

NICU FELLOWSHIP NEUROPROTECTIVE NICU CARE

Presented by:
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OBJECTIVES

- Discuss critical periods of brain development
- Describe the 7 Neuroprotective Core Measures and how they can provide structure and organization to the Neuroprotective Care you provide at the bedside
- Describe the difference between neuroprotection and neuroplasticity
- Describe the importance of parent involvement for long term outcomes
- Identify 3 non-pharmacologic strategies to minimize stress and pain



A newborn baby is lying in a hospital bed, wearing a patterned hospital gown. The baby's head is resting on a pillow. Above the baby, the name 'JOEY' is written in large, blue, stylized letters on the headboard. The scene is dimly lit, with a soft light source creating a glow around the baby's head. The overall mood is intimate and tender.

**YOU MAKE THE
DIFFERENCE!**

What is your why?

CRITICAL PERIODS OF BRAIN DEVELOPMENT

3rd trimester

- Forming sulci (grooves) and gyri (ridges)
 - Higher level processing (memory, language, visual perception, reasoning, information processing)
- Neurons begin to mature, organize, and interconnect
- Myelination begins



7 CORE MEASURES

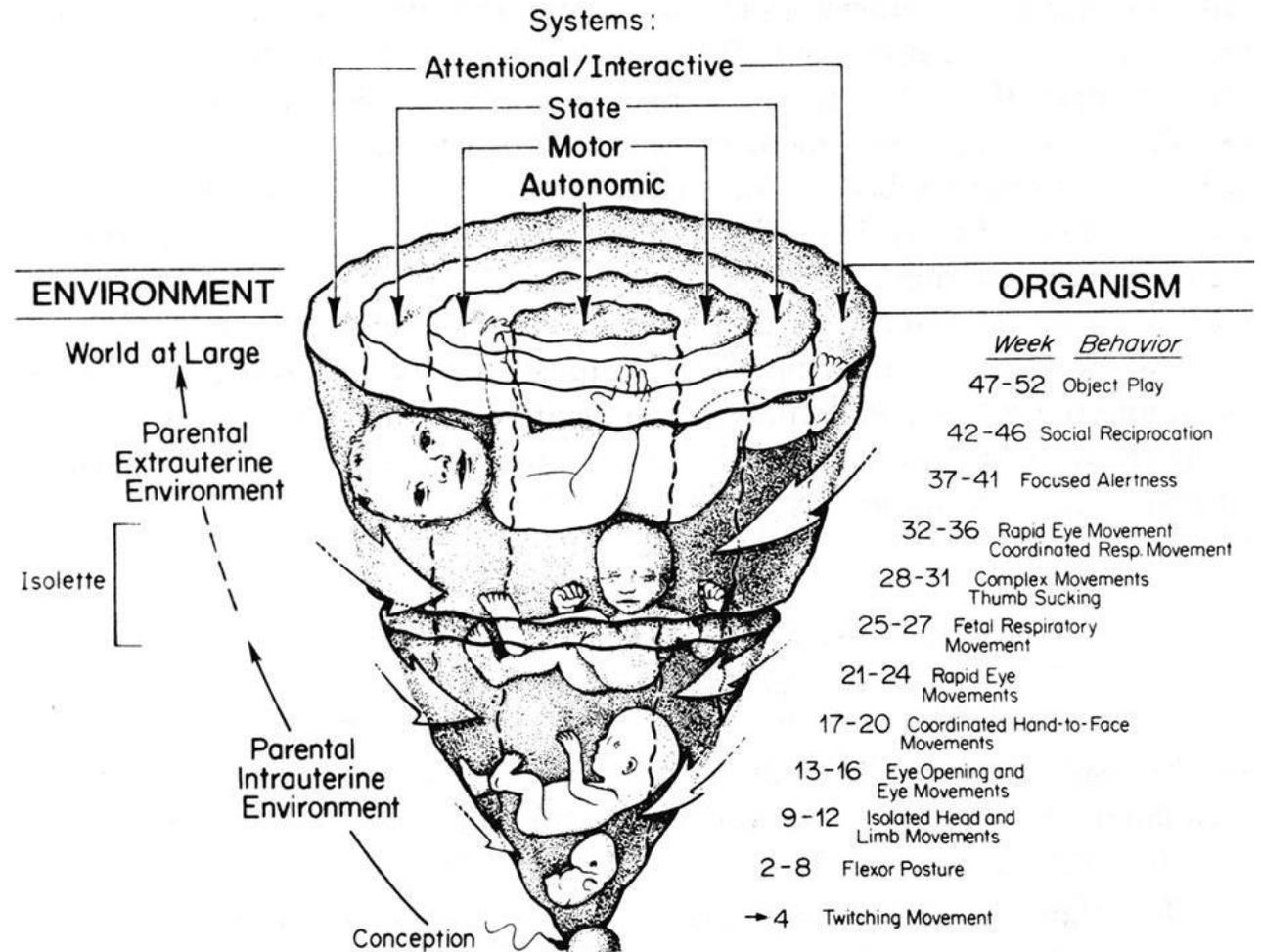
1. The Healing Environment
 2. Partnering With Families
 3. Positioning and Handling
 4. Safeguarding Sleep
 5. Minimizing Stress and Pain
 6. Protecting Skin
 7. Optimizing Nutrition
- ❖ Preparing For Home



IT'S DOESN'T MATTER WHAT BELLS AND WHISTLES YOUR HOSPITAL HAS. NOTHING CAN REPLACE THE IMPORTANCE OF MOM OR DAD'S CHEST.

