

Developmental Observer

The Official Newsletter of the NIDCAP[®] Federation International

NIDCAP Federation International (NFI)

Founded in 2001, the NFI is an international, non-profit membership organization. The NFI encourages highly attuned implementation of the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) for all intensive, special care and newborn nurseries around the world. The NFI serves as the authoritative leader for research, development, and dissemination of NIDCAP, and for the certification of trainers, healthcare professionals, and nurseries in the NIDCAP approach.

“The best time to plant a tree was 20 years ago. The second-best time is now.”

CHINESE PROVERB

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Greetings from the Editor

The NIDCAP Federation International has reached 20 years and we all look forward to the celebrations at this year's NIDCAP Trainers Meeting. In this issue we highlight the work of the various committees within the NFI. I encourage you, the members to get involved as your organization is only as strong as the membership's contributions.

In this issue Eleni Gerassis shows us how the impact of having a sick baby proved to be a catalyst for her amazing ongoing support for the current families as she celebrates her daughter's 13 years. We can learn so much from the families and how they cope with the trauma of an early birth.

We are challenged to improve our practice. Inge Van Herreweghe and Delphine Druart in Belgium share their efforts to improve feeding practices for small babies. From her Science Desk, Ita Litmanovitz challenges us about technology and its impact on the babies and families.

The profile of the Children's Hospital University of Illinois (CHUI) Training Center takes you through a NIDCAP Report to give an update on their amazing work. We travel to South Africa to hear about one woman's extraordinary work to ensure Developmental Care has an impact – congratulations Welma Lubbe.

The Facebook pages of many of the Training Centers highlight NIDCAP. If your center has a Facebook page please let me know so I can profile your work. The number of publications relevant to NIDCAP is increasing – a small sample is included in this issue.

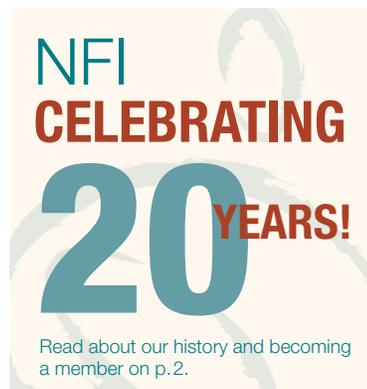
Enjoy the issue and please let me know what you liked and what you would like to see more of in future issues.



Kaye Spence AM

Senior Editor – Developmental Observer

Adjunct Associate Professor/ Clinical Nurse Consultant, Australasian NIDCAP Training Centre/ Sydney Children's Hospitals Network/Western Sydney University/Australia



NIDCAP Care in the Moment

*Calming Supportive
Hands*



Used with permission

THE NFI CELEBRATES 20 YEARS!

Deborah Buehler, PhD, Sandra Kosta, BA

DOI: 10.14434/do.v14i2.32998



Twenty years ago, the NIDCAP Federation International (NFI) was founded. In the years leading up to 2001, NIDCAP outreach had grown to 12 NIDCAP Training Centers (11 in the US and 1 in Europe). It became clear that NIDCAP efforts would be best served by organizing and forming a community of NIDCAP Trainers and supporters. So, in October 2001, the NFI was incorporated as a membership and educational certifying non-profit organization (501c3). Twenty years later, in 2021, our international community has grown to include over 3,000 clinicians, educators, researchers, families and students. The NFI continues to evolve, and to oversee, develop and support the NIDCAP model, caregiving and training approach.

The NFI's efforts, overseen by the Board of Directors, are distributed across four major committees: Program, Governance, Advancement and Finance, and three Advisory Councils. Graphic depictions of the NFI's committees, councils, subcommittees and their respective activities can be seen here and on the next page.



Developmental Observer

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Contributions

We would like to thank all of our individual donors for their generous support of the NFI and its continuing work.

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- Collaborate with the Financial Oversight Committee



Members are welcome and encouraged to participate in the NFI's mission to advance *the philosophy and science of NIDCAP care and assure the quality of NIDCAP education, training, mentoring and certification for professionals and hospital systems.*

Whether you wish to volunteer time to write a blog or be interviewed for a podcast or join a committee or taskforce... there is a place for you to contribute. Please direct your questions and interest to info@nidcap.org.

We look forward to continuing to realize the NFI's potential together over the next 20 years!

Evolution of National Guidelines to Support the Development of Preterm Infants' Feeding Competencies and Breastfeeding

Inge Van Herreweghe, Delphine Druart

Brussels NIDCAP Training Center, Saint-Pierre Hospital, Brussels, Belgium

DOI: 10.14434/do.v14i2.33000

Background

In 1998, under the leadership of Professor Dominique Hautmont, the first NIDCAP training started at Saint-Pierre University Hospital. Thanks to the coaching of Dr. Joy Browne, Senior NIDCAP Master Trainer, two staff members obtained their NIDCAP certificate. NIDCAP observations were regularly performed and became a part of the routine practice of modifying the environment, positioning infants in the incubator and adapting the organization and delivery of caregiving. All of this was achieved in the framework of a personalised approach, with the parents' collaboration. Local workgroups, including the multidisciplinary team and the Heads of the Unit helped in the implementation of NIDCAP.

In 2005, a newly designed neonatology ward consisting of 16 rooms, 3 three-bed, 5 two-bed and 8 single rooms was inaugurated. The single room design included special spaces for the parents. The environment was adapted to best support the baby's optimal development. Progressively, as we observed the infants' feeding behaviours, we started to reflect on our practices. At that time, babies were fed every three hours, at set times based on the caregivers' schedules. Oral feedings were supplemented by tube-feedings until discharge. Infants were gradually given feedings every four hours in preparation for going home. Parents were not involved in tube-feeding and, when they were not present, bottle feeding was used regularly even for breastfeeding infants. Full breastfeeding rates by the time of discharge were low, around 20%.

Through our observations of infant behaviour, we realised babies were often fed when they were not ready or emotionally available. We also understood we were not attentive enough to some of the infant's early and subtle attempts at eating. When we did notice their rooting behaviour and tried to meet their oral needs, it was mostly late towards the end of caregiving, when the infant had already spent a lot of energy.

The information we reported on and shared among caregivers only concerned feeding methods and volumes of intake. There was no communication about the infant's behaviour during the feeding, the quality and success of the feeding itself, the parents' involvement in feeding, or what suited each baby best.

Aims

The NIDCAP observations gave us details on some infants' individual behaviours during feedings, suggesting the need for individual practice changes. Because these findings were recurrent, we became aware of the necessity to modify the unit's general feeding practices. In 2006, with this aim, we formed a multi-disciplinary work group including the unit's leaders and reviewed relevant literature on the topic of feeding competence in preterm infants.

The issues we wanted to address were the following:

- How to reduce negative oral stimuli and encourage natural, positive experiences.
- When to introduce the premature infant to their first feeding experience.
- What is a successful feeding and how to provide a consistent and relaxing environment to support the baby's developing competency?
- How to manage tube feedings whilst facilitating the development of the parent-infant bond and their nurturing relationship.
- How to adapt feeding schedules to phase in semi-demand feedings without systematically supplementing them by tube feeding.
- How to increase full breastfeeding rates at discharge from the NICU.
- How to convey information related to an infants' feeding including but also going beyond the notion of volumes of intake.

Methodology

Review of the literature, visits to other units, and dialogue with experts in preterm infant feeding competencies enabled us to:

- Develop new work objectives and a new feeding protocol based on each infant's individual behaviour and competence, which, in turn, enabled us to phase in semi-demand feeding.
- Stop using bottle feeding instead of breastfeeding and consider the use of alternative methods when parents were absent.
- Develop new monitoring forms detailing observations of sucking, swallowing, and breathing coordination. The notes also documented any modification of the infant's physiologic parameters recorded during feedings, information about their behavioural state during feeding, the quality of the feeding, the infant's distal and proximal environment, feeding methodology, and who fed the infant.
- Create an educational feeding brochure and organise weekly information meetings focussed on the parents.
- Work on the environment to facilitate the infant's tucked position and offer them the opportunity to access and explore their fingers orally.
- Stop the practice of stimulating sucking during feeding by moving and pushing the bottle into the baby's mouth.

The whole team received theoretical information and training in the use of the new feeding protocol, the observation sheets and adapting the infant's environment.

Results

Following implementation of the changes previously discussed and of the new protocol, we observed that:

- Infants started their feeding experiences earlier.
- The quality of the feedings was addressed.
- Gradually involving parents in tube feeding was encouraged and facilitated interaction between the nurse, the parents, and the infant.
- Full breastfeeding rates at discharge increased.
- Instead of fewer feedings with larger volumes which were difficult for infants to manage, up to 8 - 12 smaller feedings were provided until discharge.
- Infants were developing their feeding competencies at their own pace without spending all their energy. This, in turn, enabled them to keep on developing their other competencies until discharge.

Continued Integration of Developmentally Supportive Feeding Practices

In 2007, we became a NIDCAP training centre and continued trying to maintain good practices for feeding preterm infants. We also advocated promoting the feeding protocol through our NIDCAP training sessions in other Belgian and French hospitals, in nursing schools, and at conferences.

Progressively, we worked at reinforcing parental presence and their stay within the unit, which led to increased parental involvement in tube feeding. This was made easier through skin-to-skin holding and skin-to-breast feedings. It was also facilitated by the opportunity for parents to sleep next to their baby.

Expansion to a National Focus

From 2014 to 2016, Saint-Pierre CHU supported the transfer of Delphine Druart, NIDCAP Trainer, to the Public Health Ministry to assume the role of developmental care coordinator. Her task was to promote NIDCAP and developmental care at the national level, in collaboration with Kelly Janssens, RN (currently a NIDCAP Trainer-in-Training at UZ Leuven, Belgium). Study days for staff at Belgian Hospitals were organised. Meetings with teams occurred to inform and help them assess their practices and identify possible areas for change. Within this context, the Public Health Ministry decided in 2015 to set up an inter-hospital multidisciplinary workgroup to establish national premature infant feeding guidelines.

Many paediatricians, nurses, speech therapists, NIDCAP experts and breastfeeding advisors from different hospitals took part in the project. In 2018, the guidelines were completed and translated from French into Dutch because national guidelines can only be published if they are in both country languages. The guidelines were sent to all Belgian hospitals and made available on the Public Health Ministry's website.

At the same time, we observed that many babies continued to receive feedings infused by a feeding pump every 1-2 hours as volumes of intake progressively increased. We then decided, together with Dr. Marie Tackoen, head doctor of the NICU since 2015, and Dr. Inge Van Herreweghe, head of the clinic and the NIDCAP Training Centre since 2015, to allow pump feedings only on medical advice and after having first tried split and/or paced tube feedings, based on the infant's behaviour. To achieve this, we involved parents by helping them provide tube feedings for their baby while monitoring the infant's breathing and behaviour, interspersing the feeding with breathing breaks as needed. As a result, most babies who are tube fed receive parental skin-to-skin during a tube feeding by gravity flow instead of administered by a feeding pump.

We also acquired more portable breast pumps, trained two breastfeeding advisors, and updated a breastfeeding brochure enabling mothers to monitor their daily milk production volume. All staff members in our unit were invited to attend free ongoing four-day breastfeeding training within the hospital.

Supporting Breastfeeding

In 2019, we developed a programme enabling us to transfer the mother and baby from the delivery room to the maternity and neonatal wards whilst keeping them skin-to-skin. The programme also allowed us to prolong the skin-to-skin time to at least 10 hours a day. In fact, this scheme had first been set up in the framework of a pilot project in our non-intensive neonatal unit (Koala unit), where parents have been able to stay with their baby 24 hours a day since 2017.

