

Risks and Benefits of Pacifiers

SUMI SEXTON, MD, *Georgetown University School of Medicine, Washington, District of Columbia*

RUBY NATALE, PhD, PsyD, *Mailman Center for Child Development, Miami, Florida*

Physicians are often asked for guidance about pacifier use in children, especially regarding the benefits and risks, and when to appropriately wean a child. The benefits of pacifier use include analgesic effects, shorter hospital stays for preterm infants, and a reduction in the risk of sudden infant death syndrome. Pacifiers have been studied and recommended for pain relief in newborns and infants undergoing common, minor procedures in the emergency department (e.g., heel sticks, immunizations, venipuncture). The American Academy of Pediatrics recommends that parents consider offering pacifiers to infants one month and older at the onset of sleep to reduce the risk of sudden infant death syndrome. Potential complications of pacifier use, particularly with prolonged use, include a negative effect on breastfeeding, dental malocclusion, and otitis media. Adverse dental effects can be evident after two years of age, but mainly after four years. The American Academy of Family Physicians recommends that mothers be educated about pacifier use in the immediate postpartum period to avoid difficulties with breastfeeding. The American Academy of Pediatrics and the American Academy of Family Physicians recommend weaning children from pacifiers in the second six months of life to prevent otitis media. Pacifier use should not be actively discouraged and may be especially beneficial in the first six months of life. (*Am Fam Physician*. 2009;79(8):681-685. Copyright © 2009 American Academy of Family Physicians.)

► Patient information:

A handout on pacifier use in infants, written by the authors of this article, is available at <http://aafp.org/afp/20090415/681-s1.html>.

Nonnutritive sucking is a natural reflex for a fetus and newborn, usually manifested by sucking the hands and fingers. The pacifier, also referred to as a “dummy,” has been used as a method for fulfilling this innate desire.¹ Historically, pacifiers were viewed as beneficial until the early 1900s, when an anti-pacifier movement spread concerns that their use led to poor hygiene and indulgent behavior.² At present, there are mixed opinions as to whether pacifier use is beneficial, yet roughly 75 to 85 percent of children in Western countries use a pacifier.³ *Table 1* summarizes the risks, benefits, and recommendations for pacifier use at various ages.⁴⁻¹¹

Benefits

ANALGESIA

Pacifiers provide a calming effect and have been used for pain and anxiety prevention. A subgroup of the American Academy of Pediatrics (AAP) lists pacifiers as one of the key methods for pain relief in newborns and infants younger than six months undergoing minor procedures in the emergency department.⁴ A small amount of sucrose solution (2 mL) can be given within two minutes of a procedure, alone or in combination with a nipple or pacifier; the combination appears

to be more effective.^{12,13} Several studies of full-term and preterm newborns showed that pacifiers were superior to various sweet solutions,¹⁴⁻¹⁶ whereas a study of very preterm newborns showed that pacifiers in combination with sweet solutions were no better than sweet solutions alone.¹⁷ A more recent study confirmed that pacifier use reduces crying time in infants undergoing venipuncture in the emergency department, especially in those younger than three months.¹⁸ Pacifiers have been studied or recommended by the AAP for use with the following procedures: catheterization, circumcision, heel sticks, immunizations, insertion of an intravenous line, lumbar puncture, screening for retinopathy of prematurity, and venipuncture.^{4,13,15,18,19}

PRETERM INFANTS

A Cochrane review found that nonnutritive sucking is associated with shorter hospital stays, earlier transition to bottle feeding from enteral feeding, and improved bottle feeding.²⁰ Although the review did not show that pacifiers have a significant impact on weight gain, behavior, energy intake, heart rate, oxygen saturation, intestinal transit time, or age at full oral feeds, none of the studies reported harmful effects from

