Supine and Prone Infant Positioning: A Winning Combination

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Abstract

Since 1992, the optimal sleeping position for infants in the United States has been supine. This position has been shown to greatly reduce the rate of Sudden Infant Death Syndrome (Skadberg, Morild, & Markestad, 1998). However, the supine position may lead to other unintended consequences or complications. Through a review of literature, this article explores some of the complications associated with the "Back to Sleep" campaign in the U.S. and discusses educational strategies for perinatal educators.

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Prior to the 1990s, nearly all infants in the United States were placed for sleep in the prone or "tummy" position (Willinger et al., 1998). In 1992, the American Academy of Pediatrics (AAP) published a position statement recommending that all infants be placed in nonprone positioning for sleep with the intended purpose of decreasing the incidence of Sudden Infant Death Syndrome (SIDS). In 1996, the AAP position was amended to promote supine sleep as the preferred position. Although lateral-sleeping position confers a lower risk when compared to prone positioning, it still has a higher risk when compared to supine sleeping position (AAP, 1996). Over the past 10 years, the AAP, U.S. Public Health Service, SIDS Alliance, and the Association of SIDS and Infant Mortality Programs have provided much education to the general public, including the well-known "Back to Sleep" campaign (AAP, 1996).

Sometimes, as changes occur in medical practice, unanticipated sequelae appear in other areas. Following the change to supine sleeping, pediatricians, pediatric therapists, neurosurgeons, and plastic surgeons noted some new trends in their various practice areas, as illustrated in the case studies described below. Following the case studies, this article will review the literature relating to trends and the research supporting the supine sleep position, and will present an overview of information on the prevention of SIDS. Strategies will also be provided for perinatal educators to use in the education of their patients regarding the information presented here.

Case Presentations

Baby Girl A was born at a local hospital and then transferred to a neonatal intensive care unit in Virginia. The birth was by cesarean section due to breech presentation. Apgar scores were 3 at 1 minute and 8 at 5 minutes. Her birth weight was 1,050 grams at 30 weeks gestation, reflecting intrauterine growth restriction that was thought to be the result of the mother's pregnancy-induced hypertension. The infant had mild respiratory distress requiring mechanical ventilation for 1 day. She spent 5 days in the neonatal intensive care unit where tube feedings were successfully established and her respiratory status remained stable. She was then transferred to a Level II step-down unit at another hospital to continue her convalescence before being discharged to return home with her parents.

The infant presented to the neonatal follow-up clinic at 6 months of age. Physical examination revealed an obvious left torticollis. Her head position was tilted to the left, and she was unable to fully rotate her head to the right beyond approximately 30° from midline (see Figure 1). She also had plagiocephaly (a form of abnormal postnatal head molding), with occiput flattening noted on the posterior left side of her skull. When observing the infant's head from a posterior-superior orientation, the examiner noted her forehead to be asymmetrical, with the right side of her forehead appearing flattened when compared to the left. Her left ear appeared to be anterior to her right ear (see Figure 2).

History-taking indicated that the infant's gross motor milestones were markedly delayed at the 1-month level, with her skills limited to being able to lift her

Figure 1 Baby Girl A — Torticollis with Head Tilt to Left

head in the prone position. She was unable to roll over, push up on her forearms or wrists, or reach for objects—skills that are normally attained by 3–5 months of age. Parents reported that her pediatrician had advised them to put her to sleep on her side but had not specifically told them to alternate from one side to the other. Essentially, the infant had been sleeping on one side since discharge from the hospital. Parents reported that the infant had experienced minimal prone playtime because she did not seem to like this position. She was sent for anterior/posterior view and lateral cervical spine x-rays to rule out anatomic abnormalities. A referral for physical therapy was made.