In the context of this program, we developed a new feeding method no longer based on the infant's weight gain after a breastfeeding. We now assess the quality of the breastfeeding by using the Fleur de Lait¹, a breastfeeding scale derived from the Premature Infant Breastfeeding Behaviour Scale (PIBBS).² To proceed safely and cautiously, we tested this new protocol first on stable late preterm infants. Of course, we help parents acquire progressive autonomy in the use of this method which works as follows:

- The doctor prescribes a minimum daily volume of intake for the baby.
- The nurse then calculates an hourly amount.
- A maximal lapse of time between two feedings is defined by the team.
- If the baby does not wake up at the end of the maximal lapse of time, the baby is fed by tube. If the baby breastfeeds, the Fleur de Lait score is calculated. If the score is less than 12, the baby's intake is supplemented by a tube-feeding. The volume of this supplemental feeding is calculated according to the number of hours elapsed since the latest feeding deemed efficient (i.e., the score was higher than 12). This way, the baby is fed at their own pace as soon as they show signs of wanting to be fed.

At the beginning of 2020, we extended this practice to infants in the neonatal intensive care unit. The whole team at-

tended an information workshop. Depending on the evaluation of this project, we hope to extend this protocol to even younger infants less than 34 weeks.

The infants who experience this feeding regimen and longer skin-to-skin periods, reach the full breastfeeding phase earlier and are discharged sooner. We are assessing the impact of this approach on infant stability, age of autonomous feeding, age of discharge, and on the parents' and team's satisfaction. We hope to share these results in the future.

As a part of the previous developmental feeding project, we set up a peer-to-peer breastfeeding support programme. We developed it with the help of volunteers who are parents of babies who stayed in our unit. The parents first benefited from an interview with the team's psychologist, followed by training in breastfeeding, developmental care, and premature infant feeding. This project will also be evaluated as to the parents' and volunteers' satisfaction. We hope to also share these results soon.

Summary

Our goal is to make feeding a time of pleasure and bonding for babies and their parents. We are pleased that now 75% of pre-term babies are receiving their mother's milk on discharge from the neonatal unit. We are proud that these projects could go on even in COVID-19 times.

References:

1. Petit I, Grattepanche C. Accompanying the progression of the premature baby at the breast thanks to the "fleur de lait". *Journal de Pédiatrie et de Puériculture* 2012, 33(268):44-46, DOI: 10.1016/j.spp.2012.07.011
2. Lober A, Dodgeson JE, Kelly L. Using the Preterm Infant Breastfeeding Behavior Scale (PI-BBS) with late preterm infants. 2020, *Clinical Lactation* 11(3), DOI: 10.1891/CLINLACT-D-20-00001

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Newborn Individualized Developmental Care and Assessment Program (NIDCAP)

The Newborn Individualized Developmental Care and Assessment Program (NIDCAP), originated in 1984 by Heidelise Als, PhD, is the only comprehensive, family centered, evidence-based approach to newborn developmental care. NIDCAP focuses on adapting the newborn intensive care nursery to the unique neurodevelopmental strengths and goals of each newborn cared for in this medical setting. These adaptations encompass the physical environment and its components, as well as, the care and treatment provided for the infant and his or her family, their life-long nurturers and supporters.

Assessment of Preterm Infants' Behavior (APIB)

The Assessment of Preterm Infants' Behavior (APIB) (Als et al., 1982) is a comprehensive and systematic research based neurobehavioral approach for the assessment of preterm and fullterm newborns. The APIB provides an invaluable diagnostic resource for the advanced level clinician in support of developmental care provision in a nursery.

NIDCAP Nursery Program

The NIDCAP Nursery Program provides a comprehensive resource for the self-evaluation by a nursery system of its strengths and goals for integration of NIDCAP principles into all aspects of their functioning. Highly attuned implementation of NIDCAP care for infants and their families, as well as for the staff, in a developmentally supportive environment is a goal as well as a process. External review and validation by the NFI may be sought when a nursery feels it has achieved this distinction. Nurseries that have achieved NIDCAP Nursery certification serve as a model and an inspiration to others. For information on the nursery self-assessment resources as well as the certification process and its eligibility requirements, please see: www.nidcap.org; and/or contact Rodd E. Hedlund, MEd, NIDCAP Nursery Program Director at: nidcapnurserydirector@nidcap.org or 785-841-5440.

ALWAYS TOGETHER:

Improving the Future for Babies and Families



ANNUAL NIDCAP TRAINERS MEETING

20, 21*, 22 October 2021

1800 - 2130 GMT

Virtual Meeting, hosted by the NFI

(Full meeting attendance is by invitation only)

***Thursday, October 21, 2021**

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CALLING ALL MEMBERS OF THE NFI

We would like to include more stories, poetry or reflections from the NFI membership.

If you have a story to tell, a reflection about your NIDCAP experience or some poetry you have written inspired by NIDCAP then please send to the Editor. developmentalobserver@nidcap.org





Getting through a traumatic experience is something that takes hold of one's life. Eleni's experience in the NICU ignited a passion within her and her family has followed in her footsteps. We are very appreciative to parents that take a leadership role in enhancing the lives of infants who are sick or who are born prematurely. Support from parents that have gone through a similar experience is invaluable and helps families navigate through what is often one of the most challenging times in their lives.

A Miraculous Journey

By Eleni Gerassis

DOI: 10.14434/do.v14i2.32999

I would like to share my miraculous story with you. While it was a nightmare experience, it is a story with a happy ending that has changed our lives for the better. My husband and I appreciate how blessed we are and are determined to help make a difference in the most crucial beginning of a baby's life.

Life was perfect. Mario and I had been married for three years with our beautiful little two-year-old Sophia. We were so happy to find out we were expecting our second child. At the 20-week ultrasound, we were told everything was normal and that we were having a little sister for Sophia, something I always dreamt about. We named her Dimitra (Dimi).

At just 24 weeks pregnant my dream turned into a living nightmare. I knew something was wrong, I was so sick, not able to move, and my baby wasn't moving. After extensive tests and consultations an initial diagnosis of Congenital Cystic Adenomatoid Malformation or otherwise known as CCAM, was made. CCAM is a rare abnormality in an infant's lung development and the medical team predicted a 10% chance of survival for Dimi.

For us it was a chance worth taking. We were rushed to the Obstetric Hospital where I stayed for one month on complete bed rest to prolong Dimi's birth and give her that extra chance to survive. Upon arrival to the hospital, both my unborn baby and I required special surgeries to drain large volumes of fluid from our bodies. I also had a rare in utero procedure that involved placing a shunt (drain) into the cyst growing inside Dimi's chest that would be removed during surgery after her birth.

At 30 weeks, I gave birth at Westmead Hospital. It was Mother's Day 2008 and a Mother's Day I will never forget. It was not your normal natural delivery. The room was filled with doctors and nurses explaining to us the possibility our baby might not survive and that she would be taken from us at once following the birth for urgent assistance. When Dimi was born, she was not breathing. Once she was stabilized, Dimi was placed on a ventilator and later transferred to the Grace Centre in preparation for surgery. We prepared for the worst and cried enough tears to fill a dam! Our supportive family, who we are so grateful for, stepped in with love and around-the-clock care for our two-year-old, Sophia, allowing Mario to constantly stay by my side in hospital. Four days after Dimi's surgery, her surgeon, the wonderful Dr. Soundappan, confirmed the growth in Dimi's



Dimi following surgery

chest was a benign Teratoma tumour and that all 500g of it had been successfully removed from her tiny body. Dimi's weight was now approx. 1.5kg and Mario's wedding band fit around her ankle.

Unfortunately, I did not have the pleasure of holding my Dimi for weeks and touched her through holes in her incubator. When I finally did get to hold Dimi, she was attached to machines. I felt robbed. I didn't want photos, gifts or anything that would remind me of her as I was so worried we would lose her. This was my way of dealing with things at the time. No beautiful flowers or congratulations. No going home with our baby. My time was filled with spending the days with her, and then having to leave her every night. Leaving her was absolute torture, even though we knew she was in the best hands.

Dimi spent the next four months in the Newborn Intensive Care Unit attached to a special machine to help her breathe and a feeding tube to help her grow enough to go home which she did. Our precious Dimi came home with us on Father's Day.

I thank God every day for blessing me with the most supportive husband who not once left my side and my two precious daughters, Sophia and Dimitra who everyday remind me about the true meaning of life! Dimi, I am convinced you were brought



Eleni, Sophia and Mario enjoying the much-awaited time for a cuddle.

on this earth for a reason...to show us all to be fighters and to never give up. Thank you, Dimi, for making me the person I am today.

My husband and I made a promise to ourselves and our little Dimi that we would do everything possible to give back to the amazing work that saves critically ill newborn babies lives daily. We will be eternally grateful to the Grace Centre for Newborn Intensive Care at The Children's Hospital at Westmead for the lifesaving care our daughter received. The dedicated professional team at Grace Centre go above and beyond their call of duty, not only caring for critically ill newborn babies, but also supporting the families during the most traumatic experience of their lives. My family and I have supported this amazing facility over the past 10 years raising over \$250,000, purchasing lifesaving medical equipment, renovating various rooms within the unit, and contributing startup costs towards the Australasian NIDCAP Training Centre within Grace. After many years of fundraising for this cause so close to my heart, two years ago I was honored to be invited to join the Board of Directors of NIDCAP Australia. Through the many initiatives of the Australasian NIDCAP Training Centre, I can see how the programs are helping the babies and their parents at the Grace Centre.

Dimi often tells me when we are organizing our fundraising initiatives, 'Mum, I really love getting involved, it makes me happy, and I really care about the sick babies.' Hearing this warms my heart and reinforces to me how important it is that we appreciate all that we have and what we have been given. It also reminds me that I do what I do to help make that little bit of a difference for other families going through one of the most terrifying experiences one could ever go through whilst also supporting an amazing facility that cares for the country's sickest babies on a daily basis. Neonatal Intensive Care Units would not exist without the experienced, dedicated and highly trained staff that are required to care for our critically ill babies.

Dimi is now a healthy and bright 13-year-old in year 7 and absolutely loving high school. She is doing extremely well in all her subjects and tells us how one day she would love to be



Dimi (right) with her sister Sophia participating in the fundraiser Race for Grace Bike Marathon

a "baby nurse". We are so proud of the young woman Dimi is growing up to be. She is a caring individual with a compassionate nature and determination to do well. One of most emotional and proudest moments for all of us was at the end of Dimi's last year at primary school. She became student leader, and at the year-end Award's ceremony Dimi received the one and only Citizenship Award. This award was given to a child who has always displayed continuous service to the school community, always puts others before herself, and is an active member in the school community.

I am proud to say both my girls are always the first to put their hands up when it comes to taking part in any school or community fundraising events or even just to simply lend a helping hand to their friends and family.



A special bond formed between Dimi and Kristen James Nunez, Nurse Practitioner and NIDCAP Professional. Photo taken at the Annual Grace Gala event 2021.



Neurodevelopmental supportive care in a rainbow nation

South Africa, the rainbow country at the tip of the African continent, is home to a population of 65 million people. It is a country that is divided into nine provinces, with 11 official languages and cultural and ethnic diversity. Four major ethnic groups are evident in South Africa with various sub-groups (Department, 2019; SA-V; Statista, 2021). In addition, the country comprises urban, semi-urban and rural to deep rural areas.



The birth rate for South Africa in 2020 was 19.995 births per 1000 people (Macrotrends, 2021), (1,171,219 births in total for the year 2019) (Department, 2019). In South Africa the preterm birth rate was 12.4% in 2014 representing one out of every ten births (Chawanpaiboon et al., 2019). Premature babies are born and cared for in various economic areas, but care may differ dramatically due to the available human and other resources.