CREATING A HEALING ENVIRONMENT

MODEL OF THE SYNACTIVE ORGANIZATION OF BEHAVIORAL DEVELOPMENT

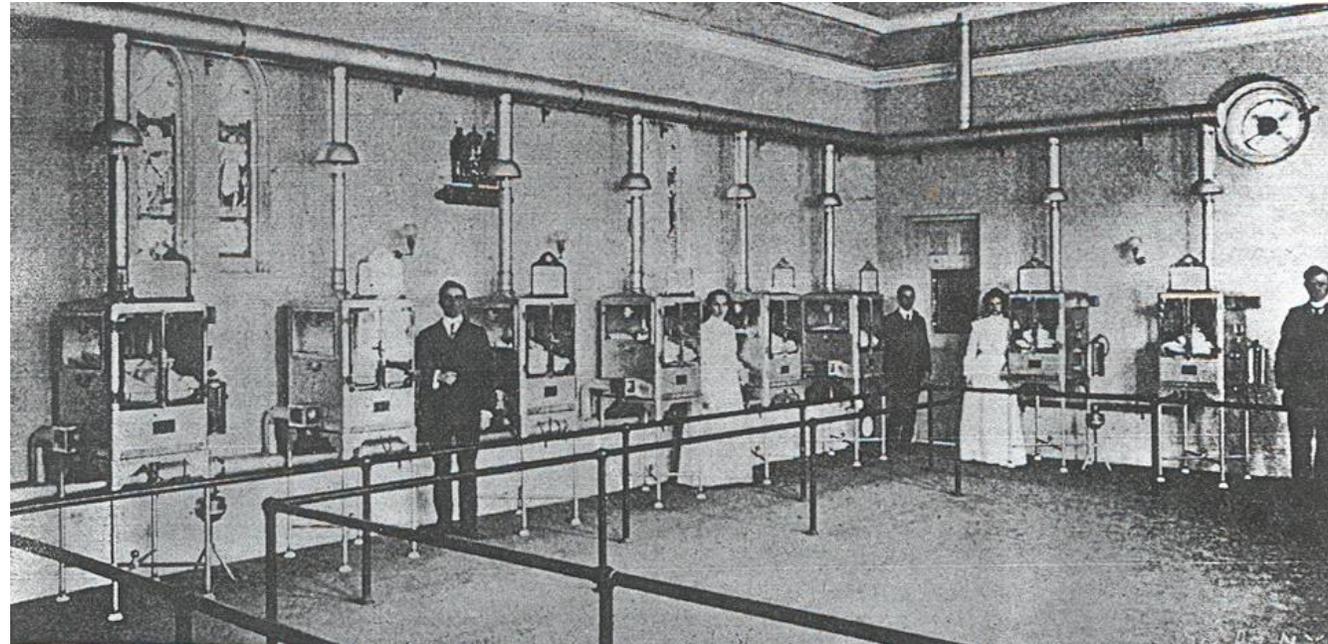


CREATING A HEALING ENVIRONMENT

The Physical Environment

- Maintain an environment that promotes healing and protects the brain

- Space
- Privacy
- Safety



CREATING A HEALING ENVIRONMENT

Keeping space clean

Top half of bed – CLEAN

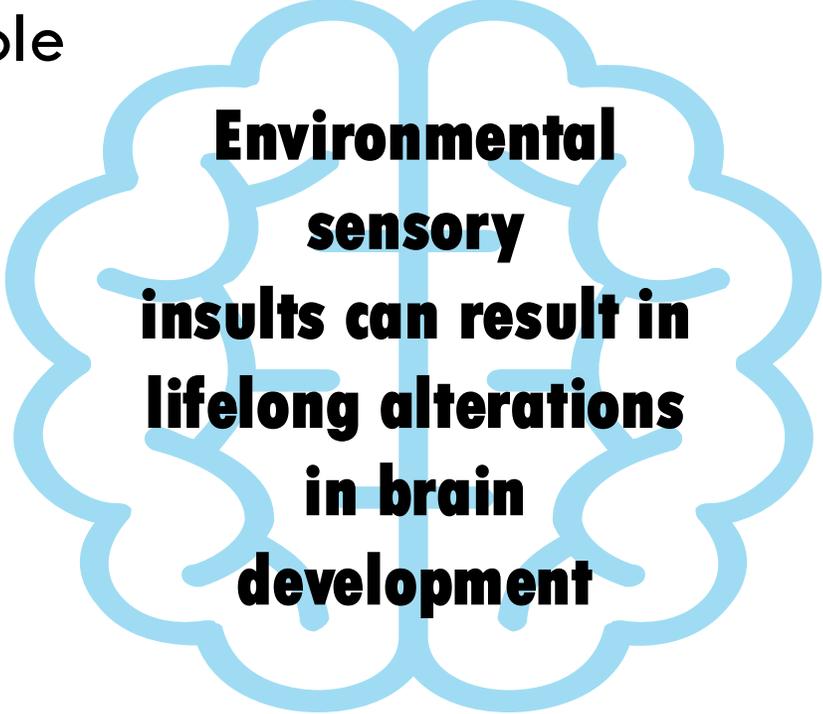
Bottom half – DIRTY



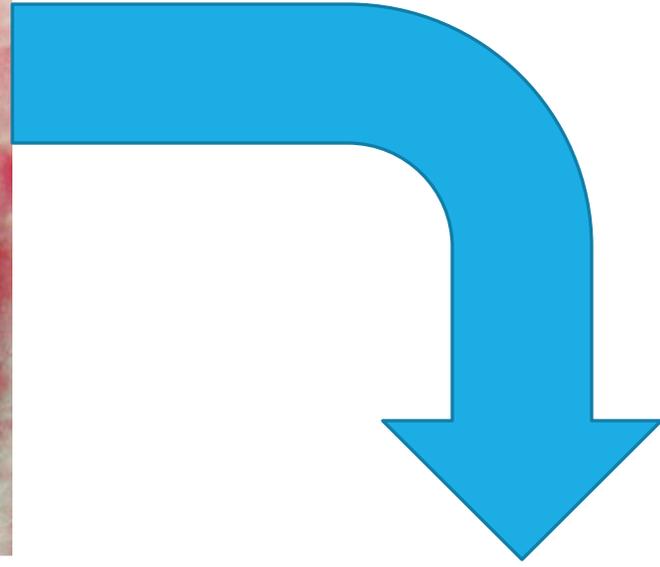
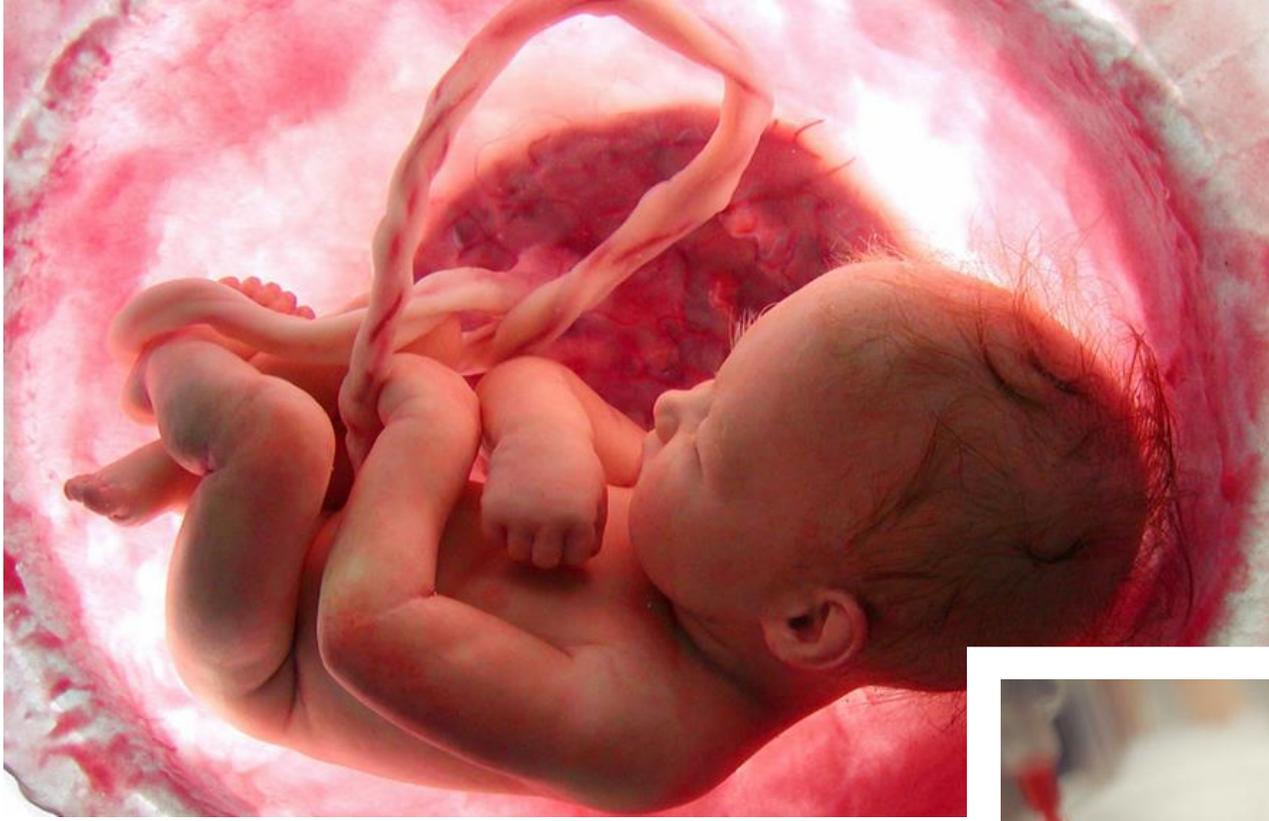
CREATING A HEALING ENVIRONMENT

The Sensory Environment

- Maintain an environment that promotes healing and protects the brain including the family as the central role
 - Temperature
 - Touch
 - Proprioception
 - Smell/Taste
 - Sound/Noise
 - Light



**Environmental
sensory
insults can result in
lifelong alterations
in brain
development**



SENSORY ENVIRONMENT

TEMPERATURE

- Encourage skin to skin
- Allow for NTE
- Swaddled bath
