Preterm Births at Siaya District Hospital: An Evaluation of Risk Factors, Management, & Outcomes in the Newborn Unit

Monique Sutherland
May 10, 2013
Points of Discussion

- Introduction/Background
  - Incidence, Etiology, Risk Factors
- Objectives (General and Specific)
- Methods
  - Chart Review
- Results
- Discussion
  - Interesting Findings, Complications, Management
- Limitations
- Recommendations
Introduction/Background

- 15 million preterm babies are born each year around the world.
- Roughly 1 million babies die from complications related to preterm birth.
- 12 million of those preterm babies are born in Africa and Asia.
- Half of babies born at 32 weeks in low-income settings die due to a lack of feasible, cost-effective care, such as warmth, breastfeeding support, and basic care for infections and breathing difficulties.
- While nearly all babies at the same gestational age survive in high-income countries.
- **Kenya** ranks 15th of the two-thirds of the world’s preterm births.
## Definitions

<table>
<thead>
<tr>
<th>Preterm birth (PTB)</th>
<th>&gt;20wga and &lt;37wga</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low birth weight (LBW)</strong></td>
<td></td>
</tr>
<tr>
<td>LBW</td>
<td>&lt;2500g</td>
</tr>
<tr>
<td>VLBW</td>
<td>&lt;1500g</td>
</tr>
<tr>
<td>ELBW</td>
<td>&lt;1000g</td>
</tr>
<tr>
<td><strong>Perinatal Mortality</strong></td>
<td>Sum of stillbirths (&gt;20wga) + neonatal through 28 days of life (DOL)</td>
</tr>
<tr>
<td><strong>Infant Mortality</strong></td>
<td>Leading cause related to PTB – births &lt;32wga</td>
</tr>
<tr>
<td><strong>Perinatal Morbidity</strong></td>
<td>Common complications: RDS, IVH, BPD, PDA, NEC, sepsis, apnea, ROP</td>
</tr>
<tr>
<td><strong>Stillbirth</strong></td>
<td>Fetal death &lt;20wga</td>
</tr>
<tr>
<td><strong>Neonatal Death</strong></td>
<td>&lt;28 days after birth</td>
</tr>
<tr>
<td><strong>Infant Death</strong></td>
<td>&lt;12 months after birth</td>
</tr>
<tr>
<td><strong>Obstetric Data</strong></td>
<td>Include all living fetuses that enter L+D</td>
</tr>
</tbody>
</table>
| **Neonatal Data**   | Exclude intrapartum & delivery room deaths, based on admission to nursery  
*Rates of Survival and morbidity at same age and/or BW – higher than OB data* |
Etiology

- Spontaneous parturitional process
  - Cervical changes – ripen, shorten
  - Membrane/decidual activation – early membrane rupture
  - ↑Uterine contractility – uncoordinated contractures → coordinated contractions

- Iatrogenic
  - Mother or baby’s health is at risk
    - Major hemorrhage, hypertension, or poor fetal growth.
Risk Factors

**Spontaneous Preterm Birth**

- History of genital tract colonization, infection, or instrumentation
- Urinary tract infection and bacteriuria
- Sexually transmitted infections such as *Chlamydia*, gonorrhea, human papillomavirus, or *Trichomonas*
- Bacterial vaginosis
- Cervical dysplasia and treatment for same
- Spontaneous or induced abortion
- African American
- Bleeding of uncertain origin in pregnancy
- History of a previous spontaneous preterm birth
- Uterine anomaly
- Assisted fertility care
- Multifetal gestation
- Cigarette smoking, substance abuse
- Poor nutrition and low prepregnancy weight (body mass index <19.6)
- Periodontal disease
- Limited education, low income, and low social status
- Late registration for prenatal care
- High levels of personal stress in one or more domains of life
<table>
<thead>
<tr>
<th>WITH INDICATED PRETERM BIRTH</th>
</tr>
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<tbody>
<tr>
<td>- Diabetes, diagnosed before or during pregnancy</td>
</tr>
<tr>
<td>- Chronic or acute (preeclampsia) hypertension</td>
</tr>
<tr>
<td>- Obstetrical disorders or risk conditions in the current or previous pregnancy</td>
</tr>
<tr>
<td>- Preeclampsia</td>
</tr>
<tr>
<td>- Previous uterine surgery (e.g., prior cesarean birth via a vertical or T-shaped uterine incision)</td>
</tr>
<tr>
<td>- Cholestasis</td>
</tr>
<tr>
<td>- Placental disorders</td>
</tr>
<tr>
<td>- Placenta previa</td>
</tr>
<tr>
<td>- Premature separation (abruption) of the placenta</td>
</tr>
<tr>
<td>- Medical disorders</td>
</tr>
<tr>
<td>- Seizures</td>
</tr>
<tr>
<td>- Thromboembolism</td>
</tr>
<tr>
<td>- Connective tissue disorders</td>
</tr>
<tr>
<td>- Asthma and chronic bronchitis</td>
</tr>
<tr>
<td>- Maternal HIV or HSV</td>
</tr>
<tr>
<td>- Obesity</td>
</tr>
<tr>
<td>- Smoking</td>
</tr>
<tr>
<td>- Advanced maternal age</td>
</tr>
<tr>
<td>- Fetal disorders</td>
</tr>
<tr>
<td>- Fetal compromise</td>
</tr>
<tr>
<td>- <strong>Chronic—poor fetal growth</strong></td>
</tr>
<tr>
<td>- Acute—fetal distress, for example, abnormal fetal testing (NST or BPP)</td>
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<tr>
<td>- Excessive (polyhydramnios) or inadequate (oligohydramnios) amniotic fluid</td>
</tr>
<tr>
<td>- Fetal hydrops, ascites, blood group alloimmunization</td>
</tr>
<tr>
<td>- Birth defects</td>
</tr>
<tr>
<td>- Fetal complications of multifetal gestation (e.g., growth deficiency, twin-to-twin transfusion syndrome)</td>
</tr>
</tbody>
</table>
Objectives

