Breastfeeding and the Use of Human Milk

Section on Breastfeeding

Pediatrics 2005;115;496-506
DOI: 10.1542/peds.2004-2491

AMERICAN ACADEMY OF PEDIATRICS

POLICY STATEMENT

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Section on Breastfeeding

Breastfeeding and the Use of Human Milk

ABSTRACT. Considerable advances have occurred in recent years in the scientific knowledge of the benefits of breastfeeding, the mechanisms underlying these benefits, and in the clinical management of breastfeeding. This policy statement on breastfeeding replaces the 1997 policy statement of the American Academy of Pediatrics and reflects this newer knowledge and the supporting publications. The benefits of breastfeeding for the infant, the mother, and the community are summarized, and recommendations to guide the pediatrician and other health care professionals in assisting mothers in the initiation and maintenance of breastfeeding for healthy term infants and high-risk infants are presented. The policy statement delineates various ways in which pediatricians can promote, protect, and support breastfeeding not only in their individual practices but also in the hospital, medical school, community, and nation. *Pediatrics* 2005;115:496–506; *breast, breastfeeding, breast milk, human milk, lactation.*

ABBREVIATIONS. AAP, American Academy of Pediatrics; WIC, Supplemental Nutrition Program for Women, Infants, and Children; CMV, cytomegalovirus; G6PD, glucose-6-phosphate dehydrogenase.

INTRODUCTION

Extensive research using improved epidemiologic methods and modern laboratory techniques documents diverse and compelling advantages for infants, mothers, families, and society from breastfeeding and use of human milk for infant feeding.[1] These advantages include health, nutritional, immunologic, developmental, psychologic, social, economic, and environmental benefits. In 1997, the American Academy of Pediatrics (AAP) published the policy statement *Breastfeeding and the Use of Human Milk*.[2] Since then, significant advances in science and clinical medicine have occurred. This revision cites substantial new research on the importance of breastfeeding and sets forth principles to guide pediatricians and other health care professionals in assisting women and children in the initiation and maintenance of breastfeeding. The ways pediatricians can protect, promote, and support breastfeeding in their individual practices, hospitals, medical schools, and communities are delineated, and the central role of the pediatrician in coordinating breastfeeding management and providing a medical home for the child is emphasized.[3] These recommendations are consistent with the goals and objectives of *Healthy People 2010*,[4] the Department of Health and Human Services' *HHS Blueprint for Action on Breastfeeding*,[5] and the United States Breastfeeding Committee's *Breastfeeding in the United States: A National Agenda*.[6]

This statement provides the foundation for issues related to breastfeeding and lactation management for other AAP publications including the *New Mother's Guide to Breastfeeding*[7] and chapters dealing with breastfeeding in the AAP/American College of Obstetricians and Gynecologists *Guidelines for Perinatal Care*,[8] the *Pediatric Nutrition Handbook*,[9] the *Red Book*,[10] and the *Handbook of Pediatric Environmental Health*.[11]

doi:10.1542/peds.2004-2491

THE NEED

Child Health Benefits

Human milk is species-specific, and all substitute feeding preparations differ markedly from it, making human milk uniquely superior for infant feeding.[12] Exclusive breastfeeding is the reference or normative model against which all alternative feeding methods must be measured with regard to growth, health, development, and all other short- and long-term outcomes. In addition, human milk-fed premature infants receive significant benefits with respect to host protection and improved developmental outcomes compared with formula-fed premature infants.[13–22] From studies in preterm and term infants, the following outcomes have been documented.

Infectious Diseases

Research in developed and developing countries of the world, including middle-class populations in developed countries, provides strong evidence that human milk feeding decreases the incidence and/or severity of a wide range of infectious diseases[23] including bacterial meningitis,[24,25] bacteremia,[25,26] diarrhea,[27–33] respiratory tract infection,[22,33–40] necrotizing enterocolitis,[20,21] otitis media,[27,41–45] urinary tract infection,[46,47] and late-onset sepsis in preterm infants.[17,20] In addition, postneonatal infant mortality rates in the United States are reduced by 21% in breastfed infants.[48]

Other Health Outcomes

Some studies suggest decreased rates of sudden infant death syndrome in the first year of life[49–55] and reduction in incidence of insulin-dependent (type 1) and non–insulin-dependent (type 2) diabetes melli-

tus,[56–59] lymphoma, leukemia, and Hodgkin disease,[60–62] overweight and obesity,[19,63–70] hypercholesterolemia,[71] and asthma[36–39] in older children and adults who were breastfed, compared with individuals who were not breastfed. Additional research in this area is warranted.

Neurodevelopment

Breastfeeding has been associated with slightly enhanced performance on tests of cognitive development.[14,15,72–80] Breastfeeding during a painful procedure such as a heel-stick for newborn screening provides analgesia to infants.[81,82]

Maternal Health Benefits

Important health benefits of breastfeeding and lactation are also described for mothers.[83] The benefits include decreased postpartum bleeding and more rapid uterine involution attributable to increased concentrations of oxytocin,[84] decreased menstrual blood loss and increased child spacing attributable to lactational amenorrhea,[85] earlier return to prepregnancy weight,[86] decreased risk of breast cancer,[87–92] decreased risk of ovarian cancer,[93] and possibly decreased risk of hip fractures and osteoporosis in the postmenopausal period.[94–96]

Community Benefits

In addition to specific health advantages for infants and mothers, economic, family, and environmental benefits have been described. These benefits include the potential for decreased annual health care costs of $3.6 billion in the United States[97,98]; decreased costs for public health programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)[99]; decreased parental employee absenteeism and associated loss of family income; more time for attention to siblings and other family matters as a result of decreased infant illness; decreased environmental burden for disposal of formula cans and bottles; and decreased energy demands for production and transport of artificial feeding products.[100–102] These savings for the country and for families would be offset to some unknown extent by increased costs for physician and lactation consultations, increased office-visit time, and cost of breast pumps and other equipment, all of which should be covered by insurance payments to providers and families.

CONTRAINDICATIONS TO BREASTFEEDING

Although breastfeeding is optimal for infants, there are a few conditions under which breastfeeding may not be in the best interest of the infant. Breastfeeding is contraindicated in infants with classic galactosemia (galactose 1-phosphate uridyltransferase deficiency)[103]; mothers who have active untreated tuberculosis disease or are human T-cell lymphotropic virus type I– or II–positive[104,105]; mothers who are receiving diagnostic or therapeutic radioactive isotopes or have had exposure to radioactive materials (for as long as there is radioactivity in the milk)[106–108]; mothers who are receiving antimetabolites or chemotherapeutic agents or a small number of other medications until they clear the milk[109,110]; mothers who are using drugs of abuse ("street drugs"); and mothers who have herpes simplex lesions on a breast (infant may feed from other breast if clear of lesions). Appropriate information about infection-control measures should be provided to mothers with infectious diseases.[111]

In the United States, mothers who are infected with human immunodeficiency virus (HIV) have been advised not to breastfeed their infants.[112] In developing areas of the world with populations at increased risk of other infectious diseases and nutritional deficiencies resulting in increased infant death rates, the mortality risks associated with artificial feeding may outweigh the possible risks of acquiring HIV infection.[113,114] One study in Africa detailed in 2 reports[115,116] found that exclusive breastfeeding for the first 3 to 6 months after birth by HIV-infected mothers did not increase the risk of HIV transmission to the infant, whereas infants who received mixed feedings (breastfeeding with other foods or milks) had a higher rate of HIV infection compared with infants who were exclusively formula-fed. Women in the United States who are HIV-positive should not breastfeed their offspring. Additional studies are needed before considering a change from current policy recommendations.

