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Identifying Breastfeeding-Sensitive Conditions by Expert Consensus

Celia Quinn, MD, MPH

Department of Family and Social Medicine, Albert Einstein College of Medicine, 1300 Morris Park Ave, c/o Karen Bonuck, Bronx, NY 10461, USA

Celia Quinn: clquinn711@gmail.com

Abstract

Background—Infant feeding-related health outcomes need to be consistently defined prior to inclusion in health services research.

Objective—To categorize conditions common in infants under 12 months old by their association with breastfeeding for use as outcome measures in a randomized, controlled trial of breastfeeding promotion.

Methods—A modified Delphi consensus method synthesized opinions of 13 physician experts on breastfeeding's association with ICD-9 infant diagnosis codes derived from literature review and medical center experience. A pilot round and 2 subsequent Delphi rounds were used. For the first round, consensus was achieved when more than 80% of experts agreed on a classification for a particular condition, with a predetermined level of certainty based on a 7-point Likert scale. For the second round, consensus was achieved when a majority of experts agreed on the classification from Round 1.

Results—An initial 68 diagnosis codes were identified for evaluation by the expert panel. After a pilot round, the codes were refined and condensed, which resulted in 38 diagnoses for categorization into 1 of 3 categories: (1) breastfeeding protects against the condition; (2) breastfeeding may cause or worsen the condition; and (3) breastfeeding is unrelated to the condition. At the conclusion of the process, consensus was achieved on the classification of 31 conditions, and 7 conditions remained unclassified because of a lack of consensus.

Conclusions—This study provides a list of conditions common in infants under 12 months of age classified based on relationship to infant feeding method and validated by expert consensus. These conditions, based on readily available insurance claims data, contribute to the standardization of outcome measures used for health services research related to breastfeeding promotion.

¹Department of Family and Social Medicine, Albert Einstein College of Medicine, Bronx, NY, USA

²Department of Obstetrics, Gynecology, and Women's Health, Albert Einstein College of Medicine, Bronx, NY, USA

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Background

Evidence supporting the beneficial effects of breastfeeding for maternal and child health has prompted investment in efforts that promote sustained, exclusive breastfeeding and related public health goals.¹ However, investigation into the efficacy of such programs has been limited.² Measuring breastfeeding rates is one way to evaluate the success of breastfeeding promotion programs, but it does not address the downstream health effects of breastfeeding that such programs target. Just as consistency is needed in defining breastfeeding outcomes, defining which health outcomes can be used to evaluate breastfeeding promotion interventions requires a consistent and standardized approach. Identifying which infant health conditions are sensitive to changes in breastfeeding rates can provide researchers with an important tool for evaluating breastfeeding promotion efforts in terms of the impact of breastfeeding promotion on infant health.

A 2007 report from the Agency for Healthcare Research and Quality (AHRQ) examined 13 conditions identified by a technical expert panel for their association with breastfeeding in full-term infants in developed countries. The authors performed a review of the literature and an updated meta-analysis and concluded that a history of breastfeeding is associated with a reduction in the risk of 10 infant conditions: acute otitis media, nonspecific gastroenteritis, severe lower respiratory tract infections, atopic dermatitis, asthma (young children), obesity, type 1 and type 2 diabetes, childhood leukemia, and sudden infant death syndrome. An association between breastfeeding of full-term infants in developed countries and 3 other outcomes could not be characterized based on good or moderate quality evidence: cognitive development, cardiovascular diseases, and infant mortality.³ In order to translate current best evidence for the association between breastfeeding and various infant diagnoses into a schema that can easily be used for health services and breastfeeding promotion research, we sought to categorize health conditions commonly seen in infants less than 12 months old based on their relationship to breastfeeding status.

Despite extant data on breastfeeding's effect on many infant health conditions, several limitations affect applicability for researchers examining the effects of breastfeeding promotion interventions. First, although evidence for the protective effect of breastfeeding is supported by large epidemiologic studies and meta-analyses, this research base has not sought to classify presenting conditions in a population at greatest risk of low-breastfeeding rates. Infant illness case definitions and patterns from such a population may differ from those for which data have been analyzed. Second, there is substantial variability in case definitions of health outcomes, as they relate to breastfeeding, ranging from parent report of symptoms to clinical diagnosis. This variability is problematic for researchers, policy makers, and health insurers who may rely on insurance claims data. For example, current research finds a protective effect of exclusive breastfeeding against acute otitis media. However, no studies directly address related diagnosis codes (eg, chronic otitis media or specific complications of acute otitis media) that might be observed in a particular population. Rather than simply eliminating diagnosis codes that reflect these related diagnoses from their analysis, health services researchers need to be able to decide how to classify these codes for outcomes research. In situations in which medical and public health professionals have limited evidence to support decisions, expert opinion is frequently used.

