Objectives

• Define the significance of the golden hour
• Describe the importance of teamwork and communication before, during and after the golden hour
• Understand the unique physiologic needs of the preterm Very Low Birth Weight (VLBW) baby and measures to promote optimal outcomes

Preterm Birth Classifications

• Mild prematurity 37 to 38 weeks
• Late preterm (LPI) 34 0/7 to 36 6/7
• Very preterm < 32 weeks
• Extreme prematurity ≤ 28 weeks
Low Birth Weight Categories

- Low Birth Weight ≤ 2500 gms
- Very Low Birth Weight ≤ 1500 gms
- Extremely Low Birth Weight ≤ 1000 gms

Trends for Preterm Birth in the U.S.

U.S. preterm births rise for second year in a row

What about in California?

Percentage of live births that are preterm:

**Racial Disparity & Preterm Birth**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Preterm Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>7.7%</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7.3%</td>
</tr>
<tr>
<td>Black</td>
<td>10.9%</td>
</tr>
<tr>
<td>American Indian/Native</td>
<td>11.8%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

In California, the preterm birth rate among black women is 46% higher than the rate among all other women.

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**What is the “Golden Hour”?**

![Golden Hour Clock]

**The Golden Hour**

- **Definition**
  - Taken from shock trauma medicine indicating the critical first hour as the most important for improving survival
  - For the extremely preterm neonate, initial steps undertaken to optimize coordination and execution of care with the goal of minimizing injury and improving outcomes
Golden Hour

History of the Golden Hour

- Emergency & Trauma medicine
- WHO
  - 3 main elements (skin to skin, delayed cord clamping, early initiation of breastfeeding)
- Vermont Oxford Network (VON)
  - Expanded to include neonatal population in 1990s
  - Focused on Very Low Birthweight (VLBW) infants

The main focus of the Golden Hour

Reducing HARM

- Focus is on standardizing care to prevent complications that may have lifelong impacts, and to improve outcomes
  - Hypothermia
  - Chronic Lung Disease
  - Retinopathy of Prematurity
  - Intraventricular Hemorrhage
  - Hypoglycemia
The promise of golden hour in neonatal care lies not only in evidence-based treatment, but also in team structure, communication and proficiency.

The golden hour strategy is a philosophical approach that reinforces communication and collaboration using evidence-based protocols and procedures that standardize as many elements as possible for delivery and initial management of a very preterm birth.

It Really Does Take a Village
We Are Better, Together!
California Perinatal Quality Care Collaborative (CPQCC): Delivery Room Management

• Collaborative aims:
  • Best practice "Bundle" to improve care at high risk deliveries addressing:
    – Teamwork with use of pre-resuscitation checklists and simulation based learning
    – Optimization of respiratory care for the preterm baby
    – Maintenance of normothermia, avoidance of hypo and hyperthermia


Lee et al., 2014: Implementation methods for delivery room management: A quality improvement comparison study, Pediatrics.

• 20 hospitals in the collaborative
  • Face to face meetings, monthly webcasts, monthly open submission of data for each measure, access to expert panel

• 31 individual hospitals outside the collaborative
  • Furnished with change package, blinded data submission, access to QI experts

• 44 non participant hospitals
  • Other hospitals who report to CPQCC given change package info but not required to report data on change measures

(CPQCC): Delivery Room Management

Collaborative Outcomes

<table>
<thead>
<tr>
<th>Measure</th>
<th>Collaborative Before/After n=20</th>
<th>Individual Before/After n=31</th>
<th>Non Participant Before/After n=44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Hypothermia</td>
<td>From 39% to 21%</td>
<td>From 38% to 33%</td>
<td>From 42% to 34%</td>
</tr>
<tr>
<td>Rate of Intubation in DR</td>
<td>From 53% to 40%</td>
<td>From 44% to 36%</td>
<td>From 43% to 40%</td>
</tr>
<tr>
<td>Rate of Surfactant Administration in DR</td>
<td>From 37% to 20%</td>
<td>From 19% to 12%</td>
<td>From 18% to 10%</td>
</tr>
</tbody>
</table>
Collaborate and Communicate

- Communication is the key to our success
  - Supporting the family
  - Decision making
  - Plan of care
  - Coordination of teams: all members!

