Neonatal Massage:
Benefits, Considerations and Implications for Practice

As research continues to highlight the short and long term consequences of stress on brain development (1), NICU teams strive to prioritize non-pharmacological interventions to minimize stress and optimize neurodevelopmental outcomes. From the immediate benefits of improved autonomic stability, to enhanced brain maturation and reduced length of stay, **neonatal massage is an evidence-based intervention to support infants and families in the NICU.**

In combination with neuroprotective care practices, developmentally supportive handling, and intentional interactions, neonatal massage is a powerful intervention to support infants and empower families as primary caregivers in the NICU.

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Moderate pressure massage has been proven to be more beneficial than light pressure strokes (2), and provides an opportunity for nurturing, positive touch experiences for developing infants in the NICU. Evidence-based benefits of neonatal massage for infants in the NICU include:

Benefits	Evidence
Improved growth	Research suggests that infants who receive massage show improved growth (2,3,4), and that daily weight gain is greater for infants massaged with oil (5,6).
Improved digestion	Infants who receive massage show improved digestion, including a reduction in mean gastric residual volume and reduced abdominal circumference (7). Abdominal massage has been found to decrease abdominal circumference, reduce gastric volume residuals, and increase stooling frequency (8).
Improved oral feeding	Enhanced oral feeding performance has been documented, including reduced time to achieve full oral feedings (9).
Reduced length of stay	A 2024 RCT found that infants who received massage showed improved growth, amount of oral feeding, and shorter length of stay. Infants who received massage were discharged an average of 10 days earlier than control infants (10). A 2013 meta analysis found that massage decreased length of stay by 4.41 days (11) suggesting that massage has both neuroprotective and financial benefits.
Improved sleep	Neonatal massage has been shown to improve the mean length of sleep for preterm infants (12). The influence of sleep on functional brain connectivity and neurodevelopmental outcomes is well documented (13,14). Infants who receive massage have also been shown to have improved sleep states, and reduced fidgeting and crying behavior (15).
Improved autonomic stability	Infants who received massage have shown improvements in heart rate, oxygen saturations, and circulation (16).
Reduced bilirubin	Infants who received massage and phototherapy showed reduced bilirubin compared to those who received phototherapy alone (17,18). Abdominal massage has been shown to reduce bilirubin levels and may increase stooling (19).
Decreased stress and pain	Massage has also been shown to reduce post procedural pain scores (20-22), and reduce mean cortisol levels in infants (21).
Improved brain maturation	Evidence also suggests that massage by parents improves brain maturation across all EEG bands (24).

Yet the benefits of massage extend beyond the infant, to support caregivers as well. Empowering parents is critical (25), and helping parents know their infant through the use of massage is a powerful tool to engage families in the NICU.

Reduced parental stress	Research has highlighted the benefits of massage in reducing parental stress for both mothers and fathers (26), lowering maternal state anxiety, and improving maternal satisfaction (27).

Practical Implications:
Integrating Neonatal Massage into your unit practice

The level of evidence supporting the benefits of massage in the NICU continues to grow, and includes RCTs and meta-analyses which can be used to advance and support your practice. Research supports the benefits of massage and its importance as a non-pharmacological intervention to reduce stress for infants and families, empower parents as primary caregivers, and optimize both short- and long-term development of infants in the NICU.

Positive touch experiences are foundational for sensorimotor development. Neonatal massage is a **goal directed intervention** for each individual infant and family. Infants in the NICU have unique vulnerabilities in the context of their medical and developmental complexities, and require interventions that are specific to those needs.

Considerations for massage in the NICU

Who can provide massage?

Neonatal massage is an advanced practice intervention that should be done by trained health care providers in the NICU including nurses, occupational therapists, physical therapists, and speech language pathologists. Parents should also be taught to provide massage with the overarching goal of fostering independence. Nurturing the parent-infant relationship is critical to support attachment, and massage provides a meaningful activity for parents to promote attachment and build parental confidence and competence as primary caregivers.