Consensus methods are one way to synthesize expert opinion and obtain useful information about questions that are not easily answered with available evidence.^{4,5}

To address the above limitations, this translational project combined infant ICD-9 diagnoses from a low-income, multi-ethnic population with a literature review to identify ICD-9 codes for review. These ICD-9 codes were the basis for a modified Delphi process that was employed to achieve consensus on these diagnoses based on their relationship to breastfeeding. These results will then be used as outcome measures for 2 related randomized controlled trials of breastfeeding promotion interventions that enrolled nearly 1000 women and followed their infant's health visit diagnoses for 12 months.⁶

Methods

Description of Delphi Method

A modified Delphi method was used to identify which infant diagnoses could be used as outcome measures for randomized controlled trials of a breastfeeding promotion intervention.⁶ The Delphi method for consensus originated in 1948 and consists of iterative questioning of experts, with report of results from each round provided to the group. Feedback for each round is compiled by the research team and provided for participants in each round for reflection to bring the group closer to consensus. The Delphi group is completed at either the point of consensus on all topics or a point of diminishing returns. Experts can complete the questionnaires anonymously, and this method can be performed by mail or electronically, which allows participation of experts from disparate locations.⁴ This method has been used extensively in health services literature.^{5,7,8} Figure 1 presents an overview of the Delphi methodology used in this study.

Identification of Diagnoses for Classification

To compile the list of diagnoses for review, we reviewed preliminary reports of infant diagnoses from trial participants to develop a comprehensive list of conditions arising in the first 12 months of life. At the time of the preliminary data review, 500 infants had been born to 606 participants. There were 351 infants for whom diagnosis data from both inpatient and outpatient visits were available. Since some infants received multiple diagnoses, there were 543 diagnoses altogether. Twenty-five separate ICD-9 codes were represented in the data, and the 5 most frequent diagnoses accounted for 63% of all recorded diagnoses. These diagnoses were acute upper respiratory infection (ICD-9 code 465.9, 166 cases); otitis media unspecified (ICD-9 code 382.9, 52 cases); other atopic dermatitis (ICD-9 code 691.8, 51 cases); unspecified fetal or neonatal jaundice (ICD-9 code 774.6, 40 cases); and cough (ICD-9 code 786.2, 37 cases). In addition, we conducted a review of relevant literature,^{3,9–12} which included the infant diagnoses examined in the 2007 AHRQ evidence report on breastfeeding.³ In designing the Delphi survey, researchers prioritized the inclusion of diagnoses that either have significant evidence supporting an association with breastfeeding or were frequently diagnosed in our study population.

Selection of Experts

Experts were selected for participation in the online consensus group based on experience and expertise in the fields of pediatrics and breastfeeding medicine. Physicians and researchers were initially identified based on participation in an expert panel convened in April 2009 for development of the 2011 Surgeon General's Call to Action to Support Breastfeeding.¹³ Specifically, those panel members with expertise in the epidemiology of breastfeeding and infant illness, alone or in combination with clinical expertise in breastfeeding and infant illness, were invited to participate in the pilot round of this Delphi study. For subsequent rounds, local experts in pediatrics with clinical expertise in breastfeeding or strong interest in breastfeeding promotion were also included. Participants were asked to use their knowledge of current research in breastfeeding medicine, as well as clinical expertise and experience in classifying diagnoses. Approval by the Montefiore IRB was not required for the voluntary participation of experts on this panel.

Pilot Round

In a pilot round, the list of potential breastfeeding-sensitive diagnoses compiled by the research team was sent to 9 experts in the field of breastfeeding and breastfeeding research. This list consisted of 68 separate ICD-9 codes. Experts were asked to classify the diagnoses into 1 of the following categories: breastfeeding protective, potential adverse effect, ambiguous, unrelated to breastfeeding, or not diagnosed in infants under 12 months. Results from this pilot round were used to refine and condense the diagnoses used in the list and to improve the clarity of the categorization scheme.

