth-weight sample.

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Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
			LBW sample: 110 mothers completed portion of 30-item survey at end of first week of breast-feeding. Feeding patterns measured 8 weeks later. Subjects from Midwest and Western U.S.		<ul style="list-style-type: none"> • Scale as a whole and each subscale separately positively correlated with level of breastfeeding at 8 weeks with term infants • Correlations: .42 with scale as whole; • .42 for confidence/commitment subscale; .41 with satiety subscale; .32 for satisfaction subscale
Baker & Rasmussen (1997)	NICU Breast-feeding Record	None	N/A	Mother variables <ul style="list-style-type: none"> • Milk volume • Frequency of breast pumping • Maternal comfort Infant variables <ul style="list-style-type: none"> • Infant's physiological response to breastfeeding • Amount of supplementation Also includes LATCH scale	Not a research study.
Chezem, Montgomery, & Fortman (1997)	Breastfeeding confidence; number of questions unclear	None	53 women in third trimester; duration measured by postpartum phone calls; Midwest U.S.	Breastfeeding confidence	Breastfeeding confidence was not related to breastfeeding duration.
Humenick, Hill, & Wilhelm (1997)	Survey during postpartum hospitalization; additional survey at 1, 2, 3, 4, 5, and 6 weeks postpartum; 5-item Mother-Infant Breastfeeding Satisfaction Scale (MIBSS) weekly for 6 weeks after discharge.	Adaptation of Ajzen's Theory of Planned Behavior	120 women during postpartum hospitalization; after discharge by home visits and phone calls	<ul style="list-style-type: none"> • Importance of breastfeeding • Perception of encouragement/discouragement from others about breastfeeding • Knowledge and preparedness for breastfeeding • Prenatal class attendance • Other time spent learning about breastfeeding • Commitment to breastfeeding 	Only significant variables for breastfeeding duration measured in early postpartum were: <ul style="list-style-type: none"> • reading of books ($p = .001$) • attendance at prenatal classes for primiparas ($p = .03$) • encouragement by the childbirth educator ($r = .30$)
Riordan & Koehn (1997)	Infant Breastfeeding Assessment Tool (IBFAT), Mother Baby Assessment Tool (MBA), and LATCH	None	Nurse raters viewed 28 videotaped breastfeeding episodes	Congruence among the three instruments in rating a single breastfeeding episode	Inter-rater reliabilities ranged from .11 to .69; correlations among the scores of the three tools ranged from .68 to .78; test-retest reliabilities ranged from .64 to .88.

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Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
Wambach (1997)	Attitudes on Breastfeeding Scale (ABS) – 17 items; subjective norms, 8 items; perceived control of breastfeeding, 4 items; confidence, 1 item; breast-feeding intention, 1 item	Theory of Planned Behavior	135 women in the last 6 weeks of pregnancy; Midwestern U.S.; duration measured by mailed questionnaire	<ul style="list-style-type: none"> • Prenatal attitudes • Confidence • Subjective norms • Perceived control of breastfeeding • Breastfeeding intention 	Attitudes and perceived control were found to significantly affect intention ($R^2 = .23$); Intention very weak ($R^2 = .04$) predicted breastfeeding duration.
Brandt, Andrews, & Kvale (1998)	Barnard's Nursing Child Assessment Feeding Scale (NCAFS)	None	Breastfeeding episode observed in subject's home, at 24–96 hours postpartum; follow-up phone call to determine duration at 6 weeks	<ul style="list-style-type: none"> • Sensitivity to cues • Response to distress • Social-emotional growth fostering • Cognitive growth fostering • Clarity of cues • Responsiveness to parent 	Scores of dyads still breastfeeding at 6 weeks were significantly higher than those of dyads who had stopped breastfeeding by 6 weeks postpartum ($t(41) = 2.43, p < .05$).
Duckett, Henly, Avery, Potter, Hills-Bonczyk, Hulden et al. (1998)	Researcher-designed, 83-item questionnaire; 14-item Breastfeeding Knowledge Test	Theory of Planned Behavior	602 healthy breastfeeding women in the Midwestern U.S., during postpartum hospitalization; analysis split among homemakers, women working less than 20 hours per week, and women working more than 20 hours per week.	<ul style="list-style-type: none"> • Intention to breastfeed • Attitudes toward breastfeeding and bottle-feeding • Beliefs about outcomes of breastfeeding and bottle-feeding • Subjective norm and normative beliefs • Perceived control • Control beliefs • Knowledge about breastfeeding 	Significantly related to breastfeeding duration: <ul style="list-style-type: none"> • intention ($R^2 = .29-.43$) • perceived insufficient milk supply (measured after hospital discharge, $R^2 = -.12$ to $-.31$) • breastfeeding knowledge ($R^2 = .13$ for employed groups only) • mother's education level ($R^2 = .13$ for employed groups only) • attitudes toward breastfeeding ($R^2 = .11$ for employed groups only) and bottle-feeding ($R^2 = -.13$ for employed groups only)
de la Mora, Russell, Dungy, Losch, & Dusdieker (1999)	Iowa Infant Feeding Attitude Scale – 17 items	None	980 postpartum women prior to hospital discharge; breastfeeding duration measured in 725 women by phone	<ul style="list-style-type: none"> • Attitudes toward breastfeeding and formula-feeding • Breastfeeding duration 	Scale scores significant for duration of exclusive breastfeeding ($R^2 = .08$) and duration of partial breastfeeding ($R^2 = .06$).

