Golden Hour Part I:  
Delivery Room Management

MAYA BALAKRISHNAN, MD
FPQC GOLDEN HOUR PART I PROJECT CHAMPION
UNIVERSITY OF SOUTH FLORIDA
ASSISTANT PROFESSOR OF PEDIATRICS
DIVISION OF NEONATOLOGY

FPQC NEONATAL MEETING
10/2013
Objectives

1. Discuss FPQC leadership & its role in this initiative

2. Discuss evidence-based measures in Delivery Room (DR) management
   - Teamwork
   - Thermoregulation
   - Oxygen administration
   - Delayed cord clamping

3. Discuss current status of Golden Hour initiative
Quality Collaborative Function

- 1 Neonatology & 1 Obstetric project each year
- Each hospital develops & implements *individualized* guidelines
- Minimum data collection required
- FPQC electronic data collection & analysis
- Provide coaching & reports
FPQC Leadership:
J. Curran, B. Sappenfield, L. Detman
D. Hardy, M. Balakrishnan

OB Project: Postpartum Hemorrhage

Neonatology Project: Golden Hour Part I: Delivery Room management project

Quality Leader:
Terri Ashmeade

Project Sponsor:
Maya Balakrishnan
Selection of Pilot Hospitals

• Participate in FPQC
• Deliver babies with
  • GA ≤ 30 6/7 wks
  • anticipated BW ≤ 1500g
• Expressed interest in participation

Looked for variety in:

• # births
• extent of existing quality infrastructure
Selection of Pilot Hospitals

ACADEMIC
USF/TGH
ACH/Johns Hopkins

NON-ACADEMIC
St. Joseph’s Hospital
Baptist Hospital Miami
Florida Hospital Tampa
Pilot Hospital Teams

Core team
Minimum of 4 members

- Administrative Lead
- Physician Lead
- Nurse Lead
- Data Lead

Each hospital has a multidisciplinary team

Consider involvement:

- Respiratory therapy
- Pharmacy
- Nursing (e.g. charge nurses, transport/delivery team nurses, nurse practitioners)
- Labor & Delivery
The Golden Hour

- Transition from fetal $\rightarrow$ neonatal life
  - Many complex physiologic changes

Interventions in this time period may affect:
- Short term morbidities (e.g. thermoregulation, hypoglycemia)
- Long term morbidities (e.g. CLD, ROP, IVH)
- Mortality

*While there is no direct causation, studies show a strong association*
Quality Improvement Suggests…

- Management of Golden Hour could be:
  - Standardized
  - Evidence-based practices
  - Multidisciplinary team approach

- Goal in GA $\leq 30$ 6/7 wks OR anticipated BW $\leq 1500$ g
  - More efficient care at delivery & immediate post-delivery period
  - Improve short & long term outcomes
FPQC Golden Hour Project Proposal

Value of Golden Hour Quality Initiative
- Clinically important in neonatology
- There exists potential for process & quality improvement
- Specific & measurable process & outcome measures
- Some measures taken can potentially affect all babies

Golden Hour Part I:
Addresses Delivery Room management

Golden Hour Part II:
Addresses immediate post-delivery management
Background

Standardized DR practices aimed at:

- enhancing teamwork
- maintaining normothermia
- avoidance of hyperoxia/hypoxia
- delaying umbilical cord clamping

→→ improved outcomes in VLBWs
Evidence-Based Measures in DR Management

1. **TEAMWORK**

2. **THERMOREGULATION**

3. **OXYGEN ADMINISTRATION**

4. **DELAYED CORD CLAMPING**
Teamwork

- Communication errors identified as root cause of ~72% of perinatal deaths & injuries

  **Consistent, scripted care has shown benefit**

- Nonmedical fields (e.g. aviation, nuclear energy, military)
- Medical fields (e.g. CV surgery, emergency, trauma)

*Principles learned from these fields are used in Golden hour management*

Teamwork benefits the NICU

- Planning/scripting of roles/tasks
  - Communication, timeline, SIM training

- Established goals with resuscitation & early management strategy helps
  - Communication in multidisciplinary team
  - Allow for feedback & education
  - Facilitates coordination & consistency among providers
  - Prevents avoidable errors


*VON does not capture any measure for teamwork*
By 12/2014 pilot hospital sites will implement a specific DR management plan for infants with GA ≤30 6/7 wks OR anticipated birth weight ≤1500 g with the goals of:

