MODERATE AND LATE PRETERM BABIES: OUTCOMES AND ECONOMIC BURDEN

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• I do not have any conflict of interest, nor will I be discussing any off-label product use.

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OBJECTIVES

1. Define criteria for moderate and late preterm infants.
2. Describe epidemiology, morbidity and economic burden of moderate and late preterm infants.
3. Discuss short and long term health outcomes for moderate and late preterm infants.
4. Describe the conditions that contributed to a rise in preterm birth.
“Childbirth at < 37 completed weeks, or 259 days of gestation” -1969, WHO

- 1970s -1980s: Close to term gestation or “near-term”
  
  Fully mature

  No different from full-term infants

- In 2006, NICHD:

- Late preterm (LPT) for 34 0/7-36 6/7wGA

- ‘Near-term’ abolished
DEFINITIONS OF MODERATELY PT AND LATE PT

- **Very Preterm**: < 32\(0/7\) weeks of gestational age
- **Moderately Preterm**: 32\(0/7\) - 33\(6/7\) weeks of gestational age
- **Late Preterm**: 34\(0/7\) - 36\(6/7\) weeks of gestational age
- **Term**: > 37\(0/7\) weeks of gestational age

Chabra, Dev Med Child Neurol, 2009
The U.S. preterm rate declines for the second straight year—the first 2-year decline in nearly three decades.

Figure 1. Preterm birth rates: United States, final 1990–2006 and preliminary 2007 and 2008

1990-2006: PT births rose from 10.62 to 12.80% (>20%)
- Greatest rise: LPT (34-36 wGA)
- Births <34 wGA: only 10% rise
- Obstetric interventions
- Fertility treatment

• 2007: PTB declined by 10%
  - Decreasing teen pregnancies/non-marital childbearing
  - Obstetric interventions
Delivery Indication for Late Preterm and Early Term Infants

- Spontaneous preterm birth: 36%
- PPROM: 18%
- Elective: 8%
- Medically indicated (stable condition): 9%
- Medically indicated (unstable condition): 29%
You may feel ready to meet your baby, but your baby may not be ready to meet the world. Important developments occur throughout pregnancy—especially in the final months and weeks.

32 weeks pregnant
It’s too early...
Although your baby’s lungs are still developing, he or she can practice breathing.

35 weeks pregnant
It’s still too early...
Your baby’s brain develops the fastest at the end of your pregnancy.

37 weeks pregnant
Almost there...
Your baby is quickly adding weight. If your baby is born too small, he or she may need extra support to grow.

39+ weeks pregnant
You made it!
Congratulations! If you have a healthy pregnancy, wait at least 39 weeks until delivery.
Recommendations by the American Congress of Obstetricians and Gynecologists (ACOG)

Avoid non–medically indicated or “elective” early-term deliveries before 39 weeks
Figure 1. Very Preterm, Preterm, Very Low Birth Weight, and Low Birth Weight Rates, 1990–2012

Percent Distribution of Preterm Births: US, 2013

- 34-36 weeks: 70%
- 32-33 weeks: 13%
- 28-31 weeks: 11%
- <28 weeks: 6%
PRETERM BIRTH RATES INCREASE!

• In 2015: Preterm births in the United States rose for first time in 8 years
• Racial minorities: higher rates of early labor
• Late preterm (34-36 weeks) (6.83 to 7.05)
• Total preterm (<37 weeks) (9.57 to 9.63)
• An additional 2,000 babies born prematurely in U.S

Natality report CDC
The March of Dimes used data from the National Center for Health Statistics:

- Assigned grades to each State
- Comparing its prenatal birth rate to
- National average and the organization's goal of 8.1 percent
States with higher rates

- Alabama, Louisiana, Mississippi
- Arkansas
- West Virginia
- South Carolina
- Kentucky
- Tennessee
- Georgia

Preterm birth rate > 8.1 percent
States with lower rates

- Vermont
- Oregon
- New Hampshire and
- Washington

Earned highest marks

Preterm birth rate at 8.1 percent or below
WHERE DOES UNITED STATES STAND?

