



# Benefits of Infant Massage for Infants and Parents in the NICU

Britt Frisk Pados & Kelly McGlothen-Bell

**ABSTRACT:** Infant massage is an ancient therapeutic technique used around the world. For infants who experience painful procedures, are exposed to the stressful NICU environment, and are separated from their parents, infant massage has been promoted as a method to reduce stress and promote bonding. In this article, we review the current literature on infant massage in the NICU. There is evidence that infant massage has beneficial effects on preterm infants in the NICU, including shorter length of stay; reduced pain; and improved weight gain, feeding tolerance, and neurodevelopment. Parents who performed massage with their infants in the NICU reported experiencing less stress, anxiety, and depression. Neonatal nurses can obtain education and certification in infant massage and can teach parents infant massage techniques, thereby promoting the health and well-being of parent–infant dyads.

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Infants born prematurely or with complex medical conditions are exposed to the highly medicalized environment of the NICU. The critical nature of the NICU exposes infants to chronic stressors, including painful medical treatments, parental

separation, and noxious stimuli (D'Agata et al., 2017). Frequent painful and stressful events are associated with negative effects on growth and developmental outcomes in infants (Badr, Abdallah, & Kahale, 2015; Smith, 2012).

## CLINICAL IMPLICATIONS

- There is evidence that infant massage has beneficial effects for infants and their parents, including strong evidence that it reduces pain during painful procedures, such as heel stick and tape removal.
- Infant massage has been associated with decreased stress, anxiety, and depression among parents who provided massage to their hospitalized infants.
- There are multiple ways for neonatal nurses to obtain education and certification in infant massage.
- Neonatal nurses can teach parents how to use infant massage to promote parent–infant bonding and infant health.

For the past three decades, researchers have studied methods to reduce stress in infants in the NICU. Neonatal nurses use therapies such as nonnutritive sucking, skin-to-skin care (i.e., kangaroo mother care), infant massage, swaddling, and positioning to minimize stress and promote optimal neurodevelopment (Badr et al., 2015). A body of literature exists on the effectiveness of nonpharmacologic interventions such as nonnutritive sucking and skin-to-skin care and suggests that these interventions have positive effects on stress and a variety of infant and parent outcomes (Badr et al., 2015; Foster, Psaila, & Patterson, 2016; Johnston et al., 2017). Although the literature on nonnutritive sucking and kangaroo mother care point to reasonably strong evidence of their efficacy, there remain questions about the use of infant massage in the NICU. The purpose of this article is to describe infant massage and the current literature on the use of infant massage in the NICU.

## Infant Massage History and Techniques

Massage is an ancient therapeutic technique that was first documented in the Chinese medical literature more than 4,000 years ago (Badr et al., 2015). There has been documentation of its use across cultures throughout history. Today, mothers around the world massage their infants and consider it an essential part of parenting to enhance infant health and facilitate bonding (Badr et al., 2015; Darmstadt & Saha, 2002, 2003; Mullany, Darmstadt, Khatry, & Tielsch, 2005).

Massage therapy is the systematic application of tactile stimulation, which can be applied by using a variety of techniques and results in stimulation of the sensory receptors in the skin, muscles, bones, and joints (Kulkarni, Kaushik, Gupta, Sharma, & Agrawal, 2010; Robles-De-La-Torre, 2003). Massage may include touching, stroking, friction, stretching,

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compression, and passive movement of joints (Diego, Field, & Hernandez-Reif, 2014; Fritz, 2013).

## Application of Infant Massage to the NICU Environment

The use of massage as a therapeutic technique in the NICU was first studied in the 1980s (Field et al., 1986; White-Traut & Nelson, 1988). Although there are some concerns about the compatibility of infant massage with efforts to minimize stimulation and cluster care, particularly in preterm infants, proponents of infant massage have emphasized the positive, comforting touch aspects of massage, which differ from touch associated with medically necessary care (Smith, 2012). This positive touch overcomes the otherwise physical separation of the infant from his or her parents in the NICU and, for the preterm infant, provides tactile stimulation that he or she would normally experience while developing in utero. The fetus in utero is exposed to constant tactile stimulation through contact of the skin with the amniotic fluid and, as the fetus grows larger, through compression by the uterine walls. Since the first studies in the 1980s, quite a bit of research has been done on the use of infant massage in the NICU. At the same time, advances in neonatal care have also allowed for the survival of more premature and critically ill infants, increasing the need for alternative therapies to reduce stress and enhance optimal neurodevelopment.



Alvarez and colleagues (2017) reported a systematic review of massage therapy in hospitalized preterm neonates; however, their review was limited to studies published between January 2004 and December 2013, which was actually a review of older literature than was reviewed by Badr and colleagues (2015). Finally, Niemi (2017) also published a recent review of randomized controlled trials of infant massage. In this article, we report findings of Badr et al.'s meta-analyses and provide an overview of research published in the last 10 years, not limited to randomized controlled trials.