>50% of DR teams having assigned roles

>50% of DR teams with team debriefings w/in 4 hours of delivery
Evidence-Based Measures in DR Management

1. TEAMWORK
2. THERMOREGULATION
3. OXYGEN ADMINISTRATION
4. DELAYED CORD CLAMPING
Effects of Hypothermia & Hyperthermia

**RS**
- Pulmonary vasomotor tone
- Difficult resuscitation
- O₂ consumption / RR

**CVS**
- Low BP
- Delayed transition

**CNS**
- Cerebral blood flow

**Metab**
- Low glucose
- Lactic acidosis
- Water losses
- Late onset sepsis
- IVH
-  Mortality

Hyperthermia associated w/cardio-respiratory compromise & lethargy
Thermoregulation

A naked infant at room temperature can burn 150 kcal/min\(^1\)

- VLBWs are vulnerable to cold stress
- Many studies show small babies w/ low GA are at risk
- Maintaining VLBW in neutral thermal environment significantly reduced mortality\(^2\)

Admission Temperature

Goal temperature: 36.5-37.5°C

- Temp <36°C: 20%
- Temp 36.0-36.4°C: 25.3%
- Temp 36.5-37.0°C: 36%
- Temp >37°C: 18.8%

~50% of VLBWs have a low admission temperature

FPQC 2012 Data (n=2,294)
By 12/2014 pilot hospital sites will implement a specific DR management plan for infants with
GA ≤30 6/7 wks OR anticipated birth weight ≤1500 g with the goal of:

≥75% of infants with a NICU admission temperature of 36.5°-37.5°C
Evidence-Based Measures in DR Management

1. TEAMWORK
2. THERMOREGULATION
3. OXYGEN ADMINISTRATION
4. DELAYED CORD CLAMPING
Dangers of Hypoxia & Hyperoxia

Hypoxia

O2 free radicals

Brain

Lungs

Mortality

Hyperoxia

Oxidative stress

CLD

ROP
**NRP Recommendations**

6th Edition

- DR goals mirror expected O2 saturation increases from fetal levels

- Same goals apply to preterm & term infants

<table>
<thead>
<tr>
<th>Titrate FiO2 to maintain pre-ductal O2 sats:</th>
<th>1 min</th>
<th>60-65%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 min</td>
<td>65-70%</td>
</tr>
<tr>
<td></td>
<td>3 min</td>
<td>70-75%</td>
</tr>
<tr>
<td></td>
<td>4 min</td>
<td>75-80%</td>
</tr>
<tr>
<td></td>
<td>5 min</td>
<td>80-85%</td>
</tr>
<tr>
<td></td>
<td>10 min</td>
<td>85-95%</td>
</tr>
<tr>
<td></td>
<td>&gt;10 min</td>
<td>follow unit protocol</td>
</tr>
</tbody>
</table>

*VON does not capture compliance w/NRP O2 administration standards*
# Respiratory Care

<table>
<thead>
<tr>
<th></th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR oxygen</td>
<td>84% (2,248)</td>
</tr>
<tr>
<td>DR CPAP</td>
<td>29% (2,249)</td>
</tr>
<tr>
<td>DR surfactant</td>
<td>29% (2,248)</td>
</tr>
<tr>
<td>CLD</td>
<td>23% (2,000)</td>
</tr>
</tbody>
</table>

VON FPQC data 2012
By 12/2014 pilot hospital sites will implement a specific DR management plan for infants with GA ≤30 6/7 wks OR anticipated birth weight ≤1500 g with the goal of:

≥50% compliance with NRP oxygen targets (85-95%) at 10 minutes of life
Evidence-Based Measures in DR Management

1. TEAM WORK
2. THERMOREGULATION
3. OXYGEN ADMINISTRATION
4. DELAYED CORD CLAMPING
Delayed Cord Clamping

Delayed Cord Clamping is endorsed

WHO
American College of Obstetricians & Gynecologists
Society of Obstetricians & Gynecologists of Canada
European Association of Perinatal Medicine
International Liaison Committee on Resuscitation

• Preterms: 30-60 seconds
• Offers potential transfusion benefit
  ▪ C-sections: 5-15 ml/kg
  ▪ Vaginal births: 10-30 ml/kg
### Delayed Cord Clamping

