Preterm Birth: Epidemiology and Public Health Approach

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Presentation Objectives

- Review the epidemiology of preterm birth.
- Understand how and possibly why the pattern is changing.
- Define continuum of prevention and management of preterm birth and care of the pre-term infant
- Describe a perinatal collaborative approach to PTB
- Determine what can be done to advance key best practices
Neonatal conditions accounted for over 40% of U5 mortality in 2010.

Global U5MR by disease, 2010
Deaths per 1,000 live births

Neonatal conditions account for 40% of U5MR

1 Other includes other conditions for neonatal and non-neonatal causes of mortality; other conditions among children aged 1-59 months included congenital abnormalities, causes originated during the perinatal period, cancer, pertussis, severe malnutrition, pediatric TB and other specified causes.

Scaling and sustaining existing solutions has potential to save millions of lives

Projected U5MR Countdown countries¹, 2035
Deaths per 1,000 live births

- 2010
- Scaling up today’s tools
- Additional U5MR impact to 2035
- 2035...
- ... and beyond

- New technologies
- Delivery innovations
- Girls’ education
- Poverty reduction

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¹ U5MR for 75 Countdown Countries (Low-Low/Middle Income); global U5MR is 57/1000
Source: Based on Lives Saved Tool modeling by Johns Hopkins Bloomberg School of Public Health 2012

Vitamin A
PMCTC
Zinc
Pneumococcal rotavirus immunization
Oral rehydration salts
Insecticide treated bed nets
Newborn resuscitation bag and mask
Drivers contributing to the increase in preterm birth rate of the United States from 1989 to 2004

50% of the increase cannot be explained

Data Sources: Chang et al Lancet 2012
Born Too Soon
The Global Action Report on Preterm Birth
Of the 11 countries with the highest rates, 9 are in Africa

Source: Blencowe et al National, regional and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications
India staring at killer lifestyle epidemic

Warning Bells: More people dying of lifestyle diseases than of infections; experts for policies to promote healthy living.

NEW DELHI: We have a killer lifestyle.

Today, more Indians are dying of lifestyle diseases than of infections — a reverse of the situation 20 years ago. Heart ailments are the biggest killers, followed by lung disease and stroke, shows data from Global Burden of Diseases, Injuries, and Risk Factors 2010 (GBD 2010) being released Tuesday morning.

Unhealthy diet and indoor air pollution, mostly from cooking with wood fire and charcoal in poorly ventilated homes, are the two biggest disease and death risks. And if bad diet and pollution don’t get you, roads will. Indian roads are the most dangerous in the world, with road injuries among the leading causes of death, show the data from 187 countries.

“The menace of heart disease, stroke, diabetes, lung disease, depression, and road injuries is mounting in the form of premature deaths and disability,” said Dr Srinath Reddy, president, Public Health Foundation of India.

10 biggest killers in India

1. Heart disease
2. Lung disease
3. Stroke
4. Diarrhoea
5. Chest infections
6. Tuberculosis
7. Preterm birth complications
8. Self-harm (suicides)
9. Road injuries
10. Diabetes

India’s top 10 death, disease risk factors

1. Bad diet
2. Indoor air pollution
3. Smoking
4. High blood pressure
5. Childhood underweight
6. Occupational risks
7. Air pollution
8. Diabetes
9. Anaemia (iron deficiency)
10. Alcohol

10 biggest killers in the world

1. Heart disease
2. Stroke
3. Chest infections
4. Lung disease
5. Diarrhoea
6. Tuberculosis
7. Preterm birth complications
8. Lung cancer
9. Malaria
10. Road injuries

Source: Global Burden of Diseases, Injuries, and Risk Factors 2010

Child cured of HIV

Doctors in the US have made history by curing an infant born with HIV. The child now needs no medication.
UN Commission on Life Saving Commodities

13 Commodities for Women and Children
- Family Planning
- Maternal Health
- Newborn Health
  - Dexamethasone
- Child Health

