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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

Continued
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

Continued
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

Continued
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

Continued
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

Continued
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.

Continued
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.

Continued
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

Continued
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

Continued
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?

Continued
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

Continued
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

Continued
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

Continued
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**