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# Evaluating the Prevention of Infant Mortality

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## Section A

### *Reducing the Proportion of High Risk Pregnancies*

# Reducing the Proportion of High Risk Pregnancies

- ◆ Reducing the number of unwanted pregnancies
- ◆ Increasing spacing between pregnancies
- ◆ Reducing the number of teenage pregnancies

# Title X of the Public Health Service Act (1970)

- ◆ Provides funds to non-profit groups to provide family planning services (regardless of income or age)
- ◆ Provides support for educational programs and research in contraceptive development

# Medicaid (1965) Title XIX

- ◆ Health insurance program designed to meet the needs of those unable to afford care, especially women and children
- ◆ Financed jointly by the federal government and the states

# Medicaid (1965) Title XIX

- ◆ Medicaid program was intended to improve access to mainstream medical care for those eligible
- ◆ Medicaid has never provided universal coverage for the low-income population
- ◆ Majority of public money spent on family planning from Medicaid

# Impact of Title X and Medicaid on Birth Outcomes

- ◆ Fertility
  - Is the hypothesized reduction a result of a reduction in the pregnancy rate or an increase in the pregnancy termination rate?
- ◆ Neonatal and infant mortality
  - Several studies found family planning services related to reductions

# Fetal and Infant Mortality Reviews Programs (FIMR)

- ◆ The U.S. has a long history of population-based strategies to improve MHC
- ◆ Perinatal health systems initiatives in local communities
- ◆ FIMR—community-based process aimed at the improving the system of perinatal health care
  - Development of recommendations is key component
- ◆ Recent nationwide evaluation of FIMR programs

## Section B

*Programs that Address Broad  
Societal Factors and Facilitate Entry  
into Prenatal Care*

# Programs that Reduce Financial Barriers to Access

- ◆ *Healthy Start*
  - Massachusetts Department of Health—evaluation, 1988
- ◆ *Medicaid Expansions*

# Programs that Reduce Financial Barriers to Access

- ◆ There are three primary sources of funding for prenatal care services for low income women
  - *Medicaid*
  - *Title V Maternal and Child Health Block Grant Program*
  - *Local Health Departments*

# Programs that Reduce Financial Barriers to Access

- ◆ Expansions for pregnant women and their newborns were accomplished in four areas
  1. Severing the link between *Medicaid* and *Aid to Families with Dependent Children*
  2. Simplifying and shortening the eligibility process
  3. Enhancing services provided by the program

# Programs that Reduce Financial Barriers to Access

- ◆ Expansions for pregnant women and their newborns were accomplished in four areas
  4. Increasing provider participation in the program (since 1989)
- ◆ Some enhancements have been at the option of the states, but many have been required

# Programs that Reduce Financial Barriers to Access

- ◆ Removal of financial barriers alone will not eliminate inequities in availability of health care for low income women
- ◆ Few studies have evaluated the impact

# Programs that Improve Capacity of the Health Care System to Provide PNC or Modify Institutional Practices of Providers

- ◆ *Pennsylvania Health Beginnings Plus Program*
  - To make a comprehensive array of maternity services available and accessible to low-income women

# Programs that Improve Capacity of the Health Care System to Provide PNC or Modify Institutional Practices of Providers

- ◆ *Maternal and Infant Care (MIC)*
  - Multidisciplinary approach to reduce barriers to accessing prenatal care
- ◆ *Comprehensive Prenatal Care Clinics*
  - Comprehensive, coordinated prenatal care including the following: high risk screening, education about PTL prevention, referrals to WIC, counseling, and general health education

# Programs that Improve Capacity of the Health Care System to Provide PNC or Modify Institutional Practices of Providers

- ◆ *Improved Pregnancy Outcome (IPO)*
  - To improve maternal care and pregnancy outcomes in areas with excessively high infant mortality
- ◆ *OB Access Project*
  - Comprehensive program including: psychosocial assessment, a nutrition assessment, perinatal education, and a well-baby exam