Neurodevelopmental supportive care (NDSC) is a widely known but fragmentally implemented care model in the South African context. A variety of researchers from different disciplines conducted studies on various components of NDSC over the last two decades and this article aims to provide an overview of the development and adoption of NDSC in the South African context.

The first training on developmental care was presented in 2001 in Pretoria by professional nurse, Sonja Willemse, to a small number of healthcare professionals, consisting primarily of nursing professionals. Thereafter some components were incorporated in neonatal care by individuals, however changing the culture to ensure that neurodevelopmental care became the underlying model of care in all neonatal units across the country, has proven to be challenging.

While working in the NICU, I (the author) realised that we, as hospital staff take on the 'ownership' of the babies in our care, and parents are not empowered for their parenting role. During 2003, I explored parental needs while their babies were admitted to the NICU in South Africa, with the aim to develop an early intervention program to restore the parenting role for parents while their babies were admitted to the NICU. After completing my master's degree, I developed the first South African, evidence-based website for parents with preterm infants in NICU: www.littlesteps.co.za (2004). The idea was that we can provide an information platform where information can be updated quickly, and that each unit could have a computer for

parents to access the information. This was before smartphones took over the world. The reality for both private and public sector was, that parents only had access to this information from private resources, such as a home computer or internet café. As a result, I started to present preterm parenting workshops for parents in my geographical area, in a format similar to that of ante-natal classes, but with the focus on preterm development and care. Parents' feedback was that they 'learned more in four hours than in 60 days in the NICU' and that 'staff do not know

this information'. I then realised that more must be done to ensure implementation of NDSC in all clinical facilities

During 2005, Little Steps, took over the professional 2-day training workshop, expanded it to a 3-day workshop to include preterm feeding, and in 2006 registered the Little Steps Premies trademark and added an additional training: Little Steps Premmie Parenting Facilitators. I believed that parents in every hospital should have access to information about their premie's development and care in a structured format, therefore training more presenters of the parenting workshop seemed like a



The guidelines in this website will help you to interpret your preterm baby's unique premie language, support parent-infant bonding and attachment processes and return the parenting role to you, the parents of the preterm baby(s). It will further provide you with 'take-home' messages and tips for families and friends on how to support the premie family. This website does not attempt to replace the doctors, nurses and therapists who are looking after your baby, but to help you to get to know your baby better and get involved in his or her care. This should help you being less afraid and more prepared when taking your preterm baby home and also enable you to care for yourself.

For more detailed information it is recommended that you also read 'Prematurity - Adjusting your Dream' by Welma Lubbe.

For the sake of simplicity, all babies will be referred to as her/his. This however does not exclude baby boys: they are just as important.

*preemies are also referred to as preterm infants, preterm baby premature infants and premies

WHICH SECTION WOULD YOU LIKE TO VISIT?



Little Steps Parenting Website: www.littlesteps.co.za

solution. Interestingly, enough parenting workshops were more evident in the public sector with the private sector taking much longer to adopt.

During my work in the NICU and with parent support and healthcare professional training, I realised that having a website (at that point in time) was not the most effective means of communication. Parents wanted to have something to read in their hands while sitting next to their baby in NICU. As a result, the full color illustrated book: *Prematurity – Adjusting your dream* (Lubbe, 2008), was born and published in 2008. It has since proven to be a valuable resource for parents and professionals working with preemies and got feedback that it really carried parents through their NICU journey – feedback for which I am very thankful. The second edition of the book is currently in pre-print format and should be available during 2021.

Awareness of developmental care grew during this time, with many healthcare professionals embarking on studies in this field but focusing on selected aspects of the care model - some focussed on sensory integration issues, while others focussed on kangaroo mother care or parental support. Developmental care was still not the underlying model used in the NICU, but rather a nice-to-have add on. However, in the process, some supporting products have been developed and manufactured within South Africa, such as the Little Steps Nest.



Little Steps Nest

I obtained my PhD in Nursing in Midwifery and Neonatal Nursing from the North-West University, in South Africa, and my dissertation was entitled the development of 'Best practice guidelines for neurodevelopmental supportive care of the preterm infant in South Africa (Lubbe, 2010). The first phase of the study was to identify the components of NDSC to determine how we could implement this in the South African context while programs such as NIDCAP were considered too expensive and time intensive for the South African context at this time. Some important publications followed from this research and are used in clinical practice, such as the 'Integrative literature review defining evidence-based neurodevelopmental supportive care of the preterm infant (Lubbe *et al.*, 2012) and more recently the publication of 'Best practice guidelines: Neurodevelopmental supportive care of the preterm infant – condensed guide for clinicians (Lubbe, 2019). Further research in the field of NDSC then funded by the National Research Fund (South Africa) from



Public sector change

2012-2015 and implementation became more evident with post-graduate students from various universities and a variety of professional disciplines working on this topic.

To highlight some work in this field, the following authors studied some component of NDSC.

- Hennessy (2006) obtained her PhD on 'Facilitation of developmental care for high-risk neonates: an intervention study'
- Nieder-Heitmman (2010) conducted her study on 'The impact of a sensory developmental care programme for very low birth weight preterm infants in the neonatal intensive care unit'.
- Lecuona (2012) completed her research on 'Sensory integration intervention and the development of the extremely low to very low birth weight premature infant.'
- Du Plessis-Faure (2019) obtained her PhD on 'A model for nurses to facilitate mothers' caring of their preterm infants in an informal settlement, Gauteng'.
- In 2020 Dr. Alet Rheeder obtained her PhD titled: 'Implementation strategy for neurodevelopmental supportive care best practice guidelines in South African context' (Rheeder, 2019) and successfully integrated NDSC in a private hospital group where NDSC is now part of the auditing structure of care.
- Dr. Lizelle Jacobs completed her PhD titled: 'The implementation of a multi-disciplinary, neurodevelopmental supportive care training program related to preterm infants in the South African public health sector (Jacobs, 2020)
- Dr. Susan Davis-Strauss her PhD titled: 'Developing a hospital-to-home transition programme to support South African parents of premature infants admitted into neonatal wards in public hospitals (Davis-Strauss, 2021).

Currently the aim is to support hospitals towards sustainable implementation of NDSC in their hospitals by means of a leadership program based on the Kouzes and Posner transformational leadership theory: The INDeSC study. This study has been funded by the South African Medical Research Council since 2018, with a pause in implementation in 2020 due to COVID-19.



The hospital after the renovation

Participants currently include both public and private hospitals across the country. The initial phase of the study was the identification of champions in the participating hospitals to act as project coordinators within their facilities. These champions were then provided with leadership training based on the Kouzes and Posner leadership theory and thereafter they are supported for a period of 10 months to implement the various components of NDSC in their facility: 1) Positioning, handling and KMC, 2) Pain management, 3) Neurosocial development, 4) Environment and sensory management, 5) Feeding and non-nutritive sucking, 6) Breastfeeding in the NICU, 7) Individualised, family-centered care, 8) Transport, 9) Procedures using NDSC, and 10) Hospital-to-home. Assessment of the status of NDSC is done before, midway and after the implementation of the various components, and champions experiences of the implementation is also determined to provide valuable information for scale-up of NDSC implementation. The INDeSC tool is used to determine the level of implementation of NDSC in participating units and provides a guideline on areas that require attention.



For parents in the South African context there are some Facebook peer support groups available such as Neonatal Buddies, LittleLittlePrem, Parents of premature babies – Cape Town, to name a few. In addition, there is the Little Steps Online Parenting Workshop (Little Steps, 2021) as well as in-person premie parenting workshops in selected hospitals.

Implementation of NDSC in a country such as South Africa that is so diverse in terms of resources and location, is a challenging undertaking. However, with healthcare professionals having the best interest of these tiny patients and their parents at heart, unexpected and impactful change can be seen across the country.

References

- Chawanpaiboon S, Vogel JP, Moller A.-B, Lumbiganon P, Petzold M, Hogan D, ... Laopaiboon M. Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. *The Lancet Global Health*, 2019;7(1):e37-e46.
- Davis-Strauss, S. 2021. *Developing a hospital-to-home transition programme to support South African parents of premature infants admitted into neonatal wards in public hospitals*. University of Pretoria.
- Department, S.S.A.R.o.S.A. 2019. *Mid-year population estimates STATISTICAL RELEASE P0302*. <https://www.statssa.gov.za/publications/P0302/P03022019.pdf> Date of access: 31 May 2021.
- du Plessis-Faurie, A.S. 2019. *A model for nurses to facilitate mothers' caring of their preterm infants in an informal settlement, Gauteng*. University of Johannesburg. file:///C:/Users/21547173/Downloads/Du%20Plessis%20Fourie%20ETD.pdf.pdf
- Hennessy AC. 2006. *Facilitation of developmental care for high-risk neonates: an intervention study*. University of Pretoria.
- Jacobs L. 2020. *The implementation of a multi-disciplinary, neurodevelopmental supportive care training program related to preterm infants in the South African public health sector*. WITS.
- Lecuona ER. 2012. *Sensory integration intervention and the development of the extremely low to very low birth weight premature infant*. University of the Free State.
- Little Steps. 2021. *Little Steps Online Parenting Workshop*. <https://littlестeps.co.za/online-parenting-workshop/> Date of access: 7 July 2021.
- Lubbe W. 2008. *Prematurity: Adjusting Your Dream*. Little Steps.
- Lubbe W. 2010. *Best practice guidelines for neurodevelopmental supportive care of the preterm infant*. North-West University.
- Lubbe W. 2019. *Best practice guidelines: Neurodevelopmental supportive care of the preterm infant – condensed guide for clinicians*. Potchefstroom, South Africa: Little Steps.
- Lubbe W, Van der Walt CS, Klopper HC.. Integrative literature review defining evidence-based neurodevelopmental supportive care of the preterm infant. *J Perinat Neonatal Nurs*, 2012, 26(3):251-259. 10.1097/JPN.0b013e3182650b7e
- Macrotrends. 2021. *South Africa Birth Rate 1950-2021*. <https://www.macrotrends.net/countries/ZAF/south-africa/birth-rate> Date of access: 31 May 2021.
- Nieder-Heitmann E. 2010. *The impact of a sensory developmental care programme for very low birth weight preterm infants in the neonatal intensive care unit*. Stellenbosch: University of Stellenbosch.
- Rheeder A. 2019. *Implementation strategy for neurodevelopmental supportive care best practice guidelines in South African context* Potchefstroom: North-West University.
- SA-V, S.A. *South Africa Languages and Culture*. https://www.sa-venues.com/sa_languages_and_culture.htm Date of access: 31 May 2021.
- Statista RD. 2021. *Total population of South Africa 2019, by ethnic groups*. <https://www.statista.com/statistics/1116076/total-population-of-south-africa-by-population-group/> Date of access: 31 May 2021.