In another case, Baby Boy B was born at 36 weeks gestation by spontaneous vaginal delivery without complications. He did not require any special infant care and spent 48 hours in a normal newborn nursery prior to his being discharged home with his parents. His mother stated that from the time he was born her son seemed to prefer sleeping with his head turned to the left side. At his 3-month-old well-baby checkup, the infant's pediatrician noted some plagiocephaly and left-sided torticollis and offered positioning suggestions to the mother. At 5½ months of age, the infant showed little progress. He was referred for physical therapy at a children's hospital where a plastic surgeon prescribed

Supine and Prone Infant Positioning: A Winning Combination

Figure 2 Baby Girl A – Plagiocephaly

orthotic helmet therapy (discussed later in this article; see Figure 3). After 5 months of therapy, the infant neared the end of treatment, and the parents reported being pleased with the success of the interventions. The infant's mother noted that she would have benefited from information during her prepared childbirth class regarding positioning and associated problems that can result.

The two cases described above are common stories of unadvised sleep positioning and simultaneous abnormal head molding or positional plagiocephaly, acquired torticollis, and delayed acquisition of gross motor milestones. All of these conditions will be discussed in depth in this article.

Review of Literature

Physiology of Sleep Position and Respiration

Although substantial research has been done on the cause of SIDS, not any one factor has been determined to be responsible. Multiple mechanisms may account for the reduction of SIDS secondary to the change in sleep position. Jeffery, Megevand, and Page (1999) examined the laryngeal protective reflexes of infants as a possible explanation. Swallowing and arousal are essential in preventing laryngeal stimulation, and the researchers found that a reduction of these airway protective responses occurred when the infant was in the prone position.

Galland, Bolton, Taylor, Sayers, and Williams (2000) examined physiological responses of ventilation and arousal to mild asphyxia in prone and supine sleeping infants. Methods included an asphyxial test: placing a box over the head of the sleeping infants and changing the gas mixture breathed by the infants for

(Photo by Melissa C. Rose, PT)

Figure 3 Baby Boy B – Orthotic Helmet Therapy

5–6 minutes. Study results showed that babies sleeping prone, when compared to supine, had poorer ventilatory responses to mild asphyxia during sleep at 3 months of age ($p = 0.050$).

Ishikawa, Isono, Aiba, Tanaka, and Nishino (2002) examined passive pharyngeal collapsibility in supine and prone positioned infants and concluded that the prone position increases upper airway collapsibility contributing to SIDS. Waters and colleagues (1999) studied the brains of 29 SIDS victims and, in 79% of the cases, found significant neuronal apoptosis, a form of cell death that can be triggered by hypoxemia. They posited that neuronal damage caused functional loss in key brain regions and may have some implications for understanding the sequence of events that lead to SIDS. Regardless of mechanisms involved, this change in sleep position has significantly decreased the incidence of SIDS, as illustrated by the following studies.

Sleep Position and Incidence of SIDS

Willinger and colleagues (1998) conducted telephone interviews with 1,000 parents of infants born between 1992 and 1996 and living in 48 states. The objective

was to determine the typical sleep positions of the infants and changes that occurred after the recommendation of supine sleeping. Results showed that the prevalence of infants placed in the prone position for sleep declined by 66%. During the same window of time, the rate of SIDS declined approximately 38%. Skadberg, Morild, and Markestad (1998) used a population-based case reference study with the reference group consisting of 500 randomly selected infants to show a 98% decrease in prone sleeping in a 3-year period from 1993 to 1995. During this timeframe, the SIDS rate decreased from 3.5 per 1,000 live births to 0.2 per 1,000 live births, which equals an overall decrease of 94%. Thus, supine positioning for sleep is clearly evidence-based and has saved the lives of many children.

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Prior to the Back to Sleep campaign, infants who slept in the prone position also tended to spend awake time in the prone position. When an infant awakes in prone and becomes fussy or bored, it naturally learns to push up on its forearms and lift its head to explore the environment. Pushing up against gravity also has the added benefit of strengthening the muscles used in other prone skills such as pushing up onto hands and knees, creeping, crawling, and rolling over. Infants who sleep in a supine position are not in the appropriate position upon awakening to achieve these skills spontaneously. Without adequate prone time, the anti-gravity motor patterns may be underdeveloped. When the infant is then placed in prone, it is an uncomfortable position and the infant will often fuss and cry. The parents' response is to then say that their infant does not like this position, and therefore they may not provide prone time during the day.