- General – Evaluate the Outcomes of Preterm Babies

- Specific
  - Apgar Scores
  - Birth Weight
  - Maternal Condition
    - presence of infections, HIV status, hypertension, preeclampsia, prior history of preterm births, history of multiple gestation
  - Mode of delivery
  - Deaths
    - etiology, management and complications after birth
Methods

1326 Total Births from September 2012 – March 2013

47 preterm newborns admitted to the neonatal unit

29 premature newborn inpatient files found

26 corresponding inpatient maternal files found, including 8 non-survivors

**DATA COLLECTED**

**Mom:** Age, gravida and parity, history of abortions and neonatal death, maternal HIV status, mode of delivery, indication for Cesarean section

**Newborn:** Sex, gestational age, length of stay, Apgar scores, birth weight, diagnosis upon admission
Data Analysis

- The total newborn files investigated were divided into 2 groups:
  - **Survivors** (21) – Discharged from the hospital in stable condition either to the mother or referred for follow-up in the Maternal and Child Health (MCH) clinic or Pediatric Outpatient Clinic (POPC)
  - **Non-Survivors** (8) – Died during their hospital admission

- Excel and SPSS 19
## Results

### Background Stats and Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>44.8</td>
</tr>
<tr>
<td>Female</td>
<td>55.2</td>
</tr>
<tr>
<td>Mode of Delivery</td>
<td></td>
</tr>
<tr>
<td>Spontaneous Vaginal Delivery</td>
<td>69</td>
</tr>
<tr>
<td>Cesarean section</td>
<td>31</td>
</tr>
<tr>
<td>Maternal HIV Status</td>
<td></td>
</tr>
<tr>
<td>Reactive (positive)</td>
<td>10.3</td>
</tr>
<tr>
<td>Nonreactive (negative)</td>
<td>82.8</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
</tr>
<tr>
<td>Survivors</td>
<td>72.4</td>
</tr>
<tr>
<td>Non-survivors</td>
<td>27.6</td>
</tr>
</tbody>
</table>
Results – Hospital Stay

Length of Admission of Preterm Newborns

Survivors

Non-survivors

38 days

Outcomes

Length of Admission (days)
Diagnosis upon Admission in Surviving Preterm Newborns

Prematurity – 20
RDS – 9
LBW - 7
Diagnosis upon Admission in Preterm Nonsurvivors

- Prematurity: 6
- RDS: 3
- LBW: 1
- VLBW
- Asphyxia
- Congenital Malformation
- Accomodation

Legend:
- Prematurity
- RDS
- LBW
- VLBW
- Asphyxia
- Congenital Malformation
- Accomodation
Results – Apgar Scores

Apgar Scores in Preterm Survivors and Non-survivors

Outcomes

- Apgar Score at 1 minute
- Apgar Score at 5 minutes
- Apgar Score at 10 minutes
Discussion

✦ Interesting Findings

✦ Maternal HIV Status – Non-Survivors

✦ Indication for C/S – Survivors vs. Non-Survivors

✦ S (All breech) and NS (50% breech, 25% APH, 12.5% Prior C/S, 12.5% ROM, breech)

✦ Maternal History


<table>
<thead>
<tr>
<th></th>
<th>Gravida</th>
<th>Parity</th>
<th>Hx of Abortions</th>
<th>Hx of Neonatal Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>3.2</td>
<td>3</td>
<td>0.5</td>
<td>0.28</td>
</tr>
<tr>
<td>NS</td>
<td>3.4</td>
<td>2</td>
<td>0.17</td>
<td>1.67</td>
</tr>
</tbody>
</table>