- Swaddled weights
- Swaddled feedings



SENSORY ENVIRONMENT

TOUCH

- Encourage skin to skin
- Speak softly prior to touch
- Minimum 5 seconds of containment prior to touch
- Support baby during every caregiving activity
- Utilize family for containment when possible
- Side-lying cares





SENSORY ENVIRONMENT

PROPRIOCEPTION:

Awareness of oneself, or an awareness of your position and movements of your body in space.

SENSORY ENVIRONMENT

SMELL

- Encourage skin to skin
- Utilize scent cloths when appropriate
- Avoid wearing perfumes or scented lotions
- Allow hand sanitizer to completely dry prior to touch

TASTE

- Encourage skin to skin
- Oral immune therapy
- Avoid potentially negative feeding experiences

SENSORY ENVIRONMENT

SOUND/NOISE

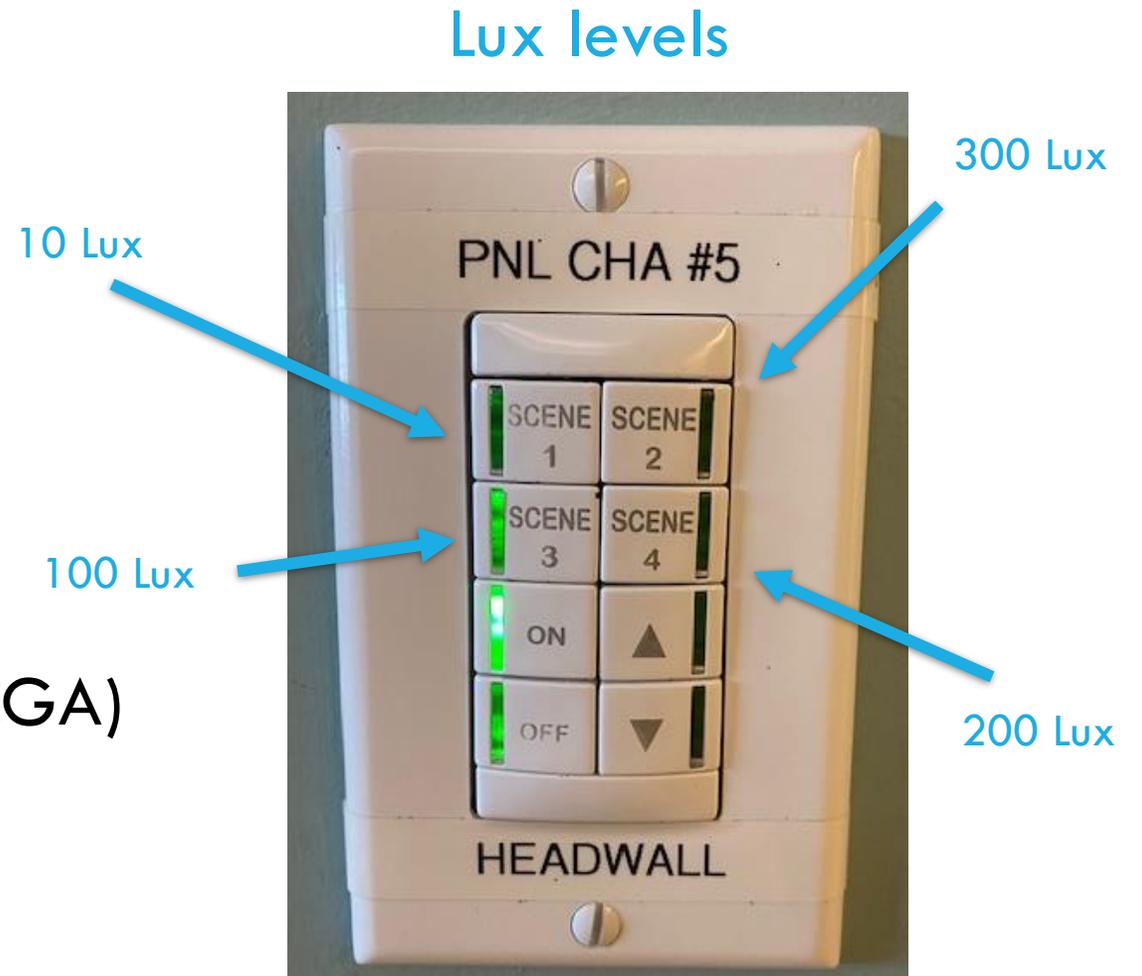
- Encourage skin to skin
- Sound levels should be maintained “green” on unit
- Avoid unnecessary noise
- Hearing accuracy comparable to adults by 42 weeks