Although "tummy time" is also included in the Back to Sleep educational materials, it is often forgotten. In addition, parents are often so fearful of SIDS that they are often reluctant to provide prone time, even when the infant is awake. Mildred, Beard, Dallwitz, and

Unwin (1995) found a significant association between the knowledge of SIDS and fears connected with prone play positioning. In a self-administered questionnaire, 93% of the parents reported that their knowledge of SIDS influenced the sleep position they chose for their infants. Eighty-four percent of these parents reported that they never placed their infant in a prone position for sleep, and 26% reported never placing their infant in a prone position for play. These results demonstrated a significant association ($p = 0.002$) between the knowledge of SIDS and the avoidance of the prone position for play.

The finding in Mildred and colleagues' (1995) research was corroborated later in a study by Davis, Moon, Sachs, and Ottolini (1998). Despite receiving counseling regarding prone play, 26% of the parents in this study did not provide prone playtime for their infants.

Fears of SIDS appear to overpower the information given to parents regarding the importance of supervised prone play. The following trends discussed below have been noted in association with the change to supine sleeping position and subsequent lack of prone playtime.

Gross Motor Milestone Delays

The first trend noted following the change to supine sleep positioning involves delays in acquisition of early gross motor milestones. Physicians and therapists commonly use motor milestones to evaluate normal developmental progress in infants and children. Parents are also generally very aware and concerned if their infants do not seem to achieve these milestones appropriately. Jantz, Blosser, and Fruechting (1997) noted some changes in the motor milestones of infants in their private pediatric practice. They conducted a retroactive chart review in order to evaluate these changes in motor milestones observed at well-child checkups. The study included 343 full-term infants who were seen for normal newborn care, and the screening tool used was the Denver Developmental Test—Revised. Results showed that infants who slept supine or in a side-lying position were less likely to roll over at the 4-month checkup than those who slept in the prone position.

A second pediatric practice group, Davis and colleagues (1998), suspected that they were also finding

Supine and Prone Infant Positioning: A Winning Combination

differences in the rate of milestone acquisition between prone- and supine-sleeping infants. A prospective, practice-based study was conducted with a sample of 351 healthy term infants in which parents were asked to keep a sleep position log for the first 6 months of the infant's life. Results showed a significant difference in age for attainment of many early motor milestones—including rolling, sitting, creeping, crawling, and pulling to stand—with the prone sleepers acquiring the milestones earlier than those sleeping supine ($p = 0.05$). Infants achieved all milestones within the normal age range, which was defined by using range parameters adapted from the Denver Developmental Test. Information was culled from the parents' logs, making it more subjective than standardized testing due to the results being limited by the accuracy of the parents' responses. The researchers concluded that it was significant to reassure parents that, although milestones may be on the low end of normal, the infants will eventually attain the milestones.

Occupational therapists Salls, Silverman, and Gatty (2002) also reported some changes in gross motor milestone achievements in their pediatric practice. These researchers conducted a descriptive developmental pilot study in which they compared a 1998 sample of infants to the Denver II, a screening tool that was initially standardized in 1988 (Frankenburg, Dodds, Archer, Shapiro, & Bresnick, 1992). Sixty-six infants were included in the study and were examined at 2, 4, and 6 months of age. Motor milestones examined were head control, rolling prone to supine, tripod sitting, creeping, crawling, and pulling to stand. Parents were also asked to give estimates of awake-time in prone. Results showed significant differences in average milestone achievement at 2 months of age when compared to the 1988 normative population. However, infants who had 15 minutes or more of prone time during the day had statistically similar pass-fail results when compared to normative populations. This suggests that prone positioning for play, even in small amounts, may relate to faster achievement of developmental milestones. No significant differences occurred between the groups at 4 and 6 months, but the researchers suggested that using a more sensitive instrument than the Denver II may provide more definitive results in future studies.

Dewey, Fleming, and Golding (1998) performed a prospective study using 12,208 infants delivered be-

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fore, during, and after the Back to Sleep campaign in the United Kingdom and followed these infants to 18 months of age. The researchers found that, although infants sleeping supine scored lower on gross motor milestones at 6 months of age, the difference resolved by 18 months of age.