CONDITIONS THAT ARE NOT CONTRAINDICATIONS TO BREASTFEEDING

Certain conditions have been shown to be compatible with breastfeeding. Breastfeeding is not contraindicated for infants born to mothers who are hepatitis B surface antigen–positive,[111] mothers who are infected with hepatitis C virus (persons with hepatitis C virus antibody or hepatitis C virus-RNA–positive blood),[111] mothers who are febrile (unless cause is a contraindication outlined in the previous section),[117] mothers who have been exposed to low-level environmental chemical agents,[118,119] and mothers who are seropositive carriers of cytomegalovirus (CMV) (not recent converters if the infant is term).[111] Decisions about breastfeeding of very low birth weight infants (birth weight <1500 g) by mothers known to be CMV-seropositive should be made with consideration of the potential benefits of human milk versus the risk of CMV transmission.[120,121] Freezing and pasteurization can significantly decrease the CMV viral load in milk.[122]

Tobacco smoking by mothers is not a contraindication to breastfeeding, but health care professionals should advise all tobacco-using mothers to avoid smoking within the home and to make every effort to wean themselves from tobacco as rapidly as possible.[110]

Breastfeeding mothers should avoid the use of alcoholic beverages, because alcohol is concentrated in breast milk and its use can inhibit milk production. An occasional celebratory single, small alcoholic drink is acceptable, but breastfeeding should be avoided for 2 hours after the drink.[123]

For the great majority of newborns with jaundice and hyperbilirubinemia, breastfeeding can and should be continued without interruption. In rare instances of severe hyperbilirubinemia, breastfeed-

TABLE 1. Breastfeeding Rates for Infants in the United States: Any (Exclusive)

	Actual: 2001			*Healthy People 2010* Goals[4]		
	Initiation[125]	6 mo[125]	1 y[132]	Initiation	6 mo	1 y
All women	70% (46%)	33% (17%)	18%	75%	50%	25%
Black	53% (27%)	22% (11%)	12%			
Hispanic	73% (36%)	33% (16%)	18%			
Asian	NA	NA	NA			
White	72% (53%)	34% (19%)	18%			

NA indicates that the data are not available.

ing may need to be interrupted temporarily for a brief period.[124]

THE CHALLENGE

Data indicate that the rate of initiation and duration of breastfeeding in the United States are well below the *Healthy People 2010* goals (see Table 1).[4,125] Furthermore, many of the mothers counted as breastfeeding were supplementing their infants with formula during the first 6 months of the infant's life.[5,126] Although breastfeeding initiation rates have increased steadily since 1990, exclusive breastfeeding initiation rates have shown little or no increase over that same period of time. Similarly, 6 months after birth, the proportion of infants who are exclusively breastfed has increased at a much slower rate than that of infants who receive mixed feedings.[125] The AAP Section on Breastfeeding, American College of Obstetricians and Gynecologists, American Academy of Family Physicians, Academy of Breastfeeding Medicine, World Health Organization, United Nations Children's Fund, and many other health organizations recommend exclusive breastfeeding for the first 6 months of life.‡[2,127–130] Exclusive breastfeeding is defined as an infant's consumption of human milk with no supplementation of any type (no water, no juice, no nonhuman milk, and no foods) except for vitamins, minerals, and medications.[131] Exclusive breastfeeding has been shown to provide improved protection against many diseases and to increase the likelihood of continued breastfeeding for at least the first year of life.

Obstacles to initiation and continuation of breastfeeding include insufficient prenatal education about breastfeeding[132,133]; disruptive hospital policies and practices[134]; inappropriate interruption of breastfeeding[135]; early hospital discharge in some populations[136]; lack of timely routine follow-up care and postpartum home health visits[137]; maternal employment[138,139] (especially in the absence of workplace facilities and support for breastfeeding)[140]; lack of family and broad societal support[141]; media portrayal of bottle feeding as normative[142]; commercial promotion of infant formula through distribution of hospital discharge packs, coupons for free or discounted formula, and some television and general magazine advertising[143,144]; misinformation; and lack of guidance and encouragement from health care professionals.[135,145,146]

‡ There is a difference of opinion among AAP experts on this matter. The Section on Breastfeeding acknowledges that the Committee on Nutrition supports introduction of complementary foods between 4 and 6 months of age when safe and nutritious complementary foods are available.

RECOMMENDATIONS ON BREASTFEEDING FOR HEALTHY TERM INFANTS

1. Pediatricians and other health care professionals should recommend human milk for all infants in whom breastfeeding is not specifically contraindicated and provide parents with complete, current information on the benefits and techniques of breastfeeding to ensure that their feeding decision is a fully informed one.[147–149]
   - When direct breastfeeding is not possible, expressed human milk should be provided.[150,151] If a known contraindication to breastfeeding is identified, consider whether the contraindication may be temporary, and if so, advise pumping to maintain milk production. Before advising against breastfeeding or recommending premature weaning, weigh the benefits of breastfeeding against the risks of not receiving human milk.
2. Peripartum policies and practices that optimize breastfeeding initiation and maintenance should be encouraged.
   - Education of both parents before and after delivery of the infant is an essential component of successful breastfeeding. Support and encouragement by the father can greatly assist the mother during the initiation process and during subsequent periods when problems arise. Consistent with appropriate care for the mother, minimize or modify the course of maternal medications that have the potential for altering the infant's alertness and feeding behavior.[152,153] Avoid procedures that may interfere with breastfeeding or that may traumatize the infant, including unnecessary, excessive, and overvigorous suctioning of the oral cavity, esophagus, and airways to avoid oropharyngeal mucosal injury that may lead to aversive feeding behavior.[154,155]
3. Healthy infants should be placed and remain in direct skin-to-skin contact with their mothers immediately after delivery until the first feeding is accomplished.[156–158]
   - The alert, healthy newborn infant is capable of latching on to a breast without specific assistance within the first hour after birth.[156] Dry the infant, assign Apgar scores, and perform the initial physical assessment while the infant

is with the mother. The mother is an optimal heat source for the infant.[159,160] Delay weighing, measuring, bathing, needle-sticks, and eye prophylaxis until after the first feeding is completed. Infants affected by maternal medications may require assistance for effective latch-on.[156] Except under unusual circumstances, the newborn infant should remain with the mother throughout the recovery period.[161]

4. Supplements (water, glucose water, formula, and other fluids) should not be given to breastfeeding newborn infants unless ordered by a physician when a medical indication exists.[148,162–165]
5. Pacifier use is best avoided during the initiation of breastfeeding and used only after breastfeeding is well established.[166–168]
   - In some infants early pacifier use may interfere with establishment of good breastfeeding practices, whereas in others it may indicate the presence of a breastfeeding problem that requires intervention.[169]
   - This recommendation does not contraindicate pacifier use for nonnutritive sucking and oral training of premature infants and other special care infants.
6. During the early weeks of breastfeeding, mothers should be encouraged to have 8 to 12 feedings at the breast every 24 hours, offering the breast whenever the infant shows early signs of hunger such as increased alertness, physical activity, mouthing, or rooting.[170]
   - Crying is a late indicator of hunger.[171] Appropriate initiation of breastfeeding is facilitated by continuous rooming-in throughout the day and night.[172] The mother should offer both breasts at each feeding for as long a period as the infant remains at the breast.[173] At each feed the first breast offered should be alternated so that both breasts receive equal stimulation and draining. In the early weeks after birth, nondemanding infants should be aroused to feed if 4 hours have elapsed since the beginning of the last feeding.
   - After breastfeeding is well established, the frequency of feeding may decline to approximately 8 times per 24 hours, but the infant may increase the frequency again with growth spurts or when an increase in milk volume is desired.
7. Formal evaluation of breastfeeding, including observation of position, latch, and milk transfer, should be undertaken by trained caregivers at least twice daily and fully documented in the record during each day in the hospital after birth.[174,175]
   - Encouraging the mother to record the time and duration of each breastfeeding, as well as urine and stool output during the early days of breastfeeding in the hospital and the first weeks at home, helps to facilitate the evaluation process. Problems identified in the hospital should be addressed at that time, and a documented plan for management should be clearly communicated to both parents and to the medical home.
8. All breastfeeding newborn infants should be seen by a pediatrician or other knowledgeable and experienced health care professional at 3 to 5 days of age as recommended by the AAP.[124,176,177]
   - This visit should include infant weight; physical examination, especially for jaundice and hydration; maternal history of breast problems (painful feedings, engorgement); infant elimination patterns (expect 3–5 urines and 3–4 stools per day by 3–5 days of age; 4–6 urines and 3–6 stools per day by 5–7 days of age); and a formal, observed evaluation of breastfeeding, including position, latch, and milk transfer. Weight loss in the infant of greater than 7% from birth weight indicates possible breastfeeding problems and requires more intensive evaluation of breastfeeding and possible intervention to correct problems and improve milk production and transfer.
9. Breastfeeding infants should have a second ambulatory visit at 2 to 3 weeks of age so that the health care professional can monitor weight gain and provide additional support and encouragement to the mother during this critical period.
10. Pediatricians and parents should be aware that exclusive breastfeeding is sufficient to support optimal growth and development for approximately the first 6 months of life‡ and provides continuing protection against diarrhea and respiratory tract infection.[30,34,128,178–184] Breastfeeding should be continued for at least the first year of life and beyond for as long as mutually desired by mother and child.[185]
    - Complementary foods rich in iron should be introduced gradually beginning around 6 months of age.[186–187] Preterm and low birth weight infants and infants with hematologic disorders or infants who had inadequate iron stores at birth generally require iron supplementation before 6 months of age.[148,188–192] Iron may be administered while continuing exclusive breastfeeding.
    - Unique needs or feeding behaviors of individual infants may indicate a need for introduction of complementary foods as early as 4 months of age, whereas other infants may not be ready to accept other foods until approximately 8 months of age.[193]
    - Introduction of complementary feedings before 6 months of age generally does not increase total caloric intake or rate of growth and only substitutes foods that lack the protective components of human milk.[194]
    - During the first 6 months of age, even in hot climates, water and juice are unnecessary for breastfed infants and may introduce contaminants or allergens.[195]
    - Increased duration of breastfeeding confers significant health and developmental benefits for the child and the mother, especially in delaying return of fertility (thereby promoting optimal intervals between births).[196]