- Why so much emphasis on communication?

Sentinel Event Alert #30:
Preventing Infant Death and Injury During Delivery

2004 Joint Commission Recommendations
Sentinel Event Alert # 30

- Conduct team training in perinatal areas to teach staff to work together and communicate more effectively

- For high risk events, such as emergency cesarean delivery, conduct clinical drills and debriefings to evaluate team performance and identify areas for improvement
Teamwork
CPQCC Delivery Room Management Change Package

- Improve teamwork and communication in the delivery room using briefings, debriefings and other methods
  - At a minimum, each resuscitation requires a briefing and debriefing

Communication Tools and Strategies

- Briefs
- Huddles
- White boards
- Hand-offs
- SBAR
- Check backs
- Call outs
- Checklists
- Debriefs
- Closing the loop

CPQCC Delivery Room Management Change Package

- Use a checklist to prepare for all high risk resuscitations
Delivery room checklists/roles

- Checklists & clearly defined roles
  - Improved communication
  - Reduced adverse effects
  - Better adherence to procedures
  - Reduced morbidity & mortality

Pre-admission

- Notify team of planned admission: Obstetric MD, NNP, RN, NBP, Intake baby core staff RN to assist delivery & admit infant
- Notify pharmacy to prepare TPN from refrigeration: D5W, 25 wks, D10W, 25 wks
- When L&D calls for delivery ensure room temperature is set 77.8°F
- If infant is <25 wks, anticipate possible surfactant dosing & obtain from pharmacy (administer with D5W, head neutral, without positive changes)
- Take bath, check vitals, snuggle; ports Warren mattress, ensure transport isolates
- Stable gravis temperature & humidity (RH) is set appropriately
- Warm all lines, attach IV, & anything coming in contact with infant
- Goal is to obtain IC in L & D prior to placing CPAP cap
- Prepare ventilate CPAP at bedside including pre-moistening the ventilator with humidity
- Second RN or RT to call unit & notify when ventilation mode
- Set up the bedside for UAC/VVC insertion

Pre Delivery: In-Unit Preparation for Admission (Triage RN)
- Quick huddle/pre-brief with Bridge team to discuss resuscitation plan, roles
- OB to pend babe immediately (our docs can call them)
- Obtain estimated weight if not already known
- Have physician team write fluid orders for admission to ICN: starter TPN, ½ NS with heparin x2 (or NaAcetate with heparin x2)
- Assign zone leader, 2nd triage RN or any available RN to obtain fluids ASAP, run through the tubing and transducers and have fluids in pumps on standby at bedside
- Notify RT
Pre-Delivery: Set-Up Room Preparation

**Airway/Ventilation**
- Blender on 21% (RN, RT)
- Bulb syringe, Neoducker (premie size) attached to suction tubing (suction @ 80mm) (RN, RT)
- Correct size mask in isolette (RN, RT)
- Check bag/mask system with warm, humidified gas for initial resuscitation, ongoing hand ventilation (RN, RT)
- Noninvasive ventilation supplies present: CPAP hat/mask, Infant Flow ventilator (RT)
- Surfactant preparation (RT)

**Thermoregulation**
- Thermostat set at 80° (RN)
- PortaWarm on scale covered with cloth diaper (RN)
- Neowrap opened in isolette (RN)
- Thermal hat in isolette (supply in set up room in bin on counter) (RN)
- Check isolette temp, room temp (RN)

**Glucose Homeostasis (RN)**
- Prepare IV supplies
  - Have 2 syringe pumps at bedside
  - Aseptically prepare D10W infusion. Place onto sterile field:
    - Wet down umbilical tray and catheters (3.5Fr single and double-lumen)

---

**Reference:**
Team Roles

Resuscitation Team Roles

- **Leader:** Attending
- **Airway:** Fellow/NNP (most experienced)
- **HR:** Resident
- **VS/warmth measures:** RN #1
  - RN #1: Patient RN, Triage RN, Charge RN
- **Initial IV placement, glucose infusion:** RN #1
- **Secure airway, assist ventilation modes, surfactant:** RT
- **UAC/UVC placement:** Resident/NNP
- **Charting/Timekeeper/Assistant:** RN #2
  - RN #2: Charge RN, Triage RN