Although the difference in milestone acquisition between supine and prone sleepers has been shown to resolve over time, it still has some impact on the parents and infants. Parental anxiety associated with the perceived delays in milestones may occur. In the absence of other neurological findings, parents can be assured that delays are transient and will resolve over time. For the infant who may miss learning and exploring experiences accrued during prone play, it is possible that the effects may be more lasting. Thus, supervised prone playtime should be stressed in all prenatal and discharge education, along with supine sleeping.

Shoulder Retraction

Shoulder external rotation and retraction with scapular adduction has been seen more frequently since the change in sleep position (Hunter & Malloy, 2002; Montfort & Case-Smith, 1997). In developmental clinics, this is commonly referred to as "high guard" positioning and is caused when the infant's arms consistently rest in external rotation in supine positioning (Montfort & Case-Smith, 1997). Essentially, some infants get "stuck" in this position, which can affect hand-to-mouth activities, fine motor skills that involve hand midline play and reaching, and gross motor activities that require forearm propping (Hunter & Malloy, 2002). Although many infants who experience this are able to resolve it on their own, others may require physical therapy. Providing prone playtime as well as facilitating midline hand skills will help prevent this condition.

Positional Torticollis

Positional or acquired torticollis is caused by a contracture or tightening of the sternocleidomastoid muscle and includes lateral flexion to the affected side and rotation to the opposite side (Ratliffe, 1998). This is again a diagnosis seen more commonly in infants who sleep in the supine position (Golden, Beals, Littlefield, & Pomatto, 1999). Positional torticollis is caused when the infant's head is maintained primarily in one position. This may occur if the infant has a preference for head position to one side or if parents consistently place the infant in the same position. This condition can occur alone, but it is also associated with positional plagiocephaly, which will be discussed in the next section.

With torticollis, the infant is unable to turn his head away from the affected area, which over time may cause mild facial asymmetry, range restriction of the neck, delayed development of postural control, and alteration in visual gaze to one side (Emery, 1997; Hylton, 1997). Physical therapy involving stretching or deep neck massage may be indicated. Prior to physical therapy, it is important to obtain cervical x-rays to rule out structural abnormalities. Surgical release of the sternocleidomastoid muscle is done only as a last resort if other therapy fails. Botox® injections are a new form of treatment being utilized by some practitioners to release the tight neck muscles (Luther, 2002).

Positional Plagiocephaly or Plagiocephaly without Synostosis

Synostosis refers to the fusing of the lambdoid cranial suture (craniosynostosis), resulting in head molding or plagiocephaly. In positional plagiocephaly, the suture is not fused and the asymmetry or head molding is caused by pressure exerted by the position of the head in one position for a period of time. Boere-Boonekamp and van der Linden-Kuiper (2001) examined the positional preference of 7,609 infants and followed up on those with cranial asymmetry after 2 years of age. Infants sleeping in the supine position were found to be among the group of infants having a higher risk of asymmetries, restricted range of motion, and flattening of the skull at 2–3 years of age. Positional preference was defined as “the condition in which the infant, in supine position, shows head rotation to either the right

or the left side for approximately three quarters of the time in observation” (Boere-Boonekamp & van der Linden-Kuiper, 2001, p. 340).

Peitsch, Keefer, LaBrie, and Mulliken (2002) studied early signs of cranial flattening in infants and potential risk factors. They found that the incidence of cranial flattening was 13% in singletons and 56% in twins. Risk factors identified were assisted vaginal delivery, prolonged labor, unusual birth position, multiparity, and male gender. They concluded that localized occiput flattening at birth might also be a precursor to deformational plagiocephaly. What is thought to happen is that the infant, unable to roll on its own and without intervention from caregivers, lies supine with the head turned to the flattened side. Parents need to be aware of their infant's head position preference and remember to alternate head positions when putting the infant to sleep. This is even more important when cranial flattening is noted immediately following the birth of an infant.