Accomplishments 2013
- Dexamethasone added to EML
- WHO Preterm Birth Guidelines
- 3 trials on increased use:
  - NIH: task shifting to health center level (Zambia, DRC)
  - MCHIP: increased utilization
  - Gates: increasing utilization
- World Prematurity Day
  - 17 November, every year
- Package of Training and Service Delivery Materials
Perinatal Collaborative Approach
Maternal & Newborn Health Teams Working Together

<table>
<thead>
<tr>
<th>ACTION</th>
<th>PROVIDER</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention of preterm birth</td>
<td>Antepartum care provider</td>
<td>Reduce number of preterm births</td>
</tr>
<tr>
<td>Management of Conditions that lead to preterm birth</td>
<td>Skilled birth attendant</td>
<td>Reduce the complications of preterm birth</td>
</tr>
<tr>
<td>Care of the newborn born prematurely</td>
<td>Newborn care provider</td>
<td>Reduce the mortality of complications from prematurity</td>
</tr>
</tbody>
</table>

- Multiple providers
- Complementary roles
- Additive impact

Maternal interventions with fetal / newborn benefit
Interventions to address high burden of disease

Interventions:
- Ready for scale up now
- Cheap and available, but not widely used
- Future considerations, due to cost and complexity

Figure 2.5: Estimated numbers of preterm births in 2010

10 countries account for 60% of the world’s preterm births by rank:
1. India
2. China
3. Nigeria
4. Pakistan
5. Indonesia
6. United States of America
7. Bangladesh
8. Philippines
10. Brazil
<table>
<thead>
<tr>
<th>Interventions available now</th>
<th>Identification of women at risk of preterm birth</th>
<th>PTB Consciousness: Starting a PTB Protocol for Antepartum hemorrhage (placenta previa, abruptio placenta); severe PE or eclampsia; PPROM; PTL; maternal illness.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement in pregnancy dating</td>
<td>Protocol for clear EDD determination</td>
<td>Clear documentation and communication to woman</td>
</tr>
<tr>
<td>Antenatal Corticosteroids</td>
<td>A single course, administered to women between 24 and 34 (37?) weeks who are at risk for early delivery within 7 days; continuation protocol during transport</td>
<td></td>
</tr>
<tr>
<td>Preparation of birthing environment</td>
<td>Specially trained team approach, preparedness for interventions</td>
<td></td>
</tr>
<tr>
<td>Early transfer to higher level center</td>
<td>Mother/uterus is the best transport vehicle. Clear communication and referral protocols</td>
<td></td>
</tr>
<tr>
<td>Avoid early Cesarean</td>
<td>Policy of no elective cesarean before 39 weeks. No elective C/S without excellent gestational age determination</td>
<td></td>
</tr>
<tr>
<td>Family planning</td>
<td>Promotion as maternal &amp; newborn health intervention</td>
<td></td>
</tr>
</tbody>
</table>
# Accessible Interventions

*Simple and cheap, but not widely used*

## Infection

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening and treatment for reproductive tract infections</td>
<td>Treatment of syphilis, gonorrhea and chlamydia.</td>
</tr>
<tr>
<td>Screening and treatment of urinary tract infections, other infections</td>
<td>UTI $\rightarrow$ Pyelonephritis $\rightarrow$ Preterm birth</td>
</tr>
<tr>
<td></td>
<td>Malaria, tuberculosis and HIV may increase risk of preterm birth</td>
</tr>
<tr>
<td>Identification of intra-amniotic infection and treatment</td>
<td>Chorioamnionitis should be treated with ampicillin and gentamicin, and induction of labor for delivery</td>
</tr>
<tr>
<td>Better management of preterm prelabor rupture of membranes</td>
<td>Increase period between rupture and delivery.</td>
</tr>
<tr>
<td></td>
<td>NO digital exams. Give 2 days of ampicillin + erythromycin IV then 5 days of amoxicillin + erythromycin orally.</td>
</tr>
<tr>
<td></td>
<td>Epidemiology of Group B Strep.</td>
</tr>
<tr>
<td>Tocolysis for preterm labor</td>
<td>For short-term prolongation of pregnancy to allow 48 hours of antenatal corticosteroids, administration of magnesium and transport</td>
</tr>
<tr>
<td>Administration of magnesium sulfate for neuroprotection of newborn</td>
<td>Can result in 30% reduction in incidence of cerebral palsy in surviving newborns when birth is anticipated before 32 weeks gestation</td>
</tr>
<tr>
<td>Delayed cord clamping for preterm newborn</td>
<td>Has been shown to be beneficial in reducing intracranial hemorrhage</td>
</tr>
</tbody>
</table>
# Future Interventions