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Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
Dennis & Faux (1999)	Breastfeeding Self-Efficacy Scale (BSES) – 33 items; two subscales: technique and intrapersonal thoughts	Self-Efficacy Theory	130 postpartum Canadian women	Breastfeeding confidence	Significant difference between exclusively breastfeeding and exclusively formula-feeding women at 6 weeks postpartum
Riordan, Gross, Angeron, Krumwiede, & Melin (2000)	Infant Breastfeeding Assessment Tool (IBFAT)		129 women in postpartum hospital rooms; duration data by phone at 6 weeks	<ul style="list-style-type: none"> • Labor analgesia • Infant suckling • Breastfeeding duration 	Subjects with low IBFAT scores had breastfeeding duration significantly shorter than those with medium or high IBFAT scores.
McCarter-Spaulding & Kearney (2001)	Perception of Insufficient Milk Supply Questionnaire (PIM) and Reese's Parent Expectations Survey (PES)	Insufficient Milk Supply Framework	Mailed surveys from 60 mothers coming in to pediatric offices for well-child infancy visits	<ul style="list-style-type: none"> • Parenting self-efficacy • Breastfeeding problems 	No difference in PES scores between women experiencing breastfeeding problems and those reporting no problems. PES related to PIM ($r = .49$; $R^2 = .23$).
Blyth, Creedy, Dennis, Moyle, Pratt, & DeVries, (2002)	Breastfeeding Self-Efficacy Scale (BSES) – 33 items; two subscales: technique and intrapersonal thoughts	Bandura's Social Cognitive Theory and Breastfeeding Self-Efficacy Theory	300 women in Australia; 300 prenatally, 276 at 1 week postpartum; 233 at 4 months postpartum	Breastfeeding confidence	High prenatal confidence related to breastfeeding duration at 1 week ($p < .001$). High 1-week postpartum confidence related to breastfeeding duration at 4 months postpartum ($p < .001$)
Dick, Evans, Arthurs, Barnes, Caldwell, Hutchins et al. (2002)	Breastfeeding Attrition Prediction Tool (BAPT), modified – four subscales: Positive Breastfeeding Sentiment, Negative Breastfeeding Sentiment, Social and Professional Support, and Control	Theory of Planned Behavior	269 women in North Carolina and Florida during postpartum hospitalization. Breastfeeding duration measured with phone call at 8 weeks.	<ul style="list-style-type: none"> • Positive breastfeeding sentiment • Negative breastfeeding sentiment • Social and Professional Support • Control • Breastfeeding status at 8 weeks 	Breastfeeding status predicted in 73% of the cases, with negative breastfeeding sentiments and control subscales being the only subscales showing significance.

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Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
Hall, Mercer, Teasley, McPherson, Simon, Santos et al. (2002)	Breastfeeding Assessment Score (BAS) – 68-items initially; 39 items from the women's medical records; 47 items by phone after discharge.	No formal framework	1,075 predominantly suburban and middle-class breastfeeding women prior to their postpartum discharge	Maternal age <ul style="list-style-type: none"> • Previous breastfeeding experience • Frequency of difficulty latching the infant on to the breast • How frequently breastfeeding occurred in the hospital • How many bottles of formula given to the infant during hospitalization • Medical conditions of mother (previous breast surgery, hypertension of any cause during pregnancy, and vacuum-assisted vaginal delivery) 	Eight items significant and predictive of breastfeeding cessation by 7–10 days postpartum: <ul style="list-style-type: none"> • Maternal age ($OR = 1.6$) • Previous breastfeeding experience ($OR = 2.4$) • Frequency of difficulty latching the infant on to the breast ($OR = 1.6$) • How frequently breastfeeding occurred in the hospital ($OR = 1.4$) • How many bottles of formula given to the infant during hospitalization ($OR = 1.5$) • Medical conditions of mother (previous breast surgery, hypertension of any cause during pregnancy, and vacuum-assisted vaginal delivery) ($OR = 1.3$)
Chezem, Friesen, & Boettcher (2003)	Maternal Confidence Survey (MCS) during third trimester by phone; Breastfeeding Questionnaire (BQ) given 4–8 weeks postpartum by mail	No formal framework	74 women, mostly Caucasian	<ul style="list-style-type: none"> • Breastfeeding duration at 6 weeks, 3 months, and 6 months • Maternal confidence • Breastfeeding knowledge 	BQ scores had a strong relationship to breastfeeding duration ($r = .455$) and to MCS ($r = .262$)
Dodgson, Henly, Duckett, & Tarrant (2003)	Minnesota Infant Feeding Questionnaire	Theory of Planned Behavior, modified	209 women in Hong Kong during postpartum hospitalization. Breastfeeding duration measured by phone at 1, 3, 6, 9, and 12 months.	<ul style="list-style-type: none"> • Beliefs about outcomes of formula-feeding or breastfeeding • Referent beliefs • Control beliefs • Attitudes about formula-feeding or breastfeeding • Subjective norms • Intended length of breastfeeding 	Significant correlations between actual breastfeeding duration and: <ul style="list-style-type: none"> • early postpartum intention (.52) • perceived control (.40.) • a posthoc constructed "breastfeeding difficulty index" (–.39)