Is there evidence to support the use of oil with neonatal massage?

Yes. Using oil as a lubricant during massage has been shown to provide additional benefits above the well-known benefits of massage alone (6,28-30). Research suggests that preterm and low birth weight infants who receive massage with oil have greater weight gain than infants who receive massage without oil (5,28).

When can I initiate massage, and massage with oil?

There are a number of factors to consider before initiating massage, and massage with oil. As with all interventions, it is important to understand the unique clinical needs of each infant in the context of their medical acuity, gestational age, developmental readiness, skin maturity and integrity, and the individual goals of care. Preterm infants have immature skin and the structural integrity of the stratum corneum is related to gestational age at birth (31).
An emollient can be considered, with individual assessment, after 32 weeks PMA (32).

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Practice Implications

Not all infants in the NICU are eligible for massage. However, all infants should be provided with positive nurturing touch. Preterm infants below 32 weeks postmenstrual age, and infants with contraindications for neonatal massage, can be supported through the use of neuroprotective care and handling practices. Early parent engagement, skin to skin holding, hand hugs, and two person cares are fundamental opportunities to provide positive touch, promote neurodevelopment, and empower families in the care of their infant.

Clinical reasoning is always needed to identify contraindications for an individual infant, and those decisions should be made in accordance with unit policy and collaboration with the interdisciplinary team. Readiness for massage, with or without oil, also requires assessment of an infant's medical stability, and developmental readiness for the sensory motor experience of massage.

Indications for neonatal massage:

At least 32 weeks PMA with intact, mature skin
Medically stable and showing developmental readiness
Absence of contraindications

Contraindications for neonatal massage:

Typically <32 weeks PMA
Autonomic medical instability
Active or presumed infection

Questions to consider before initiating massage:

Am I trained in neonatal massage?
Advanced clinical reasoning is essential to guide assessment, observation, and intervention.

What is the infant's gestational age, and how does that support my understanding of their skin integrity and thermoregulation?

What are the unique medical and developmental needs of the infant?

Is the infant medically and autonomically stable?

Does the infant have a presumed or active infection that would preclude massage?

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Nurturing Oil for Nurturing Touch

What is Nurturing Oil, and what is it made of?

beb Organic™ Nurturing Oil was developed specifically for sensitive baby skin and is rich in essential fatty acids and nutrients. The pH balanced complex of oleic and linoleic acids create an ideal glide for massage without leaving an oily residue.

beb organic™

Made from 70% or more organic ingredients, each of which was chosen for its benefits to the skin.
Free of dyes, parabens, phthalates, paraffin, silicone, lanolin and irritating essential oils
Clinically tested, non-allergenic and top rated by the Environmental Working Group for safety

Additional considerations for the use of oil:

Oils or other emollients used on newborn skin are best provided in single-use containers and/or each infant should have a personal dispenser (33). Intentional effort should be made to preserve the cleanliness of the emollient container (32).

Should I wipe the oil off after massage?

No. Nurturing Oil is an organic product that is safe for use on mature skin and does not need to be wiped off following massage.

Where can I learn more about neonatal massage?

Neonatal massage is a goal directed, advanced practice intervention. To learn more about how to become Neonatal Touch and Massage Nurse Certified (NTMNC) or Neonatal Touch and Massage Therapist Certified (NTMTC), please visit Creative Therapy Consultants, home of the **Neonatal Touch and Massage Certification (NTMC).**
https://www.neonatalcertification.com/

