

## NIDCAP Federation International (NFI)

Founded in 2001, the NFI is an international, non-profit membership organization. The NFI encourages the implementation of developmental care and assures the quality of the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) approach in 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.

“When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

JOHN MUIR

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## Message from the NFI President

Our founder and first president, Heidelise Als, PhD, realized the importance of incorporating a solid theoretical framework supported by scientific evidence into a Newborn Intensive Care Nursery (NICN) care approach. She also recognized and worked to develop an accompanying educational training program. Every year, more NICN professionals and nurseries adopt this evidence-based best practice framework.

In 1990, a small group of NIDCAP developmentalists gathered in Washington, DC and started the tradition of trainers and supporters coming together annually for education and support. In 2001, our group was formalized and therefore further strengthened by the formation of the NIDCAP Federation International.

The work of the Board of Directors of the NIDCAP Federation International, like the NIDCAP program itself, is dynamic, continuously responsive to the changing needs of our members and the infants and families we serve.

In 2016, I assumed the role of president of the NFI Board of Directors. Striving to articulate and support our evolving vision while expanding the work of my predecessors is my task and my privilege. I will work to direct my efforts during my term in office on the organization's needs in areas where I feel I can best contribute.

My own NIDCAP journey has included being a NIDCAP and APIB trainer and a collaborator and most recently as a champion for our organization's advancement. I have focused on raising global awareness and positioning the NFI for increased outreach, engagement and financial resources. Being the president of the NFI holds a new set of responsibilities for me.

These responsibilities will be guided by the vision from our most recent **2015 Strategic Plan**, where we “*envision a global society in which all hospitalized newborns and their families receive care and assessment in the evidence based NIDCAP model, which supports development, minimizes stress, is individualized and uses a relationship-based, family-integrated approach.*”

As we grow and adapt to serve ever more newborns and their families around the world, we face many challenges which, of course, also become our opportunities. My goal is to support those which are key: (1) to raise global awareness for NIDCAP to advance its reach and support its growth; (2) to support education and training especially in parts of the world where NIDCAP is underutilized; (3) to build on scientific evidence and understandings; and (4) to provide support, mentorship and cohesiveness within our organization and membership.

How we will strive to realize our organizational next steps is through our greatest resource... the people who make up our organization. Drawing from the talents, creativity and energies of our group, we are forming several new councils and task forces to:



Deborah Buehler, PhD, NFI Board of Directors President

- Build a NIDCAP Nursery Assessment and Certification Program foundational educational program, including use of e-learning strategies;
- Consider ways to develop reflective consultation and support for trainers;
- Examine from a global perspective, potential partnerships with organizations with shared goals;
- Strategize ways to revitalize NIDCAP in the United States;
- Create resources for NIDCAP scientific research development; and
- Develop corporate partnerships to bring financial resources into the NFI.

These are just a few of the ideas that our membership and leadership have identified for our current focus, with more to follow as our capacities and needs evolve. Members are welcome to reach out to share ideas and potential availabilities to participate in ongoing efforts.

There is tremendous complexity in the world in which we live and work. Our model and training program are incredibly beneficial and valuable. We have a responsibility to ensure that both aspects adapt to stay relevant and useful for generations to come. How we uphold the quality, integrity and dynamic nature

of NIDCAP will determine the NFI's future and success in "changing the future for newborns and their families."

## NIDCAP Trainers Meeting Abstract Edition

Dear Readers,

Welcome to the Second Abstract Edition of the *Developmental Observer*. In this edition, we have published nine abstracts that were shared with the participants at the 27<sup>th</sup> Annual NIDCAP Trainers Meeting in Bologna, Italy, hosted by the Italian Modena NIDCAP Training Center, October 26-29, 2016.

All past (2007-present) and future editions of the *Developmental Observer*, will be archived at the IUScholarWorks, Indiana University (IU). IUScholarWorks is supported by the IU Libraries and the IU Digital Library Program, a collaborative effort of the IU Libraries and University Information Technology Services. Please enjoy reading this first abstract edition of the *Developmental Observer*.

Developmentally yours,  
The Editors  
*Developmental Observer*



Participants from our 27<sup>th</sup> Annual NIDCAP Trainers Meeting (October 26-29, 2016) in Bologna, Italy

## 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.

# The Noisy NICU: a Quality Improvement Project to Target Noise Reduction

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**Key Words:** noise, premature infant, environmental health, developmental care, quality improvement

## Background

The human auditory system is unique in its capacity to receive, interpret, discern and respond to complex language, music, and sound. The auditory environment for the fetus is initially low frequency, transmitted, predictable, and expected. In contrast, in the Newborn Intensive Care Nursery (NICN), the preterm infant is exposed to environmental noise generated by ventilators, infusion pumps, fans, telephones, pagers, and alarms. Exposure to these noises includes a broad spectrum of frequency and unpredictability, and competes with natural human (mother/father) sounds. Excessive or inappropriate noise in the NICN

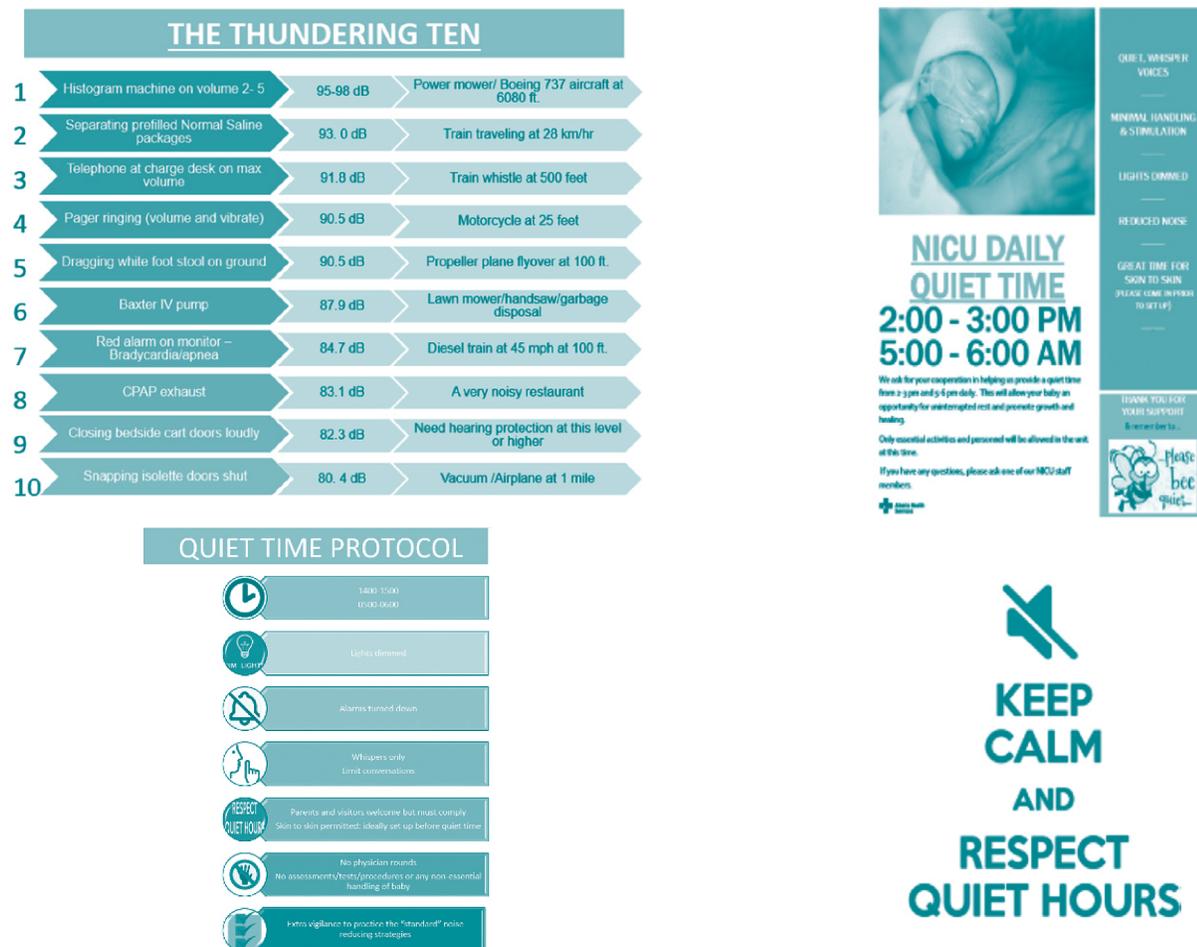
may have impact on physiologic stability, sleep, language and development, and attention and auditory processing.<sup>1,2</sup> Acoustic environment standards have been established and recommended for the NICN.<sup>3,4</sup>