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Authors	Instrument	Theoretical Framework	Subjects and Setting	Variables/Scale Concepts	Major Findings
Evans, Dick, Lewallen, & Jeffrey (2004)	Breastfeeding Attrition Prediction Tool (BAPT), modified	Theory of Planned Behavior	117 women at prenatal breastfeeding classes and again after delivery. Duration measured by phone at 8 weeks.	<ul style="list-style-type: none"> • Positive breastfeeding sentiment • Negative breastfeeding sentiment • Social and professional support • Control • Breastfeeding status at 8 weeks 	Significant difference between prenatal and postpartum scores on two of the four subscales: social and professional support and breastfeeding control ($p < .01$). Neither score predicted duration.
Gau (2004)	Breastfeeding Attitude Questionnaire—20 items. Breastfeeding Attitude Questionnaire —32 items.	No formal framework	4,614 postpartum women in seven Taiwan hospitals.	<ul style="list-style-type: none"> • Interplay of breastfeeding and the baby's health • Advantages of breastfeeding • Possibilities of replacing breast milk with formula • Breastfeeding taboos • Breastfeeding advantages • Handling of breastfeeding problems • Methods and techniques of breastfeeding • Type of hospital of delivery (breastfeeding "friendly" vs. no special policies regarding breastfeeding) 	Breastfeeding knowledge ($r = .17$) and breastfeeding attitude ($r = .16$) were related to breastfeeding duration.

based on the number of breastfeeding problems reported during follow-up phone calls.

Another instrument based on the TPB is the Breastfeeding Attrition Prediction Tool (BAPT), originally developed by Janke (1992). Dick and colleagues (2002) tested this instrument with 269 postpartum women. The BAPT instrument consists of 86 items divided into four subscales: Positive Breastfeeding Sentiment, Negative Breastfeeding Sentiment, Social and Professional Support, and Control, all measured with 5-point Likert scales. Three of the subscales are scored by creating product scores, and one (Control) is simply summed. Follow-up phone calls were made at 8 weeks postpartum to determine breastfeeding status. Using discriminant function analysis, the BAPT was able to predict breastfeeding status at 8 weeks in 63% of the cases, with Negative Breastfeeding Sentiments and Control the only subscales that showed significance. Factor analysis was conducted on these data, and items were deleted from the scale, leaving a total of 71 items. Testing predictive ability with the modified scale, *breastfeeding status was able to be predicted in 73% of the cases, again with Negative*

Breastfeeding Sentiments and Control subscales being the only subscales showing significance.

This modified BAPT was tested again during the last trimester of pregnancy and in the immediate postpartum period to look for differences in scores between the two time periods and to test the ability of each set of scores to predict early breastfeeding attrition (Evans, Dick, Lewallen, & Jeffrey, 2004). One hundred seventeen women were recruited from a prenatal breastfeeding class where they completed the modified BAPT. The instrument was completed a second time in the postpartum hospital room after participants gave birth, and the women were called 8 weeks later to determine if they were still breastfeeding. The women differed significantly between the prenatal and postpartum period on two of the four subscales: Social and Professional Support and Breastfeeding Control. In both instances, the women scored higher on the subscales after birth (indicating more perceptions of support and control). However, *neither set of scores reliably predicted early breastfeeding attrition.*

Wambach (1997) used the TPB to design a study of factors influencing breastfeeding intention and

duration with 135 women. She hypothesized that prenatal attitudes, subjective norms, and perceived control of breastfeeding would influence breastfeeding duration indirectly through their influence on breastfeeding intention. Wambach also hypothesized that breastfeeding intention and perceived control of breastfeeding would have a direct influence on breastfeeding duration. Prenatal attitudes (all prenatal instruments were administered during the last 6 weeks of pregnancy) were measured by the 17-item Attitudes on Breastfeeding Scale (ABS), which uses a 5-point Likert scale. This scale is summed and divided by the number of items to create a mean score. Subjective norms were measured by eight researcher-developed items. Four of these eight items measured beliefs about the participant's significant other's expectations and four measured the mother's motivation to comply with those expectations. Each item in the first set was multiplied by the corresponding item in the second set, then all four products were summed to create the score. Perceived breastfeeding behavioral control was measured by a researcher-developed, 4-item scale, with three items measured on a 7-point Likert scale and one additional overall confidence item measured on a 5-point scale. Mean scores were created for this scale similar to the ABS described above. Breastfeeding intentions were measured by one researcher-developed item on a 7-point scale. Breastfeeding duration, measured in days, and other variables were measured after 4 weeks postpartum with a mailed questionnaire. Attitudes and perceived control were found to significantly affect intention, but the variable of subjective norms was not significant. *Intention weakly predicted breastfeeding duration, but perceived control had no effect.*

