



Infant- & family-centered development care



european standards of
care for newborn health

EFGNI european foundation for
the care of newborn infants



Topic Expert Group:

Infant- and family-centred developmental care

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Topic Expert Group: Infant- and family-centred developmental care

Overview

Infant- and family-centred developmental care (IFCDC) is a descriptive term for a framework of newborn care that incorporates the theories and concepts of neurodevelopment, neuro-behaviour, parent-infant interaction, parental involvement, breastfeeding promotion, environmental adaptation, and change of hospital systems. It is based on the leading-edge work of Als and her colleagues in the NIDCAP Federation International (NFI) (1,2) and Brazelton (3) and on the World Association for Infant Mental Health Declaration of Infants' Rights. (4)

The core pillars of IFCDC are: sensitive care based on infant behavioural communication and cues gives the infant a voice (1,2) and is beneficial for brain growth (5), parent engagement supports parental wellbeing and infant development (6–10), and customised adaptations of the NICU environment and hospital system as a whole. (11)

The strategies for implementing this approach are based on supporting the unity of infant and parents, i.e. family access and integration into all care, early bonding, shared-decision-making, and parental involvement as the primary caregivers. (12,13) The practical implementation is assured by early and continuous skin-to-skin contact between mother or father and the newborn infant, as well as by the promotion and support of breastfeeding. (14) Sensory and environmental expectations of the newborn infant are paramount, since early sensory experiences have been shown to have significant impact on neurodevelopment. The model, therefore, advocates protection from deleterious environmental stimuli in newborn intensive care units (NICU) and access to positive sensory stimulation from parents and other caregivers. (15–18) Support strategies for families play a major role, including socioeconomic, mental health, and spiritual services as well as an individual case management plan for each newborn infant. This case management plan is established in collaboration with parents. (11) Well trained and supported healthcare professionals who receive counselling and regular clinical supervision in communicating with and providing emotional support for parents is the prerequisite for proficient successful implementation of IFCDC. (8,19,20)

The role of the Topic Expert Group on Infant- and family-centred developmental care focuses on defining practice standards for the implementation of newborn care that is centred around the infant and the infant's family and their close supporters in order to support optimally the infant's health and development.

Sources

1. Als H. A Synactive Model of Neonatal Behavioral Organization: Phys Occup Ther Pediatr. 1986 Jan 1;6(3–4):3–53.
2. NIDCAP. Program Guide – Newborn Individualized Developmental Care and Assessment Program (NIDCAP). An education and training program for health care professionals [Internet]. 2015. Available from: <http://nidcap.org/wp-content/uploads/2014/09/Program-Guide-Rev-22Sep2014.pdf>



3. Brazelton TB, Nugent KJ. Clinics in Developmental Medicine. Neonatal Behavioral Assessment Scale. 3rd ed. London: Mac Keith Press;
4. World Association for Infant Mental Health. Declaration of Infant's Right [Internet]. WAIMH; 2016. Available from: <https://perspectives.waimh.org/2016/06/15/waimh-position-paper-on-the-rights-of-infants/>
5. Als H, Duffy FH, McAnulty G, Butler SC, Lightbody L, Kosta S, et al. NIDCAP improves brain function and structure in preterm infants with severe intrauterine growth restriction. *J Perinatol*. 2012 Feb 2;32:797.
6. McAnulty G, Duffy FH, Kosta S, Weisenfeld NI, Warfield SK, Butler SC, et al. School-age effects of the newborn individualized developmental care and assessment program for preterm infants with intrauterine growth restriction: preliminary findings. *BMC Pediatr*. 2013 Feb 19;13:25.
7. Als H, Gilkerson L, Duffy FH, McAnulty GB, Buehler DM, Vandenberg K, et al. A three-center, randomized, controlled trial of individualized developmental care for very low birth weight preterm infants: medical, neurodevelopmental, parenting, and caregiving effects. *J Dev Behav Pediatr JDBP*. 2003 Dec;24(6):399–408.
8. Gilkerson L, Als H. Role of reflective process in the implementation of developmentally supportive care in the newborn intensive care nursery: *Infants Young Child*. 1995 Apr;7(4):20–8.
9. Westrup B. Family-Centered Developmentally Supportive Care. *NeoReviews*. 2014 Aug 1;15(8):e325–35.
10. Roué J-M, Kuhn P, Lopez Maestro M, Maastrup RA, Mitanchez D, Westrup B, et al. Eight principles for patient-centred and family-centred care for newborns in the neonatal intensive care unit. *Arch Dis Child – Fetal Neonatal Ed*. 2017 Jul;102(4):F364–8.
11. Smith K, Buehler D, Als H. Nursery Assessment Manual. NIDCAP Nursery Program. [Internet]. NIDCAP Federation International (NFI); 2015. Available from: <http://nidcap.org>
12. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics*. 2010 Feb;125(2):e278-285.
13. Mörelius E, Ortenstrand A, Theodorsson E, Frostell A. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early Hum Dev*. 2015 Jan;91(1):63–70.
14. Conde-Agudelo A, Belizán JM, Diaz-Rossello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev*. 2011 Mar 16;(3):CD002771.
15. Caskey M, Stephens B, Tucker R, Vohr B. Importance of parent talk on the development of preterm infant vocalizations. *Pediatrics*. 2011 Nov;128(5):910–6.
16. Filippa M, Panza C, Ferrari F, Frassoldati R, Kuhn P, Balduzzi S, et al. Systematic review of maternal voice interventions demonstrates increased stability in preterm infants. *Acta Paediatr Oslo Nor* 1992. 2017 Aug;106(8):1220–9.
17. Frie J, Bartocci M, Lagercrantz H, Kuhn P. Cortical Responses to Alien Odors in Newborns: An fNIRS Study. *Cereb Cortex N Y N 1991*. 2017 Aug 1;1–12.
18. Kuhn P, Zores C, Pebayle T, Hoefl A, Langlet C, Escande B, et al. Infants born very preterm react to variations of the acoustic environment in their incubator from a minimum signal-to-noise ratio threshold of 5 to 10 dBA. *Pediatr Res*. 2012 Apr;71(4 Pt 1):386–92.



19. Hall SL, Phillips R, Hynan MT. Transforming NICU Care to Provide Comprehensive Family Support. *Newborn Infant Nurs Rev.* 2016 Jun;16(2):69–73.
20. Hyrkäs K, Appelqvist-Schmidlechner K, Haataja R. Efficacy of clinical supervision: influence on job satisfaction, burnout and quality of care. *J Adv Nurs.* 2006 Aug;55(4):521–35.



Case management and transition to home

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Target group

Infants, parents, and families

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

An individual case management plan for each newborn infant is established, in collaboration with parents, to plan and coordinate needed investigations and procedures, ensure the acquisition of needed parental competences prior to discharge and to plan follow-up and continuing care.

Rationale

An early appraisal of the expected clinical course during and after the hospital stay of each admitted infant and corresponding planning, collaboratively with parents, will safeguard effective provision of care. (see TEG Follow-up & continuing care) It will also support informed and empowered parental involvement, that subsequently will ensure adequate preparation for discharge. (1–7) (see TEG Follow-up & continuing care) Parents can best assess their infant's needs (8), and are expected to assume full responsibility for their child's care including feeding, medication and treatment regimens (9) as well as recognising signs and symptoms of infection or developmental issues. (8) Supporting and involving parents during the hospital stay and in the discharge process from the NICU can reduce the risk of readmission and also give the parents the confidence in caring for their preterm infant at home. (10–14) (see TEG Follow-up & continuing care) Providing domiciliary care when some medical care still is needed but feasible at home, is an example of how to support a smooth transition from hospital to home. Home care provided by NICU affiliated staff can facilitate discharge from hospital even if the infant still needs some medical care, and ensures the access to the unit after discharge if readmission is needed. The safety of the infants is ensured by regular home visits by healthcare professionals from the home care team. Parental skills are enhanced and hospital stay is reduced. (15–22) It is important that the hospital can ensure parental access and involvement if the infant needs readmission after discharge.

Benefits

Short-term benefits

- Improved preparedness for discharge and reduced length of hospital stay (3–5,7,12,22)
- Improved parental confidence and bonding (14)
- Improved recognition and management of potential infant medical issues (11)
- Improved management of developmental issues through linking in with the community-based intervention services prior to discharge



Long-term benefits

- Reduced rate of readmissions and emergency department visits (11–13)
- Improved parent experience leading to reduction in parental anxiety issues (7,23,24)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and family are informed by healthcare professionals about the importance of their involvement in planning the care and in the discharge process of the infant. (12)	A (High quality) B (High quality)	Patient information sheet
2. Parents are guided to participate in creating and regularly updating a case management plan in collaboration with responsible healthcare professional. (3–6,12)	A (High quality)	Parent feedback
For healthcare professionals		
3. A unit guideline on case management is adhered to by all healthcare professionals. (3–6,12)	A (High quality)	Guideline
4. Training on case management is attended by all responsible healthcare professionals.	B (Moderate quality)	Training documentation
5. The individual case management plans are implemented in collaboration with parents by all healthcare professionals. (3–6,12)	A (High quality)	Clinical records, guideline
6. Support of families throughout their stay with ongoing structured conversations about the care of their infant, infant feeding, information about health management and infant development is ensured. (4–7,13)	A (High quality)	Clinical records, parent feedback
For neonatal unit		
7. A unit guideline on case management is available and regularly updated. (3–6,12)	A (High quality)	Guideline



8. A unit guideline ensuring family access and parental involvement in case of readmission after discharge is available and regularly updated. B (Moderate quality) Guideline

For hospital

9. Training on case management is ensured. (4–7) A (High quality) Training documentation

10. A hospital guideline ensuring family access and parental involvement in case of readmission after discharge is available and regularly updated. B (Moderate quality) Guideline

For health service

11. A national guideline on implementation of case management and transition to home programmes is available and regularly updated. (4–7) A (High quality) Guideline

Where to go – further development of care

Further development	Grading of evidence
For parents and family	
• Parents and family are offered peer-to-peer support whilst in the unit. (25)	A (Moderate quality)
• Every family has access to a post-discharge family support unit including 24-hour telephone support. (26)	A (Moderate quality)
• Every family has access to home care. (16)	A (Moderate quality)
For healthcare professionals	
• Coordinate peer-to-peer support activities. (25)	A (Moderate quality)
For neonatal unit	
• Provide rooming facilities for all families.	A (Moderate quality)
• Supervise, train and authorise the peer-to-peer family support. (25)	A (Moderate quality)
• Provide a post discharge family support group including 24-hour telephone support. (26)	A (Moderate quality)
• Provide a home care programme. (7,15,22,26)	A (Moderate quality)
For hospital	
N/A	
For health service	
N/A	



Getting started

Initial steps

For parents and family

- Parents and family are verbally informed by healthcare professionals about the discharge planning process.

For healthcare professionals

- Attend training on case management.
- Establish a Discharge Planning Group with an aim also to develop a structured discharge planning education programme for families.

For neonatal unit

- Develop and implement a unit guideline on case management.
- Develop information material on case management for parents.
- Authorise and approve the establishment of a designated discharge planning nurse and a unit discharge planning group to develop a structured discharge planning education programme for families.

For hospital

- Support healthcare professionals to participate in training on case management.
- Make preparations for creating a discharge planning education programme for families.
- Make preparations for creating a home care programme.

For health service

- Develop and implement a national guideline on implementation of case management and transition to home programmes.

Description

Planning for discharge for very preterm infants begins around the time of birth. During the clinical course, various disciplines and departments are involved according to the individual needs of the infant and their family. The role of case management is to plan and monitor the entire care pathway and prepare parents for the next phase. Coordination between needed investigations, treatment and services, and adequate communication with families, is best ensured by providing a specific unit case manager, who is usually a specialist neonatal nurse or a nurse practitioner. The case manager, in close collaboration with parents, makes a case management plan that is regularly updated according to the interventions needed by the infant and training and support services needed by their family, e.g., in breastfeeding and practical caregiving (see TEG Care procedures, Nutrition, and Infant- & family-centred developmental care). The transition to home is enhanced by organising follow-up and continuing care on an individual basis.



Source

1. Mills MM, Sims DC, Jacob J. Implementation and case-study results of potentially better practices to improve the discharge process in the neonatal intensive care unit. *Pediatrics*. 2006 Nov;118 Suppl 2:S124-133.
2. Hockenberry MJ, Wilson D, editors. *Wong's nursing care of infants and children*. 10th edition. St. Louis, Missouri: Elsevier; 2015. 1734 p.
3. Ingram J, Redshaw M, Manns S, Beasant L, Johnson D, Fleming P, et al. "Giving us hope": Parent and neonatal staff views and expectations of a planned family-centred discharge process (Train-to-Home). *Health Expect Int J Public Particip Health Care Health Policy*. 2017 Aug;20(4):751–9.
4. Burnham N, Feeley N, Sherrard K. Parents' perceptions regarding readiness for their infant's discharge from the NICU. *Neonatal Netw NN*. 2013 Oct;32(5):324–34.
5. Aydon L, Hauck Y, Murdoch J, Siu D, Sharp M. Transition from hospital to home: Parents' perception of their preparation and readiness for discharge with their preterm infant. *J Clin Nurs*. 2018 Jan;27(1–2):269–77.
6. Shieh S-J, Chen H-L, Liu F-C, Liou C-C, Lin Y -i.-H, Tseng H-I, et al. The effectiveness of structured discharge education on maternal confidence, caring knowledge and growth of premature newborns. *J Clin Nurs*. 2010 Dec;19(23–24):3307–13.
7. Broedsgaard A, Wagner L. How to facilitate parents and their premature infant for the transition home. *Int Nurs Rev*. 2005 Sep;52(3):196–203.
8. Mancini, A., While, A. Discharge planning from a neonatal unit: An exploratory study of parents' views. *J Neonatal Nurs*. 2001;7(2):59–62.
9. Sneath N. Discharge teaching in the NICU: are parents prepared? An integrative review of parents' perceptions. *Neonatal Netw NN*. 2009 Aug;28(4):237–46.
10. Smith VC, Young S, Pursley DM, McCormick MC, Zupancic J a. F. Are families prepared for discharge from the NICU? *J Perinatol Off J Calif Perinat Assoc*. 2009 Sep;29(9):623–9.
11. Ingram JC, Powell JE, Blair PS, Pontin D, Redshaw M, Manns S, et al. Does family-centred neonatal discharge planning reduce healthcare usage? A before and after study in South West England. *BMJ Open*. 2016 Mar 10;6(3):e010752.
12. Gonya J, Martin E, McClead R, Nelin L, Shepherd E. Empowerment programme for parents of extremely premature infants significantly reduced length of stay and readmission rates. *Acta Paediatr Oslo Nor 1992*. 2014 Jul;103(7):727–31.
13. Vohr B, McGowan E, Keszler L, Alksninis B, O'Donnell M, Hawes K, et al. Impact of a Transition Home Program on Rehospitalization Rates of Preterm Infants. *J Pediatr*. 2017 Feb;181:86-92.e1.
14. Toral-López I, Fernández-Alcántara M, González-Carrión P, Cruz-Quintana F, Rivas-Campos A, Pérez-Marfil N. Needs Perceived by Parents of Preterm Infants: Integrating Care Into the Early Discharge Process. *J Pediatr Nurs*. 2016 Apr;31(2):e99–108.
15. Ortenstrand A, Waldenström U, Winbladh B. Early discharge of preterm infants needing limited special care, followed by domiciliary nursing care. *Acta Paediatr Oslo Nor 1992*. 1999 Sep;88(9):1024–30.
16. Ortenstrand A, Winbladh B, Nordström G, Waldenström U. Early discharge of preterm infants followed by domiciliary nursing care: parents' anxiety, assessment of infant health and breastfeeding. *Acta Paediatr Oslo Nor 1992*. 2001 Oct;90(10):1190–5.



17. Dellenmark-Blom M, Wigert H. Parents' experiences with neonatal home care following initial care in the neonatal intensive care unit: a phenomenological hermeneutical interview study. *J Adv Nurs*. 2014 Mar;70(3):575–86.
18. Altman M, Vanpée M, Cnattingius S, Norman M. Moderately preterm infants and determinants of length of hospital stay. *Arch Dis Child Fetal Neonatal Ed*. 2009 Nov;94(6):F414-418.
19. Altman M, Vanpée M, Bendito A, Norman M. Shorter hospital stay for moderately preterm infants. *Acta Paediatr Oslo Nor 1992*. 2006 Oct;95(10):1228–33.
20. Ringborg A, Berg J, Norman M, Westgren M, Jönsson B. Preterm birth in Sweden: what are the average lengths of hospital stay and the associated inpatient costs? *Acta Paediatr Oslo Nor 1992*. 2006 Dec;95(12):1550–5.
21. Lopez GL, Anderson KH, Feutchinger J. Transition of premature infants from hospital to home life. *Neonatal Netw NN*. 2012 Aug;31(4):207–14.
22. Lundberg B, Lindgren C, Palme-Kilander C, Örténstrand A, Bonamy A-KE, Sarman I. Hospital-assisted home care after early discharge from a Swedish neonatal intensive care unit was safe and readmissions were rare. *Acta Paediatr Oslo Nor 1992*. 2016 Aug;105(8):895–901.
23. Zanardo V, Freato F, Zacchello F. Maternal anxiety upon NICU discharge of high-risk infants. *J Reprod Infant Psychol*. 2003 Feb;21(1):69–75.
24. Rabelo MZ da S, Chaves EMC, Cardoso MVLML, Sherlock M do SM. Feelings and expectations of mothers of preterm babies at discharge. *Acta Paul Enferm*. 2007 Sep;20(3):333–7.
25. Hurst I. One size does not fit all: parents' evaluations of a support program in a newborn intensive care nursery. *J Perinat Neonatal Nurs*. 2006 Sep;20(3):252–61.
26. Purdy IB, Craig JW, Zeanah P. NICU discharge planning and beyond: recommendations for parent psychosocial support. *J Perinatol Off J Calif Perinat Assoc*. 2015 Dec;35 Suppl 1:S24-28.

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Clinical consultation and supervision for healthcare professionals on supporting families

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Target group

Infants, parents, families, and healthcare professionals

User group

Neonatal units, hospitals, and health services

Statement of standard

Healthcare professionals receive counselling and regular clinical supervision in communicating with and providing emotional support for parents.

Rationale

Parents of preterm infants often experience stress levels, anxiety, and depression during their infant's admission in a neonatal unit (1,2) and are at risk for prolonged symptoms during the first years after birth. (1,3) These parental psychological symptoms are associated with a compromised parent-infant relationship (4,5), child's lower cognitive performance, and behavioural problems. (6,7) Several interventions, in turn, have shown to have positive influence on parental psychological factors, parenting, and child outcomes. (8–14) Effective components of these interventions are: active involvement of the parents in their infant's care and psychological support for parents (13). Communication between healthcare professionals and parents is a critical factor in involving parents to the day-to-day care and in provision of emotional support for parents.

Support for an infant and the family through a process of involvement and participation (15) should be a part of high-quality neonatal intensive care. (16) As these skills are strongly related to individual attitudes (17), professionals should receive support that enables reflection on their current communication and collaboration skills. Reflection is a technique for reinforcing professional development on collaboration and emotional support. Reflective supervision, in turn, is a technique that is commonly used among professionals working with parent-child relationships and parenting. (18) Staff often experience the provision of emotional support as stressful, especially when supporting mourning or traumatised parents (16), therefore their need for debriefing, counselling, or clinical supervision should be recognised. (19,20) While debriefing and counselling can be case-based one-off sessions, the supervision is usually a process of frequent meetings scheduled in advance.

Benefits

Short-term benefits

- Improved staff self-efficacy in supporting parents (20)
- Reduced emotional stress for healthcare professionals related to supporting parents (21)
- Improved work satisfaction (21)
- Improved care practices and attitudes supporting infant- and family-centred developmental care (22)



- Improved quality of care (1,22)
- Improved family support for bonding with infant (22,23)
- Improved involvement of parents in care (3,19,20)
- Improved sense of parenthood and responsibility for the infant during hospital stay (24)
- Prolonged duration of skin-to-skin care (25)
- Reduced stress during hospital stay (consensus)

Long-term benefits

- Decreased staff turnover (consensus)
- Decreased parental depression, anxiety, and stress (13)
- Improved child outcomes (13)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents receive psycho-social and pastoral support and interact with a team of healthcare professionals who receive supervision to provide sensitive and relevant support to care for their infant. (26,27)	A (High quality) B (Moderate quality)	Parent feedback, patient information sheet
For healthcare professionals		
2. A unit guideline on participation in supervision and/or counselling is adhered to by all healthcare professionals. (28)	A (High quality) B (High quality)	Guideline
3. Training on family support strategies is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
4. Regular supervision on within team communication and interactions with parents faced with critical decision-making situations or bereavement are attended by all responsible healthcare professionals. (29,30)	A (High quality) B (Moderate quality)	Audit report
For neonatal unit		
5. A unit guideline on participation in supervision and family support strategies is available and regularly updated. (28)	A (High quality) B (High quality)	Guideline



6. A unit guideline on communication and support for parents is available and regularly updated, to include the strategy for debriefing and developing skills in sensitive communication and emotional support around critical care and bereavement. (29,30)	A (High quality) B (Moderate quality)	Guideline
For hospital		
7. Training on family support strategies is ensured.	B (High quality)	Training documentation
8. Support for healthcare professionals within neonatal services from mental health professionals is ensured.	B (Moderate quality)	Healthcare professional feedback
For health service		
9. A national guideline on supervision and counselling or debriefing practices is available and regularly updated.	B (Moderate quality)	Guideline
10. Sensitive communication skills and palliative care are part of continuing professional development.	B (Moderate quality)	Training documentation

Where to go – further development of care

Further development	Grading of evidence
For parents and family N/A	
For healthcare professionals N/A	
For neonatal unit	
<ul style="list-style-type: none"> Implement, monitor and study impact of quality improvement projects related to healthcare professional skills to support parental involvement during neonatal care. (31,32) 	A (High quality)
For hospital	
<ul style="list-style-type: none"> Develop feedback systems that are specifically focused on parents' experience on the collaboration with the healthcare team in relation to the infant care and received support. Establish career development programmes for healthcare professionals to become practice development experts, debriefing facilitators, and clinical supervisors. 	A (Low quality) B (Moderate quality)
For health service N/A	



Getting started

Initial steps

For parents and family

- Parents are facilitated to provide feedback to staff about their experience of communication and support while their infant is in the neonatal unit.

For healthcare professionals

- Attend training on supportive collaboration and communication with parents and on the effects of the support on parenting and parental well-being.
- Attend training on benefits of multi-professional counselling and clinical supervision.
- Conduct an audit to understand how parents experience the received support from the staff and their expectations related to the support for their involvement to the infant care from the staff or from the hospital.

For neonatal unit

- Develop and implement a unit guideline on regular counselling and clinical support for staff, debriefing, and the management of palliative care and bereavement.
- Develop information material about unit policies and practices to promote staff skills on parent support by multi-professional team for parents.
- Establish a designated team, including both doctors and nurses, that is specially focused on developing staff's skills to communicate and collaborate with parents and support parents.

For hospital

- Support healthcare professionals to participate in training on supportive collaboration and communication with parents and respective benefits.

For health service

- Develop and implement a national guideline on staff counselling and supervision.
- Provide evidence-based reasoning of benefits of parental support during the perinatal care among infants born preterm or ill.

Description

Healthcare professionals working in neonatal care provide care for parents who are frequently anxious, frightened, traumatised or even mourning. This is an emotional burden for healthcare professionals that should be recognised and managed within the neonatal intensive care setting. Furthermore, it is important because infant- and family-centred developmental care, a key feature of modern neonatal care, is defined as a partnership between parents and healthcare professionals, including shared responsibility for infant care, collaboration, open information sharing, and joint decision-making. (15) The quality of the relationship between the healthcare professionals and parents seems to be important in support parenting and early parent infant relationship during the hospitalisation. Open communication and a supportive relationship between staff and parents facilitate parents' feelings of inclusion, which increases parent-infant bonding and parental sense of control.