Pre-Admission at San Joaquin

- **Notify team (SCN, MD, RCP)**
- **Pre-briefing with team**
- Utilize “proposed roles” worksheet, assign roles
- Attempt to increase delivery room temperature
- Put code cart outside delivery room
- Anticipate surfactant, and obtain
- Gather equipment for delivery (hat, mattress, wrap)
- RCP: prepare CPAP, vent, intubation supplies
- In SCN: prepare for setup of umbilical lines (double lumen 3.5 UVC, single lumen 3.5 UAC)

**NDRN**
- Warm room
- Place monitor & code cart outside room
- Apply neopuff, PPV

**SCN RN**
- Prepare bed
- Apgar
- Warm, Occlusive wrap, apply double hat
- Pulse Ox
- Prepare Epi

**RT**
- Heart rate
- Prepare vent/cap
- Prepare surf
- Prepare, assist intubation

**Neo/Hosp**
- Brief Team
- Team leader
- Airway
- Prepare umbilical lines in unit
- Prepare vent/cap
- Record
- Compressions
- Call for Xray

**SCN staff**
- Other staff

Prenatal consultation

- Standardized approach with multidisciplinary team if possible
- Current ELBW outcomes nationally and at your center
- Family expectations and support for their decision

Example of Standardized Approach

“We know that babies born at this gestation have low rates of survival and those who do survive are likely to have a lot of medical problems.”

● If they wish to know statistics, a sample verbiage would be:
  o “Outcomes vary greatly between states and institutions. The numbers that will mean the most for your baby are the statistics at our hospital.”
● The statistic that we think is most important is the survival without moderate/severe impairment.

Survival without moderate/severe impairment (NEJM stats)

- **23 weeks**
  - Survival 24-37%
  - Survival without moderate or severe impairment 7%-19%
- **24 weeks**
  - Survival 47-67%
  - Survival without moderate or severe impairment 19-34%
- **25 weeks**
  - Survival 66-80%
  - Survival without moderate or severe impairment 35-52%
- **26 weeks**
  - Survival 79-86%
  - Survival without moderate or severe impairment 54-67%
### Periviability Resuscitation Checklist

**Resuscitation at limits of viability**

- **>26 weeks** – Universal resuscitation
- **25 0/7 - 25 6/7** – Resuscitation is default option, with parental choice for comfort care or resuscitation
- **24 0/7 - 24 6/7** – Do not recommend resuscitation. Parental choice for comfort care or resuscitation, based on individual risk factors, e.g. chorio, IUGR, etc.
- **23 0/7 – 23 6/7** – Strong recommendation against resuscitation. Parental choice IF meets ALL mandatory criteria to be considered:

**CRITERIA MANDATORY TO BE OFFERED RESUSCITATION AT 23 0/7-23 6/7**

- [ ] No major congenital anomalies
- [ ] No chorioamnionitis on presentation, clinical diagnosis made by obstetrics team
- [ ] Greater than 24 hours from first dose of BMZ

**RELATIVE CONTRAINDICATIONS TO RESUSCITATION AT 23 0/7 – 23 6/7, unless otherwise specified**

- [ ] within 24 hours s/p select fetal treatment procedure (i.e. Twin to twin), though all fetal treatment cases need to be discussed on an individual basis with MFM, Neonatology, and the fetal treatment team prior to fetal intervention
- [ ] multiple gestation pregnancy
- [ ] IUGR (<10%)
- [ ] Unexplained or prolonged oligohydramnios

**Preparation:**

- [ ] Joint counseling with main stakeholders:
- [ ] Portable chairs, space for multidisciplinary counseling
- [ ] In person translator, if needed
- [ ] Ensure periviability checklist is completed in Apex Problem List
- [ ] Temporizing/Supportive Measures
  - Magnesium for neuroprotection

### Pre-admission communication with OB team

- Obtain information from prenatal/OB visit
- Gestational age
- Known diagnosis
- Parental wishes
- Received steroids
- Magnesium
- Antibiotics