Iowa Infant Feeding Attitude Scale

The Iowa Infant Feeding Attitude Scale (de la Mora, Russell, Dungy, Losch, & Dusdieker, 1999) is a 17-item scale measuring attitudes toward breastfeeding and formula-feeding. The items use a 5-point Likert scale, and nine of the items are reversed, then summed to create a score. The instrument was developed and refined during three independent studies involving 980 postpartum women prior to hospital discharge. The sample was mostly well-educated and Caucasian women. Breastfeeding duration was measured by phone over a 16-week period with a sample of 725 breastfeeding women. In the study sample, the average duration of exclusive breastfeeding was 6.5 weeks, and the average

duration of partial breastfeeding was 10 weeks. *Scores on this scale accounted for 8% of the variance in duration of exclusive breastfeeding and 6% of the variance in duration of partial breastfeeding.*

NICU Breastfeeding Record

Several instruments have been developed as a way to clinically document breastfeeding progress during the postbirth hospitalization period. The NICU Breastfeeding Record was developed for use in the clinical area and includes information about available instruction, discharge planning data, and a breastfeeding assessment grid (Baker & Rasmussen, 1997). The breastfeeding assessment grid contains information about the mother (milk volume, frequency of breast pumping, maternal comfort) and her baby (infant's physiological response to breastfeeding and amount of supplementation). The assessment grid also includes the LATCH scale (see description, below). The NICU Breastfeeding Record was used for the provision of nursing care rather than research, but the authors point out it does provide important data that could be used for research.

Created as a tool for clinical documentation, the LATCH scale was modeled on the Apgar score and has a score range of 0–10. Each of the scale's five parameters can be assigned a maximum of two points. The scales' five parameters are the following:

- the infant's latch on to the breast (L);
- the amount of audible swallowing (A);
- the mother's nipple type (T);
- the mother's level of comfort (C); and
- the help from nurses (H) required during the breastfeeding encounter to hold the baby in the breastfeeding position.

This scale was designed to be completed by nursing staff as the mother is observed in breastfeeding, and total scores are expected to vary from one feeding to the next as conditions change. The scale can also be completed using only the mother's self-report in response to standardized questions for each parameter (Jensen, Wallace, & Kelsay, 1994).

Reliability and Construct Validity of Three Scales

A study was done to assess the reliability and construct validity of three instruments used in the clinical area to assess breastfeeding (Riordan & Koehn, 1997). The Infant Breastfeeding Assessment Tool (IBFAT), the Mother Baby Assessment Tool (MBA), and the LATCH were used by nurse raters

to score 28 videotaped breastfeeding episodes of healthy newborns. Six months later, some of the same episodes were viewed and rescored by the original raters. The IBFAT examines four infant components of breastfeeding (readiness to feed, rooting, fixing, and suckling) and two maternal components (perception of the feeding and satisfaction with the feeding). Scores can range from 0–12, with 12 representing vigorous and effective feeding. The MBA assesses the process of breastfeeding and includes five steps, each with both a maternal and infant behavior component (signaling, positioning, fixing, achieving milk transfer, and ending). Possible scores range from 0–10, with 10 being the most positive. The LATCH was discussed earlier.

Inter-rater reliabilities were low on all the tools. Correlations among the scores of the three tools were moderate. Percentages of agreement among the raters for the retest six months later were highly variable, ranging from 37 to 97%. *The authors concluded the instruments were not reliable enough for use in clinical decision-making.* However, they did concede that rating by viewing a videotape was quite different from rating when present at an actual feeding, where different views can be obtained and the mother can be questioned about what she feels during the episode. Also, the authors acknowledged that a nurse viewing the feeding and rating the event would base the assessment on different data than would the mother, herself, rating the feeding. The mother's rating may be more accurate and comprehensive because she can describe sensations that cannot be objectively assessed.