SENSORY ENVIRONMENT

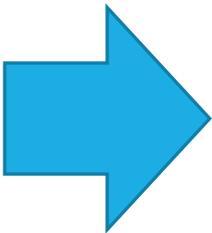
LIGHT

- Protect eyes from light < 30 weeks corrected gestational age (CGA)
- Follow cycled lighting > 32 weeks (CGA)
- Minimal purposeful visual stimulation other than the parent's face until 40 weeks CGA
- Vision is the last sensory system to mature

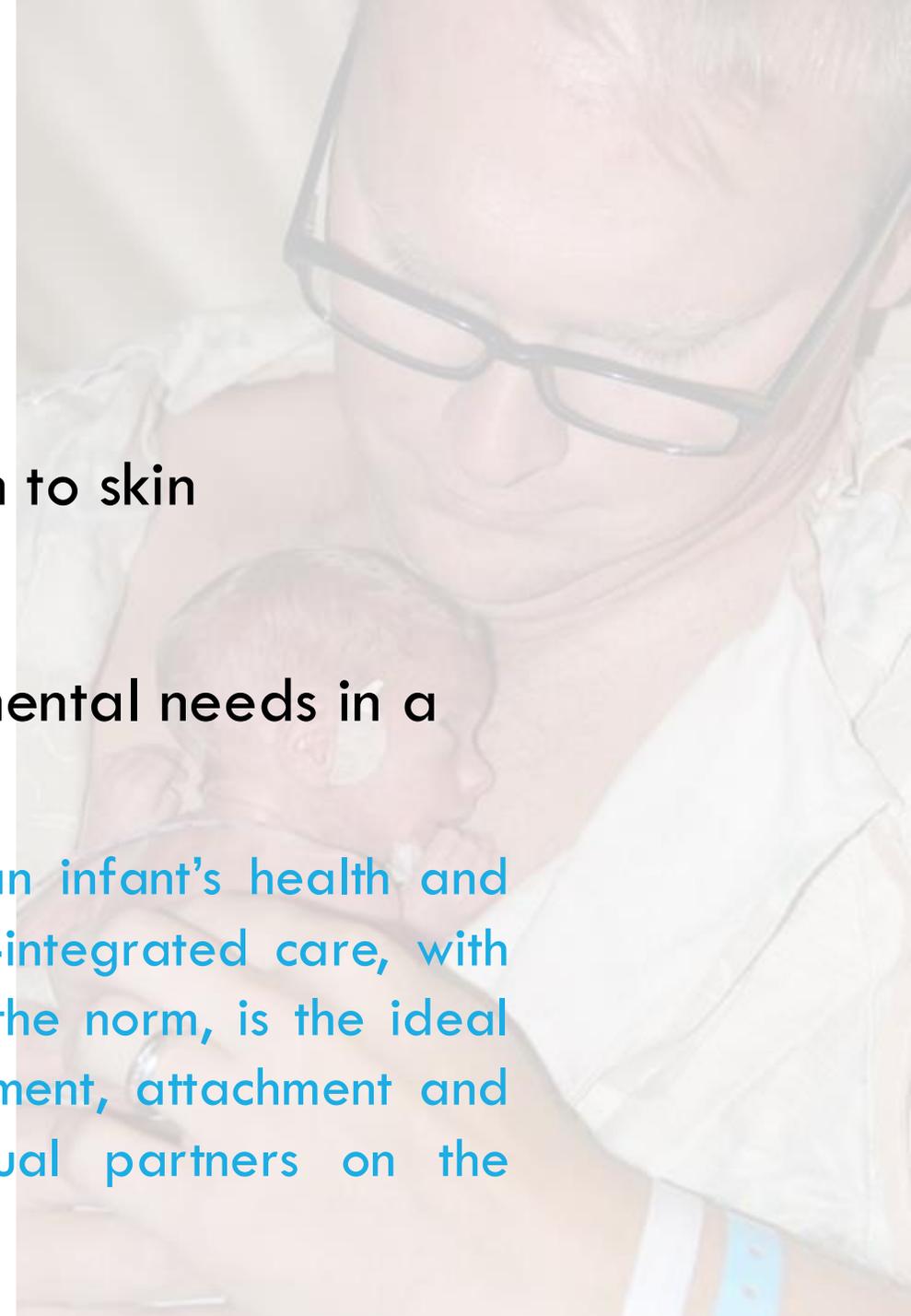


PARTNERING WITH FAMILIES

- Facilitate early, frequent and prolonged skin to skin
- Include parents in cares
- Communicate infant's medical and developmental needs in a culturally appropriate manner



“The family has the greatest influence over an infant’s health and well-being. Compassionately delivered family-integrated care, with zero separation, where skin-to-skin contact is the norm, is the ideal model of care to encourage normal development, attachment and bonding, and empower parents to be equal partners on the caregiving team.”



SKIN TO SKIN

WHEN TO DO IT

- Early
- Frequent
- Prolonged
- Before cares
- After cares
- Between cares

BARRIERS

- IVH Bundle
- Phototherapy
- Medically unstable – discussion at rounds
 - Chest tube
 - Peripheral art line
 - Pressers
 - HFOV

SKIN TO SKIN

WHAT IS **NOT** A BARRIER?

