The NeuroNICU Trend & Expanding Roles for EVERY Bedside Provider

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Objectives
• List the four pillars of the NeuroNICU practice framework
• Describe at least two daily clinical practices, or QI opportunities, that bedside providers can influence related to one of the NeuroNICU care pillars

Disclosures
• President/Owner – Synapse Care Solutions
• Presentation was created without any commercial influence
• No off-label use of medications or devices will be discussed

Isn’t every NICU a NeuroNICU?
Neuron-ICU

Neuro-NICU’s: Getting above the clavicles

- UCSF Neurointensive Care Nursery – 2007
- Phoenix Children’s NeuroNICU – 2009
- Johns Hopkins
- St. Louis Children’s
- Vanderbilt Medical Center
- Children’s National Medical Center, Washington D.C.
- Boston Children’s – Peds Neuro ICU
- Lucile Packard Children’s at Stanford
- Loma Linda University Children’s Hospital
- Sharp Mary Birch & Rady’s Children’s – San Diego
- Riley Children’s – Indiana
- CHOC – Orange, CA
- And More…

Photo credit – www.ucsf.edu

Neonatal Brain Injury

- There are a number of causes and diagnoses
- Outcomes depend on location, timing, extent of injury, interventions

Why is there a NeuroNICU Trend?

- Recognition of improved survival with increased morbidities
- Bringing new care practices and research findings to the bedside
- To improve the short and long term outcomes for infants and their families.

Perinatal-Neonatal Brain Injury

- The incidence of neurological disabilities related to perinatal brain injury has not decreased in decades
  - CP, Cognitive impairment, Epilepsy
  - Term and preterm infants are affected
IQ scores at 26 years (n=359)

Frequency Distribution of Autism Spectrum Disorder

What we don’t know...

• On the basis of our follow-up data we feel that the size of the hemorrhage on ultrasound is by no means the only guideline to outcome.
• There may well be other factors influencing the result which we cannot yet diagnose by ultrasound.
  "M. I. Levene - Letter to the Editor, Lancet, 1981"

What we still don’t know

• Neither structural brain alterations nor the medical complications common in the NICU population fully explain the variation in long-term neurobehavioral development
  "Milgrom, Pediatric Research, 2010"

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Long Term Follow Up is Essential

- At 6yr, approximately 2 out of 5 of infants who were diagnosed with severe disability at 30mo no longer had severe disability.
- By contrast, 1 in 4 infants without any disability at 30mo were found to have moderate or severe disability at 6yr.


4 Pillars of Neuro-NICU Care

Pillar #1: Neuro-Assessment

Assessment Skills

- Clinical Assessment is challenging and is influenced by:
  - Experience
  - Infant Gestation
  - Medications
  - Equipment

Quotes from Florence

- The most important practical lesson that can be given to nurse (or any bedside providers) is to teach them what to observe and how to observe
  - what symptoms indicate improvement or the reverse
  - which are of importance, which are of none
  - which are the evidence of neglect, and of what kind of neglect.
**UTILIZE STANDARDIZED EXAMS**

**Use of Standardized Exams**
- Sarnat = HIE
- NPASS = Pain
- Finnegan/Eat, Sleep, Console = NAS
- Dubowitz = Development
- NIDCAP/APIB/NBAS = Adaptation

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**Specialized Imaging & Challenges**

MRI, MRS, Ultrasound, CT (for emergencies/trauma), F-MRI, PETs

**Specialized Imaging**
- Positioning
- Environment & Noise
- Temperature
- Sedation-free

Exemplars:
- St Louis & Boston: Sedation Free MRI & now In-Unit MRI

**Sedation Free MRI**
- Feed and swaddle method
- Assistive devices
What about the brain?

Blood pressure
Heart rate
SaO2
Respiratory rate
End tidal CO2

Pillar #2: Bedside Monitoring....