## Research Objectives

The aims of this project were:

1. To create a culture change to a more sound sensitive environment through education and implementation of a quiet time.
2. To decrease noise levels by 1-2dB from the baseline with the above interventions.

**FIGURE 1.** Educational initiatives to parents and staff to increase awareness of appropriate noise levels included a flyer for parents, posted signage, and theme of the week.



## Methods

At baseline, we measured noise levels at a 37 bed level II/III open bay NICN using four SoundEar II Noise Warning Signs with internal data logging capability. We conducted a multidisciplinary staff survey about noise levels in the NICN and about awareness of an existing noise clinical practice guideline (CPG). Thereafter, we had a month long sound awareness/education campaign using a variety of tools (teaching rounds, pod talks, posters, theme of the week, buttons, flyers, and brochures) targeting all NICN staff and parents in the NICU (Figure 1). Halfway through the education campaign, a twice daily quiet time was implemented. The quiet times were based on peak noise levels from the baseline measurements. Approximately four weeks after the education campaign and implementation of the quiet time, we repeated noise measurements and sought staff feedback through a survey.

## Results

At baseline, our NICU exceeded hourly noise equivalent (Leq) of 45 dB 100% of the time (Figure 2). The baseline staff survey revealed that 97% of the staff think our NICN is noisy; 98% think noise affects the babies in some way; 88% are adversely affected by noise levels themselves; and 69% were aware of the noise CPG. After the education program and implementation of the quiet times, the unit average improved by 0.65 dB (Figure 2). Pod averages improved by as much as 2.49 dB as: 97% of staff believed they had enough education to adopt the quiet time; 94% felt quiet time was a positive change; 98% felt it helped to reduce noise levels during quiet times, and 47% outside of quiet times. Overall, the staff sensed a quieter and calmer environment and improved satisfaction with the reduction in nursery noise levels.

## Conclusions

Despite availability of a CPG and staff awareness, the noise levels in our NICN exceed recommended levels. Education and implementation of a quiet time resulted in a modest decrease in sound levels, yet improved impression of a quieter and calmer environment. Targeting operational factors of sound is a cost effective method to decrease these levels, but structural components need to be addressed as well. Monitoring noise levels with current measuring devices is challenging. Ongoing initiatives include moving bedside and handover rounds away from the baby, while continuing: involvement of the family; the provision of noise education to multidisciplinary staff; and measuring physiologic parameters of individual babies related to noise levels in the NICN.

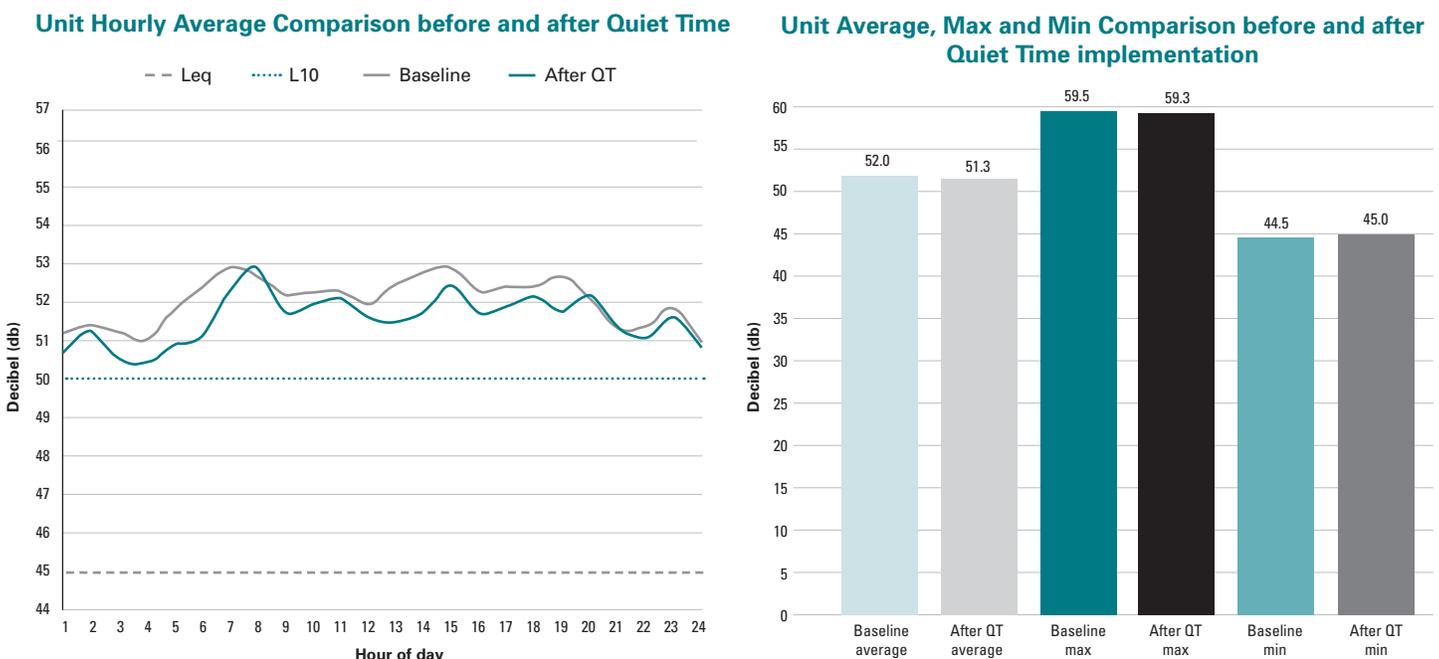
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FIGURE 1. Hourly noise levels at baseline and after education and implementation of a quiet time



# Early Development of Very Preterm Infants: Effects of Feeding Approach and Neurological Vulnerability

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## Background

Scheduled interval feeding of prescribed enteral volumes is the current standard practice for preterm infants. However, feeding preterm infants in response to their hunger and satiation cues rather than at scheduled intervals, may help in the establishment of independent oral feeding, increase nutrient intake and growth rates, and allow for earlier hospital discharge.

## Objectives

To assess the effect of feeding methods (traditional vs. individualized cue based paced feeding (ICBPF) and neurological maturity [brainstem evoked response (ABR): dysfunction vs. typical function] on clinical outcomes of preterm infants. We hypothesized that ICBPF will positively affect medical and developmental outcomes of preterm infants, in particular, infants with brainstem dysfunction, during and after discharge from the newborn intensive care nursery (NICN).