Parents smoke

Parents can only be here for a short time

It is not care time

Baby is sleeping

Baby has a lot of alarms

Baby does not tolerate cares

Baby is dressed/swaddled

READ THE SIGNS





If you see
something

beautiful,
speak it

Strong families



Strong babies

POSITIONING AND HANDLING



- Plan cares to provide minimal stress
- Support infant during every caregiving interaction
- Maintain Flexed, Aligned, Contained, Comfortable position
- Use appropriate prone support to ensure flexed shoulders and hips
- Swaddled bathing, weights, and feedings
- Promote hand to mouth
- Rounded shoulders, flexion in lower extremities

HANDS TO FACE

- Calming / Self-Regulation
- Tone
- Proprioception



POSITIONING AND HANDLING

IPAT TOOL

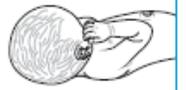
- Validated tool used to evaluate posture in 6 areas
- Goal: to achieve proper positioning and maintain consistency and accountability by staff

Infant Positioning Assessment Tool (IPAT)

Patient's name: _____ Birth gestational age/corrected gestational age: _____

Clinician's name: _____ Date/time of assessment: _____

Infant position: Supine Side-lying Prone

Indicator	0	1	2	Score
Head	 Head rotated laterally (L or R) > 45° from midline	 Head rotated laterally (L or R) 30 - 45° from midline	 Head aligned (L or R) 0 - 30° from midline	
Neck	 Neck in hyperextension or hyperflexion	 Neck neutral	 Neck neutral, aligned, head slightly flexed forward 10°	
Shoulders	 Shoulders retracted	 Shoulders aligned, flat to surface	 Shoulders rounded forward towards midline	
Hands	 Hands away from body	 Hands touching torso	 Hands touching face	
Hips/pelvis	 Hips/pelvis abducted, externally rotated	 Hips/pelvis aligned but extended	 Hips/pelvis aligned and softly flexed	
Knees/ankles/feet	 Knees extended, ankles and feet externally rotated	 Knees, ankles, feet aligned but extended	 Knees, ankles, feet aligned and softly flexed	
12 = ideal cumulative score. 9 - 11 = acceptable cumulative score. ≤ 8 = need for repositioning. Total cumulative score				

POSITIONING AND HANDLING

Prone support

Used until baby is Back to Sleep

- Extending from top of head to umbilicus with legs tucked
- Extending from top of head to pelvis with legs tucked and curled around device
- Careful not to abduct hips

Tummy time

Used after baby is Back to Sleep

- Development of head shaping
- Trunk control
- Balance
- Developmental milestones
- 10-15 minutes cumulative tummy time/day
 - Chest to chest holding in reclined position
 - Tummy time after diaper changes with cares once oral feeding well established

SAFEGUARDING SLEEP

- Use incubator covers
- Give infants time to arouse whenever possible
- Encourage periods of uninterrupted sleep

I am not a violent person but if you wake my child, I will end you.



someecards
user card

MINIMIZING STRESS AND PAIN

Neuroplasticity

- Ability of the brain to form/change synaptic neural connections in response to stimuli

Neuroprotection

- Strategies to prevent neuronal cell death
- Optimizing neuroplasticity



MINIMIZING STRESS AND PAIN



Provide individualized care/
respond to signs of
disorganization and regulation

Provide non-pharmacologic
support

- Skin to skin
- Oral sucrose
- Positioning – facilitated tucking (arms and legs flexed, close to midline)
- Containment
- Swaddling
- NNS – pacifier
- Breastfeeding
- Decrease environmental stimuli

Encourage parents to provide
containment during cares

Subsystem	Signs of Disorganization/Stress		Signs of Self-Regulation
Autonomic	<ul style="list-style-type: none"> • Apnea/Tachypnea • Bradycardia/Tachycardia • Skin color changes (mottled, pale, dusky) • Hiccups • Gagging • Spitting up 	<ul style="list-style-type: none"> • Exaggerated startle • Tremors • Coughing • Sneezing • Yawning • Seizures 	<ul style="list-style-type: none"> • Smooth regular respiratory rate • Pink, stable skin color • Stable viscera • Appropriate startle reflex • Free of tremors and seizures
Motor	<ul style="list-style-type: none"> • Hypertonicity • Extension of extremities • Finger splaying • Fisting • Trunk arching • Tongue extension • Frantic activity of extremities 		<ul style="list-style-type: none"> • Consistent appropriate muscle tone for post-conceptual age • Hand and foot claspings • Foot bracing • Tucking • Hand to mouth • Sucking
State/ Attention-Interaction	<ul style="list-style-type: none"> • Abrupt state changes • Jerky movements during sleep • Abrupt state changes • Eye floating, glassy eyed, gaze averting, raising eyebrows • Irritability • Weak cry 		<ul style="list-style-type: none"> • Calm, focused alertness • Smooth transition between sleep states • Response to auditory, visual and social stimuli • Ability to self soothe



MINIMIZING STRESS AND PAIN

Neurological Consequences of Trauma

Trauma

- Maternal deprivation/separation, unmanaged pain, social isolation, ignoring behavioral expressions of stress, sleep fragmentation, nutritional deprivation