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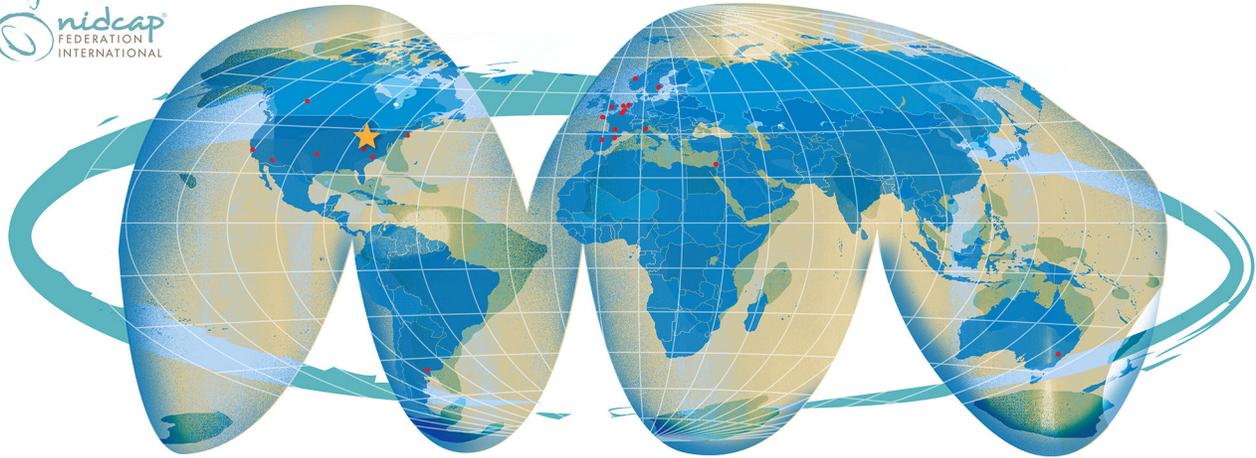
NIDCAP Care in the Moment



Shared family time



NIDCAP TRAINING CENTERS WORLDWIDE



NIDCAP Training Centers Around the World

Children's Hospital University of Illinois (CHUI) NIDCAP Training Center

10.14434/do.v14i2.33003

In honor of the CHUI NIDCAP Training Center's 15th anniversary, and UI Health's 30 years of NIDCAP affiliation, we offer this NIDCAP report describing our Training Center.

Name: CHUI NIDCAP Training Center

Observers/Authors: Jean Powlesland and Jennifer Hofherr

Date of birth of Training Center: June 2006

Date of report: June 2021

Center Director at time of center birth: Beena Peters

Current Center Directors: Jean Powlesland and Doreen Norris-Stojak

Introduction

The purpose of this NIDCAP report describing the CHUI NIDCAP Training Center is to share our history, experiences and to develop some recommendations for its future development and the development of other Training Centers.

CHUI's Environment

CHUI is a "hospital within a hospital", part of UI Health, a hospital on the West Side of Chicago affiliated with the University of Illinois at Chicago (UIC). Chicago is well known for its international population; this multi-cultural environment and the hospital's mission of serving the underserved has given UI Health a distinct culture and identity. The NIDCAP philosophy aligns with this mission as we develop a thoughtful and educated staff through various colleges and training programs.

Activities BEFORE Training Center Establishment

It is amazing to reflect that the NIDCAP journey at UIC began 30 years ago! In 1991 our unit was devoid of developmental care. Rooms were brightly lit, radios played at night and it was not unusual to see babies in incubators who scooted themselves to the sides of the incubator, looking for boundaries that we did not know they wanted!

In the early 1990's a small cohort of nurses were NIDCAP trained (thanks to a large grant that supported Gretchen Lawhon and Rodd Hedlund as Trainers). In addition, all nursing staff had mandatory education in basic developmental care, and we became more aware of our practice.

In 1998 UIC received a grant from the Harris Foundation to establish a NIDCAP Training Center in Chicago with Dr. Als as Trainer. In January 1999,

Dr. Als arrived with 2 suitcases dedicated to slide carousels and VHS tapes to do her lectures! Thank goodness some things have changed!

As we trained we began steps to improve our practice with staff education and formation of a developmental care committee and began staff education. A real breakthrough came when our NICU manager, Beena Peters, picked up much of Jennifer's salary from the therapy department in order to ensure dedicated time for her NIDCAP Training.

Activities during our Training Center work

Jean and Jennifer were certified as NIDCAP Professionals in 2001 and as APiB Professionals in early 2003. Jennifer began her Trainer-in-Training process in late 2003 and Jean in 2004. Two years later, in June 2006, we celebrated the opening of the



Original UI Health NIDCAP Team at the Center opening gala. From left to right: Back row: Kristen Grief, RN; Jean Powlesland RN, Pamela Klost, PT. Front row: Agnes Kutek, RN, Suzanne Herrera, RN, Heidelise Als, Noel Cortes-Caston, RN and Jennifer Hofherr, OTR/L

Training Center with a half day conference and a gala celebratory dinner at UIC.

The CHUI NIDCAP Training Center has trained in Wisconsin, Iowa, Minnesota, Ohio and Illinois. Internationally we have trained in Lebanon and Saudi Arabia. We have also presented NIDCAP topic lectures at conferences or seminars in Poland, Canada and the U.S. In addition, as FINE trainers, our team has trained in four different states thus far.

In 2013, Jennifer left UIC to become the therapy manager for the NICUs operated by Nationwide Children's Hospital in Columbus, Ohio. We are fortunate to have her still affiliated with our Training Center, and she has been instrumental in our recent training in Saudi Arabia.

Activities after the Training Center

We are still very much active and hope to be around for the foreseeable future!!!



20th Annual NIDCAP Trainers Meeting held on Chicago

Summary

One of our great privileges was to have Dr. Als as our Trainer for all three phases of our training. With each visit and interaction we learned so much from her. She had an uncanny ability to set the stage for our next phase of learning/integration. Often something she said at one visit may have gone over our heads, but by the next time we had that “aha!” moment, of “now I understand!” One very important lesson we learned from her was to be flexible and innovative in supporting people to connect to the NIDCAP concepts, a lesson we have taken to heart in working across languages and cultures.

Recommendations:

- Consider how best to deal with the reality of changing financial and staffing constraints. If your unit has limited NIDCAP Professional time, consider how to use your resources most effectively.
 - o At CHUI, we shifted the work of our therapy team from only working with stable premature infants to becoming involved with all high-risk infants from admission.
 - o We adapted the “SORT” tool concept, developed by Carol Matthew and Ginny Laadt to help us pinpoint how to best utilize our resources. The system of risk triage helped us to identify the level of adverse developmental outcome the family-infant system faces, and to target resources accordingly.
 - o We developed streamlined, individualized information for parents of the moderate preterm infants that may not qualify for therapy or NIDCAP referral.
 - o We did “assessment in action” by providing 2-person support to babies during routine care, using both our NIDCAP and APIB skills for assessment to write up a summary, goals and recommendations.
 - o We developed “love letters”, a collaboration between developmental therapy and family support, using an



Jean and Jen getting ready to go to Saudi Arabia in 2018.

infant mental health framework to provide individualized, developmental information in the baby's voice.

- Consider how to meet the need for mental health support in your unit, both for families and for staff.
 - o We created a “family support specialist” position.
 - In 2011, we hired our first family support specialist, Jeanine Klaus, IBCLC, who was one of our first trainees after our Training Center opening. When she left to care for her aging parents in 2016 we hired Jessica Bowen, LCSW, NIDCAP Professional and infant mental health certified who could use that knowledge to great effect to support families. When she left and just as the pandemic hit us, we hired Sarah Davey, a licensed professional counselor who had worked in a similar role in Tampa, Florida. Each of these individuals grew the role and it has certainly convinced our NICU how critical a mental health professional is for our operations.
 - The staff can attend monthly reflective sessions held on all three shifts.
 - Consider how to be innovative and ahead of the curve when it comes to training and education.
 - o The pandemic has forced everyone to embrace electronic means of communication, and we have learned to adapt our training to some degree. We piloted doing virtual reliability sessions with a few of our trainees in Saudi Arabia in order to give feedback to the NFI. This has been an interesting experience, while also yielding more information on what aspects we need to improve.
 - Consider how to make change happen, keeping in mind the culture and leadership of each unit, and consider how to provide unit wide, comprehensive education on basic concepts of developmental care.
 - o For example, after we were NIDCAP certified, we did routine NIDCAP observations on our high-risk infants.
- o However, the nurses were very inconsistent in their understanding of the goal. Bedside coaching only reached a small proportion of the staff. So instead our focus shifted to staff education, especially new hires. This more effectively changed culture.
 - o One of the reasons we became FINE trainers (U.S. FINE led by Joy Browne) was because we saw the value of staff having a comprehensive basic level of education to facilitate change. As Trainers-in-Training, it may be too time consuming to create and deliver education to all staff, so having a program like FINE is very useful.
 - Consider ways to support those NIDCAP Professionals or individuals invested in developmental care who may not have a network to support them.
 - o We felt this was an important goal and inspired the creation of the Midwest Developmental Care Conference, a collaboration with Trainers Linda Lacina and Tammy Casper in Cincinnati and has been a recurring event since 2013.
 - Consider ways for your Center to experience and see what others do, and to help your trainees envision a more advanced NIDCAP care.
 - o We had such limited developmental care experience before 1998 that we had difficulty imagining what NIDCAP care looked like. We appreciated the opportunity to see NIDCAP in practice in other units. We visited the former NIDCAP Training Center in Milwaukee and Jean went to the Centers at University of Connecticut and St. Luke's in Boise, Idaho. Thanks to Laura Davis, Dorothy Vittner, Cathy Daguio, and Karen Smith who were so gracious with their time as well as Linda Gilkerson of the Erikson Institute, who volunteered her time for reflective sessions during our training. Others advised us on logistics of operating a Training Center, so a big thank you to Jim Helm, Laurie Mouradian, Karen Smith and Joy Browne.
 - o For trainees who do not have experience with developmental care, help them envision what is possible by sharing some inspirational examples through video.
 - Consider how to adapt your teaching methods while working in different health care systems and international cultures.
 - o Training in places where the language, traditions, perspectives on families and the organization of the health care systems is different can be most illuminating. Examples used in our own unit may not be relatable elsewhere. Adapting your consultative advice based on how the health care system is organized is important also.
 - o We spent time reflecting on how best to assess progress in training when a trainee's written skills or language barriers might limit the communication of nuanced or subtle concepts.



NICU Leadership at 2019 Midwest Developmental Conference

Reflective note

Over the years we have seen many changes in the units that we have worked in. The resistance to developmental care practices that was so common when we began is now rarely seen. The challenge is not convincing people TO do it, but more about overcoming the many barriers of HOW to do it.

Reducing those barriers is key to sustained change. The NIDCAP Nursery Program provides a pathway and a list of outcomes to achieve. However, in hindsight we as Trainers would benefit from more formal training and experience on managing those change processes. Sustainability is critical also. Perhaps one of the unhappy legacies of the pandemic is realizing how vulnerable some of our work is in face of a global emergency. And

while culture change at the unit or hospital level may have happened, larger government agencies may have a different perspective and the power to override your practice.

Still, with each year we see such positive adoption of the NIDCAP philosophy in various formats and various ways. It is most gratifying to see how Dr. Als' ideas have spread around the world!

As we finish our 3rd decade of NIDCAP association, we don't know what NIDCAP or NICU care will look like in another 30 years, or what role CHUI will have, but we are proud of our history and look forward to great changes in the years ahead.



Mission

The NFI promotes the advancement of the philosophy and science of NIDCAP care and assures the quality of NIDCAP education, training, mentoring and certification for professionals, and hospital systems.

Adopted by the NFI Board, July 1, 2019

Vision

The NFI envisions a global society in which all hospitalized newborns and their families receive care in the evidence-based NIDCAP model. NIDCAP supports development, enhances strengths and minimizes stress for infants, family and staff who care for them. It is individualized and uses a relationship-based, family-integrated approach that yields measurable outcomes.

Adopted by the NFI Board, October 20, 2017



Combined multimodal cerebral monitoring and focused hemodynamic assessment in extremely low birth weight infants – Potential benefits or potential costs?