## Methods

This work, currently in progress, includes 115 low-risk premature infants born at <32 GA. All infants were appropriate for gestational age and born in a single medical center. Intervention began upon reaching 34 weeks of gestation, the time point in which oral feeding is offered. These infants were divided into three groups:

**Group 1:** Traditionally Fed Historical (TF, N=53). A retrospective group of traditionally fed infants (predefined amount every three hours).

Sixty-two infants were randomized into two experimental groups:

**Group 2:** Experimental ICBPF (IPF, N=28). Feeding intervals and volume intakes were determined by parent(s) or caregiver(s) who identified infant hunger and satiety by reading the infants' behavioral cues.

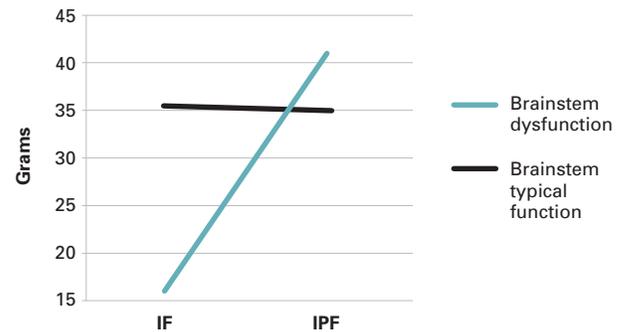
**Group 3:** Traditionally Fed Control (viewed as an *intermediate level group*) (IF, N=34). A traditionally fed group which was recruited parallel to the IPF group, and was thus influenced by the feeding protocol shift in the NICN.

ABR (N=25) were measured by a trained audiologist in the NICN.

## Results

The IPF group transitioned to full oral feeding quicker compared to the TF and IF groups (F= 16.35, p<.001). Weight gain during the first transition week was lower in the IPF group compared to the TF group. In the second week weight gain was highest in the IPF group (F = 8.46, p<.001). The IPF were discharged earlier

Average weight gain per day  
2<sup>nd</sup> transition w



from the NICN (F = 4.53, p<.05). Further, infants diagnosed with brainstem dysfunction benefitted more from IPF compared to non-compromised infants in terms of weight gain and transition to full oral feeding (F=13.98, p<.001). ANOVA indicated that ABR dysfunction predicted more apnea/ desaturation events during the intervention period (F = 4.76, p<.05).

	TF	IF	IPF	P
Maternal Age (years)	32.08 ± 5.47	32.75 ± 4.37	32.57 ± 5.55	ns
Maternal Education (years)	15.45 ± 5.455	16.39 ± 2.96	15.81 ± 1.60	ns
Spontaneous Birth %	62.3%	60.7%	61.9%	ns
Twin %	54.7%	67.9%	28.6%	p<.05
Female %	49.1%	53.6%	47.6%	ns
Birth gestation Age (weeks)	30.39 ± 1.11	29.35 ± 2.26	29.37 ± 2.12	p<.05
Birth weight (gram)	1397.56 ± 249.72	1225.25 ± 317.07	1305.47 ± 296.69	p<.05
CRIB II	5.01 ± 2.0	7.35 ± 3.67	6.71 ± 4.22	P<.01
Age at full oral feeding (weeks)	35.32 ± .79	35.14 ± .69	34.28 ± .46	p<.001
Daily weight gain – 1 <sup>st</sup> transition week (34)	30.63 ± 9.54	27.25 ± 8.58	21.61 ± 18.01	p<.05
Daily weight gain – 2 <sup>nd</sup> transition week (35)	31.23 ± 8.94	27.03 ± 11.54	36.09 ± 8.62	p<.01
Weight at 36 gestational age week (gram)	2119.55 ± 318.58	2154.47 ± 306.69	2269.92 ± 306.21	ns
Age at discharge (weeks)	37.07 ± 1.22	36.56 ± .77	36.35 ± .67	p<.05

## Conclusion

This preliminary data may point to the positive effect of ICBPF intervention on clinical outcome of VLBW premature infants. Intervention gains seem to be moderated by infant's integrity of ABR, suggesting involvement of brainstem related pathways in the susceptibility and in feeding intervention efficacy in preterm newborns.

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# Safe Sleep Readiness Rubric Pilot Study

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## Background

Frequently the question arises within the newborn intensive care nursery (NICN) as to when and how to appropriately transition newborns to exclusive supine positioning that is consistent with a "safe sleep environment" for the prevention of Sudden Infant Death Syndrome (SIDS). In the NICN, infants are often placed prone or on their side with positioning aids to: improve lung oxygenation,<sup>1</sup> mediate newborn stress responses,<sup>2</sup> and to support and shape the developing musculoskeletal system.<sup>3,4</sup> As a result, many infants that are admitted to the NICN regularly sleep in the prone position during the early weeks of their care; this prone positioning has been noted to be a risk factor associated with SIDS after discharge, presumably due to parental use of care practices observed in the NICN.<sup>5,6</sup> To address the unique situation posed by a NICN admission on safe sleep practices, recent safe sleep guidelines, per the American Academy of Pediatrics (AAP), recommend initiating a transition to supine sleep positioning "as soon as the infant is medically stable and well before the infant's anticipated discharge, by 32 weeks postmenstrual age."<sup>7</sup>

However, the guideline leaves it unclear as to how to fundamentally assess "medically stable" in the patient receiving intensive care services and how to determine the sequence of a "transition" to supine sleeping without postural support. In addition, little evidence exists that supports 32 weeks postmenstrual age as a developmentally appropriate age for full guideline implementation.<sup>8</sup> The literature states that competency in sleep is a multi-systemic, dynamic concept.<sup>2,9</sup> Any assessment of readiness in the newborn must account for the emerging, yet fluctuating competence, of preterm infants to maintain sleep states, respirations, and muscle tone in the face of internal and external stimuli.<sup>9</sup> To my knowledge, such a tool does not exist.

The Safe Sleep Readiness Rubric (SSRR) was developed based on the recognition that, while the AAP guideline recommends that premature infants begin to transition to a safe sleep environment at 32 weeks in the NICN setting, there is no guidance in the literature on how to do so, and there is also a lack of criteria to establish developmental readiness for supine sleep that supports physiological stability and neuromuscular and neuroregulatory functions in premature infants.<sup>8</sup> This transitioning process is challenged by the immature, or dysmature, development of inhibitory, descending neurological pathways in the convalescing preterm infant. Because a theoretically-grounded and validated assessment did not exist that can be used in a clinical application at-the bedside, the SSRR was developed using Als' synactive theory as a construct. This rubric proposes to fill a gap in clinical practice by using a theoretical framework to recognize an infant's multi-dimensional subsystem capacities in the context of safe sleep environment readiness, while also providing a quantitative score that can be used to guide the weaning of developmental positioning aids, predict success in weaning of

aids, as well as to suggest the need for supports when necessary. By recognizing and responding to the infant's need for continuous regulation, transitions to a safe sleep environment can be individualized and promoted when they are developmentally appropriate, regardless of their postmenstrual age, with greater success and continuity, and thus avoid delays in discharge and provide parents with positional strategies that offer the safest sleep environment upon the infant's discharge.

## Objectives

The aims of this pilot study were to: 1) test the feasibility and validity of the SSRR, developed by the principal investigator; 2) objectively evaluate neurodevelopmental regulation in newborns who are considered appropriate for inclusion in the safe sleep protocol as defined by the AAP recommendation; and 3) to standardize an operational definition of physiologic stability in the context of safe sleep guidelines.