# Programs that Provide Social Supports Without Specialized, Direct Medical Interventions

## ◆ *Resource Mothers*

- To decrease mortality and morbidity among infants of adolescent mothers
- To promote teenage mothers' health and parenting skills

# Programs that Provide Social Supports Without Specialized, Direct Medical Interventions

- ◆ *Home Visiting*
  - To improve child health and development
- ◆ *Social Support*
- ◆ *TAPP*
  - School based clinic for teens

## Section C

*Programs that Identify Specific Risk  
Factors for PTL and Implement  
Preventive Measures*

# Programs that Identify Patients at Risk for PTL and Institute Early Measures to Prolong Gestation

- ◆ Pre-term birth prevention programs
  - Multi-center randomized controlled trial
- ◆ Ambulatory home monitoring of uterine contractions

# Programs that Identify Patients at Risk for PTL and Institute Early Measures to Prolong Gestation

## Pre-term Birth Prevention Programs

- ◆ The effectiveness of these programs has not been definitively established
- ◆ Programs usually involve
  - Education of provider with regard to risk assessment and community support resources

# Programs that Identify Patients at Risk for PTL and Institute Early Measures to Prolong Gestation

## Pre-term Birth Prevention Programs

- ◆ Programs usually involve
  - Education of patient with regard to early signs of pre-term labor and unhealthy behaviors
  - Attempts to treat pre-term labor (e.g., tocolysis, bed rest, cervical cerclage, home visits)

# Summary of Murphy (1993)

- ◆ Do methodologic differences explain the mixed results?
- ◆ Are etiologic differences in pre-term delivery obscuring the benefits of these programs?
- ◆ Are population differences obscuring the benefits of these programs?

# Summary of Murphy (1993)

- ◆ Are we looking for improved outcomes in the right subgroups?
- ◆ Are inadequate risk screening methods obscuring potential benefits?
- ◆ Are our interventions effective?

# Ambulatory Home Monitoring of Uterine Contractions

- ◆ To prevent pre-term birth by early detection of pre-term labor for women at high risk of pre-term delivery
- ◆ Use of external toco-dynamometer to monitor uterine activity with transmission of data by telephone to provider

# Ambulatory Home Monitoring of Uterine Contractions

- ◆ Summary of study results
  - Early studies concluded intervention may be useful but were unable to determine if it was the monitor or the daily nursing contacts responsible
  - Several randomized controlled trials showed no benefit

# Ambulatory Home Monitoring of Uterine Contractions

- ◆ Summary of study results
  - ACOG recommends that it is not to be routinely used until proven to be effective

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

- ◆ Cervical cerclage
- ◆ Antibiotics
- ◆ Nutrition
- ◆ Smoking cessation
- ◆ Substance abuse
- ◆ Domestic violence during pregnancy

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Cervical Cerclage

- ◆ Used to prevent pre-term birth by "treating" cervical incompetence (suturing cervix)
- ◆ Study results
  - Any benefit of cerclage would appear to be small and there is little evidence that cerclage is at all effective at preventing pre-term birth

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Antibiotic Therapy

- ◆ Used to prevent pre-term birth by treating bacterial infections of the reproductive tract
- ◆ Study results
  - Some recommend that testing and treating such infections should be a routine part of pregnancy care, others more cautious

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Antibiotic Therapy

- ◆ Study results
  - Infection may simply co-occur with pre-term birth and might not be the cause

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Nutrition

- ◆ WIC (supplemental food program for women, infants, and children)
  - Nutritionally "at-risk" and income <185 percent of the federal poverty level
  - Nutritional counseling and vouchers for specific nutritious foods

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Nutrition

- ◆ WIC (supplemental food program for women, infants, and children)
  - Also encourages prenatal care
  - Overall, WIC appears to have a small effect on the rate of pre-term delivery