In another study, Riordan, Gross, Angeron, Krumwiede, and Melin (2000) used the IBFAT to assess the effect of labor analgesia on infant suckling and breastfeeding duration. Nurse lactation consultants administered the IBFAT to mothers in the postpartum hospital room. Satisfactory inter-rater reliability was obtained among the four evaluators. Data on breastfeeding duration was collected by phone at 6 weeks postpartum. *Mother-infant dyads with low IBFAT scores had a breastfeeding duration significantly shorter than those with medium or high IBFAT scores.*

Breastfeeding Assessment Score

A synthesis of the literature and qualitative data were used to develop the Breastfeeding Assessment Score (BAS) (Hall et al., 2002). This instrument is designed to identify, before hospital discharge, infants at risk for early breastfeeding cessation. The

instrument was developed by using concepts found in other breastfeeding assessment instruments, as well as through information gained by talking with breastfeeding women in the early postpartum period. A 68-item questionnaire was administered to 1,075 breastfeeding women prior to their postpartum discharge; then, researchers completed another 39 items from the women's medical records. Finally, researchers completed 47 items by phone with the women after they were discharged from the hospital. Using logistic regression models, *eight items emerged as significant and predictive of breastfeeding cessation by 7–10 days postpartum. Two points are given to each of five indicators: maternal age, previous breastfeeding experience, frequency of difficulty of latching the infant on to the breast, how frequently breastfeeding occurred in the hospital, and how many bottles of formula were given to the infant during hospitalization. Then, points are deducted from this score if any of three medical conditions are present: previous breast surgery, hypertension of any cause during pregnancy, and vacuum-assisted vaginal birth.* The instrument is suggested for use prior to leaving the hospital to assess for risk.

Breastfeeding Self-Efficacy Scale

The mother's confidence in her ability to breastfeed has been the basis for instrument development, using Bandura's (1977) Social Learning Theory as a framework. The Breastfeeding Self-Efficacy Scale (BSES), developed by Dennis and Faux (1999), is a 33-item scale to measure breastfeeding confidence. The scale has the stem of "I can always," and items have a 5-point Likert scale with the anchors "not at all confident" and "always confident." *Two subscales were identified: Technique, which deals with physical tasks of breastfeeding, and Intrapersonal Thoughts, which deals with the mother's attitudes and beliefs about breastfeeding.* Scores are summed with a possible range of 33–165. A predominantly Caucasian sample of 130 Canadian women completed the instrument during their postpartum hospitalization. *A significant difference was found between scores of women who were exclusively breastfeeding at 6 weeks and those who were exclusively feeding with formula.*

The BSES was tested in Australia prenatally and at 1 week and 4 months postpartum (Blyth et al., 2002). *Higher prenatal breastfeeding confidence was found to be related to breastfeeding duration at 1 week postpartum. Additionally, breastfeeding confidence measured at 1 week postpartum was found to*

be even more predictive of breastfeeding duration at 4 months postpartum. Specific high or low cut-off scores were not given.

Dennis (2002) then shortened this instrument based on results of psychometric testing of the original version, deleting 18 items for a new total of 14 for the short form of the BSES (BSES-SF). The BSES-SF was then tested by mail with women at 1 week ($n = 491$), 4 weeks ($n = 459$), and 8 weeks ($n = 389$) postpartum. *Not only did the 1-week BSES-SF significantly differentiate between breastfeeding and formula-feeding women at 4 and 8 weeks, but it also differentiated between those breastfeeding women who would breastfeed exclusively and those who would supplement with formula.*

Breastfeeding Confidence

Chezem, Montgomery, and Fortman (1997) measured breastfeeding confidence using a 5-point Likert scale, along with demographic and employment variables, in the third trimester of pregnancy. *Breastfeeding confidence was not related to breastfeeding duration, as measured by postpartum phone calls at 6 weeks, 3 months, and 6 months postpartum.* It was not clear from the article if the confidence scale used in this study had more than one question.

Chezem, Friesen, and Boettcher (2003) used the Maternal Confidence Survey (MCS) (O'Campo, Faden, Gielen, & Wang, 1992), which asked a predominantly Caucasian sample of 74 women to respond on a 6-point scale (very confident to very unsure) to items asking about their perceived ability to breastfeed in 10 different situations. The survey was completed over the phone during the third trimester of pregnancy. The scale is summed and divided by the number of responses to create a mean confidence score. A modified Breastfeeding Questionnaire (BQ) (Gulick, 1982), which assessed breastfeeding knowledge scored by a percentage of correct responses, was completed by the subjects between 4 and 8 weeks postpartum and returned by mail. Follow-up phone calls were conducted at 6 weeks, 3 months, and 6 months postpartum to assess breastfeeding duration. *BQ scores had a strong relationship to breastfeeding duration and to MCS; however, the prenatal MCS was not significantly correlated to duration (.06).*

In Australia, Lawson and Tulloch (1995) measured breastfeeding intention, confidence that the decision about intended infant feeding would come to fruition, and coping confidence in a group of 80 primiparas planning to breastfeed. Intention

was measured by one question. Confidence about the intended type of feeding and attitude about formula-feeding were each measured with one question on a 6-point scale. Coping confidence was assessed by 10 questions on a 6-point scale asking how confident with breastfeeding the subject would feel under a variety of circumstances. The preceding questions were asked by mail prenatally. Breastfeeding duration, in addition to other variables, was measured by mailed questionnaire at 3 months postpartum. The confidence score was found to be significantly correlated with intended duration of breastfeeding and commitment to feed for the intended duration. Discriminant function analysis showed that *an earlier decision to breastfeed, longer intended duration, higher education, and a negative attitude toward formula predicted a longer actual breastfeeding duration.* Confidence about the ability to overcome problems and level of commitment to the intended breastfeeding duration were not related to actual duration.