## Methods

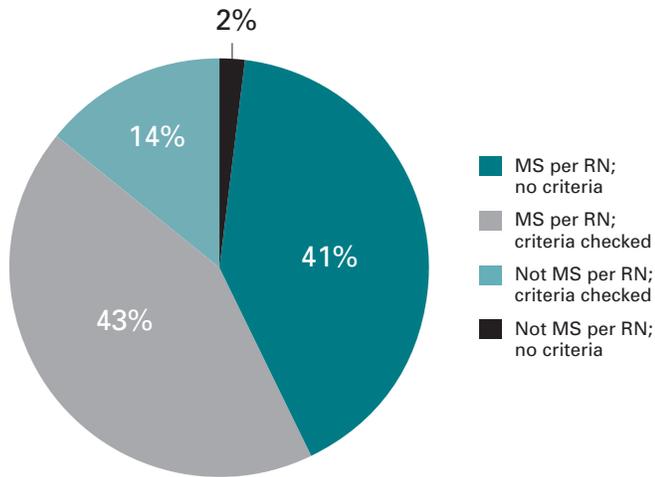
### *Rubric Description*

The SSRR is an adaptation of the Assessment of Preterm Infants' Behavior (APIB).<sup>9</sup> The rubric assigns a rating (disorganized=5, moderately disorganized=10, mildly disorganized=15, more organized=20) to four neurobehavioral dimensions and one measure of respiratory support. A score of 25-100 may be attained to rate the infant's neurobehavioral capacity during mild perturbances, right before the beginning of care interactions. The neurobehavioral dimensions are: 1) state of arousal; 2) motor tone; 3) autonomic stability; 4) regulatory capacity; and 5) current respiratory support. Scores closer to 100 reflect mature, neurodevelopmental competence. Scores at the lower end of the scale represent relative requirements for co-regulatory support to further enhance successful supine sleeping in the context of mild perturbances. Successful supine sleeping is defined as: 1) the infant being free of apnea and bradycardia during sleep and/or drowsy states; 2) sustained muscle tone and posture; 3) age appropriate state control, and 4) the infant's capacity to self-regulate and habituate to external stimuli in order to maintain a sleep state when appropriate.

### *Patients and Methods*

This pilot trial was reviewed and accepted by the Nationwide Children's Safe Sleep Taskforce and the Institutional Review Board of Nationwide Children's Research Institute. Infants from the Mount Carmel St. Ann's Level III NICN (a Nationwide Children's NICN) were assessed using the SSRR by nursing and occupational therapy staff from the nursery. Six staff members attended a two-hour in-service on the developmental nature of postural control, sleep/state development and the continuum of neurobehavioral regulation in premature infants. Each trained staff person demonstrated accurate use of the scale prior to initiation of data collection. For one month, trained nurses and

**CHART 1. Defining Medical Stability**



therapists used the scale during their shifts to observe infants who were considered appropriate, based on the AAP guideline (>32 weeks gestation and medically stable), for safe sleep positioning. These nurses were asked to use the scale, document the score, and note if the infant qualified for the safe sleep guideline and whether or not the safe sleep policy was being followed. The caregiver was asked if the infant was medically stable by her own assessment and the observing nurse documented the caregiver's response and noted the presence of specific criteria that was developed to indicate potential signs of medical instability (i.e.

need for oxygen support greater than 1 liter, IV fluids, status post-surgical procedure, etc). Observers noted comments as to why an infant may not be placed in a safe sleep environment if so observed. Additionally, staff made notes as to how reliable the scale was throughout a shift and whether or not the nurse would make any changes to the scale. Positioning recommendations were not made based on the safe sleep rubric score nor was the medical team advised of the score.

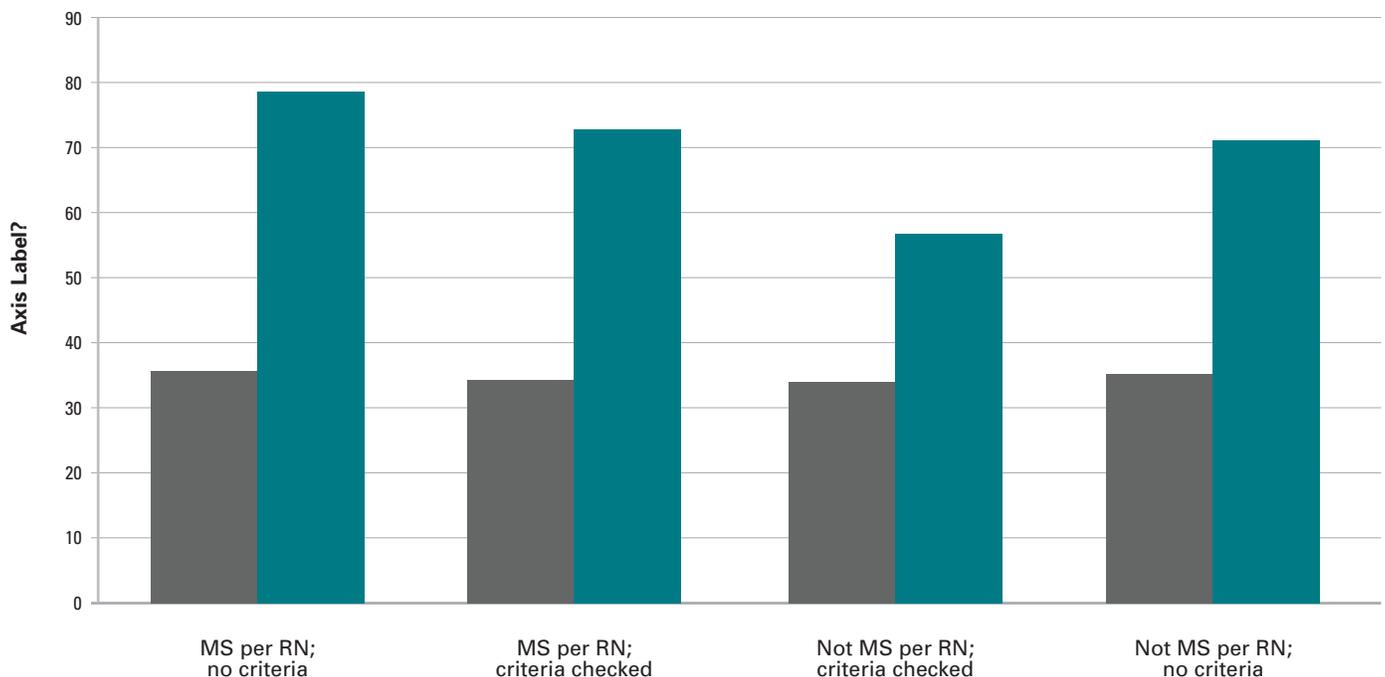
**Results**

Data was collected on 44 infants with a total of 182 observations completed. The average number of observations done per infant was 4.1 with a range of 1-13 observations completed per infant. Gestational age at birth ranged from 24.2 to 39.2 weeks with the average gestational age equivalent to 32.1.

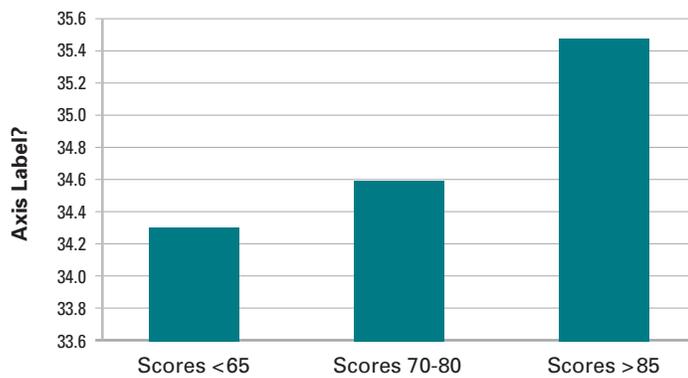
Caregivers appeared to be equally likely to consider an infant "medically stable" despite meeting criteria identified by the study team (active withdrawal, high flow oxygen, IV nutrition, etc.) as he/she is to state infant is "medically stable" in the absence of criteria. (Chart 1) Presence of pre-determined criteria for medical stability provided a good correlation with rubric scoring.