On an A to F scale
The March of Dimes Prematurity Campaign aims to reduce preterm birth rates across the United States. Premature Birth Report Card grades are assigned by comparing the 2015 preterm birth rate in a state or locality to the March of Dimes goal of 8.1 percent by 2020. The Report Card also provides county and race/ethnicity data to highlight areas of increased burden and elevated risks of prematurity.
Late and Moderately Preterm babies (LAMBS)

Increasing awareness

• Health care resource utilization
• Health and neurodevelopmental sequelae
• Increased risk for neonatal mortality and morbidities
CORTICAL DEVELOPMENT: 32 TO 40 WKS

Development of the Human Cerebral Cortex

20 weeks  
35 weeks  
40 weeks  

Near-term  

Seminars in Perinatology April 2006
LPT Brain weighs 2/3 of term wt at 34 weeks
Late Preterm Infants: Near Term But Still in a Critical Developmental Time Period

- **Cortical growth & connectivity**: Dramatic changes last weeks of gestation (Collin & van den Heuvel, 2013)

- **Cortical gray matter volume** increases 45% between 34-40 weeks gestation

- **White matter** increases fivefold (34-40 wGA)

- Less gyri/sulci (**smoother**)
% Full-Term Brain Weight

Gestational Age (weeks)

Late Preterm
LAMBs: Basal ganglia, PLIC

- Brain volume
  - 60% of term at 32 weeks
  - 65% of term at 34 weeks
- Smaller corpus callosum, basal ganglia and thalami, cerebellum (at term-equivalent)
- Posterior limb of internal capsule less developed
- Decreased cortical folding

Adams-Chapman I. Seminars in Perinatology April 2006
Effect of Gestational Age on Brain volume

**Brain Volume (mL)**

**White Matter Volume (mL)**
Connectivity, synaptogenesis 24-40 wGA

- Active phase of **synaptogenesis** 28-40 wGA
- Increased neural connectivity, dendritic arborization, & synaptic junctions
- 26-40 weeks: **40,000 connections/minute**
- Sensory development-early, integration is later
- Frontal lobes last to develop: most vulnerable (executive function)
Disrupted brain growth and maturation ex-utero

- Smaller brains and larger cerebrospinal fluid spaces
- Low rates of injury overall
- Disrupted trajectory of brain growth (from 32 to 40 weeks PMA) occurs in environment with increased visual, auditory, and tactile stimulation
- May explain basis of poorer long-term neurodevelopmental outcomes of MLPT infants

2014 Walsh et al, Radiology
• Larger total brain tissue, white matter, and cerebellar volumes at term-equivalent: ASSOCIATED WITH BETTER NEURODEVELOPMENT

• BRAIN VOLUME: IMPORTANT MARKER for: NEURODEVELOPMENTAL DEFICITS DESCRIBED IN MODERATE AND LATE PRETERM CHILDREN
Effect on Brain Size and Maturation at Term-Equivalent

- Smaller brain biparietal diameters in MLPT infants than in term infants
- Larger extra-axial spaces like the interhemispheric distance and the right superior extra-axial distance
Decreased deep gray nuclear areas

(a) Axial T2-weighted image shows deep gray nuclei (DGN) width, anteroposterior (AP) distance, and surface area. (b) Coronal T2-weighted image shows lateral ventricle atrial measures and transverse cerebellar diameter (TCD)
Effect on Brain Size and Maturation at Term-Equivalent

- Global thinning of the corpus callosum
  Measures of the genu, midbody, and splenium were smaller in LAMBs
- Smaller cerebellar transverse measurements
Immature Brain: Myelination & gyral maturation

- At term-equivalent age, LAMBs had a more immature brain compared to controls.
- The odds ratio for having delayed gyral maturation in LAMBs compared with full-term control infants was 23.8 (3.1–182.6)
- Odds ratio for complete myelination of the PLIC in LAMBs compared with full-term control infants was 0.2 (0.1–0.8), adjusted for both sex and gestation at MR imaging.

2014 Walsh et al, Radiology
LAMBs: Poor School Performance

- Difficulty with complex language functions (3-12 y)
- Compared to full-term infants, LAMBs
  - Lower intelligence
  - Poorer visual-motor skills
  - Poorer executive functioning
- Earlier gestational age is associated
  - Lower reading scores
  - Lower math scores at third grade
Risk for Autism and hyperactivity

- Evidence links LAMBs with symptoms of autism
- Positive screens using M-CHAT questionnaire and follow-up interview in LAMBs and term-controls
- UK study: school age outcomes of infants 32-35wGA parent and teacher reports
  - 1/3rd had educational problems; required additional help at school
  - Hyperactivity in 8%; associated with poor school performance
Risk for poor school performance

- Behavioral and emotional issues
- Reading skills
- Fine Motor skills (writing)
- Visual-motor skills
- Learning difficulties
- Difficulty with speaking, listening, reading, math
- Sensory modulation and processing
Risk for poor school performance

- Executive function impairments:
  - Working memory
  - Planning
  - Self-regulation
  - Inhibition
  - Judgment
- Motor skills (coordination, balance)
- PE: Difficulty
Neurobehaviour and ND delays?