*More complex and expensive*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group antenatal care</strong></td>
<td>Model in USA called “Centering Pregnancy” has demonstrated a reduction in preterm birth</td>
</tr>
<tr>
<td><strong>Progesterone supplementation</strong></td>
<td>For women with a history of preterm birth, progesterone supplementation during pregnancy can reduce recurrence</td>
</tr>
<tr>
<td><strong>Ultrasound measurement of cervical length</strong></td>
<td>Short cervix alone is not a good predictor of preterm birth, but can be used in combination with history, examination and symptoms</td>
</tr>
<tr>
<td><strong>Cervical cerclage</strong></td>
<td>In select women with a known incompetent cervix, a cerclage may be useful for prolonging pregnancy.</td>
</tr>
</tbody>
</table>
## Interventions known to be ineffective

<table>
<thead>
<tr>
<th>Ineffective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotics for intact membranes</td>
</tr>
<tr>
<td>Tocolysis among women with preterm contractions but no cervical change</td>
</tr>
<tr>
<td>Maintenance tocolytic therapy (after acute therapy)</td>
</tr>
<tr>
<td>Bed rest, hydration and sedation for preterm contractions or preterm labor</td>
</tr>
<tr>
<td>Regular repeat courses or multiple courses of corticosteroids</td>
</tr>
</tbody>
</table>
## ANTENATAL CORTICOSTEROIDS: Efficacy Data from hospital settings

### Summary of “All Babies” included in the 2006 Cochrane Review

<table>
<thead>
<tr>
<th>Condition</th>
<th>Favors Intervention</th>
<th>Favors Control</th>
<th>RR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Distress Syndrome</td>
<td>□</td>
<td>□</td>
<td>0.66 [0.59, 0.73]</td>
</tr>
<tr>
<td>Moderate/Severe RDS</td>
<td>□</td>
<td>□</td>
<td>0.55 [0.43, 0.71]</td>
</tr>
<tr>
<td>Need for CPAP/Ventilation</td>
<td>□</td>
<td>□</td>
<td>0.69 [0.53, 0.9]</td>
</tr>
<tr>
<td>Neonatal Deaths</td>
<td>□</td>
<td>□</td>
<td>0.69 [0.58, 0.81]</td>
</tr>
<tr>
<td>Death in Childhood</td>
<td>□</td>
<td>□</td>
<td>0.68 [0.36, 1.27]</td>
</tr>
<tr>
<td>Maternal (Puerperal) Sepsis</td>
<td>□</td>
<td>□</td>
<td>1.35 [0.93, 1.95]</td>
</tr>
</tbody>
</table>

1
ANTENATAL CORTICOSTEROIDS: Partial dose
Even partial dose of ACS confers some benefit

Relative risks using partial doses of dexamethasone in infants <1kg
N=124

<table>
<thead>
<tr>
<th>Dexe dose</th>
<th>1 versus 0</th>
<th>2 versus 0</th>
<th>3-4 versus 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>0.6 (0.2 to 2.3)</td>
<td>0.1 (0.0 to 0.7)</td>
<td>0.2 (0.1 to 0.5)</td>
</tr>
<tr>
<td>Surfactant</td>
<td>1.0 (0.3 to 3.4)</td>
<td>0.4 (0.1 to 1.7)</td>
<td>0.2 (0.1 to 0.5)</td>
</tr>
<tr>
<td>IVH¹</td>
<td>0.4 (0.1 to 1.6)</td>
<td>2.1 (0.4 to 11.2)</td>
<td>0.2 (0.0 to 0.5)</td>
</tr>
<tr>
<td>CLD &amp; death</td>
<td>0.7 (0.2 to 2.6)</td>
<td>0.2 (0.0 to 0.9)</td>
<td>0.4 (0.1 to 1.1)</td>
</tr>
</tbody>
</table>