In Chart 2, scores and average PCA trends down as medical stability changes based on perception and presence of perception. The last columns represent only three data points. These seem to be outliers. Further statistical analysis will be helpful to determine if particular criteria are more critical than others. Rubric scores tended to trend up as age increased.

**CHART 2. Scores/ages by Medical Stability**



**CHART 3. Post Conceptual Age and Readiness Score (Higher Score = Greater Readiness)**



In Chart 3, the rubric seems to reflect the infant’s developmental capacities as well as the impact of overall stability on the expression of developmental readiness for SSP. Readiness for safe sleep practices may be recommended for infants with a score > 85.

One of the most interesting findings was that the infants who received any support after 32 weeks PCA appear to show readiness for SSP earlier than those infants who were not provided with positioning aids after 32 weeks PCA.

In Chart 4, average GA at birth is the same for both groups. Nineteen infants never achieved a score of 85 when observed. It is not possible to know if those infants achieved a higher score prior to discharge or not, or if there were any consequences of a lower score prior to discharge on outcomes. The future research study would look specifically at this question.

**Conclusions**

Readiness for supine sleep position in the preterm infant may be considered a developmental milestone that unfolds as a result of support to the underlying mechanisms necessary for all developmental skills: physiologic, motoric, state and regulatory competency. As such, a tool that will guide the caregiver to give the “just right” support to the developing postural system may enhance compliance with the safe sleep protocol without

delaying discharge. Based on the pilot data, an intervention study has been accepted by the Institutional Review Board to further investigate the impact of the use of the rubric on behavioral outcomes and length of stay. Additionally, an operationalized definition of “medical stability” in the context of safe sleep readiness has been created and added to the hospital safe sleep policy. Nurses and therapists now collaborate to assess and assign appropriate positioning interventions based on a common language and understanding of the infant’s emerging capacities to achieve the developmental milestone of secure, supine sleeping.

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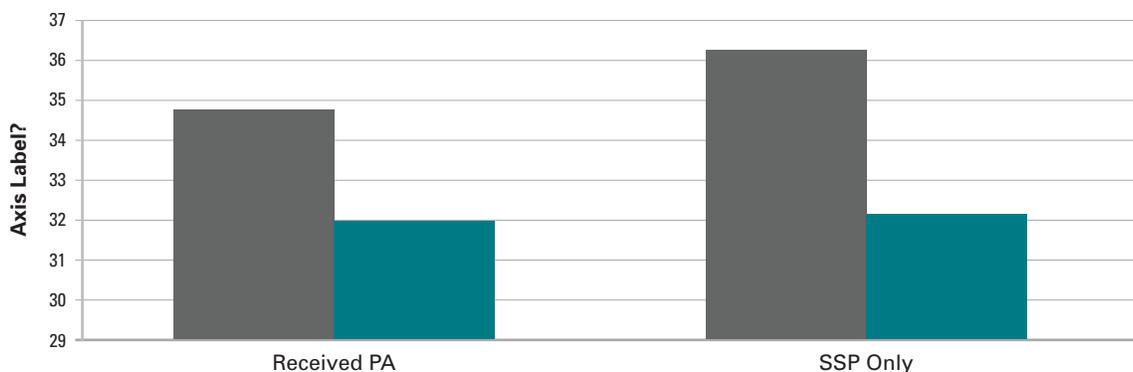
**Acknowledgement**

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*Statement of Financial Support*

*Jennifer Hofherr has no financial relationships with commercial entities to disclose.*

**CHART 4. Age at First Threshold Score Per Positioning Experience**



# Bio-Behavioral Mechanisms During Maternal/Paternal Skin-To-Skin Contact with Preterm Infants

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## Background

The newborn intensive care nursery (NICU) environment is a stark contrast to the expectations of developing infants and can induce parental stress and anxiety that have lifelong effects. Fundamental to the infant's developmental trajectory is early parent-infant contact. Maternal touch, especially during skin-to-skin contact (SSC) can reduce the adverse consequences of prematurity. SSC is an evidenced based holding strategy that increases parental proximity and provides a continuous interactive environment known to enhance infant physiologic stability and affective closeness within the parent-infant dyad.<sup>1-4</sup> Animal studies demonstrate that parent-infant proximity and touch can activate the oxytocinergic system. Another key role that the oxytocinergic system plays is in bond formation and parenting.<sup>4,5</sup> In turn, oxytocin release stimulates bonding and parenting behaviors by a bio-behavioral feedback loop.<sup>6-8</sup> In limited human studies, parental plasma oxytocin concentrations were positively related to mother-infant affectionate contact and father-infant stimulatory contact at six months postpartum.<sup>9-10</sup> Demonstrated differences in behavioral responses such as state regulation and improved motor system modulation even after short interventions of SSC have been reported.<sup>11</sup> Biobehavioral responses of cortisol and improved maternal infant co-regulation have also been reported.<sup>12-13</sup>

## Objectives

The purpose of this study was to examine bio-behavioral mechanisms associated with maternal and paternal skin-to-skin contact (M-SSC and P-SSC) with healthy premature infants. Specifically, changes that occur in infant and parental (mother and/or father) salivary oxytocin (OT) and salivary cortisol levels during SSC which will be associated with simultaneous reductions in anxiety and with later outcomes reflecting improvements in infant neurobehavioral development and responsiveness with parental-infant interaction. Fathers are included in the study in an effort to examine the OT mechanism associated with SSC, as well as to engage fathers in the practice of SSC. The specific objectives of this study were:

1. Examine biological mechanisms pre, during and post SSC in parents with stable preterm infants. Hypotheses: a) Parents' (mother and/or father) salivary OT levels will be higher during M-SSC/P SSC, compared to pre and post-SSC; b) Parents' (mother and/or father) salivary cortisol levels will be lower during M-SSC/P-SSC, compared to pre and post-SSC;

c) Changes in parents' (mother and/or father) salivary cortisol levels, during- vs. pre- and during- vs. post- M-SSC/P-SSC, will be correlated with changes in parents' anxiety scores.

2. Examine biological mechanisms pre, during and post SSC in parents with stable preterm infants the role of OT in with the infant's behavioral, autonomic and stress responses. Hypotheses: a) Changes in infants' OT levels, during- vs. pre- M-SSC/P-SSC, will be correlated with changes in infant HRV; b) Infants salivary OT levels will be higher during M-SSC/P-SSC compared to pre- and post-SSC; c) Infants salivary cortisol levels will be lower during M-SSC/P-SSC compared to pre- and post-SSC.

