Positioned for success!

In a Level III NICU....
Whey are we here?

- We work with the ultimate micro-environments
  - Isolette
  - Open Crib
- Environment can influence the baby and we can influence the environment
  - Autonomic Stability
  - Posture and movement
  - State regulation
  - Active engagement
- For Better or for Worse
  - Nursery acquired deformities
  - Tools to influence the environment
The Intrauterine environment....

The Extra-uterine Environment...
What happened this time?

I was viciously attacked by gravity!
Positioning is one way to influence the environment

- Autonomic Stability
- Engagement and Interaction
- State Regulation
- Posture and Movement
Medical instability and support may:
- limit positioning options
- limit positional opportunities (frequency)
- limit active movement
- Limit joint mechanoreceptor stimulation
- May feed into the recruitment of specific motor patterns
Autonomic Stability

- Respiration
  - Rate
  - Saturation
  - Work of breathing
- Cardiac
  - Heart Rate
  - Circulation
- Digestion and Elimination
State Regulation

- Encourage self-calming and behavioral organization
  - External support to facilitate infant strategies
- Provision of boundaries that facilitate movement of extremities toward MIDLINE IN FLEXION
- Management of sleep-wake cycles
Active Engagement

- Increased periods of quiet, alert state
- Facilitate visual and auditory skill development
- Support for a variety of controlled movement
Posture and Movement

- Nervous system
- Musculoskeletal system
- Sensory System
Neurodevelopment

- Tone develops
  - caudal-cephalo direction
    - Amiel-Tison: 30-32 weeks PCA LEs and 36 weeks UEs
    - Allen and Capute: 33-35 weeks LE, 35-37 weeks UEs
  - Distally to proximally
  - Influenced by cramped environment
Musculoskeletal Development

- Muscle fiber differentiation by 20 weeks
  - Higher ratio of fast twitch fibers
- Bone ossification begins at 8 weeks gestation
- Mechanoreceptors in joint capsules are formed in the 5th-8th week of gestation but require stimulation for refinement
Musculoskeletal development

Form follows Function  (and gravity)

- Head shape
- Spinal curves
- Development of
  - Shoulders
  - Hips
  - Knee
  - Feet
Postural Control

- Variety (the quantity of movement repertoire)
- Variability of movements (the ability to make an adaptive selection)
- Pre-term infants movement patterns are often with larger excursions, repetitive and less complex than term infants
- Variability and variety is more consistent with development of postural control strategies
Effect of positioning on the incidence of abnormalities of muscle tone in low risk, preterm infants
L. Vaivre-Douret et al
European Journal of Paediatric Neurology 2004

- 60 infants: 31-36 weeks gestation with no neurological abnormalities with similar presentation on neuromaturational assessment
- Divided into 2 groups
  - Prone positioning with horizontal roll under hips
    - Typical posture of NICU at that time
  - Treatment group- position change with each feed into prone, sidelying and supine
Control Group

- **Alignment assessment**
  - Forced caudocephal weightshift- cervical hyperextension
  - Froglegged position
  - Shoulders in external rotation, abduction and retraction

- **Motor**
  - Imbalance of tone (control group)
    - Increased in extensor muscles of the neck and trunk
    - Decreased traction response
    - Higher incidence of induced opisthotonos
    - Decreased flexor/extensor balance
  - Head preference in 30% of control vs. 10% of treated group
Experimental Group

- What was different?
  - Frequent position changes
  - Freedom of supported movement
  - Opportunities to achieve postural balance
Additional Nursery Acquired Deformities

- Retracted shoulders->shortened scapular adductor muscles which interferes with bringing hands to midline, reaching and poor shoulder stability in prone
- Hyperextended neck- shortened extensors, interferes with midline and graded head control, downward gaze and midline awareness
- Frogged legs- shortened hip abductors and IT band, external tibial torsion- out-toeing in gait, transitions, wide base of support
- Everted Feet- pronation in standing and gait
- Plagiocephaly and head preference
Sensory

- **Afferent input**
  - Babies perception of touch, pain, movement

- **Behavior (Vaivre study 2004)**
  - Control group more difficult to calm
  - Increased Moro reflex
  - More difficult to hold from increased extension
    - Effects on bonding
Good support is good...

Better support is

Better!
Individualized Bedside Positioning Programs

- Minimize standard protocols
- Team approach - observation of infant’s movement and postures over time
- 1st target areas of concern - support to minimize medical instability is primary
- Fluidity
Positioning is one way to influence the environment

- Autonomic Stability
- Engagement and Interaction
- Posture and Movement
- State Regulation
What’s in your toolbox?
Positioning Aides

- Z-flo Mattress Support, snakes, pads
- Snuggle-Ups
- DandleRoo
- Bendy Bumpers
- Prone supports
- Wedges
- Zacky Hands
- Fredrick T. Frogs
The most important tools
Guiding Principles

- Individualized support
- Variety of positions
- Observation of infant response
- Fluidity - modify as needed
- Support midline for motor development and self regulation
- Support active movement with return to a flexed posture
- Accept the challenge!
Supine

- Promotes development of head control in midline with proper supports
- Promotes development of visual skills
- Supports should allow for symmetry of arms and legs, hands to mouth, physiological flexion
- AVOID the supine, “W” configuration if at all possible
Supine: Supports flexion, hands to face, controlled movement, symmetry
Sidelying

- May be used to facilitate flexion
- Encourage hand to face/mouth activity
- May benefit infants that demonstrate arching by providing them with boundaries to support flexion
- Encourage neutral head position or chin tuck if gravity used as an assist
- Place toys in visual field to promote the desired head position (once visual fixation present)
- Give infant rattle or toy that they can hold or grasp (>full term)
Sidelying: Hand to mouth, proper alignment of hips, opportunity for controlled movement
Prone

- Facilitates flexion
- Facilitates the development of early head control
- May improve oxygenation due to the mechanical advantages of prone positioning on chest wall expansion
- Facilitates development of balance between flexion and extension as infant begins to push into weight bearing surface
- Promotes downward gaze, awareness of hands as infant becomes closer to 40 wks PMA
The Open Crib Challenge

- New Environment
- Open Isolette- begins modeling for discharge
- Infants may be as young as 32-33 weeks
"How wonderful it is that nobody need wait a single moment before starting to improve the world." — Anne Frank
References