Ita Litmanovitz, MD

DOI: 10.14434/do.v14i2.33001

Israel NIDCAP Training Center, Meir Medical Center, Kfar-Saba, Israel, affiliated to Sackler School of Medicine, Tel-Aviv University, Tel-Aviv, Israel. NIDCAP & Science Sub-Committee, NFI

Target article: Combined Multimodal Cerebral Monitoring and Focused Hemodynamic Assessment in the First 72 h in Extremely Low Gestational Age Infants. Deshpande P, Jain Ríos DR, Bhattacharya S, Dirks J, Baczynski M, McNamara KP, Hahn C, McNamara PJ, Shah P, Guerguerianb AM. *Neonatology* 2020; 117:504–512. DOI: 10.1159/000508961

Brain injury remains one of the major unresolved challenges in neonatal care. With improvements in the overall survival rate of newborn infants, it was natural that attention would shift to intact survival and good neurodevelopmental outcomes. It is widely acknowledged that neonatal brain injury is the result of the complex interaction between pathological processes, the developmental trajectory, genetic susceptibility, and environmental influences. Hence, no single intervention can have a significant effect on outcomes for the infant. Rather, a coordinated, interdisciplinary approach combined with precise clinical care is needed to facilitate new neuroprotective approaches to the phenomenon. This understanding has been translated into several concepts of neonatal care. Two distinct examples are the "Small Baby Unit" and the "Neuro-Intensive Care Nursery" ("Neuro NICU").² The two NICU modalities advocate for the implementation of uniformly standardized care guidelines, adherence to evidence-based practices, and the creation of comprehensive and multidisciplinary teams. However, while the target of the "Small Baby Unit" is the unique population of Extremely Low Gestational Age (ELGA) infants, the target population of the "Neuro NICU" includes all newborns at risk of brain damage, including full-term infants with Hypoxic Ischemic Encephalopathy (HIE) or suffering from strokes or seizures, as well as ELGA infants. Furthermore, the concept of the "Small Baby Unit" focuses on optimization of care for these uniquely vulnerable infants in the context of parent-centered care principles. The "Neuro NICU", for its part, relies on the use of advanced technology such as modern neuromonitoring and neuroimaging, as described in the target article. So, despite the common goal of improving developmental outcomes, the two models for preterm infant care differ greatly.

Severe intraventricular hemorrhage (IVH) and white matter injury are associated with a significant risk of adverse neurodevelopmental outcomes and remain a persistent challenge for preterm infants. The first 72 hours after birth present with the greatest risk of brain injury and is considered "the critical window" for intervention and preventing neurological damage. Many quality-improvement (QI) projects aimed at preventing IVH focus on this critical period. The study by Deshpande et

al., "Combined Multimodal Cerebral Monitoring and Focused Hemodynamic Assessment in the First 72 h in Extremely Low Gestational Age Infants", is a prospective observational cohort study investigating the feasibility and safety of advanced cerebral and hemodynamic monitoring in this population of vulnerable infants during this sensitive period.

Study Details

Fifty infants born between 23⁺⁰ and 27⁺⁶ weeks gestation were enrolled on the study. The infants had all been managed using an IVH prevention bundle, which included midline head positioning and minimal handling. Cerebral regional oxygen saturation (CrSO₂) and integrated EEG (aEEG) were measured continuously, and echocardiography (ECHO) and head ultrasounds were performed 2–4 times. The small head size, fragile skin, coexisting headgear with an interface for ventilatory support, and high ambient incubator humidity all made sensor application challenging. However, the study demonstrated that the combined monitoring approach was feasible with 98% of the infants. Mild erythema without skin breakdown beneath CrSO₂ sensors was noted in 8/50 subjects (16%), and desaturations were reported during 17/197 (8.6%) of the ultrasound studies. Compared to infants with no IVH, infants with severe IVH (grade III/IV) showed a different pattern of cerebral and systemic hemodynamics. Specifically, changes detected by Near-Infrared Spectroscopy (NIRS) showed low CrSO₂ and high cerebral fractional tissue extraction, consistent with physiological changes related to hypoxia-reperfusion – known to be one of the risk factors for IVH.³ However, since the study was not designed to identify specific variables predicting IVH, along with the low incidence of severe IVH (8%), the clinical relevance of this observation could not be assessed. The authors concluded that cerebral and cardiovascular multimodal monitoring for ELGA infants is safe and well-tolerated, with a low adverse event rate.

Technological Advances

The technological development of non-invasive bedside techniques over recent years has allowed the bedside monitoring of heart function and hemodynamics by functional ECHO,

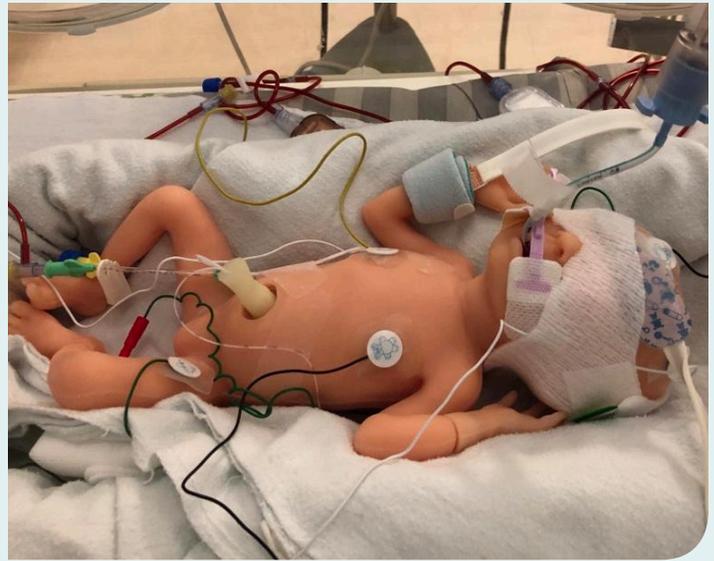
cerebral oxygenation by NIRS, as well as cerebral electrical activity by aEEG. This type of monitoring can support clinicians in identifying infants at risk of IVH, to allow for early neuroprotective interventions.

Functional echocardiography and NIRS have been used as clinical and research tools to assess changes in systemic and cerebral blood flow and oxygenation during transitional circulation in preterm infants. It has been documented that both cerebral blood flow and cerebral oxygenation are lower for infants who develop IVH.³ However, it is yet to be determined whether monitoring cerebral oxygenation, if combined with clinical interventions when cerebral oxygenation levels are outside the desired range, can prevent cerebral injury and improve neurological outcomes. A recent multicenter randomized clinical trial, the SafeBoosC,⁴ demonstrated that it was possible to reduce the burden of cerebral hypoxia during the first 72 hours of life using treatment guidelines for respiratory and hemodynamic support. However, despite reductions in cerebral hypoxia for less than half of the treatment group, there were no differences in brain injury markers between the groups: neither in the aEEG tracing, nor in specific blood biomarkers.⁵ The authors questioned the significance of cerebral hypoxia as an etiology for brain injury, recommending that the guidelines should not be used outside a research setting.⁵

Functional echocardiography can provide direct assessment of hemodynamics at the bedside and can be used as a modern hemodynamic monitoring tool in the neonatal intensive care unit. This is currently regarded by many clinicians as an extension to the infant clinical examination in conditions such as neonatal hypotension and shock, suspected patent ductus arteriosus, and suspected persistent pulmonary hypertension of the newborn.⁶⁻¹⁰ The anatomic, physiological, and hemodynamic information provided by a functional ECHO can be used in directing specific interventions and evaluating response to treatment.⁶ It has been shown that a functional ECHO, when carefully performed by a trained neonatologist, is well tolerated even by extremely preterm infants.⁷ In combination with blood pressure measurement, it can provide essential information about the hemodynamic status of the newborn and enables a targeted hemodynamic management approach that can account for the underlying pathophysiologic mechanisms of circulatory failure in the individual patient.⁶⁻⁹ Toyoshima et al. demonstrated in a prospective cohort study that tailor-made circulatory management significantly reduced both the incidence and the severity of IVH, improved survival rates, and was associated with a trend towards a decrease in mental retardation.⁹ An echocardiographic assessment of the hemodynamic status of the newborn has the potential to improve neonatal intensive care; however, there is still a paucity of prospective studies demonstrating improved outcomes.

The combined monitoring also included recordings of an aEEG and a head ultrasound. Both are used mainly to estimate the timing of the brain injury and its severity, to improve prognosis prediction.¹⁰ Changes in cerebral oxygenation during head ultrasounds were reported previously for more than half

FIGURE 1. *Premie HAL® manikin (Gaumard® scientific) with a CrSO₂ sensor on the forehead and 3 aEEG sensors on the scalp, as described by Deshpande et al.*



of the infants;¹¹ indeed, QI projects aiming for neuroprotection recommend postponing the first ultrasound until 72 hours after birth.¹²

There is more to multimodal cerebral monitoring, as pointed out by Deshpande et al. The illustration in Fig. 1 presents compelling proof of the possible impact of multimodal monitoring on bonding processes and parental stress – both recognized as factors that can affect long-term neurodevelopment.

Implications for NIDCAP

There is a significant body of evidence showing the positive effects of sensitive and responsive maternal behavior on child development. Higher levels of early maternal responsiveness, sensitivity and positive mind-set have been positively associated with infants' cognitive and social-emotional development, supporting the proposition that healthy early mother-infant interactions can improve not only behavioral but also developmental outcomes¹³.

The first hours after birth represent a crucial period: not only in a physiological sense, due to the hemodynamic instability and transitional processes involved in it, but also because this is a sensitive period for the mother-child interaction, setting the basis for subsequent maternal behavior.

Close contact between mother and child in the first hours after birth is essential, to provide the optimal conditions for the maternal behavior that will facilitate secure attachment in the first year of life. Separation following birth restricts opportunities for the mother-infant dyad to engage in intimate physical contact, potentially altering the unfolding of the affectionate bond between mother and infant. In very low birth weight preterm infants, close contact between mother and child is not routinely possible. The technical environment of the baby and the architecture of NICUs pose additional barriers to physical closeness. This separation hampers normal physical contact and emotional closeness between the parents and their infant, with long-lasting

consequences for emotional programming, neurodevelopmental outcomes, and parental mental health.^{13, 14}

Several studies have reported differences in the bonding behavior of the mothers of preterm and full-term infants. Mothers of preterm infants were found to show less secure attachment, as well as less acceptance of the infant and reduced caregiving sensitivity.^{12,13} Feldman et al.¹⁴ showed that the delayed first contact between mother and child led to the decrease of maternal attachment behaviors and representations. Mehler et al.¹⁵ demonstrated that mothers who were able to see their infant in the first 3 hours after birth developed a more optimal maternal attachment. Thus, strategies to facilitate bonding, despite the obstacles posed by the infant's neurobehavioral immaturity and medical challenges, are an imperative in the NICU setting. Moreover, these strategies need to be anticipated and intentional, designed by and considered from the different perspectives that a multidisciplinary and well-coordinated team can provide.

For parents, the extreme preterm delivery of their infant will be a traumatic experience, one followed by a phase of extreme psychological disturbance. Many parents feel detached and separated from their infants as they cannot or do not feel able to interact as freely with their infant as they would with a full-term infant at home. A recent meta-analysis underlines the fact that parents may be extremely distressed and disturbed by the sight of their baby attached to tubes and equipment, and by the fragile appearance of extreme preterm infants. Indeed, the stress related to the physical appearance of their infant was found to be the second greatest source of burden for parents;¹⁶ so, it is of concern that the extra tapes and tubing of the multimodal monitoring approach may be an additional source of distress for both mothers and fathers.

Future studies must include an assessment of the impact of multi-modal monitoring on opportunities for early bonding, and on parental stress.