### Pre Delivery Communication with Obstetrical Team

- Gestational age
- Steroids
- GBS status
- Fetal/maternal risk factors
- ROM?, fluid characteristics
- Maternal fever
- Concerning fetal heart tracings
- Medications given to mother
- Discuss delayed cord clamping
Antenatal steroids

- **Antenatal use of betamethasone**
  - Improves intact survival
  - Decreases risk of intracranial hemorrhage
- **Antenatal Betamethasone for Women at Risk for Late Preterm Delivery**
  - Administered to women in labor at risk for late preterm delivery
  - Decreased need for substantial respiratory support
  - Reduced rates of:
    - Severe respiratory complications, Transient tachypnea of the newborn, Bronchopulmonary dysplasia, Surfactant use, Resuscitation

Magnesium sulfate

- ACOG statement supports use for:
  - “Fetal neuroprotection before anticipated early preterm (less than 32 weeks of gestation) delivery, and short-term prolongation of pregnancy (up to 48 hours) to allow for the administration of antenatal corticosteroids in pregnant women who are at risk of preterm delivery within 7 days.” (ACOG, 2016)
  - Significant reductions in death and/or "gross motor dysfunction"
  - Reduces the risk of cerebral palsy in surviving infants

Pre-Briefing (where can this happen?)

- What do we know about this patient?
- Plans for resuscitation (full care, comfort care, no heroic efforts)
- Review roles and responsibilities (Resident, RN, RT, Fellow, Attending)
- Ensure appropriate equipment is available
Delayed Cord Clamping (DCC)

- Recommended for premature infants to improve blood volume/transitional circulation
- Recommended for term infants to increase Hgb levels & iron stores in 1st several months of life
- Decreased RBC transfusion, necrotizing enterocolitis & intraventricular hemorrhage
- May delay resuscitation efforts:
  - special circumstances where contraindicated when concern for fetal and/or maternal safety (hemorrhage, CHD, hydrops, prolonged anesthesia etc.)

Umbilical Cord Milking (UMC)

- Similar benefits to DCC, with increased blood pressures and urine output in first 12 and 72 hours of life
- Should not interfere with resuscitation
- Less likely to develop intraventricular hemorrhage

Debriefing

- Did we have all the information we need to admit this patient?
- What did we do well (Resident, RN, RT, Fellow, Attending, in that order)
- What can we improve upon?
- How can we ensure better outcomes next time?
- Do we need follow-up on any items?
- Is charting complete?
Baby is out…
Now what??

Unique Needs of the VLBW Baby:
It’s All About Protection

- What we do during those first minutes, to hours can affect short and long term outcomes
- All systems immature and vulnerable

Effect of Prematurity on Systems

- Neuro
  - Reflexes
  - Tone
  - Autoregulation
  - Sensory overload
  - Presence of germinal matrix
  - Risk for intraventricular hemorrhage (IVH)
IVH: Intraventricular Hemorrhage

- In the developing fetus the subependymal germinal matrix is adjacent to the lateral ventricles and is highly vascular and fragile
- Area involutes by about 34 weeks gestation
- Incidence of IVH is inversely proportional to gestational age
- Greatest risk for IVH during the first 72 hours during period of greatest instability

Protecting the Brain

- Before the birth
  - Antenatal corticosteroids
  - Magnesium sulfate
- During and After the birth
  - Gentle handling
  - Head position
  - Maintaining BP in normal range
  - Avoiding things that may change cerebral blood flow
  - Developmental care
  - Delayed cord clamping

Delivery Room Management

- Developmental Concerns
  - Gentle handling (2-person handling)
  - Avoid Trendelenburg position
  - Minimize noxious stimuli
Neutral Head Position

- Head midline first 72 hours
- HOB slightly elevated
- Turning head to one side may:
  - Increase intracranial pressure → ↑ cerebral venous pressure
  - Occlude major ipsilateral veins → ↓ cerebral venous drainage
- Can be done with any type of respiratory support

IVH Risk Factors in the SCN

- Abrupt changes in cerebral circulation
- Rapid changes in PaCO2
- Rapid changes in BP
- Rapid fluid administration
- Asphyxia
- Pneumothorax
- High CPAP
- Hypomagnesemia
- Hypothermia
- Thrombocytopenia