- There is no upper limit to the duration of breastfeeding and no evidence of psychologic or developmental harm from breastfeeding into the third year of life or longer.[197]
- Infants weaned before 12 months of age should not receive cow's milk but should receive iron-fortified infant formula.[198]

11. All breastfed infants should receive 1.0 mg of vitamin K_1 oxide intramuscularly after the first feeding is completed and within the first 6 hours of life.[199]
    - Oral vitamin K is not recommended. It may not provide the adequate stores of vitamin K necessary to prevent hemorrhage later in infancy in breastfed infants unless repeated doses are administered during the first 4 months of life.[200]
12. All breastfed infants should receive 200 IU of oral vitamin D drops daily beginning during the first 2 months of life and continuing until the daily consumption of vitamin D-fortified formula or milk is 500 mL.[201]
    - Although human milk contains small amounts of vitamin D, it is not enough to prevent rickets. Exposure of the skin to ultraviolet B wavelengths from sunlight is the usual mechanism for production of vitamin D. However, significant risk of sunburn (short-term) and skin cancer (long-term) attributable to sunlight exposure, especially in younger children, makes it prudent to counsel against exposure to sunlight. Furthermore, sunscreen decreases vitamin D production in skin.
13. Supplementary fluoride should not be provided during the first 6 months of life.[202]
    - From 6 months to 3 years of age, the decision whether to provide fluoride supplementation should be made on the basis of the fluoride concentration in the water supply (fluoride supplementation generally is not needed unless the concentration in the drinking water is <0.3 ppm) and in other food, fluid sources, and toothpaste.
14. Mother and infant should sleep in proximity to each other to facilitate breastfeeding.[203]
15. Should hospitalization of the breastfeeding mother or infant be necessary, every effort should be made to maintain breastfeeding, preferably directly, or pumping the breasts and feeding expressed milk if necessary.

ADDITIONAL RECOMMENDATIONS FOR HIGH-RISK INFANTS

- Hospitals and physicians should recommend human milk for premature and other high-risk infants either by direct breastfeeding and/or using the mother's own expressed milk.[13] Maternal support and education on breastfeeding and milk expression should be provided from the earliest possible time. Mother-infant skin-to-skin contact and direct breastfeeding should be encouraged as early as feasible.[204,205] Fortification of expressed human milk is indicated for many very low birth weight infants.[13] Banked human milk may be a suitable feeding alternative for infants whose mothers are unable or unwilling to provide their own milk. Human milk banks in North America adhere to national guidelines for quality control of screening and testing of donors and pasteurize all milk before distribution.[206–208] Fresh human milk from unscreened donors is not recommended because of the risk of transmission of infectious agents.
- Precautions should be followed for infants with glucose-6-phosphate dehydrogenase (G6PD) deficiency. G6PD deficiency has been associated with an increased risk of hemolysis, hyperbilirubinemia, and kernicterus.[209] Mothers who breastfeed infants with known or suspected G6PD deficiency should not ingest fava beans or medications such as nitrofurantoin, primaquine phosphate, or phenazopyridine hydrochloride, which are known to induce hemolysis in deficient individuals.[210,211]

ROLE OF PEDIATRICIANS AND OTHER HEALTH CARE PROFESSIONALS IN PROTECTING, PROMOTING, AND SUPPORTING BREASTFEEDING

Many pediatricians and other health care professionals have made great efforts in recent years to support and improve breastfeeding success by following the principles and guidance provided by the AAP,[2] the American College of Obstetricians and Gynecologists,[127] the American Academy of Family Physicians,[128] and many other organizations.[5,6,8,130,133,142,162] The following guidelines summarize these concepts for providing an optimal breastfeeding environment.

General

- Promote, support, and protect breastfeeding enthusiastically. In consideration of the extensively published evidence for improved health and developmental outcomes in breastfed infants and their mothers, a strong position on behalf of breastfeeding is warranted.
- Promote breastfeeding as a cultural norm and encourage family and societal support for breastfeeding.
- Recognize the effect of cultural diversity on breastfeeding attitudes and practices and encourage variations, if appropriate, that effectively promote and support breastfeeding in different cultures.

Education

- Become knowledgeable and skilled in the physiology and the current clinical management of breastfeeding.
- Encourage development of formal training in breastfeeding and lactation in medical schools, in residency and fellowship training programs, and for practicing pediatricians.
- Use every opportunity to provide age-appropriate breastfeeding education to children and adults in the medical setting and in outreach programs for student and parent groups.

Clinical Practice

- Work collaboratively with the obstetric community to ensure that women receive accurate and

sufficient information throughout the perinatal period to make a fully informed decision about infant feeding.
- Work collaboratively with the dental community to ensure that women are encouraged to continue to breastfeed and use good oral health practices. Infants should receive an oral health-risk assessment by the pediatrician between 6 months and 1 year of age and/or referred to a dentist for evaluation and treatment if at risk of dental caries or other oral health problems.[212]
- Promote hospital policies and procedures that facilitate breastfeeding. Work actively toward eliminating hospital policies and practices that discourage breastfeeding (eg, promotion of infant formula in hospitals including infant formula discharge packs and formula discount coupons, separation of mother and infant, inappropriate infant feeding images, and lack of adequate encouragement and support of breastfeeding by all health care staff). Encourage hospitals to provide in-depth training in breastfeeding for all health care staff (including physicians) and have lactation experts available at all times.
- Provide effective breast pumps and private lactation areas for all breastfeeding mothers (patients and staff) in ambulatory and inpatient areas of the hospital.[213]
- Develop office practices that promote and support breastfeeding by using the guidelines and materials provided by the AAP Breastfeeding Promotion in Physicians' Office Practices program.[214]
- Become familiar with local breastfeeding resources (eg, WIC clinics, breastfeeding medical and nursing specialists, lactation educators and consultants, lay support groups, and breast-pump rental stations) so that patients can be referred appropriately.[215] When specialized breastfeeding services are used, the essential role of the pediatrician as the infant's primary health care professional within the framework of the medical home needs to be clarified for parents.
- Encourage adequate, routine insurance coverage for necessary breastfeeding services and supplies, including the time required by pediatricians and other licensed health care professionals to assess and manage breastfeeding and the cost for the rental of breast pumps.
- Develop and maintain effective communication and coordination with other health care professionals to ensure optimal breastfeeding education, support, and counseling. AAP and WIC breastfeeding coordinators can facilitate collaborative relationships and develop programs in the community and in professional organizations for support of breastfeeding.
- Advise mothers to continue their breast self-examinations on a monthly basis throughout lactation and to continue to have annual clinical breast examinations by their physicians.

Society
- Encourage the media to portray breastfeeding as positive and normative.
- Encourage employers to provide appropriate facilities and adequate time in the workplace for breastfeeding and/or milk expression.
- Encourage child care providers to support breastfeeding and the use of expressed human milk provided by the parent.
- Support the efforts of parents and the courts to ensure continuation of breastfeeding in separation and custody proceedings.
- Provide counsel to adoptive mothers who decide to breastfeed through induced lactation, a process requiring professional support and encouragement.
- Encourage development and approval of governmental policies and legislation that are supportive of a mother's choice to breastfeed.