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>	<i>Comments</i>
Pacifiers may be used to help relieve pain from minor procedures.	B	4, 12-19	Most studies are small randomized controlled trials.
Pacifiers may be offered at the onset of sleep to reduce the risk of sudden infant death syndrome.	B	6, 22	Reference 22 is a meta-analysis of seven case-controlled studies.
Pacifier use may be associated with early breast weaning or may be a marker of breastfeeding difficulties; therefore, it should be avoided until breastfeeding is well established.	B	5, 7, 21, 23-26	References 21 and 26 are randomized trials.
Although adverse dental effects may occur after 24 months of pacifier use, the effects are more significant after 48 months. Therefore, pacifier use should be discouraged after four years of age.	B	10, 11, 30-32	Reference 30 is a meta-analysis.
Pacifier use should be stopped or limited in the second six months of life to reduce the risk of otitis media.	B	3, 8, 9	Reference 3 is a randomized trial.

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <http://www.aafp.org/afpsort.xml>.

pacifier use. Overall, pacifier use appears to be a reasonable and inexpensive option for preterm infants.

SUDDEN INFANT DEATH SYNDROME

AAP guidelines suggest offering pacifiers to infants at the onset of sleep to reduce the risk of sudden infant death syndrome (SIDS).⁶ The guidelines recommend not introducing pacifiers to breastfeeding infants until one month of age because later onset of pacifier use appears to have fewer negative effects on breastfeeding.²¹ Pacifiers should not be forced on the infant or reinserted during sleep if the infant spits it out. The exact mechanism of benefit for reducing rates of SIDS is not fully understood, but pacifier use may decrease the likelihood of rolling into the prone position, increase arousal, maintain airway patency, decrease gastroesophageal reflux and resultant sleep apnea, or increase respiratory drive with carbon dioxide retention.²² A meta-analysis²² of seven case-control studies demonstrated a strong association between pacifier use and a reduction in the risk of SIDS, estimating a number needed to treat of 2,733.

Complications

BREASTFEEDING

Observational studies²³⁻²⁵ and a randomized controlled trial (RCT)²¹ showing that pacifier use is associated with early breast weaning have led to concerns. However, an RCT that studied the effect of pacifier use on breastfeeding in 281 mother-infant pairs for three months postpartum had a different conclusion.²⁶ Although an observational association was noted between pacifier use and early weaning, when the data were analyzed further, the intervention (advice to avoid pacifier use) did not significantly reduce weaning at three months. The authors

concluded that pacifier use may be a marker of breastfeeding difficulties, but does not appear to be the cause of early weaning. The intervention group used pacifiers less often, but had no significant difference in crying or fussing, suggesting that other soothing methods are as effective as pacifier use. A more recent RCT on preterm infants did not demonstrate a significant effect of pacifier use on early weaning.²⁷

Because there is conflicting evidence about whether early use of a pacifier disrupts breastfeeding or merely indicates other breastfeeding difficulties, guidelines are cautionary.²⁸ The American Academy of Family Physicians (AAFP) recommends educating mothers about the risks of pacifier use in the immediate postpartum period.⁷ The AAP recommends postponing pacifier use until breastfeeding habits are well established; this recommendation does not contradict use in preterm infants for oral training.⁵

DENTAL HEALTH

A systematic review found inconsistent results regarding the effect of pacifier use on early childhood caries, suggesting that there is no proven correlation.²⁹ A meta-analysis concluded that pacifier use after three years of age is associated with a higher incidence of malocclusion.³⁰ In one study, the prevalence of malocclusion was roughly 71 percent in children who used a pacifier or sucked a digit for more than 48 months, compared with 32 percent in those who ceased sucking between 36 and 48 months, and 14 percent in those who ceased sucking before 24 months.³¹ The most significant malocclusions occurred in children who continued sucking habits beyond 48 months, but there were notable changes in children who continued beyond 24 months.