Personal Reflection

I should disclose that my insights on the article by Deshpande et al. are influenced by my perspective as a Neonatologist and NIDCAP trainer. After a 30-year professional career, and with the equanimity and wisdom that retirement allows, I truly believe that the biggest achievement in my career was being part of the transformative processes that my own NICU went through, to offer individualized and supportive care for infants and families in the framework of the NIDCAP Nursery Program. Therefore, until more evidence is available, my answer to the first question – does combined multimodal cerebral monitoring poses potential benefits or potential cost? – is probably individualization. That is to say, individualized monitoring and individualized care in the context of family-centered care.¹⁷ Accordingly, I will probably advocate for the development of "small baby units" over "Neuro NICUs", because they allow for the appropriate family-centered developmental care that can address the different needs of extreme preterm infants. There is a growing body of evidence suggesting that family-centered and developmental care strategies have the potential to improve neurodevelopmental

outcomes, and that these need to be considered as an essential part of future neuroprotection care bundles.¹⁷

References

1. Fathi O, Nelin LD, Shepherd EG, Reber KM. Development of a small baby unit to improve outcomes for the extremely premature infant. *Journal of Perinatology*. 2021; 12:1-8. doi: 10.1038/s41372-021-00984-0.
2. Austin T. The development of neonatal neurointensive care. *Pediatric Research*. 2019; 12-18. doi: 10.1038/s41390-019-0729-5
3. Lim J, Hagen E. Reducing Germinal Matrix-Intraventricular Hemorrhage: Perinatal and Delivery Room Factors. *NeoReviews*. 2019; 20(8): e452-e463. doi: 10.1542/neo.20-8-e452
4. Pellicer A, Greisen G, Benders M, et al. The SafeBoosC phase II randomized clinical trial: a treatment guideline for targeted near-infrared-derived cerebral tissue oxygenation versus standard treatment in extremely preterm infants. *Neonatology* 2013; 104:171–8. doi:10.1159/000351346
5. Plomgaard AM, van Oeveren W, Petersen TH, et al. The SafeBoosC II randomized trial: treatment guided by near-infrared spectroscopy reduces cerebral hypoxia without changing early biomarkers of brain injury. *Pediatric Research*. 2016; 79(4):528-35. doi: 10.1038/pr.2015.266
6. Tissot C, Singh Y. Neonatal functional echocardiography. *Opinion in Pediatrics*. 2020; 32(2):235-244. doi: 10.1097/MOP.
7. de Boode WP, van der Lee R, Horsberg Eriksen B et al. European Special Interest Group 'Neonatologist Performed Echocardiography' (NPE). The role of Neonatologist Performed Echocardiography in the assessment and management of neonatal shock. *Pediatric Research*. 2018; 84(Suppl 1):57-67. doi: 10.1038/s41390-018-0081-1.
8. Giesinger RE, McNamara PJ. Hemodynamic instability in the critically ill neonate: an approach to cardiovascular support based on disease pathophysiology. *Seminars in Perinatology*. 2016; 40(3):174-88. doi: 10.1053/j.semperi.2015.12.005
9. Toyoshima K, Kawataki M, Ohyama M et al. Tailor-made circulatory management based on the stress-velocity relationship in preterm infants. *Journal of Formos Medical Association*. 2013; 112(9):510-7. doi: 10.1016/j.jfma.2013.02.011.
10. Pisani F, Spagnoli C. Monitoring of newborns at high risk for brain injury. *Italian Journal of Pediatrics*. 2016; 14;42(1):48. doi: 10.1186/s13052-016-0261
11. Murthy B, Zein H, Thomas S. Neuroprotection Care Bundle Implementation to Decrease Acute Brain Injury in Preterm Infants. *Pediatric Neurology*, 2020; 110:42-48. doi: 10.1016/j.pediatrneurol.2020.04.016
12. Forcada-Guex M, Pierrehumbert B, Borghini A et al. Early dyadic patterns of mother-infant interactions and outcomes of prematurity at 18 months. *Pediatrics*. 2006; 118(1): e107-14. doi: 10.1542/peds.2005-1145.
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 Obstetrica Gynecologica Scandinavica*. 2012; 91(2):164– 73. doi: 10.1111/j.1600-0412.2011.01304.x.
14. Feldman R, Weller A, Leckman JF, Kuint J, Eidelman AI. The nature of the mother's tie to her infant: maternal bonding under conditions of proximity, separation and potential loss. *Journal of Child Psychology Psychiatry*. 1999; 40: 929–939. PMID: 10509887.
15. Mehler K, Wendrich D, Kissgen R, et al. Mothers seeing their VLBW infants within 3 h after birth are more likely to establish a secure attachment behavior: evidence of a sensitive period with preterm infants? *Perinatology*. 2011, 31(6):404-10. doi: 10.1038/jp.2010.139.
16. Caporali C, Pisoni C, Gasparini L, Ballante E, Zecca M, Orcesi S, A global perspective on parental stress in the neonatal intensive care unit: a meta-analytic study. *Provenzi L. Journal of Perinatology*. 2020, 40(12):1739-1752. doi: 10.1038/s41372-020-00798-6.
17. Soni R, Tscherning Wel-Wel C, Robertson NJ. Neuroscience meets nurture: challenges of prematurity and the critical role of family-centred and developmental care as a key part of the neuroprotection care bundle. *Archives of Disease in Childhood, Fetal Neonatal Edition*. 2021 fetalneonatal-2020-319450. doi: 10.1136/archdischild



Below are selected publications from late 2020 to early 2021 relevant to NIDCAP.

2020

Angot F, Van Vooren V, Castex C, Glorieux I, Casper C. **Behavioral changes in preterm children during nasogastric tube feeding. Comparative study of manual administration by parents versus mechanical administration via electric syringe pump.** *Early Human Development.* 149, 2020. DOI: <http://dx.doi.org/10.1016/j.earlhumdev.2020.105151>

This randomized, crossover study examined the behavioral changes of preterm infants during nasogastric tube feeding: manual milk administration by parents (MAP) versus electric syringe administration (ESA) over a 30-minute period. Method: Preterm infants less than 33 weeks of age and over 7 days of life were included. A video recording was performed to assess the behavioral response. Fifteen preterm infants with a median gestational age of 30.1 weeks and a median birth weight of 1.210 g were included from March to October 2012. The facility, environment, and state of alertness of the infants were similar in both groups. Signs of well-being were significantly more prevalent in the MAP group versus the ESA group (36.2 (± 8.0) versus 30.7 (± 9.5)), (p = 0.04), particularly “hand-to-mouth, mouth gestures, seeking suction and sucking”. Although not significant, motor withdrawal signs were more apparent and fluctuating in the ESA group. Qualitative analysis of NIDCAP observations confirms this data.

Browne JV, Jaeger C, Kenner C. **Executive summary: standards, competencies, and recommended best practices for infant- and family-centered developmental care in the intensive care unit.** *Journal of Perinatology*, suppl. 1. 2020, 40: 5-10. DOI:10.1038/s41372-020-0767-

An interprofessional and parent committee utilized a systematic review and consensus process to evaluate the evidence for intensive care practice. Infant- and family-centered developmental care was described, practice components identified, and evidence-based standards and competencies articulated. Consensus process results included articulation of *Standards, Competencies and Recommended Best Practices for Infant and Family Centered Developmental Care (IFCDC)*, including components of systems thinking, positioning and touch, sleep and arousal, skin-to-skin contact, reduction of pain and stress for infants and families, and feeding. Successful IFCDC-recommended practices provide opportunities to integrate the family with the interprofessional team, standardize practice, and improve outcomes.

Charafeddine L, Masri S, Sharafeddin SF, Kurdahi Badr L. **Implementing NIDCAP training in a low-middle-income country: Comparing nurses and physicians' attitudes.** *Early Human Development.* 147, 2020. DOI: <http://dx.doi.org/10.1016/j.earlhumdev.2020.105092>

The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) provides a developmentally supportive environment for preterm infants and their families. Few studies evaluated staff perceptions about NIDCAP implementation and its effect on infant and parents and working conditions. A cross-sectional anonymous online survey of 57 NICU staff (29 nurses and 28 doctors) who were present at least one year prior to and during the implementation of NIDCAP training were included. The implementation of NIDCAP in a low-middle income country was perceived as a positive experience for both nurses and doctors. It was thought to have improved infant care and wellbeing, as well as the staff relationship with parents, however working conditions remained a challenge. More studies are needed to address areas of improvement for implementation.

Eskandari Z, Akrami F, Nejad MR, Almasi-Hashiani A, Heidarzadeh M. **Assessing family-centered care in Iranian NICUs from perspective of neonatal individual developmental care.** *Iranian Journal of Neonatology.* 2020, 11(4): 87-92. DOI: <http://dx.doi.org/10.22038/ijn.2020.47189.1808>

This national cross-sectional study was conducted in a total of 23 NICUs from nine universities of medical sciences, in seven provinces of Iran. Family-centered developmental care was assessed in six different domains, including the philosophy of the nursery, family communication, family support, family resources, admission and discharge planning, and decision-making. A total of 29 items, extracted from the Nursery Assessment Manual, were assessed. The mean scores in all domains were weak, and the total score for all domains was 34.18 (95% CI: 33.75-34.60) out of 100. The mean scores were 30 in the philosophy of nursery, 43.47 in family communication, 26.71 in family support, 35 in family resources, 45 in admission and discharge planning, and 25 in decision-making. The lowest score was reported for decision-making, and the highest score was reported for admission and discharge planning. Since family-centered developmental care in Iran is not favorable, the obtained findings suggest the development of a suitable plan to upgrade family-centered developmental care as well as comprehensive NICU care, including developmental care.

Eskandari Z, Seyedfatemi N, Haghani H, Almasi-Hashiani A, Mohagheghi P. **Effect of nesting on extensor motor behaviors in preterm infants: A randomized clinical trial.** *Iranian Journal of Neonatology*. 2020, 11(3): 64-70. DOI: <http://dx.doi.org/10.22038/ijn.2020.42355.1703>

In this randomized controlled trial, 44 clinically stable preterm infants, admitted to the NICU, were recruited and randomly divided into two groups of control and intervention. The routine of the unit was to take care of infants on a flat mattress. The intervention was a U-shaped cloth nest in which the intervention group was bedded for seven days. The control group consisted of infants who were normally cared for without any containment supports (e.g. nests). All infants were videotaped before and on the last day of the intervention. The motor behaviors, as defined in the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) sheet, were analyzed in each of the films. According to the findings, supporting the preterm infant body even by accessible materials could enhance their neurodevelopmental strengths and motor behavior stabilities.

Foladi N, Farahani AS, Nourian M, Faghizadeh E, Mojen LK, Gholami S, Goudarzi F. **Barriers to the implementation of "newborn individualized developmental care and assessment program" from the perspectives of nurses and physicians.** *Iranian Journal of Neonatology*. 2020, 11(4): 14-20. DOI: <http://dx.doi.org/10.22038/ijn.2020.46116.1774>

The study aimed to investigate the barriers to the implementation of NIDCAP from the perspectives of nurses and physicians. This descriptive-comparative included 100 nurses and 21 physicians working in the Neonatal Intensive Care Unit (NICU). Data were collected using a researcher-made questionnaire. The validity and reliability of the questionnaire were determined in this study. According to the findings of this study, environmental-structural barriers were considered the main hurdles to the implementation of NIDCAP. Therefore, it is recommended that hospital administrators make efforts to eradicate the existing barriers by making appropriate decisions in order to improve the quality of this method of care.