✦ Management
Management-History

- Over the past couple decades, neonatal intensive care has become less interventional and therefore more feasible to adapt to lower-income settings
  - Widespread use of antenatal corticosteroids
  - **Shift to less invasive** ventilator pressures and increase usage of CPAP
  - Use of quality care protocols by skilled neonatal nurses addressing:
    - Infection prevention, feeding support, use of IVFs, safe O₂ use with careful tracking of O₂ levels
Management - Progression

- Limited comparable data on long-term outcomes after preterm birth
  - As neonatal care improves and complexity increases, monitoring quality of care and tracking outcomes are crucial in low-income settings.
  - Recognizing small babies vs. preterm babies is essential to prioritize care.
    - 1st trimester U/S vs. LMP and BW
    - Highest risk babies: Both PT and growth restricted
# Vulnerabilities of Preterm Babies

## Table 5.1: Life-saving essential and extra newborn care

<table>
<thead>
<tr>
<th>Risk for all babies, especially those who are preterm</th>
<th>Essential care for all babies</th>
<th>Extra care for preterm babies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothermia = low body temperature</strong> (Increased risk of infections, mortality, and for preterm babies increased risk of RDS)</td>
<td><strong>Thermal care</strong> Drying, warming, skin-to-skin and delayed bathing</td>
<td><strong>Extra thermal care</strong> Kangaroo Mother Care, baby hats, blankets, overhead heaters, incubators</td>
</tr>
<tr>
<td><strong>Cord and skin infections, neonatal sepsis</strong></td>
<td><strong>Hygienic cord and skin care at birth and home care practices</strong> Hand washing and other hygiene Delayed cord clamping Consider chlorhexidine</td>
<td><strong>Extra attention to infection prevention and skin care</strong> Consider chlorhexidine and emollients</td>
</tr>
<tr>
<td><strong>Hypoglycemia = low blood sugar</strong> (Increased risk of impairment or death)</td>
<td><strong>Early and exclusive breastfeeding</strong></td>
<td><strong>Extra support for breastfeeding</strong> e.g., expressing and cup or tube feeding, supplemented breast milk if indicated Lack of breast milk is a risk factor for necrotising enterocolitis in preterm babies</td>
</tr>
<tr>
<td><strong>Hypoxia = low oxygen levels, (Increased risk of impairment or death and for preterm babies, higher risk of RDS and intracranial bleeding)</strong></td>
<td><strong>Neonatal resuscitation if not breathing at birth</strong> Bag-and-mask resuscitation with room air is sufficient for &gt;99% of babies not breathing at birth</td>
<td><strong>Safe oxygen use</strong> Monitored oxygen use e.g., in head box or with nasal cannula, routine use of pulse oximeters</td>
</tr>
</tbody>
</table>
Global Action Report on Preterm Birth

- **Neonatal Resuscitation** – Basic bag and mask or mouth to mask saves 4 out of 5 babies who need resuscitation

- **Helping Babies Breathe** and Partners - for promotion of basic neonatal resuscitation at lower levels of health system in low-resource setting to help improve outcomes (currently >30 countries)

- **KMC** – more health system friendly by decreasing hospital stay and nursing load which decreases costs (*Shown to help babies survive <800g*)

- **Malawi 2010** – CPAP device developed for low-resource setting is being tried in babies with RDS and >1000g (*Encouraging results*)
PMNCH Evidence Limitations

- Most trials from high-income
- Few in low-income → Severe morbidity and mortality are common
  - Urgent need for more facility-based research addressing quality of care (including cost analysis)
Limitations

- Incomplete Charting
  - Inpatient vs. Outpatient Charts
  - Maternal History
  - Physical Exam for Newborns
  - Daily weights
- Women referred from other towns
- Death Certificates
Recommendations

- Compile inpatient and outpatient charts
- Develop a protocol for management of preterm newborns
- Maternal History with Newborn Charts
- Physician daily progress notes
Suggestions for Future Studies

 Pru Look at Maternal Conditions
 Pru Malaria during pregnancy
 Pru Diagnosis at Admission
 Pru Hypertension, Infection, Preeclampsia, etc.
 Pru History of ANC Visits

 Pru Outcomes of Survivors
 Pru Follow-up in POPC or MCH

 Pru Develop a Form for Maternal History
 Pru Can be completed in maternal inpatient chart – possibly keep a copy in newborn inpatient chart as well
Acknowledgments

- Siaya District Hospital
  - Lucy, Vicky and Mary, Records
  - Dr. Omoto and Dr. Wagude
  - Dr. Agumba
  - Dr. Ajala Osagie
Thank You

GE/NMF International Scholars Program

Maseno University

Dr. Onyango & Dr. Dyer