The H & H Lactation Scale, developed by Hill and Humenick (1996), was based on the Insufficient Milk Supply (IMS) conceptual framework. The 30-item scale measured the variables of perceived infant satisfaction, maternal satisfaction, and maternal confidence with breastfeeding on a 7-point Likert scale. It was tested with two samples: 110 mothers of low-birth-weight infants and 120 mothers of healthy term infants. Using factor analysis, the scale was reduced to 20 items that comprised three subscales: Maternal Confidence/Commitment (10 items), Maternal-Infant Breastfeeding Satisfaction (5 items), and Perceived Infant Breastfeeding Satiety (5 items). *A positive correlation was found between the 1 week postpartum Confidence/Commitment subscale and level of breastfeeding at 8 weeks postpartum in the low-birth-weight sample (the other two subscales were not tested in this sample in early postpartum). The scale, as a whole, and each subscale, separately, were positively correlated with level of breastfeeding at 8 weeks postpartum with term infants.*

Breastfeeding Encouragement

Humenick, Hill, and Wilhelm (1997) examined demographic data, importance of breastfeeding, perception of encouragement/discouragement from others about breastfeeding, knowledge and preparedness for breastfeeding, prenatal class attendance, and other time spent learning about breastfeeding. The preceding variables were measured

during the postpartum hospital stay. Then, additional information about satisfaction with breastfeeding, encouragement/discouragement from others, and level of breastfeeding was collected during home visits as early as 1 week postpartum. Level of breastfeeding was also assessed through phone calls during the postpartum period. Encouragement was measured using one item on a 7-point Likert scale. Knowledge was measured with one item on a 7-point Likert scale, as well as by recording the woman's estimated number of minutes learning about breastfeeding in a class, from books, or some other way, and by recording attendance at prenatal classes. A single item (on a 7-point Likert scale) was used to measure commitment to breastfeeding during the postpartum hospitalization, along with the number of months the woman planned to continue breastfeeding. Continued commitment was measured weekly after hospital discharge using the Mother Infant Breastfeeding Satisfaction Scale (MIBSS), a subscale of the H & H Lactation Scale. This subscale had five items, all measured on a 7-point Likert scale.

During the postpartum hospitalization, perceived encouragement was found to be significant in continued breastfeeding only in primiparas who perceived encouragement from their childbirth educator. At Week 1, perceived encouragement for breastfeeding from partners was related to breastfeeding duration in primiparas and inexperienced multiparas, but not by experienced multiparas. At Week 2, perceived encouragement from co-workers and employers was inversely related to breastfeeding duration; however, by 4 weeks, sisters' encouragement was significantly related to longer duration. Attendance at prenatal class was significantly related to breastfeeding duration in primiparas, as was reported prenatal reading time about breastfeeding. Interestingly, primiparas who planned to breastfeed for a limited amount of time ended up breastfeeding significantly longer than those who had planned to breastfeed a longer amount of time. Maternal satisfaction with breastfeeding, measured beginning at 2 weeks postpartum, was significant to increased duration. Thus, the only early postpartum predictor of continued breastfeeding was reading of books and encouragement by the childbirth educator, who typically works with both the woman and her partner.

Milk Maturation Rate

Humenick, Mederios, Wreschner, Walton, and Hill (1994) tested and refined a physiologic measure of

milk maturation called the Maturation Index of Colostrum and Milk (MICAM), in which breast milk was dropped onto filter paper and allowed to dry and the pattern was analyzed as to its stage in the milk maturation process. When compared to laboratory analysis of the breast milk, the MICAM was found to be a valid indicator of milk maturation. After training the observers, the researchers established good inter-rater reliability in interpreting the MICAM samples. The MICAM was then examined for its relationship with other variables, including duration of breastfeeding. *Earlier milk maturation was significantly related to sustained breastfeeding.* Breastfeeding satisfaction was measured weekly for 6 weeks using the MIBSS. Breastfeeding satisfaction scores during the second week significantly predicted milk type on Day 42. Additionally, the IBFAT was completed by the mother at each feeding from Days 1–6. The data from Day 1 contained too many missing values to be useful, but mean scores were calculated for Days 2–6. IBFAT scores were a predictor of later milk maturation.