Professional support for the healthcare team may comprise:

1. Case-based consultations or supervision

Multiprofessional (e.g. parent-infant relationship focused mental health specialists, social workers, psychiatrists, psychologist) counsellors are available for the healthcare team.

- Enables the NICU team to gain wider professional understanding about psychological well-being of parents, parenting, parent-infant relationship or family situation.
- Debriefing after patient's death or critical situation
- Provides emotional support for the staff members
- Provides staff members with opportunity to analyse communication within health care teams and between the health care team and parents

2. Regular consultation

A counsellor is integrated into the healthcare team

- Provides direct emotional support for the parents (19,30) and integrates that knowledge to the work of whole health care team e.g. by participating in the medical rounds frequently

3. Regular supervision

Group or individual supervision sessions enable professionals to reflect on their current communication and collaboration skills (e.g. how they facilitate the inclusion of parents in the collaboration, open information sharing with parents, and engagement of parents in decision-making, and how they receive information parents provide and worries they express)

- Provides support for healthcare professionals to acquire skills to collaborate with parents (communicate, negotiate, make shared decisions) and supports them emotionally
- Enables professionals to maintain and develop skills to provide support to parents.
- Enables professionals to reflect complex interaction situations between staff and parents.

Source

1. Pace CC, Spittle AJ, Molesworth CM-L, Lee KJ, Northam EA, Cheong JLY, et al. Evolution of Depression and Anxiety Symptoms in Parents of Very Preterm Infants During the Newborn Period. *JAMA Pediatr.* 2016 Sep 1;170(9):863–70.
2. Shaw RJ, Deblois T, Ikuta L, Ginzburg K, Fleisher B, Koopman C. Acute stress disorder among parents of infants in the neonatal intensive care nursery. *Psychosomatics.* 2006 Jun;47(3):206–12.
3. Huhtala M, Korja R, Lehtonen L, Haataja L, Lapinleimu H, Munck P, et al. Parental psychological well-being and cognitive development of very low birth weight infants at 2 years. *Acta Paediatr Oslo Nor* 1992. 2011 Dec;100(12):1555–60.
4. Korja R, Savonlahti E, Ahlqvist-Björkroth S, Stolt S, Haataja L, Lapinleimu H, et al. Maternal depression is associated with mother-infant interaction in preterm infants. *Acta Paediatr Oslo Nor* 1992. 2008 Jun;97(6):724–30.



5. Korja R, Savonlahti E, Haataja L, Lapinleimu H, Manninen H, Piha J, et al. Attachment representations in mothers of preterm infants. *Infant Behav Dev.* 2009 Jun;32(3):305–11.
6. Huhtala M, Korja R, Lehtonen L, Haataja L, Lapinleimu H, Rautava P, et al. Associations between parental psychological well-being and socio-emotional development in 5-year-old preterm children. *Early Hum Dev.* 2014 Mar;90(3):119–24.
7. Huhtala M, Korja R, Lehtonen L, Haataja L, Lapinleimu H, Rautava P, et al. Parental psychological well-being and behavioral outcome of very low birth weight infants at 3 years. *Pediatrics.* 2012 Apr;129(4):e937-944.
8. Keren M, Feldman R, Eidelman AI, Sirota L, Lester B. Clinical Interview for high-risk Parents of premature infants (CLIP) as a predictor of early disruptions in the mother-infant relationship at the nursery. *Infant Ment Health J.* 2003 Mar;24(2):93–110.
9. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics.* 2006 Nov;118(5):e1414-1427.
10. Melnyk BM, Feinstein NF. Reducing hospital expenditures with the COPE (Creating Opportunities for Parent Empowerment) program for parents and premature infants: an analysis of direct healthcare neonatal intensive care unit costs and savings. *Nurs Adm Q.* 2009 Mar;33(1):32–7.
11. Nordhov SM, Rønning JA, Dahl LB, Ulvund SE, Tunby J, Kaaresen PI. Early intervention improves cognitive outcomes for preterm infants: randomized controlled trial. *Pediatrics.* 2010 Nov;126(5):e1088-1094.
12. Spittle A, Orton J, Anderson PJ, Boyd R, Doyle LW. Early developmental intervention programmes provided post hospital discharge to prevent motor and cognitive impairment in preterm infants. *Cochrane Database Syst Rev.* 2015 Nov 24;(11):CD005495.
13. Benzies KM, Magill-Evans JE, Hayden K, Ballantyne M. Key components of early intervention programs for preterm infants and their parents: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2013;13(Suppl 1):S10.
14. Achenbach TM, Howell CT, Aoki MF, Rauh VA. Nine-year outcome of the Vermont intervention program for low birth weight infants. *Pediatrics.* 1993 Jan;91(1):45–55.
15. Mikkelsen G, Frederiksen K. Family-centred care of children in hospital - a concept analysis. *J Adv Nurs.* 2011 May;67(5):1152–62.
16. Twohig A, Reulbach U, Figueroa R, McCarthy A, McNicholas F, Molloy EJ. Supporting preterm infant attachment and socioemotional development in the neonatal intensive care unit: Staff perceptions. *Infant Ment Health J.* 2016 Apr;37(2):160–71.
17. Saunders RP, Abraham MR, Crosby MJ, Thomas K, Edwards WH. Evaluation and development of potentially better practices for improving family-centered care in neonatal intensive care units. *Pediatrics.* 2003 Apr;111(4 Pt 2):e437-449.
18. O'Rourke P. The significance of reflective supervision for infant mental health work. *Infant Ment Health J.* 2011 Mar;32(2):165–73.
19. Hyrkäs K, Appelqvist-Schmidlechner K, Haataja R. Efficacy of clinical supervision: influence on job satisfaction, burnout and quality of care. *J Adv Nurs.* 2006 Aug;55(4):521–35.
20. Hall SL, Phillips R, Hynan MT. Transforming NICU Care to Provide Comprehensive Family Support. *Newborn Infant Nurs Rev.* 2016 Jun;16(2):69–73.



21. Liddy C, Laferriere D, Baskerville B, Dahrouge S, Knox L, Hogg W. An overview of practice facilitation programs in Canada: current perspectives and future directions. *Healthc Policy Polit Sante*. 2013 Feb;8(3):58–67.
22. Axelin A, Ahlqvist-Björkroth S, Kauppila W, Boukydis Z, Lehtonen L. Nurses' perspectives on the close collaboration with parents training program in the NICU. *MCN Am J Matern Child Nurs*. 2014 Aug;39(4):260–8.
23. Flacking R, Thomson G, Axelin A. Pathways to emotional closeness in neonatal units - a cross-national qualitative study. *BMC Pregnancy Childbirth*. 2016 19;16(1):170.
24. Guillaume S, Michelin N, Amrani E, Benier B, Durrmeyer X, Lescure S, et al. Parents' expectations of staff in the early bonding process with their premature babies in the intensive care setting: a qualitative multicenter study with 60 parents. *BMC Pediatr* [Internet]. 2013 Dec [cited 2018 Jun 28];13(1). Available from: <http://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-13-18>
25. De Rouck S, Leys M. Information needs of parents of children admitted to a neonatal intensive care unit: a review of the literature (1990-2008). *Patient Educ Couns*. 2009 Aug;76(2):159–73.
26. Leonard M. The human factor: the critical importance of effective teamwork and communication in providing safe care. *Qual Saf Health Care*. 2004 Oct 1;13(suppl_1):i85–90.
27. McCormack B. Clinical practice development. White E, editor. *J Res Nurs*. 2010 Mar;15(2):189–92.
28. Horbar JD, Carpenter JH, Buzas J, Soll RF, Suresh G, Bracken MB, et al. Collaborative quality improvement to promote evidence based surfactant for preterm infants: a cluster randomised trial. *BMJ*. 2004 Oct 30;329(7473):1004.
29. Keene EA, Hutton N, Hall B, Rushton C. Bereavement debriefing sessions: an intervention to support health care professionals in managing their grief after the death of a patient. *Pediatr Nurs*. 2010 Aug;36(4):185–9; quiz 190.
30. Redinbaugh EM, Baum A, Tarbell S, Arnold R. End-of-life caregiving: what helps family caregivers cope? *J Palliat Med*. 2003 Dec;6(6):901–9.
31. Wigert H, Dellenmark MB, Bry K. Strengths and weaknesses of parent–staff communication in the NICU: a survey assessment. *BMC Pediatr* [Internet]. 2013 Dec [cited 2018 Jun 28];13(1). Available from: <http://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-13-71>
32. Vazquez V, Cong X. Parenting the NICU infant: A meta-ethnographic synthesis. *Int J Nurs Sci*. 2014 Sep;1(3):281–90.

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Education and training for infant- and family-centred developmental care (IFCDC)

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Target group

Infants, parents, and families

User group

Healthcare professionals, hospital staff, neonatal units, hospitals, and health services

Statement of standard

Infant- and family-centred developmental care (IFCDC) competence is ensured by providing formal education and recurrent training for hospital and unit leadership, healthcare professionals and other staff working or visiting the neonatal unit.

Rationale

Infant- and family-centred developmental care (IFCDC) is a framework of care founded on the theories and concepts of neurodevelopment, neuro-behaviour, parent-infant interaction, parental involvement, breastfeeding promotion, and environmental adaptation. It has three core principles: sensitive care is good for the brain; parent engagement is good for development; individualised care gives the infant a voice and a better outcome. (1–4)

Specialist knowledge and skills are the foundations of safe and effective IFCDC. Good practice is based on education that promotes understanding of the theoretical and scientific background, and awareness of the evidence that supports translation into practice. Skills training is structured around this knowledge and may also be passed down from specialist to novice in the work setting.

IFCDC interventions that have been widely, and successfully, tested are based on sound theoretical frameworks with formalised skills training. For example, the Newborn Individualised Developmental Care and Assessment Program (NIDCAP) is based on Als' synactive theory of infant development (5) and has a structured training programme supported by experienced mentors (6); the Mother Infant Transaction Programme (MITP) (7) is similarly based on the work of Brazelton and colleagues, formulated in Newborn Behavioral Assessment Scale (NBAS) training. (8)

Developing educational pathways that lead from novice to expert (9) will ensure that all NICU professionals have educational and training opportunities to develop the knowledge and skills needed to implement high quality IFCDC, which includes guiding of parents as primary caregivers. A variety of educational strategies should be employed, ranging from access to internet services, to training leaders and specialist who can guide practice and policies, set and evaluate standards, and provide teaching, coaching, mentoring and supervision. (see TEG Education & Training)



Benefits

Benefits from interventions based on structured education within the framework of infant- and family-centred developmental care could be seen as indirect to infants, parents, and healthcare professionals. (5,7,8,10–12)

Short-term benefits

- Reduced length of hospital stay (7,13,14)
- Reduced rate of medical complications e.g. better respiratory outcomes (13,15,16)
- Improved sleep regulation (17)
- Improved stress and pain management (18)
- Increased uptake of breastfeeding and kangaroo care (19,20)
- Increased parental perception of support given by NICU staff (21–23)
- Increased healthcare professional perception of positive benefits for own practice as well as general benefits for infants and families (21–23)

Long-term benefits

- Improved infant brain development (24–27)
- Improved infant developmental and behavioural outcomes (7,13,21,26,28–32)
- Improved sense of wellbeing/quality of life in childhood (33,34)
- Reduced parental stress and increased confidence and wellbeing (19,35–38)
- Improved parental mental health (14,36)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family N/A		
For healthcare professionals		
1. A unit guideline on peer support for new team members and participation in working groups for infant- and family-centred developmental care (IFCDC) is adhered to by healthcare professionals. (1,4,21,39)	A (Moderate quality) B (Moderate quality)	Guideline
2. Training on IFCDC is attended by all responsible healthcare professionals. (1,4,21,39)	A (Moderate quality) B (Moderate quality)	Training documentation



For neonatal unit		
3. A unit guideline is available and regularly updated, including <ul style="list-style-type: none"> Dedicated hours to an appropriately trained IFCDC coordinator Coaching sessions for healthcare professionals by appropriately trained IFCDC coordinator Quality improvement plans and use of tools evaluating practice. (1,4,21,39) 	A (Moderate quality) B (Moderate quality)	Guideline
4. An educational pathway including IFCDC is in place. (39)	A (Moderate quality) B (Moderate quality)	Guideline
For hospital		
5. Training on IFCDC for all healthcare professionals and other staff in the neonatal unit is ensured. (1,4,21,39)	A (Moderate quality) B (Moderate quality)	Training documentation
For health service		
6. A national guideline for education and training in IFCDC is available and regularly updated. (1,4,21,39)	A (Moderate quality) B (Moderate quality)	Guideline

Where to go – further development of care

Further development	Grading of evidence
For parents and family	
<ul style="list-style-type: none"> Parent representatives play an active role in staff education, e.g. by involvement in reflection rounds. 	B (Moderate quality)
<ul style="list-style-type: none"> Parents are educated and supported by healthcare professionals that enables them to be fully engaged in all aspects of their infant's developmental care. (1,21) 	A (Moderate quality)
For healthcare professionals and neonatal unit	
<ul style="list-style-type: none"> Provide basic level training in infant- and family-centred developmental care (IFCDC). (1,4,21,39,40) 	A (Moderate quality) B (Moderate quality)
<ul style="list-style-type: none"> Involve all professions in a developmental care team that promotes education and training in IFCDC. (1,4,21,39,40) 	A (Moderate quality) B (Moderate quality)
For hospital	
<ul style="list-style-type: none"> Provide an in-house pathway for developmental care education at all levels. (1,4,21,39,40) 	A (Moderate quality) B (Moderate quality)
For health service	
<ul style="list-style-type: none"> Accredit developmental care training with an academic institution or professional organisations. (1,4,21,39,40) 	A (Moderate quality) B (Moderate quality)
<ul style="list-style-type: none"> Support a national training programme. (1,4,21,39,40) 	A (Moderate quality) B (Moderate quality)



Getting started

Initial steps

For parents and family

- Parents are verbally informed by healthcare professionals about infant- and family-centred developmental care (IFCDC) skills and education material.

For healthcare professionals and neonatal unit

- Develop information material on IFCDC for parents.
- Attend training on IFCDC.
- Develop education and training material for all staff containing: notes about the benefits of IFCDC with references and abstracts, notes about preterm and newborn development, guidelines for best practice (illustrated if possible), links to useful websites, self-assessment materials, description of developmental leader's/specialist's roles, expected competencies.
- Organise regular meetings and training open to all NICU caregivers e.g. introduction of short teaching sessions, delivered on rotation to improve practical skills, developmental care focus groups, include IFCDC in a team journal club.
- Form a developmental care team to promote IFCDC education.
- Identify key personnel with potential to develop higher level expertise/leadership.
- Involve parents to support infant- and family-centred developmental care education.
- Use self-assessment and site assessment tools to identify areas where upgraded knowledge and skills would improve potential for quality improvement.

For hospital

- Support participation of healthcare professionals in training on IFCDC.
- Support the development and dissemination of a parent guide available on IFCDC.

For health service

- Facilitate training collaborations between regional/national neonatal services.

Description

The benefits of infant- and family-centred developmental care (IFCDC) have been reviewed by Westrup (1) and Montirosso (4) and are also described in other Topic Expert Group reports, but education and training opportunities and standards vary from place to place.

Internationally regulated standards of training for IFCDC include NIDCAP (6) and the NBAS (8). Randomised studies with NIDCAP and NBAS based interventions have positive short- and longer-term results for the development and well-being of infants and families. (7,13,15,21,28,29) The outcomes vary as would be expected, as there are many unmanageable variables affecting the way care is delivered in any centre. Benefits from NIDCAP studies have included shorter hospital stays, less disability, better developmental performance up to 2 years and beyond, more normal brain structure and function. (24–26,41) The Mother Infant Transaction Programme, which is based on the NBAS, has shown improved cognitive and behavioural outcomes well into childhood. (29,30,33)

Staff feedback on NIDCAP implementation shows a positive perception of the impact on infants, parents and staff. (21–23) Staff has also reported favourable perceptions of the impact of the Close Collaboration with Parents programme in Finland. (42) A



large population study in France showed that NIDCAP based education supported translation of developmental care policies into practice, in particular for skin-to-skin contact and breastfeeding. (20) The Family and Infant Neurodevelopmental Education (FINE) pathway (39), based on similar evidence and principles, is an intermediate/foundational more affordable and accessible programme. Preliminary results from a survey show positive staff perceptions of change in the quality of care of infants, parents and working practices. (in Preparation: Warren I, Mat Ali E, Green M. Preliminary Evaluation of Family and Infant Neurodevelopmental Education (FINE))

These programmes place considerable emphasis on coaching which is more effective than classroom teaching when it comes to changing practice. (43) Learning alongside skilled practitioners is highly valued as a way to learn. (44) Close Collaboration with Parents also uses a coaching model to train staff to observe infants and consult with parents. (10)

Programmes that take on education of the whole team, tend to involve high financial outlay and have limited evidence of neurodevelopmental benefit. Family Integrated Care (FIC), is a relatively inexpensive team-based and parent peer support approach that aims to upscale parental participation by allowing parents to take on supervised responsibility for most of their infant's care. (45) However, the educational component of developmental supportive care is limited to just one 4-hour teaching session.

The optimal dose of developmental care is difficult to define. Montirosso looked at outcomes for infants cared for with high or low levels of developmental care (Infant Centred Care, ICC) and found that infants in units with higher levels of ICC had better scores on a quality of life index at five years of age. (34) Infants in units with 24-hour parental presence have shorter lengths of stay and spend less time in intensive care. (46) Lester's recent report on single family rooms indicates that the extent of the mother's engagement with her infant determines developmental outcomes at 18 months. However short interventions can also have significant benefits. (31,35,47,48)

Research supports specific areas of practice, for example skin-to-skin contact (48–50), feeding practices (51) and management of environment. (52,53)

Recommendations or evidence-based guidelines for good practice provide a framework for competencies and training. (54–58) Education is a strategy for upscaling such practices. (59)

Support for parents, to build their resilience and facilitate engagement with their infants is skilled and demanding work. Strategies for supporting staff so that they can manage the demanding work of nurturing parents includes education. (60)

Developmental care is included in the educational recommendations proposed by Hall and colleagues to enable staff to provide psychosocial support for families with infants in hospital. (61)

Good communication skills support IFCDC. Another approach to learning that has been positively perceived by participants, who felt more confident in their communications with families as a result, is group away-days with a programme of role play scenarios (with actors), presentations and discussion. (62,63)

Experience of stress and pain is linked to developmental outcome. (64–66)

Developmental care helps to reduce stress and pain and training in pain assessment and implementation of non-pharmacological pain management strategies should be



in place to ensure that infants are not put at risk by failure to observe recommendations for safe, humane practice. (18,67) There are many pain assessment tools available but lack of training maybe one reason why they are not used. (68) The Evaluation of Intervention Scale (EVIN), which quantifies the quality of care taken to minimise stress and pain during all procedures and caregiving activities is a low-cost tool that can be used for training, audit, and self-assessment of non-pharmacological pain management. (69)

The presence of highly trained developmental leaders or facilitators in the nurseries will enable peer coaching, reflection and innovation to become part of the educational strategy. Hendricks Munoz found that a developmental care team gave staff more confidence to deliver developmental care. (70) Wallin showed how facilitators can help to change practice in a study that aimed to improve skin-to-skin implementation. (71) The benefits of developing specialists and leaders with the ability to use a coaching model of training are likely to be greater than other methods that aim to change practice. (43)

Some members of a multidisciplinary team may require specific skills training related to their professional roles. They then become a resource for the rest of the team, enabling care plans to be individualised to meet the needs of infants who are high risk for disability due to congenital or perinatal complications. (54–57)

Many educational resources - publications, educational videos, e-learning modules and evaluation tools, are available to support learning, to back up the work of skilled leaders and to get people started.

Source

1. Westrup B. Family-Centered Developmentally Supportive Care. *NeoReviews*. 1. August 2014;15(8):e325–35.
2. Westrup B. Family-centered developmentally supportive care: the Swedish example. *Arch Pediatr Organe Off Soc Francaise Pediatr*. Oktober 2015;22(10):1086–91.
3. Roué J-M, Kuhn P, Lopez Maestro M, Maastrup RA, Mitanchez D, Westrup B, u. a. Eight principles for patient-centred and family-centred care for newborns in the neonatal intensive care unit. *Arch Dis Child Fetal Neonatal Ed*. Juli 2017;102(4):F364–8.
4. Montirosso R, Tronick E, Borgatti R. Promoting Neuroprotective Care in Neonatal Intensive Care Units and Preterm Infant Development: Insights From the Neonatal Adequate Care for Quality of Life Study. *Child Dev Perspect*. März 2017;11(1):9–15.
5. Als H. Toward a synactive theory of development: Promise for the assessment and support of infant individuality. *Infant Ment Health J*. Dezember 1982;3(4):229–43.
6. Als H. Program Guide. *Newborn Individualized Developmental Care and Assessment Program (NIDCAP). An Education and Training Program for Health Care Professionals*. [Internet]. 2015. Verfügbar unter: <http://nidcap.org/wp-content/uploads/2014/09/Program-Guide-Rev-22Sep2014.pdf>
7. Rauh VA, Nurcombe B, Achenbach T, Howell C. The Mother-Infant Transaction Program. The content and implications of an intervention for the mothers of low-birthweight infants. *Clin Perinatol*. März 1990;17(1):31–45.



8. Brazelton T, Nugent JK, Lester BM. Neonatal Behavioral Assessment Scale. In: Wiley series on personality processes Handbook of infant development. Oxford, England: John Wiley & Sons.; 1987. S. 780–817.
9. Benner PE. From novice to expert: excellence and power in clinical nursing practice. Commemorative ed. Upper Saddle River, N.J: Prentice Hall; 2001. 307 S.
10. Ahlqvist-Björkroth S, Boukydis Z, Axelin AM, Lehtonen L. Close Collaboration with Parents™ intervention to improve parents' psychological well-being and child development: Description of the intervention and study protocol. *Behav Brain Res.* 15 2017;325(Pt B):303–10.
11. Welch MG, Hofer MA, Brunelli SA, Stark RI, Andrews HF, Austin J, u. a. Family nurture intervention (FNI): methods and treatment protocol of a randomized controlled trial in the NICU. *BMC Pediatr.* 7. Februar 2012;12:14.
12. Nugent JK, Herausgeber. Understanding newborn behavior & early relationships: the newborn behavioral observations (NBO) system handbook. Baltimore, Md: Paul H. Brookes Pub; 2007. 256 S.
13. Peters KL, Rosychuk RJ, Henderson L, Coté JJ, McPherson C, Tyebkhan JM. Improvement of short- and long-term outcomes for very low birth weight infants: Edmonton NIDCAP trial. *Pediatrics.* Oktober 2009;124(4):1009–20.
14. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, u. a. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics.* November 2006;118(5):e1414-1427.
15. Als H, Gilkerson L, Duffy FH, McAnulty GB, Buehler DM, Vandenberg K, u. a. A three-center, randomized, controlled trial of individualized developmental care for very low birth weight preterm infants: medical, neurodevelopmental, parenting, and caregiving effects. *J Dev Behav Pediatr JDBP.* Dezember 2003;24(6):399–408.
16. Westrup B, Kleberg A, von Eichwald K, Stjernqvist K, Lagercrantz H. A randomized, controlled trial to evaluate the effects of the newborn individualized developmental care and assessment program in a Swedish setting. *Pediatrics.* Januar 2000;105(1 Pt 1):66–72.
17. Bertelle V, Mabin D, Adrien J, Sizun J. Sleep of preterm neonates under developmental care or regular environmental conditions. *Early Hum Dev.* Juli 2005;81(7):595–600.
18. Kleberg A, Warren I, Norman E, Mörelus E, Berg A-C, Mat-Ali E, u. a. Lower stress responses after Newborn Individualized Developmental Care and Assessment Program care during eye screening examinations for retinopathy of prematurity: a randomized study. *Pediatrics.* Mai 2008;121(5):e1267-1278.
19. O'Brien K, Bracht M, Macdonell K, McBride T, Robson K, O'Leary L, u. a. A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. *BMC Pregnancy Childbirth.* 2013;13(Suppl 1):S12.
20. Pierrat V, Coquelin A, Cuttini M, Khoshnood B, Glorieux I, Claris O, u. a. Translating Neurodevelopmental Care Policies Into Practice: The Experience of Neonatal ICUs in France-The EPIPAGE-2 Cohort Study. *Pediatr Crit Care Med J Soc Crit Care Med World Fed Pediatr Intensive Crit Care Soc.* Oktober 2016;17(10):957–67.
21. Westrup B, Stjernqvist K, Kleberg A, Hellström-Westas L, Lagercrantz H. Neonatal individualized care in practice: a Swedish experience. *Semin Neonatol SN.* Dezember 2002;7(6):447–57.
22. van der Pal SM, Maguire CM, Cessie SL, Veen S, Wit JM, Walther FJ, u. a. Staff opinions regarding the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Early Hum Dev.* Juli 2007;83(7):425–32.