- Less trunk and leg flexor tone, and poorer head control than term-peers
  - shortly after birth
  - at term-equivalent age
- Poorer arousal, regulation, lethargy, and higher rates of non-optimal reflexes, stress, and hypotonicity
- Unclear whether early neurobehavioral changes in LAMBS are associated with ND delays
Poor performance on the lethargy and excitability scales associated with worse cognitive outcomes at 2 years

Poor performance on the Hammersmith Neonatal Neurological Examination associated with worse cognitive outcomes at 2 years in LAMBs.

Poor performance on the NNNS lethargy scale is associated with motor and language delay at 2 years in LAMBs.
### Table II: Mean (SD) IQ scores split by gestational age

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number with data (% of eligible)</th>
<th>Term infants</th>
<th>Moderate/late preterm infants</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IQ measures</strong></td>
<td></td>
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<tr>
<td>Verbal IQ</td>
<td>6897 (50)</td>
<td>107 (17)</td>
<td>106 (17)</td>
<td>0.081</td>
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<tr>
<td>Performance IQ</td>
<td>6890 (50)</td>
<td>100 (17)</td>
<td>98 (17)</td>
<td>0.087</td>
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<tr>
<td>Summary IQ</td>
<td>6957 (50)</td>
<td>104 (16)</td>
<td>103 (16)</td>
<td>0.059</td>
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<tr>
<td><strong>Tests of memory</strong></td>
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<tr>
<td>Non-word repetition</td>
<td>6970 (50)</td>
<td>100 (15)</td>
<td>98 (14)</td>
<td>0.003</td>
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<tr>
<td>Span score</td>
<td>6601 (48)</td>
<td>100 (15)</td>
<td>99 (14)</td>
<td>0.123</td>
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<tr>
<td><strong>Tests of attention</strong></td>
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<tr>
<td>Sky Search Attention</td>
<td>6797 (49)</td>
<td>100 (15)</td>
<td>98 (15)</td>
<td>0.025</td>
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<tr>
<td>Dual Attention score</td>
<td>5254 (38)</td>
<td>100 (15)</td>
<td>99 (15)</td>
<td>0.099</td>
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<tr>
<td><strong>Tests of reading</strong></td>
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<tr>
<td>Accuracy</td>
<td>6523 (47)</td>
<td>100 (15)</td>
<td>97 (16)</td>
<td>0.001</td>
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<tr>
<td>Read per minute</td>
<td>6507 (47)</td>
<td>100 (15)</td>
<td>98 (16)</td>
<td>0.015</td>
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<tr>
<td>Comprehension</td>
<td>6523 (47)</td>
<td>100 (15)</td>
<td>98 (15)</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Long-term cognitive outcomes

- Despite LAMBS having similar IQ scores as term peers:
- Higher risk of having **special educational needs** at school (OR 1.56 [1.18-2.07])
- Little evidence of reduction in IQ, memory, or attention measures at school age in LAMBS
- Further work is needed to identify why these infants have increased educational needs

Edward et al, DMCN 2012
• “Preterm phenotype”: Increased risk for cognitive impairments, attention deficits, social–emotional problems, however, absence of increased risk for disruptive or oppositional behavioral problems

• **Consistency in outcomes** between countries, cultures, and healthcare systems over time

• Evidence for a **universal “preterm phenotype”**

  Associated with the neurodevelopmental immaturity conferred by Very Preterm birth (<32 weeks)
Increased risk for cognitive, language, social–emotional, and eating difficulties

- At 2 years
- At school age

Does adverse impact of preterm interruption to the developing brain affect:

- Total LMPT population or
- Subgroup of babies at high clinical risk?
Neurodevelopmental Outcomes: questions

Cognitive and behavioral sequelae associated with LAMBs represent an extension of the ‘Preterm phenotype’

OR

• Resemble a profile observed in the term-born babies?