Breast-Milk Sodium

Humenick, Hill, Thompson, and Hart (1998) conducted a study to determine if the amount of sodium in the breast milk served as a predictor marker of early weaning. In addition to samples of breast milk, the researchers used two paper and pencil measures to assign risk status for early weaning. First, one item on a 4-point scale was used to assess the density of the woman's breastfeeding support network, administered at 1 day postpartum. If the woman scored 3 or 4 on this item, she was considered low risk. Second, the MIBSS was administered at 1 week postpartum. *Significant differences in breastfeeding duration were found among women who were identified at risk on one or both of these measures versus those who were identified as low risk on both measures. Additionally, breast-milk sodium levels were found to be a significant factor in predicting women who would not sustain breastfeeding as long as they had planned to do.*

Perception of Insufficient Milk Supply Questionnaire

The Perception of Insufficient Milk Supply Questionnaire (PIM), developed from Hill and Humenick's theory (1989) and from the literature, was tested in conjunction with Reece's (1992) Parent Expectations Survey (PES), which tests parenting self-efficacy (McCarter-Spaulling & Kearney, 2001), and a demographic data sheet. The sample

Mothers who began feeding when their infants were quiet-alert or active-alert, rather than drowsy or crying, were more likely to still be breastfeeding at 6 weeks postpartum.

consisted of 60 mothers visiting pediatric offices for well-child infancy visits, and surveys were mailed back to the researchers. No difference in PES scores was found between women experiencing breastfeeding problems and those reporting no problems; however, *PIM and PES scores were significantly related*. This instrument is discussed here because, even though breastfeeding duration is not specifically measured, one of the most frequent reasons given by mothers for early cessation of breastfeeding is the perception of insufficient milk (Kirkland & Fein, 2003).

Breastfeeding Satisfaction

Leff, Jefferis, and Gagne (1994) reported on the development and testing of an instrument to measure satisfaction with breastfeeding. The Maternal Breastfeeding Evaluation Scale (MBES) contains 30 items divided into three subscales: Maternal Enjoyment and Role Attainment (14 items), Infant Satisfaction and Growth (8 items), and Lifestyle/Maternal Body Image (8 items). This instrument was mailed to women in northern New England who had given birth within the past year. They were asked to consider their most recent breastfeeding experience when responding to the questions. Although not designed to predict duration of breastfeeding, *16 of the 30 items did discriminate between women who breastfed briefly (6 weeks or less) and women who breastfed longer than 6 weeks*.

Nursing Child Assessment Feeding Scale

Brandt, Andrews, and Kvale (1998) used Barnard's Nursing Child Assessment Feeding Scale (NCAFS) to predict breastfeeding duration in a group of Latina women enrolled in the Women's, Infant's, and Children's program in California. In order to use this instrument, the user must achieve accuracy through use of standardized training videotapes, as the principal investigator of this study did. The NCAFS consists of six subscales: Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, Cognitive Growth Fostering, Clarity of Cues, and Responsiveness to Parent. Each subscale can potentially contribute a certain number of

points to the total score, with a possible total score range of 1–76. The scale was completed in the subject's home during a breastfeeding episode between 28 and 96 hours postpartum. Breastfeeding duration was determined by phone at 6 weeks postpartum. Scores of dyads still breastfeeding at 6 weeks postpartum were significantly higher than those of dyads that had stopped breastfeeding by 6 weeks postpartum. The authors state *the mother's responses to her infant's hunger cues were especially important to this relationship*, with mothers who began feeding when their infants were quiet-alert or active-alert, rather than drowsy or crying, more likely to still be breastfeeding at 6 weeks postpartum.

Hospital Policies

As part of a study evaluating changes in hospital policy to incorporate WHO/UNICEF's "Ten Steps to Successful Breastfeeding," 4,614 postpartum women in Taiwan responded to two instruments related to breastfeeding (Gau, 2004). The Breastfeeding Attitude Questionnaire is a 20-item instrument divided into three categories: the interplay of breastfeeding and the baby's health, the advantages of breastfeeding, and the possibilities of replacing breast milk with formula. The Breastfeeding Knowledge Questionnaire had 32 questions in four categories: breastfeeding taboos, breastfeeding advantages, handling of breastfeeding problems, and methods and techniques of breastfeeding. Study participants were divided into an experimental group (women who gave birth in hospitals that had policies rated as highly consistent with the "Ten Steps") and a control group (women who gave birth in hospitals that did not rate as highly consistent with the "Ten Steps"). *Breastfeeding duration was significantly longer in women from the experimental group than in those from the control group. Additionally, small and significant correlations existed between both breastfeeding knowledge and breastfeeding attitudes, and breastfeeding duration.*

IMPLICATIONS FOR RESEARCH AND PRACTICE

This review demonstrates that a variety of instruments are being used both in clinical practice and in research to assess breastfeeding. Many of the research instruments are lengthy and complicated to score, making them difficult to use in clinical practice. However, many of the instruments have

variables in common, and some have been shown to predict breastfeeding duration when collected very early in the postpartum period. These include:

- intention to breastfeed (Dodgson et al., 2003; Duckett et al., 1998; Lawson & Tulloch, 1995; Wambach, 1997);
- attitudes toward breastfeeding and bottle-feeding (de la Mora, et al., 1999; Dick et al., 2002; Duckett et al., 1998; Gau, 2004; Lawson & Tulloch, 1995);
- breastfeeding control (Dick et al., 2002; Dodgson et al., 2003);
- responsiveness to cues between mother and infant (Brandt et al., 1998); and
- commitment to breastfeeding (Hill & Humenick, 1996).