Research
- Promote continued basic and clinical research in the field of breastfeeding. Encourage investigators and funding agencies to pursue studies that further delineate the scientific understandings of lactation and breastfeeding that lead to improved clinical practice in this medical field.[216]

CONCLUSIONS

Although economic, cultural, and political pressures often confound decisions about infant feeding, the AAP firmly adheres to the position that breastfeeding ensures the best possible health as well as the best developmental and psychosocial outcomes for the infant. Enthusiastic support and involvement of pediatricians in the promotion and practice of breastfeeding is essential to the achievement of optimal infant and child health, growth, and development.

SECTION ON BREASTFEEDING, 2003–2004
*Lawrence M. Gartner, MD, Chairperson
Jane Morton, MD
Ruth A. Lawrence, MD
Audrey J. Naylor, MD, DrPH
Donna O'Hare, MD
Richard J. Schanler, MD

*Arthur I. Eidelman, MD
Policy Committee Chairperson

LIAISONS
Nancy F. Krebs, MD
Committee on Nutrition
Alice Lenihan, MPH, RD, LPN
National WIC Association
John Queenan, MD
American College of Obstetricians and Gynecologists

STAFF
Betty Crase, IBCLC, RLC

**Lead authors*

REFERENCES

1. Kramer MS, Chalmers B, Hodnett ED, et al. Promotion of Breastfeeding Intervention Trial (PROBIT): a randomized trial in the Republic of Belarus. *JAMA*. 2001;285:413–420
2. American Academy of Pediatrics, Work Group on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 1997;100: 1035–1039

3. American Academy of Pediatrics, Medical Home Initiatives for Children With Special Needs Project Advisory Committee. The medical home. *Pediatrics.* 2002;110:184–186
4. US Department of Health and Human Services. *Healthy People 2010: Conference Edition—Volumes I and II*. Washington, DC: US Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health; 2000:47–48
5. US Department of Health and Human Services. *HHS Blueprint for Action on Breastfeeding*. Washington, DC: US Department of Health and Human Services, Office on Women's Health; 2000
6. United States Breastfeeding Committee. *Breastfeeding in the United States: A National Agenda*. Rockville, MD: US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau; 2001
7. American Academy of Pediatrics. *New Mother's Guide to Breastfeeding*. Meek JY, ed. New York, NY: Bantam Books; 2002
8. American Academy of Pediatrics, American College of Obstetricians and Gynecologists. *Guidelines for Perinatal Care*. Gilstrap LC, Oh W, eds. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2002
9. American Academy of Pediatrics, Committee on Nutrition. *Pediatric Nutrition Handbook*. Kleinman RE, ed. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2004
10. American Academy of Pediatrics. *Red Book: 2003 Report of the Committee on Infectious Diseases*. Pickering LK, ed. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003
11. American Academy of Pediatrics, Committee on Environmental Health. *Handbook of Pediatric Environmental Health*. Etzel RA, Balk SJ, eds. 2nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003
12. Hambraeus L, Forsum E, Lönnerdal B. Nutritional aspects of breast milk and cow's milk formulas. In: Hambraeus L, Hanson L, MacFarlane H, eds. *Symposium on Food and Immunology*. Stockholm, Sweden: Almqvist and Wiksell; 1975
13. Schanler RJ. The use of human milk for premature infants. *Pediatr Clin North Am.* 2001;48:207–219
14. Lucas A, Morley R, Cole TJ. Randomised trial of early diet in preterm babies and later intelligence quotient. *BMJ.* 1998;317:1481–1487
15. Horwood LJ, Darlow BA, Mogridge N. Breast milk feeding and cognitive ability at 7–8 years. *Arch Dis Child Fetal Neonatal Ed.* 2001;84: F23–F27
16. Amin SB, Merle KS, Orlando MS, Dalzell LE, Guillet R. Brainstem maturation in premature infants as a function of enteral feeding type. *Pediatrics.* 2000;106:318–322
17. Hylander MA, Strobino DM, Dhanireddy R. Human milk feedings and infection among very low birth weight infants. *Pediatrics.* 1998;102(3). Available at: www.pediatrics.org/cgi/content/full/102/3/e38
18. Hylander MA, Strobino DM, Pezzullo JC, Dhanireddy R. Association of human milk feedings with a reduction in retinopathy of prematurity among very low birthweight infants. *J Perinatol.* 2001; 21:356–362
19. Singhal A, Farooqi IS, O'Rahilly S, Cole TJ, Fewtrell M, Lucas A. Early nutrition and leptin concentrations in later life. *Am J Clin Nutr.* 2002; 75:993–999
20. Schanler RJ, Shulman RJ, Lau C. Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula. *Pediatrics.* 1999;103:1150–1157
21. Lucas A, Cole TJ. Breast milk and neonatal necrotising enterocolitis. *Lancet.* 1990;336:1519–1523
22. Blaymore Bier J, Oliver T, Ferguson A, Vohr BR. Human milk reduces outpatient upper respiratory symptoms in premature infants during their first year of life. *J Perinatol.* 2002;22:354–359
23. Heinig MJ. Host defense benefits of breastfeeding for the infant. Effect of breastfeeding duration and exclusivity. *Pediatr Clin North Am.* 2001; 48:105–123, ix
24. Cochi SL, Fleming DW, Hightower AW, et al. Primary invasive *Haemophilus influenzae* type b disease: a population-based assessment of risk factors. *J Pediatr.* 1986;108:887–896
25. Istre GR, Conner JS, Broome CV, Hightower A, Hopkins RS. Risk factors for primary invasive *Haemophilus influenzae* disease: increased risk from day care attendance and school-aged household members. *J Pediatr.* 1985;106:190–195
26. Takala AK, Eskola J, Palmgren J, et al. Risk factors of invasive *Haemophilus influenzae* type b disease among children in Finland. *J Pediatr.* 1989;115:694–701
27. Dewey KG, Heinig MJ, Nommsen-Rivers LA. Differences in morbidity between breast-fed and formula-fed infants. *J Pediatr.* 1995;126:696–702
28. Howie PW, Forsyth JS, Ogston SA, Clark A, Florey CD. Protective effect of breast feeding against infection. *BMJ.* 1990;300:11–16
29. Kramer MS, Guo T, Platt RW, et al. Infant growth and health outcomes associated with 3 compared with 6 mo of exclusive breastfeeding. *Am J Clin Nutr.* 2003;78:291–295
30. Popkin BM, Adair L, Akin JS, Black R, Briscoe J, Flieger W. Breastfeeding and diarrheal morbidity. *Pediatrics.* 1990;86:874–882
31. Beaudry M, Dufour R, Marcoux S. Relation between infant feeding and infections during the first six months of life. *J Pediatr.* 1995;126: 191–197
32. Bhandari N, Bahl R, Mazumdar S, Martines J, Black RE, Bhan MK. Effect of community-based promotion of exclusive breastfeeding on diarrhoeal illness and growth: a cluster randomized controlled trial. Infant Feeding Study Group. *Lancet.* 2003;361:1418–1423
33. Lopez-Alarcon M, Villalpando S, Fajardo A. Breast-feeding lowers the frequency and duration of acute respiratory infection and diarrhea in infants under six months of age. *J Nutr.* 1997;127:436–443
34. 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
35. Oddy WH, Sly PD, de Klerk NH, et al. Breast feeding and respiratory morbidity in infancy: a birth cohort study. *Arch Dis Child.* 2003;88: 224–228
36. Chulada PC, Arbes SJ Jr, Dunson D, Zeldin DC. Breast-feeding and the prevalence of asthma and wheeze in children: analyses from the Third National Health and Nutrition Examination Survey, 1988–1994. *J Allergy Clin Immunol.* 2003;111:328–336
37. Oddy WH, Peat JK, de Klerk NH. Maternal asthma, infant feeding, and the risk of asthma in childhood. *J Allergy Clin Immunol.* 2002;110:65–67
38. Gdalevich M, Mimouni D, Mimouni M. Breast-feeding and the risk of bronchial asthma in childhood: a systematic review with meta-analysis of prospective studies. *J Pediatr.* 2001;139:261–266
39. Oddy WH, Holt PG, Sly PD, et al. Association between breast feeding and asthma in 6 year old children: findings of a prospective birth cohort study. *BMJ.* 1999;319:815–819
40. Wright AL, Holberg CJ, Taussig LM, Martinez FD. Relationship of infant feeding to recurrent wheezing at age 6 years. *Arch Pediatr Adolesc Med.* 1995;149:758–763
41. Saarinen UM. Prolonged breast feeding as prophylaxis for recurrent otitis media. *Acta Paediatr Scand.* 1982;71:567–571
42. Duncan B, Ey J, Holberg CJ, Wright AL, Martinez FD, Taussig LM. Exclusive breast-feeding for at least 4 months protects against otitis media. *Pediatrics.* 1993;91:867–872
43. Owen MJ, Baldwin CD, Swank PR, Pannu AK, Johnson DL, Howie VM. Relation of infant feeding practices, cigarette smoke exposure, and group child care to the onset and duration of otitis media with effusion in the first two years of life. *J Pediatr.* 1993;123:702–711
44. Paradise JL, Elster BA, Tan L. Evidence in infants with cleft palate that breast milk protects against otitis media. *Pediatrics.* 1994;94:853–860
45. Aniansson G, Alm B, Andersson B, et al. A prospective cohort study on breast-feeding and otitis media in Swedish infants. *Pediatr Infect Dis J.* 1994;13:183–188
46. Pisacane A, Graziano L, Mazzarella G, Scarpellino B, Zona G. Breastfeeding and urinary tract infection. *J Pediatr.* 1992;120:87–89
47. Marild S, Hansson S, Jodal U, Oden A, Svedberg K. Protective effect of breastfeeding against urinary tract infection. *Acta Paediatr.* 2004;93: 164–168
48. Chen A, Rogan WJ. Breastfeeding and the risk of postneonatal death in the United States. *Pediatrics.* 2004;113(5). Available at: www.pediatrics.org/cgi/content/full/113/5/e435
49. Horne RS, Parslow PM, Ferens D, Watts AM, Adamson TM. Comparison of evoked arousability in breast and formula fed infants. *Arch Dis Child.* 2004;89(1):22–25
50. Ford RPK, Taylor BJ, Mitchell EA, et al. Breastfeeding and the risk of sudden infant death syndrome. *Int J Epidemiol.* 1993;22:885–890
51. Mitchell EA, Taylor BJ, Ford RPK, et al. Four modifiable and other major risk factors for cot death: the New Zealand study. *J Paediatr Child Health.* 1992;28(suppl 1):S3–S8
52. Scragg LK, Mitchell EA, Tonkin SL, Hassall IB. Evaluation of the cot death prevention programme in South Auckland. *N Z Med J.* 1993;106: 8–10
53. Alm B, Wennergren G, Norvenius SG, et al. Breast feeding and the sudden infant death syndrome in Scandinavia, 1992–95. *Arch Dis Child.* 2002;86:400–402
54. McVea KL, Turner PD, Peppler DK. The role of breastfeeding in sudden infant death syndrome. *J Hum Lact.* 2000;16:13–20

