AAP Guidelines: Levels of Neonatal Care
Brief Housekeeping Notes

• Press *6 to mute/ummute your line
• To submit questions throughout the call, type your question in the chat box at the lower right-hand side of your screen.
Housekeeping Notes Cont.

**Recording**

- Today’s webinar will be recorded

- The recording will be available on the AMCHP website at **www.amchp.org**
Objectives

• Define perinatal regionalization and discuss its implications for infant care
• Provide overview of the new AAP Guidelines on Levels of Neonatal Care
• Describe the practical implications of the Guidelines for clinicians and public health providers
Featuring:

• **CAPT Wanda Barfield, MD, MPH, FAAP**
  Division of Reproductive Health
  National Center for Chronic Disease Prevention and Health Promotion
  Centers for Disease Control and Prevention

• **Lu-Ann Papile, MD, FAAP**
  Indiana University School of Medicine
  Chair, Committee on Fetus and Newborns
  American Academy of Pediatrics
Levels of Neonatal Care

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Association of Maternal and Child Health Programs Webinar
December 7, 2012
U.S. Trends in Neonatal Mortality: Advances in Intensive Care

*NMR=neonatal mortality rate: # deaths to infants <28 days/1,000 live births
Infant, Neonatal and Postneonatal Mortality Rates
United States, 2000-2011

Infant mortality rates by State:
United States, 2010

More than 8.00
7.00 to 7.99
6.00 to 6.99
5.00 to 5.99
Less than 5.00

U.S. rate = 6.15

Source: National Vital Statistics System, NCHS, CDC
Framework: Levels of Neonatal Care

- Toward Improving the Outcome of Pregnancy (I, II)
- AAP Committee on Fetus and Newborn and ACOG/AAP Guidelines for Perinatal Care
  - Objective: Develop nationally applicable uniform definitions based on the capability of facilities to provide increasing complexity of care
- Healthy People 2010/MCHB Performance Measure #17; HP2020 MICH 33
Improving Outcomes: Provision of Risk Appropriate Care

Evidence: risk of for very-low birth weight/very preterm infants at non-level III facilities

- Review of 30 years of evidence on perinatal regionalization
- 104,944 VLBW infants
  - VLBW (≤1500g) infants (37 studies)
    - OR 1.62, 95% CI 1.44-1.83
  - ELBW (≤1000g) infants (4 studies)
    - OR 1.64, 95% CI 1.14-2.36
  - Very Preterm (≤32 weeks) infants (4 studies)
    - OR 1.55, 95% CI 1.21, 1.98

Lasswell, Barfield, Rochat, Blackmon. *JAMA 2010*
Meta-Analysis of High Quality Publication on VLBW Infants

Figure 3. Meta-analysis Results of Adequate- and High-Quality Publications on Very Low-Birth-Weight (VLBW) Infants, Stratified by Level of Adjustment for Confounding

<table>
<thead>
<tr>
<th>Source</th>
<th>Adjustment for Confounding: Case Mix</th>
<th>Level Comparison</th>
<th>Lower Levels</th>
<th>Level III</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>Z Value</th>
<th>Favors Lower-Level Hospitals</th>
<th>Favors Level III Hospitals</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paneth et al, 1982</td>
<td>II vs III</td>
<td>602/1083</td>
<td>423/869</td>
<td>1.32 (1.08-1.62)</td>
<td>2.68</td>
<td>.01</td>
<td>&lt;.001</td>
<td>.01</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Gortmaker et al, 1985</td>
<td>I and II vs II</td>
<td>708/1771</td>
<td>508/2382</td>
<td>1.30 (1.14-1.48)</td>
<td>3.96</td>
<td>.48</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sanderson et al, 2000</td>
<td>II + vs III</td>
<td>15/88</td>
<td>292/2038</td>
<td>1.23 (0.70-2.17)</td>
<td>0.71</td>
<td>.16</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Bode et al, 2001</td>
<td>II vs III</td>
<td>929/2266</td>
<td>2517/14479</td>
<td>2.06 (1.82-2.33)</td>
<td>11.39</td>
<td>.02</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Kamath et al, 2008</td>
<td>I and II vs II</td>
<td>757</td>
<td>1459</td>
<td>1.85 (2.31-1.22)</td>
<td>6.41</td>
<td>.01</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
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<tr>
<td>Combined estimate</td>
<td>Test for heterogeneity: Q = 31.56; P &lt; .001</td>
<td></td>
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</tr>
<tr>
<td>Adjustment for Confounding: Extensive</td>
<td>Verloove-Vanhoek et al, 1988</td>
<td>II vs III</td>
<td>83/359</td>
<td>125/482</td>
<td>1.90 (1.11-3.24)</td>
<td>2.36</td>
<td>.02</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cifuentes et al, 2002</td>
<td>II vs III</td>
<td>1414</td>
<td>2472</td>
<td>2.37 (1.65-3.40)</td>
<td>4.68</td>
<td>.21</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Bacak et al, 2005</td>
<td>I and II vs II</td>
<td>232/545</td>
<td>570/1127</td>
<td>1.50 (1.11-2.02)</td>
<td>2.66</td>
<td>.02</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Howell et al, 2008</td>
<td>I and II vs II/IV</td>
<td>1626/11781</td>
<td></td>
<td>1.23 (0.89-1.70)</td>
<td>1.25</td>
<td>.01</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
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<tr>
<td>Combined estimate</td>
<td>Test for heterogeneity: Q = 7.60; P = .06</td>
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<tr>
<td>Overall: all adequate- and high-quality VLBW studies</td>
<td>Test for heterogeneity: Q = 39; P &lt; .001</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Lasswell, Barfield, Rochat, Blackmon. JAMA 2010
Provision of Risk Appropriate Care