Note: Data from seven infants not included secondary to early death.
RDS = Respiratory Distress Syndrome,
IVH = Intraventricular hemorrhage
CLD = Chronic lung disease

WHO data suggests huge opportunities to increase usage

**Notes:**
ACS coverage rates are preliminary figures from WHO MCS Survey, 2011
Hospitals surveyed had >1000 births annually
Coverage rate is defined as % of live births 24-34wks GA with childbirth taking place after 3hrs in hospital
No data is available on the type of ACS used, protocol, or completion of dosing
OBSTETRICS
Antenatal corticosteroid administration: understanding its use as an obstetric quality metric

Suchitra Chandrasekaran, MD; Sindhu K. Srinivas, MD, MSCE

OBJECTIVE: In 1994, the National Institutes of Health recommended a full course of antenatal corticosteroids (ACS) to women who were at risk of delivery at 24-32 weeks of gestation. In 2010, the Joint Commission on Accreditation of Healthcare Organization incorporated ACS administration rates as a perinatal core quality measure. The objective of this study is (1) to assess ACS administration rates among eligible patients at a tertiary care center and (2) to identify modifiable factors to optimize administration rates.

STUDY DESIGN: A retrospective chart review of preterm deliveries at <37 weeks of gestation from July 2009 to July 2011 was performed. Hospital level data, delivery information, obstetric history, and neonatal outcomes were abstracted. Categoric variables were compared with the use of the $\chi^2$ test. Continuous variables were compared with the use of a 2-sample t-test, Wilcoxon rank-sum, or Kruskal Wallis tests.

RESULTS: Nine hundred four women had preterm delivery; 38% of them delivered from 24-34 weeks of gestation. Of the eligible patients, 81.3% received at least 1 dose of ACS, and 69.6% received both doses before delivery. The median time from evaluation to ACS administration was 2.6 hours (interquartile range, 1.6—4.8 hours). Thirty-three percent of the patients who did not receive ACS had had a previous triage visit within 2 weeks of delivery (66.6% of them were evaluated for symptoms of preterm labor) vs 2.8% for those women who received ACS.

CONCLUSION: Of the eligible patients, 81.3% received at least 1 dose of ACS. Tangible opportunities that were identified for systems-based improvement in ACS administration rates included decreasing the time interval from patient evaluation to ACS administration and standardizing outpatient follow-up evaluation for patients who were discharged with symptoms of preterm labor.

Key words: antenatal corticosteroid, neonatal outcome, quality metric
Broader context

Other clinical situations with higher rates of PTB

- Adolescent pregnancy
- Pregnancy among women > 35
- Closely spaced pregnancies
- Multiple pregnancies
- Stress, gender-based violence
- Maternal obesity, smoking, etc.

Interventions

- Pre-conception care
- Delayed first birth, PPFP
- Careful infertility protocols
Programs to address preterm birth

- WHO Global guidelines / recommendations
  - To be developed in 2013/2014

- Advocacy:
  - Local: National Prematurity Day 17 November
  - Global: BTS Report, Dexamethasone on EML

- Research:
  - NIH trial (DRC, Zambia); MCHIP trial; Gates trial (Malawi, Uganda)

- Capacity:
  - Quality improvement / training on known and available interventions

- Monitoring:
  - Collection of key indicators
Thank you!

www.jhpiego.org

www.mchip.net

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References:

- ACOG Practice Bulletin #80, Premature Rupture of Membranes. ACOG, Washington, DC April 2007
- ACOG Committee Opinion #475, Antenatal Corticosteroid Therapy for Fetal Maturation. ACOG, Washington, DC February 2011