Kane, Mitchell, Craven, and Marsh (1996) reviewed the charts of 269 infants presenting to a craniofacial center between 1979 and 1994 to determine and verify an increase in referral of infants with plagiocephaly without synostosis. The researchers discovered that, in the period of time between 1992 and 1994, the number of referrals was six times greater than that during the preceding 13 years. This provided evidence suggesting a causal relationship to AAP's recommendation for supine sleeping.

Turk, McCarthy, Thorne, and Wisoff (1996) reviewed 52 consecutive patients presenting to a craniofacial center with deformational plagiocephaly from 1992 to 1994. The mean age at which cranial asymmetry was noted was 3.6 months. Following a marked increase in the referral of infants with this problem to their center, their objective was to study the etiologies of deformational plagiocephaly and possible correlation with infant head position. The researchers discovered that all of the affected infants included in this study were put to sleep in the back- or side-lying position showing a direct association with the change to nonprone sleep position and the finding of an increased incidence of deformational plagiocephaly. Of these infants, 73% resolved with frequent head turning, 23% resolved with helmet molding therapy, and 4% required surgery.

Supine and Prone Infant Positioning: A Winning Combination

Positional plagiocephaly results when an external molding force is applied to an infant's cranium. Skull bones in infants less than 6 months of age tend to be very soft, malleable, and maneuverable. In most cases, similar to torticollis, positional plagiocephaly is caused by infants holding their heads in a single position at rest. Prior to the change in sleep position, this was a relatively rare condition (Littlefield, Reiff, & Rekate, 2001), with cranial deformation or head molding seen primarily in the premature population (Chan, Kelley, & Khan, 1995). The length of time required to produce a lasting deformity of the cranium is several weeks to 3 months (Ripley et al., 1994).

Positional plagiocephaly is characterized by asymmetrical occiput flattening, with resulting compensatory changes in other areas of the skull. Contralateral brow lowering or inferior displacement of the brow, contralateral forehead or frontal region flattening, and ipsilateral anterior ear shift may occur. An ipsilateral anterior orbit and cheek shift may also result. All or a combination of these may result in facial asymmetry or distortion (Littlefield et al., 2001; Turk et al., 1996). Diagnosis of this condition is fairly easy and is accomplished by observing the child's head from a posterior-superior view. Plagiocephaly may not be as obvious on the frontal view of the infant's head. Typically, this can be identified by the 2-month well-baby visit. Early, mild asymmetry may be missed due to the deformity occurring over time. The back of the head is affected, which is not as noticeable, and the head circumference is usually within normal limits (Najarian, 1999).

Treatment of plagiocephaly involves the use of active counter-positioning, helmet orthotics, or surgery. In infants less than 6 months of age, counterpositioning is effective in returning the head to a more normal shape. After that time, infants will often choose their head position themselves, making this process more difficult to achieve (Littlefield et al., 2001). Loveday and de Chalan (2001) compared active counterpositioning and orthotic helmets as treatment options for positional plagiocephaly. Using a random sample of 74 infants, of which 45 were managed with active counterpositioning and 29 with orthotic helmets, results showed that the outcomes were comparable, but the management period with the helmets was approximately three times shorter.

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Helmet treatment for positional plagiocephaly was developed in the late 1970s as a nonsurgical alternative treatment for positional head molding (Clarren, Smith, & Hanson, 1979). Currently, a helmet called a thermoplastic orthotic device involves the use of thermoplastic materials that can be molded directly onto the infant's head. The device is lined throughout, using a soft material to protect the skin of the infant. It is light, comfortable, and tolerated well by the infant (Aliberti, Pittore, Ruggiero, Cinalli, & Maggi, 2002). This mode of treatment is most effective if initiated prior to 6 months of age and involves the infant wearing the helmet for several months with weekly adjustments made by a specialized technician (Littlefield et al., 1998).

Helmet treatment is not offered in all geographical areas. It is expensive and currently covered by only a few insurance plans. To achieve optimal results, this therapy requires a very compliant and diligent parent. For these reasons, counterpositioning may be the best treatment for mild to moderate cases of positional plagiocephaly, with the use of helmet treatment considered only for the most severe cases. Surgery is mentioned in the literature as a treatment for the most severe cases of plagiocephaly. However, due to the risks inherent in any surgical procedure, conservative therapy is optimal and preferred (O'Broin, Allcutt, & Earley, 1999).