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References

1. Nist, M., Harrison, T., Steward, D. (2019). The biological embedding of neonatal stress exposure: A conceptual model describing the mechanisms of stress-induced neurodevelopmental impairment in preterm infants. Research in Nursing and Health, 42(1), 61-71.
2. Lu, L., Lan, S., Hsieh, Y., Lin, L., Chen, J., & Lan, S. (2020). Massage therapy for weight gain in preterm neonates: A systematic review and meta analysis of randomized controlled trials. Complimentary Therapies in Clinical Practice, 101168.
3. Elmoneim, M., Mohamed, H., Awad, A., El-Hawary, A., Salem, N., El helaly, R., Nasef, N., & Abdel-Hady, H. (2021). Effect of tactile/kinesthetic massage therapy on growth and body composition of preterm infants. European Journal of Pediatrics, 180, 207-215. DOI:10.1007/s00431-020-03738-w
4. Erçelik, Z. E., Doğan, P., & Yılmaz, H. B. (2022). The Effect of Massage on Growth in Premature Babies: A Systematic Review and Meta-Analysis. J Educ Res Nurs, 19(2), 1917, DOI:10.5152/jern.2022.13285
5. Liao, Y.C., Wan, Y. H., Chen, P. H., & Hsieh, L. Y. (2021). Efficacy of medium-chain triglyceride oil massage on growth in preterm infants: a randomized controlled trial. Medicine, 100(30), e26794. DOI:10.1097/MD.0000000000026794
6. Saeadi, R., Ghorbani, Z., & Shapouri Moghaddam, A. (2015) The effect of massage with medium-chain triglyceride oil on weight gain in premature neonates. Acta Medicalranica, 53(2), 134-138.
7. Seiiedi-Biarag, L. & Mirghafourvand, M. (2020). The effect of massage on feeding intolerance in preterm infants: a systematic review and meta-analysis study. Italian Journal of Pediatrics, 46 (1), 52. DOI: 10.1186/s13052-020-
8. Abd Elrazek, A., E Abo Zaid, D., & A Hassan, R. (2022). Effect of Abdominal Massage on Feeding Intolerance and Weight of Preterm Neonates. Egyptian Journal of Health Care, 13(4), 1725-1736. DOI:10.21608/ejhc.2022.284291
9. Fontana, C., Menis, C., Pesenti, N., Passera, S., Liotto, N., Mosca, F., Roggero, P. & Fumagalli, M. (2018). Effect of early intervention on feeding behavior in preterm infants: a randomized controlled trial. Early Human Development, 121, 15-20. Freitas, OMS; Lopes, EPM; Figueired
10. Düken, M. E., & Yayan, E. H. (2024). A follow up study on the effects of massage on preterm infants: A randomized controlled research. EXPLORE, 20(3), 392-400.
11. Wang, L., He, J., Zhang, S.(2013) The efficacy of massage on preterm infants: a metanalysis. American Journal of Perinatology, 30(9), 731-738.DOI:10.1055/s-00321332801
12. Anwr, D., Mohamed, O., Ayed, M. (2020). Effect of massage on increasing growth parameters and inducing sleep among premature neonates. Egyptian Journal of Health Care, 11(3), 530-540. DOI: 10.21608/EJHC.2020.146733
13. Graven, S., (2006). Sleep and brain development. Clinics in Perinatology, 33, 693-706.
14. Uchitel, J., Vanhatalo, S., & Austin, T. (2022). Early development of sleep and brain functional connectivity in term-born and preterm infants. Pediatric Research, 91(4), 771–786. https://doi.org/10.1038/s41390- 021-01497-4
15. Baniasadi, H., Hosseini, S., Abdollahyar, A., & Sheikhbardsiri, H. (2017). Effect of massage on behavioural responses of preterm infants in an educational hospital in Iran. Journal of Reproductive and Infant Psychology,
16. Elsagh, A., Lotfi, R., Amiri, S., & Gooya, H. (2019). Comparison of massage and prone position on heart rate and blood oxygen saturation level in preterm neonates hospitalized in neonatal intensive care unit: a randomized controlled trial. Iranian Journal of Nursing and Midwifery Research, 24(5), 343-347.