55. Mosko S, Richard C, McKenna J. Infant arousals during mother-infant bed sharing: implications for infant sleep and sudden infant death syndrome research. *Pediatrics.* 1997;100:841–849
56. Gerstein HC. Cow's milk exposure and type 1 diabetes mellitus. A critical overview of the clinical literature. *Diabetes Care.* 1994;17:13–19
57. Kostraba JN, Cruickshanks KJ, Lawler-Heavner J, et al. Early exposure to cow's milk and solid foods in infancy, genetic predisposition, and the risk of IDDM. *Diabetes.* 1993;42:288–295
58. Pettit DJ, Forman MR, Hanson RL, Knowler WC, Bennett PH. Breastfeeding and the incidence of non-insulin-dependent diabetes mellitus in Pima Indians. *Lancet.* 1997;350:166–168
59. Perez-Bravo E, Carrasco E, Guitierrez-Lopez MD, Martinez MT, Lopez G, de los Rios MG. Genetic predisposition and environmental factors leading to the development of insulin-dependent diabetes mellitus in Chilean children. *J Mol Med.* 1996;74:105–109
60. Davis MK. Review of the evidence for an association between infant feeding and childhood cancer. *Int J Cancer Suppl.* 1998;11:29–33
61. Smulevich VB, Solionova LG, Belyakova SV. Parental occupation and other factors and cancer risk in children: I. Study methodology and non-occupational factors. *Int J Cancer.* 1999;83:712–717
62. Bener A, Denic S, Galadari S. Longer breast-feeding and protection against childhood leukaemia and lymphomas. *Eur J Cancer.* 2001;37:234–238
63. Armstrong J, Reilly JJ, Child Health Information Team. Breastfeeding and lowering the risk of childhood obesity. *Lancet.* 2002;359:2003–2004
64. Dewey KG, Heinig MJ, Nommsen LA, Peerson JM, Lonnerdal B. Breast-fed infants are leaner than formula-fed infants at 1 year of age: the DARLING study. *Am J Clin Nutr.* 1993;57:140–145
65. Arenz S, Ruckerl R, Koletzko B, Von Kries R. Breast-feeding and childhood obesity—a systematic review. *Int J Obes Relat Metab Disord.* 2004;28:1247–1256
66. Grummer-Strawn LM, Mei Z. Does breastfeeding protect against pediatric overweight? Analysis of longitudinal data from the Centers for Disease Control and Prevention Pediatric Nutrition Surveillance System. *Pediatrics.* 2004;113(2). Available at: www.pediatrics.org/cgi/content/full/113/2/e81
67. Stettler N, Zemel BS, Kumanyika S, Stallings VA. Infant weight gain and childhood overweight status in a multicenter, cohort study. *Pediatrics.* 2002;109:194–199
68. Gillman MW, Rifas-Shiman SL, Camargo CA, et al. Risk of overweight among adolescents who were breastfed as infants. *JAMA.* 2001;285:2461–2467
69. Toschke AM, Vignerova J, Lhotska L, Osancova K, Koletzko B, von Kries R. Overweight and obesity in 6- to 14-year old Czech children in 1991: protective effect of breast-feeding. *J Pediatr.* 2002;141:764–769
70. American Academy of Pediatrics, Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics.* 2003;112:424–430
71. Owen CG, Whincup PH, Odoki K, Gilg JA, Cook DG. Infant feeding and blood cholesterol: a study in adolescents and a systematic review. *Pediatrics.* 2002;110:597–608
72. Horwood LJ, Fergusson DM. Breastfeeding and later cognitive and academic outcomes. *Pediatrics.* 1998;101(1). Available at: www.pediatrics.org/cgi/content/full/101/1/e9
73. Anderson JW, Johnstone BM, Remley DT. Breast-feeding and cognitive development: a meta-analysis. *Am J Clin Nutr.* 1999;70:525–535
74. Jacobson SW, Chiodo LM, Jacobson JL. Breastfeeding effects on intelligence quotient in 4- and 11-year-old children. *Pediatrics.* 1999;103(5). Available at: www.pediatrics.org/cgi/content/full/103/5/e71
75. Reynolds A. Breastfeeding and brain development. *Pediatr Clin North Am.* 2001;48:159–171
76. Mortensen EL, Michaelsen KF, Sanders SA, Reinisch JM. The association between duration of breastfeeding and adult intelligence. *JAMA.* 2002;287:2365–2371
77. Batstra L, Neeleman, Hadders-Algra M. Can breast feeding modify the adverse effects of smoking during pregnancy on the child's cognitive development? *J Epidemiol Community Health.* 2003;57:403–404
78. Rao MR, Hediger ML, Levine RJ, Naficy AB, Vik T. Effect of breastfeeding on cognitive development of infants born small for gestational age. *Acta Paediatr.* 2002;91:267–274
79. Bier JA, Oliver T, Ferguson AE, Vohr BR. Human milk improves cognitive and motor development of premature infants during infancy. *J Hum Lact.* 2002;18:361–367
80. Feldman R, Eidelman AI. Direct and indirect effects of breast-milk on the neurobehavioral and cognitive development of premature infants. *Dev Psychobiol.* 2003;43:109–119
81. Gray L, Miller LW, Phillip BL, Blass EM. Breastfeeding is analgesic in healthy newborns. *Pediatrics.* 2002;109:590–593
82. Carbajal R, Veerapen S, Couderc S, Jugie M, Ville Y. Analgesic effect of breast feeding in term neonates: randomized controlled trial. *BMJ.* 2003;326:13
83. Labbok MH. Effects of breastfeeding on the mother. *Pediatr Clin North Am.* 2001;48:143–158
84. Chua S, Arulkumaran S, Lim I, Selamat N, Ratnam SS. Influence of breastfeeding and nipple stimulation on postpartum uterine activity. *Br J Obstet Gynaecol.* 1994;101:804–805
85. Kennedy KI, Labbok MH, Van Look PF. Lactational amenorrhea method for family planning. *Int J Gynaecol Obstet.* 1996;54:55–57
86. Dewey KG, Heinig MJ, Nommsen LA. Maternal weight-loss patterns during prolonged lactation. *Am J Clin Nutr.* 1993;58:162–166
87. Newcomb PA, Storer BE, Longnecker MP, et al. Lactation and a reduced risk of premenopausal breast cancer. *N Engl J Med.* 1994;330:81–87
88. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50302 women with breast cancer and 96973 women without the disease. *Lancet.* 2002;360:187–195
89. Lee SY, Kim MT, Kim SW, Song MS, Yoon SJ. Effect of lifetime lactation on breast cancer risk: a Korean women's cohort study. *Int J Cancer.* 2003;105:390–393
90. Tryggvadottir L, Tulinius H, Eyfjord JE, Sigurvinsson T. Breastfeeding and reduced risk of breast cancer in an Icelandic cohort study. *Am J Epidemiol.* 2001;154:37–42
91. Enger SM, Ross RK, Paganini-Hill A, Bernstein L. Breastfeeding experience and breast cancer risk among postmenopausal women. *Cancer Epidemiol Biomarkers Prev.* 1998;7:365–369
92. Jernstrom H, Lubinski J, Lynch HT, et al. Breast-feeding and the risk of breast cancer in BRCA1 and BRCA2 mutation carriers. *J Natl Cancer Inst.* 2004;96:1094–1098
93. Rosenblatt KA, Thomas DB. Lactation and the risk of epithelial ovarian cancer. WHO Collaborative Study of Neoplasia and Steroid contraceptives. *Int J Epidemiol.* 1993;22:192–197
94. Cumming RG, Klineberg RJ. Breastfeeding and other reproductive factors and the risk of hip fractures in elderly women. *Int J Epidemiol.* 1993;22:684–691
95. Lopez JM, Gonzalez G, Reyes V, Campino C, Diaz S. Bone turnover and density in healthy women during breastfeeding and after weaning. *Osteoporos Int.* 1996;6:153–159
96. Paton LM, Alexander JL, Nowson CA, et al. Pregnancy and lactation have no long-term deleterious effect on measures of bone mineral in healthy women: a twin study. *Am J Clin Nutr.* 2003;77:707–714
97. Weimer J. *The Economic Benefits of Breast Feeding: A Review and Analysis.* Food Assistance and Nutrition Research Report No. 13. Washington, DC: Food and Rural Economics Division, Economic Research Service, US Department of Agriculture; 2001
98. Ball TM, Wright AL. Health care cost of formula-feeding in the first year of life. *Pediatrics.* 1999;103:870–876
99. Tuttle CR, Dewey KG. Potential cost savings for Medi-Cal, AFDC, food stamps, and WIC programs associated with increasing breast-feeding among low-income Hmong women in California. *J Am Diet Assoc.* 1996;96:885–890
100. Cohen R, Mrtek MB, Mrtek RG. Comparison of maternal absenteeism and infant illness rates among breast-feeding and formula-feeding women in two corporations. *Am J Health Promot.* 1995;10:148–153
101. Jarosz LA. Breast-feeding versus formula: cost comparison. *Hawaii Med J.* 1993;52:14–18
102. Levine RE, Huffman SL, Center to Prevent Childhood Malnutrition. *The Economic Value of Breastfeeding, the National, Public Sector, Hospital and Household Levels: A Review of the Literature.* Washington, DC: Social Sector Analysis Project, Agency for International Development; 1990
103. Chen Y-T. Defects in galactose metabolism. In: Behrman RE, Kliegman RM, Jenson HB, eds. *Nelson Textbook of Pediatrics.* 16th ed. Philadelphia, PA: W. B. Saunders; 2000:413–414
104. Ando Y, Saito K, Nakano S, et al. Bottle-feeding can prevent transmission of HTLV-I from mothers to their babies. *J Infect.* 1989;19:25–29
105. Centers for Disease Control and Prevention and USPHS Working Group. Guidelines for counseling persons infected with human T-lymphotropic virus type I (HTLV-1) and type II (HTLV-II). *Ann Intern Med.* 1993;118:448–454
106. Gori G, Cama G, Guerresi E, et al. Radioactivity in breastmilk and placenta after Chernobyl accident [letter]. *Am J Obstet Gynecol.* 1988;158:1243–1244