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Perceived Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased Hb</td>
<td>• Increased Tbilirubin*</td>
</tr>
<tr>
<td>• Decreased transfusions</td>
<td>• Increased phototherapy*</td>
</tr>
<tr>
<td>• Increased systemic BP</td>
<td>• Polycythemia*</td>
</tr>
<tr>
<td>• Decreased incidence IVH</td>
<td>• Urgency of resuscitation#</td>
</tr>
<tr>
<td>• At 1 y/o: Increased Hb, serum ferritin, &amp; iron stores</td>
<td>• Temperature on NICU admission#</td>
</tr>
</tbody>
</table>

*Inconsistent results in multiple studies.*

# no significant difference in Apgars, cord pH, NICU admit temp. degree of respiratory distress
FPQC 2013 Data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Any IVH</td>
<td>25.4%</td>
</tr>
<tr>
<td>Severe IVH</td>
<td>9.3%</td>
</tr>
</tbody>
</table>

FPQC 2012 Data (n=2013)
By 12/2014 pilot hospital sites will implement a specific DR management plan for infants with GA $\leq 30\ 6/7$ wks OR anticipated birth weight $\leq 1500$ g with the goal of:

$\geq 50\%$ compliance with delayed cord clamping for 30-60 seconds
Project Aims

- GA ≤30 6/7 wks OR anticipated birth weight ≤1500 g
  - 5 pilot sites, x 5-15 infants/month at each site ➔ ~1,000 infants
- DR team notified of delivery ➔ NICU admission
- QI cycles from 10/2013 to 12/2014
  1. >50% of DR teams having **assigned roles**
  2. >50% of DR teams w/debriefings w/in 4 hours of delivery
  3. ≥75% w/NICU admission temperature of 36.5°-37.5°C
  4. 50% w/NRP oxygen targets (85-95%) at 10 minutes of life
  5. ≥50% w/delayed cord clamping for 30-60 seconds
Timeline

- 3/2013
  - FPQC annual conference
  - Presented Golden Hour QI project
- 5/2013
  - FPQC leadership selected Golden Hour initiative
- 7/2013
  - Recruited 5 pilot NICUs
  - Pilots developed multidisciplinary improvement teams
  - Project charter signed
  - Hospital CEO letters signed
Timeline

8/2013

- Pilots process mapped their site’s DR process
- Developed evidence-based DR toolkit
Potentially Better Practices | Supporting Evidence
--- | ---
**TEAM WORK & ANTENATEAL MANAGEMENT**
FPQC goal: Develop and utilize a specific delivery room (DR) management plan in infants with GA ≤ 30 6/7 wks or anticipated BW ≤ 1500 g who are admitted to the NICU to facilitate: 1. Pre-defined DR team roles assigned in ≥ 50% of deliveries, 2. DR team debriefings within 4 hours of delivery in ≥ 50% of infants.

Organize DR care as you would NICU care:
Determine your hospital’s process for DR management. Useful quality improvement methodologies include:
- Scripting
- Process mapping (e.g., fishbone diagrams, value stream mapping)
- Lean thinking approach (i.e., increase efficiency, reduce waste in time/materials)
- Evaluation of process parameters

Utilize a standardized, scripted, multi-disciplinary approach to enhance coordination and guidance of initial management for all newborn infants.

Premature and very low birth weight (VLBW; ≤ 1500 g) infants have unique requirements for effective transition from fetal to extra-uterine life. They are at increased risk for severe hypothermia and respiratory failure, which significantly increases the risk of morbidities and mortality. Creation of a DR environment that closely mimics the NICU, appropriate preparation, and effective interventions decreases these risks.¹

The resuscitation and initial stabilization of newborn infants is a transition consisting of several discrete processes that require coordination of personnel and equipment. Events occurring during this transition can affect immediate survival and long-term morbidity. A coordinated team effort improves outcomes.²
Timeline