## Methods

This randomized cross-over design study used a three-day time-frame conducted in the NICU. Utilizing a convenience sampling approach, the participants consisted of 28 stable preterm infants (30 0/7 – 34 6/7 weeks gestational age 3 -10 days old) and their mothers and fathers. After informed consent, each infant-mother-father triad was randomly assigned to one of two sequences: M-SSC conducted on day 1 and P-SSC on day 2; or P-SSC on day 1 and M-SSC on day 2. Infants' and parents' saliva samples for OT and salivary cortisol assays were collected pre-SSC, 60-min during-SSC, and 45-min post-SSC. Infants' spectral analysis of heart rate variability (HRV), and parental anxiety was measured at the same three time points. In addition, infant outcomes were examined in relationship to parent (mother and/or father) oxytocin/cortisol levels. The parent-infant interaction assessed during a five-minute video using dyadic mutuality coding (DMC) was completed prior to hospital discharge. Parental eligibility criteria were: 1) > 18 years old; 2) English speaking; and 3) without history of depression. A maternal history of the diagnosis of depression is a significant predictor of postpartum depression and may influence OT.<sup>7,14</sup> Based on limited data that were collected from previous triads, mean changes in salivary OT levels provided a standardized effect size (Cohen's d) of 0.50, an effect of precisely medium magnitude. A sample size of 28 triads will provide 80% levels of power for M-SSC/P-SSC with one-sided tests at the 5% level of statistical significance. McCall (1986) has endorsed one-tailed tests as long as there is "some reason" to predict the direction of the outcome.<sup>15</sup> Cong and colleagues' previous work provided insight into the directional possibilities for this proposal which allowed the use of one-tailed testing.<sup>16</sup>

## Results

Analyses of data were done using bivariate statistical methods to test for changes in infant, maternal and paternal OT and cortisol levels between the pre-SSC, during-SSC and post-SSC periods using SPSS22 software. Using repeated measures analysis of variance (RM-ANOVA) OT levels significantly increased for mothers ( $p>0.000$ ), fathers ( $p>0.001$ ) and infants ( $p>0.000$ ) during SSC compared to pre and post-SSC. Parental anxiety scores were correlated to parental salivary OT and cortisol level. Relationships between changes in infant OT levels during SSC and later levels of reciprocity and synchronicity within parent-infant interactions measured with DMC total scale scores will be evaluated. Parental OT levels during SSC and subsequent DMC total scale scores will also be explored for OT influences on parental responsiveness during interactions with their infant.

## Conclusions

Oxytocin release was activated in mothers, fathers and infants during SSC. Salivary cortisol levels significantly decreased for infants during SSC indicating that SSC may be used as a strategy to decrease infant stress in the NICU. This study addressed the gap in understanding the mechanisms that link parent-infant contact to bio-behavioral responses, which is an important step in exploring OT as a potential moderator to improve infant developmental outcomes and the effect on responsive interactions between mother and infant as well as the father and infant. The practice of SSC remains inconsistent despite strong evidence supporting its use.<sup>3,17-20</sup> These findings may also increase health professionals' interest and motivation to encourage more universal use of SSC.

### Statement of Financial Support

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## NIDCAP Care in the Moment



### Steadying Support

# Implementation of Developmental Care in Newborn Units Supported by the Government: The Belgian Experience

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**Key Words:** developmental care; Baby Friendly Hospital Initiative; NIDCAP; public health care.

## Background

Developmental care programs have been emerging in Europe since the nineties in a highly variable way. In Belgium, Professor Haumont and her staff of the Saint Pierre University Hospital (SPUH) in Brussels have been pioneers in implementing this approach of care. Newborn Individualized Developmental Care and Assessment Program (NIDCAP) training started in this hospital unit in 1998. A major part of the project and training activities were financed by federal grants. Between 2006 and 2010, the Federal Public Service, Health, Food Chain Safety and Environment (FPS) established an agreement with SPUH to support the creation of the Brussels NIDCAP Training Center that was eventually established in 2007.

The FPS also began to support hospitals with maternity wards choosing to invest in the Baby Friendly Hospital Initiative (BFHI) for the promotion of breastfeeding. Financial support was granted to hospitals that achieved the goals set forth by the BFHI. During the pilot phase two coordinators were appointed to assist hospitals in obtaining the BFHI label. Today 27 of the 97 Belgian maternity hospitals have been awarded this label.

In 2012, the government continued its support in maternity wards by offering financial support if those hospitals chose to educate their medical and caregiving staff on a regular basis in breastfeeding, without the obligation of obtaining the BFHI label.

In 2013, providing support for training in developmental care extended the breastfeeding contract. The decision to add developmental care to the scope of the contract was made in response to the demand of the caregivers and as a means of moving away from traditional newborn care towards Family Centered Developmental and Couplet Care. The FPS appointed a coordination cell to organize meetings and conferences to help realize this change in care, as well to provide site visits in settings that wanted to implement developmental care. Currently 48 hospitals benefit from this educational contract on breastfeeding and developmental care.

In June 2014, the government decided to finance ten Newborn Intensive Care Nurseries (NICNs) to experience the NIDCAP process with the aim of increasing the developmental care practices in Belgian NICUs. One year later in June 2015 the NIDCAP training of two professionals in the supported NICNs could begin. Before starting the FPS program, five of the 19 NICNs and one medium care newborn unit were already engaged in NIDCAP training. To date, 13 of the 19 NICNs are engaged in a NIDCAP training program, with one unit experiencing the process without FPS support.

## Objectives

- To review the developmental care practices in Belgian newborn units before governmental support on developmental care.
- To evaluate the impact of governmental financial support on the change of care practices in Belgian units.

## Methods

Initially a survey concerning developmental care was sent to all 48 hospitals with an educational contract with the FPS. The units were questioned on five care themes: environment (8 items), bedding and positioning (5 items), care procedures (15 items), feeding (20 items) and couplet care (12 items). When analyzing the results of the survey, the differences regarding developmental care practices between NIDCAP units (minimum one NIDCAP certified caregiver working in the unit) and Non-NIDCAP units (no NIDCAP certified staff) were remarkable. In August 2015, the survey was resent to re-evaluate developmental care practices and the impact of the governmental support.

A semi-quantitative analysis method was used to evaluate the surveys, aiming to give each theme a global score. To obtain this global score the items within the theme were allocated a number of points in relation to the importance of the item in developmental care practices. This allowed hospitals to have a broad idea about the baseline of developmental care practices in the units while enabling them to anonymously compare their scores and to position themselves compared to the median score for each item. A comparison in hospital practices was made regarding the impact of being BFHI labeled and the presence of NIDCAP certified professionals in the unit.

The presence of NIDCAP certified staff had a significant impact on developmental care practice concerning feeding and care procedures, couplet care and the “global developmental score.” There is a positive correlation between the number of NIDCAP Professionals and each of the developmental care themes except for bedding and positioning. These results must be interpreted with precaution because of the small number of units with NIDCAP certified professionals (Table 1). Being a BFHI labeled unit only had a significant impact on feeding strategies and the “global developmental score” (see Table 1).

The comparison in terms of improvement of developmental care practices between 2014 and 2015 did not demonstrate any statistical significance. Nevertheless, an augmentation of the median was seen in the scores for the following themes: care

procedures, couplet care and the “global developmental score.” It should be mentioned that the professionals who filled out the survey weren’t necessarily the same from one year to the next. Most of the units were also involved in the process of implementing developmental care. This could explain a more severe scoring due to better comprehension of the concepts treated in the survey. Also the re-evaluation was done after only a year, which is a relatively short period of time.

A difference in practices was seen between NICNs and medium care neonatal nurseries (MCNNs). This is probably due to the fact that NICNs have been alerted on the importance of developmental care in relation to a better outcome for preterm hospitalized infants in these units. Only recently published data on the outcome of late preterms have pushed MCNNs to evolve in this way of care. The developmental part of the contract is not mandatory even though an important adherence is noted in the majority of the MCNNs. Working groups on developmental care themes are set in place. There is a tendency towards improvement in developmental care in most of the units and the NIDCAP and BFHI contribute significantly to this progression.