107. Robinson PS, Barker P, Campbell A, Henson P, Surveyor I, Young PR. Iodine-131 in breast milk following therapy for thyroid carcinoma. *J Nucl Med.* 1994;35:1797–1801
108. Bakheet SM, Hammami MM. Patterns of radioiodine uptake by the lactating breast. *Eur J Nucl Med.* 1994;21:604–608
109. Egan PC, Costanza ME, Dodion P, Egorin MJ, Bachur NR. Doxorubicin and cisplatin excretion into human milk. *Cancer Treat Rep.* 1985;69: 1387–1389
110. American Academy of Pediatrics, Committee on Drugs. Transfer of drugs and other chemicals into human milk. *Pediatrics.* 2001;108: 776–789
111. American Academy of Pediatrics. Transmission of infectious agents via human milk. In: Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003:118–121
112. Read JS; American Academy of Pediatrics, Committee on Pediatric AIDS. Human milk, breastfeeding, and transmission of human immunodeficiency virus type 1 in the United States. *Pediatrics.* 2003;112: 1196–1205
113. World Health Organization. *HIV and Infant Feeding: A Guide for Health Care Managers and Supervisors*. Publication Nos. WHO/FRH/NUT/ 98.2, UNAIDS/98.4, UNICEF/PD/NUT/(J)98.2. Geneva, Switzerland: World Health Organization; 1998
114. Kourtis AP, Buteera S, Ibegbu C, Belec L, Duerr A. Breast milk and HIV-1: vector of transmission or vehicle of protection? *Lancet Infect Dis.* 2003;3:786–793
115. Coutsoudis A, Pillay K, Spooner E, Kuhn L, Coovadia HM. Influence of infant-feeding patterns on early mother-to-child transmission of HIV-I in Durban, South Africa: a prospective cohort study. South African Vitamin A Study Group. *Lancet.* 1999;354:471–476
116. Coutsoudis A, Rollins N. Breast-feeding and HIV transmission: the jury is still out. *J Pediatr Gastroenterol Nutr.* 2003;36:434–442
117. Lawrence RA, Lawrence RM. Appendix E. Precautions and breastfeeding recommendations for selected maternal infections. In: *Breastfeeding: A Guide for the Medical Profession*. 5th ed. St Louis, MO: Mosby Inc; 1999:868–885
118. Berlin CM Jr, LaKind JS, Sonawane BR, et al. Conclusions, research needs, and recommendations of the expert panel: Technical Workshop on Human Milk Surveillance and Research for Environmental Chemicals in the United States. *J Toxicol Environ Health A.* 2002;65: 1929–1935
119. Ribas-Fito N, Cardo E, Sala M, et al. Breastfeeding, exposure to organochlorine compounds, and neurodevelopment in infants. *Pediatrics.* 2003;111(5). Available at: www.pediatrics.org/cgi/content/full/111/ 5/e580
120. Hamprecht K, Maschmann J, Vochem M, Dietz K, Speer CP, Jahn G. Epidemiology of transmission of cytomegalovirus from mother to preterm infant by breastfeeding. *Lancet.* 2001;357:513–518
121. Yasuda A, Kimura H, Hayakawa M, et al. Evaluation of cytomegalovirus infections transmitted via breast milk in preterm infants with a real-time polymerase chain reaction assay. *Pediatrics.* 2003;111: 1333–1336
122. Friis H, Andersen HK. Rate of inactivation of cytomegalovirus in raw banked milk during storage at −20 degrees C and pasteurisation. *Br Med J (Clin Res Ed).* 1982;285:1604–1605
123. Anderson PO. Alcohol and breastfeeding. *J Hum Lact.* 1995;11:321–323
124. American Academy of Pediatrics, Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics.* 2004;114:297–316
125. Ryan AS, Wenjun Z, Acosta A. Breastfeeding continues to increase into the new millennium. *Pediatrics.* 2002;110:1103–1109
126. Polhamus B, Dalenius K, Thompson D, et al. *Pediatric Nutrition Surveillance 2001 Report*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2003
127. American College of Obstetricians and Gynecologists. Breastfeeding: maternal and infant aspects. *ACOG Educational Bulletin Number 258*. Washington, DC: American College of Obstetricians and Gynecologists; 2000
128. American Academy of Family Physicians. *AAFP Policy Statement on Breastfeeding*. Leawood, KS: American Academy of Family Physicians; 2001
129. Fifty-Fourth World Health Assembly. *Global Strategy for Infant and Young Child Feeding. The Optimal Duration of Exclusive Breastfeeding*. Geneva, Switzerland: World Health Organization; 2001
130. United Nations Children's Fund. *Breastfeeding: Foundation for a Healthy Future*. New York, NY: United Nations Children's Fund; 1999
131. Institute of Medicine, Committee on Nutritional Status During Pregnancy and Lactation. *Nutrition During Lactation*. Washington, DC: National Academy Press; 1991:24–25, 161–171, 197–200
132. The Ross Mothers Survey. *Breastfeeding Trends Through 2002*. Abbott Park, IL: Ross Products Division, Abbot Laboratories; 2002
133. World Health Organization and United Nations Children's Fund. *Protecting, Promoting and Supporting Breast-Feeding: The Special Role of Maternity Services*. Geneva, Switzerland: World Health Organization; 1989:13–18
134. Powers NG, Naylor AJ, Wester RA. Hospital policies: crucial to breastfeeding success. *Semin Perinatol.* 1994;18:517–524
135. Freed GL, Clark SJ, Sorenson J, Lohr JA, Cefalo R, Curtis P. National assessment of physicians' breast-feeding knowledge, attitudes, training, and experience. *JAMA.* 1995;273:472–476
136. Braveman P, Egerter S, Pearl M, Marchi K, Miller C. Problems associated with early discharge of newborn infants. *Pediatrics.* 1995;96: 716–726
137. Williams LR, Cooper MK. Nurse-managed postpartum home care. *J Obstet Gynecol Neonatal Nurs.* 1993;22:25–31
138. Gielen AC, Faden RR, O'Campo P, Brown CH, Paige DM. Maternal employment during the early postpartum period: effects on initiation and continuation of breast-feeding. *Pediatrics.* 1991;87:298–305
139. Ryan AS, Martinez GA. Breast-feeding and the working mother: a profile. *Pediatrics.* 1989;83:524–531
140. Frederick IB, Auerback KG. Maternal-infant separation and breastfeeding. The return to work or school. *J Reprod Med.* 1985;30:523–526
141. Spisak S, Gross SS. *Second Followup Report: The Surgeon General's Workshop on Breastfeeding and Human Lactation*. Washington, DC: National Center for Education in Maternal and Child Health; 1991
142. World Health Assembly. *International Code of Marketing of Breast-Milk Substitutes*. Resolution of the 34th World Health Assembly. No. 34.22, Geneva, Switzerland: World Health Organization; 1981
143. Howard CR, Howard FM, Weitzman ML. Infant formula distribution and advertising in pregnancy: a hospital survey. *Birth.* 1994;21:14–19
144. Howard FM, Howard CR, Weitzman M. The physician as advertiser: the unintentional discouragement of breast-feeding. *Obstet Gynecol.* 1993;81:1048–1051
145. Freed GL, Jones TM, Fraley JK. Attitudes and education of pediatric house staff concerning breast-feeding. *South Med J.* 1992;85:483–485
146. Williams EL, Hammer LD. Breastfeeding attitudes and knowledge of pediatricians-in-training. *Am J Prev Med.* 1995;11:26–33
147. Gartner LM. Introduction. Breastfeeding in the hospital. *Semin Perinatol.* 1994;18:475
148. American Academy of Pediatrics, Committee on Nutrition. Breastfeeding. In: Kleinman RE, ed. *Pediatric Nutrition Handbook*. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2004:55–85
149. American Dietetic Association. Position of the American Dietetic Association: breaking the barriers to breastfeeding. *J Am Diet Assoc.* 2001;101:1213–1220
150. Schanler RJ, Hurst NM. Human milk for the hospitalized preterm infant. *Semin Perinatol.* 1994;18:476–484
151. Lemons P, Stuart M, Lemons JA. Breast-feeding the premature infant. *Clin Perinatol.* 1986;13:111–122
152. Kron RE, Stein M, Goddard KE. Newborn sucking behavior affected by obstetric sedation. *Pediatrics.* 1966;37:1012–1016
153. Ransjo-Arvidson AB, Matthiesen AS, Lilja G, Nissen E, Widstrom AM, Uvnas-Moberg K. Maternal analgesia during labor disturbs newborn behavior: effects on breastfeeding, temperature, and crying. *Birth.* 2001;28:5–12
154. Widstrom A-M, Thingstrom-Paulsson J. The position of the tongue during rooting reflexes elicited in newborn infants before the first suckle. *Acta Paediatr.* 1993;82:281–283
155. Wolf L, Glass RP. *Feeding and Swallowing Disorders in Infancy: Assessment and Management*. San Antonio, TX: Harcourt Assessment, Inc; 1992
156. Righard L, Alade MO. Effect of delivery room routine on success of first breast-feed. *Lancet.* 1990;336:1105–1107
157. Wiberg B, Humble K, de Chateau P. Long-term effect on mother-infant behavior of extra contact during the first hour post partum. V. Follow-up at three years. Scand J Soc Med. 1989;17:181–191
158. Mikiel-Kostyra K, Mazur J, Boltruszko I. Effect of early skin-to-skin contact after delivery on duration of breastfeeding: a prospective cohort study. *Acta Paediatr.* 2002;91:1301–1306
159. Christensson K, Siles C, Moreno L, et al. Temperature, metabolic adaptation and crying in healthy, full-term newborns cared for skin-to-skin or in a cot. *Acta Paediatr.* 1992;81:488–493