Bedside neuromonitoring devices

Continuous video EEG (cEEG)
Amplitude integrated EEG (aEEG)
Near infrared Spectroscopy (NIRS)

Roles: Bedside neuromonitoring devices

- Sensor application
- Troubleshooting symmetry, artifacts, impedance

Roles: Bedside neuromonitoring devices

- Sensor application & Skin protection
- Documentation of sensor impedance
- Marking clinical events

Medication Administration

LORAZEPAM GIVEN
#17 – Cares & Patting

- Sensor application & Skin protection
- Documentation of sensor impedance
- Marking clinical events
- Assess the trend & report abnormal findings

Roles: Bedside neuromonitoring devices

- Lauren Sacco, DNP created a "layover tool" to help with normal pattern identification – Neonatal Network, 2016
- Free E-Book (Randall 2008) – 7 Steps to assess any aEEG & YouTube Channel Boston – aEEG Strip of the Week

Pillar #3: Neuro-Protection

- Treatments and cares to prevent cell injury and death

Prevention: The first tenet of care

- The very first requirement in a hospital is that it should do the sick no harm.
  ~Florence Nightingale

4 Ways to Provide Neuro-Protection
Prevent common NICU complications

• Implement and monitor programs to reduce:
  • CLABSI
  • NEC
  • VAP
  • IVH

4 Ways to Provide Neuro-Protection

• Interventions That Aim To:
  • Prevent Primary Injuries
  • Reduce Injury Progression (containment)

Manage infants undergoing cooling

• Ensure equipment is ready and staff are well-trained
  • Create tools to improve documentation and communication

Exemplars:

• Cooling Teams and Leads
  • Daily Logs & Communication Tools (Stanford & Brigham)
Manage infants undergoing cooling

- Ensure equipment is ready and staff are well-trained
- Ensure target temperature is achieved and maintained
- Assess and intervene non-neurological effects of HIE and hypothermia
- Remain vigilant for clinical and sub-clinical seizures

Exemplars:

- Clinical care pathway for infants with HIE & undergoing cooling
  - Diane Wilson, NNP – Sick Kids Toronto – Presentation at PAS 2018

Manage infants undergoing cooling

- Ensure equipment is ready and staff are well-trained
- Ensure target temperature is achieved and maintained
- Assess and intervene non-neurological effects of HIE and hypothermia
- Remain vigilant for clinical and sub-clinical seizures

Exemplars:

- Supporting parents with acquisition of parenting role
  - Charla Parkinson, Johns Hopkins Hospital – Parent Education Tool for HIE, Maryland
  - Dr. Alexa Craig, Neurologist, Maine Medical – Parental Communication Studies

After Re-Warming

- Temperature Management
- Re-assess neuro-exam
- Feeding Evaluations & Interventions
  - Exemplar: Kelly Andrasik, OT – Lucile Packard Children’s Hospital, Stanford University

Exemplars:

- Exemplar: Kelly Andrasik, OT – Lucile Packard Children’s Hospital, Stanford University
Post-Hemmorhagic Hydrocephalus

- ELVIS – Early vs. Late Ventricular Intervention Study

There had never been a good trial to find out if that is the best time to intervene, but some observational data suggested that earlier intervention might lead to better long term outcomes, and, perhaps more surprisingly, fewer permanent VP shunts.


Results

- More LP's and Reservoirs in the Early Group
- About 1 in 5 still need a shunt
- Long-term outcomes are pending

Pillar #4 – Neuro-Development

The Bottom Line

- We are providing developmental care every day in our NICU, whether you plan to our not.
- Term and Preterm brains are rapidly developing every moment of every day in your NICU.

Neuro-Development = GROW & NUTURE NEURONS

- Grow New Neurons (neurogenesis)
  - Investigational Approaches
    - EPO
    - Stem Cell
    - IGF-1
  - Available Now
    - Massage
    - Kangaroo Care
    - Optimal Nutrition

Skin to Skin Care: Promotes brain maturation

- Higher Bayley Mental and Motor scores
- Higher IQ's
- Better brain complexity (more synapses)
- 2-4 weeks more maturity than non KC preterm infants
  - Scher MS et al. (2009)

Exemplar: Jayne Solomon, NNP, Tampa FL – First Hold Initiative
Neonatal Nutrition

- Growth is Brain
- Optimal Nutrition is Neuroprotective
  - Protein
  - Essential Fatty Acids
  - Mother’s Milk
- Infusion causes fat loss from milk (1,2)