Khosravan S, Khoshahang M, Heidarzadeh M, Basirimoghdam M. **Effect of NIDCAP home care follow-up program of preterm newborns on maternal anxiety and stress.** *Annali di Igiene*. 2020, 32(6): 627-634. DOI: <http://dx.doi.org/10.7416/ai.2020.2384> (Italy)

The Newborn Individualized Developmental Care and Assessment Program (NIDCAP) is designed to empower the parents in comprehensively caring for their preterm baby after discharge from the hospital. The present research was intended to study the effects of NIDCAP follow-up on the stress and anxiety of the mothers. In this clinical trial, 20 mothers of preterm babies with the gestational age of 26 to 32 weeks were studied. NIDCAP was

performed during the hospital stay and twice after discharge. The control group received routine care without NIDCAP. Anxiety and stress of the mothers were assessed using the Spielberger and Cohen questionnaires. At baseline, there were no statistically significant differences between the experimental and the control groups. After the intervention, the average score of anxiety was significantly lower among mothers in the experimental group compared to the control group ($p=0.009$). NIDCAP also reduced the stress of the mothers in the experiment group ($p=0.033$). Implementation of NIDCAP and its home follow-up was effective in reducing the stress and the anxiety of the mothers of preterm babies. Implementation of NIDCAP for mothers of preterm babies is recommended to all hospitals of the country.

Lopez-Maestro M, De la Cruz J, Perapoch-Lopez J, Gimeno-Navarro A, Vazquez-Roman S, Alonso-Diaz C, Munoz-Amat B, Morales-Betancourt C, Soriano-Ramos M, Pallas-Alonso C. **Eight principles for newborn care in neonatal units: Findings from a national survey.** *Acta Paediatrica*. 2020, 9(7): 1361-1368. DOI: 10.1111/apa.15121

A European expert group established eight 'Principles of Care' in 2018 that define neurodevelopmental and family-centred care. The implementation of each principle was assessed by a survey sent to level-III Spanish units. A principle was considered to be implemented if all answers to the principle-associated questions were positive. The response rate was 84.5% (65/77). No unit had implemented eight principles. Principle 1 (free parental access) was implemented in 21.5% of the centres; Principle 2 (psychological support) 40%; Principle 3 (pain management) 7.7%; Principle 4 (environmental influences) 29%; Principle 5 (postural support) 84.6%; Principle 6 (kangaroo-care) 67.7%; Principle 7 (breastfeeding) 23% and Principle 8 (sleep protection) in 46%. In units attending ≥ 50 very low birth weight (VLBW) infants, four or more principles had been implemented in 31% vs 13% < 50 VLBW neonates (odds ratio 3.0 CI 95% 0.9-10.1, $p .07$). The principle with the highest implementation was related to newborn body positioning. Pain management was the principle with lowest implementation. More principles for IFCDC tend to be implemented in units providing care for a higher number of VLBW infants.

Welch MG, Barone J, Porges S, Hane A, Kwon K, Ludwig RJ, Stark RI, Surman AL, Myers MM, Kolacz J. **Family nurture intervention in the NICU increases autonomic regulation in mothers and children at 4-5 years of age: Follow-up results from a randomized controlled trial.** *PLoS One* 2020, 15 (8):e0236930. DOI:10.1371/journal.pone.0236930

A subset of infants and mothers (48% of infants, 51% of mothers) randomly assigned to either standard (SC), or SC plus Family Nurture Intervention (FNI) in the NICU in a prior randomized control trial (RCT) (ClinicalTrials.gov; 2020. NCT01439269) returned for follow-up assessments when the

children were 4 to 5 years corrected age (CA). Both children and mothers in the FNI group had significantly greater levels of RSA compared to the SC group (child: mean difference = 0.60, 95% CI 0.17 to 1.03, $p = 0.008$; mother: mean difference = 0.64, 95% CI 0.07 to 1.21, $p = 0.031$). In addition, RSA increased more rapidly in FNI children between infancy and the 4 to 5-year follow-up time point (SC = $+3.11 \pm 0.16$ loge msec², $+3.67 \pm 0.19$ loge msec² for FNI, $p < 0.05$). These results show that the rate of increase in RSA from infancy to childhood is more rapid in FNI subjects. Although these preliminary follow-up results are based on approximately half of the subjects originally enrolled in the RCT, they suggest that FNI-NICU led to healthier autonomic regulation in both mother and child, when measured during a brief face-to-face socioemotional interaction. A Pavlovian autonomic co-conditioning mechanism may underlie these findings that can be exploited therapeutically.

2021

Aita M, De Clifford Faugere G, Lavallee A, Feeley N, Stremler R, Rioux E, Proulx MH. **Effectiveness of interventions on early neurodevelopment of preterm infants: a systematic review and meta-analysis.** *BMC Pediatrics*. 21(1):210, 2021 04 29. DOI: 10.1186/s12887-021-02559-6

Findings of 12 studies involving 901 preterm infants were synthesized. Three studies were combined in a meta-analysis showing that compared to standard care, the NIDCAP intervention is effective in improving preterm infants' neurobehavioral and neurological development at two weeks corrected age (CA). Two other studies were combined in a meta-analysis indicating that parental participation did not significantly improve preterm infants' neurobehavioral development during NICU hospitalization. For all other interventions (i.e., developmental care, sensory stimulation, music and physical therapy), the synthesis of results shows that compared to standard care or other types of comparators, the effectiveness was either controversial or partially effective. The overall quality of evidence was rated low to very low. Future studies are needed to identify interventions that are the most effective in promoting preterm infants' early neurodevelopment during NICU hospitalization or close to term age. Interventions should be appropriately designed to allow comparison with previous studies and a combination of different instruments could provide a more global assessment of preterm infants' neurodevelopment and thus allow for comparisons across studies.=

Artese C, Paterlini G, Mascheroni E, Montirosso R, Developmental Care Study Group (DCSG) of the Italian Neonatology Society: Cavicchioli P, Bertocelli N, Chiandotto V, Strola P, Simeone N, Calciolari G, Ferrari F. **Barriers and facilitators to conducting Kangaroo Mother Care in Italian neonatal intensive care units.** *Journal of Pediatric Nursing*. 2021, 57: e68-e73. DOI 10.1016/j.pedn.2020.10.028

A survey design was conducted in 86 newborn intensive care

units to determine both obstacles and supports to implementation of Kangaroo Mother Care (KMC). The survey investigated three main specific areas including: a) unit's characteristics; b) unit's policies toward parents; c) unit's KMC practice and policies. Eighty-one NICUs provided KMC. These 81 NICUs had less restrictive parental access policies ($\chi^2 = 7.373$, $p = .007$). More than 70% of the units did not have adequate facilities for parents. KMC daily length was positively predicted ($R^2 = 0.18$, $F = 7.91$, $p = .001$) by repeated sessions and documentation of KMC. The implementation of KMC is characterized by different barriers and facilitators that determine the parent's possibility to provide KMC. Structural factors (e.g., adequate space and facilities) can support families in providing KMC. A unique result of this survey is that KMC documentation in medical records appears critical for improving its practice. Although most of the Italian units provide KMC as a routine practice, improving its practical support would be beneficial to its implementation. A more formalized approach to KMC may strengthen staff habits to consider KMC as a standard care treatment.

Chandebois L, Nogue E, Bouschbacher C, Durand S, Masson F, Mesnage R, Nagot N, Cambonie G. **Dissemination of newborn behavior observation skills after Newborn Individualized Developmental Care and Assessment Program (NIDCAP) implementation.** *Nursing Open*. 2021. DOI: <http://dx.doi.org/10.1002/nop2.904>

To assess nurses' ability to observe newborn behavior after in situ training provided by caregivers with advanced practice certification in the Newborn Individualized Developmental Care and Assessment Program (NIDCAP). Twelve nurses viewed 20-min films showing the behavior of 10 premature newborns before, during and after the usual caregiving. The behavior was rated on an observation sheet with 88 items distributed into six systems. The responses were compared to the reference ratings established by two professionals certified for this program. Despite less accurate observations during care and for some components, the nurses generally showed a satisfactory ability to observe newborn behavior after training by NIDCAP expert professionals. The dissemination of observation skills among caregivers may result in an improved quality of patient care and better communication among professionals in a department of neonatology.

Epstein S, Bauer S, Stern OL. **Preterm infants with severe brain injury demonstrate unstable physiological responses during maternal singing with music therapy: A randomized controlled study.** *European Journal of Pediatrics*, 2021, 180, (5): 1403-1412. DOI:10.1007/s00431-020-03890-3

In this prospective, randomized intervention, 35 preterm infants with severe brain injury who underwent skin-to-skin contact (SSC) with or without maternal singing during Music Therapy (MT) were evaluated for physiological responses, including autonomic nervous system stability (low frequency (LF)/high frequency (HF) power), heart rate, respiratory rate, oxygen saturation, and behavioral state. Higher mean +/- standard deviation

(SD) LF/HF ratio (1.8 +/- 0.7 vs. 1.1 +/- 0.25, $p = 0.01$), higher mean +/- SD heart rate (145 +/- 15 vs. 132 +/- 12 beats per minute, $p = 0.04$), higher median (interquartile range) +infant behavioral state (NIDCAP manual for naturalistic observation and the Brazelton Neonatal Behavioral Assessment) score (3 (2-5) vs. 1 (1-3), $p = 0.03$), and higher mean +/- SD maternal anxiety (state-trait anxiety inventory) score (39.1 +/- 10.4 vs. 31.5 +/- 7.3, $p = 0.04$) were documented in SSC combined with maternal singing during MT, as compared to SSC alone. A unique MT intervention should be designed for preterm infants with severe brain injury and their mothers.

Griffiths N, James-Nunez K, Spence K, Crowle C, Pettigrew J, Loughran-Fowlds A, Samra HA. **The evolution of an interdisciplinary developmental round in a surgical Neonatal Intensive Care Unit.** *Advances in Neonatal Care.* 2021, 21 (1) (pp E2-E10). DOI: <http://dx.doi.org/10.1097/ANC.0000000000000741>

A retrospective audit of developmental round key performance criteria undertaken over a 4-year period (2015-2018). More than 300 developmental consults and 2000 individualized developmental recommendations occurred annually. Parental presence during the developmental round increased by 10%, from 48% to 58%, during the audit period. Literature has supported the use of developmental round interventions; however, minimal data have been reported to date. This article provides retrospective audit data of a developmental round intervention in the sNICU with a focus on data over four years to highlight key areas, including the structure and process, recommended educational standards for team members, and parental engagement, as key markers for developmental round efficacy. Future research should focus on the link between the developmental round intervention and long-term neonatal outcomes.

Herrera S, Pierrat V, Kaminski M, Benhammou V, Bonnet AL, Ancel PY, Germa A. **Factors associated with non-nutritive sucking habits at 2 years of age among very preterm children: EPIPAGE-2 cohort study.** *Paediatric and Perinatal Epidemiology.* 2021, 35(2):217-226. DOI 10.1111/ppe.12725

The study was based on data from EPIPAGE-2, a French national prospective cohort study of preterm births during 2011 that included 2593 children born between 24 & 31 weeks' gestation. The frequency of non-nutritive sucking habits (NNSHs) at 2 years was 69% in the overall sample, but higher among girls (adjusted risk ratio [RR] 1.12, 95% confidence interval [CI] 1.05, 1.17), children born from multiple pregnancies (RR 1.07, 95% CI 1.00, 1.11), children who were fed by nasogastric tube (RR 1.07, 95% CI 1.01, 1.13), or those who benefitted from developmental care programs (RR 1.10, 95% CI 1.02, 1.19). The NNSHs frequency was lower if mothers were not born in France (RR 0.70, 95% CI 0.64, 0.77), children had 2 or more

older siblings (RR 0.88, 95% CI 0.82, 0.96), or children were breast-fed at discharge (RR 0.90, 95% CI 0.85, 0.95). NNSHs at 2 years seemed associated with cultural background, development care programs, and breast feeding. Whether NNSHs at 2 years among very preterm children are associated with future maxillofacial growth anomalies deserves further attention.