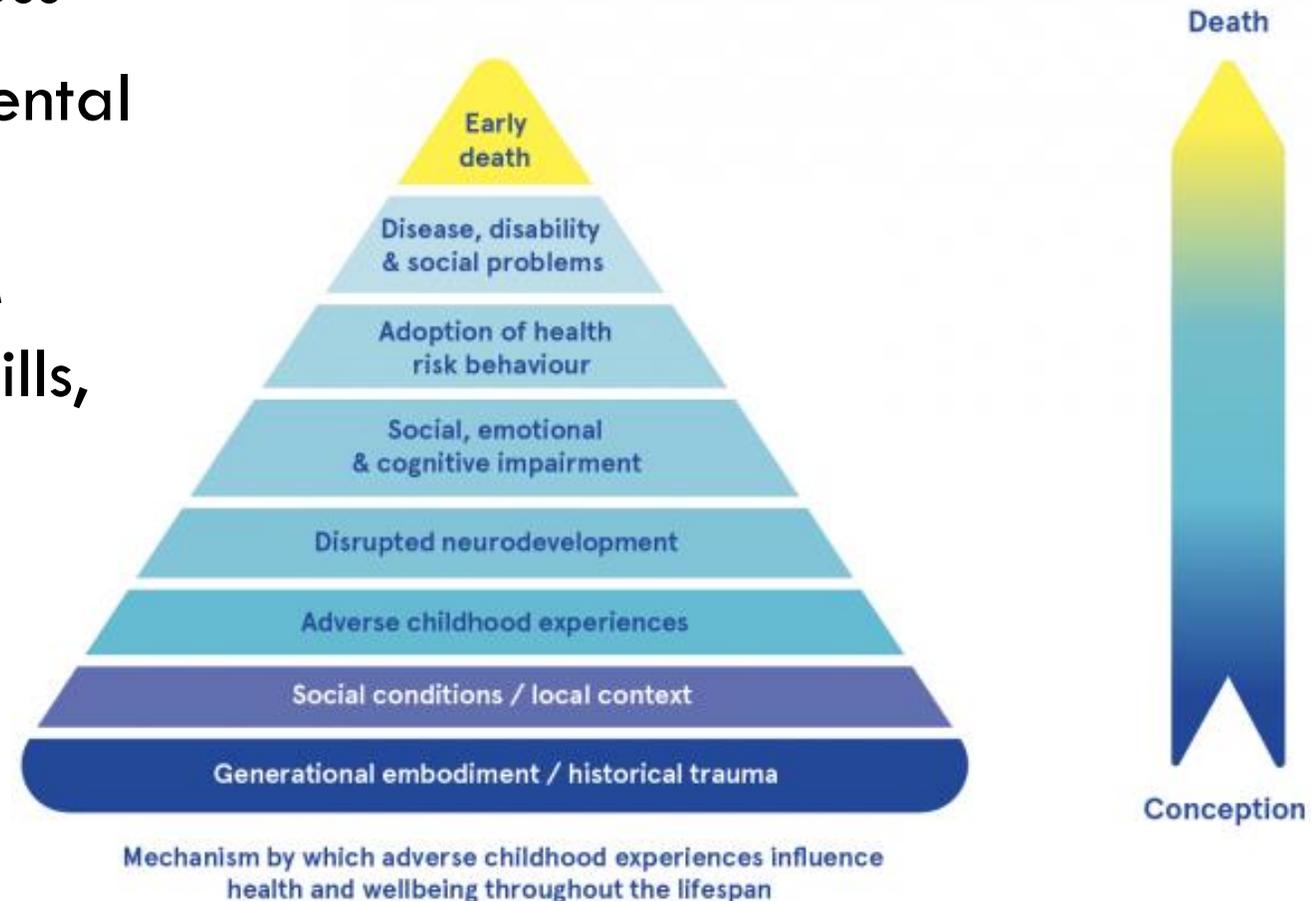
Early life adversity (ACEs)

These experiences can change us at the epigenetic level (how the gene is turned off or on)

Bridging the gap between knowledge and practice

ACE PYRAMID

- Preterm birth predicts family stress
- Parental ACEs predict developmental delays
- ACEs negatively impact cognitive development, social-emotional skills, and health
- **Intervention Strategies**
- Ensure families use resources available to them
- Ensure families are strong



Developmental Coordination Disorder

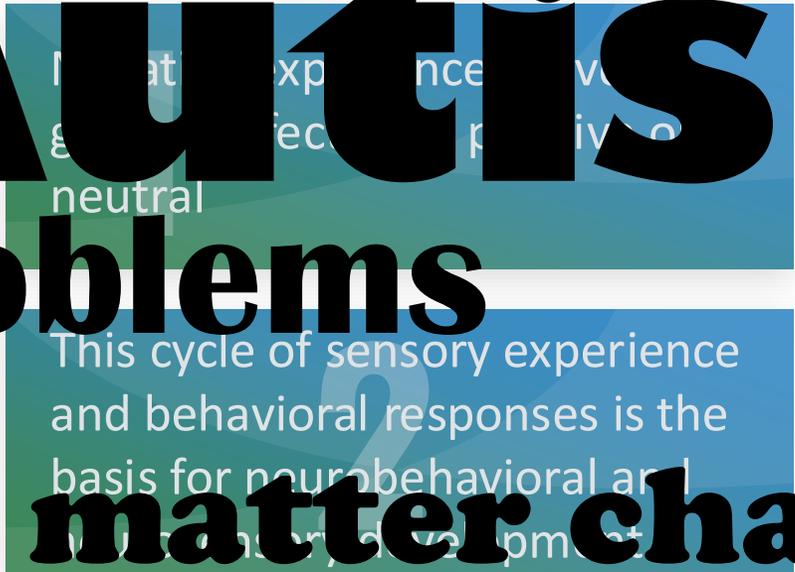
The Brain Interrupted

Anxiety Disorders

Post Traumatic Stress

Autism

Visual spatial problems



Widespread white matter changes

Neurotic/introverted

ADD/ADHD

PROTECTING SKIN

- Bathing every 3-4 days
- Swaddled bathing
- Provide appropriate positioning products
- Minimize use of adhesives when possible