“Let the food come at the right time, and be taken away; eaten or un eaten, at the right time.”
-Florence Nightingale (1859)

NeuroDevelopment: GROW & NUTURE NEURONS

- Grow New Neurons (neurogenesis)
- Nurture the Neurons we have

Trauma-Informed Care

- To baby
- To parents
- To staff

Mary Coughlin, NNP,
Quantum Caring Essentials

Nurture Growing Neurons

- Interventions That Aim To:
  - Minimize Stress and Pain

Pain & the Brain

- Findings that high stress exposure is associated with differences in the brain on both an anatomic and functional level.

- Decreased brain size in the frontal and parietal regions and altered brain microstructure and functional connectivity within the temporal lobes

Maternal holding + painful experiences

Breastfeeding, when compared to placebo or no intervention control, effectively reduces behavioral pain response associated with common puncture procedures in infants.

- Heart rate
- Cry duration
- Behavioural facial response

Nurture Growing Neurons

- Interventions That Aim To:
  - Minimize Stress and Pain
  - Provide Supportive and Therapeutic Positioning

Before & After

The inherent goal of supporting the premature infant’s body as closely as possible to the position the baby would have been in the womb.

Infant Positioning Assessment Tool (IPAT)
Max Score = 12

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Coaghlin, Lohman, & Gibbins (2010)
Reliability and Effectiveness of an Infant Positioning Assessment Tool to Standardize Developmentally Supportive Positioning Practices in the Neonatal Infant Care Unit, Wounds and Infant Nursing Reviews, Volume 10, Issue 2, Pages 104-106, June 2010

Change Positions!
Mid-Line DOES NOT mean Supine 100% of the time!

The impact of the environment on a wounded individual’s ability to heal is undeniable.

It matters in the NICU today as much as it did for Florence in the war fields of England in the 1800’s.
ENVIRONMENT OF CARE

• Private rooms
• Cycled lighting
• Minimize noise
• Maximize language

Exemplar: Sarah Bakke – Baby Bookworm Program (Wilmington, Delaware)

Balance SENSORY Experiences

Slow movements - Keep Contained - 2 Person Care

Aromatherapy - University Kentucky

https://winw.uky.edu/uk-healthcare/pediatric-experts-find-aromatherapy-effective-promoting-infant-healing-max-recovery
Nurture Growing Neurons

• Interventions That Aim To:
  • Minimize Stress and Pain
  • Offer Positive Sensory Experiences
  • Protect Sleep

What is Neuro-Protection??

• Interventions That Aim To:
  • Nurture the neurons we have
  • Minimize Stress and Pain
  • Offer Positive Sensory Experiences
  • Protect Sleep
  • Minimize Parent-Child Separation

Maternal Mental Health

• Depression is a common mental health diagnosis
• Treating mothers can result in better outcomes for babies
  • Improved toddler attachment
  • Improved toddler temperament
  • Improved maternal parenting efficacy

Developmental cascade effects of interpersonal psychotherapy for depressed mothers: Longitudinal associations with toddler attachment, temperament, and maternal parenting efficacy
Elizabeth D. Handley(a1), Louisa C. Michl-Petzing (a1), Fred A. Rogosch (a1), Dante Cicchetti (a1) (a2)...
DOI: https://doi.org/10.1017/S0954579417000219
Published online: 12 April 2017

Maternal Mental Health

• NICU Psychologists
  • Referred by social workers
  • Work directly with families and provide therapy sessions
  • Exemplars: Drs. Richard Shaw and Angelica Moreya - Stanford University

Inside the NICU: cameras keep families connected to their NICU babies

Developmental cascade effects of interpersonal psychotherapy for depressed mothers: Longitudinal associations with toddler attachment, temperament, and maternal parenting efficacy
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- Interventions That Aim To:
  - Nurture the neurons we have
  - Minimize Stress and Pain
  - Offer Positive Sensory Experiences
  - Protect Sleep
  - Minimize Parent-Child Separation
  - Address family Psychological needs
  - Promote Strong Bonds between Baby and Family

Create Bonds that will last a life-time

What are you now? Where are you going?