23. Mosqueda R, Castilla Y, Perapoch J, de la Cruz J, López-Maestro M, Pallás C. Staff perceptions on Newborn Individualized Developmental Care and Assessment Program (NIDCAP) during its implementation in two Spanish neonatal units. *Early Hum Dev.* Januar 2013;89(1):27–33.
24. Als H, Duffy FH, McAnulty GB, Rivkin MJ, Vajapeyam S, Mulkern RV, u. a. Early experience alters brain function and structure. *Pediatrics.* April 2004;113(4):846–57.
25. Als H, Duffy FH, McAnulty G, Butler SC, Lightbody L, Kosta S, u. a. NIDCAP improves brain function and structure in preterm infants with severe intrauterine growth restriction. *J Perinatol.* 2. Februar 2012;32:797.
26. McAnulty G, Duffy FH, Kosta S, Weisenfeld NI, Warfield SK, Butler SC, u. a. School-age effects of the newborn individualized developmental care and assessment program for preterm infants with intrauterine growth restriction: preliminary findings. *BMC Pediatr.* 19. Februar 2013;13:25.
27. Welch MG, Myers MM, Grieve PG, Isler JR, Fifer WP, Sahni R, u. a. Electroencephalographic activity of preterm infants is increased by Family Nurture Intervention: a randomized controlled trial in the NICU. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol.* April 2014;125(4):675–84.
28. Achenbach TM, Howell CT, Aoki MF, Rauh VA. Nine-year outcome of the Vermont intervention program for low birth weight infants. *Pediatrics.* Januar 1993;91(1):45–55.
29. Nordhov SM, Rønning JA, Dahl LB, Ulvund SE, Tunby J, Kaaresen PI. Early intervention improves cognitive outcomes for preterm infants: randomized controlled trial. *Pediatrics.* November 2010;126(5):e1088-1094.
30. Landsem IP, Handegård BH, Ulvund SE, Tunby J, Kaaresen PI, Rønning JA. Does An Early Intervention Influence Behavioral Development Until Age 9 in Children Born Prematurely? *Child Dev.* Juli 2015;86(4):1063–79.
31. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, u. a. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry.* November 2015;56(11):1202–11.
32. McAnulty GB, Duffy FH, Butler SC, Bernstein JH, Zurakowski D, Als H. Effects of the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) at age 8 years: preliminary data. *Clin Pediatr (Phila).* März 2010;49(3):258–70.
33. Landsem IP, Handegård BH, Ulvund SE, Kaaresen PI, Rønning JA. Early intervention influences positively quality of life as reported by prematurely born children at age nine and their parents; a randomized clinical trial. *Health Qual Life Outcomes.* 22. Februar 2015;13:25.
34. Montirosso R, Giusti L, Del Prete A, Zanini R, Bellù R, Borgatti R. Does quality of developmental care in NICUs affect health-related quality of life in 5-y-old children born preterm? *Pediatr Res.* 2016;80(6):824–8.
35. Lester BM, Salisbury AL, Hawes K, Dansereau LM, Bigsby R, Lupton A, u. a. 18-Month Follow-Up of Infants Cared for in a Single-Family Room Neonatal Intensive Care Unit. *J Pediatr.* Oktober 2016;177:84–9.
36. Welch MG, Halperin MS, Austin J, Stark RI, Hofer MA, Hane AA, u. a. Depression and anxiety symptoms of mothers of preterm infants are decreased at 4 months corrected age with Family Nurture Intervention in the NICU. *Arch Womens Ment Health.* Februar 2016;19(1):51–61.
37. Kaaresen PI, Rønning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics.* Juli 2006;118(1):e9-19.



38. Kleberg A, Hellström-Westas L, Widström A-M. Mothers' perception of Newborn Individualized Developmental Care and Assessment Program (NIDCAP) as compared to conventional care. *Early Hum Dev.* Juni 2007;83(6):403–11.
39. Warren I. Family and Infant Neurodevelopmental Education: an innovative, educational pathway for neonatal healthcare professionals. *Infant.* 2017;13(5):200–3.
40. Raiskila S, Axelin A, Toome L, Caballero S, Tandberg BS, Montirosso R, u. a. Parents' presence and parent-infant closeness in 11 neonatal intensive care units in six European countries vary between and within the countries. *Acta Paediatr Oslo Nor* 1992. Juni 2017;106(6):878–88.
41. Westrup B, Böhm B, Lagercrantz H, Stjernqvist K. Preschool outcome in children born very prematurely and cared for according to the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Acta Paediatr Oslo Nor* 1992. April 2004;93(4):498–507.
42. Axelin A, Ahlqvist-Björkroth S, Kauppila W, Boukydis Z, Lehtonen L. Nurses' perspectives on the close collaboration with parents training program in the NICU. *MCN Am J Matern Child Nurs.* August 2014;39(4):260–8.
43. Knight J. Coaching: The Key to Translating Research into Practice Lies in Continuous, Job-Embedded Learning with Ongoing Support. *J Staff Dev.* 2009;30(1):18–20.
44. Spence K, Sinclair L, Morritt ML, Laing S. Knowledge and learning in speciality practice. *J Neonatal Nurs.* Dezember 2016;22(6):263–76.
45. Galarza-Winton ME, Dicky T, O'Leary L, Lee SK, O'Brien K. Implementing family-integrated care in the NICU: educating nurses. *Adv Neonatal Care Off J Natl Assoc Neonatal Nurses.* Oktober 2013;13(5):335–40.
46. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, u. a. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics.* Februar 2010;125(2):e278-285.
47. Hane AA, Myers MM, Hofer MA, Ludwig RJ, Halperin MS, Austin J, u. a. Family nurture intervention improves the quality of maternal caregiving in the neonatal intensive care unit: evidence from a randomized controlled trial. *J Dev Behav Pediatr JDBP.* April 2015;36(3):188–96.
48. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry.* 1. Januar 2014;75(1):56–64.
49. Conde-Agudelo A, Belizán JM, Diaz-Rossello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev.* 16. März 2011;(3):CD002771.
50. Baley J, COMMITTEE ON FETUS AND NEWBORN. Skin-to-Skin Care for Term and Preterm Infants in the Neonatal ICU. *Pediatrics.* September 2015;136(3):596–9.
51. Wellington A, Perlman JM. Infant-driven feeding in premature infants: a quality improvement project. *Arch Dis Child Fetal Neonatal Ed.* November 2015;100(6):F495-500.
52. White RD, Smith JA, Shepley MM, Committee to Establish Recommended Standards for Newborn ICU Design. Recommended standards for newborn ICU design, eighth edition. *J Perinatol Off J Calif Perinat Assoc.* April 2013;33 Suppl 1:S2-16.
53. Liu WF, Laudert S, Perkins B, Macmillan-York E, Martin S, Graven S, u. a. The development of potentially better practices to support the neurodevelopment of infants in the NICU. *J Perinatol Off J Calif Perinat Assoc.* Dezember 2007;27 Suppl 2:S48-74.



54. Sweeney JK, Heriza CB, Blanchard Y, American Physical Therapy Association. Neonatal physical therapy. Part I: clinical competencies and neonatal intensive care unit clinical training models. *Pediatr Phys Ther Off Publ Sect Pediatr Am Phys Ther Assoc.* 2009;21(4):296–307.
55. Sweeney JK, Heriza CB, Blanchard Y, Dusing SC. Neonatal physical therapy. Part II: Practice frameworks and evidence-based practice guidelines. *Pediatr Phys Ther Off Publ Sect Pediatr Am Phys Ther Assoc.* 2010;22(1):2–16.
56. Vergara E, Anzalone M, Bigsby R, Gorga D, Holloway E, Hunter J, u. a. Specialized knowledge and skills for occupational therapy practice in the neonatal intensive care unit. *Am J Occup Ther Off Publ Am Occup Ther Assoc.* Dezember 2006;60(6):659–68.
57. Barbosa VM. Teamwork in the neonatal intensive care unit. *Phys Occup Ther Pediatr.* Februar 2013;33(1):5–26.
58. Vandenberg KA. Basic competencies to begin developmental care in the intensive care nursery. *Infants Young Child* [Internet]. 1993;6(2). Verfügbar unter: https://journals.lww.com/iyjournal/Fulltext/1993/10000/Basic_competencies_to_begin_developmental_care_in.8.aspx
59. Vesel L, Bergh A-M, Kerber KJ, Valsangkar B, Mazia G, Moxon SG, u. a. Kangaroo mother care: a multi-country analysis of health system bottlenecks and potential solutions. *BMC Pregnancy Childbirth.* 2015;15 Suppl 2:S5.
60. Warren I. Creating a Holding Environment for Caregivers. *J Perinat Neonatal Nurs.* März 2017;31(1):51–7.
61. Hall SL, Cross J, Selix NW, Patterson C, Segre L, Chuffo-Siewert R, u. a. Recommendations for enhancing psychosocial support of NICU parents through staff education and support. *J Perinatol Off J Calif Perinat Assoc.* Dezember 2015;35 Suppl 1:S29-36.
62. Boss RD, Urban A, Barnett MD, Arnold RM. Neonatal Critical Care Communication (NC3): training NICU physicians and nurse practitioners. *J Perinatol Off J Calif Perinat Assoc.* August 2013;33(8):642–6.
63. Meyer EC, Brodsky D, Hansen AR, Lamiani G, Sellers DE, Browning DM. An interdisciplinary, family-focused approach to relational learning in neonatal intensive care. *J Perinatol Off J Calif Perinat Assoc.* März 2011;31(3):212–9.
64. Vinall J, Miller SP, Bjornson BH, Fitzpatrick KP, Poskitt KJ, Brant R, u. a. Invasive procedures in preterm children: brain and cognitive development at school age. *Pediatrics.* März 2014;133(3):412–21.
65. Smith GC, Gutovich J, Smyser C, Pineda R, Newnham C, Tjoeng TH, u. a. Neonatal intensive care unit stress is associated with brain development in preterm infants. *Ann Neurol.* Oktober 2011;70(4):541–9.
66. Brummelte S, Chau CMY, Cepeda IL, Degenhardt A, Weinberg J, Synnes AR, u. a. Cortisol levels in former preterm children at school age are predicted by neonatal procedural pain-related stress. *Psychoneuroendocrinology.* Januar 2015;51:151–63.
67. Johnston C, Campbell-Yeo M, Fernandes A, Inglis D, Streiner D, Zee R. Skin-to-skin care for procedural pain in neonates. *Cochrane Database Syst Rev.* 23. Januar 2014;(1):CD008435.
68. Anand KJS. Pain assessment in preterm neonates. *Pediatrics.* März 2007;119(3):605–7.
69. Warren I, Hicks B, Kleberg A, Eliahoo J, Anand KJS, Hickson M. The validity and reliability of the Evaluation of Intervention Scale: preliminary report. *Acta Paediatr Oslo Nor* 1992. Juni 2016;105(6):618–22.



70. Hendricks-Muñoz KD, Prendergast CC. Barriers to provision of developmental care in the neonatal intensive care unit: neonatal nursing perceptions. *Am J Perinatol*. Februar 2007;24(2):71–7.
71. Wallin L, Rudberg A, Gunningberg L. Staff experiences in implementing guidelines for Kangaroo Mother Care--a qualitative study. *Int J Nurs Stud*. Januar 2005;42(1):61–73.

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Family access

Westrup B, Kuhn P, Daly M, Guerra P, Ahlqvist-Björkroth S, Bertoncelli N, Bergman N, Boukydis Z (†), Caballero S, Casper C, Filippa M, Hüppi P, König K, Lenes-Ekeberg B, Lilliesköld S, Montiroso R, Pallás Alonso C, Rankovic-Janevski M, Slinning K, Warren I

Target group

Infants, parents, and families

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

Parents (and substitutes designated by the parents) have continuous access and are able to remain with the infant throughout the 24 hours.

Rationale

Throughout Europe there is evidence that parents do not have 24-hour access to their infant. (1–3) Early separation is harmful for both newborn infants and their parents, since it disrupts the biological and emotional bonding that has developed already during gestation. (4,5) Separation between parents and infants has short- and long-term consequences. This acts as a stressor with effects on the physical and mental health for both the infant and family, it may interfere with breastfeeding, and alter the bonding and attachment process. Researchers have suggested that parent engagement in the NICU has the potential to be a low cost, high quality intervention with a positive influence on the health outcomes of preterm or ill infants and their parents. (6)

Thus, there is a clear rationale to have the neonatal units open throughout the 24 hours for parents (or by them designated substitutes) and to provide facilities for parents and family members to stay with the infant without interruption in, or adjacent to the neonatal unit.

Benefits

Short-term benefits

- Improved parent-infant bonding (7)
- Increased breastfeeding rates (8)
- Longer skin-to-skin contact (9)
- Reduced short-term pulmonary morbidity (10)
- Improved feeding (11) and weight gain (12)
- Reduced stress for infants (13)
- Increased neuro-behavioural stability in preterm infants (14)
- Increased parental involvement (14,15)
- Reduced length of stay in the NICU (10,14,16)



Long-term benefits

- Improved parent-infant interaction following discharge (17)
- Reduced rates of readmission following NICU discharge (18)
- Reduced costs of NICU hospitalisation (17)
- Improved parental mental health (11,16,19–22)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and family are informed by healthcare professionals about the importance of being present and being the primary care giver during neonatal care. (23)	B (High quality) C (High quality)	Patient information sheet
2. Parents (or family designated substitutes) are educated and supported to be the primary care givers during neonatal care by healthcare professionals. (10,23) (see TEG Infant- & family-centred developmental care)	A (Moderate quality) B (Moderate quality) C (High quality)	Guideline, parent feedback, training documentation
For healthcare professionals		
3. A unit guideline on 24-hour access for parents (or family designated substitutes) without interruption during rounds, shift changes and procedures is adhered to by all responsible healthcare professionals. (10)	A (Moderate quality) B (High quality)	Guideline, parent feedback
For neonatal unit		
4. A unit guideline on 24-hour unit access for parents (or family designated substitutes) and solutions to meet confidentiality needs is available and regularly updated. (10) (see TEG NICU design)	A (Moderate quality) B (High quality)	Guideline, parent feedback
For hospital		
5. The 24-hour access to the hospital building is authorised for parents (or family designated substitutes). (10)	A (Moderate quality) B (Moderate quality)	Guideline, parent feedback



For health service

- | | | |
|---|--|-----------|
| 6. A national guideline on 24-hour access to neonatal units is available and regularly updated and supported by national professional societies and health ministries. (10) | A (Moderate quality)
B (High quality) | Guideline |
|---|--|-----------|

Where to go – further development of care

Further development	Grading of evidence
For parents and family N/A	
For healthcare professionals	
<ul style="list-style-type: none"> Support access to neonatal units for siblings and other relatives. 	B (Moderate quality)
For neonatal unit and hospital	
<ul style="list-style-type: none"> Develop and support the availability of Couplet Care (concomitant care of infant and mother in need of medical care in the same ward/unit). 	B (Moderate quality)
For health service	
<ul style="list-style-type: none"> Develop a policy of Couplet Care. 	A (Low quality) B (Moderate quality)

Getting started

Initial steps
For parents and family
<ul style="list-style-type: none"> Parents and family are verbally informed by healthcare professionals about the importance of being present and being the primary care giver during neonatal care. Parents are encouraged to spend as much daily time as possible with direct physical access to their infant over several feeding and caring times.
For healthcare professionals
<ul style="list-style-type: none"> Promote meetings with all caregivers to discuss attitudes, barriers and concrete solutions to establish access throughout the 24 hours in the NICU for parents.
For neonatal unit and hospital
<ul style="list-style-type: none"> Develop and implement a unit guideline on opening of the NICU throughout the 24 hours for parents (or designated substitutes).
For health service
<ul style="list-style-type: none"> Develop and implement a national guideline on 24-hour unit access for parents (or family designated substitutes) and infant- and family-centred developmental care.



Description

Early separation can affect maternal post-natal bonding (24), which in turn has been suggested to be a risk factor for the socio-emotional infant development. (25) Effects of early exposure to NICU stress may be at least partially alleviated by developmental care practices. Parental presence, including the fostering of an early closeness between mother and newborn infant, has been shown to have short-term benefits for the infants. (10,15)

There are few studies that examine whether the actual amount of parental daily access is directly related to the effects seen for parental participation in care. Reynolds and colleagues examined parental access and parental holding of their infants in the NICU. Increased access was associated with generally better parameters of infant neurobehavioral functioning on the NICU Network Neurobehavioral Scale (NNNS) (26), while more holding was associated with improved quality of movement, less stress, less non-optimal arousal and less excitability of infants on the NNNS assessment. O'Brien and co-workers report higher rates of breastfeeding when the parents spend ≥ 8 hours per day in the NICU and participate in a Family Integrated Care model. (8)

When there is 24-hour access, parents have more opportunities to participate in various aspects of touching, holding, and caring for their infant and this participation in care will typically lead to beneficial effects for both the infant and family. However, 24-hour access does not necessarily assure that parents are participating actively in care of their infant. (2) Suggestions for supporting active, effective parental involvement in the care of their infant in the NICU will be addressed elsewhere.

Surveys of degree of parental participation in care and intervention studies which aim to study, and influence parental participation in care indicate a number of specific benefits (see benefits section). (6)

Infection risk management

In times of increased infections in the community, access for parents and extended family members is limited. A review of the literature related to epidemic nosocomial infection in neonatology proposes some preventing measures: (27)

- To limit the access of family members with on-going infection or who have been exposed to an infection recently
- To limit the duration and number of visits per week for siblings during the epidemic periods
- To vaccinate hospitalised infants and their relatives
- To wear protective masks, in the case of respiratory infection
- To reinforce hand hygiene measures

Ethical arguments

Beyond the increasing scientific evidence for the importance of parental presence with their infant in the NICU, there is an important human and spiritual consideration about the importance of early parent-infant contact for healthy human growth. And conversely, reduction of distress arising from separation of infant and parent is a moral imperative that goes beyond providing appropriate medical and nursing care for the infant. These considerations are addressed in the Humane Neonatal Care Initiative. (28)



Legal context

The United Nations Convention on the Rights of the Child indicates in the U. N. General Assembly Document A/RES/44/25 (12 December 1989)

- Article 7: The child ... shall have the right from birth to ... *be cared for by his or her parents*
- Article 9: States Parties shall ensure that *a child shall not be separated from his or her parents against their will ...*

In essence this is the right of the child to be with his or her parents at all times, including during periods of hospitalisation.

In the area of neonatal care, this means that not only providing adequate care to infants should be legally recognised in each country; but that healthcare institutions must provide ways for infants to be with their parent (family members) as a universally sanctioned legal right. The infant has a legal right, which should be provided for, by whatever means necessary, to be with their parent.

The European Association for Children in Hospital defines 10 Rights of Hospitalised Children in its Charter, Leiden, 1998 indicates:

- Point 2: a hospitalised child has the right to have both parents or their substitutes present day and night whatever his age or his medical condition.
- Point 3: we shall encourage the parents to remain with their infants and facilities should be offered to them with no extra cost to them or no loss in salary. Parents shall be informed about the rules and the operating conditions of the unit in order to let them actively participate in the care of their infants.

In some European countries national laws are available on the topic, for example:

France

- DH/E03/688 du 23/11/1998 specifies that whatever the situation, the mother, father or who cares for the infant must have access to the paediatric infant so long as the infant wishes them to stay
- HAS "Prise en charge de l'enfant et de l'adolescent 2011"- everything should be organised to allow parental access for hospitalised infants

Norway

- Forskrift om barns opphold i helseinstitusjon, Lov data Dato FOR-2000-12-01-1217

Portugal

- Lei n 106/2009 Hospitalisation Family Support- Portuguese Law

Spain

- Unidades de Neonatología. Estándares y Recomendaciones de calidad. Informes, estudios e investigación 2014. Ministerio de Sanidad, Servicios Sociales e Igualdad. NIPO: 680-14-147-2



Source

1. Casper C, Caeymaex L, Dicky O, Akrich M, Reynaud A, Bouvard C, et al. [Parental perception of their involvement in the care of their children in French neonatal units]. *Arch Pediatr Organe Off Soc Francaise Pediatr.* 2016 Sep;23(9):974–82.
2. Montirosso R, Fedeli C, Del Prete A, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Maternal stress and depressive symptoms associated with quality of developmental care in 25 Italian Neonatal Intensive Care Units: a cross sectional observational study. *Int J Nurs Stud.* 2014 Jul;51(7):994–1002.
3. Greisen G, Mirante N, Haumont D, Pierrat V, Pallás-Alonso CR, Warren I, et al. Parents, siblings and grandparents in the Neonatal Intensive Care Unit. A survey of policies in eight European countries. *Acta Paediatr Oslo Nor* 1992. 2009 Nov;98(11):1744–50.
4. Latva R, Lehtonen L, Salmelin RK, Tamminen T. Visiting less than every day: a marker for later behavioral problems in Finnish preterm infants. *Arch Pediatr Adolesc Med.* 2004 Dec;158(12):1153–7.
5. Franck LS, Spencer C. Parent visiting and participation in infant caregiving activities in a neonatal unit. *Birth Berkeley Calif.* 2003 Mar;30(1):31–5.
6. Benzies KM, Magill-Evans JE, Hayden K, Ballantyne M. Key components of early intervention programs for preterm infants and their parents: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2013;13(Suppl 1):S10.
7. Browne JV, Talmi A. Family-based intervention to enhance infant-parent relationships in the neonatal intensive care unit. *J Pediatr Psychol.* 2005 Dec;30(8):667–77.
8. O'Brien K, Bracht M, Macdonell K, McBride T, Robson K, O'Leary L, et al. A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. *BMC Pregnancy Childbirth.* 2013;13(Suppl 1):S12.
9. Raiskila S, Axelin A, Toome L, Caballero S, Tandberg BS, Montirosso R, et al. Parents' presence and parent-infant closeness in 11 neonatal intensive care units in six European countries vary between and within the countries. *Acta Paediatr.* 2017 Jun;106(6):878–88.
10. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics.* 2010 Feb;125(2):e278-285.
11. Meyer EC, Coll CT, Lester BM, Boukydis CF, McDonough SM, Oh W. Family-based intervention improves maternal psychological well-being and feeding interaction of preterm infants. *Pediatrics.* 1994 Feb;93(2):241–6.
12. Raiskila S, Axelin A, Rapeli S, Vasko I, Lehtonen L. Trends in care practices reflecting parental involvement in neonatal care. *Early Hum Dev.* 2014 Dec;90(12):863–7.
13. Mörelius E, Ortenstrand A, Theodorsson E, Frostell A. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early Hum Dev.* 2015 Jan;91(1):63–70.
14. Reynolds LC, Duncan MM, Smith GC, Mathur A, Neil J, Inder T, et al. Parental presence and holding in the neonatal intensive care unit and associations with early neurobehavior. *J Perinatol Off J Calif Perinat Assoc.* 2013 Aug;33(8):636–41.
15. Montirosso R, Del Prete A, Bellù R, Tronick E, Borgatti R, Neonatal Adequate Care for Quality of Life (NEO-ACQUA) Study Group. Level of NICU quality of developmental care and neurobehavioral performance in very preterm infants. *Pediatrics.* 2012 May;129(5):e1129-1137.



16. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics*. 2006 Nov;118(5):e1414-1427.
17. Melnyk BM, Feinstein NF. Reducing hospital expenditures with the COPE (Creating Opportunities for Parent Empowerment) program for parents and premature infants: an analysis of direct healthcare neonatal intensive care unit costs and savings. *Nurs Adm Q*. 2009 Mar;33(1):32–7.
18. Meyer, E., Lester, B., Boukydis, Z., Bigsby, R. Family-based intervention with high-risk infants and their families. *J Clin Psychol Med Settings*. 1998;5(1):49–69.
19. Melnyk BM, Crean HF, Feinstein NF, Fairbanks E. Maternal anxiety and depression after a premature infant's discharge from the neonatal intensive care unit: explanatory effects of the creating opportunities for parent empowerment program. *Nurs Res*. 2008 Dec;57(6):383–94.
20. Montiroso R, Provenzi L, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Measuring maternal stress and perceived support in 25 Italian NICUs. *Acta Paediatr Oslo Nor* 1992. 2012 Feb;101(2):136–42.
21. Zelkowitz P, Feeley N, Shrier I, Stremler R, Westreich R, Dunkley D, et al. The Cues and Care Trial: a randomized controlled trial of an intervention to reduce maternal anxiety and improve developmental outcomes in very low birthweight infants. *BMC Pediatr*. 2008 Sep 26;8:38.
22. Zelkowitz P, Feeley N, Shrier I, Stremler R, Westreich R, Dunkley D, et al. The cues and care randomized controlled trial of a neonatal intensive care unit intervention: effects on maternal psychological distress and mother-infant interaction. *J Dev Behav Pediatr JDBP*. 2011 Oct;32(8):591–9.
23. UNICEF. The United Nations Convention on the Rights of the Child [Internet]. 1990. Available from: https://downloads.unicef.org.uk/wp-content/uploads/2010/05/UNCRC_united_nations_convention_on_the_rights_of_the_child.pdf?_ga=2.163550268.1218459234.1527076484-403558301.1527076484
24. Obeidat HM, Bond EA, Callister LC. The parental experience of having an infant in the newborn intensive care unit. *J Perinat Educ*. 2009;18(3):23–9.
25. Korja R, Latva R, Lehtonen L. The effects of preterm birth on mother-infant interaction and attachment during the infant's first two years. *Acta Obstet Gynecol Scand*. 2012 Feb;91(2):164–73.
26. Lester BM, Tronick EZ, Brazelton TB. The Neonatal Intensive Care Unit Network Neurobehavioral Scale procedures. *Pediatrics*. 2004 Mar;113(3 Pt 2):641–67.
27. Polin RA, Saiman L. Nosocomial Infections in the Neonatal Intensive Care Unit. *NeoReviews*. 2003 Mar 1;4(3):81e – 89.
28. Levin A. Humane Neonatal Care Initiative. *Acta Paediatr Oslo Nor* 1992. 1999 Apr;88(4):353–5.

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Family support services

Westrup B, Kuhn P, Daly M, Guerra P, Bertocelli N, Damhuis G, Lilliesköld S, Slinning K, Warren I

Target group

Infants, parents, and families

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

The family receives care in an environment where their socioeconomic, mental health, and spiritual needs are supported.

Rationale

Neonatal care should include comprehensive family support services, including staff trained in family-centred care, facilities for family life (e.g., sibling area, laundry, meals), psychosocial support, links to pastoral services for spiritual support, peer-to-peer support (e.g. from parent associations), and facilities that allow for mother's medical care to be coupled with that of their infants to avoid separation. (1)

There are compelling reasons for a family supportive environment. Multiple studies report mental health problems in mothers and fathers. (2–10) Research shows benefits of psychosocial support programmes on the well-being of NICU parents (11–13) and siblings (14), during the antepartum period, through the NICU stay and into the post-NICU period.

General principles of infant- and family-centred developmental care include respect for diversity regarding racial, ethnic, spiritual, educational, geographic and socioeconomic backgrounds, cultural and linguistic traditions, and care preferences. (15,16) Improving communication may increase the involvement of minority populations in family-centred care. (17)

The NICU environment can be traumatic for siblings (18) as well as parents. Barriers to the presence of siblings are common (19) but sibling support programmes have been reported to promote family well-being and infant-sibling attachment, and to decrease sibling anxiety. (20)

There is a range of self-assessment and external review programmes (21–24), available to assess the family support aspects in neonatal care. Units should use a relevant tool to assess and benchmark their status. Parents can also assess parental perception of care delivered using similar tools. (25)



Benefits

Short-term benefits

Reduced length of hospital stay (12,26,27)

- Improved neurodevelopmental outcomes at discharge (28)
- Enhanced maternal attachment behaviour in the postpartum period (29,30)
- Improved pleasure in interaction with the infant (30)
- Improved parental learning to recognise and adequately respond to infants' behavioural and social signals (31–33)
- Facilitated process of becoming a parent during NICU stay (10,12,34)
- Enhanced parental confidence and reduced parental stress (35)

Long-term benefits

- Improved neurodevelopmental outcomes (36–41)
- Improved emotional well-being of infants at home (42)
- Improved cognitive development at ten years of life (29)
- Better child physiologic stability at ten years of life (29)
- Higher quality of parent-infant interaction (29,43)
- Improved emotional well-being of parents at home (10,42)
- Reduced maternal depression and/or anxiety (12,29)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and families are informed by healthcare professionals about family support services available. (1,13,44)	A (Moderate quality) B (High quality)	Patient information sheet
For healthcare professionals		
2. Unit guidelines on family support services are adhered to by all healthcare professionals. (1,13,44)	A (Moderate quality) B (High quality)	Guideline
3. Healthcare professionals are informed about family support services.	B (High quality)	Training documentation
For neonatal unit		
4. Unit guidelines are available and regularly updated to cover: <ul style="list-style-type: none"> • Socio-economic support by social worker (1,13,44) • Psychological support and referrals to mental health specialists (1,13,44) • Arrangements for pastoral/spiritual support (1,13,44) 	A (Moderate quality) B (High quality)	Guideline



<ul style="list-style-type: none"> • Postpartum care for mothers with admitted infants (1,13,44) • Family daily activities (e.g. sibling area, laundry) (1,13,44) • Regular psycho-social grand rounds (1,13,44) • Parent associations available for support 		
5. Annual self-assessment regarding infant- and family-centred developmental care, with regular assessment of parent experiences and satisfaction is undertaken. (21–25)	A (Moderate quality) B (High quality)	Audit report
For hospital		
6. Hospital guidelines are established and regularly updated on the topics named in component 4.	A (Moderate quality) B (High quality)	Guideline
For health service		
7. National guidelines are available and regularly updated on the provision of socioeconomic, psychological, pastoral, and parent associations' support. (1,13,44)	A (Moderate quality) B (High quality)	Guideline

Where to go – further development of care

Further development	Grading of evidence
For parents and family N/A	
For healthcare professionals N/A	
For neonatal unit <ul style="list-style-type: none"> • Provide mental health screening. • Offer a physical bed space for mothers in need of medical care in the NICU. (1) • Conduct NIDCAP Nursery Assessment and Certification. (22) 	B (Moderate quality) A (Moderate quality) B (Moderate quality) A (Moderate quality) B (Moderate quality)
For hospital N/A	
For health service <ul style="list-style-type: none"> • Develop structures to facilitate couplet care. (1,13,44) 	A (Moderate quality) B (High quality)



Getting started

Initial steps

For parents and family

- Parents and families are verbally informed by healthcare professionals about services offered by social workers and psychologists, and postpartum care for mothers with admitted infants, peer-to-peer support and of facilities for family daily activities.
- Parents are encouraged by healthcare professionals to use peer-to-peer support by parent associations.

For healthcare professionals

- Attend training on family support services.

For neonatal unit

- Develop and implement a unit guideline to cover the provision of:
- Socio-economic support by social worker (1,13,44)
- Psychological support and referrals to mental health specialists (1,13,44)
- Arrangements for pastoral/spiritual support (1,13,44)
- Postpartum care for mothers with admitted infants (1,13,44)
- Family daily activities (e.g. sibling area, laundry) (1,13,44)
- Regular psycho-social grand rounds (1,13,44)
- Parent associations available for support
- Develop information material on family support services for parents.

For hospital

- Support healthcare professional to participate in training on family support services.
- Support provision of social work, psychology, pastoral/spiritual, and parent association input into neonatal care.

For health service

- Develop and implement a national guideline on the provision of socioeconomic, psychological, pastoral, and parent associations' support. (1,13,44)
- Authorise for parent associations support.

Source

1. Westrup B. Family-centered developmentally supportive care: the Swedish example. Arch Pediatr. Oktober 2015;22(10):1086–91.
2. Holditch-Davis D, Miles MS, Weaver MA, Black B, Beeber L, Thoyre S, u. a. Patterns of distress in African-American mothers of preterm infants. J Dev Behav Pediatr JDBP. Juni 2009;30(3):193–205.
3. Greene MM, Rossman B, Patra K, Kratovil AL, Janes JE, Meier PP. Depression, anxiety, and perinatal-specific posttraumatic distress in mothers of very low birth weight infants in the neonatal intensive care unit. J Dev Behav Pediatr JDBP. Juni 2015;36(5):362–70.
4. Hynan MT, Mounts KO, Vanderbilt DL. Screening parents of high-risk infants for emotional distress: rationale and recommendations. J Perinatol Off J Calif Perinat Assoc. Oktober 2013;33(10):748–53.



5. Kim WJ, Lee E, Kim KR, Namkoong K, Park ES, Rha D-. Progress of PTSD symptoms following birth: a prospective study in mothers of high-risk infants. *J Perinatol Off J Calif Perinat Assoc.* August 2015;35(8):575–9.
6. Montirosso R, Fedeli C, Del Prete A, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Maternal stress and depressive symptoms associated with quality of developmental care in 25 Italian Neonatal Intensive Care Units: a cross sectional observational study. *Int J Nurs Stud.* Juli 2014;51(7):994–1002.
7. Muller-Nix C, Forcada-Guex M, Pierrehumbert B, Jaunin L, Borghini A, Ansermet F. Prematurity, maternal stress and mother-child interactions. *Early Hum Dev.* September 2004;79(2):145–58.
8. Huhtala M, Korja R, Lehtonen L, Haataja L, Lapinleimu H, Rautava P, u. a. Associations between parental psychological well-being and socio-emotional development in 5-year-old preterm children. *Early Hum Dev.* März 2014;90(3):119–24.
9. Candelori C, Trumello C, Babore A, Keren M, Romanelli R. The experience of premature birth for fathers: the application of the Clinical Interview for Parents of High-Risk Infants (CLIP) to an Italian sample. *Front Psychol.* 2015;6:1444.
10. Provenzi L, Santoro E. The lived experience of fathers of preterm infants in the Neonatal Intensive Care Unit: a systematic review of qualitative studies. *J Clin Nurs.* Juli 2015;24(13–14):1784–94.
11. Kazak AE, Kassam-Adams N, Schneider S, Zelikovsky N, Alderfer MA, Rourke M. An integrative model of pediatric medical traumatic stress. *J Pediatr Psychol.* Mai 2006;31(4):343–55.
12. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, u. a. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics.* November 2006;118(5):e1414-1427.
13. Benzie KM, Magill-Evans JE, Hayden KA, Ballantyne M. Key components of early intervention programs for preterm infants and their parents: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2013;13 Suppl 1:S10.
14. Levick J, Quinn M, Holder A, Nyberg A, Beaumont E, Munch S. Support for siblings of NICU patients: an interdisciplinary approach. *Soc Work Health Care.* 2010;49(10):919–33.
15. Harrison TM. Family-centered pediatric nursing care: state of the science. *J Pediatr Nurs.* Oktober 2010;25(5):335–43.
16. COMMITTEE ON HOSPITAL CARE and INSTITUTE FOR PATIENT- AND FAMILY-CENTERED CARE. Patient- and family-centered care and the pediatrician's role. *Pediatrics.* Februar 2012;129(2):394–404.
17. Guerrero AD, Chen J, Inkelas M, Rodriguez HP, Ortega AN. Racial and ethnic disparities in pediatric experiences of family-centered care. *Med Care.* April 2010;48(4):388–93.
18. Camhi C. Siblings of premature babies: Thinking about their experience. *Infant Obs.* Dezember 2005;8(3):209–33.
19. Greisen G, Mirante N, Haumont D, Pierrat V, Pallás-Alonso CR, Warren I, u. a. Parents, siblings and grandparents in the Neonatal Intensive Care Unit. A survey of policies in eight European countries. *Acta Paediatr Oslo Nor* 1992. November 2009;98(11):1744–50.
20. Doll-Speck L, Miller B, Rohrs K. Sibling education: implementing a program for the NICU. *Neonatal Netw NN.* Juni 1993;12(4):49–52.
21. Hall SL, Phillips R, Hynan MT. Transforming NICU Care to Provide Comprehensive Family Support. *Newborn Infant Nurs Rev.* Juni 2016;16(2):69–73.



22. Hedlund R. E. NIDCAP Nursery Assessment and Certification Program [Internet]. Verfügbar unter: <http://nidcap.org/en/contact-us/nidcap-certification-program/>
23. Stewart K. National Action and Good Practice Conference including launch of Bliss Family Friendly Accreditation Scheme. *J Neonatal Nurs.* Oktober 2013;19(5):247.
24. Dyke P, Buttigieg P, Blackmore AM, Ghose A. Use of the measure of process of care for families (MPOC-56) and service providers (MPOC-SP) to evaluate family-centred services in a paediatric disability setting. *Child Care Health Dev.* März 2006;32(2):167–76.
25. Latour JM, Duivenvoorden HJ, Hazelzet JA, van Goudoever JB. Development and validation of a neonatal intensive care parent satisfaction instrument. *Pediatr Crit Care Med J Soc Crit Care Med World Fed Pediatr Intensive Crit Care Soc.* September 2012;13(5):554–9.
26. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, u. a. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics.* Februar 2010;125(2):e278-285.
27. Hall SL, Cross J, Selix NW, Patterson C, Segre L, Chuffo-Siewert R, u. a. Recommendations for enhancing psychosocial support of NICU parents through staff education and support. *J Perinatol Off J Calif Perinat Assoc.* Dezember 2015;35 Suppl 1:S29-36.
28. Ohlsson A, Jacobs SE. NIDCAP: a systematic review and meta-analyses of randomized controlled trials. *Pediatrics.* März 2013;131(3):e881-893.
29. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry.* 1. Januar 2014;75(1):56–64.
30. Gathwala G, Singh B, Balhara B. KMC facilitates mother baby attachment in low birth weight infants. *Indian J Pediatr.* Januar 2008;75(1):43–7.
31. Roller CG. Getting to know you: mothers' experiences of kangaroo care. *J Obstet Gynecol Neonatal Nurs JOGNN.* April 2005;34(2):210–7.
32. Mörelius E, Broström EB, Westrup B, Sarman I, Ortenstrand A. The Stockholm Neonatal Family-Centered Care Study: effects on salivary cortisol in infants and their mothers. *Early Hum Dev.* Juli 2012;88(7):575–81.
33. Kymre IG, Bondas T. Balancing preterm infants' developmental needs with parents' readiness for skin-to-skin care: a phenomenological study. *Int J Qual Stud Health Well-Being.* 11. Juli 2013;8:21370.
34. Kozlowski JL, Lusk P, Melnyk BM. Pediatric Nurse Practitioner Management of Child Anxiety in a Rural Primary Care Clinic With the Evidence-Based COPE Program. *J Pediatr Health Care Off Publ Natl Assoc Pediatr Nurse Assoc Pract.* Juni 2015;29(3):274–82.
35. Kaaresen PI, Rønning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics.* Juli 2006;118(1):e9-19.
36. Kleberg A, Westrup B, Stjernqvist K. Developmental outcome, child behaviour and mother-child interaction at 3 years of age following Newborn Individualized Developmental Care and Intervention Program (NIDCAP) intervention. *Early Hum Dev.* Dezember 2000;60(2):123–35.
37. Westrup B, Böhm B, Lagercrantz H, Stjernqvist K. Preschool outcome in children born very prematurely and cared for according to the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Acta Paediatr Oslo Nor* 1992. April 2004;93(4):498–507.



38. Peters KL, Rosychuk RJ, Henderson L, Coté JJ, McPherson C, Tyebkhan JM. Improvement of short- and long-term outcomes for very low birth weight infants: Edmonton NIDCAP trial. *Pediatrics*. Oktober 2009;124(4):1009–20.
39. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, u. a. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry*. November 2015;56(11):1202–11.
40. Zhang X, Kurtz M, Lee S-Y, Liu H. Early Intervention for Preterm Infants and Their Mothers: A Systematic Review. *J Perinat Neonatal Nurs*. 18. November 2014;
41. Als H, Gilkerson L, Duffy FH, McAnulty GB, Buehler DM, Vandenberg K, u. a. A three-center, randomized, controlled trial of individualized developmental care for very low birth weight preterm infants: medical, neurodevelopmental, parenting, and caregiving effects. *J Dev Behav Pediatr JDBP*. Dezember 2003;24(6):399–408.
42. Mörelius E, Örténstrand A, Theodorsson E, Frostell A. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early Hum Dev*. Januar 2015;91(1):63–70.
43. Korja R, Latva R, Lehtonen L. The effects of preterm birth on mother-infant interaction and attachment during the infant's first two years. *Acta Obstet Gynecol Scand*. Februar 2012;91(2):164–73.
44. Montiroso R, Tronick E, Borgatti R. Promoting Neuroprotective Care in Neonatal Intensive Care Units and Preterm Infant Development: Insights From the Neonatal Adequate Care for Quality of Life Study. *Child Dev Perspect*. März 2017;11(1):9–15.

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Management of the acoustic environment

Sizun J, Hallberg B, Moen A, Bambang Oetomo S, Druart D, Ferrari F, Garzuly-Rieser T, Kuhn P, White R

Target group

Infants, parents, and families

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

A managed acoustic environment reduces stress and discomfort for infants.

Rationale

A managed acoustic environment supports the infant's comfort and development, and improves satisfaction for parents and healthcare professionals. Before birth, the fetus is exposed to low frequency sounds which are organised and predictable maternal vocalisations, with low exposure to noise. Following birth, the newborn infant is exposed to a wide spectrum of sounds from the environment and human attendants, and relatively low exposure to maternal voice. (1) Environmental noise may comprise loud transients against a high level of background noise (above the hourly Leq 45 dBA threshold (2), which may be associated with discomfort and adversely affect development. (3–5)

Very preterm infants react to sound peaks that are 5-15 dBA above the background noise (6) and which may negatively impact their sleep. (7) Sleep is an important contributor to brain development during early infancy (8) and sleep deprivation in a poorly managed acoustic environment may have a negative long term impact on cognitive, psychomotor and behavioural development. (9) In contrast, low exposure to human or maternal voices may have a negative impact on language development. (10) Using behavioural strategies to alter the NICU environment can thus improve the comfort of the infant, sleep organisation and improve long term development. (11,12) A noisy environment may be a barrier for prolonged parental presence in the NICU (11,12) and for healthcare professionals may interfere with the quality of communication and job performance. (13)

Benefits

Short-term benefits

- Improved comfort and sleep for infants (11–14)
- More attractive environment for prolonged presence for parents (11,12)
- More attractive working environment for healthcare professionals (15)

Long-term benefits

- Improved language development (10,16)



Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and family are informed by healthcare professionals about the need of managed acoustic environment to reduce stress and discomfort for infants. (17)	A (Moderate quality) B (High quality)	Patient information sheet
2. Parents are encouraged to request reduction of environmental noise and loud talking near their infant.	B (Moderate quality)	Parent feedback
3. Parents and family are encouraged to talk and sing to their infant adjusted to the infant's cues. (16,18)	A (Moderate quality)	Parent feedback
For healthcare professionals		
4. A unit guideline for managing and monitoring the acoustic environment is adhered to by all staff.	B (High quality)	Guideline
5. Training on acoustic expectation for the infant and on acoustic environment is attended by all staff.	B (High quality)	Training documentation
For neonatal unit		
6. A unit guideline for managing and monitoring the acoustic environment is available and regularly updated. (3–5)	A (Moderate quality) B (High quality)	Guideline
7. A culture for minimising noise and avoidance of loud and unnecessary talking by staff is established.	B (Moderate quality)	Parent feedback, staff feedback
8. A quiet hour is implemented. (13,19)	A (High quality)	Audit report, parent feedback
9. Equipment alarm sounds are decreased. (4)	A (Moderate quality)	Guideline
10. The acoustic environment is evaluated regularly to create awareness and facilitate changes.	B (Moderate quality)	Audit report
For hospital		
11. Training on acoustic expectation for the infant and on acoustic environment is ensured. (4,17,20)	A (Moderate quality) B (High quality)	Training documentation



12. Acoustic criteria are used to select new material, medical device, and equipment. B (Moderate quality) Guideline

For health service

13. A national guideline for managing and monitoring the acoustic environment is available and regularly updated. B (High quality) Guideline

14. National and European regulations take into account the combined effect on the acoustic environment from all the medical equipment used by the patient. B (High quality) Guideline

Where to go – further development of care

Further development	Grading of evidence
For parents and family N/A	
For healthcare professionals N/A	
For neonatal unit	
<ul style="list-style-type: none"> Monitor sound levels continuously within the scope of a quality improvement process. 	B (Low quality)
For hospital N/A	
For health service	
<ul style="list-style-type: none"> Train and educate on sensory expectations of infants in relevant curricula. 	B (Low quality)

Getting started

Initial steps
For parents and family
<ul style="list-style-type: none"> Parents and family are verbally informed and advised by healthcare professionals about how to speak, to sing and to read in a quiet voice to their infant when awake.
For healthcare professionals
<ul style="list-style-type: none"> Attend training on acoustic expectation for the infant and on acoustic environment. Reflect (as individual and as a team) on possible sources of noise and how to reduce noise. At the bedside, try to avoid any activities other than direct care.



For neonatal unit

- Develop and implement a unit guideline for managing and monitoring the acoustic environment.
- Develop information material on the acoustic environment for parents.
- Measure the environmental noise level in different places in the unit and close to the newborn infant to evaluate the acoustic environment.
- Establish a quiet hour.

For hospital

- Support healthcare professionals to participate in trainings on acoustic expectation for the infant and on acoustic environment standard.
- Use sound-absorbing materials for renovating or building NICUs.

For health service

- Develop and implement a national guideline for managing and monitoring the acoustic environment.

Description

The impact of sound reduction on short term medical outcomes, on sleep patterns at three months of age, on staff performance and on parents' satisfaction with the care needs to be evaluated in large and well-designed trials. (21) However, such trials are difficult to conduct for practical and ethical reasons. Thus, recommendations are based on the precautionary principle, as is common in environmental science. (22) The US standards on NICU design (3) recommend that in newborn infant rooms, the sound level shall not exceed an hourly equivalent sound level (Leq) of 45 dBA, sounds should not exceed 50 dBA more than 10% of the time (L10) with transient maximum sounds (Lmax) below 65 dBA. In staff work areas and family areas, and staff lounge areas, the sound level should not exceed an hourly Leq of 50 dB, an hourly L10 of 55 dB, or with transient sounds (Lmax) not over 70 dB.