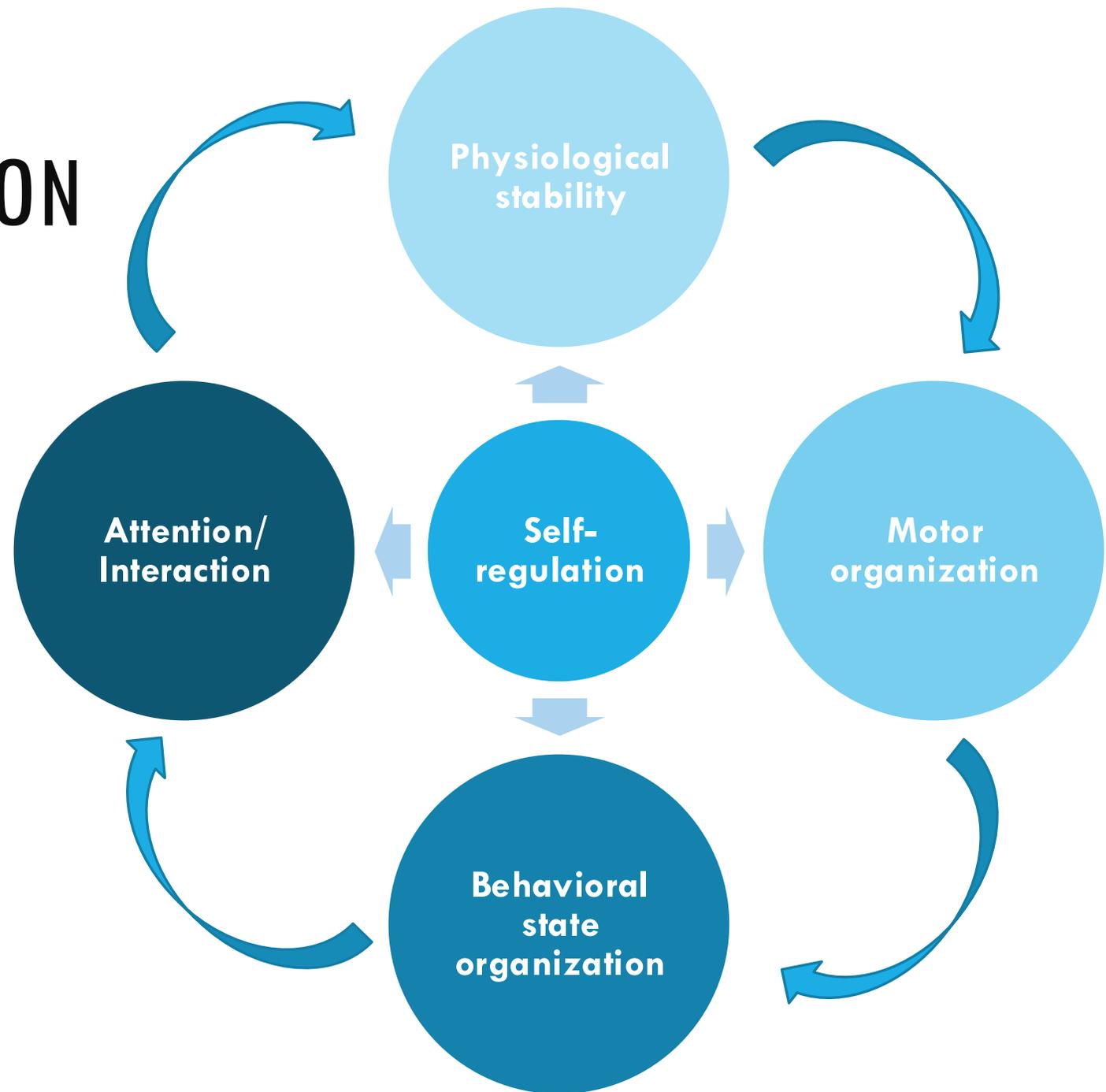
OPTIMIZING NUTRITION



- Minimize negative oral experiences
- Oral care using breast milk
- Follow infant driven feeding guidelines
- Educate parents on feeding cues

OPTIMIZING NUTRITION

- The goal for the baby is to get to self-regulation
- Self-regulation is necessary for:
 - Successful feedings
 - Social interaction
 - Sensory stimulation



PRE-FEEDING SKILLS

Scent cloths

Oral immune therapy/Milk Drops

Protected breastfeeding

Protect from negative oral
experiences

Pacifier with gavage when cueing

READING CUES



CARE BY AGE

Individualize

Care of the infant should be individualized by age and ability to self-regulate

Understand

Understand infant's signs of self-regulation and disorganization

Modify

Modify care accordingly

PARENT EDUCATION SHEETS

Methodist Health System

Babies Born 32-35 Weeks

Sleeping

- It is important for your baby to have long periods of sleep for his/her brain to develop. If possible, your baby should not be woken up when asleep.
- Allow your baby 30 minutes before and after a care time to wake up on his/her own.
- Your baby will be placed to sleep on his/her back when medically stable.

Positioning

- At this age your baby is stronger and able to be swaddled in a snugged position with his/her arms rounded and legs flexed.
- Your baby's hands will be positioned close to his/her face.
- Your baby's head position will be changed with each care time. He/she should spend the same amount of time with his/her head positioned to the right, left and straight forward.

Touching and holding

- Talk to your baby in a soft voice prior to touching him/her.
- Use gentle pressure when touching your baby. He/she is sensitive to touch and cannot handle being rubbed or stroked.
- Use containment (cradle your baby by placing your hands around his/her head and bottom/feet) for 5 seconds before and during care times.
- Place your finger in your baby's hand for him/her to hold.
- Daily skin to skin holding is very important for your baby. This is when you hold your undressed baby next to your bare chest. Talk to your nurse about when this may be done.
- When holding your baby talk or sing to him/her in a soft voice.

Feeding

- When your baby is medically stable he/she may be ready to begin oral (breast or bottle) feeding. Once stable, your baby's nurse will get an order to do a feeding safety assessment. If it is safe, your baby will then be assessed to see if he/she is strong or mature enough to wake up and show he/she wants to try to orally feed. Your baby may bring his/her hands to his/her mouth to show he/she is hungry.

Looking, Listening and Smelling

- Your baby's room will be kept lighter during the day and dimmer at night; this is called cycled lighting. His/her eyes will be protected from direct light.
- When your baby is trying to open his/her eyes, shield the light and position yourself so your baby can see your face.
- Avoid loud noises in your baby's room. Turn your ringer off on your cell phone and close the doors to the incubator quietly. Talk, sing and read to your baby in a soft voice when they are awake; he/she will recognize your voice.
- Protect your baby from strong odors by not wearing perfume, aftershave or scented lotions.
- Ask your nurse for a scent cloth. A scent cloth is a small piece of fabric that you wear close to your skin and then it is placed with your baby. Your scent provides comfort to your baby.

Diapering

- Use containment during diaper changes to decrease stress.
- Move your baby slowly and do not raise his/her bottom above his/her head when changing the diaper.

Bathing

- Your baby may be stable enough for a swaddled tub bath.
- Hospital approved soap will be used to bathe your baby.
- You can support your baby during this time by providing containment.

Stress Signs

The following may be signs that your baby is showing stress; when you see these signs, give your baby a rest

- Changes in color (becoming pale, mottled or bluish in color)
- Changes in heart rate, blood pressure and oxygen saturations
- Changes in breathing (faster, harder, apnea or holding their breath)
- Hand splaying
- Coughing, hiccupping, yawning or gagging
- Looking away

HEAD SHAPING

- CVI
- Asymmetry
- Recommendations
- Parent education

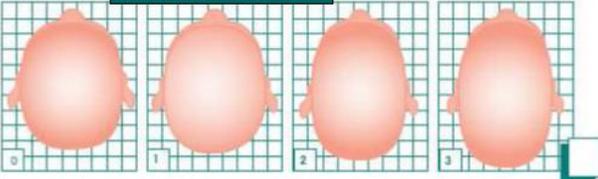
Bird's Eye View (Scaphocephaly)

Reference

CarePlan information Chart guide Nurse preparation Patient education

Severity Assessment for SCAPHOCEPHALY

Bird's Eye View



If there is a score of 2 or 3 in any of the areas, this should be discussed in rounds.