Prematurity did not affect ALL babies born LMPT

• Specific adverse effects (pattern ~ to ‘preterm phenotype’) only on a small group

• LMPT with cognitive and behavioral problems:
  • exhibit a profile of outcomes consistent with the profile of ‘term population’
No difference in behavior problems (LMPT and term)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Term n = 765</th>
<th>LMPT n = 638</th>
<th>P value</th>
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<tbody>
<tr>
<td>Obstetric and neonatal variables</td>
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<tr>
<td>Gestational age, mean (SD)</td>
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<td>Female sex, n (%)</td>
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<td>SGA age, n (%)</td>
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<td>&gt;10th percentile</td>
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<td>3rd–10th percentile</td>
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<td>&lt;3rd percentile</td>
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<tr>
<td>Nonwhite ethnicity, n (%)</td>
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<td>Socioeconomic risk, n (%)</td>
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<td>Low risk</td>
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<td>Medium risk</td>
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<td>High risk</td>
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<tr>
<td>Smoked during pregnancy, n (%)</td>
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<td>Pre-eclampsia, n (%)</td>
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<td>Received breast milk at discharge, n (%)</td>
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<tr>
<td>Neurodevelopmental outcomes at 2 years’ corrected age</td>
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<tr>
<td>Corrected age at assessment, mo, mean (SD)</td>
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<tr>
<td>Nonverbal cognitive impairment, n (%)</td>
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<tr>
<td>Delayed language development, n (%)</td>
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<tr>
<td>Behavior problems, n (%)</td>
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<tr>
<td>Delayed social–emotional competence, n (%)</td>
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<tr>
<td>Positive autism screen, n (%)</td>
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<tr>
<td>Clinically significant eating difficulties, n (%)</td>
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</table>
PUBLIC HEALTH IMPACT

- LMPT comprise 84% of all preterm births
- Public health efforts to reduce the rates of adverse outcomes → Significant public health impact.
- Reducing rates of LMPT birth: reduce the absolute number of children with cognitive or behavioral problems.
- Efforts to reduce smoking in pregnancy
- Increasing breastfeeding rates (lower among mothers of babies born LMPT)
Public health implications

• Incidence of neurodevelopmental impairments in LAMBs is lower than peers born very preterm
• **Birth rates of LAMBs birth much greater**
• LAMBs: significant burden on the health system, not only in the neonatal period but also throughout childhood
• Given the size of the LMPT population,
  • Even small increases in impaired outcomes
  • Significant long-term public health implications
Economic costs of late and moderately preterm birth

- Significant financial burden on
  - Parents, families and
  - Health and educational services.
- Given the increased neonatal morbidity in LMPT infants
  - Cost of initial birth hospitalization higher
  - Have more hospital admissions during childhood
Economic burden of LAMBs

- **MPT:** Hospital days 1.6 at age two to 0.09 at age ten
- Cost per infant over the first ten years of life
- **MPT:** $52,796
- **LPT:** $10,010
- Total national costs
  - $255.6 million: MPT
  - $208.2 million: LPT
  - $587.1 million: ALL infants
National-level Economic burden: MPT and LPT

- Greatest national-level burden: MPT; large cost per infant and population size
- Highest individual-level burden: VPT
- Largest total population size: LPT infants
- Highest medical costs:
  - Incurred during the neonatal period,
- Greater resource utilization and costs:
  - Extend into childhood
Neurodevelopmental outcomes in LMPT

- **NEUROSENSORY IMPAIRMENT**
  
  1.6% of LMPT vs 0.3% of controls (RR 4.89, 95% CI 1.07 to 22.25)

- **COGNITIVE IMPAIRMENTS** most common adverse outcome

  6.3% of LMPT vs 2.4% controls (RR 2.09, 95% CI 1.19 to 3.64)

- LMPT infants **twice the risk for ND disability** (RR 2.19, 95% CI 1.27 to 3.75).

- Johnson S et al, Arch Dis Child Fetal Neonatal, 2015
Cognitive impairments common in LMPT

- Majority of impairments in **cognitive domain**
- Other independent predictors of low cognitive scores following LMPT birth
  - Male sex
  - Socio-economic disadvantage
  - Non-white ethnic origin
  - Not receiving BM at discharge
  - Preeclampsia:

LMPT infants: Neurodevelopmental disability

- Increased risk for moderate/severe neurodevelopmental disability (6.9% vs 2.5%; adjusted RR 2.19, 95% CI 1.27 to 3.75) compared to term
- 91% with cognitive impairment
- Increased risk for neuromotor/sensory impairment (1.6% vs 0.3%; RR 4.89, 95% CI 1.07 to 22.25)
- Hearing, vision and gross motor impairments were each 0.3–0.5% higher in LMPT infants than in controls