Strategies to reach these recommended levels have not been studied in depth. Using high-performance sound-absorbing materials to build or renovate the NICU has been suggested (23,24) (see TEG NICU design). Single rooms seem to be quieter than open-bay rooms except for respiratory support equipment. (17,25) The continuous use of sound-monitoring equipment leads to reduction in the sound level for 2 months, but not longer. (5) Changing the behaviour of staff members and the culture of the NICU team is complex. Implementing a “quiet hour” could be a feasible first step. (13) Developmental care training could have an impact on the NICU environment.

Providing an adequate acoustic environment to hospitalised newborn infants is not only based on protecting them from the deleterious effect of noise but also to offer them a nurturing environment enabling the access to biologically meaningful sensory stimuli. (see TEG Infant- and family-centred developmental care)



Source

1. Lahav A, Skoe E. An acoustic gap between the NICU and womb: a potential risk for compromised neuroplasticity of the auditory system in preterm infants. *Front Neurosci.* 2014;8:381.
2. Lasky RE, Williams AL. Noise and Light Exposures for Extremely Low Birth Weight Newborns During Their Stay in the Neonatal Intensive Care Unit. *PEDIATRICS.* 2009 Feb 1;123(2):540–6.
3. White RD, Smith JA, Shepley MM, Committee to Establish Recommended Standards for Newborn ICU Design. Recommended standards for newborn ICU design, eighth edition. *J Perinatol Off J Calif Perinat Assoc.* 2013 Apr;33 Suppl 1:S2-16.
4. Chawla S, Barach P, Dwaihy M, Kamat D, Shankaran S, Panaitescu B, et al. A targeted noise reduction observational study for reducing noise in a neonatal intensive unit. *J Perinatol Off J Calif Perinat Assoc.* 2017 Sep;37(9):1060–4.
5. Degorre C, Ghyselen L, Barcat L, Dégrugilliers L, Kongolo G, Leké A, et al. [Noise level in the NICU: Impact of monitoring equipment]. *Arch Pediatr Organe Off Soc Francaise Pediatr.* 2017 Feb;24(2):100–6.
6. Kuhn P, Zores C, Pebayle T, Hoefl A, Langlet C, Escande B, et al. Infants born very preterm react to variations of the acoustic environment in their incubator from a minimum signal-to-noise ratio threshold of 5 to 10 dBA. *Pediatr Res.* 2012 Apr;71(4 Pt 1):386–92.
7. Kuhn P, Zores C, Langlet C, Escande B, Astruc D, Dufour A. Moderate acoustic changes can disrupt the sleep of very preterm infants in their incubators. *Acta Paediatr Oslo Nor 1992.* 2013 Oct;102(10):949–54.
8. Ednick M, Cohen AP, McPhail GL, Beebe D, Simakajornboon N, Amin RS. A review of the effects of sleep during the first year of life on cognitive, psychomotor, and temperament development. *Sleep.* 2009 Nov;32(11):1449–58.
9. Graven S. Sleep and brain development. *Clin Perinatol.* 2006 Sep;33(3):693–706, vii.
10. Pineda RG, Neil J, Dierker D, Smyser CD, Wallendorf M, Kidokoro H, et al. Alterations in brain structure and neurodevelopmental outcome in preterm infants hospitalized in different neonatal intensive care unit environments. *J Pediatr.* 2014 Jan;164(1):52-60.e2.
11. Heinemann A-B, Hellström-Westas L, Hedberg Nyqvist K. Factors affecting parents' presence with their extremely preterm infants in a neonatal intensive care room. *Acta Paediatr Oslo Nor 1992.* 2013 Jul;102(7):695–702.
12. Bertelle V, Mabin D, Adrien J, Sizun J. Sleep of preterm neonates under developmental care or regular environmental conditions. *Early Hum Dev.* 2005 Jul;81(7):595–600.
13. Strauch C, Brandt S, Edwards-Beckett J. Implementation of a quiet hour: effect on noise levels and infant sleep states. *Neonatal Netw NN.* 1993 Mar;12(2):31–5.
14. Thomas KA, Martin PA. NICU sound environment and the potential problems for caregivers. *J Perinatol Off J Calif Perinat Assoc.* 2000 Dec;20(8 Pt 2):S94-99.
15. Westrup B, Stjernqvist K, Kleberg A, Hellström-Westas L, Lagercrantz H. Neonatal individualized care in practice: a Swedish experience. *Semin Neonatol SN.* 2002 Dec;7(6):447–57.
16. Caskey M, Stephens B, Tucker R, Vohr B. Importance of Parent Talk on the Development of Preterm Infant Vocalizations. *PEDIATRICS.* 2011 Nov 1;128(5):910–6.
17. Davidson JE, Aslakson RA, Long AC, Puntillo KA, Kross EK, Hart J, et al. Guidelines for Family-Centered Care in the Neonatal, Pediatric, and Adult ICU. *Crit Care Med.* 2017 Jan;45(1):103–28.



18. Filippa M, Devouche E, Arioni C, Imberty M, Gratier M. Live maternal speech and singing have beneficial effects on hospitalized preterm infants. *Acta Paediatr.* 2013 Oct;102(10):1017–20.
19. Brown G. NICU noise and the preterm infant. *Neonatal Netw NN.* 2009 Jun;28(3):165–73.
20. Mosqueda-Peña R, Lora-Pablos D, Pavón-Muñoz A, Ureta-Velasco N, Moral-Pumarega MT, Pallás-Alonso CR. Impact of a Developmental Care Training Course on the Knowledge and Satisfaction of Health Care Professionals in Neonatal Units: A Multicenter Study. *Pediatr Neonatol.* 2016 Apr;57(2):97–104.
21. Almadhoob A, Ohlsson A. Sound reduction management in the neonatal intensive care unit for preterm or very low birth weight infants. *Cochrane Database Syst Rev.* 2015 Jan 30;1:CD010333.
22. Kriebel D, Tickner J, Epstein P, Lemons J, Levins R, Loechler EL, et al. The precautionary principle in environmental science. *Environ Health Perspect.* 2001 Sep;109(9):871–6.
23. Ulrich RS, Zimring C, Zhu X, DuBose J, Seo H-B, Choi Y-S, et al. A review of the research literature on evidence-based healthcare design. *HERD.* 2008;1(3):61–125.
24. Philbin MK. Planning the acoustic environment of a neonatal intensive care unit. *Clin Perinatol.* 2004 Jun;31(2):331–52, viii.
25. Shahheidari M, Homer C. Impact of the design of neonatal intensive care units on neonates, staff, and families: a systematic literature review. *J Perinat Neonatal Nurs.* 2012 Sep;26(3):260–6; quiz 267–8.

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Parental involvement

Pallás Alonso C, Westrup B, Kuhn P, Daly M, Guerra P

Target group

Infants, parents of infants hospitalised in the neonatal intensive care units (NICUs) at all levels, and families

User group

Healthcare professionals, neonatal units, hospitals, health services, policy makers, and institutions involved in NICU care

Statement of standard

Parents are members of the caregiving team and, with individualised support, assume the primary role in the provision of care of their infant, and are active partners in decision-making processes.

Rationale

The goal is to ensure the parental involvement in the care of the infant. Most parents have a sensitive understanding of their newborn infant. Contingent with infant cues, parents *normally and intuitively* present well-timed interactions in multimodal forms involving the mediums of voice, proximity, touch and gestures to regulate infants' physiological, behavioural and emotional responses, and responding to their nutritional needs. (1) However, infants in neonatal intensive care units usually are physically and emotionally separated from their parents, making it difficult for the parents to assume this expected role of caregiver. (2)

Prematurity and illness implies infant fragility and behaviour quite different from that of healthy full term infants, but implementing parent involvement can significantly improve the well-being of both parent and infant.

Although the majority of units in eight European countries reported a policy of encouraging both parents to participate in the care of their infants, the intensity and ways of involvement as well as the role played by parents varied within and between countries. (3) Parents are willing to practice new skills through guided participation, even for more complex care. (4)

Parental integration enables their participation in the medical discussions and decision making about their infant. The full integration of families into the neonatal team to actively provide much of their infant's care is beneficial for both parents and the infants themselves. (3,5)

Educational programmes can be established to involve parents in the care of their infant. They can have a more theoretical (6–8) or more practical (9,10) foundation.



Benefits

Short-term benefits

- Reduced length of NICU stay (5,9,11)
- Increased breastfeeding rate (3)
- Improved weight gain (3)
- Reduced occurrence of moderate to severe bronchopulmonary dysplasia (5)
- Tendency toward a lower rate of nosocomial infection (10)
- Reduced stress for parents (3,12)
- Increased understanding of and involvement in infant pain management (13)
- Increased satisfaction regarding communication about their infant (14)

Long-term benefits

- Reduced rate of readmissions (15)
- Reduced risk of maternal depression (12,15)
- Improved child behaviour and long-term cognitive development (16–22)
- Improved quality of life for the child (16)
- Improved long-term outcomes from mother/father skin-to-skin contact (20)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents and family are informed by healthcare professionals about the importance of their involvement in the provision of care for their infant during the stay on the neonatal unit.	B (High quality)	Patient information sheet
2. Parents are the primary caregivers for their infant. (1,2,23)	A (Moderate quality) B (Moderate quality) C (High quality)	Parent feedback
3. Parents participate in medical rounds. (3,5–7)	A (Moderate quality) B (Moderate quality)	Parent feedback
4. Parents are partners in decision-making processes. (3,5–7)	A (Moderate quality) B (Moderate quality)	Parent feedback
5. Parents have access to medical records. (3,5)	A (Moderate quality) B (Moderate quality)	Guideline, parent feedback



For healthcare professionals

- | | | |
|---|--|----------------------------------|
| 6. A unit guideline on parental involvement in terms of being the primary caregivers, participation in medical rounds, and partnering in decision-making is adhered to by all healthcare professionals. (3,5–7) | A (Moderate quality)
B (High quality) | Guideline |
| 7. Training on integrating parents into the neonatal unit is attended by all responsible healthcare professionals. (3,5,9,10) | A (Moderate quality)
B (High quality) | Training documentation |
| 8. The role as educator, coach, and facilitator of care and bonding is undertaken. (3,5,9,10) | A (Moderate quality)
B (High quality) | Healthcare professional feedback |

For neonatal unit

- | | | |
|--|----------------------|-----------------|
| 9. A unit guideline on parental involvement in terms of being the primary caregivers, participation in medical rounds, and partnering in decision-making is available and regularly updated. (3,5–7) | B (High quality) | Guideline |
| 10. A parent advisory panel is engaged in appropriate planning and decision-making processes. (3,5,9,10) | B (Moderate quality) | Parent feedback |

For hospital

- | | | |
|---|--|------------------------|
| 11. Training on integrating parents into the neonatal unit and resources for the parents as primary caregivers is ensured. (3,5,9,10) | A (Moderate quality)
B (High quality) | Training documentation |
| 12. Appropriate resources are provided to support infant- and family-centred developmental care. (3,5,9,10) | A (Moderate quality)
B (High quality) | Audit report |

For health service

- | | | |
|--|------------------|-----------|
| 13. A national guideline on the role of parents as primary caregivers of their infants and on the role of parents of advisory functions in hospitals is available and regularly updated. | B (High quality) | Guideline |
|--|------------------|-----------|



Where to go – further development of care

Further development	Grading of evidence
For parents and family	
<ul style="list-style-type: none"> Parents give input to both written and electronic medical records. (3,5) 	A (Moderate quality) B (Moderate quality)
For healthcare professionals	
<ul style="list-style-type: none"> Support parental presence throughout the 24 hours. (3,5–7) 	A (Moderate quality) B (Moderate quality)
For neonatal unit	
<ul style="list-style-type: none"> Conduct ongoing quality assurance of parent participation. (3,5–7) Provide a unit guideline for parental and family presence throughout the 24 hours. (3,5–7) Provide unit guideline on full parental access and input to both written and electronic medical records by the parents. (3,5–7) 	A (Moderate quality) B (Moderate quality) A (Moderate quality) B (Moderate quality) A (Moderate quality) B (Moderate quality)
For hospital	
<ul style="list-style-type: none"> Include parents in hospital patient advisory committee. (3,5–7) Provide facilities for parents to reside in the neonatal unit. (3,5) (see TEG NICU design) 	A (Moderate quality) B (Moderate quality) A (Moderate quality) B (Moderate quality)
For health service	
N/A	

Getting started

Initial steps

For parents and family

- Parents are verbally informed by healthcare professionals about the importance of their involvement in the provision of care for their infant. (3,5–7)
- Parents are involved in daily care procedures, e.g. changing nappies, measuring temperature, hygiene of the mouth, bathing etc. (3,5–7)

For healthcare professionals

- Attend training on infant- and family-centred developmental care. (3,5–7)
- Welcome parents as active participants in the care. (3,5–7)

For neonatal unit

- Develop and implement a unit guideline on parental involvement in terms of being the primary caregivers, participation in medical rounds, and partnering in decision-making. (3,5–7)
- Develop information material on care and treatment of infants for parents.

For hospital

- Support healthcare professionals to participate in training on infant- and family-centred developmental care. (3,5–7)

For health service

- Develop and implement a national guideline on family involvement in the care of their infant. (3,5–7)



Description

According to natural order, parents expect to be the primary caregiver of their newborn infant. Although the medical professionals in most neonatal units attempt to involve parents in the care of their infant it is generally accepted that the type of care required in the neonatal unit is highly complex and should therefore be a responsibility of experienced professionals. Inadvertently, this approach makes the parents feel like passive spectators regarding the care of their infant and tend to make them feel insecure, more stressed, anxious and less competent when they later take the infant home at discharge from the hospital. (24)

Despite the challenging circumstances, under the guidance and supervision of the healthcare professionals, the parents can gradually learn how to adjust the normal parent behaviour and carryout even the more complex tasks of caring for their infant. Subsequently – according to the individual competencies of the parents – the professionals will progressively be able to delegate most, if not all, nursing tasks to the parents.

Challenges associated with the involvement of the parents

It is possible that the parents may not detect changes that require prompt medical attention in their infant's condition. However, healthcare professionals retain primary responsibility for the infant and supervise parents closely, which should ensure that appropriate care is given. Another concern is that parents may become overly anxious about providing care for their sick infant. However, the provision of care procedures by parents is introduced gradually and individualised according both to the situation of the infant and the parents. Most parents involved in these programmes report decreased anxiety and stress because they feel in control and well informed when given a purposeful role in the care of their infant. (10)

The barriers to implementing the involvement of parents

For extremely ill infants who require mechanical ventilation or other complex treatments and where parents are not able to room-in, parental involvement in care giving is more challenging. Having parents as the primary caregivers in an intensive care setting represents a substantial shift in the current model of neonatal care in most countries. There are numerous barriers to widespread implementation of this model of care. Parents can feel stressed, over-whelmed and over-burdened when providing newborn infant care. (25) Thus, it is really important to give them continuous support and on an individual level, gradually introduce parents as the primary caregivers. On the other hand, healthcare professionals may feel uncomfortable about reducing their control of the infant's care. (26) Thus, also healthcare professionals could benefit from support and training concerning parental involvement. (3,5–7)

Source

1. Hofer MA. Early relationships as regulators of infant physiology and behavior. Acta Paediatr Oslo Nor 1992 Suppl. 1994 Jun;397:9–18.
2. Feldman R, Eidelman AI. Maternal postpartum behavior and the emergence of infant-mother and infant-father synchrony in preterm and full-term infants: the role of neonatal vagal tone. Dev Psychobiol. 2007 Apr;49(3):290–302.



3. O'Brien K, Bracht M, Macdonell K, McBride T, Robson K, O'Leary L, et al. A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. *BMC Pregnancy Childbirth*. 2013;13(Suppl 1):S12.
4. Casper C, Caeymaex L, Dicky O, Akrich M, Reynaud A, Bouvard C, et al. [Parental perception of their involvement in the care of their children in French neonatal units]. *Arch Pediatr Organe Off Soc Francaise Pediatr*. 2016 Sep;23(9):974–82.
5. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics*. 2010 Feb;125(2):e278-285.
6. Westrup B. Family-centered developmentally supportive care: the Swedish example. *Arch Pediatr Organe Off Soc Francaise Pediatr*. 2015 Oct;22(10):1086–91.
7. Warren I. Family and Infant Neurodevelopmental Education: an innovative, educational pathway for neonatal healthcare professionals. *Infant*. 2017;13(5):200–3.
8. Ahlqvist-Björkroth S, Boukydis Z, Axelin AM, Lehtonen L. Close Collaboration with Parents™ intervention to improve parents' psychological well-being and child development: Description of the intervention and study protocol. *Behav Brain Res*. 2017 15;325(Pt B):303–10.
9. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics*. 2006 Nov;118(5):e1414-1427.
10. Lee SK, O'Brien K. Parents as primary caregivers in the neonatal intensive care unit. *CMAJ Can Med Assoc J J Assoc Medicale Can*. 2014 Aug 5;186(11):845–7.
11. Narayanan I, Kumar H, Singhal PK, Dutta AK. Maternal participation in the care of the high risk infant: follow-up evaluation. *Indian Pediatr*. 1991 Feb;28(2):161–7.
12. Matricardi S, Agostino R, Fedeli C, Montiroso R. Mothers are not fathers: differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr Oslo Nor* 1992. 2013 Jan;102(1):8–14.
13. Franck LS, Oulton K, Nderitu S, Lim M, Fang S, Kaiser A. Parent involvement in pain management for NICU infants: a randomized controlled trial. *Pediatrics*. 2011 Sep;128(3):510–8.
14. Voos KC, Ross G, Ward MJ, Yohay A-L, Osorio SN, Perlman JM. Effects of implementing family-centered rounds (FCRs) in a neonatal intensive care unit (NICU). *J Matern-Fetal Neonatal Med Off J Eur Assoc Perinat Med Fed Asia Ocean Perinat Soc Int Soc Perinat Obstet*. 2011 Nov;24(11):1403–6.
15. Erdevė O, Arsan S, Yigit S, Armangil D, Atasay B, Korkmaz A. The impact of individual room on rehospitalization and health service utilization in preterms after discharge. *Acta Paediatr Oslo Nor* 1992. 2008 Oct;97(10):1351–7.
16. Montiroso R, Giusti L, Del Prete A, Zanini R, Bellù R, Borgatti R. Does quality of developmental care in NICUs affect health-related quality of life in 5-y-old children born preterm? *Pediatr Res*. 2016 Dec;80(6):824–8.
17. Westrup B, Böhm B, Lagercrantz H, Stjernqvist K. Preschool outcome in children born very prematurely and cared for according to the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Acta Paediatr Oslo Nor* 1992. 2004 Apr;93(4):498–507.
18. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry*. 2014 Jan 1;75(1):56–64.



19. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, et al. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry*. 2015 Nov;56(11):1202–11.
20. Charpak N, Tessier R, Ruiz JG, Hernandez JT, Uriza F, Villegas J, et al. Twenty-year Follow-up of Kangaroo Mother Care Versus Traditional Care. *Pediatrics*. 2017 Jan;139(1).
21. Melnyk BM, Alpert-Gillis L, Feinstein NF, Fairbanks E, Schultz-Czarniak J, Hust D, et al. Improving cognitive development of low-birth-weight premature infants with the COPE program: A pilot study of the benefit of early NICU intervention with mothers. *Res Nurs Health*. 2001 Oct;24(5):373–89.
22. Lester BM, Salisbury AL, Hawes K, Dansereau LM, Bigsby R, Lupton A, et al. 18-Month Follow-Up of Infants Cared for in a Single-Family Room Neonatal Intensive Care Unit. *J Pediatr*. 2016 Oct;177:84–9.
23. UNICEF. The United Nations Convention on the Rights of the Child [Internet]. 1990. Available from: https://downloads.unicef.org.uk/wp-content/uploads/2010/05/UNCRC_united_nations_convention_on_the_rights_of_the_child.pdf?_ga=2.163550268.1218459234.1527076484-403558301.1527076484
24. Montirosso R, Provenzi L, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Measuring maternal stress and perceived support in 25 Italian NICUs. *Acta Paediatr Oslo Nor* 1992. 2012 Feb;101(2):136–42.
25. Cooper LG, Gooding JS, Gallagher J, Sternesky L, Ledsky R, Berns SD. Impact of a family-centered care initiative on NICU care, staff and families. *J Perinatol Off J Calif Perinat Assoc*. 2007 Dec;27 Suppl 2:S32-37.
26. Fenwick J, Barclay L, Schmied V. Craving closeness: a grounded theory analysis of women's experiences of mothering in the Special Care Nursery. *Women Birth J Aust Coll Midwives*. 2008 Jun;21(2):71–85.

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Support for parental-infant bonding

Montirosso R, Westrup B, Kuhn P, Ahlqvist-Björkroth S, Bertocelli N, Lilliesköld S

Target group

Newborn infants and parents

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

The fostering of early bonding between parents and their newborn infant is pursued through strategies which promote early contact for the parent-infant dyad.

Rationale

The goal is to define optimal support opportunities for mothers and fathers/partners to facilitate early intimate contacts with their infant, to promote affectionate bonding toward and feeling of belonging with their newborn infant.