Round 1

The first round of the study was sent electronically to an expanded group of physician experts, including several with extensive clinical experience in pediatrics and interest in breastfeeding medicine. A total of 13 experts were contacted via email and encouraged to complete an online survey. Experts were given 4 weeks to complete the survey, and 2 reminder emails were sent. In this round, experts were again asked to categorize infant diagnoses. The 68 ICD-9 codes presented in the pilot round were grouped into 38 diagnoses that the experts were asked to review and categorize. Categories included: breastfeeding protects against this condition; breastfeeding may cause or worsen this condition; and breastfeeding is not related to this condition. Then, experts were asked to rate their confidence in their categorization of the condition on a 7-point Likert scale (1 = not at all confident, 7 = very confident).

For each response with at least 80% of respondents assigning the condition to the same category, a median and an interquartile deviation were calculated. The median represents the 50th percentile of respondent confidence in categorization of the condition, and it was understood to reflect the degree of assurance with which experts thought the condition could be used as an outcome measure for evaluation of breastfeeding promotion. The interquartile deviation represents the distance between the 25th percentile and 75th percentile of responses for each item, and it was used to determine consensus. Diagnoses that were assigned to the same category by at least 80% of respondents and had a median confidence score of 5 or

greater were accepted as belonging to that category. Items with an interquartile deviation of 1.5 or less were considered to have reached consensus.

Round 2

In the second round, the same panel of experts from Round 1 was again sent an invitation to complete an electronic questionnaire. Experts were given 2 weeks to complete the second-round survey. In this questionnaire, diagnoses that were not assigned to a category or whose assignment did not reach consensus were included. An additional 2 diagnoses that were generated by comments from expert participants in Round 1 were also included. Results from the first round were presented, including the percentage of respondents who assigned the diagnosis to a particular category, the median confidence score for assignments to that category, and comments provided by respondents from the first round. Experts were asked whether the group could agree on the classification representing majority opinion from the first round, and they were provided space to explain their decision. For example, “Acute pharyngitis, 71% categorized as breastfeeding protects against this condition (with confidence score 6 out of 7), 29% categorized as breastfeeding is unrelated (with confidence score of 4.5 out of 7). Can we agree to categorize acute pharyngitis as ‘breastfeeding protects against this condition’? Why or why not?” Diagnoses that achieved agreement from more than 50% of respondents on a category were assigned to that category.

Results

Although clinicians as well as researchers were invited to participate in the pilot round, only physicians responded, and for subsequent rounds, participants were limited to US physicians, all with expertise in breastfeeding medicine, promotion, teaching, or research. Thirteen experts were invited to participate in the consensus group. After 2 rounds, 9 had completed surveys in either the first or second round (69% participation). All of the experts consulted were clinicians: 3 were general pediatricians, 3 were neonatologists, 1 was a specialist in pediatric infectious diseases, 1 was a specialist in adolescent medicine, and 1 had medicine-pediatrics training. All have been involved either in breastfeeding research or promotion, as described above. Four experts participated in both rounds. In Round 1, the total number of completed surveys was 7. In Round 2, the total number of completed surveys was 6.

Six participants completed the pilot round of the survey. Three codes were classified by the majority of respondents as “not diagnosed in infants under 12 months” and removed. The remaining ICD-9 codes were reviewed by the research team grouped with similar diagnoses, based on responses in the pilot round. Results from the pilot round were used to design a survey for Round 1 that presented 38 diagnoses representing more than 50 separate ICD-9 codes.

After Round 1, consensus was achieved on categorization of 14 of the 38 diagnoses presented (Table 1). One diagnosis, “fluid and electrolyte imbalances,” was removed because it was too vague and was not associated with a specific ICD-9 code.

After Round 2, consensus was achieved on 17 of the remaining 23 diagnoses. Consensus was not reached on the remaining 7 diagnoses, which remained unclassifiable (Table 2). Of the 2 additional diagnoses included in round 2, 1 was classified into the category “Breastfeeding Protects” based on the criteria described for Round 1. The other did not achieve consensus and thus remained uncategorized.