States regulate health care services and facilities
• License hospitals
• Promulgate State Health Plans/Regulations
• Approve facility expansion and construction
• Implement Title V programs ($)

Many States have not met MCHB/HP 2010 goal of 90% VLBW infants delivered in level III facilities

Blackmon, J Perinatol, 2009; Nowakowski, MCHJ 2009
Percent of VLBW Infants Delivered in Level III NICU

Delivered in NICU (%)
- 45.1% - 73.9%
- 74% - 81.4%
- 81.5% - 87.8%
- 87.9% - 99.8%

Source: MCHB, Title V Information System, 2009
State Definitions and Criteria of Neonatal Services Study*

- States regulate health care services and facilities
  - License hospitals
  - Promulgate State Health Plans
    - Distribution of services
    - Allocation of resources
  - Approve facility expansion and construction
  - Implement Title V programs
    - Certification of specialty services
    - Reimburse for specialty care

*Blackmon, Barfield, Stark J Perinatol 2009
Methods

- Systematic search of websites for all 50 states and DC (2008)
  - Regulations for hospital licensure
  - Regulations for Certificate of Need
  - State health facility planning documents
  - State MCH funded patient services or programs
  - Publications by affiliated non-governmental state perinatal health entities

*Blackmon, Barfield, Stark J Perinatol 2009
Definition Criteria: Levels Designation

• Specific language to designate multiple patient care services (not physical facilities or units)
• Multiple care levels described
• Description of graduated requirements of complexity of care or capabilities of intensity of care

*Blackmon, Barfield, Stark J Perinatol 2009*
Results: Designations of Levels of Care

Defined levels of neonatal services
Named facilities but do not meet definition
Lack defined levels

*Blackmon, Barfield, Stark J Perinatol 2009
Results: Functional Criteria

• 25 states use one or a combination of:
  – Population characteristics such as BW or gestational age (most often < 1.5 kg or <28 or <32 weeks)
  – Respiratory care – supplemental O2 concentration or duration; mode of ventilation or duration
  – Neonatal surgery, cardiac surgery, ECMO

• 8 states use non-specific terms (eg mild, moderate, severe) that limit objectivity

*Blackmon, Barfield, Stark J Perinatol 2009
Results: Utilization Criteria

• 18 states have one or more requirement:
  – Capacity: Minimum number of bed type per unit or per population base
  – Volume: Deliveries or live births per year
  – Occupancy: average daily census or percent capacity
  – Case Mix:
    • VLBW admissions, VLBW patient days, ventilator days, or surgeries per year

*Blackmon, Barfield, Stark J Perinatol 2009*
## Results: Compliance Criteria

<table>
<thead>
<tr>
<th>Compliance Measures</th>
<th>License Renewal</th>
<th>CON/SHP Approval</th>
<th>SHD/Affiliated Program Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of States</td>
<td>18 total</td>
<td>14 total</td>
<td>14 total</td>
</tr>
<tr>
<td></td>
<td>10 exclusively</td>
<td>4 exclusively</td>
<td>9 exclusively</td>
</tr>
<tr>
<td>Renewal</td>
<td>1-5 yrs</td>
<td>Initial application</td>
<td>1-5 yrs</td>
</tr>
<tr>
<td></td>
<td>MF*: annual</td>
<td>only</td>
<td></td>
</tr>
<tr>
<td>Mandated Reporting</td>
<td>11 states</td>
<td>7 states</td>
<td>2 states; regional centers only</td>
</tr>
<tr>
<td>On-site Inspections</td>
<td>4 initial; 7 episodic</td>
<td>2 states</td>
<td>7 states; 3 regional centers only</td>
</tr>
<tr>
<td>Self Designation</td>
<td>1 state</td>
<td>1 state</td>
<td>4 states</td>
</tr>
</tbody>
</table>