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Smoking Cessation

- ◆ Outcomes
  - LBW
  - IMR
  - Quit rates
- ◆ Most likely, impact is small

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Substance Abuse

- ◆ Care for addicted, pregnant women is scarce and fragmented
- ◆ Difficulties in finding adequate care for pregnant, addicted women include:
  - Refusal of care: Many existing drug programs refuse care to pregnant women, especially if they are on Medicaid and are addicted to crack

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Substance Abuse

- ◆ Difficulties in finding adequate care for pregnant, addicted women include:
  - If admission into a program is allowed, prenatal care, medical care, and child care are usually not available through the same program

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Substance Abuse

- ◆ Difficulties in finding adequate care for pregnant, addicted women include:
  - Fractionated outpatient care, which requires transportation to multiple sites, is an added burden that reduces participation and compliance of pregnant women

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Substance Abuse

- ◆ Programs which provide comprehensive medical and social care have shown some positive results
- ◆ Substance abuse during pregnancy may be associated with increased risk of pre-term delivery and other poor pregnancy outcomes

# Programs Focusing on the Elimination of a Single Risk Factor for LBW/PTB

## Domestic Violence During Pregnancy

- ◆ Reported rates ranging from 4–19%
- ◆ However, few controlled studies have been done to establish that abuse leads to poor outcomes
  - Victims of domestic violence tend to enter prenatal care later in pregnancy

# Specific Interventions to Treat the Cause of PTL and Stop Progression

- ◆ Bed rest
- ◆ Tocolytics

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Bed Rest

- ◆ Purpose—To prevent premature delivery
- ◆ Mechanism of action not understood
- ◆ Summary of study results
  - Randomized studies of bed rest for multiple gestation pregnancies show little benefit

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Bed Rest

- ◆ Summary of study results
  - No studies have been reported that evaluate the potential benefit of bed rest for singleton pregnancy
  - While it would appear to be a low cost intervention to the medical provider, income lost to the family can be significant

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Bed Rest

- ◆ Summary of study results
  - Complications of bed rest include thromboembolic disease, muscle atrophy, bone demineralization, calcium depletion, decreasing plasma volumes, and decreasing cardiac output

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Tocolytics

- ◆ Purpose—To stop pre-term labor and prolong pregnancy in women experiencing premature labor
  - Pharmacologic agent used to inhibit uterine contractions in pre-term labor

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Tocolytics

- ◆ Study results
  - Prolongation may allow for transport to a facility more capable of managing a pre-term infant (e.g., with an NICU)
  - Administration of maternal corticosteroids that may enhance fetal lung maturity

# Specific Interventions to Treat the Cause of PTL and Stop Progression

## Tocolytics

- ◆ Study results
  - Further study is needed to determine optimal benefit-risk ratio for tocolysis

## Section D

*Improving Birth Weight Specific  
Survival by Strengthening Obstetric  
and Neonatal Health Systems*

# Improving Birth Weight Specific Survival by Strengthening Obstetric and Neonatal Health Systems

- ◆ Technological advances
  - Neonatal Intensive Care Units (NICU)
  - Surfactant
  - Steroids
- ◆ Access to risk appropriate care (regionalization)
  - Maternal and neonatal referral and transport

# Technologic Advances: NICU

- ◆ Ventilation methods were developed and neonatal intensive care units were introduced in the late 1960s
  - 1976: >125 NICUs; 2004: >900 NICUs
- ◆ Increased access to NICU associated with declines in neonatal mortality
  - ◆ However, growth has outpaced the need
  - ◆ Recent study shows between 1980-1995, the number of hospitals grew by 99%, NICU beds by 138%, and neo-natologists by 268%
  - ◆ Growth in needed bed days was only 84%

# Technologic Advances: NICU

- ◆ Infants born in hospitals with advanced neonatal care services available have higher birth weight specific survival than infants born in hospitals without such services

# Technological Advances: Surfactant

- ◆ Manufactured substance which reduces serious lung disease in premature infants
- ◆ Recent drop in NMR coincided with introduction of surfactant

# Technological Advances: Steroids

- ◆ Use of maternal steroids prior to delivery, even for just one to two days, can increase lung maturation in premature infants
- ◆ With widespread use of this therapy, neonatal mortality may continue to decline

# Ethical Issues

- ◆ Current limit of viability is 23–24 weeks gestation and 500 grams
- ◆ Infants born >25 weeks gestation have an excellent chance of a good outcome
- ◆ Dilemma: Is aggressive intervention warranted given there is a very small chance that the infant will survive and not develop severe, multiple handicaps?