Potentially Better Practices to Prevent Brain Injury

- Early management by a Neonatologist/Nurse Practitioner
- Antenatal steroids & magnesium
- Delivery room management
- Thermoregulation
- Respiratory management
- Minimize pain and stress
- Neutral head position
- Limit harmful medications
Best Practices: Preventing IVH

- Diaper changes **without** elevation legs
- Don’t need to fasten diaper, but rather can slide under patient for the first 2 weeks of life

Best Practices: Preventing IVH

- **No bath** first week of life
  - baths every 4 days after one week of life
  - Use sterile water only if <1000g
- **Suctioning** only PRN

Best Practices: Promoting Neurodevelopment

- **Protect sensory environment**
  - In isolette with cover
  - Provided with smells from MOB (i.e.: cloth hearts)
  - Oral care: 4 times a day with new swabs
  - Quiet!
  - lower alarm and phone volumes
  - close port holes quietly
  - suction placed on holder
  - bag off inside isolette
- **Keep lights dim**
  - No visual dim necessary until 40 weeks
  - Giraffe covers utilized properly at all times
  - Penlight used for exam
Golden Hour: Thermoregulation

- Maximize metabolic efficiency
- Reduce oxygen use
- Reduce calorie expenditure
- Reduce morbitidty

Do you know...???
A naked newborn exposed to an environmental temperature of 23°C (73.4°F) suffers the same heat loss as a naked adult in 0°C (32°F)

Facts About Hypothermia and the VLBW
- They have a larger body surface area to body mass ratio
- Decreased tone
- They lack insulating fat (brown fat)
- They lack ability to vasoconstrict
- They can lose 0.2-1°C per minute
- They have increased evaporative heat and fluid losses through thin skin
The Golden Hour & Temperature Control

CPOCC Delivery Room Management Change Package: Maintain Normal Temperature (36.5-37.5°C)

- Physiologic challenges
- Iatrogenic challenges
- Emphasis on normothermia as critical to stabilization of the VLBW

NICU Numbers

Despite Decreases, Nearly 4 in 10 Infants Are Cold When Admitted to the NICU

Temperature at NICU admission by year (excluding early deaths)

NICU Numbers

Despite Decreases, Nearly 4 in 10 Infants Are Cold When Admitted to the NICU

Distribution of admission temperature for infants in 2016 (excluding early deaths)
Delivery Room Management- thermoregulation

- Laptook, 2003
  - 5,277 infants 401-1499g
  - 14.3% had admission temps <35, 32.6% 35-35.9
  - Admission temperatures inversely related to mortality with 28% increase in death for every 1°C decrease in temperature
- Miller (CPQCC) 2006
  - 8,782 VLBW infants
  - Mean admission temperatures 36.3 (+/-) 0.8
  - 30.5% had mild hypothermia on admission
  - 25.6% moderately hypothermic associated with risk of IVH/death

The Detrimental Effects of Hypothermia

- Hypothermia causes increased glucose utilization oxygen consumption, and right to left shunting
- Hypothermia is associated with
  - Impaired immune function =↑sepsis risk
  - Impaired coagulation =↑ risk of IVH and pulmonary hemorrhage
  - Impaired surfactant production =↑ respiratory distress

The Bottom Line:
Protecting VLBW Babies from Hypothermia is as Important as...

- Immediately intubating a CDH and placing a replogle
- Protecting an abdominal wall defect
- Covering and protecting a myelo
Steps to Achieve Normothermia: Preparing for Birth

- Room temperature UP (77°F)
- Preheat radiant warmer or incubator in manual mode
- Keep side rails up to prevent convective heat loss
- Chemical mattress
- Open polyethylene wrap and lay as shown diagonally on the warmer (red lines)
- You may make cuts from lateral corners inward to create flaps for upper and lower body
- Wrap should lie directly on top of heated mattress, no linen in between

The Following Steps Should Be Done During the First Minutes Of Life:

- Maintain warmth during delayed cord clamping
- Weigh?
- Drying not necessary
- Cover head
- Attach preductal sat and temp probe
- Bed to servo control of 37°
- Wrap arms, body
- Get first temp by 5 minute Apgar then a minimum of q 5-10″ while in resuscitation room
- Transport to NICU with heat source
- Goal temp: 36.5-37.5 C or 97.7-99.5 F
- Delay bath

Into the Wrap

Baby can be softly dried/blotted with a blanket or can go into wrap without drying
Cover the Head
(You have 2 Choices)

• One:
  – Use Poly Lined Hats for the VLBWs

• Two:
  – Cover head with wrap, then apply hat

Wrap!