## Conclusions

The actions of the Belgian health authorities seem to meet the expectations of the newborn nurseries. There is a positive trend in changing the practice towards developmental care. Financing guidance by two developmental care coordinators in the field, organization of conferences and the financing of NIDCAP Training and elaboration of the BFHI seem to be productive. Two thirds of the Belgian NICN’s are engaged in NIDCAP® training. However, the results of the survey show a persisting gap between knowledge and practice. Therefore the continuity of this support in the future is mandatory. A long-term evaluation is necessary in order to confirm the impact of the governmental support on the implementation of developmental care practices, and most importantly to evaluate the short and long term benefits for preterm babies and their families.

### Statement of Financial Support

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**TABLE 1. Impact of the presence of NIDCAP certified professionals in the unit and the BFHI label on the improvement of Developmental Care (DC) practices.**

Themes	Scores for NIDCAP units	Scores for NON-NIDCAP units	Comparison (test t)
Environment	7.96 +/- 2.37	5.74 +/- 2.73	p = 0.051
Bedding /Positioning	8.33 +/- 1.83	6.53 +/- 2.59	p = 0.111
Care procedures	7.81 +/- 1.87	4.82 +/- 2.27	p = 0.004*
Feeding	8.27 +/- 1.66	6.16 +/- 2.13	p = 0.027*
Couplet care	7.31 +/- 2.22	4.94 +/- 2.34	p = 0.026*
Total DC score	79.36 +/- 18.12	56.39 +/- 18.03	p = 0.006*

Themes	BFHI	non- BFHI	Comparison (test t)
Alimentation	7.04 +/- 2.35	5.71 +/- 1.73	p = 0.050*
Total DC score	65.05 +/- 19.91	52.49 +/- 17.14	p = 0.038*

\*Significant improvement in DC practices p<0.05

# The Changing Focus of Interdisciplinary Developmental Rounds to Support Newborns, Families and Staff in a Surgical Newborn Intensive Care Nursery

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## Background

Developmentally supportive environments are known to improve medical outcomes for hospitalized newborns and are considered the overarching philosophy for practice in the Newborn Intensive Care Nursery (NICN).<sup>1</sup> Despite developmental care standards, the application of developmental care may be influenced by environmental constraints, staff knowledge deficits and communication.<sup>2</sup> Globally, the use of developmental rounds to highlight the application of individualized strategies in practice is being increasingly utilized as a measure to counter some of the barriers to developmental care application.<sup>3</sup>

## Objectives

- To ensure premature and fragile at risk newborns are reviewed by developmental specialists during their admission.
- To increase parental and staff understanding of developmental care and its application.
- Provide readily accessible developmental care recommendations and strategies to support the provision of individualized care.

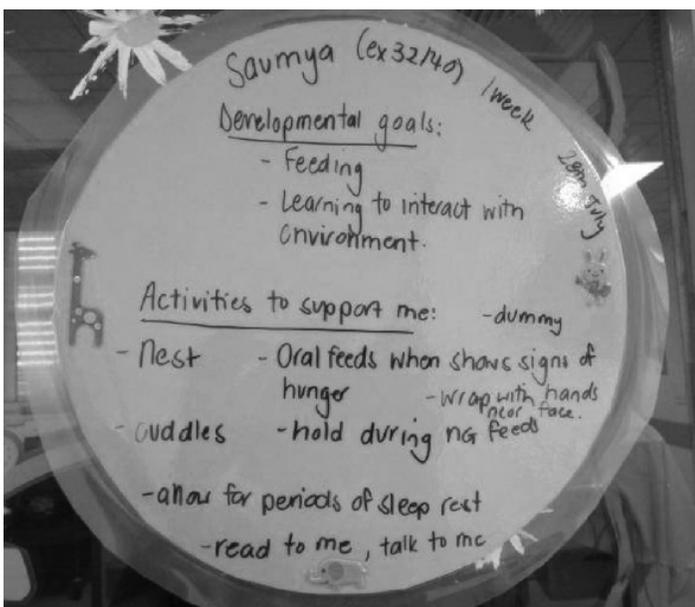
## Methods

The surgical NICN, at the Grace Centre for Newborn Care, Sydney Children's Hospital Network, Westmead, Australia has

utilized interdisciplinary developmental rounds since 2005 as a means to support the application of consistent developmentally supportive interventions. In 2013, the model and process was revised. Members of the developmental team were expanded to include NIDCAP Professionals, medical, nursing, lactation, physiotherapy, speech and occupational therapy staff members. Criteria for developmental consults were refined to include medically fragile infants, and the frequency of the round increased from once to twice weekly in response to an increasing number of consults. Documentation was modified to include a visual tool, a "green dot," increasing accessibility to information for families and staff. The green dot is handwritten by the developmental team for each baby and includes the babies name, gestational age at birth and current age, developmental goals and strategies that can be utilized to support the infant in the unit by both nursing staff and parents. Green dots are placed in a location at the infants bed that can be easily seen by members of the multidisciplinary team and parents. The dots are reviewed approximately every two weeks and reflected to update the infants changing needs.

## Results

From January to December 2015, 283 developmental team consults, of which 42% (120) were follow-up consultations, occurred. Twenty-eight percent of unit admissions were seen by



Pictures of the "Green Dot"

the developmental team. Of 225 (80%) developmental team consultations, utilizing the “green dot,” both staff and families indicated a positive response to this tool. Sixty-six percent of the consults occurred for infants >42 weeks gestation. Five hundred ninety-six (596) developmentally supportive strategies were discussed and documented with parents and nursing staff. A range of 21 strategies were recommended by the team, with positioning (10%) and seating (9%) most frequently identified.

## Conclusions

The use of developmental rounds in the surgical NICU has evolved to meet the needs of a changing population and workforce. Further evaluation of their influence on the newborns’

admission and developmental outcomes are currently being explored.

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## Statement of Financial Support

*None of the authors have financial relationships with commercial entities to disclose.*

# The Gold Standard for Excellence in Newborn Individualized Developmental Care

## What All Newborn Infants and Their Families Deserve

### Newborn Individualized Developmental Care and Assessment Program (NIDCAP)

The Newborn Individualized Developmental Care and Assessment Program (NIDCAP), originated in 1984 by Heide-ise 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 Assessment and Certification Program (NNACP)

The NIDCAP Nursery Assessment and Certification Program (NNACP) 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. External review and validation by the NFI may be sought when a nursery feels it has achieved this goal. Successful NIDCAP Nursery Certification, the ultimate goal, denotes distinction in the provision of a consistently high level of NIDCAP care for infants and their families, as well as for the staff, in a developmentally supportive environment. Nurseries that have achieved this recognition serve as a model and an inspiration to others. For information on eligibility requirements and the certification process please see: [www.nidcap.org](http://www.nidcap.org); and/or contact Rodd E. Hedlund, MEd, NNACP Director at: [nnacpdirector@nidcap.org](mailto:nnacpdirector@nidcap.org) or 785-841-5440.

# Developmental Care: A Global Perspective

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## Introduction

Developmental Care was first described in the early 1980's. Since then it has been promoted as the optimal model to guide practice in Newborn Intensive Care Nurseries (NICNs) for pre-mature and sick newborns. Various models have been described with multiple implementation strategies. This phenomenon has spread over the past three decades with a common language to identify infant behavior and supportive care-giving strategies.

## Objectives

To determine the spread of developmental care and the various components that are used in practice across many countries and continents.

## Methods

A literature search was undertaken for the past five years. A survey was constructed from the literature that identified 18 components of developmental care and six possible well known training/education programs. This online survey was circulated on international email distribution lists and the NFI google groups. The survey was further distributed widely within two countries to capture variance within specific countries.