160. Van Den Bosch CA, Bullough CH. Effect of early suckling on term neonates' core body temperature. *Ann Trop Paediatr.* 1990;10: 347–353
161. Sosa R, Kennell JH, Klaus M, Urrutia JJ. The effect of early mother-infant contact on breast feeding, infection and growth. In: Lloyd JL, ed. *Breast-feeding and the Mother*. Amsterdam, Netherlands: Elsevier; 1976: 179–193
162. American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Care of the neonate. In: Gilstrap LC, Oh W, eds. *Guidelines for Perinatal Care*. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2002:222
163. Shrago L. Glucose water supplementation of the breastfed infant during the first three days of life. *J Hum Lact.* 1987;3:82–86
164. Goldberg NM, Adams E. Supplementary water for breast-fed babies in a hot and dry climate—not really a necessity. *Arch Dis Child.* 1983;58: 73–74
165. Eidelman AI. Hypoglycemia in the breastfed neonate. *Pediatr Clin North Am.* 2001;48:377–387
166. Howard CR, Howard FM, Lamphear B, de Blieck EA, Eberly S, Lawrence RA. The effects of early pacifier use on breastfeeding duration. *Pediatrics.* 1999;103(3). Available at: www.pediatrics.org/cgi/content/full/103/3/e33
167. Howard CR, Howard FM, Lanphear B, et al. Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. *Pediatrics.* 2003;111:511–518
168. Schubiger G, Schwarz U, Tonz O. UNICEF/WHO Baby-Friendly Hospital Initiative: does the use of bottles and pacifiers in the neonatal nursery prevent successful breastfeeding? Neonatal Study Group. *Eur J Pediatr.* 1997;156:874–877
169. Kramer MS, Barr RG, Dagenais S, et al. Pacifier use, early weaning, and cry/fuss behavior: a randomized controlled trial. *JAMA.* 2001;286: 322–326
170. Gunther M. Instinct and the nursing couple. *Lancet.* 1955;1:575–578
171. Klaus MH. The frequency of suckling. A neglected but essential ingredient of breast-feeding. *Obstet Gynecol Clin North Am.* 1987;14: 623–633
172. Procianoy RS, Fernandes-Filho PH, Lazaro L, Sartori NC, Drebes S. The influence of rooming-in on breastfeeding. *J Trop Pediatr.* 1983;29: 112–114
173. Anderson GC. Risk in mother-infant separation postbirth. *Image J Nurs Sch.* 1989;21:196–199
174. Riordan J, Bibb D, Miller M, Rawlins T. Predicting breastfeeding duration using the LATCH breastfeeding assessment tool. *J Hum Lact.* 2001;17:20–23
175. Hall RT, Mercer AM, Teasley SL, et al. A breast-feeding assessment score to evaluate the risk for cessation of breast-feeding by 7 to 10 days of age. *J Pediatr.* 2002;141:659–664
176. American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine. Recommendations for preventive pediatric health care. *Pediatrics.* 2000;105:645–646
177. American Academy of Pediatrics, Committee on Fetus and Newborn. Hospital stay for healthy term newborns. *Pediatrics.* 1995;96:788–790
178. Ahn CH, MacLean WC Jr. Growth of the exclusively breast-fed infant. *Am J Clin Nutr.* 1980;33:183–192
179. Brown KH, Dewey KG, Allen LH. *Complementary Feeding of Young Children in Developing Countries: A Review of Current Scientific Knowledge*. Publication No. WHO/NUT/98.1. Geneva, Switzerland: World Health Organization; 1998
180. Heinig MJ, Nommsen LA, Peerson JM, Lonnerdal B, Dewey KG. Intake and growth of breast-fed and formula-fed infants in relation to the timing of introduction of complementary foods: the DARLING study. Davis Area Research on Lactation, Infant Nutrition, and Growth. *Acta Paediatr.* 1993;82:999–1006
181. Kramer MS, Kakuma R. *The Optimal Duration of Exclusive Breastfeeding. A Systematic Review*. Geneva, Switzerland: World Health Organization; 2002
182. Chantry CJ, Howard CR, Auinger P. Breastfeeding fully for 6 months vs. 4 months decreases risk of respiratory tract infection [abstract 1114]. *Pediatr Res.* 2002;51:191A
183. Dewey KG, Cohen RJ, Brown KH, Rivera LL. Effects of exclusive breastfeeding for four versus six months on maternal nutritional status and infant motor development: results of two randomized trials in Honduras. *J Nutr.* 2001;131:262–267
184. Butte NF, Lopez-Alarcon MG, Garza C. *Nutrient Adequacy of Exclusive Breastfeeding for the Term Infant During the First Six Months of Life*. Geneva, Switzerland: World Health Organization; 2002
185. Sugarman M, Kendall-Tackett KA. Weaning ages in a sample of American women who practice extended breastfeeding. *Clin Pediatr (Phila).* 1995;34:642–647
186. Dallman PR. Progress in the prevention of iron deficiency in infants. *Acta Paediatr Scand Suppl.* 1990;365:28–37
187. Domellof M, Lonnerdal B, Abrams SA, Hernell O. Iron absorption in breast-fed infants: effects of age, iron status, iron supplements, and complementary foods. *Am J Clin Nutr.* 2002;76:198–204
188. American Academy of Pediatrics, Committee on Fetus and Newborn, and American College of Obstetricians and Gynecologists. Nutritional needs of preterm neonates. In: *Guidelines for Perinatal Care*. 5th ed. Washington, DC: American Academy of Pediatrics, American College of Obstetricians and Gynecologists; 2002:259–263
189. American Academy of Pediatrics, Committee on Nutrition. Nutritional needs of the preterm infant. In: Kleinman RE, ed. *Pediatric Nutrition Handbook*. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2004:23–54
190. Pisacane A, De Vizia B, Valiante A, et al. Iron status in breast-fed infants. *J Pediatr.* 1995;127:429–431
191. Griffin IJ, Abrams SA. Iron and breastfeeding. *Pediatr Clin North Am.* 2001;48:401–413
192. Dewey KG, Cohen RJ, Rivera LL, Brown KH. Effects of age of introduction of complementary foods on iron status of breastfed infants in Honduras. *Am J Clin Nutr.* 1998;67:878–884
193. Naylor AJ, Morrow AL. *Developmental Readiness of Normal Full Term Infants to Progress From Exclusive Breastfeeding to the Introduction of Complementary Foods: Reviews of the Relevant Literature Concerning Infant Immunologic, Gastrointestinal, Oral Motor and Maternal Reproductive and Lactational Development*. Washington, DC: Wellstart International and the LINKAGES Project/Academy of Educational Development; 2001
194. Cohen RJ, Brown KH, Canahuati J, Rivera LL, Dewey KG. Determinants of growth from birth to 12 months among breast-fed Honduran infants in relation to age of introduction of complementary foods. *Pediatrics.* 1995;96:504–510
195. Ashraf RN, Jalil F, Aperia A, Lindblad BS. Additional water is not needed for healthy breast-fed babies in a hot climate. *Acta Paediatr.* 1993;82:1007–1011
196. Huffman SL, Ford K, Allen H, Streble P. Nutrition and fertility in Bangladesh: breastfeeding and post partum amenorrhoea. *Popul Stud (Camb).* 1987;41:447–462
197. Dettwyler KA. A time to wean: the hominid blueprint for the natural age of weaning in modern human populations. In: Stuart-Macadam P, Dettwyler KA, eds. *Breastfeeding: Biocultural Perspectives*. Hawthorne, NY: Aldine de Gruyter; 1995:39–73
198. American Academy of Pediatrics, Committee on Nutrition. Iron fortification of infant formulas. *Pediatrics.* 1999;104:119–123
199. American Academy of Pediatrics, Committee on Fetus and Newborn. Controversies concerning vitamin K and the newborn. *Pediatrics.* 2003; 112:191–192
200. Hansen KN, Ebbesen F. Neonatal vitamin K prophylaxis in Denmark: three years' experience with oral administration during the first three months of life compared with one oral administration at birth. *Acta Paediatr.* 1996;85:1137–1139
201. Gartner LM, Greer FR; American Academy of Pediatrics, Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency: new guidelines for vitamin D intake. *Pediatrics.* 2003;111:908–910
202. Centers for Disease Control and Prevention. Recommendations for using fluoride to prevent and control dental caries in the United States. *MMWR Recomm Rep.* 2001;50(RR-14):1–42
203. Blair PS, Fleming PJ, Smith IJ, et al. Babies sleeping with parents: case-control study of factors influencing the risk of the sudden infant death syndrome. *BMJ.* 1999;319:1457–1462
204. Charpak N, Ruiz-Pelaez JG, Figueroa de C Z, Charpak Y. Kangaroo mother versus traditional care for newborn infants ≤2000 grams: a randomized, controlled trial. *Pediatrics.* 1997;100:682–688
205. Hurst N, Valentine CJ, Renfro L, Burns P, Ferlic L. Skin-to-skin holding in the neonatal intensive care influences maternal milk volume. *J Perinatol.* 1997;17:213–217
206. Hughes V. Guidelines for the establishment and operation of a human milk bank. *J Hum Lact.* 1990;6:185–186
207. Human Milk Banking Association of North America. *Guidelines for Establishment and Operation of a Donor Human Milk Bank.* Raleigh, NC: Human Milk Banking Association of North America Inc; 2003
208. Arnold LD. Clinical uses of donor milk. *J Hum Lact.* 1990;6:132–133