Discussion

Using a Delphi method for expert consensus, we were able to classify 38 infant health conditions with respect to their relationship to breastfeeding. After a 2-round process, the expert panel agreed that breastfeeding is protective against 25 of the conditions and may be causative for 1 condition (jaundice). Only 7 diagnoses remained uncategorized after the 2-round Delphi procedure. Because our group classified diagnoses based on ICD-9 code, these results may guide researchers using outcomes data based on physician coding for evaluation of interventions that promote breastfeeding.

Experts classified many more diagnoses into the category “breastfeeding is protective against this condition.” This finding may partly reflect the initial selection of diagnoses based on available literature, since most current evidence supports the beneficial effects of breastfeeding on infant health, and research on conditions caused or worsened by breastfeeding is more limited. In addition, since the panel consisted of experts familiar with breastfeeding research, it should not be surprising that most participants were more comfortable classifying conditions for which extensive evidence already exists.

The 1 condition classified as “breastfeeding may cause or worsen” was neonatal jaundice. A link between breastfeeding and jaundice, both early onset and later onset (“breast milk jaundice”), has long been recognized and is thoroughly described in the literature.¹⁴ There are several explanations for this association, and protocols designed specifically for identification and treatment of neonatal jaundice in the breastfed infant are supportive of continued breastfeeding.¹⁵

The diagnoses that were classified as “breastfeeding is protective against this condition” were generally reflective of results from a recent review of data conducted by the AHRQ (Table 3).³ Given the group’s familiarity with the relevant literature, this review provides evidence of convergent validity. In addition, the consensus method used here allowed us to synthesize expert opinion based on both reading of the available literature and clinical experience to categorize related conditions and complications of conditions that may also be related to breastfeeding, even if current evidence is limited. For example, the panel classified acute pharyngitis as “breastfeeding is protective against this condition,” despite the lack of specific evidence for this relationship. Some participant comments included: “Unclear effect on upper respiratory tract infections, but [breastfeeding] is protective against viral illnesses in general,” and “It makes sense that as milk is swallowed, it coats the pharynx with the same factors (secretory IgA, oligosaccharides, other immune factors), just like the rest of the GI tract.” Use of the expert consensus group to generate this list of classifications helps to validate the use of these particular diagnoses in outcomes research

for breastfeeding in the absence of perfect data on the relationship between breastfeeding and some infant conditions.

A number of conditions could not be categorized, even after 2 rounds of the Delphi procedure. Most of those were likely unable to be classified because of a probable ambiguous relationship to breastfeeding status. These conditions included neonatal electrolyte disturbances, feeding problems in newborn, functional digestive disorders, abnormal loss of weight and underweight, and failure to thrive. A typical expert comment was “Optimal breastfeeding is protective, suboptimal breastfeeding may exacerbate many problems.” As such, it is unclear what effect a breastfeeding promotion intervention might have on these conditions. One condition (bronchitis) remained unclassified, probably because this diagnosis is not frequently used by pediatricians. One participant in the first round commented, “I do not use the diagnosis of bronchitis in my clinical practice. I am not sure that it exists in children, so I would not comment on its relationship to breastfeeding.”

One uncategorized condition, acute myelogenous leukemia, deserves special attention because the 2007 AHRQ report found a reduction of risk associated with long-term breastfeeding, but our expert panel was not able to achieve consensus on categorizing the condition as “breastfeeding is protective.” Some participants did comment, referencing the 2007 report on meta-analyses regarding childhood leukemias.³ One agreed with the categorization of “breastfeeding is protective” and said, “The data support this conclusion when duration of breastfeeding is considered. Longer-term breastfeeding appears to be protective in meta-analyses.” Another disagreed with the categorization, noting, “I would say that protection from rare events is more likely to be confounded or spurious.” Although evidence from meta-analyses may suggest a reduction in risk related to breastfeeding status for this condition, our experts may have been hesitant to classify these very rare conditions for use as breastfeeding-related outcomes in a particular population.