Bonding starts to emerge during pregnancy and comprises consistent parental feelings of being attached to the infant. In the event of a preterm birth, this process may be disrupted abruptly as admission to the neonatal unit becomes necessary, causing mother-infant separation soon after birth. (1–5) This separation hampers the normal physical contact and emotional closeness between the mother and her infant which causes long-lasting effects on emotional programming, neurodevelopmental outcomes, and parental mental health. (3,6–9)

Thus, particular support to facilitate bonding, despite obstacles posed by the infant's neurobehavioural immaturity and medical challenges, is required. Bonding may be sustained using different strategies, including educational and informational support (10), fostering of physical contact through skin-to-skin contact, and promotion of emotional interaction. (11–13) These strategies are opportunities for parents to learn to understand their infant's behaviour and to respond to them appropriately, encouraging the feeling that the infant "belongs" to them. (14,15) (see TEG Education & training)

Benefits

Short-term benefits

- Facilitated parental attachment behaviour (14,16) and the process of becoming a parent (10,12,17)
- Increased pleasure in interaction with the infant (14)
- Facilitated recognition and response to the infant's signals (18–22)
- Increased rate of breastfeeding (13,14)
- Improved neurobehaviour (11,23–25)
- Reduced length of hospital stay (10,26,27)



Long-term benefits

- Improved neurodevelopmental outcome (21,22,28–30)
- Improved physiologic stability and cognitive development (16)
- Increased quality of parent-infant interaction (3,16)
- Improved emotional well-being of infants and parents (12,13)
- Reduced maternal depression and/or anxiety (10,16)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about strategies to enhance bonding.	B (High quality)	Patient information sheet
2. Parents are facilitated to initiate intimate contacts with their infant, as soon as possible and guided in their understanding of their infant's behaviour. (1,13,31–33)	A (Moderate quality) B (Moderate quality)	Parent feedback
For healthcare professionals		
3. A unit guideline on early parent-infant contact, including both mother and father/partner's needs is adhered to by all healthcare professionals. (1,12,13,34–36)	A (Moderate quality) B (High quality)	Guideline, parent feedback
4. Training on facilitation of parent-infant bonding is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
5. A unit guideline on early parent-infant contact, including both mother and father/partner's needs is available and regularly updated. (1,12,13,34–36)	A (Moderate quality) B (High quality)	Guideline, parent feedback
6. The unit design supporting early contact, closeness and parent-infant intimacy is ensured. (see TEG NICU design)	B (Moderate quality)	Audit report
For hospital		
7. Training on facilitation of parent-infant bonding is ensured.	B (High quality)	Training documentation



- | | | |
|---|--|--------------|
| 8. Psychological support to promote bonding is ensured. (see TEG Infant- & family-centred developmental care) | A (Moderate quality)
B (Moderate quality) | Audit report |
|---|--|--------------|

For health service
N/A

Where to go – further development of care

Further development	Grading of evidence
For parents and family	
<ul style="list-style-type: none"> Recognise the role of siblings and grandparents in a family-centred bonding support. (31,33) 	A (Moderate quality) B (High quality)
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
<ul style="list-style-type: none"> Develop strategies on implementing Couplet Care. (26,37) 	A (Moderate quality) B (Moderate quality)

Getting started

Initial steps
For parents and family
<ul style="list-style-type: none"> Parents are verbally informed by healthcare professionals about the importance of early skin-to-skin contact and bonding. Greatest possible closeness between the parents and their infant is ensured.
For healthcare professionals
<ul style="list-style-type: none"> Attend training to facilitate parent-infant bonding.
For neonatal unit
<ul style="list-style-type: none"> Develop and implement a unit guideline on early parent-infant contact, including both mother and father/partner's needs. Develop information material on the importance of early skin-to-skin contact and bonding for parents. Adapt the available architecture with adequate furniture supporting parental presence and interaction with their infant. (see TEG NICU design) Provide professional (e.g. psychologist) emotional support for parents.
For hospital
<ul style="list-style-type: none"> Support healthcare professionals to participate in training to facilitate parent-infant bonding.
For health service
N/A



Description

Infants who are born very preterm are especially fragile and show neuro-behavioural immaturity, even in absence of critical medical conditions or perinatal injuries. (38,39) Because of this vulnerability, preterm infants receive care in a NICU, during which they may be separated from the mother soon after birth. (1) Separation limits the opportunities to engage in intimate mother-infant physical contacts (2), and can alter the emergence of an affectionate bonding between parent and infant. (3) For example, oxytocin secretion, which is generally acknowledged as the main hormone involved in affectionate bonding between parents and infants (40), is highly affected by the early mother-infant contact after birth. (41) It is plausible that NICU-related maternal separation might impair normally occurring oxytocin-related parenting activities and caregiving actions, leading to reduced feelings of maternal bonding. (42) Early separation has long lasting effects on emotional programming, neurodevelopmental outcomes, and parental health. (3,6–9) Preterm mothers show a distinct pattern of brain activation in response to viewing own infants, compared to those of full-term mothers. (43) Parental bonding represents stable feelings toward the infant, including a sense of ownership, competence and affection. (16,44,45) Bonding may be considered to be a process which emerges during pregnancy and can be critically disrupted by premature birth and early separation. (2,4,26) Bonding in mothers of very preterm infants is characterised by a subjective experience of being less intimate with the infant, which in turn moderates the pattern of infant difficulties in socio-emotional stress regulation at 3-months of age. (46)

Obstacles to bonding include infant-related factors (e.g., immaturity, prolonged need of respiratory support, sedation etc.), parent-related factors (e.g., poor maternal health, uncomfortable in touching the infant, etc.), family related factors (e.g., long distance from home, need to take care of the siblings, ...etc.), and environment-related factors (e.g., lack of support from NICU staff, restrictive access to the baby). (1,5) Parent-to-infant bonding may be sustained by very different strategies. (10–13,16,39) The facilitation of skin-to-skin contact or Kangaroo care can support its development, as parents may learn to read signals of their own baby and start responding adequately. Engaging in caregiving activities during the NICU stay has the advantage of facilitating parents of a fragile and immature infant with the supervision of experts. The development of preterm infants and parental well-being are enhanced if skin-to-skin contact is supported early during hospitalisation. (1,47) Nonetheless, the fostering of the early intimate contact between parents and infants needs to be tailored to parental needs and address their concerns, since parents may have anxieties about holding the baby that should be listened and addressed by NICU staff. (20) NICU staff can successfully support parent-to-infant bonding, recognising differences between mothers and fathers in the style of establishing affective bonding toward the infant. (12,15,34–36) Moreover, the healthcare professionals help parents feelings that the infant “belongs” to them, using the words “mother” and “father”. (2,12) 24-hour access for parents, siblings and grandparents facilitates the process and it is maximised through the adoption of family-centred, single-family NICU architectures. A homelike design is optimal to grant for parent-infant intimacy and sharing among parents and families. (26,48,49)



Source

1. Flacking R, Lehtonen L, Thomson G, Axelin A, Ahlqvist S, Moran VH, et al. Closeness and separation in neonatal intensive care. *Acta Paediatr Oslo Nor* 1992. 2012 Oct;101(10):1032–7.
2. Bialoskurski M, Cox CL, Hayes JA. The nature of attachment in a neonatal intensive care unit. *J Perinat Neonatal Nurs*. 1999 Jun;13(1):66–77.
3. Korja R, Latva R, Lehtonen L. The effects of preterm birth on mother-infant interaction and attachment during the infant's first two years. *Acta Obstet Gynecol Scand*. 2012 Feb;91(2):164–73.
4. Muller-Nix C, Forcada-Guex M, Pierrehumbert B, Jaunin L, Borghini A, Ansermet F. Prematurity, maternal stress and mother-child interactions. *Early Hum Dev*. 2004 Sep;79(2):145–58.
5. Hoffenkamp HN, Tooten A, Hall RAS, Croon MA, Braeken J, Winkel FW, et al. The Impact of Premature Childbirth on Parental Bonding. *Evol Psychol*. 2012 Jul;10(3):147470491201000.
6. Kommers D, Oei G, Chen W, Feijs L, Bambang Oetomo S. Suboptimal bonding impairs hormonal, epigenetic and neuronal development in preterm infants, but these impairments can be reversed. *Acta Paediatr Oslo Nor* 1992. 2016 Jul;105(7):738–51.
7. Mörelius E, Nelson N, Gustafsson PA. Salivary cortisol response in mother-infant dyads at high psychosocial risk. *Child Care Health Dev*. 2007 Mar;33(2):128–36.
8. Montirosso R, Provenzi L, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Measuring maternal stress and perceived support in 25 Italian NICUs. *Acta Paediatr Oslo Nor* 1992. 2012 Feb;101(2):136–42.
9. Montirosso R, Fedeli C, Del Prete A, Calciolari G, Borgatti R, NEO-ACQUA Study Group. Maternal stress and depressive symptoms associated with quality of developmental care in 25 Italian Neonatal Intensive Care Units: a cross sectional observational study. *Int J Nurs Stud*. 2014 Jul;51(7):994–1002.
10. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, et al. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics*. 2006 Nov;118(5):e1414-1427.
11. Welch MG, Myers MM, Grieve PG, Isler JR, Fifer WP, Sahni R, et al. Electroencephalographic activity of preterm infants is increased by Family Nurture Intervention: a randomized controlled trial in the NICU. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol*. 2014 Apr;125(4):675–84.
12. Provenzi L, Santoro E. The lived experience of fathers of preterm infants in the Neonatal Intensive Care Unit: a systematic review of qualitative studies. *J Clin Nurs*. 2015 Jul;24(13–14):1784–94.
13. Mörelius E, Örténstrand A, Theodorsson E, Frostell A. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early Hum Dev*. 2015 Jan;91(1):63–70.
14. Gathwala G, Singh B, Balhara B. KMC facilitates mother baby attachment in low birth weight infants. *Indian J Pediatr*. 2008 Jan;75(1):43–7.
15. Feeley N, Waitzer E, Sherrard K, Boisvert L, Zelkowitz P. Fathers' perceptions of the barriers and facilitators to their involvement with their newborn hospitalised in the neonatal intensive care unit. *J Clin Nurs*. 2013 Feb;22(3–4):521–30.



16. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry*. 2014 Jan 1;75(1):56–64.
17. Kozłowski JL, Lusk P, Melnyk BM. Pediatric Nurse Practitioner Management of Child Anxiety in a Rural Primary Care Clinic With the Evidence-Based COPE Program. *J Pediatr Health Care Off Publ Natl Assoc Pediatr Nurse Assoc Pract*. 2015 Jun;29(3):274–82.
18. Roller CG. Getting to know you: mothers' experiences of kangaroo care. *J Obstet Gynecol Neonatal Nurs JOGNN*. 2005 Apr;34(2):210–7.
19. Mörelius E, Broström EB, Westrup B, Sarman I, Örténstrand A. The Stockholm Neonatal Family-Centered Care Study: effects on salivary cortisol in infants and their mothers. *Early Hum Dev*. 2012 Jul;88(7):575–81.
20. Kymre IG, Bondas T. Balancing preterm infants' developmental needs with parents' readiness for skin-to-skin care: a phenomenological study. *Int J Qual Stud Health Well-Being*. 2013 Jul 11;8:21370.
21. Westrup B, Böhm B, Lagercrantz H, Stjernqvist K. Preschool outcome in children born very prematurely and cared for according to the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Acta Paediatr Oslo Nor 1992*. 2004 Apr;93(4):498–507.
22. Peters KL, Rosychuk RJ, Henderson L, Coté JJ, McPherson C, Tyebkhan JM. Improvement of short- and long-term outcomes for very low birth weight infants: Edmonton NIDCAP trial. *Pediatrics*. 2009 Oct;124(4):1009–20.
23. Kleberg A, Westrup B, Stjernqvist K. Developmental outcome, child behaviour and mother-child interaction at 3 years of age following Newborn Individualized Developmental Care and Intervention Program (NIDCAP) intervention. *Early Hum Dev*. 2000 Dec;60(2):123–35.
24. Welch MG, Hofer MA, Brunelli SA, Stark RI, Andrews HF, Austin J, et al. Family nurture intervention (FNI): methods and treatment protocol of a randomized controlled trial in the NICU. *BMC Pediatr*. 2012 Feb 7;12:14.
25. Ohlsson A, Jacobs SE. NIDCAP: a systematic review and meta-analyses of randomized controlled trials. *Pediatrics*. 2013 Mar;131(3):e881-893.
26. Örténstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics*. 2010 Feb;125(2):e278-285.
27. Hall SL, Cross J, Selix NW, Patterson C, Segre L, Chuffo-Siewert R, et al. Recommendations for enhancing psychosocial support of NICU parents through staff education and support. *J Perinatol Off J Calif Perinat Assoc*. 2015 Dec;35 Suppl 1:S29-36.
28. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, et al. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry*. 2015 Nov;56(11):1202–11.
29. Zhang X, Kurtz M, Lee S-Y, Liu H. Early Intervention for Preterm Infants and Their Mothers: A Systematic Review. *J Perinat Neonatal Nurs*. 2014 Nov 18;
30. Als H, Gilkerson L, Duffy FH, McAnulty GB, Buehler DM, Vandenberg K, et al. A three-center, randomized, controlled trial of individualized developmental care for very low birth weight preterm infants: medical, neurodevelopmental, parenting, and caregiving effects. *J Dev Behav Pediatr JDBP*. 2003 Dec;24(6):399–408.



31. Westrup B, Stjernqvist K, Kleberg A, Hellström-Westas L, Lagercrantz H. Neonatal individualized care in practice: a Swedish experience. *Semin Neonatol SN*. 2002 Dec;7(6):447–57.
32. Westrup B. Family-centered developmentally supportive care: the Swedish example. *Arch Pediatr Organe Off Soc Francaise Pediatr*. 2015 Oct;22(10):1086–91.
33. Montiroso R, Tronick E, Borgatti R. Promoting Neuroprotective Care in Neonatal Intensive Care Units and Preterm Infant Development: Insights From the Neonatal Adequate Care for Quality of Life Study. *Child Dev Perspect*. 2017 Mar;11(1):9–15.
34. Heidari H, Hasanpour M, Fooladi M. The Iranian parents of premature infants in NICU experience stigma of shame. *Med Arh*. 2012;66(1):35–40.
35. Guillaume S, Michelin N, Amrani E, Benier B, Durrmeyer X, Lescure S, et al. Parents' expectations of staff in the early bonding process with their premature babies in the intensive care setting: a qualitative multicenter study with 60 parents. *BMC Pediatr [Internet]*. 2013 Dec [cited 2018 Jun 13];13(1). Available from: <http://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-13-18>
36. Matricardi S, Agostino R, Fedeli C, Montiroso R. Mothers are not fathers: differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr Oslo Nor* 1992. 2013 Jan;102(1):8–14.
37. Westrup B. Family-centered developmentally supportive care: the Swedish example. *Arch Pediatr Organe Off Soc Francaise Pediatr*. 2015 Oct;22(10):1086–91.
38. Lester BM, Miller RJ, Hawes K, Salisbury A, Bigsby R, Sullivan MC, et al. Infant neurobehavioral development. *Semin Perinatol*. 2011 Feb;35(1):8–19.
39. Pickler RH, McGrath JM, Reyna BA, McCain N, Lewis M, Cone S, et al. A model of neurodevelopmental risk and protection for preterm infants. *J Perinat Neonatal Nurs*. 2010 Dec;24(4):356–65.
40. van IJzendoorn MH, Bakermans-Kranenburg MJ. The Role of Oxytocin in Parenting and as Augmentative Pharmacotherapy: Critical Issues and Bold Conjectures. *J Neuroendocrinol*. 2016;28(8).
41. Cong X, Ludington-Hoe SM, Hussain N, Cusson RM, Walsh S, Vazquez V, et al. Parental oxytocin responses during skin-to-skin contact in pre-term infants. *Early Hum Dev*. 2015 Jul;91(7):401–6.
42. Eapen V, Dadds M, Barnett B, Kohlhoff J, Khan F, Radom N, et al. Separation anxiety, attachment and inter-personal representations: disentangling the role of oxytocin in the perinatal period. *PLoS One*. 2014;9(9):e107745.
43. Montiroso R, Arrigoni F, Casini E, Nordio A, De Carli P, Di Salle F, et al. Greater brain response to emotional expressions of their own children in mothers of preterm infants: an fMRI study. *J Perinatol Off J Calif Perinat Assoc*. 2017 Jun;37(6):716–22.
44. Feldman R, Eidelman AI. Maternal postpartum behavior and the emergence of infant-mother and infant-father synchrony in preterm and full-term infants: the role of neonatal vagal tone. *Dev Psychobiol*. 2007 Apr;49(3):290–302.
45. Feldman R, Singer M, Zagoory O. Touch attenuates infants' physiological reactivity to stress. *Dev Sci*. 2010 Mar;13(2):271–8.
46. Provenzi L, Fumagalli M, Bernasconi F, Sirgiovanni I, Morandi F, Borgatti R, et al. Very Preterm and Full-Term Infants' Response to Socio-Emotional Stress: The Role of Postnatal Maternal Bonding. *Infancy*. 2017 Sep;22(5):695–712.



47. Nyqvist KH, Expert Group of the International Network on Kangaroo Mother Care, Anderson GC, Bergman N, Cattaneo A, Charpak N, et al. State of the art and recommendations. Kangaroo mother care: application in a high-tech environment. *Acta Paediatr Oslo Nor* 1992. 2010 Jun;99(6):812–9.
48. Lester BM, Hawes K, Abar B, Sullivan M, Miller R, Bigsby R, et al. Single-Family Room Care and Neurobehavioral and Medical Outcomes in Preterm Infants. *PEDIATRICS*. 2014 Oct 1;134(4):754–60.
49. Domanico R, Davis DK, Coleman F, Davis BO. Documenting the NICU design dilemma: comparative patient progress in open-ward and single family room units. *J Perinatol Off J Calif Perinat Assoc*. 2011 Apr;31(4):281–8.

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Supportive sensory environment

Kuhn P, Westrup B, Bertocelli N, Filippa M, Hüppi, P, Warren I

Target group

Infants and parents

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

The hospital sensory environment is adjusted to the infants' sensory expectancies and perceptual competences.

Rationale

The hospital environment may be challenging for the infant and their parents. Developmental neurosciences and psychology have enlightened the complex relationships between the environment and brain development. (1) Sensory systems develop progressively and continuously from fetal to neonatal life, with a timeline specific to each sensory modality (2,3); even extremely preterm infants are sufficiently mature to react to their environment. (4) Early brain development is genetically driven, but as early as the third trimester of pregnancy it becomes also sensory driven. Thus the period of hospitalisation is critical, since the sensory experiences can impact neurodevelopment, through many factors including synaptogenesis, synapses elimination, and epigenetic factors. (1,5–8) The harmful role of stressful/painful (over)stimulations and their long-term potential impact have been described. (9–11) As maternal stimuli are particularly salient for newborn infants, the hospital environment poses also a risk of sensory deprivation of biologically meaningful inputs for the infant. (12) Early and prolonged separation from their family can alter the bonding process and later mutual interactions. (13)

Both basic and medical research support the provision of a sensory nurturing environment. It is essential to protect infants from deleterious environmental stimuli and to support their access to positive sensory stimulations from their parents and other caregivers. Sensory interventions in the NICU, adjusted to the infants' needs and responses, attuned to their current developmental stage, are at best implemented through individualised programmes. Skin-to-skin contact is the best strategy to restore some of the sensory discontinuity associated with preterm birth.

Benefits

Enhanced, natural and direct exposure of the hospitalised infant to hedonically positive and/or biologically meaningful stimuli is provided during social interactions mainly through intimate contact between the mother (partner) and the infant, and minimising exposure to environmental stressors (see TEG NICU design). These enhanced sensory experiences are mainly delivered through skin-to-skin care, early vocal contact (direct talking and singing), exposure to maternal/paternal scents, access to breast milk taste and smell, eye contact, touch, and massage. Benefits may also come from other sensory interventions which are individually attuned to the behavioral state of the newborn infant: hedonically positive tastes, postural support, oral stimulation, and music-based intervention.



Short-term benefits

- Increased physiological and behavioural stability (14–19)
- Increased feeding competences (14,20–22)
- Improved weight gain (14,23–27)
- Supported sleep (15,28,29)
- Improved social interaction and recognition (30,31)
- Reduced pain behaviour (32–38)
- Enhanced infant vocalisations (38)
- Reduced length of hospital stay (14,23,25,26)
- Enhanced maternal attachment (39,40)
- Improved interaction with the infant (39,40)
- Improved adaptation to the infants' behavioural and social cues (41–44)
- Decreased parental stress/anxiety (41,45–47)

Long-term benefits

- Improved neurodevelopment for the infant (28,39,48–53)
- Improved language and cognitive outcome for the infant (54–57)
- Increased quality of life during childhood (58,59)
- Improved social interactions (57)
- Improved parental mental health (25)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are guided by healthcare professionals to respond to the infant's behaviour and sensory needs through attuned vocal, visual, olfactory, tactile interactions with their infant. (12,25,51,60)	A (Moderate quality) B (Moderate quality)	Guideline, parent feedback, patient information sheet
2. Parents are supported by healthcare professionals to be continually present and involved in the care of their infant. (61,62)	A (Moderate quality) B (Moderate quality) C (High quality)	Guideline, parent feedback
3. Parents are supported by healthcare professionals to provide as much skin-to-skin contact as they are comfortable with. (14)	A (High quality) B (Moderate quality)	Guideline, parent feedback



For healthcare professionals

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|---|--|-------------------------------|
| 4. A unit guideline to facilitate a supportive sensory environment and infant- and family-centred developmental care is adhered to by all healthcare professionals. | B (High quality) | Guideline |
| 5. Training on care adapted to a supportive sensory environment and infant- and family-centred developmental care is attended by all responsible healthcare professionals. | B (High quality) | Training documentation |
| 6. Environmental noise and excessive light exposure are minimised according to guidelines. (63–66) | A (High quality)
B (Moderate quality) | Guideline,
parent feedback |
| 7. Exposure to deleterious hospital odours is reduced. (67–69) | A (Moderate quality)
B (Low quality) | Guideline |
| 8. Exposure to painful, stressful stimuli related to care are minimised. (70) | A (High quality)
B (High quality) | Guideline,
parent feedback |
| 9. Parental knowledge about infant's behaviour and parental involvement during caring procedures to support the well-being and self-regulation of the infant are supported. (25) | A (High quality)
B (Moderate quality) | Guideline,
parent feedback |
| 10. Care is taken to provide appropriate multisensory input during initiation of breastfeeding. (71) | A (High quality)
B (High quality) | Guideline,
parent feedback |
| 11. Intimacy, quietness and speech privacy are preserved and supported. (64,66,72) | A (Moderate quality)
B (Low quality) | Guideline |
| 12. Early meaningful interactions between parents and infants, in particular through skin-to-skin and vocal contacts according to the condition and status of each infant are supported. (14,15,60) | A (High quality)
B (Moderate quality) | Guideline,
parent feedback |

For neonatal unit

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|--|------------------|-----------|
| 13. A unit guideline on care adapted to a supportive sensory environment and infant- and family-centred developmental care is available and regularly updated. | B (High quality) | Guideline |
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14. Noise reduction and light adjustment protocols are available. (64,66,72)	A (High quality) B (Moderate quality)	Guideline
15. Facilities to welcome parents continuously in the unit are provided. (61)	A (Moderate quality) B (Moderate quality)	Parent feedback
For hospital		
16. Training on care adapted to a supportive sensory environment and infant- and family-centred developmental care is ensured.	B (Moderate quality)	Training documentation
17. A noise management team is established.	B (Moderate quality)	Audit report
18. During the commissioning of new medical devices an assessment of the environmental and noise impact on the infant is included.	B (Moderate quality)	Audit report
For health service		
19. A national guideline on a sensory supportive environment is available and regularly updated. (73,74)	A (Moderate quality) B (High quality)	Guideline



Where to go – further development of care

Further development	Grading of evidence
For parents and family	
<ul style="list-style-type: none">• Parents are supported by healthcare professionals to be the essential providers of sensory stimulations attuned to their infant.	B (High quality)
<ul style="list-style-type: none">• Other family members are involved as a source of sensory stimulation attuned to the infant when the parents are not available.	B (Moderate quality)
For healthcare professionals and neonatal units	
<ul style="list-style-type: none">• Develop and evaluate innovative ways to support parent-infant interactions and synchrony.	A (Low quality)
<ul style="list-style-type: none">• Strengthen the information given to parents about the sensory competencies and needs of their infant (educational course).	B (Moderate quality)
For hospital	
<ul style="list-style-type: none">• Provide coherent perinatal support for skin-to-skin care and implement couplet care organisation optimising the sensory experience of the infant.	B (Moderate quality)
For health service	
<ul style="list-style-type: none">• Develop sustainable collaboration with parental organisations to support the provision by parents of a nurturing sensory environment.	B (Moderate quality)
<ul style="list-style-type: none">• Support, with specific funding, research in the field of sensory system development and in the population of preterm infants.	B (Moderate quality)

Getting started

Initial steps

For parents and family

- Parents are verbally informed by healthcare professionals about the development of sensory competencies of preterm infants and about their sensory expectancies.
- Provide skin-to-skin, vocal and touch contacts as early as possible.
- Participate in the feeding of the infant as early as possible.

For healthcare professionals

- Attend training on the development of sensory competencies of preterm infants and about their sensory expectancies.
- Protect infants from excessive sound and bright light.
- Evaluate, respect and support the infant's behavioural state.
- Support breastfeeding.
- Support safe skin-to-skin contact by parents as early as possible.

For neonatal unit

- Develop and implement a unit guideline on care adapted to a supportive sensory environment and infant- and family-centred developmental care.
- Develop information material about the development of sensory competencies of preterm infants and their sensory expectancies.



For hospital

- Support healthcare professionals to participate in training about the development of sensory competencies of preterm infants and their sensory expectancies.
- Provide accommodation for parents as continuously as possible in the hospital.

For health service

- Develop and implement a national guideline on care adapted to a supportive sensory environment and infant- and family-centred developmental care.