Johnson S et al, Arch Dis Child Fet Neonat, 2015
LMPT boys sevenfold increased risk

- LMPT birth: greater risk of moderate/severe impairment among males, compared to controls (10.5% vs 3.2%)
- Rates among female LMPT infants and controls were similar (1.4% vs 1.6%)
- Mean cognitive and language scores were 0.15 SD lower in LMPT infants than among controls: equivalent to a 2.3-point deficit in standardised IQ scores

Johnson S et al, Arch Dis Child Fet Neonat, 2015
MLPT and 2 year Social-Emotional Development

Compared with term controls

- MLPT children had **worse cognitive, language, and motor development** at age 2 years with adjusted odds ratios:
  - 1.8 (95% CI, 1.1-3.0) for cognitive delay
  - 3.1 (95% CI, 1.8-5.2) for language delay
  - 2.4 (95% CI, 1.3-4.5) for motor delay
  - 3.9 (95% CI, 1.4-10.9) for social-emotional competence

- Other behavioral domains were similar

Cheong et al, JAMA Peds, Feb 2017
Brain Volumes at Term-Equivalent Age Are Associated with 2-Year Neurodevelopment

- Recruited at birth and 2 years Bayley III
- MRI at term-equivalent age assessed for brain maturation (myelination of the PLIC and gyral folding) and injury:
  - Larger total brain tissue, white matter and cerebellar volumes: better neurodevelopment in LAMBs
  - Total brain volume of cerebral structures: higher language composite scores on Bayley III
  - Larger cerebellar volumes: higher motor composite scores
LPT Outcomes: reemerge at preschool

- Late preterm infants with similar (to Term) developmental outcomes at 24 months but…..
- Less optimal outcomes at preschool and kindergarten

2016 Pediatrics, Prachi Shah
Developmental Outcomes of LPT Infants: Kindergarten

• LPT’s: less optimal developmental outcomes compared to early terms and term ($P < .0001$)
• Late preterm infants less optimal scores compared with infants born at term gestation

• Preschool reading ($P = 0.0006$)
• Preschool mathematics ($P = 0.0014$)
• Kindergarten reading ($P = 0.0007$)

2016 Pediatrics, Prachi Shah
LAMBs: GROWTH AND NEURODEVELOPMENT

- Poor growth in the first 7 years/Short stature: increased risks of impaired motor skills and low IQ
- Lower weight at 1 and 4 years: poorer IQ scores
- Increased weight gain between age 4 and 7 years was, however, associated with poorer motor, IQ, and attention scores
- Increase in OFC gain in the first year of life: better motor and attention skills
- Decreased OFC gain: poorer motor and attention scores

Longitudinal Preterm Outcome Project (LOLLIPOP)
Postnatal growth affects neuro development of LAMBS

- Poor postnatal growth in infants born at 30–34 wGA: intrauterine growth rates are rarely achieved
- LAMBs had weight, height and head circumference below 9th percentile at 7 years
- The proportion with weight below the third percentile increased between 20 mth- 7 yrs
Risk for developmental delays in LAMBs

- Cerebral Palsy rate: 3x higher
- Developmental delay or mental retardation rate: 1.25x higher
- Delayed readiness Preschool
- School age outcomes: moderately increased risk of developmental delay and special needs
Altered brain function, structure, and developmental trajectory in children born late preterm

Jane E. Brumbaugh¹, Amy L. Conrad¹, Jessica K. Lee², Ian J. DeVolder², M. Bridget Zimmerman³, Vincent A. Magnotta⁴, Eric D. Axelson² and Peggy C. Nopoulos¹,²,⁵

- Slower processing speed
- Poor visual-spatial perception and memory
- Behavioral issues: Per parental report
- Less total cerebral tissue and more CSF
- Differences in the cerebrum distributed across cortical and subcortical tissue
• Subtle alterations in cognitive skills
• Presumably depends on prefrontal cortex
• Sets the stage for long-term issues with Executive function development
• 3 cohort and 4 case-control studies: Association between SGA and CP in LAMBs (OR: 2.34; 95% CI: 1.43–3.82)
• SGA is a reliable predictor for CP in LAMBs
• Underlying mechanisms SGA and CP association
Majority receive some level of delivery room resuscitation

Intensity of DR interventions: associated with
- Prolonged respiratory and nutritional support
- Increased mortality
- Longer length of stay
RESPIRATORY MORBIDITY