The utility of the results presented here is limited by the use of physician coding as an outcome measure. Inaccuracies in insurance claims data would reduce the validity of studies using this classification of conditions. Further research is needed to establish the validity of using the ICD-9 codes examined here for the purposes of epidemiologic studies on an outpatient population. Variability in the use of coding for infant diagnoses may affect some of the diagnoses categorized by this method more than others. For example, some clinicians may be hesitant to use the code 493 (asthma) in younger infants with wheezing, whereas others might use that code routinely for episodes of wheezing during infancy. Additionally, the panel included a mix of national and local experts, so there may be some bias toward local coding practices in the results presented here. Furthermore, upcoming changes to the coding system with the release of ICD-10 may require some adjustment to the use of the diagnoses listed here.

Although more than 60% of the experts contacted participated in the Delphi method at some point, not all of the experts from the first round completed the second round, and some who did not complete the first round did participate in the second round, despite repeated attempts at contacting the experts. This result may have reduced the benefits of iteration and feedback inherent in the consensus method that we chose for this project. However, the

group was able to achieve consensus on classification of most of the diagnoses despite some inconsistency in the participants between rounds. One reason for the relatively low participation may have been the length of the survey, since so many diagnoses were being considered. An attempt to reduce the burden of the survey was made in designing the Round 1 survey by reducing the number of categories and grouping similar ICD-9 codes into broader diagnoses, but the length of the survey could not be further reduced without limiting further the scope of the project. The methods used here are not intended to provide indisputable evidence for the protective effects of breastfeeding on the diagnoses classified here. Our intent was to identify diagnoses common in infants that could be prioritized for inclusion in future research into the relationship between breastfeeding and certain conditions, as well as to translate existing knowledge about the effects of breastfeeding into data that will be useful to other researchers pursuing health services research related to breastfeeding.

There is extensive evidence supporting beneficial health effects for breastfed infants and reduction in the risk of mortality and morbidity from many common infant conditions attributable to breastfeeding. Although those who are interested in studying downstream infant health effects of breastfeeding promotion efforts have consistent definitions and measures for breastfeeding intensity, such measures do not exist for infant health outcomes related to breastfeeding. Researchers who are interested in outcomes research for breastfeeding promotion interventions require accessible, validated measures that can be used to study the health effects of such interventions. This study provides a classification scheme for infant diagnoses based on readily available insurance claims data that have been validated by an expert consensus methodology. Further research on the validity of these measures for use in large populations of infants is warranted.

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References

1. Healthy People 2020 Topics and Objectives. US Department of Health and Human Services; 2011. <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=26> [Accessed June 16, 2011]
2. Bonuck KA. Paucity of evidence-based research on how to achieve the Healthy People 2010 goal of exclusive breastfeeding. *Pediatrics*. 2007; 120:248–249. [PubMed: 17606594]
3. Ip S, Chung M, Raman G, et al. Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)*. 2007; (153):1–186.
4. Fink A, Kosecoff J, Chassin M, Brook RH. Consensus methods: characteristics and guidelines for use. *Am J Public Health*. 1984; 74:979–983. [PubMed: 6380323]
5. Jones J, Hunter D. Consensus methods for medical and health services research. *BMJ*. 1995; 311:376–380. [PubMed: 7640549]
6. Bonuck KA, Lischewski J, Brittner M. Clinical translational research hits the road: RCT of breastfeeding promotion interventions in routine prenatal care. *Contemp Clin Trials*. 2009; 30:419–426. [PubMed: 19523539]

7. Vogel I, Brug J, van der Ploeg CP, Raat H. Strategies for the prevention of MP3-induced hearing loss among adolescents: expert opinions from a Delphi study. *Pediatrics*. 2009; 123:1257–1262. [PubMed: 19403488]
8. McDonald KM, Davies SM, Haberland CA, Geppert JJ, Ku A, Romano PS. Preliminary assessment of pediatric health care quality and patient safety in the United States using readily available administrative data. *Pediatrics*. 2008; 122:e416–425. [PubMed: 18676529]
9. Bachrach VR, Schwarz E, Bachrach LR. Breastfeeding and the risk of hospitalization for respiratory disease in infancy: a meta-analysis. *Arch Pediatr Adolesc Med*. 2003; 157:237–243. [PubMed: 12622672]
10. Gdalevich M, Mimouni D, David M, Mimouni M. Breast-feeding and the onset of atopic dermatitis in childhood: a systematic review and meta-analysis of prospective studies. *J Am Acad Dermatol*. 2001; 45:520–527. [PubMed: 11568741]
11. Stuebe A. The risks of not breastfeeding for mothers and infants. *Rev Obstet Gynecol*. 2009; 2:222–231. [PubMed: 20111658]
12. Yang YW, Tsai CL, Lu CY. Exclusive breastfeeding and incident atopic dermatitis in childhood: a systematic review and meta-analysis of prospective cohort studies. *Br J Dermatol*. 2009; 161:373–383. [PubMed: 19239469]
13. US Department of Health and Human Services. The Surgeon General's Call to Action to Support Breastfeeding. Washington, DC: US Department of Health and Human Services, Office of the Surgeon General; 2011.
14. Kivlahan C, James E. The natural history of neonatal jaundice. *Pediatrics*. 1984; 74(3):364–370. [PubMed: 6472969]
15. Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #22: Guidelines for management of jaundice in the breastfeeding infant equal to or greater than 35 weeks' gestation. *Breastfeed Med*. 2010; 5:87–93. [PubMed: 20387269]