## Results

The literature search yielded over 200 articles covering all aspects

of developmental care including theoretical frameworks, review articles and original research. The lead authors represented 25 countries. A total of 95 online surveys have been returned representing 30 countries. Eighty percent indicated developmental care was led by nurses. The components of developmental care that are used on a consistent basis included: the use of nests and buntings (82%); open access for parents (81%) and positioning (76%). Components of developmental care that were not often utilized included: parent councils or committees; single care rooms; sibling care; and developmental rounds. NIDCAP (59%), APIB (17%) and General Movements (17%) were the most often used training/education programs. Several nurseries had in-house programs. There were also differences in the uptake of developmental care between high and low resource countries.

## Conclusions

From this exploration, developmental care has reached across five continents. With a global aim of improving care to premature and sick infants, developmental care continues to move forward in many countries. However, low resource countries are in need of support to enable developmental care to have a more global reach and effect.

### *Statement of Financial Support*

*None of the authors have financial relationships with commercial entities to disclose.*



## Mission

The NFI's mission is to promote the advancement of the philosophy and science of NIDCAP care and to assure the quality of NIDCAP education, training and certification for professionals and hospital systems.

*Adopted by the NFI Board, May 1, 2015*

## Vision

The NFI envisions a global society in which all hospitalized newborns and their families receive care and assessment in the evidence based NIDCAP model, which supports development, minimizes stress, is individualized and uses a relationship-based, family-integrated approach.

*Adopted by the NFI Board, May 1, 2015*

# Online Technology Augments NIDCAP and APIB Training

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**Key Words:** NIDCAP training, APIB training, online communication; audio-visual technology

## Background

NIDCAP and APIB training require the commitment of the NIDCAP Trainer, Trainees and their respective institutions to ensure the protection of time, support of frequent travel, and payment of training fees. Regular sessions with a Trainer are recommended throughout the training process, although the exact number of such days is dependent on each Trainee's progress.

The challenges that arise in honoring these commitments, particularly international travel, can lead to very lengthy training. This may lead to the withdrawal of staff from training or the withdrawal of institutional support, if the extended length of time is viewed as lack of progress.

Online, audio-visual communication was implemented recently to augment NIDCAP and APIB training. A pilot survey of the Trainers and Trainees who participated in the online, audio-visual training was conducted.

## Objectives

To present the experience of using online, audio-visual communication to augment NIDCAP and APIB training.

To stimulate discussion about the use of online technology as a means to augment successful training.

## Approach

A pilot survey was designed and circulated amongst the five authors, during May and June 2016. Email feedback on the initial draft survey was provided by all five authors. One author collected the responses and prepared the draft of this abstract.

No statistical analyses were performed as there were only five NIDCAP Professionals included in this pilot survey. We did not intend to show statistical or clinical significance of our findings, but to use our experience as the basis for the hypothesis that online training can be used to successfully augment the frequently required on-site/live training sessions.

## Results

ZOOM (<https://zoom.us>) was the most frequently used online method of audio-video communication and enabled online sessions between USA, Canada, Australia, France and Holland. ZOOM took between one to three hours to set up and learn and was used from hospital or home.

Sessions involved APIB mentoring, review of training materials for Trainers-in-Training, and consultation. Videos [APIB exam], and documents were shared over ZOOM, enabling rich and productive discussions, although at times there were delays in the online connection.

All five responders felt that the sessions were "somewhat" to "highly effective" and were similar to real-life conversations as non-verbal communication was visible. These sessions enabled mentoring to continue when international travel was not possible, and provided timely support when the interval from last training session was long. Sessions were between 15 minutes to several hours long, depending on the purpose of each online meeting.

The responders felt that online sessions augmented training, allowed for more frequent mentoring, and was more effective than email. The elimination of international travel substantially reduced costs. However, respondents felt that online sessions should not entirely replace the required, on-site NIDCAP or APIB training sessions. Online training could help to address the limited availability of Trainers/Master Trainers, with respect to the successful introduction of NIDCAP and APIB to other centers

## Conclusions

Online audio-visual technology seems to be an effective method for mentoring the ongoing progress of NIDCAP and APIB Trainees. Expanding this preliminary survey may provide more detailed guidelines for the use of audio-visual technology to enhance training and ensure Trainee and Trainer success.

### *Statement of Financial Support*

*None of the authors have any financial relationships with commercial entities to disclose.*

# Parent-Staff Communication and Parental Stress in the Newborn Intensive Care Nursery

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## Introduction

The birth of an infant requiring hospitalization in the newborn intensive care unit (NICU) uniformly is reported to be stressful for parents and family members. This study aimed to determine parent-staff communication in the NICU and its relationship to parent stress.

## Methods

The participants in this descriptive-correlational study were 203 Iranian parents with preterm infants hospitalized in the NICU. The subjects were selected by the quota sampling method. Data collected included a three-part questionnaire: 1) Demographic parent and infant information; 2) Parent-Staff Communication Scale (the score of which ranged from 0-180); and 3) Parental Stress Scale (the score of which ranged from 0-102). Descriptive and inferential statistics including the Pearson correlation coefficient test were applied to the data, using SPSS software, Version 16.

## Results

This study revealed that fathers' and mothers' stress and communication scores were almost comparable and both higher than expected. The total mean score of the two main variables, parent-staff communication and parental stress were respectively:  $100.72 \pm 18.89$  and  $75.26 \pm 17.6$ . A significant inverse correlation was found between parental stress and parent-staff communication scores ( $r = -0.144$ ,  $P = 0.041$ ).

## Conclusions

This study's findings demonstrated that supportive parent-staff communication is related to lower parent stress scores. It is recommended that nurses and physicians receive specific skill training for the establishment of effective parent-staff communication. It is anticipated that such improved staff skills will help decrease parent stress and therewith likely promote parent and infant health in the NICU.

## Our Sponsors

The NFI thanks Sonicu and Dr. Brown's for their continued support this year. The generous support of these sponsors helps the NFI raise global awareness of the need for NIDCAP care and enhances opportunities to develop educational programs to broaden the reach of this care to more and more NICU professionals and the 'preterm families' they serve.



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# Annual NFI Membership Meeting

**Sunday, October 22, 2017**  
**8:00AM – 10:00AM**

Chateau Lacombe  
10111 Bellamy Hill Rd NW  
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Canada



## The 28<sup>th</sup> Annual NIDCAP Trainers Meeting

**October 21–24, 2017**

**Chateau Lacombe**  
**10111 Bellamy Hill Rd NW**  
**Edmonton, Alberta T5J 1N7**  
**Canada**

*Hosted by the NIDCAP Training Center in  
Development at Stollery Children's Hospital,  
Edmonton*

*(By Invitation Only)*

**Conference endorsed by the NIDCAP Federation International, Inc.**

### 5th Annual Midwest Developmental Care Conference



**Engaging families in the NICU**

### Engaging families in the NICU

*Presented by the Children's Hospital at the  
University of Illinois NIDCAP Training Center  
and the Cincinnati Children's Hospital NIDCAP  
Training & Research Center*

**Thursday April 27, 2017**  
**8AM – 5PM**

University of Illinois at Chicago Student  
Center West

Click here for [Conference Brochure](#)

# Developmental Observer

The Official Newsletter of the NIDCAP®  
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# NIDCAP on the Web

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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](mailto:sandra.kosta@nidcap.org).

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## NIDCAP TRAINING CENTERS

by order of establishment

### National NIDCAP Training Center

Boston Children's Hospital and Brigham and Women's Hospital  
Boston, Massachusetts, USA  
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### Sooner NIDCAP Training Center

(inactive)  
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School of Medicine and The Children's Hospital  
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### The Barcelona-Vall d'Hebron NIDCAP Training Center Spain

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