Monitoring and Ongoing Care
Monitoring

- Turn on oximeter, attach preductal sat monitor to right hand/wrist, then plug into cable

Leads

- Leads/Restraints prevent flexion and conservation of heat
- Babies can be initially monitored with pulse oximeter and a temp probe
- Heart rate will be displayed and respirations can be counted
- Leads can still be used but do not need to be set up on restraints except for temp probe

Transport Back to NICU... what is the practice?
Setting Isolette Temp for NTE

- Go to Comfort Zone
- Enter
  - Weight
  - GA
  - Day of life
- Your range will be displayed
- Use humidity for babies <750 gms
- Always use “air boost” feature when opening isolette door or top

Temperature Interventions

- Document ambient temperature necessary to maintain optimal body temp
- Assess carefully for cause of changes in temperature
  - Primary thermo-regulation vs. sepsis, respiratory issues, hypoglycemia
- Warm consistently: incubator, servo-control, monitor NTE
- Notify provider of episodes of hypothermia
CPQCC Delivery Room Management Change Package:

Obtain pulse oximetry reading by 2 minutes of life and continuously monitor the heart rate and oxygen saturation

Pulse Oximetry

- Monitor O₂ saturations and HR, response to interventions
- Place preductally (right hand or wrist)
  - try placing warm pack to help reading
- Functional after 60-90 secs: place immediately
- Use blended oxygen
- Wean as tolerated
Targeted Oxygen Saturation: What is the Significance of Preductal Saturation?

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Targeted Preductal SpO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60-65%</td>
</tr>
<tr>
<td>2</td>
<td>65-70%</td>
</tr>
<tr>
<td>3</td>
<td>70-75%</td>
</tr>
<tr>
<td>4</td>
<td>75-80%</td>
</tr>
<tr>
<td>5</td>
<td>80-85%</td>
</tr>
<tr>
<td>10</td>
<td>85-90%</td>
</tr>
</tbody>
</table>

Oxygen: Too Much of a Good Thing?

History of Oxygen Use for Neonates: 1940’s and 1950’s

- Ability to administer free flow oxygen into incubators
- 10,000 cases of blindness related to Retinopathy of Prematurity (ROP) over 12 year period
- Recommendation to use O2 only for cyanosis reduced rates of ROP from 50% in 1950 to 4% in 1965
The Concept of Oxygen Toxicity

▪ Is it the amount of oxygen delivered?
▪ Is it the length of exposure?
▪ Arterial oxygen fluctuation?
▪ What are the optimal saturations?
  • 85-92%?
  • 88-93%?

Dangers of Hyperoxia for the Preterm Baby

▪ How much is too much?
▪ Effects of hyperoxia
  • Oxidative cell damage
  • Bronchopulmonary dysplasia
  • Retinopathy of prematurity

Oxygen Associated Risk Factors in the Development of ROP

Pollan, 2009
Oxygen therapy

- Most commonly used drug in neonatal care
- No concentration is “safe”
- Use blender, analyzers
- Continuous monitoring (HR, sats)
- Humidify, warm
- Maintain stable delivery, concentration
- Wean with continuous monitoring

Golden Hour & The Lungs

- Impaired cardiorespiratory transition
- Respiratory distress syndrome (RDS)
  - What is it?
  - Incidence
  - Immediate concerns
  - The role of surfactant

Protecting the Lungs

- Antenatal corticosteroids
- Gentle ventilation
- The role of surfactant
- Prevention of infection (early and late onset)
- Avoidance of:
  - Barotrauma
  - Volutrauma
  - Hyperoxia
Delivery Room Management

- **Respiratory**
  - Stable non-invasive support
  - Skilled intubator if needed
  - Surfactant ready if needed
  - Maintenance of FRC
  - Pulse ox on right wrist/hand (pre-ductal)
  - Optimal FiO2 administration