Delphi Design Steps	Definition of Problem <ol style="list-style-type: none"> 1. Need to identify "breastfeeding sensitive" diagnoses to use as secondary outcome in RCT of primary-care based interventions to increase breastfeeding 2. Desire to achieve consensus on standardization of infant diagnoses used as outcome measures for breastfeeding promotion research 	Selection of ICD-9 Codes <ol style="list-style-type: none"> 1. Literature review 2. AHRQ Evidence Report 3. Review of preliminary data from RCT of breastfeeding promotion intervention 	Selection of Expert Panel <ol style="list-style-type: none"> 1. Participation in national conference on agenda for breastfeeding promotion
Pilot Round	Survey Participants and Design <ul style="list-style-type: none"> • N=6 • 68 ICD-9 codes presented • 5 categories: <ul style="list-style-type: none"> - Breastfeeding Protective - Potential adverse effect - Ambiguous - Unrelated to breastfeeding - Not diagnosed in infants 	Results of Pilot Survey Led to Redesign of Survey for 1st Delphi Round <ol style="list-style-type: none"> 1. ICD-9 codes refined and grouped into 38 diagnoses 2. Categorization scheme clarified and reduced to 3: 3. Likert scale (7 points) developed to assess expert degree of certainty 4. A priori definition of consensus for Round 1 developed: <ul style="list-style-type: none"> - 80% or more agree on category - Median confidence 5 or greater on 7-point scale - Interquartile deviation (reflecting degree of consensus) 1.5 or less 	
Delphi Round 1	Survey Participants and Design <ul style="list-style-type: none"> • Additional experts invited to participate, N=13 • 38 diagnoses presented • Experts classified diagnoses into one of 3 categories: <ul style="list-style-type: none"> - Breastfeeding protects against this condition - Breastfeeding may cause or worsen this condition - Breastfeeding is not related • Experts indicated certainty of each classification on 7-point scale • Experts given opportunity to write comments for each diagnosis 	Round 1 Results <ol style="list-style-type: none"> 1. Response rate 47% 2. Achieved consensus on categorization of 14 of 38 diagnoses 3. One diagnosis removed 4. Written comments compiled 5. Two additional diagnoses added based on expert feedback 6. A priori definition of consensus for Round 2 developed: <ul style="list-style-type: none"> - 50% or greater agree on categorization of diagnosis 	
Delphi Round 2	Survey Participants and Design <ul style="list-style-type: none"> • One expert requested to be removed from mailing, N=12 • 23 diagnoses presented along with majority opinion regarding classification, median certainty on 7-point scale, and written comments • Experts asked to agree or disagree with categorization based on majority opinion from Round 1 	Round 2 Results <ol style="list-style-type: none"> 1. Response rate 43% 2. Achieved consensus on 17 additional diagnoses 3. Unable to achieve consensus on 7 diagnoses 	

Figure 1.
Delphi Method Flow Diagram.

Table 1

Classification of Potentially Breastfeeding-Related Diagnoses: First Round.