Description

Sensory environment and brain development

Although many clinical factors may lead to a higher risk of neurodevelopmental sequelae in very preterm infants, environmental factors during critical periods of brain development also contribute. (1) Epigenetic factors contribute to this “environmental shaping of the developing brain”, as synaptogenesis and selective elimination of synapses during early stages of brain development. (5) The adaptation of the sensory experiences of a preterm infant in the NICU to its sensory expectations and capabilities is the cornerstone of early interventions in infant- and family-centred developmental care. (12) The postnatal environment differs markedly from the environment it should have continued to encounter *in utero*. (3,68,75,76) This exposes the infant to excessive sensory inputs, as well as to sensory deprivation, that can alter well-being and may interfere with brain development and growth. (77,78) For example, the number of painful/stressful procedures during neonatal life impacts brain growth and function (10), and at seven years of age correlates negatively with IQ, is associated with altered brain microstructure (9) and impacts stress sensitive behaviours. (79) Moreover, early sensory experience may have later effects, for example, brief exposure of newborn infants during the early postnatal period to artificial odours while breastfeeding can influence subsequent olfactory preferences until toddlerhood. (80)

Sensory sensitivity to the hospital environment

The provision of a sensory supportive environment is based on knowledge about sensory system development in very preterm infants and its sensitivity to and expectancies derived from the sensory environment. This knowledge guides the implementation of evidence-based and biologically meaningful strategies/interventions for sensory nurturing. The responses of a preterm infant to environmental stimuli can be recorded at physiological, behavioural and cerebral levels. Even an infant born extremely preterm, is sensitive to pain and can integrate at a cortical level a painful heel lance stimulus in pain processing areas from 25 weeks' post-menstrual age. (81) On the other hand, an infant displays fine manual tactile perceptual capacities from 28 weeks of gestation. (82) The chemosensory sensitivity of a preterm infant has been demonstrated through its behavioural responses to odours and tastes. (69,83,84) The cortical responses of preterm infants to nosocomial odours has been recorded as early as 30 weeks post-menstrual age. (67) The developing brain, only few days after birth, can process new artificial odorants in similar cortical areas to those in adults. (85) This provides evidence that human olfaction at birth relies on brain functions that involve all levels of the cortical olfactory system. A very preterm infant is able to react to moderate changes in the



artificial auditory environment that can affect its well-being, and its cerebral oxygen saturation. (86,87) They are also particularly sensitive to human voices (15,60,88) and can integrate at a cortical level subtle language differences from 29 weeks post-menstrual age (89), indicating that the immature cortical circuits might process speech even at a stage where cortical organisation in layers is not completed. Finally, although the visual system is the last to develop, a very preterm infant has the capabilities to detect small light level changes in its environment. (90)

Modulation of the hospital environment to support neurodevelopment

Understanding that the environment impacts the experience-dependent brain organisation and realising that the NICU is not the expected and optimal environment for infant development, many strategies have been developed and shown efficient to minimise the exposure to deleterious stimuli coming from the hospital: painful procedures (70), noise (64,72,74), odour from health care products (68), exposure to continuous bright light. (63) A series of recommendations and criteria have been drawn to reduce the impact of the deleterious aspects of the NICU environment (65) and a number of organisations advocate for less invasive practices. (66,73)

Moreover, other strategies support also the access to biologically meaningful stimuli. Experiences of early skin-to-skin contact and of “couplet care” with continuous access and non-separation between the infant and the mother, aim to sustain the ongoing contact between parents and preterm infants, sustaining consistent, and predictable multisensory communication, resulting in more optimal medical and developmental outcomes. Most of these strategies are included in well evaluated and validated developmental care programmes as the NIDCAP programme (12,24,52), Family Nurture Intervention (51,91,92), the COPE (25,47). Other programmes develop similar approaches and scientific evaluations are expected in the near future (93), e.g., for Family Integrated Care and the Close Collaboration with Parents. (94)

Finally, specific sensory interventions may be beneficial but have also an inherent risk of overstimulation, especially if delivered without an individualised approach adjusted to the infant’s behaviour. However, this risk could be decreased if the interventions are applied by parents (95), and/or with support of evidenced based developmental care programmes. Their long-term benefits remain to be evaluated. (18,96)

Source

1. Lagercrantz H. The newborn brain: neuroscience and clinical applications. 2nd ed. Cambridge ; New York: Cambridge University Press; 2010. 412 S.
2. Lecanuet JP, Schaal B. Fetal sensory competencies. Eur J Obstet Gynecol Reprod Biol. September 1996;68(1-2):1-23.
3. Kuhn P, Zores C, Astruc D, Dufour A, Casper C. [Sensory system development and the physical environment of infants born very preterm]. Arch Pediatr Organe Off Soc Francaise Pediatr. Juli 2011;18 Suppl 2:S92-102.
4. Lagercrantz H, Changeux J-P. Basic consciousness of the newborn. Semin Perinatol. Juni 2010;34(3):201-6.



5. Knudsen EI. Sensitive periods in the development of the brain and behavior. *J Cogn Neurosci*. Oktober 2004;16(8):1412–25.
6. Kappeler L, Meaney MJ. Epigenetics and parental effects. *BioEssays News Rev Mol Cell Dev Biol*. September 2010;32(9):818–27.
7. Montiroso R, Provenzi L. Implications of epigenetics and stress regulation on research and developmental care of preterm infants. *J Obstet Gynecol Neonatal Nurs JOGNN*. April 2015;44(2):174–82.
8. Dubois J, Dehaene-Lambertz G, Kulikova S, Poupon C, Hüppi PS, Hertz-Pannier L. The early development of brain white matter: a review of imaging studies in fetuses, newborns and infants. *Neuroscience*. 12. September 2014;276:48–71.
9. Vinall J, Miller SP, Bjornson BH, Fitzpatrick KP, Poskitt KJ, Brant R, u. a. Invasive procedures in preterm children: brain and cognitive development at school age. *Pediatrics*. März 2014;133(3):412–21.
10. Smith GC, Gutovich J, Smyser C, Pineda R, Newnham C, Tjoeng TH, u. a. Neonatal intensive care unit stress is associated with brain development in preterm infants. *Ann Neurol*. Oktober 2011;70(4):541–9.
11. Brummelte S, Grunau RE, Chau V, Poskitt KJ, Brant R, Vinall J, u. a. Procedural pain and brain development in premature newborns. *Ann Neurol*. März 2012;71(3):385–96.
12. Als H, Duffy FH, McAnulty GB, Rivkin MJ, Vajapeyam S, Mulkern RV, u. a. Early experience alters brain function and structure. *Pediatrics*. April 2004;113(4):846–57.
13. Korja R, Latva R, Lehtonen L. The effects of preterm birth on mother-infant interaction and attachment during the infant's first two years. *Acta Obstet Gynecol Scand*. Februar 2012;91(2):164–73.
14. Conde-Agudelo A, Belizán JM, Diaz-Rossello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev*. 16. März 2011;(3):CD002771.
15. Filippa M, Devouche E, Arioni C, Imberty M, Gratier M. Live maternal speech and singing have beneficial effects on hospitalized preterm infants. *Acta Paediatr Oslo Nor* 1992. Oktober 2013;102(10):1017–20.
16. Doheny L, Morey JA, Ringer SA, Lahav A. Reduced frequency of apnea and bradycardia episodes caused by exposure to biological maternal sounds. *Pediatr Int Off J Jpn Pediatr Soc*. April 2012;54(2):e1-3.
17. Varendi H, Christensson K, Porter RH, Winberg J. Soothing effect of amniotic fluid smell in newborn infants. *Early Hum Dev*. 17. April 1998;51(1):47–55.
18. Bieleninik Ł, Ghetti C, Gold C. Music Therapy for Preterm Infants and Their Parents: A Meta-analysis. *Pediatrics*. September 2016;138(3).
19. van der Heijden MJE, Oliai Araghi S, Jeekel J, Reiss IKM, Hunink MGM, van Dijk M. Do Hospitalized Premature Infants Benefit from Music Interventions? A Systematic Review of Randomized Controlled Trials. *PloS One*. 2016;11(9):e0161848.
20. Raimbault C, Saliba E, Porter RH. The effect of the odour of mother's milk on breastfeeding behaviour of premature neonates. *Acta Paediatr Oslo Nor* 1992. März 2007;96(3):368–71.
21. Fucile S, Gisel EG, McFarland DH, Lau C. Oral and non-oral sensorimotor interventions enhance oral feeding performance in preterm infants. *Dev Med Child Neurol*. September 2011;53(9):829–35.



22. Fucile S, Gisel E, Lau C. Oral stimulation accelerates the transition from tube to oral feeding in preterm infants. *J Pediatr.* August 2002;141(2):230–6.
23. Kardaş Özdemir F, Güdücü Tüfekci F. The effect of individualised developmental care practices on the growth and hospitalisation duration of premature infants: the effect of mother's scent and flexion position. *J Clin Nurs.* November 2014;23(21–22):3036–44.
24. Ohlsson A, Jacobs SE. NIDCAP: a systematic review and meta-analyses of randomized controlled trials. *Pediatrics.* März 2013;131(3):e881–893.
25. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, u. a. Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) neonatal intensive care unit program: a randomized, controlled trial. *Pediatrics.* November 2006;118(5):e1414–1427.
26. Álvarez MJ, Fernández D, Gómez-Salgado J, Rodríguez-González D, Rosón M, Lapeña S. The effects of massage therapy in hospitalized preterm neonates: A systematic review. *Int J Nurs Stud.* April 2017;69:119–36.
27. Loewy J, Stewart K, Dassler A-M, Telsey A, Homel P. The Effects of Music Therapy on Vital Signs, Feeding, and Sleep in Premature Infants. *PEDIATRICS.* 1. Mai 2013;131(5):902–18.
28. Feldman R, Eidelman AI. Skin-to-skin contact (Kangaroo Care) accelerates autonomic and neurobehavioural maturation in preterm infants. *Dev Med Child Neurol.* April 2003;45(4):274–81.
29. Scher MS, Ludington-Hoe S, Kaffashi F, Johnson MW, Holditch-Davis D, Loparo KA. Neurophysiologic assessment of brain maturation after an 8-week trial of skin-to-skin contact on preterm infants. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol.* Oktober 2009;120(10):1812–8.
30. Varendi H, Porter RH. Breast odour as the only maternal stimulus elicits crawling towards the odour source. *Acta Paediatr Oslo Nor* 1992. April 2001;90(4):372–5.
31. Varendi H, Porter RH, Winberg J. Does the newborn baby find the nipple by smell? *Lancet Lond Engl.* 8. Oktober 1994;344(8928):989–90.
32. Nishitani S, Miyamura T, Tagawa M, Sumi M, Takase R, Doi H, u. a. The calming effect of a maternal breast milk odor on the human newborn infant. *Neurosci Res.* Januar 2009;63(1):66–71.
33. Johnston C, Campbell-Yeo M, Fernandes A, Inglis D, Streiner D, Zee R. Skin-to-skin care for procedural pain in neonates. *Cochrane Database Syst Rev.* 23. Januar 2014;(1):CD008435.
34. Jebreili M, Neshat H, Seyyedrasouli A, Ghojzade M, Hosseini MB, Hamishehkar H. Comparison of Breastmilk Odor and Vanilla Odor on Mitigating Premature Infants' Response to Pain During and After Venipuncture. *Breastfeed Med Off J Acad Breastfeed Med.* September 2015;10(7):362–5.
35. Harrison D, Reszel J, Bueno M, Sampson M, Shah VS, Taddio A, u. a. Breastfeeding for procedural pain in infants beyond the neonatal period. *Cochrane Database Syst Rev.* 28. Oktober 2016;10:CD011248.
36. Stevens B, Yamada J, Lee GY, Ohlsson A. Sucrose for analgesia in newborn infants undergoing painful procedures. *Cochrane Database Syst Rev.* 31. Januar 2013;(1):CD001069.
37. Bellieni CV, Cordelli DM, Marchi S, Ceccarelli S, Perrone S, Maffei M, u. a. Sensorial saturation for neonatal analgesia. *Clin J Pain.* April 2007;23(3):219–21.
38. Caskey M, Stephens B, Tucker R, Vohr B. Importance of parent talk on the development of preterm infant vocalizations. *Pediatrics.* November 2011;128(5):910–6.



39. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry*. 1. Januar 2014;75(1):56–64.
40. Feldman R, Weller A, Sirota L, Eidelman AI. Testing a family intervention hypothesis: the contribution of mother-infant skin-to-skin contact (kangaroo care) to family interaction, proximity, and touch. *J Fam Psychol JFP J Div Fam Psychol Am Psychol Assoc Div 43*. März 2003;17(1):94–107.
41. Feldman R, Eidelman AI, Sirota L, Weller A. Comparison of Skin-to-Skin (Kangaroo) and Traditional Care: Parenting Outcomes and Preterm Infant Development. *PEDIATRICS*. 1. Juli 2002;110(1):16–26.
42. Mörelius E, Örténstrand A, Theodorsson E, Frostell A. A randomised trial of continuous skin-to-skin contact after preterm birth and the effects on salivary cortisol, parental stress, depression, and breastfeeding. *Early Hum Dev*. Januar 2015;91(1):63–70.
43. Mörelius E, Theodorsson E, Nelson N. Salivary cortisol and mood and pain profiles during skin-to-skin care for an unselected group of mothers and infants in neonatal intensive care. *Pediatrics*. November 2005;116(5):1105–13.
44. Milgrom J, Newnham C, Martin PR, Anderson PJ, Doyle LW, Hunt RW, u. a. Early communication in preterm infants following intervention in the NICU. *Early Hum Dev*. September 2013;89(9):755–62.
45. Welch MG, Halperin MS, Austin J, Stark RI, Hofer MA, Hane AA, u. a. Depression and anxiety symptoms of mothers of preterm infants are decreased at 4 months corrected age with Family Nurture Intervention in the NICU. *Arch Womens Ment Health*. Februar 2016;19(1):51–61.
46. Kaaresen PI, Rønning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics*. Juli 2006;118(1):e9-19.
47. Melnyk BM, Crean HF, Feinstein NF, Fairbanks E. Maternal anxiety and depression after a premature infant's discharge from the neonatal intensive care unit: explanatory effects of the creating opportunities for parent empowerment program. *Nurs Res*. Dezember 2008;57(6):383–94.
48. Charpak N, Tessier R, Ruiz JG, Hernandez JT, Uriza F, Villegas J, u. a. Twenty-year Follow-up of Kangaroo Mother Care Versus Traditional Care. *Pediatrics*. Januar 2017;139(1).
49. Nordhov SM, Rønning JA, Dahl LB, Ulvund SE, Tunby J, Kaaresen PI. Early intervention improves cognitive outcomes for preterm infants: randomized controlled trial. *Pediatrics*. November 2010;126(5):e1088-1094.
50. Nordhov SM, Rønning JA, Ulvund SE, Dahl LB, Kaaresen PI. Early intervention improves behavioral outcomes for preterm infants: randomized controlled trial. *Pediatrics*. Januar 2012;129(1):e9–16.
51. Welch MG, Firestein MR, Austin J, Hane AA, Stark RI, Hofer MA, u. a. Family Nurture Intervention in the Neonatal Intensive Care Unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *J Child Psychol Psychiatry*. November 2015;56(11):1202–11.
52. Peters KL, Rosychuk RJ, Hendson L, Coté JJ, McPherson C, Tyebkhan JM. Improvement of short- and long-term outcomes for very low birth weight infants: Edmonton NIDCAP trial. *Pediatrics*. Oktober 2009;124(4):1009–20.
53. Westrup B, Böhm B, Lagercrantz H, Stjernqvist K. Preschool outcome in children born very prematurely and cared for according to the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). *Acta Paediatr Oslo Nor* 1992. April 2004;93(4):498–507.



54. Caskey M, Stephens B, Tucker R, Vohr B. Adult Talk in the NICU With Preterm Infants and Developmental Outcomes. *PEDIATRICS*. 1. März 2014;133(3):e578–84.
55. Lester BM, Salisbury AL, Hawes K, Dansereau LM, Bigsby R, Lupton A, u. a. 18-Month Follow-Up of Infants Cared for in a Single-Family Room Neonatal Intensive Care Unit. *J Pediatr*. Oktober 2016;177:84–9.
56. Vohr B, McGowan E, McKinley L, Tucker R, Keszler L, Alksninis B. Differential Effects of the Single-Family Room Neonatal Intensive Care Unit on 18- to 24-Month Bayley Scores of Preterm Infants. *J Pediatr*. Juni 2017;185:42-48.e1.
57. Kleberg A, Westrup B, Stjernqvist K. Developmental outcome, child behaviour and mother-child interaction at 3 years of age following Newborn Individualized Developmental Care and Intervention Program (NIDCAP) intervention. *Early Hum Dev*. Dezember 2000;60(2):123–35.
58. Landsem IP, Handegård BH, Ulvund SE, Kaaresen PI, Rønning JA. Early intervention influences positively quality of life as reported by prematurely born children at age nine and their parents; a randomized clinical trial. *Health Qual Life Outcomes*. 22. Februar 2015;13:25.
59. Montirosso R, Giusti L, Del Prete A, Zanini R, Bellù R, Borgatti R. Does quality of developmental care in NICUs affect health-related quality of life in 5-y-old children born preterm? *Pediatr Res*. 2016;80(6):824–8.
60. Filippa M, Panza C, Ferrari F, Frassoldati R, Kuhn P, Balduzzi S, u. a. Systematic review of maternal voice interventions demonstrates increased stability in preterm infants. *Acta Paediatr Oslo Nor 1992*. August 2017;106(8):1220–9.
61. Ortenstrand A, Westrup B, Broström EB, Sarman I, Akerström S, Brune T, u. a. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. *Pediatrics*. Februar 2010;125(2):e278-285.
62. UNICEF. The United Nations Convention on the Rights of the Child [Internet]. 1990. Verfügbar unter: https://downloads.unicef.org.uk/wp-content/uploads/2010/05/UNCRC_united_nations_convention_on_the_rights_of_the_child.pdf?_ga=2.163550268.1218459234.1527076484-403558301.1527076484
63. Morag I, Ohlsson A. Cycled light in the intensive care unit for preterm and low birth weight infants. *Cochrane Database Syst Rev*. 19. Januar 2011;(1):CD006982.
64. Philbin MK, Robertson A, Hall JW. Recommended permissible noise criteria for occupied, newly constructed or renovated hospital nurseries. The Sound Study Group of the National Resource Center. *J Perinatol Off J Calif Perinat Assoc*. Dezember 1999;19(8 Pt 1):559–63.
65. Roué J-M, Kuhn P, Lopez Maestro M, Maastrup RA, Mitanchez D, Westrup B, u. a. Eight principles for patient-centred and family-centred care for newborns in the neonatal intensive care unit. *Arch Dis Child Fetal Neonatal Ed*. Juli 2017;102(4):F364–8.
66. White RD. Recommended NICU design standards and the physical environment of the NICU. *J Perinatol Off J Calif Perinat Assoc*. April 2013;33 Suppl 1:S1.
67. Frie J, Bartocci M, Lagercrantz H, Kuhn P. Cortical Responses to Alien Odors in Newborns: An fNIRS Study. *Cereb Cortex N Y N 1991*. 1. August 2017;1–12.
68. Kuhn P, Astruc D, Messer J, Marlier L. Exploring the olfactory environment of premature newborns: a French survey of health care and cleaning products used in neonatal units. *Acta Paediatr Oslo Nor 1992*. März 2011;100(3):334–9.
69. Schaal B, Hummel T, Soussignan R. Olfaction in the fetal and premature infant: functional status and clinical implications. *Clin Perinatol*. Juni 2004;31(2):261–85, vi–vii.



70. COMMITTEE ON FETUS AND NEWBORN and SECTION ON ANESTHESIOLOGY AND PAIN MEDICINE. Prevention and Management of Procedural Pain in the Neonate: An Update. PEDIATRICS. 1. Februar 2016;137(2):e20154271–e20154271.
71. Rozé J-C, Darmaun D, Boquien C-Y, Flamant C, Picaud J-C, Savagner C, u. a. The apparent breastfeeding paradox in very preterm infants: relationship between breast feeding, early weight gain and neurodevelopment based on results from two cohorts, EPIPAGE and LIFT. BMJ Open. 2012;2(2):e000834.
72. Graven SN. Sound and the developing infant in the NICU: conclusions and recommendations for care. J Perinatol Off J Calif Perinat Assoc. Dezember 2000;20(8 Pt 2):S88-93.
73. White RD, Smith JA, Shepley MM, Committee to Establish Recommended Standards for Newborn ICU Design. Recommended standards for newborn ICU design, eighth edition. J Perinatol Off J Calif Perinat Assoc. April 2013;33 Suppl 1:S2-16.
74. Committee on Environmental Health. Noise: A Hazard for the Fetus and Newborn. PEDIATRICS. 1. Oktober 1997;100(4):724–7.
75. Carbajal R, Rousset A, Danan C, Coquery S, Nolent P, Ducrocq S, u. a. Epidemiology and treatment of painful procedures in neonates in intensive care units. JAMA. 2. Juli 2008;300(1):60–70.
76. Lickliter R. Atypical perinatal sensory stimulation and early perceptual development: insights from developmental psychobiology. J Perinatol Off J Calif Perinat Assoc. Dezember 2000;20(8 Pt 2):S45-54.
77. Anand KJ, Scalzo FM. Can adverse neonatal experiences alter brain development and subsequent behavior? Biol Neonate. Februar 2000;77(2):69–82.
78. Philbin MK, Lickliter R, Graven SN. Sensory experience and the developing organism: a history of ideas and view to the future. J Perinatol Off J Calif Perinat Assoc. Dezember 2000;20(8 Pt 2):S2-5.
79. Ranger M, Synnes AR, Vinall J, Grunau RE. Internalizing behaviours in school-age children born very preterm are predicted by neonatal pain and morphine exposure. Eur J Pain Lond Engl. Juli 2014;18(6):844–52.
80. Delaunay-El Allam M, Soussignan R, Patris B, Marlier L, Schaal B. Long-lasting memory for an odor acquired at the mother's breast. Dev Sci. November 2010;13(6):849–63.
81. Slater R, Cantarella A, Gallella S, Worley A, Boyd S, Meek J, u. a. Cortical pain responses in human infants. J Neurosci Off J Soc Neurosci. 5. April 2006;26(14):3662–6.
82. Marcus L, Lejeune F, Berne-Audéoud F, Gentaz E, Debillon T. Tactile sensory capacity of the preterm infant: manual perception of shape from 28 gestational weeks. Pediatrics. Juli 2012;130(1):e88-94.
83. Marlier L, Gaugler C, Astruc D, Messer J. La sensibilité olfactive du nouveau-né prématuré. Arch Pédiatrie. Januar 2007;14(1):45–53.
84. Lipchok SV, Reed DR, Mennella JA. The gustatory and olfactory systems during infancy: implications for development of feeding behaviors in the high-risk neonate. Clin Perinatol. Dezember 2011;38(4):627–41.
85. Adam-Darque A, Grouiller F, Vasung L, Ha-Vinh Leuchter R, Pollien P, Lazeyras F, u. a. fMRI-based Neuronal Response to New Odorants in the Newborn Brain. Cereb Cortex N Y N 1991. 6. Juli 2017;1–7.