Satisfaction with breastfeeding (Leff et al., 1994) distinguished between mothers who would breastfeed for varying lengths of time, but it was measured retrospectively. *Breastfeeding knowledge*, measured both prenatally (Duckett et al., 1998) and in the postpartum period (Chezem et al., 2003; Gau, 2004), *reading books* (Humenick et al., 1997), *support from the childbirth educator* (Humenick et al., 1997), and *attendance at prenatal classes* (Humenick et al., 1997) have been shown to affect breastfeeding duration. *Breastfeeding confidence* significantly predicted duration in two studies (Blyth et al., 2002; Hill & Humenick, 1996), but not in another (Chezem et al., 1997), although it did differentiate between breastfeeding and formula-feeding mothers (Dennis & Faux, 1999). *Perception of insufficient milk supply*, measured after hospital discharge, is also an important factor in breastfeeding duration (Duckett et al., 1998), and *parents' feelings of self-efficacy* are related to this perception (McCarter-Spaulding & Kearney, 2001). Additionally, *demographic factors* such as maternal age and previous breastfeeding experience (Hall et al., 2002) and the education level of the mother (Duckett et al., 1998; Evans et al., 2004; Lawson & Tulloch, 1995) are frequently predictors of duration, as is the decision to breastfeed made early in pregnancy (Lawson & Tulloch, 1995).

Some of the clinical instruments are not formatted or tested for use in research, but they provide a wealth of data. Additionally, data that could be collected in the clinical area (e.g., history of latch problems, frequency of formula supplementation during postpartum hospitalization, and medical conditions of the mother) have been shown to pre-

Breastfeeding knowledge—measured both prenatally and in the postpartum period—reading books, support from the childbirth educator, and attendance at prenatal classes have been shown to affect breastfeeding duration.

dict early breastfeeding cessation (Hall et al., 2002), as is breastfeeding difficulty after postpartum discharge (Dodgson et al., 2003). Developed for clinical use, the IBFAT has demonstrated the ability to identify women who will have shorter breastfeeding durations (Riordan et al., 2000). More research is needed to develop or refine instruments so they are easy to administer and score and, thus, useful to identify women at risk for early weaning in time to deliver focused interventions. Alternatively, instruments already shown to be useful in clinical practice can be studied to determine their usefulness in predicting early breastfeeding attrition.

All of these variables, as well as some that are as yet unmeasured, contribute to the complex phenomenon of successful breastfeeding. Ideally, as the mother-infant dyad matures, breastfeeding routines are established and a comfortable rhythm develops. However, the early days and weeks of this relationship are tumultuous for some, filled with uncertainty. For too many mothers, this uncertainty and discomfort precipitates a change to formula-feeding, where intake can be easily measured and questions readily answered. These women who begin their parenting experience wanting to breastfeed but, for many reasons, find it too much to handle are the ones who most need intervention to allow them to meet their goals and best provide for their infant's nutrition and health. Currently, no instrument exists that is proven to be easily usable in the immediate postpartum clinical area to accurately predict which women need the most support and follow-up measures. Many instruments described in this review show promise; however, more work remains to refine them for ease in scoring and to further test them earlier in the postpartum period and with ethnically and culturally diverse groups.

Currently, no instrument exists that is proven to be easily usable in the immediate postpartum clinical area to accurately predict which women need the most support and follow-up measures for breastfeeding.

IMPLICATIONS FOR CHILDBIRTH EDUCATORS

Currently, no easy-to-use questionnaire is available to be administered in the early postpartum periods to accurately predict breastfeeding attrition. However, it is useful to the childbirth educator to know that prenatal knowledge, encouragement from the childbirth educator, and attendance at childbirth education classes are positively associated with breastfeeding duration. These factors are likely a direct influence on the mother. Because the father's support is important in launching breastfeeding, these factors may also indirectly influence the father. Typically, the childbirth educator is the only care provider who spends a significant amount of time with both the expectant father and mother. Thus, as researchers work to find better tools for predicting breastfeeding attrition, childbirth educators continue to play an important role in influencing breastfeeding duration.

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STAYING AHEAD OF THE GAME

The trouble with being in the rat race is that even if you win, you're still a rat.

– Lily Tomlin

You are where you are today because you stand on somebody's shoulders. And wherever you are heading, you cannot get there by yourself. If you stand on the shoulders of others, you have a reciprocal responsibility to live your life so that others may stand on your shoulders. It's the quid pro quo of life. We exist temporarily through what we take, but we live forever through what we give.

– Vernon Jordan, in a 2002 speech at Howard University

If I had thought about it, I wouldn't have done the experiment. The literature was full of examples that said you can't do this.

– Spencer Silver on the work that led to the unique adhesives for 3M Post-it® notepads