209. Kaplan M, Hammerman C. Severe neonatal hyperbilirubinemia: a potential complication of glucose-6-phosphate dehydrogenase deficiency. *Clin Perinatol.* 1998;25:575–590, viii
210. Kaplan M, Vreman HJ, Hammerman C, Schimmel MS, Abrahamov A, Stevenson DK. Favism by proxy in nursing glucose-6-dehydrogenase-deficient neonates. *J Perinatol.* 1998;18:477–479
211. Gerk PM, Kuhn RJ, Desai NS, McNamara PJ. Active transport of nitrofurantoin into human milk. *Pharmacotherapy.* 2001;21:669–675
212. American Academy of Pediatrics, Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. *Pediatrics.* 2003;111:1113–1116
213. Fewtrell MS, Lucas P, Collier S, Singhal A, Ahluwalia JS, Lucas A. Randomized trial comparing the efficacy of a novel manual breast pump with a standard electric breast pump in mothers who delivered preterm infants. *Pediatrics.* 2001;107:1291–1297
214. American Academy of Pediatrics, Breastfeeding Promotion in Physicians' Office Practices Program. Elk Grove Village, IL: American Academy of Pediatrics; 2001, 2004
215. Freed GL, Clark SJ, Lohr JA, Sorenson JR. Pediatrician involvement in breast-feeding promotion: a national study of residents and practitioners. *Pediatrics.* 1995;96:490–494
216. Brown LP, Bair AH, Meier PP. Does federal funding for breastfeeding research target our national health objectives? *Pediatrics.* 2003;111(4). Available at: www.pediatrics.org/cgi/content/full/111/4/e360

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.