86. Kuhn P, Zores C, Langlet C, Escande B, Astruc D, Dufour A. Moderate acoustic changes can disrupt the sleep of very preterm infants in their incubators. *Acta Paediatr Oslo Nor* 1992. Oktober 2013;102(10):949–54.
87. Kuhn P, Zores C, Pebayle T, Hoeft A, Langlet C, Escande B, u. a. Infants born very preterm react to variations of the acoustic environment in their incubator from a minimum signal-to-noise ratio threshold of 5 to 10 dBA. *Pediatr Res*. April 2012;71(4 Pt 1):386–92.
88. Saliba S, Esseily R, Filippa M, Kuhn P, Gratier M. Exposure to human voices has beneficial effects on preterm infants in the neonatal intensive care unit. *Acta Paediatr Oslo Nor* 1992. Juli 2018;107(7):1122–30.
89. Mahmoudzadeh M, Dehaene-Lambertz G, Fournier M, Kongolo G, Goudjil S, Dubois J, u. a. Syllabic discrimination in premature human infants prior to complete formation of cortical layers. *Proc Natl Acad Sci*. 19. März 2013;110(12):4846–51.
90. Zores C, Dufour A, Pebayle T, Langlet C, Astruc D, Kuhn P. Very preterm infants can detect small variations in light levels in incubators. *Acta Paediatr Oslo Nor* 1992. Oktober 2015;104(10):1005–11.
91. Welch MG, Hofer MA, Stark RI, Andrews HF, Austin J, Glickstein SB, u. a. Randomized controlled trial of Family Nurture Intervention in the NICU: assessments of length of stay, feasibility and safety. *BMC Pediatr*. 24. September 2013;13:148.
92. Welch MG, Myers MM, Grieve PG, Isler JR, Fifer WP, Sahni R, u. a. Electroencephalographic activity of preterm infants is increased by Family Nurture Intervention: a randomized controlled trial in the NICU. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol*. April 2014;125(4):675–84.
93. O'Brien K, Bracht M, Robson K, Ye XY, Mirea L, Cruz M, u. a. Evaluation of the Family Integrated Care model of neonatal intensive care: a cluster randomized controlled trial in Canada and Australia. *BMC Pediatr*. 15. Dezember 2015;15:210.
94. Ahlqvist-Björkroth S, Boukydis Z, Axelin AM, Lehtonen L. Close Collaboration with Parents™ intervention to improve parents' psychological well-being and child development: Description of the intervention and study protocol. *Behav Brain Res*. 15 2017;325(Pt B):303–10.
95. Lai MM, D'Acunto G, Guzzetta A, Boyd RN, Rose SE, Fripp J, u. a. PREMM: preterm early massage by the mother: protocol of a randomised controlled trial of massage therapy in very preterm infants. *BMC Pediatr* [Internet]. Dezember 2016 [zitiert 29. Juni 2018];16(1). Verfügbar unter: <http://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-016-0678-7>
96. Haslbeck FB, Bucher H-U, Bassler D, Hagmann C. Creative music therapy to promote brain structure, function, and neurobehavioral outcomes in preterm infants: a randomized controlled pilot trial protocol. *Pilot Feasibility Stud*. 2017;3:36.

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Very early and continuous skin-to-skin contact

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Target group

Newborn infants and parents

User group

Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard

Skin-to-skin contact between mother or father and newborn infant is initiated as early as possible and maintained continuously.

Rationale

Skin-to-skin contact (SSC) supports infant physiology and transition to extra-uterine life and clinical stabilisation. (1–3) It acts through multimodal mother-infant sensory interaction and offers an environment that elicits hormonal and epigenetic processes, also supporting the initiation of breastfeeding. On the other hand, separation of the mother and infant after birth may induce harmful stress hormone responses that potentially leads to poorer resilience through the lifespan. (4) To minimise mother-infant separation and safely provide SSC, healthcare professionals have to acquire specific competence and skills to ensure protection of patent airways and provision of medical treatment and technical support as clinically indicated.

Early SSC provides the opportunity for early bonding between the infant and a safe and supportive parent figure. There is biological evidence indicating that the moment of birth is an early critical period. Consequently, early SSC is of particular importance for very preterm infants considering their recognised challenges in establishing future secure attachment. Mother-infant separation disrupts sleep architecture (5), whereas SSC promotes sleep cycling, necessary for the developing brain. (6) Early and continuous SSC is very important for successful breastfeeding and there are indications that continuous SSC has positive effects on long-term outcome. (1)

Benefits

Short-term benefits

- Improved physiological transition to extra-uterine life (3,7)
- Improved early physiological stability in preterm infants (1,2)
- Increased breastfeeding rates (2)
- Improved growth (1)
- Improved sleep (6,8)
- Facilitated parental sensitisation to their infant's needs and cues (9)
- Improved maternal empowerment and self-efficacy (10)
- Improved paternal empowerment and self-efficacy (consensus)



Long-term benefits

- Increased breastfeeding rates beyond infant period (1,2)
- Improved parent-infant bonding and mental health (11)
- Improved immunity, decreased re-admissions (12)
- Reduced prematurity related morbidity in adulthood (13)
- Improved neurodevelopmental outcome (14)
- Improved social behaviour in early adulthood (15)
- Reduced stress for parents (16)
- Improved maternal outcomes associated with breastfeeding (17)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals before birth about the importance and provision of postnatal safe skin-to-skin contact (SSC).	A (Low quality) B (High quality)	Patient information sheet
2. Maternal SSC is provided as early and as continuously as possible. (3,7)	A (High quality) B (Moderate quality)	Guideline, parent feedback
3. The father is involved to ensure continuous SSC when the mother is not able to do so. (18)	A (Moderate quality) B (Moderate quality)	Guideline, parent feedback
For healthcare professionals		
4. A unit guideline on SSC and early suckling is adhered to by all healthcare professionals. (2,19) (see TEG Care procedures)	A (High quality) B (High quality)	Guideline
5. Training on safe SSC technique, including the protection of the airway, SSC transport from labour and operating rooms, early suckling and breastfeeding is attended by all responsible healthcare professionals. (18,20)	A (Moderate quality) B (High quality)	Training documentation
For neonatal unit		
6. A unit guideline on SSC and early suckling is available and regularly updated. (2,19)	A (High quality) B (High quality)	Guideline



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|---|---|--------------------------------|
| 7. NICU bed space and practical arrangements for SSC throughout the 24 hours by mother and father are provided. (21,22) (see TEG NICU Design) | A (Low quality)
B (Moderate quality) | Audit report |
| 8. Starting time of SSC, and daily dose for all newborn infants are documented and monitored. | B (Moderate quality) | Audit report, clinical records |

For hospital

- | | | |
|--|--|------------------------|
| 9. Training on safe SSC technique, including the protection of the airway, SSC transport from labour and operating rooms, early suckling and breastfeeding is ensured. (18,20) | A (Moderate quality)
B (High quality) | Training documentation |
| 10. Labour and operating rooms are adapted for immediate SSC by mother or family member. (23) | A (Moderate quality)
B (Moderate quality) | Audit report |

For health service

- | | | |
|--|--------------------------------------|-----------|
| 11. A national guideline on SSC and early suckling is available and regularly updated. | A (High quality)
B (High quality) | Guideline |
|--|--------------------------------------|-----------|

Where to go – further development of care

Further development	Grading of evidence
For parents and family N/A	
For healthcare professionals N/A	
For neonatal unit <ul style="list-style-type: none"> • Develop strategies for the use of skin-to-skin contact during intra- and inter-hospital transport. 	A (Low quality)
For hospital N/A	
For health service N/A	



Getting started

Initial steps

For parents and family

- Parents are verbally informed by healthcare professionals about the importance of early skin-to-skin contact (SSC).

For healthcare professionals

- Attend training on safe SSC technique, including the protection of the airway, SSC transport from labour and operating rooms, early suckling and breastfeeding.
- Encourage parents to start SSC as soon as possible.
- Take incremental steps to care for smaller and more fragile newborn infants.

For neonatal unit and hospital

- Develop and implement a unit guideline on SSC including safe technique to secure the airway during transport from the incubator to the mother.
- Develop information material on early SSC for parents.
- Provide adjustable reclining chairs for parents in NICU.
- Support healthcare professionals to participate in training on early SSC.

For health service

- Develop and implement a national guideline on SSC including safe technique to secure the airway during transport from the incubator to the mother.

Description

The benefits of skin-to-skin contact (SSC) derive from a global neurological state, in which intimate maternal-infant physical SSC is the safe and expected environment to foster reproductive fitness. (24) The immediate result is bonding, which is in the short-term expressed physiologically (25), with improved cardiorespiratory and metabolic status. (2) This same bonding is however also the psychobiological root of long-term emotional and social development. (25,26) This is the essence of “buffering protection of adult support”, and absence thereof corresponds to “toxic stress” in the context of early childhood development. (27) The many benefits of SSC are really reflecting the decrease of harms from toxic stress that follows separation.

Recent advances in the understanding of epigenetics and developmental neuroscience (28), along with interpretations from life sciences theory (evolutionary biology) (24,29) and preclinical studies (30), suggest new paradigms for improving neonatal outcomes, and by gentle early newborn care based on parents they suggesting increased attention to the needs of the developing brain, as a basis for better long-term outcomes. (2,31–33) Moreover, a feature of reproduction in primate life sciences theory is SSC, where SSC is the environment or habitat required for epigenetic and neurosensory needs (34), supporting physiological systems for survival. (25) Maternal-neonate separation in primate studies is the most severe form of stress known (35,36), resulting in physiological dysregulation (25), overwhelming autonomic and neuroendocrine stress-responses (37), with the most severe effects on development and health. (38–40) Decreased resilience is proportional to immaturity, therefore the smaller the infant the greater the potential benefit of SSC. Further it is during the period of transition to extra-uterine life immediately after birth that such regulation has the greatest importance (7), and when failure may result in mortality in low resource settings. (1,18,41)



Several mechanisms may underlie SSC, at the heart of these is the concept of maternal-neonate co-regulation, meaning that mother and neonate in close contact constitute an evolved self-regulating system which, when functioning properly, promotes mutual health and thriving. (25,42–46) This system requires a sense of safety (47) provided by SSC. This self-regulating system comprises 'hidden regulators' – physiological, behavioural and psychological signals passed back and forth between mother and infant – that regulate physiology, mood and behaviour towards thriving. (25,45) Regulatory effects of maternal odour (45,48), breastmilk (49) and SSC (50) on human neonatal physiology, breastfeeding, sleep and brain development have been demonstrated. Sleep may be the most powerful factor, as brain development takes place primarily during hourly sleep cycles. (6) Separated infants have disturbed sleep cycles (5), while SSC in infants born preterm promotes sleep cycling (51), and consequently accelerates brain maturation. (8) Similarly, these systems regulate feeding behaviour, and offer frequent opportunities to suckle at the breast, with an umbrella of sensory cues from SSC and promote early establishment of exclusive breastfeeding. (2) Improved temperature control from SSC is achieved, fewer calories are required for thermogenesis and more are available for growth. For stable low birth weight infants, there is good evidence that SSC improves both mortality and morbidity. (1)

Animal and human evidence shows that the regulatory status of physiological systems in early life may become epigenetically programmed for life (13,52–54) and increased risk for long term physiological dysregulation and social maladaptation. (38) This permanent anatomical and physiological embedding is called developmental programming. (53,54) A ten-year follow-up study from Israel provides evidence of a long-lasting benefit from early SSC in both physiologic organisation and in cognitive control. (14) The 'hidden regulators' may be involved in establishing a number of biological rhythms (brain oscillators), that control the social vagus (parasympathetic), cortisol reactivity (sympathetic) and the sleep-wake cycle (state organisation). (55) The early settings of these may contribute to an ongoing advantage in development, ensuring a more secure maternal-infant attachment, with increasing benefit over time. (14)

Newborn infants, through their behaviour, vocalisations (56), and odours (48) also exert powerful regulatory influences over mothers and fathers. These regulatory mechanisms are reflected in the response patterns of hormones, e.g. oxytocin (57), testosterone, prolactin, and brain activity in mothers (26), and fathers. (57,58) SSC is important for fathers and their involvement enables continuous SSC. (59–61) Other close family members may also contribute. (62)

Attention to SSC technique is important. Key features are ensuring actual skin contact with no other clothing at all between infant and adult skin, and ensuring that the airway is secured and protected. There is no technology that contra-indicates the use of SSC, however a skill set is needed that ensures patient safety is protected at all times.



Source

1. Conde-Agudelo A, Belizán JM, Diaz-Rossello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev*. 2011 Mar 16;(3):CD002771.
2. Moore ER, Anderson GC, Bergman N, Dowswell T. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database Syst Rev*. 2012 May 16;(5):CD003519.
3. Bergman NJ, Linley LL, Fawcus SR. Randomized controlled trial of skin-to-skin contact from birth versus conventional incubator for physiological stabilization in 1200- to 2199-gram newborns. *Acta Paediatr Oslo Nor* 1992. 2004 Jun;93(6):779–85.
4. Charney DS. Psychobiological mechanisms of resilience and vulnerability: implications for successful adaptation to extreme stress. *Am J Psychiatry*. 2004 Feb;161(2):195–216.
5. Morgan BE, Horn AR, Bergman NJ. Should neonates sleep alone? *Biol Psychiatry*. 2011 Nov 1;70(9):817–25.
6. Peirano PD, Algarín CR. Sleep in brain development. *Biol Res*. 2007;40(4):471–8.
7. Chi Luong K, Long Nguyen T, Huynh Thi DH, Carrara HPO, Bergman NJ. Newly born low birthweight infants stabilise better in skin-to-skin contact than when separated from their mothers: a randomised controlled trial. *Acta Paediatr Oslo Nor* 1992. 2016 Apr;105(4):381–90.
8. Scher MS, Ludington-Hoe S, Kaffashi F, Johnson MW, Holditch-Davis D, Loparo KA. Neurophysiologic assessment of brain maturation after an 8-week trial of skin-to-skin contact on preterm infants. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol*. 2009 Oct;120(10):1812–8.
9. Bigelow AE, Littlejohn M, Bergman N, McDonald C. The relation between early mother-infant skin-to-skin contact and later maternal sensitivity in South African mothers of low birth weight infants. *Infant Ment Health J*. 2010 May;31(3):358–77.
10. Aghdas K, Talat K, Sepideh B. Effect of immediate and continuous mother-infant skin-to-skin contact on breastfeeding self-efficacy of primiparous women: a randomised control trial. *Women Birth J Aust Coll Midwives*. 2014 Mar;27(1):37–40.
11. Tessier R, Cristo MB, Velez S, Giron M, Nadeau L, Figueroa de Calume Z, et al. Kangaroo Mother Care: A method for protecting high-risk low-birth-weight and premature infants against developmental delay. *Infant Behav Dev*. 2003 Aug;26(3):384–97.
12. Lawn JE, Mwansa-Kambafwile J, Horta BL, Barros FC, Cousens S. “Kangaroo mother care” to prevent neonatal deaths due to preterm birth complications. *Int J Epidemiol*. 2010 Apr;39 Suppl 1:i144-154.
13. Hochberg Z, Feil R, Constancia M, Fraga M, Junien C, Carel J-C, et al. Child health, developmental plasticity, and epigenetic programming. *Endocr Rev*. 2011 Apr;32(2):159–224.
14. Feldman R, Rosenthal Z, Eidelman AI. Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. *Biol Psychiatry*. 2014 Jan 1;75(1):56–64.
15. Charpak N, Tessier R, Ruiz JG, Hernandez JT, Uriza F, Villegas J, et al. Twenty-year Follow-up of Kangaroo Mother Care Versus Traditional Care. *Pediatrics*. 2017 Jan;139(1).
16. Atzil S, Hendler T, Feldman R. Specifying the neurobiological basis of human attachment: brain, hormones, and behavior in synchronous and intrusive mothers. *Neuropsychopharmacol Off Publ Am Coll Neuropsychopharmacol*. 2011 Dec;36(13):2603–15.



17. Labbok MH. Health sequelae of breastfeeding for the mother. *Clin Perinatol*. 1999 Jun;26(2):491–503, viii–ix.
18. Bergman NJ, Jürisoo LA. The “kangaroo-method” for treating low birth weight babies in a developing country. *Trop Doct*. 1994 Apr;24(2):57–60.
19. Gartner LM, Morton J, Lawrence RA, Naylor AJ, O’Hare D, Schanler RJ, et al. Breastfeeding and the use of human milk. *Pediatrics*. 2005 Feb;115(2):496–506.
20. Sontheimer D, Fischer CB, Buch KE. Kangaroo Transport Instead of Incubator Transport. *PEDIATRICS*. 2004 Apr 1;113(4):920–3.
21. Dumas L, Lepage M, Bystrova K, Matthiesen A-S, Welles-Nyström B, Widström A-M. Influence of skin-to-skin contact and rooming-in on early mother-infant interaction: a randomized controlled trial. *Clin Nurs Res*. 2013 Aug;22(3):310–36.
22. O’Brien K, Bracht M, Macdonell K, McBride T, Robson K, O’Leary L, et al. A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. *BMC Pregnancy Childbirth*. 2013;13(Suppl 1):S12.
23. Nolan A, Lawrence C. A pilot study of a nursing intervention protocol to minimize maternal-infant separation after Cesarean birth. *J Obstet Gynecol Neonatal Nurs JOGNN*. 2009 Aug;38(4):430–42.
24. Narvaez D, Wang L, Cheng Y. The evolved developmental niche in childhood: Relation to adult psychopathology and morality. *Appl Dev Sci*. 2016 Oct;20(4):294–309.
25. Hofer MA. Psychobiological Roots of Early Attachment. *Curr Dir Psychol Sci*. 2006 Apr;15(2):84–8.
26. Nelson EE, Panksepp J. Brain substrates of infant-mother attachment: contributions of opioids, oxytocin, and norepinephrine. *Neurosci Biobehav Rev*. 1998 May;22(3):437–52.
27. Shonkoff JP, Garner AS, Committee on Psychosocial Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics, Siegel BS, Dobbins MI, Earls MF, et al. The Lifelong Effects of Early Childhood Adversity and Toxic Stress. *PEDIATRICS*. 2012 Jan 1;129(1):e232–46.
28. Ganzel BL, Morris PA, Wethington E. Allostasis and the human brain: Integrating models of stress from the social and life sciences. *Psychol Rev*. 2010 Jan;117(1):134–74.
29. Kuzawa CW, Thayer ZM. Timescales of human adaptation: the role of epigenetic processes. *Epigenomics*. 2011 Apr;3(2):221–34.
30. Panksepp J, Nelson E, Bekkedal M. Brain systems for the mediation of social separation-distress and social-reward. Evolutionary antecedents and neuropeptide intermediaries. *Ann N Y Acad Sci*. 1997 Jan 15;807:78–100.
31. Westrup B. Newborn Individualized Developmental Care and Assessment Program (NIDCAP) - family-centered developmentally supportive care. *Early Hum Dev*. 2007 Jul;83(7):443–9.
32. Westrup B, Kleberg A, Stjernqvist K. The Humane Neonatal Care Initiative and family-centred developmentally supportive care. *Acta Paediatr Oslo Nor* 1992. 1999 Oct;88(10):1051–2.
33. Kennell J, De Chateau P, Wasz-Höckert O. John Lind memorial symposium. *Infant Ment Health J*. 1987;8(3):190–209.
34. Panksepp J. *Affective neuroscience: the foundations of human and animal emotions*. Oxford: Oxford Univ. Press; 2005. 466 p. (Series in affective science).



35. Dettling AC, Feldon J, Pryce CR. Repeated parental deprivation in the infant common marmoset (*Callithrix jacchus*, primates) and analysis of its effects on early development. *Biol Psychiatry*. 2002 Dec 1;52(11):1037–46.
36. Kalin NH, Shelton SE, Barksdale CM. Opiate modulation of separation-induced distress in non-human primates. *Brain Res*. 1988 Feb 9;440(2):285–92.
37. McEwen BS, Gianaros PJ. Stress- and allostasis-induced brain plasticity. *Annu Rev Med*. 2011;62:431–45.
38. Arabadzisz D, Diaz-Heijtz R, Knuesel I, Weber E, Pilloud S, Dettling AC, et al. Primate early life stress leads to long-term mild hippocampal decreases in corticosteroid receptor expression. *Biol Psychiatry*. 2010 Jun 1;67(11):1106–9.
39. Sabatini MJ, Ebert P, Lewis DA, Levitt P, Cameron JL, Mirnics K. Amygdala gene expression correlates of social behavior in monkeys experiencing maternal separation. *J Neurosci Off J Soc Neurosci*. 2007 Mar 21;27(12):3295–304.
40. Morgan B. Biological embedding of early childhood adversity: Toxic stress and the vicious cycle of poverty in South Africa. *Res Policy Brief Ser*. 2013;2:11.
41. Worku B, Kassie A. Kangaroo mother care: a randomized controlled trial on effectiveness of early kangaroo mother care for the low birthweight infants in Addis Ababa, Ethiopia. *J Trop Pediatr*. 2005 Apr;51(2):93–7.
42. Barrett J, Fleming AS. Annual Research Review: All mothers are not created equal: neural and psychobiological perspectives on mothering and the importance of individual differences. *J Child Psychol Psychiatry*. 2011 Apr;52(4):368–97.
43. Feldman R. Infant-mother and infant-father synchrony: The coregulation of positive arousal. *Infant Ment Health J*. 2003 Jan;24(1):1–23.
44. Kaffman A, Meaney MJ. Neurodevelopmental sequelae of postnatal maternal care in rodents: clinical and research implications of molecular insights. *J Child Psychol Psychiatry*. 2007 Apr;48(3–4):224–44.
45. Dulac C, O'Connell LA, Wu Z. Neural control of maternal and paternal behaviors. *Science*. 2014 Aug 15;345(6198):765–70.
46. Zhang T-Y, Bagot R, Parent C, Nesbitt C, Bredy TW, Caldji C, et al. Maternal programming of defensive responses through sustained effects on gene expression. *Biol Psychol*. 2006 Jul;73(1):72–89.
47. Porges S. *Neuroception: A Subconscious System for Detecting Threats and Safety*. Vol. 24. 2004.
48. Welch MG, Myers MM, Grieve PG, Isler JR, Fifer WP, Sahni R, et al. Electroencephalographic activity of preterm infants is increased by Family Nurture Intervention: a randomized controlled trial in the NICU. *Clin Neurophysiol Off J Int Fed Clin Neurophysiol*. 2014 Apr;125(4):675–84.
49. Verduci E, Banderali G, Barberi S, Radaelli G, Lops A, Betti F, et al. Epigenetic effects of human breast milk. *Nutrients*. 2014 Apr 24;6(4):1711–24.
50. Feldman R, Eidelman AI. Skin-to-skin contact (Kangaroo Care) accelerates autonomic and neurobehavioural maturation in preterm infants. *Dev Med Child Neurol*. 2003 Apr;45(4):274–81.
51. Ludington-Hoe SM, Johnson MW, Morgan K, Lewis T, Gutman J, Wilson PD, et al. Neurophysiologic assessment of neonatal sleep organization: preliminary results of a randomized, controlled trial of skin contact with preterm infants. *Pediatrics*. 2006 May;117(5):e909–923.



52. McEwen BS, Gianaros PJ. Central role of the brain in stress and adaptation: links to socioeconomic status, health, and disease. *Ann N Y Acad Sci*. 2010 Feb;1186:190–222.
53. Gluckman PD, Hanson MA. The plastic human. *Infant Child Dev*. 2010 Jan;19(1):21–6.
54. Leckman JF, Feldman R, Swain JE, Eicher V, Thompson N, Mayes LC. Primary parental preoccupation: circuits, genes, and the crucial role of the environment. *J Neural Transm Vienna Austria* 1996. 2004 Jul;111(7):753–71.
55. Spangler G. The emergence of adrenocortical circadian function in newborns and infants and its relationship to sleep, feeding and maternal adrenocortical activity. *Early Hum Dev*. 1991 Jun;25(3):197–208.
56. Leerkes EM, Weaver JM, O'Brien M. Differentiating Maternal Sensitivity to Infant Distress and Non-Distress. *Parent Sci Pract*. 2012 Jan 1;12(2–3):175–84.
57. Abraham E, Hendler T, Shapira-Lichter I, Kanat-Maymon Y, Zagoory-Sharon O, Feldman R. Father's brain is sensitive to childcare experiences. *Proc Natl Acad Sci*. 2014 Jul 8;111(27):9792–7.
58. Wynne-Edwards KE. Hormonal changes in mammalian fathers. *Horm Behav*. 2001 Sep;40(2):139–45.
59. Christensson K. Fathers can effectively achieve heat conservation in healthy newborn infants. *Acta Paediatr Oslo Nor* 1992. 1996 Nov;85(11):1354–60.
60. Erlandsson K, Dsilna A, Fagerberg I, Christensson K. Skin-to-skin care with the father after cesarean birth and its effect on newborn crying and prefeeding behavior. *Birth Berkeley Calif*. 2007 Jun;34(2):105–14.
61. Velandia M, Uvnäs-Moberg K, Nissen E. Sex differences in newborn interaction with mother or father during skin-to-skin contact after Caesarean section. *Acta Paediatr Oslo Nor* 1992. 2012 Apr;101(4):360–7.
62. Ludington-Hoe SM. Thirty years of Kangaroo Care science and practice. *Neonatal Netw NN*. 2011 Oct;30(5):357–62.

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