<table>
<thead>
<tr>
<th>Targeted Postnatal SpO2 After Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min</td>
</tr>
<tr>
<td>2 min</td>
</tr>
<tr>
<td>3 min</td>
</tr>
<tr>
<td>4 min</td>
</tr>
<tr>
<td>5 min</td>
</tr>
<tr>
<td>10 min</td>
</tr>
</tbody>
</table>

CPQCC Delivery Room Management Change
Package: Optimize Initial Respiratory Support

- **Ventilatory strategies**
  - Early use of CPAP
  - Avoid intubation (if possible)
  - Avoid prophylactic administration of surfactant in the delivery room

CPQCC: To Surf, or Not to Surf?

- In addition to communication and use of pulse oximetry, CPQCC wanted to measure the number of VLBW and ELBW infants receiving surfactant in the delivery room.
- **GOAL:** ZERO (0)
- Why???
  - Introduce early initiation of CPAP.
  - Verify ETT placement prior to administration.
  - Provide a more controlled environment to manage any adverse effects post-surfactant.
Respiratory-Functional Residual Capacity (FRC)

Movie 1 - Time-lapsed phase contrast X-ray image sequence, showing the effect intermittent positive pressure ventilation (PPV) without a positive end-expiratory pressure (PEEP), on lung aeration at birth.

http://neoreviews.aappublications.org/highwire/filestream/18026/field_highwire_adjunct_files/0/Movie1_PPV_no_PEEP.mov

Movie 2 - Time-lapsed phase contrast X-ray image sequence, showing the effect intermittent positive pressure ventilation (PPV) with 5 cmH2O of positive end-expiratory pressure (PEEP), on lung aeration at birth.

http://neoreviews.aappublications.org/highwire/filestream/18026/field_highwire_adjunct_files/1/Movie2_PPV_with_PEEP.mov

Keeping PEEP on your mind…

When should we think about PEEP & FRC?
- Suctioning
- Removal of CPAP for skin checks
- For patient comfort
- Positioning
- During extubation
  - Apply CPAP before extubation

Optimizing Respiratory Management
- Volume strategy shown benefit
- Avoid hypocapnia
  - Hypocarbia & long-term effects
    - Cerebral vasoconstriction
    - ↑ poor outcomes, ↑ death,
      ↑ disability
    - ↑ PVL, ↑ CP, ↑ neuro deficits
- Avoid chest physiotherapy
- Avoid routine suctioning
Delivery Room Management

- Nutrition/Glucose
  - IV fluids started within 30 minutes of life*
    - 4-7mg/kg/min
    - 80 mL/kg/day
  - Starter TPN within 1 hour*
  - Preemies have very limited energy stores
  - Deposition of adipose tissue occurs in final weeks of pregnancy
  - Neonatal glucose concentration decreases quickly after birth
  - Glucose and protein are needed soon after delivery

---

Glucose Homeostasis

- ASAP once airway established, place PIV. Limit to 2 attempts, notify MDs if unsuccessful (RN #1)
- When PIV secured, start D10W infusion at ordered rate (if no PIV, infuse into UVC when placed) (RN #1)
- Proceed to umbilical line placement ASAP once airway established (MD/NNP)
- Glucose at 10 mins of life (preferably when IV access is achieved), then at 30mins and 1 hour (or immediately after D10 bolus if needed) (RN #1)

---

The Threshold of Viability

- Extreme preterm birth rates relatively unchanged
- More therapies available
- Survival has increased
- Lower gestational ages being resuscitated (22-24 weeks)
- Coordinated, specialized care essential to improve short and long term outcomes
Ongoing Care

- Support all systems
  - Cardiovascular
  - Metabolic needs
  - Feeding
  - Skin care
  - Neurodevelopmental care
  - High risk infant follow up
  - Family participation/integrated care

"Everything Matters"
Dr. Heidelise Als

Everything Matters!!

Utilizing Golden Hour policies and protocols may help improve outcomes and reduce morbidity and mortality

- Taking steps to prevent sequelae from
  - Hypothermia
  - Chronic Lung Disease
  - Retinopathy of Prematurity
  - Hypoglycemia
  - Intraventricular Hemorrhage

Take care of our tiniest brains!!
Questions?
Thank You For Coming!!
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