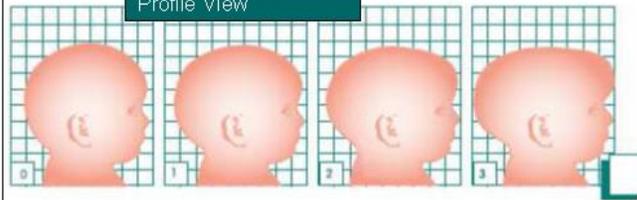
Profile View (Scaphocephaly)

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CarePlan information Chart guide Nurse preparation Patient education

Severity Assessment for SCAPHOCEPHALY

Profile View



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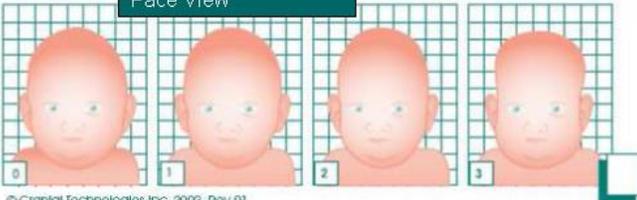
Face View (Scaphocephaly)

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Severity Assessment for SCAPHOCEPHALY

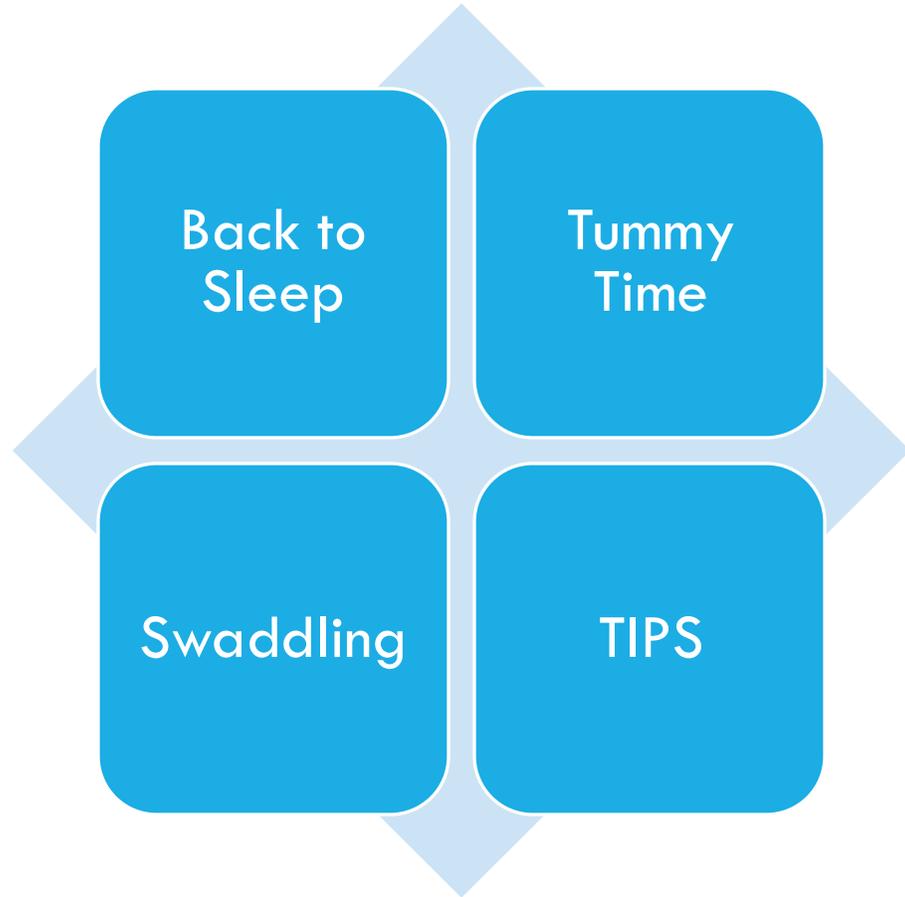
Face View



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If there is a score of 2 or 3 in any of the areas, this should be discussed in rounds.

PREPARING FOR HOME



USE YOUR RED FOLDER

<http://www.developmentaltips.com/family-stories.html>

<http://www.developmentaltips.com/for-providers.html>

TIPS



RESOURCES

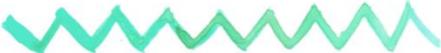
Reading List

- The Neonatal Integrative Developmental Care Model: Seven Neuroprotective Core Measures for Family-Centered Developmental Care Leslie Altimier & Raylene M. Phillips
- Core Measures for Developmentally Supportive Care in Neonatal Intensive Care Units: Theory, Precedence and Practice

Websites/app

- TIPS - <http://www.developmentaltips.com/>
- Positioning Guidelines on Department Page
- Positioning video on Department page
- NeuroProtective Guidelines on Department Page
- <https://www.cdc.gov/ncbddd/actearly/milestones/index.html>
- <https://www.zerotothree.org/>
- <https://pathways.org/>
- subscribe-babytalk@listserv.unc.edu
-  Vroom

YOU MAKE THE DIFFERENCE!



DO
small things
with
great
Love



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- Als, H., Butler, S., Kosta, S., & McAnulty, G. (2005). The Assessment of Preterm Infants' Behavior (APIB): Furthering the Understanding and Measurement of Neurodevelopmental Competence in Preterm and Full-Term Infants. *Mental Retardation and Developmental Disabilities Research Reviews*, 11(1), 94–102. <http://doi.org/10.1002/mrdd.20053>
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- Lickliter, R., Bahrick, L. E., & Vaillant-Mekras, J. (2017). The intersensory redundancy hypothesis: Extending the principle of unimodal facilitation to prenatal development. *Developmental Psychobiology*, 59(7), 910–915. <http://doi.org/10.1002/dev.21551>
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- Vida Health Communications, INC. (Producer) 2007. *Focus on the brain: Part 2: Clinical practices for special care nurseries*. United States: Children's Medical Ventures.