# Ethical Issues

- ◆ Relevant ethical principles include
  - Preservation of life
  - Alleviation of suffering
  - Nonmaleficence
  - Patient autonomy
  - Justice

# Access to Risk Appropriate Care

- ◆ Regionalization refers to a population-based systems approach involving regional organization and coordination of perinatal services
- ◆ Rationales for regionalization
  - Technological advances in perinatal care are associated with improved survival of the newborn

# Access to Risk Appropriate Care

- ◆ Rationales for regionalization
  - Not cost efficient to provide this care in all institutions
  - Majority of births are uncomplicated
- ◆ Substantial evidence for the effectiveness of regionalization

## Section E

### *Reducing Postneonatal Mortality from Specific Causes*

# Reducing Post-Neonatal Mortality from Specific Causes

- ◆ Changing sleep position to prevent *Sudden Infant Death Syndrome* (SIDS)
- ◆ Mandating use of infant care seats to prevent deaths due to injury
- ◆ Screening for congenital malformations

# Changing Sleep Position to Prevent SIDS

- ◆ SIDS describes the death of an infant under one year of age, which remains unexplained after the performance of a complete post-mortem investigation, including an autopsy, the examination of the death scene and the review of the case history

# Changing Sleep Position to Prevent SIDS

- ◆ Leading cause of IM in post-neonatal period in the U.S.
- ◆ 90% of deaths occur within first six months
- ◆ Peak in mortality in 2–4 months range
- ◆ Breast fed babies less likely to die of SIDS
- ◆ More common in colder months
- ◆ Prone (face down) sleeping position as risk factor

# Changing Sleep Position to Prevent SIDS

- ◆ Meta Analyses of SIDS retrospective case-control studies
  - Combined RR associated with the prone sleeping position was 2.4 (CI 1.74, 3.3)
  - Evidence strongly suggests a causal association between the prone sleeping position of the infant and SIDS
  - AAP recommends that infants should be positioned on their back to sleep

# Mandating Use of Infant Car Seats to Prevent Deaths Due to Injury

- ◆ Increase in infant car seat use has saved lives and prevented injuries
  - 2000, 87% of infants, compared to 60% in 1983
  - Of the children ages 0 to 14 years who were killed in motor vehicle crashes in 2003, more than 50% were unrestrained
  - Fatalities among infant passengers related to an increased “on-the-road” exposure

# Mandating Use of Infant Car Seats to Prevent Deaths Due to Injury

- ◆ By 1985, all 50 states had mandatory car seat laws
- ◆ Car seat laws vary considerably from state to state

# Screening for Congenital Malformations

- ◆ Carrier testing
- ◆ Amniocentesis
- ◆ Chronic Villus Sampling (CVS)
- ◆ Maternal Serum Alpha-Fetoprotein Screening (MSAFP)
- ◆ Percutaneous Umbilical Blood Sampling
- ◆ Ultrasonography

# Screening for Congenital Malformations

- ◆ Evaluating the effect of screening on postneonatal mortality has two components:
  - Reliability and validity of the screening test
  - Impact of early diagnosis on morbidity and mortality

# Reducing Postneonatal Mortality from Specific Causes

- ◆ **Primary Prevention**
  - Determine couples who have a significant risk for a fetus affected with a serious congenital disorder and counsel them to avoid pregnancy
- ◆ **Secondary Prevention**
  - Identify fetuses with serious congenital malformations and provide opportunity for induced abortion of affected fetus
- ◆ **Treatment**