17. Doğan, E., Kaya, H. D., & Günaydin, S. (2023). The effect of massage on the bilirubin level in term infants receiving phototherapy. EXPLORE, 19(2), 209-213.https://doi.org/10.1016/j.explore.2022.05.001
18. Rashwan, Z. I., Abohadida, R. M., Khonji, L. M., & Saleh, S. E. S. (2023). Bundling gentle body massage along with regular position change under phototherapy among full-term neonates with hyperbilirubinemia: Is it effective?. Journal of Neonatal Nursing, 29(3), 464-470. DOI:10.1016/j.jnn.2022.08.002
19. Köse, S., Gözen, D., Aytemiz, Ö. E. K., & Çağlayan, S. (2024). The effect of abdominal massage on bilirubin levels in term infants receiving phototherapy: A randomized controlled trial. Advances in Neonatal Care, 24(3), E40-E46.
20. Liu, J., Fang, S., Wang, Y., Gao, L., Xin, T., & Liu, Y. (2022). The effectiveness of massage interventions on procedural pain in neonates: A systematic review and meta-analysis. Medicine, 101(41).
21. Yavas, S., Bulbul, T., & Topcu Gavas, H. (2021). The effect on pain level and comfort of foot massages given by mothers to newborns before heel lancing: Double-blind randomized controlled study. Japan Journal of Nursing Science, 18(4), e12421.DOI:10.1111/jjns12421
22. Küçüktepe, A., & Canbulat Şahiner, N. (2023). The effect of regional massage performed before blood collection on pain and vital signs in newborns. Journal of Paediatrics and Child Health. DOI: 10.1111/jpc.16368
23. Jabraeili, M., Mirghafourvand, M., Montazeri, M., & Farshi, M. R. (2023). The effect of massage on cortisol level in infants: A systematic review and meta-analysis. Journal of Neonatal Nursing, 29(5), 720-727. DOI: 10.1016/j.jnn.2023.02.010
24. Lai, M., D'Acunto, G., Guzzetta, A., Finnigan, S., Ngenda, N., Ware, R. S., Boyd, R. N., & Colditz, P. B. (2022). Infant massage and brain maturation measured using EEG: A randomised controlled trial. Early Human Development, 172, 105632. DOI: 10.1016/j.earlhumandev.2022.105632
25. Haward, M., Lantos, J., Janvier, A. & the POST Group. (2020). Helping parents cope in the NICU. Pediatrics, 145(6), e20193567. https://doi.org/10.1542/peds.2019-3567
26. Hwu, L. J., Tzeng, Y. L., Teng, Y. K., & Liu, S. J. (2023). Effects of massage intervention on discharged premature infants' weight, parental stress, and parent–child attachment: A randomized controlled trial. Infant Behavior and Development, 72, 101867,DOI:10.1016/j.infbeh.2023.101867
27. Pados, B., McGlothen-Bell, K. (2019). Benefits of infant massage for infants and parents in the NICU. Nursing for Women's Health, 23(3), 256-271. DOI: 10.1016/j.nwh.2019.03.004
28. Jamshaid, A. A., Hamid, M. H., Fatima, T., Noor, M., & Wasim, A. (2021). Emollient Therapy in Preterm & Low Birth Weight Neonates: A Randomised Clinical Trial. J Coll Physicians Surg Pak, 31(3), 298-301.
29. Pupala, S., Rao, S., Strunk, T., & Patole, S. (2019). Topical application of coconut oil to the skin of preterm infants: a systematic review. European Journal of Pediatrics, 178(9), 1317-1324.
30. Li, X., Zhong, Q., Tang, L. (2016). A meta-analysis of the efficacy and safety of using oil massage to promote infant growth. Journal of Pediatric Nursing, 31(5), 313-322.
31. Visscher et al. Newborn infant skin: Physiology, development, and care. Clinics \in Dermatology (2015) 33, 271- 280.
32. Association of Women's Health, Obstetric and Neonatal Nurses. (2018). Neonatal Skin Care, Fourth Edition: Evidence Based Clinical Practice Guidelines. Washington, DC: AWHONN.
33. American Academy of Pediatrics (AAP) & American College of Obstetricians and Gynecologists (ACOG) (2017) Guidelines for perinatal care (8th ed) Elk Grove Village, IL: AAP; Washington, DC: ACOG

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