8/2013

- Pilots process mapped their site’s DR process
- Developed evidence-based DR toolkit
- Consensus on data and improvement measures
| Study ID #: | 
| FPQC Golden Hour Part I QI Data Collection Sheet |
| (Complete for those who have birth GA ≤ 30 6/7 wks OR anticipated BW ≤ 1500 g AND survives to NICU admission) | 
| Birth weight (whole number) | grams | Gestational age (mask data source) | weeks | days |
| Delivery type | □ vaginal □ C-section | Delayed cord clamping after delivery (30-60 seconds) | □ yes | □ no | 1st Hct: ___% (one decimal) |
| Date of birth (MM/DD/YY) | / / | Time of birth: (military time) | 
| Apgar score at 5 minutes | | Time of NICU admission: (military time) | 
| Resuscitation required any chest compressions | □ yes □ no | Resuscitation required ET or IV epinephrine | □ yes □ no |
| Pre-delivery DR preparation (check all that apply) | □ Delivery team briefing prior to anticipated delivery | □ Equipment check prior to delivery | □ Radiant warmer turned to 100% heat prior to delivery |
| Method of temperature regulation used (check all that apply) | □ Attention paid to ambient room temperature | □ Chemical warming mattress activated prior to delivery | □ Hat applied to baby's head within 2 minutes of life | □ Polyethylene wrap applied to baby within 2 minutes of life |
| Temperature on NICU admission | °C | °F | □ axillary □ rectal □ other: |
| Monitoring supplemental oxygen use (whole numbers) | Pulse ox probe on RUE & connected to oximeter w/in 2 min of life: □ yes □ no | Pre-ductal oxygen saturation at 10 minutes of life: % | FiO2 at 10 minutes of life: % |
| DR team roles (check all that apply) | Team leader: □ yes □ no | Circulation: □ yes □ no |
| Airway: □ yes □ no | Scribe: □ yes □ no |
| Other: | |
| Timing of DR debriefing | □ within 4 hours of resuscitation | □ after 4 hours of resuscitation | □ no debriefing |
| Name 1-3 opportunities for improvement discussed in debriefing: | 1) | |
| 2) | |
| 3) | |
| Other comments: | |

All data collected in this document strictly is for quality improvement purposes only and is not part of the baby's medical record.
Tentative Goals

8/2013

- Pilots process mapped their site’s DR process
- Developed evidence-based DR toolkit
- Consensus on data and improvement measures
- Developed FPQC database to provide monthly reports
- Submitted IRB for FPQC database
Study NICU ID?

- All Children's Hospital/Johns Hopkins Medicine, St. Petersburg
- Baptist Hospital, Miami
- Florida Hospital, Tampa
- St. Joseph's Hospital, Tampa
- University of South Florida/Tampa General Hospital, Tampa

Study Neonate ID#? (Unique 3 digits starting with 001 and upwards)

Birth Weight? (Grams in whole numbers)

Gestational Age?

  Weeks
  Days
Timeline

- Submitted ABP MOC credit application
- Data Use Agreements signed
- Developed Project listserv
- Developing FPQC project mini-site
- Pilot sites
  - developed DR management guidelines
  - start baseline data collection
- FPQC neonatal meeting

9/2013

10/2013

- TeamSTEPPS training webinar
- Baseline data entry into FPQC database
• Pilot sites enter data monthly
• FPQC provides coaching & monthly benchmarking reports
Facilitating communication

- Project newsletter monthly
Facilitating communication

- Project newsletter Qmonthly
- Project leader will make Qmonthly calls to site leaders
- Quarterly conference calls between sites
- Project listserv
  - contact mbalakri@health.usf.edu to be included
- FPQC project mini-site to share materials/tools
Facilitating QI education

- Monthly quality focus in newsletter
- Webinars
  - quality improvement, CUSP training, TeamSTEPPS training

TeamSTEPPS Training Webinar

Laura Haubner, MD, CPHQ, CHSE will be presenting our first webinar on application of TeamSTEPPS methodology to the Golden Hour in October 2013 (date and time to be announced). Dr. Haubner is an Associate Professor in the Division of Neonatology at USF’s College of Medicine. She is a TeamSTEPPS master trainer. The webinar will include discussion on the following topics:

- Team structure, critical aspects of teamwork, and the importance of a shared mental model
- Discuss communication techniques and strategies for briefing, huddles, and debriefing
- Golden hour applications for leadership, mutual support, situation monitoring, & communication.

Please contact her at haubner@health.usf.edu if you are interested in having Dr. Haubner visit your site for more intensive TeamSTEPPS training.
Why Participate?

- Improve the quality and consistency of care
- Improve health outcomes in a vulnerable population
- Foster teamwork
- Develop your hospital’s quality infrastructure
- Receive ABP MOC credit
Contact Maya Balakrishnan at mbalakri@health.usf.edu if your site is interested in joining our efforts.