- Neuro-NICU’s can be a:
  - QI project
  - Expanded Program
  - New unit design/environment
  - Change in culture

Final Quote from Florence

*Were there none who were discontented with what they have, the world would never reach anything better.*
CONFERENCE AGENDA
Sunday, February 3, 2019
Point Loma Ballroom, Kona Kai Resort & Spa, San Diego, CA

9:00am  REGISTRATION DESK OPENS – FOYER OF Point Loma Ballroom

10:00am  Welcome/Introductions

10:15am  What is a NeuroNICU Nurse?
         - Kathi Randall, NNP, Synapse Care

11:00am  Brain Injuries For Term And Preterm Infants
         – Diane Wilson, NNP, Toronto Sick Kids

11:45am  BREAK

12:00pm  PHH – How To Define, Trends In Treatment, And How To Change Outcomes In Infants
         – Lauren Heimall, CNS, CHOP, Philadelphia, PA

12:45pm  HOPE In The NICU
         – Sharon Bonifazi, RNC, Sierra Vista Regional Medical Center, San Luis Obispo, CA

1:15pm   LITE LUNCH

2:15pm   Living With CP – Perspectives from The Incubator to the Clinic and Beyond
         – Dr. Jan Brustrom-Hernandez, 1 CP Place, Dallas, TX

3:15pm   WRAP UP

3:30pm   SUPERBOWL PARTY
*Times are subject to change
**This course is pending approval for up to 14 contact hours of continuing education for nurses
Monday, February 4, 2019

7:30am  BREAKFAST AND EXHIBITS GRAND OPENING
8:30am  Welcome

8:45am  5 Reasons Minor Morbidities Are Not So Minor
       – Dr. Paige Church, Sunnybrook, Toronto

9:30am  SENSE and Sensibility in the NICU
       – Joan Smith, NNP, PhD, St. Louis Children’s Hospital, MO

10:15am BLUE DIAMOND SPONSOR PRESENTATION

10:30am BREAK AND EXHIBITS

11:15am Brain Injuries and Other Controversies Related to Neonatal Hypoglycemia
       – Kris Karlsen, NNP, PhD, STABLE Programs, Utah

12:15pm The Impact of Pain on The Developing Brain – Diane Wilson, NNP

1:00pm LUNCH ON THE PATIO & EXHIBITS OPEN AT 1:30

2:00pm Bedside Management During Therapeutic Hypothermia
       – Shannon Tinkler, BSN, RNC, Lucile Packard Children’s Hospital, CA

2:45pm Humanitarian Healthcare – What does NICU Practice look like in Ethiopia?
       – Phillip Platt, NNP, Baptist Health System, Amarillo, TX

3:30pm BREAK AND EXHIBITS

4:00pm Sleeping Beauties – Importance of Sleep On The Developing Brain
       – Mary Coughlin, NNP, Caring Essentials

5:00pm ONE Nurse Award

5:30pm ADJOURN TO BEACH FOR NETWORKING BONFIRES

*Times are subject to change
**This course is pending approval for up to 14 contact hours of continuing education for nurses
Tuesday, February 5, 2019

7:00am      BREAKFAST AND EXHIBITS

7:45am      Advanced aEEG Cases – What’s Wrong With My aEEG?
             – Kathi Randall, NNP

8:30pm      Supporting Family Mental Health in the NICU
             – Angelica Moreya, PhD

9:15am      Stress, Anxiety and Depression in the NICU – Best Practices For Nursing Self Care – Michelle Waddell, MSN, Neonatal Excellence

10:00am     BREAK AND EXHIBITS // HOTEL CHECK OUT

10:45am     Knowing is not enough, we must do: Translation Of Evidence In To Practice
             – Mary Coughlin, NNP, Caring Essentials

11:30am     ONE AND DONE – From Idea to Implementation
             – Jayne Solomon, NNP, St. Joseph’s Hospital, Tampa, FL

12:15pm     Being The ONE – AWARD

12:30pm     Strength to be The ONE – WRAP UP

1:00pm      ADJOURN – See you in 2020!!!