Litmanovitz I, Silberstein D, Butler S, Vittner D. **Care of hospitalized infants and their families during the COVID-19 pandemic: an international survey.** *Journal of Perinatology.* 2021, 41(5): 981-987. DOI:10.1038/s41372-021-00960-8

This research explored changes in family-centered care practices for hospitalized infants and families due to the COVID-19 pandemic. This exploratory descriptive study used a 49-item online survey, distributed to health care professionals working with hospitalized infants and families. The sample consisted of 96 participants from 22 countries. Prior to the COVID-19 pandemic, 87% of units welcomed families and 92% encouraged skin-to-skin care. During the pandemic, family presence was restricted in 83% of units, while participation in infant care was restricted in 32%. Medium-sized (20–40 beds) units applied less restriction than small (<20 beds) units ($p = 0.03$). Units with single-family rooms that did not restrict parental presence, implemented fewer restrictions regarding parents' active participation in care ($p = 0.02$). Restrictions to families were not affected by geographic infection rates or developmental care education of health care professionals. Restrictions during the pandemic increased separation between the infant and family.

Levesque V, Johnson K, McKenzie Amy, Nykipilo A, Taylor B, Joynt C. **Implementing a skin-to-skin care and parent touch initiative in a tertiary cardiac and surgical Neonatal Intensive Care Unit.** *Advances in Neonatal Care.* 2021, 21(2):E24-E34. DOI 10.1097/ANC.0000000000000770

The purpose of this quality improvement project was to increase Skin-to-Skin Care (SSC), parental holds, and parent touch events for infants in our cardiac and surgical neonatal intensive care unit. When traditional SSC was not possible, alternative holds and alternative parent touch (APT) methods were encouraged. Implementation included educational tools and resource development, simulations, peer champions, in-class teaching, and team huddles. Decisions around the type of hold and parent touch were fluid and reflected complex infant, family, staff, and physical space needs. Given its initial scarcity, there was an increased frequency of SSC and variety of holds or APT events. Skin-to-skin care, holds, and APT practices are feasible and safe for term and preterm infants receiving highly instrumented and complex cardiac and surgical care. Future research regarding the intervention's impact on neurodevelopmental outcomes of infants and on parent resilience in the surgical and cardiac neonatal intensive care unit is warranted.

Menke B, Hass J, Diener C, Pöschl J. **Family-centered music therapy—Empowering premature infants and their primary caregivers through music: Results of a pilot study.** *PLoS ONE*. 2021, 16(5): e0250071. DOI:10.1371/journal.pone.0250071

The aim of this pilot RCT was to determine the influence of interactive live-improvised music therapy interventions on both the physiological development of premature infants and stress factors in both mothers and fathers. A total of 50 parent-infant pairs were analyzed for their physiological development at discharge. 47 mothers and 30 fathers completed the questionnaires on parental stress factors. The results suggest that a live-improvised interactive music therapy intervention for preterm infants and their parents has a beneficial effect on the therapy duration before discharge from hospital. Group comparisons showed a significant reduction in the duration of caffeine therapy, the duration of nasogastric/orogastric tube feeding, and the length of hospitalization in the group of infants receiving music therapy. The results show fathers experience the same level of stress as mothers of premature infants. Interestingly, the anxiety levels reported by fathers are lower compared to those reported by mothers. The results suggest that music therapy interventions may directly empower the parents by reducing their stress levels, promoting relaxation and enhancing their well-being. At time of discharge from the hospital, mothers of the treatment group showed a statistically significant reduction in stress, anxiety and postpartum depression. At the same time, they showed an increase in their maternal competencies. Fathers of the treatment group also showed a statistically significant reduction in stress and state anxiety. Several limitations were identified.

Vitale FM, Chirico G, Lentini C. **Sensory stimulation in the NICU environment: Devices, systems, and procedures to protect and stimulate premature babies.** *Children*. 2021, 8(5): 334. DOI:10.3390/children8050334

The purpose of this review was to investigate the effects of NICU noise pollution on preterm infants and parents. The authors focused on the systems and projects used to control and modulate sounds, as well as on those special devices and innovative systems used to deliver maternal sounds and vibrations to this population. The results showed beneficial effects on the preterm infants in different areas such as physiological, autonomic, and neurobehavioral development. Although most of these studies highlight positive reactions, there is also a general acknowledgment of the current limitation: small and heterogeneous groups, lack of structured variable measurements, systematic control groups, longitudinal studies, and normative values. The mother's presence is always preferred, but the use of music therapy and the devices analyzed, aim to soften her absence (not replace her presence), through familiar and protective stimuli, which was a very powerful aid during the COVID-19 pandemic.

Kato Y, Takemoto A, Oumi C, Hisaichi T, Shimaji Y, Takaoka M, Moriyama H, Hirata K, Wada K. **Effects of skin-to-skin care on electrical activity of the diaphragm in preterm infants during neurally adjusted ventilatory assist.** *Early Human Development*, 2021, 157, <https://doi.org/10.1016/j.earlhumdev.2021.105379>

This study aimed to evaluate the effect of Skin to Skin Care (SSC) on electrical activity of the diaphragm (Edi) and vital signs in premature infants who are intubated and under neurally adjusted ventilatory assist ventilation. This was an observational cross-over study. Data were measured in three periods: before (pre-SSC period), during (SSC period), and after (post-SSC period) SSC. Stable 30-min data in each period were extracted. Thirty-four SSC procedures were performed in 14 preterm infants with a median gestational age of 25.3 weeks (interquartile range, 24, 26.4) and a birth weight of 659 g (566, 694). The median postnatal age was 41 days (31, 53) at the study with a median postmenstrual age of 31.3 weeks (30.4, 32.5). Median values of Edi peak, Edi minimum, respiratory rate, SpO₂, and heart rate were measured in each condition. The Kruskal–Wallis test with Bonferroni multiple comparisons was used to compare each parameter in each period. Median Edi peak and Edi minimum values were significantly lower during SSC compared with pre- and post-SSC, without any change in respiratory rate, SpO₂, or heart rate. The conclusion was that respiratory efforts as evaluated by Edi are significantly reduced during SSC in ventilated preterm infants.

Castro Dias C, Costa R, Miguel Pinto T, Figueiredo B. **The Infant Behavior Questionnaire – Revised: psychometric properties at 2 weeks, 3, 6 and 12 months of life.** *Early Human Development*, 2021, 153. <https://doi.org/10.1016/j.earlhumdev.2020.105290>

Temperament characteristics are key elements for infants' development. The Infant Behavior Questionnaire – Revised (IBQ-R) is one of the most used measures to assess temperament in infants aged between 3 and 12 months. Its reliability and factor structure have not yet been examined in infants younger than 3 months. The aim was to analyze the reliability of the IBQ-R at 2 weeks and the IBQ-R factor structure from 2 weeks to 12 months of life. A longitudinal repeated measures design was used. Three hundred mothers completed the IBQ-R when their infants were 2 weeks, and 3, 6 and 12 months. At 2 weeks the proportion of “non-applicable” responses was higher in duration of orienting, high intensity pleasure, approach and smiling and laughter scales. The Cronbach's alpha for the IBQ-R dimensions ranged between 0.62 and 0.63 and the McDonald's omega ranged between 0.67 and 0.80, all dimensions exhibited a mean-scale correlation above 0.15, and more than half of the scales revealed a scale-dimension correlation higher than 0.30. The same factor structure was found at 2 weeks, and at 3, 6, and 12 months. The IBQ-R may be applied in the first weeks of life and its factor structure remains stable when applied across different ages throughout infancy.

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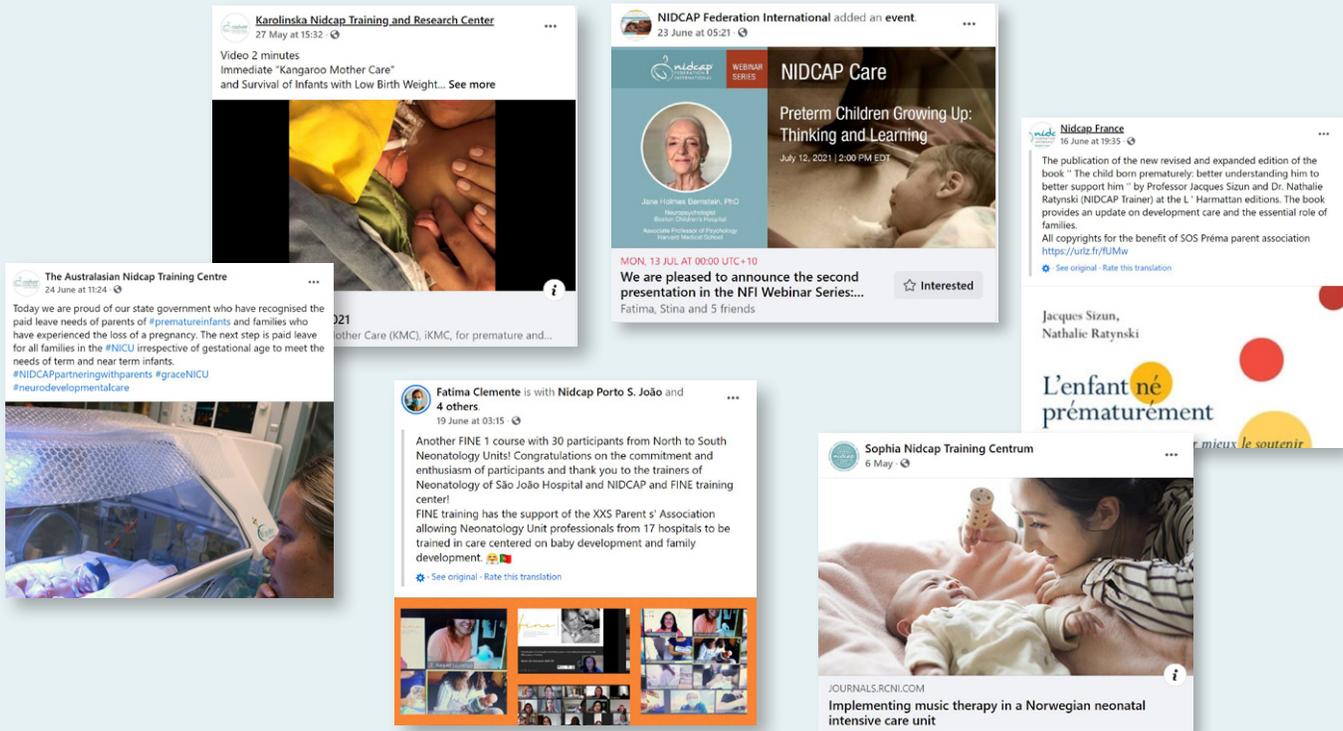
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NIDCAP on the Web

NIDCAP Training Centers – Facebook Pages

During the past six months, despite the adversity facing the NIDCAP Training Centers and NIDCAP Professionals worldwide, many positive achievements have taken place. This series of snapshots from the various Training Centers enable us to all celebrate and acknowledge each other's achievements.



The NFI [NIDCAP Blog](#) offers observations from many different perspectives on NIDCAP and its implementation, such as NIDCAP and APIB training, Nursery Certification, the science behind the approach, the family experience with NIDCAP, the NFI, and much more. We encourage you to visit the NIDCAP Blog and to leave comments for our bloggers and our NIDCAP community in general. If interested in becoming a guest blogger please contact Sandra Kosta at sandra.kosta@nidcap.org.

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NIDCAP TRAINING CENTERS

AMERICAS

North America

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Become a Member of the NFI

The NFI invites you to join us! For more information and the online application form, visit our website at: www.nidcap.org or email us at nfimembership@nidcap.org