Table 1. Recommendations for Pacifier Use

Age	Potential benefits	Potential complications	Recommendations
Preterm infants	Analgesia Decreased hospital stay, earlier transition to bottle feeding from enteral feeding, improved bottle feeding performance	—	AAP recommends pacifier use in infants up to six months of age to help prevent pain from minor procedures in the emergency department. ⁴ AAP guideline on breastfeeding does not contradict pacifier use for oral training in preterm infants. ⁵
Up to six months	Analgesia Reduced SIDS risk	Early breast weaning	AAP recommends pacifier use in infants up to six months of age for pain relief from minor procedures in the emergency department. ⁴ AAP suggests offering pacifiers to infants at the onset of sleep to reduce the risk of SIDS. ⁶ AAP recommends avoiding pacifier use until breastfeeding is well established (usually by one month of age). ⁵ AAP recommends educating mothers about the effect of pacifier use on breastfeeding in the immediate postpartum period. ⁷
Six months to two years	—	Otitis media	AAFP/AAP joint guidelines recommend reducing or stopping pacifier use in the second six months of life to reduce the risk of otitis media. ⁸ ICSI recommends avoiding pacifier use after 10 months of age. ⁹
Two years and older	—	Dental malocclusion (misalignment of the teeth, such as open bite, crossbite, or overjet)	ADA and AAPD recommend actively discouraging pacifier use after four years of age. ^{10,11}

NOTE: Pacifier colonization with microorganisms may occur with pacifier use at any age; however, a direct association between these organisms and infection has not been proven.

AAFP = American Academy of Family Physicians; AAP = American Academy of Pediatrics; AAPD = American Academy of Pediatric Dentistry; ADA = American Dental Association; ICSI = Institute for Clinical Systems Improvement; SIDS = sudden infant death syndrome.

Information from references 4 through 11.

A more recent study confirms these negative dental effects with pacifier use after two years of age.³²

Studies comparing orthodontic and conventional pacifiers found minor differences in malocclusion.^{33,34} The American Dental Association and the American Academy of Pediatric Dentistry recommend that pacifier use be discouraged after four years of age.^{10,11}

INFECTION

Several studies have shown that pacifiers are often colonized with *Candida* and bacterial organisms (typically nonpathogenic).³⁵⁻³⁷ One study found 21 of 40 pacifiers to have a positive culture finding, with none containing the common pathogens of otitis media.³⁸ Latex pacifiers are more significantly colonized with *Candida* and *Staphylococcus* than silicone pacifiers.^{36,39}

A population-based study of more than 10,000 infants in the United Kingdom evaluated pacifier use and finger sucking at 15 months of age and their association with infection at 18 months of age.⁴⁰ The 36 percent of infants

who used a pacifier had a higher incidence of earache and colic compared with the 40 percent of infants who did not suck and the 21 percent of infants who sucked fingers. The 2.7 percent of infants who sucked both a pacifier and fingers had more wheezing and earaches and poorer health in the month before the study. One explanation for the association between pacifier use and illness may be that pacifiers were used to calm sick infants. A direct link between illness and type of sucking habit could not be determined from this study; more research is needed before recommendations can be made.⁴⁰

A systematic review of epidemiologic studies found three studies that showed an association between pacifier use and infection, such as otitis media, dental infection, and respiratory and gastrointestinal symptoms.⁴¹ These studies are also too limited to draw conclusions. Although some evidence exists for pacifier colonization with microorganisms, the direct association between these organisms and infection has not been proven.

Pacifiers

OTITIS MEDIA

There are two proposed mechanisms for how pacifier use could cause otitis media: reflux of nasopharyngeal secretions into the middle ear from sucking, and eustachian tube dysfunction from altered dental structure.⁴² A meta-analysis, including 22 studies from various countries, showed that pacifier use increased the risk of developing otitis media, with a risk ratio (RR) of 1.24.⁴³ Infants in day care outside the home had an RR of 2.45, those in family day care had an RR of 1.59, and those with a parent who smoked had an RR of 1.66. Breastfeeding reduced the risk of otitis media, with an RR of 0.87.