Category	Diagnosis	ICD-9 Code(s)
Breastfeeding is protective	Unspecified viral condition	079.9
	Other organism, not elsewhere classified (viral enteritis NOS; viral gastroenteritis)	008.8
	Intestinal infectious diseases	001–009
	Acute upper respiratory infection, unspecified site (Acute URI, NOS)	465.9
	Acute otitis media	381.0x
	Chronic otitis media (includes chronic serous otitis, chronic mucoid otitis, other and unspecified chronic otitis)	381.1x, 381.2x, 381.3, 381.4
	Acute suppurative otitis media (includes suppurative otitis media, suppurative otitis media without rupture of ear drum, and unspecified otitis media)	382.0, 382.00, 382.9
	Viral pneumonia	480
	Asthma	493
	Necrotizing enterocolitis in newborn	777.5
	Other atopic dermatitis and related conditions (eczema, neurodermatitis)	691.x
	Diarrhea NOS	787.91
	Sudden death, unknown cause (sudden infant death syndrome)	798
Breastfeeding may cause or worsen	Jaundice (includes unspecified fetal and neonatal jaundice excluding that of preterm infants, kernicterus not as a result of isoimmunization, breastmilk jaundice)	774.2

Abbreviation: NOS, not otherwise specified.

Table 2**Classification of Potentially Breastfeeding-Related Diagnoses: Second Round**

Category	Diagnosis	ICD-9 Code(s)
Breastfeeding is protective	Acute lymphoblastic leukemia	204
	Volume depletion	276.5
	Acute pharyngitis	462
	Croup	464.4
Breastfeeding is unrelated	Acute bronchitis and bronchiolitis, including bronchiolitis as a result of respiratory syncytial virus	466, 466.11
	Pneumonia, including pneumococcal, other bacterial, organism unspecified, and other pneumonia	481, 482, 485, 486
	Asthma, unspecified, with acute exacerbation	493.92
	Other disturbances of temperature regulation of newborn (dehydration fever, environmentally induced pyrexia, hyperthermia, transitory fever)	778.4
	Other and unspecified noninfectious gastroenteritis and colitis	558, 558.9
	Abnormal weight gain	783.1
	Cough	786.2
	Milk protein allergy ^a	558.3
	Other diseases of nasal cavity and sinus	478.1, 478.19
	Esophageal reflux and reflux esophagitis	530.81, 530.11
Uncategorized	Lack of expected normal physiologic development during childhood	783.4
	Shock, including shock without mention of trauma and other shock	785.5, 785.59
	Vomiting alone	787.03
	Acute myelogenous leukemia	205
	Bronchitis, not specified as acute or chronic	490
	Transitory neonatal electrolyte disturbances	775.5
	Feeding problems in newborn	779.3
	Functional digestive disorders not elsewhere classified	564
	Abnormal loss of weight and underweight	783.2
	Failure to thrive	783.41
	Rickets, including active rickets, late effect, unspecified Vitamin D deficiency ^a	268.0, 268.1, 268.9

^a Additional diagnosis classified based on Round I criteria.

“Breastfeeding is Protective” Classification: Overlap with Agency for Healthcare Research and Quality Meta-analysis versus Additional Diagnoses Classified by Delphi Review.

Table 3

“Breastfeeding is Protective” Quality Review	Diagnoses that Overlap with Agency for Healthcare Research and	Additional “Breastfeeding is Protective” Diagnoses Not Examined in Recent Meta-analysis
Acute otitis media		Unspecified viral condition
Acute suppurative otitis media		Acute upper respiratory infection, site unspecified (Acute URI, NOS)
Other atopic dermatitis		Chronic otitis media
Intestinal infectious diseases		Asthma ^b
Viral enteritis, NOS		Volume depletion
Diarrhea, NOS		Acute pharyngitis
Viral pneumonia ^d		Croup
Acute bronchitis and bronchiolitis ^f		Other disturbances of temperature regulation in newborn
Asthma with acute exacerbation ^d		Other and unspecified noninfectious gastroenteritis and colitis
Pneumonia, including pneumococcal, other bacterial organism not specified ^d		Abnormal weight gain ^c
Acute lymphocytic leukemia		Cough
Sudden infant death, unknown cause (sudden infant death syndrome)		Milk protein allergy
Necrotizing enterocolitis in newborn		

^a Meta-analysis demonstrated reduction in risk of hospitalization as a result of this condition.

^b Meta-analysis included studies that assessed asthma in children older than 12 mo.

^c Meta-analysis demonstrated reduction in risk of obesity during childhood but did not address growth patterns in infants less than 12 mo old.