The literature in the past 10 years is almost exclusively limited to infants born preterm, with

only two studies reporting on the effects of infant massage in hospitalized full-term infants (Chik, Ip, & Choi, 2017; Hahn et al., 2016). In the current literature on the effects of massage on infants, a wide variety of outcome measures have been reported, including weight gain, length of stay, feeding, neurodevelopment, and pain.

**Infant Weight Gain.** Weight gain has been the most commonly reported infant outcome of research on infant massage. Badr and colleagues (2015) reported a meta-analysis of 13 studies in which researchers reported on infant daily weight gain and found that infants who received massage gained 0.53 g more per day than infants who did not receive massage ( $p = .0001$ ). In their meta-analysis of 10 studies reporting on weight at discharge, they found that infants who had received massage weighed 51.04 g more than infants who did not receive massage, but this was not statistically significant ( $p = .09$ ; Badr et al., 2015). Since Badr's meta-analyses, two additional studies have reported on infant weight gain with a massage intervention. Saeidi, Ghorbani, and Moghadam (2015) compared weight gain between three groups: massage with oil, dry massage, and a control group (i.e., no massage). They found that infants receiving massage with oil gained significantly more weight over a 7-day period than infants receiving dry massage or no massage and that infants receiving dry massage gained more weight than infants receiving no massage (Saeidi et al., 2015). In a different study

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## Current Literature on Infant Massage in the NICU

Most research on infant massage in the NICU has focused on the infant, and only a few studies have focused on outcomes associated with a parent, usually the mother.

### *Effects of Massage on Infants in the NICU*

In 2015, Badr and colleagues reported a systematic review and meta-analysis of data on preterm infant massage. Meta-analyses use statistical methods to test the effect of infant massage as an intervention by using aggregate data from all studies reporting on a given outcome measure. More recently,

to examine the effects of 15-minute massages with sunflower oil given three times per day for 5 days, [Taheri and colleagues \(2018\)](#) found that infants receiving massages had greater daily weight gain ( $p = .03$ ) and that their weight at the end of the fifth day was higher than that of the control group ( $p = .001$ ). A third study reported on the effects of infant massage on physical growth (i.e., height and chest circumference) and found that infants who received 15-minute massages twice-daily for 14 days had significantly greater growth in height and chest circumference ([Choi et al., 2016](#)). Overall, the evidence is strong, despite variations in massage techniques, that infant massage supports growth in preterm infants. The effects of infant massage on growth in other populations of critically ill infants has not been studied.

**Length of Stay.** The second most commonly reported outcome of research on infant massage is length of stay. [Badr and colleagues \(2015\)](#) conducted a meta-analysis of six studies in which length of stay was reported and found that infants who received massage did not have a significant reduction in length of stay ( $p = .26$ ). However, in more recent studies, significant decreases in length of stay have been found. [Moradi, Arshidi-Bostanabad, Seyedrasooli, Tapak, and Valizadeh \(2018\)](#) found that infants who received a massage intervention as part of a maternal empowerment program, which also included education on a variety of infant care topics, had a shorter length of stay than infants who received standard care (14.8 vs. 20.4 days;  $p = .02$ ). [Taheri and colleagues \(2018\)](#) also found a significant decrease in length of stay ( $p = .03$ ), with greater effects seen in infants born between 33 and 36 weeks gestation compared with infants born between 30 and 32 weeks. Taheri et al.'s findings suggested that there may be subgroups of infants who respond more positively to an infant massage intervention than others. Future research needs to be designed to take this into consideration and analyze effects by subgroups to better determine the infants for whom massage is most beneficial.

**Feeding.** Researchers have evaluated the effects of infant massage on a variety of outcomes related to feeding. [Badr's \(2015\)](#) meta-analysis of data from five studies concluded that although caloric intake was greater in infants who received massage, the difference was not statistically significant ( $p < .16$ ). Other studies have reported improved gastric motility ([Diego, Field, & Hernandez-Reif, 2005](#); [Diego et al., 2007](#)), earlier attainment of full oral feeding ([Fontana et al., 2018](#); [Fucile, Gisel, McFarland, & Lau, 2011](#); [Kim & Bang, 2018](#)), and reduced symptoms of feeding intolerance ([Choi et al., 2016](#); [Tekgunduz, Gurol, Apay, & Caner, 2014](#)).

**Neurodevelopment.** Similar to other outcomes, neurodevelopment has been measured in a variety of ways. Meta-analyses of three studies using the Bayley Scales of Infant Development found that mental development was significantly greater in infants who received massage ( $p = .03$ ) but that motor development was not significantly different ([Abdallah,](#)

[Badr, & Hawwari, 2013](#); [Badr et al., 2015](#); [Procianoy, Mendes, & Silveira, 2010](#); [Teti et al., 2009](#)). Researchers who used the Test for Infant Motor Performance found higher motor scores in infants receiving massage ([Fucile & Gisel, 2010](#)), although in one study, significant differences were found only for those infants with low initial Test for Infant Motor Performance scores ([Ho, Lee, Chow, & Pang, 2010](#)), suggesting a differential response to infant massage in different subgroups of critically ill infants.