- Immature antioxidant and surfactant systems
- Delayed intrapulmonary fluid absorption due to developmentally regulated epithelial sodium channel expression
- Persistent pulmonary hypertension of the newborn
- Respiratory failure (0.94 vs. 0.11%) are higher in LPT infants, compared with term controls
RESPIRATORY MORBIDITY

- 21% of 33–34 weeks’ GA
- 7% of 35–36 weeks’ GA respiratory distress
- 46% of 30–34 weeks’ GA required assisted ventilation
- 3.2% needed supplemental oxygen at 36 weeks’ postmenstrual age
USE OF VENTILATOR BY GA
INCREASED ICU THERAPIES IN LPT INFANTS

- IV fluids and lines
- Vasopressors
- Surfactant
- High-frequency ventilation
- Inhaled nitric oxide
- ECMO
  - Mortality was higher (26.2 vs. 11.2%)
  - Higher duration than in term infants
APNEA OF PREMATURITY

LPT infants higher risk (OR: 15.7; 95% CI: 11.8–20.9)

- Immaturity of brainstem regions
- Imperfect control of breathing
- Compliant chest wall and the upper airways
- Ventilatory response to hypercarbia blunted
THERMOREGULATION

• 10% LPT need active Rx for hypothermia
• Increased susceptibility to cold stress
  • Decreased brown fat and subcutaneous fat
  • Impaired release of thyroxine and norepinephrine in response to cold stress
• At higher risk for poor transition
GLUCOSE REGULATION

• Early postnatal hypoglycemia
  • Reduced glycogen stores and low activity of gluconeogenic/glycogenolytic enzymes
  • Exacerbated cold stress, sepsis, inadequate intake
  • 16% of LPT with hypoglycemia vs 5.3% of term infants (OR: 3.30; 95% CI: 1.1–12.2)
  • 27% received intravenous infusions (OR: 6.48; 95% CI: 2.27–22.91)
AAP recommends all LPT infants to be screened for hypoglycemia prior to each feed for initial 24 hours of life.

Higher risk in LPT compared with term peers (OR: 7.4; 95% CI: 3–18.1)
JAUNDICE IN LAMBS

- Higher rate of bilirubin production
- Immature liver: Decreased bilirubin uptake and conjugation
- Impaired elimination: Increased enterohepatic circulation
- Feeding difficulties, especially breast-fed infant
- Higher use of phototherapy (OR: 5; 95% CI: 1.7–14.6) in LPT compared to term peers
JAUNDICE: RISK OF KERNICTERUS

- Overrepresent in Pilot KI Registry
- More severe
- More prolonged
- Earlier Bilirubin neurotoxicity
FEEDING DIFFICULTIES IN LAMBS

- Suck–swallow incoordination
- Immature peristalsis
- Poor sphincter control mechanisms
  - Higher risk of feeding problems (OR: 6.5; 95% CI: 2.5–16.9)
- Higher risk of necrotizing enterocolitis (OR: 7.5; 95% CI: 3.3–17.3)
  - Increased risk with each week decrease in GA from 36 to 32 weeks
In the NICHD Neonatal Research Network observational cohort of 5,123 MPT infants:

- 85% were still in hospital at 36 weeks
  - apnea,
  - feeding difficulties
  - weight gain
INFECTION

• Fourfold increased risk of sepsis evaluations
• Fivefold higher risk: culture-positive infections
Neonatal and Infant Mortality by Gestational Age

- Infant Mortality
- Neonatal Mortality

Mortality per 1000 live births

Gestational Age (Weeks)
LPT infants have:
- Higher (RR: 5.9; 95% CI: 5–6.9) risk of neonatal death within the first 28 days of life
- Fourfold (OR: 3.7; 95% CI: 2.9–4.6) higher likelihood of death within the initial year of life
- Elevated risk (2.4-fold to 3.3-fold) at 32 and 33 weeks’ GA, compared with birth at 34 weeks’ GA
NEED FOLLOW-UP

- STRESS IMPORTANCE OF FOLLOW-UP
- BIRTH-3years
- PRESCHOOL
- KINDERGARTEN
FOLLOW-UP CLINIC : LAMBS CLINIC AT UW

Since June 2017

- Follow from age 4 mths-3 yrs
- Developmental evaluation
- Detailed report on development
- Suggestions for activities/therapies to support development
- Nutrition evaluation if needed