*MF = Most Frequent
Results: Funding of Level 3 Care

• Funding Linkage for Level III/Subspecialty Care:
  – Total: 13 States
    • 7 with neonatal care levels definitions
    • 6 without neonatal care levels definitions
    • 4 specify funding for maternity care
• Funding source for patient care:
  – Medicaid, 11 states
  – MCH (Title V), 2 states
• Funding for regional program activities:
  – 3 states
Impact of AAP on State Regulations

- 22 states cite AAP documents as a source or incorporate by reference
- Guidelines for Perinatal Care – 17 states
- Neonatal Resuscitation Program – 4 states
- 2004 COFN Levels of Care Policy Statement
  - Resource for updates in 3 states and for VLBW outcome survey in 1 state
Scheduled for publication in 2012

Editors
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Lu-Ann Papile (AAP)
Levels of Neonatal Care

• Level I
• Level II A
• Level II B
• Level III A
• Level III B
• Level III C

• Level I
• Level II
• Level III
• Level IV
Level I (basic)

GPC 6\textsuperscript{th} and 7\textsuperscript{th} Edition

- Provide neonatal resuscitation at every delivery, as needed
- Provide care for infants born at 35-37 weeks who are physiologically stable
- Stabilize infants born <35 weeks or who are ill until transfer to a higher level of care facility
Level II (Specialty Care)

GPC 6\textsuperscript{th} and 7\textsuperscript{th} Edition

- Provide care for infants $\geq 32$ weeks or $\geq 1500$ grams who have physiological immaturity (e.g. apnea, inability to feed orally) or who are moderately ill with problems that are expected resolve rapidly and are not anticipated to need subspecialty services on an urgent basis.

- Provide convalescent care after intensive care
Level II (Specialty Care)

GPC 6th Edition
- IIA – assisted ventilation on a limited basis
- IIB – mechanical ventilation for ≤24 hours or CPAP

GPC 7th Edition – Combined II A and II B
- II -assisted ventilation for ≤24 hours or CPAP
Level II (Specialty Care)

GPC 6th and 7th Edition

- Personnel and equipment continuously* available:
  - neonatologists, NNPs
  - specialized nurses, respiratory therapists
  - radiology and laboratory technicians
  - portable x-ray machine
  - blood gas analyzer

* II B requirement only
Level III (Subspecialty Care)

GPC 6th Edition

• Provide sustained life support
  − III A – infants >1000 g or >28 wk, conventional ventilation (no HFV), minor surgical procedures
  − III B – infants <1000 g and <28 wk, severe and/or complex illness, HFV, iNO
  − III C – ECMO, CHD surgery requiring bypass
Level III (Subspecialty Care)

GPC 7th Edition

- Provide sustained life support and comprehensive care for infants <32 wk and <1500 g, and all critically ill infants

- Provide a full range of respiratory support which may include conventional and/or HFO and iNO
Level III (Subspecialty Care)

GPC 6th Edition (III B)
• Prompt and on site access to a full range of pediatric medical subspecialists
• Pediatric surgical specialists and pediatric anesthesiologists on site or at a closely related institution

GPC 7th Edition (III)
• Prompt and readily available access to a full range of pediatric medical subspecialists, pediatric surgical specialists, pediatric anesthesiologists and pediatric ophthalmologists on site or at a closely related institution by pre-arranged consultative agreement
Level III (Subspecialty Care)

GPC 6\textsuperscript{th} and 7\textsuperscript{th} Edition

- Capability to perform advanced imaging with interpretation on an urgent basis, including computed tomography, magnetic resonance imaging and echocardiography
Level IV (Subspecialty Care)

GPC 6th Edition (III C)
• Located within an institution with the capability to provide surgical repair of serious congenital heart anomalies that require cardio-pulmonary bypass, and/or ECMO for medical conditions.

GPC 7th Edition (IV)
• Located within an institution with the capability to provide surgical repair of complex congenital or acquired conditions.
Level IV (Subspecialty Care)

GPC 6\textsuperscript{th} Edition (III C)

- Urgent access to pediatric medical subspecialists
- Pediatric surgical specialists on site or at a closely related institution

GPC 7\textsuperscript{th} Edition (IV)

- Immediate on-site access to pediatric medical and surgical subspecialists, and pediatric anesthesiologists
What can states do to improve the provision of risk appropriate care?