One widely cited, open, controlled cohort study of more than 400 patients evaluated the incidence of otitis media in infants whose parents were counseled to restrict pacifier use to when the infant was falling asleep. This counseling reduced continuous pacifier use by 21 percent and led to 29 percent fewer episodes of otitis media in the intervention group.³ A more recent prospective cohort study from the Netherlands found that 35 percent of 216 children using pacifiers and 32 percent of 260 children in the control group developed at least one episode of otitis media.⁴² However, rates of recurrent otitis media were higher in the pacifier group (16 versus 11 percent), leading the authors to conclude that pacifier use may increase the risk of recurrent otitis media.

AAFP/AAP joint guidelines on otitis media, which are based on evidence from cohort studies, recommend that physicians advocate for little to no use of pacifiers in the second six months of life to prevent otitis media.⁸ The Institute for Clinical Systems Improvement makes a similar recommendation, but suggests avoiding use by 10 months of age.⁹

Approach to the Patient

In addition to reviewing the risks and benefits of pacifiers, physicians should also counsel parents about the safe use of pacifiers.⁴⁴ Parents or caregivers should not put sweet substances on pacifiers to entice the infant. Pacifiers should be cleaned and replaced regularly to maintain good hygiene and avoid mechanical hazards.^{6,45} Manufacturing standards from the U.S. Consumer Product Safety Commission are available at <http://www.cpsc.gov/businfo/regsumpacifier.pdf>, and pacifier recalls are available at <http://www.cpsc.gov/cpsc/pub/prerel/prerel.html>.

Pacifier use should no longer be actively discouraged and may be especially beneficial in the first six months of life. However, the risks begin to outweigh the benefits around six to 10 months of age and appear to increase after two years of age. Because research suggests that

limiting pacifier use does not significantly affect crying or fussing, physicians should be prepared to counsel parents about soothing alternatives and pacifier weaning. Physicians should be mindful that after six months of age, pacifiers transform from a means of nonnutritive sucking to objects of affection that give the child a sense of security.³ Removing the pacifier can be a great source of anxiety for children and parents. Key alternatives to pacifier use in younger infants include swaddling, rocking, soft music, singing, and infant massage.⁴⁶ Older infants or toddlers may be distracted from pacifiers with activities, toys, or other objects of affection. Some weaning methods that have been studied include physician or parent encouragement, putting unpalatable substances on the pacifier, and stopping the habit abruptly.⁴⁷

Data Sources: A Medline search was completed using the key terms "pacifier," "dummy," and "soother." The search included meta-analyses, randomized controlled trials, clinical trials, and reviews. Agency for Healthcare Research and Quality evidence reports, Bandolier, Clinical Evidence, the Cochrane database, Database of Abstracts of Reviews of Effects, the Institute for Clinical Systems Improvement, the National Guideline Clearinghouse database, the Trip database, and UpToDate were also searched.

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The Authors

SUMI SEXTON, MD, is an assistant professor of family medicine at Georgetown University School of Medicine, Washington, DC, and is a founding partner of Premier Primary Care Physicians in Arlington, Va. She is also an associate editor for *American Family Physician*. Dr. Sexton received her medical degree from the University of Miami (Fla.) School of Medicine and completed a family medicine residency at Georgetown University School of Medicine.

RUBY NATALE, PhD, PsyD, is an assistant professor of clinical pediatrics in the Departments of Psychology and Early Childhood Education at the Mailman Center for Child Development, Miami. She received her doctoral degrees from Nova Southeastern University, Ft. Lauderdale, Fla., and completed a pediatric psychology fellowship at the University of Miami School of Medicine.

Address correspondence to Sumi Sexton, MD, Georgetown University Medical Center, 217 Kober-Cogan Hall, 3800 Reservoir Rd., NW, Washington, DC 20007 (e-mail: makkars@georgetown.edu). Reprints are not available from the authors.

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