Positional plagiocephaly is not life threatening, but it does have some potential adverse consequences. Panchal and colleagues (2001) examined 42 infants with plagiocephaly without synostosis to determine if they had any significant differences on a standardized test of cognitive and psychomotor skills. The mean age was 8.4 months at testing, using the Bayley Scales of Infant Development II. The scores were then compared to a standardized population sample. Within the group of infants with plagiocephaly, the scores were significantly different from the normal curve distribution ($p < 0.001$). Zero percent of the subjects in the group

Table 1 Strategies to Prevent and Treat Infant Head Molding*

- Change the position of the infant's head throughout the day to prevent pressure to same side.
- Limit the time in supine position in car seat, infant swing, and infant carriers.
- Change the position of the infant's crib relative to the door in order to encourage the infant to look in the opposite direction.
- Reverse the head-to-toe position of the infant in the crib, weekly.
- Provide visual stimulation to the infant in all vision fields.
- Change toy, mobile, and crib positions, weekly.
- Watch for "high guard" positioning (arms held up and externally rotated), and make sure the infant has midline play opportunities.
- Recognize and treat torticollis, plagiocephaly, and shoulder retraction as early as possible for optimal treatment.

*Information gathered from clinical experience as well as the following sources: Belkengren, Sapala, & Gale, 1998; Hunter & Malloy, 2002; and Neufeld & Birkett, 2000.

were accelerated, 67% were normal, 20% had a mild delay, and 13% had a significant delay indicating that, before any intervention was done, this group of infants demonstrated delays in cognitive and psychomotor development. The researchers postulated that the ipsilateral flattening may result in some focal restriction of the occipital cerebral cortex. Repeating this study with larger numbers of infants, using children without any anomalies for a control group, and following the infants to an older age would be important to verify the significance of these differences.

Miller and Clarren (2000) performed a retrospective medical record review of 64 patients with persistent plagiocephaly without synostosis and were able to document the need of special education services needed in 39.7% of children with this condition. This was contrasted to 7.7% of siblings within these families, which served as controls. This finding suggests that this group of children might be at risk for developmental difficulties during the school-age years. Again, studies using standardized controls and larger sample numbers would give a more accurate picture of developmental risks. However, the two studies together suggest that untreated plagiocephaly may have some risk for long-term developmental consequences.

Untreated plagiocephaly can also cause abnormal occlusion, temporomandibular joint difficulties, and strabismus (Neufeld & Birkett, 2000). Altered physical

Table 2 Strategies for Promoting Prone Play*

- Provide supervised prone or side-lying playtime, daily.
- Begin with 15 minutes per day and increase by 1 minute per week.
- If infant does not initially like being in prone position, place blanket roll under its chest so it can see beyond the floor and then decrease the thickness over time as the infant's skills progress. This allows the infant to work on head control as well as upper body strength while he/she is in a more functional position for visual stimulation and play activities.
- Parent can lie supine with the infant prone on the parent's chest to interact with the infant.
- Parent can place the infant in prone position on a table or in an infant seat and then sit within the infant's range of vision while keeping a hand ready for safety.
- Put interesting objects (e.g., toys, pictures, or even goldfish in a bowl) in the infant's visual field. Remember that the most interesting object to an infant is the parent's face.

*Information gathered from clinical experience as well as the following sources: Belkengren, Sapala, & Gale, 1998; Hunter & Malloy 2002; and Neufeld & Birkett, 2000.

appearance, without treatment, may be permanent (Marshall, Fenner, Wolfe, & Morrison, 1997). It can also be especially disturbing to parents. Some studies have suggested that the altered physical appearance reduces perceived attractiveness, which may affect bonding between the infant and parent (Budreau, 1987; Chan et al., 1995).

Implications for Perinatal Educators

Morbidity from supine positioning is preventable. It is also easily treatable if identified early (see Table 1 for strategies for the prevention and treatment of infants with head molding). Childbirth educators, along with other health professionals involved in perinatal education, are in an excellent position to inform and educate expectant parents about the importance of infant head

Childbirth educators and other health professionals are in an excellent position to inform and educate expectant parents about the importance of infant head positioning and prone playtime.