**Pain.** There is strong evidence that infant massage reduces pain during painful procedures (e.g., heel stick, tape removal; [Abdallah et al., 2013](#); [Chik et al., 2017](#); [Diego, Field, & Hernandez-Reif, 2009](#); [Hathaway et al., 2015](#)). In the only study reported so far on infant massage in infants with neonatal abstinence syndrome, [Hahn and colleagues \(2016\)](#) found that the use of massage alleviated infants' symptoms of withdrawal while promoting mother–infant bonding.

### *Effects of Infant Massage on the Parents of Hospitalized Infants*

Only a few studies have explored the effects of infant massage on the parents of hospitalized infants. One study found that mothers who performed massage on their infants had significantly lower maternal state anxiety than mothers whose infants received standard care (i.e., no massage; [Afand, Keshavarz, Fatemi, & Montazeri, 2017](#)). In a different study, mothers who performed infant massage reported being better adapted to motherhood and had greater confidence in their mothering abilities ([Vicente, Verissimo, & Diniz, 2017](#)). Other studies have found that mothers who perform infant massage have more rapid decline in depression symptoms, lower stress ([Holditch-Davis et al., 2014](#)), and lower anxiety ([Feijo et al., 2006](#)). Infant massage is something that mothers (and fathers) can do to actively participate in their infants' care in the hospital and is associated with high maternal satisfaction ([Holditch-Davis et al., 2013](#)).

### **Mechanisms of Action**

The mechanisms of action of infant massage are not well understood. In the infant, the mechanism of action is believed to be related to stimulation of the vagal nerve through the activation of pressure receptors and, ultimately, an effect on the neuroendocrine stress response system ([Diego et al., 2005, 2014](#); [Diego et al., 2007](#); [Field, 2014](#); [Field & Diego, 2008](#); [Smith et al., 2013](#)). [Field, Diego, and Hernandez-Reif \(2011\)](#) evaluated the underlying mechanisms for the effect of massage on infant weight gain and determined two possibilities. The first potential mechanism was activation of the vagal nerve, resulting in increased gastric motility and release of food absorption hormones (e.g., insulin; [Field et al., 2011](#)). The second possible mechanism was release of insulin-like growth factor–1 (IGF-1), leading to greater weight gain by promoting muscle and bone development ([Field et al., 2011](#)). For parents, infant massage is thought to help them take an active role in their infants' care, which can help the parents



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feel more attached and confident and can reduce their levels of stress and anxiety.

### Limitations of the Current Literature

Although there has been quite a bit of research on infant massage in the NICU, the current literature is limited by significant differences between studies in terms of massage techniques used and outcomes measured (Badr et al., 2015). The most well-studied massage technique was developed by Field (1986) and involves a 15-minute moderate-pressure massage, but a variety of alternatives have been used as well. Badr and colleagues (2015) provided an excellent overview of the different infant massage techniques. Based on the currently available literature, we still do not know which massage techniques are best; which infants benefit most from massage; whether oil should be used or not; and what timing, duration, and frequency of massage results in the best outcomes. Much more research is needed to determine these particular aspects of infant massage in the NICU. Another limitation of currently available research on infant massage in the NICU is that it is almost exclusively limited to infants born preterm and their mothers. Research on the effects of infant massage on other critically ill infants is much needed, and future research on the effects of massage for parents should actively engage fathers as well.

### BOX 1 SELECTED RESOURCES

#### Infant Massage USA

<https://www.infantmassageusa.org>

#### LiddleKidz Foundation

<http://www.liddlekidz.com>

#### Loving Touch

<http://www.lovingtouch.com>

#### Neonatal Touch & Massage Certification

<https://www.neonatalcertification.com>

### Implications for Practice

Infant massage is a relatively easily implemented intervention that has positive effects on both infants and their parents. Neonatal nurses who obtain specialized training can teach parents how to perform infant massage as a way to help parents bond and participate in the care of their infants. Education may include the importance of touch using mindfulness and gentle, but firm, pressure. Of course, an infant's medical status and cues for readiness and tolerance must always be evaluated, and care must be taken to avoid overstimulation and vigorous rubbing, which could induce skin tearing or bruising. For sick or unstable infants in the NICU, parents and family members may have the option of simply placing and holding a steady hand on their infants within the space of an incubator or radiant warmer. Infant massage can begin when the infant is stable and displaying signs of readiness. There are multiple opportunities available to health care providers to become educated and even certified to provide infant massage; see [Box 1](#) for selected resources.

### Conclusion

Studies on infant massage in the NICU have provided evidence of positive effects for both infants and their parents. Although the research has been limited in some ways, almost no studies have reported adverse effects of massage. The adverse effects that have been reported have been minor, such as a mild rash (Kulkarni et al., 2010), suggesting that it is a safe practice with positive benefits. Additional research is needed to determine the ideal technique, timing, frequency, and duration of massage to optimize benefits for infants and parents. Neonatal nurses are in a unique position to teach parents to perform massage on their hospitalized infants. Several opportunities and resources are available for nurses who wish to become trained in providing infant massage. **NWH**



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