- ASTHO President’s Challenge
  - www.astho.org
- COIN
- State-wide Quality Improvement Collaboratives
Collaboration on Innovation and Improvement Network (COIN)

- Infant Mortality Reduction Strategies
  - Perinatal Regionalization
  - Prevention of Elective Deliveries <39 weeks
  - Prevention of SIDS/SUID
  - Smoking Cessation in Pregnancy
  - Preconception and Interconception Care
Participating States

• 13 states of MCHB Region IV and VI
• Perinatal Regionalization Leads
  – Wanda Barfield, CDC
  – Paul Halverson, Arkansas Dept. of Health
  – Kate Menard, SMFM
  – Kathy Watters, HRSA/MCHB
• Partner Organizations
  – AAP, ACOG, ASTHO, NICHQ, AbT Associates
Perinatal Regionalization COINN Strategy

• VLBW infants born in risk-appropriate locations (MICH 33)
• By December 2013:
  – 90 percent of VLBW infants born in risk-appropriate locations
  – Or
  – 20% improvement in baseline percentage of VLBW infants in risk-appropriate locations
    » (e.g. increase from 54% to 74%)
• Seek opportunities to improve maternal levels of care
# Perinatal Regionalization Strategy

<table>
<thead>
<tr>
<th>Strategy Measures</th>
<th>Percent of VLBW infants born at risk appropriate facilities</th>
<th>Percent of very low birth weight infants delivered at facilities for high-risk deliveries and neonates (MICH 33) (HRSA/MCHB/PM#17)</th>
<th>Vital Statistics/Birth Records/CDC (MCHB/TVIS)</th>
<th>State/Federal</th>
<th>Team measure (same as HRSA/MCHB PM#17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of hospitals with state nursery and perinatal capacity designations that match AAP designation criteria</td>
<td>Subspecialty neonatal intensive care (level III)</td>
<td>Hospital Survey?</td>
<td>State/Program</td>
<td></td>
<td>Team measure</td>
</tr>
<tr>
<td>After your baby was born, was he or she transferred to another hospital?</td>
<td>PRAMS</td>
<td>State/Federal</td>
<td>Suggested measure</td>
<td></td>
<td></td>
</tr>
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<td>After your baby was born, were you transferred to another hospital?</td>
<td>PRAMS</td>
<td>State/Federal</td>
<td>Suggested measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal mortality by facility</td>
<td>Maternal deaths per 100,000 live births (MICH 5)</td>
<td>Vital Statistics/ Birth &amp; Death Records/NCHS/CDC</td>
<td>Federal</td>
<td>Suggested measure</td>
<td></td>
</tr>
<tr>
<td>Maternal morbidity by facility</td>
<td>Maternal illness and complications due to pregnancy (complications during hospitalization and delivery) (MICH 6)</td>
<td>National Hospital Discharge Survey/NCHS/CDC</td>
<td>Federal</td>
<td>Suggested measure</td>
<td></td>
</tr>
<tr>
<td>BW specific mortality rates by facility</td>
<td>Infant weight &lt; 500; 1000; 1500; 2000; 2500 grams</td>
<td>Vital Statistics/ Birth &amp; Death Records/NCHS/CDC</td>
<td>Federal</td>
<td>Suggested measure</td>
<td></td>
</tr>
<tr>
<td>Define criteria and develop definitions for maternal levels of care by facility.</td>
<td>Identify, define, and consistently use to measure capabilities within states: neonatal levels of care; maternal levels of care; and improve antenatal transport and bundling of perinatal services</td>
<td>State/Federal</td>
<td>Team measure (Extracted from story board)</td>
<td></td>
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</tr>
</tbody>
</table>

2. Kentucky does not implement the PRAMS
Approach

• Define Hospital Levels using new AAP guidelines
  – Caring for infants less than 35 weeks gestation?
  – Providing > 24 hours of CPAP?
  – Providing advanced respiratory therapy?
  – Available pediatric subspecialists?
  – Surgical care of complex conditions?
  – Transport systems in place?

• Clarify/refine definitions with state AAP perinatal section leaders and ACOG leaders
Approach

• Measure number (percent) of births by facility
  – Live births
  – 500 grams or more
  – Births < 1500 grams

• Calculate VLBW mortality rate by facility
  – Neonatal (<28 days) or in-hospital deaths
  – # deaths/1,000 live births
Approach

• Create collaborative forums to share information confidentially
  – State perinatal advisory group
  – AAP/ACOG representative groups

• Learn from other stakeholders
  – Parents
  – Support groups
  – Insurance organizations
  – Community organizations
Approach

• Acknowledge challenges
  – Challenges to transport
    • Funding
    • Geography
    • Antenatal transport
    • Reverse transport
  – Policy issues
    • Certificate of Need
  – Financial challenges
    • Unmet needs
    • Misaligned incentives
Summary

• Bridging clinical care and population health will improve the health of newborns

• Being born at the right place matters

• States play an important role in reducing infant deaths
Questions?

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http://www.cdc.gov/reproductivehealth/

Optimal and Equitable Reproductive Health for a Healthy Future

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