Supine and Prone Infant Positioning: A Winning Combination

Table 3 Strategies to Decrease the Risk of Sudden Infant Death Syndrome*

- For the first 6 months of life, the infant should be placed in a supine position to sleep, unless specifically medically indicated otherwise.
- Side-lying is preferred to prone; however, because the baby may inadvertently roll, side-lying is not as safe as supine.
- Infants who are able to roll over should still be placed in supine position for sleep, initially.
- Mattress should be firm, not soft.
- Soft bedding under the infant may cause suffocation or strangulation. This includes pillows, quilts, waterbeds, and sofas.
- Adult beds may increase the risk of SIDS. Infant may become trapped between the mattress and bed or wall, causing suffocation and strangling.
- Pillows and blankets should be avoided. Use blanket sleepers if room or home temperature is cold.
- Overheating may increase the risk of SIDS. Try to avoid overdressing the baby or overheating the room.
- Avoid smoking in home with infants. Passive smoke increases the risk of SIDS.
- Stuffed animals should not be placed in bed with infant.
- Breastfeeding should be encouraged.

*Sources: AAP, 1996, 1998, 2000; Hunter & Malloy, 2002; and Willinger et al., 1998.

positioning and prone playtime. Supine sleep must be stressed, but this needs to be accompanied by promoting supervised prone playtime as well. Additionally, parents need to be aware of the importance of providing multiple head position changes of infants during the day to prevent positional deformities.

As mentioned previously, parents need to be aware that infants who sleep supine initially may not like to be in the prone position. They may fuss and carry on, which can be distressing to parents. Prior knowledge of the possibility of this occurrence will decrease parental distress as well as potentially increase compliance in providing prone playtime. Parents should be informed that developmentally, the majority of infants are unable to sustain lifting their chins while in the prone position until 1 month of age. Spending prone time looking at the floor when compared to their parents' faces or stimulating toys can be frustrating to an infant. Parents can promote comfort in a prone position with a new infant by placing themselves down on the floor or within eye level of their infants, providing pleasant and engaging stimulation. Eventually, the infant will gain upper body strength and be able to lift its head and chest up in a more functional position to

explore the environment on its own (see Table 2 for strategies to promote prone play).

All health professionals working with mothers and infants should also be aware of and continue to provide appropriate information to parents regarding supine sleep and other risk factors for SIDS (see Table 3 for strategies to reduce the risk of SIDS).

Conclusions

Supine sleeping continues to be recommended as the safest position for the majority of infants and should be continued, unless medically contraindicated, for at least the first 6 months of the infant's life. Many infants will continue to sleep in this position. Along with supine sleep position, it is essential to provide supervised prone playtime as well as other position changes during the day to avoid gross motor milestone delays, head molding, shoulder retraction, and tortocollis. Infants who sleep supine may not initially like prone positioning, but even as much as 15 minutes a day may make a difference in motor milestone acquisition. Watching for occiput flattening and treating early with counterpositioning may be the easiest ways to avoid complications requiring therapy and other interventions.

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Supine and Prone Infant Positioning: A Winning Combination

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Updates on Prone Sleeping Position for Infants

The Committee on Fetus and Newborn of the American Academy of Pediatrics continues to recommend supine sleep position, safe sleeping environments, and elimination of exposure to tobacco smoke to decrease the risk of SIDS (Committee on Fetus and Newborn, 2003).

Researchers agree that re-breathing expired air may be a lethal hazard for sleeping infants in the prone position (U.S. Consumer Product Safety Commission, 1996). However, some authors and product sales persons assert that the answer is to use bedding designed to ventilate the mattress cover's undersurface in order to direct dangerous gases away from the baby. Others claim the answer is to wrap crib mattresses, as opposed to having babies sleep in the supine position. Research on these last two assertions is scant or absent.

Childbirth educators can tell expectant parents who ask that perhaps sound research will eventually inform us of mattress materials that provide a safe environment for infants sleeping in the prone position. For now, though, the recommendation remains “back to sleep and prone to play.”

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