Application of Disease Management Principles to Pregnancy and Delivery

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Overview

- Overview
  - Why Manage Pregnancy
  - Definitions, Pregnancy Statistics and Impact
  - Risk versus Etiology
  - Poor Birth Outcomes and Costs
- Approaches to a Pregnancy Management Program
- Outcomes and Informatics
- Future Directions and Ideas
Overview

• Pregnancy and Newborn care among most common and in the aggregate most expensive conditions.

• Historically viewed as episodic, event driven, and not continuous so not a candidate for “disease management”.

• “Wellness,” Case Management models also don’t completely address the issues.

• Is in fact a unique, high volume condition that benefits from primary and secondary preventive health efforts.
Why manage the condition of pregnancy?
An estimated twenty-five to forty percent of payer's total health expenditures are allocated to Maternity/Newborn Cost.

Percentages Reflect a Non-Medicaid Environment
Source: Washington Business Group on Health
Health Plan Experiences

- Precertification program for pregnancy
  - Too costly and too many normal ones
- “Drive through deliveries”
- Focused review of C-section and VBAC delivery rates
  - “unnecessary surgical procedures”
- Medical policy restrictions
  - Infertility
  - Home care
- Home made programs
Definitions

- **Preterm Labor**
  - Regular uterine contractions with cervical change that occurs between 20 and 37 weeks’ gestation

- **Preterm Birth**
  - Birth between 20 and 37 completed weeks’ gestation

- **Very Preterm Birth**
  - Birth before 20 and 32 completed weeks’ gestation
Definitions

• **Low Birth Weight**
  - Birth weight less than 2500 grams
    - (5 pounds, 8 ounces)

• **Very Low Birth Weight**
  - Birth weight less than 1500 grams
    - (3 pounds, 5 ounces)
• What is the economic impact of pregnancies that don’t go normally?
Cost of Maternity

• **Average cost per pregnancy is $15,523**

• **Analysis of 2002 data claims sets, covering 7.7 million lives, averaged $13,056 to $16,419 per pregnancy**

• **More than 1 in 3 pregnant women develop complications**

• **Society of Actuaries Large Claim Data Study, Neonates average $80,000, greatest cost of all diagnoses**

1. Report by Cigna Corporation by the Center for Risk management and Insurance Research-Georgia State University and the Center for Health Policy Studies, Columbia, Maryland; www.bls.gov/cpi;
2. Data on file
3. CDC Safe Motherhood
4. Society of Actuaries: Large Claim Data Base 1997
Pregnancy – An Expensive Condition

- More than 1 in 3 pregnant women develop complications costing $1 billion annually (2 million hospital days).\(^1\)
- Direct health care costs for a premature baby average $41,610 – 15 times higher than the $2,830 for a healthy full-term delivery.\(^2\)
- NICU expenditures for preterm birth and complications total $6.6 billion.\(^2\)

\(^1\) CDC Safe Motherhood
\(^2\) March of Dimes: www.marchofdimes.com
The Impact of Poor Birth Outcomes

• **Employer/Insurer**
  - Maternal care costs
  - Loss of productivity, absenteeism, presenteeism
  - Cost of newborn care (NICU)

• **Community/Society**
  - Continued care costs
  - Ongoing/life long disabilities and care requirements

• **Family**
  - Emotional pain and suffering/quality of life issues
  - Financial hardship
### Employer Costs for Preterm Birth

**Additional Employer Costs Due to Preterm Births**

**Average Cost Differential**

- Premature Infant
  - (first 12 months of life only)

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Cost Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Hospital</td>
<td>+$33,824</td>
</tr>
<tr>
<td>Physician Office Visits</td>
<td>+$ 4,561</td>
</tr>
<tr>
<td>Drugs</td>
<td>+$  395</td>
</tr>
<tr>
<td>Productivity/Synergy Loss</td>
<td>+$ 2,766</td>
</tr>
<tr>
<td>Average additional cost to employer per premature vs. full term birth (when mother is an employee)</td>
<td><strong>+$41,546</strong></td>
</tr>
</tbody>
</table>

March of Dimes and Thomson Medstat, The many costs of premature birth, impact on business, 2/06.
Factors that Influence Birth Outcomes

- **Employee and Family:**
  - Disease Process i.e.: Infection
  - Education/Knowledge i.e.: Signs-Symptoms
  - Psychosocial i.e.: Fear of “bothering providers”
  - Cultural/Language/Communication
  - Family Support

- **Employer/Environment/Community:**
  - Benefits
  - Work Type and Conditions
  - Living Conditions
  - Transportation

- **Physician:**
  - Education/Training
  - Practice Patterns
  - Office Staff Training
  - Elective C/Section

- **Hospital:**
  - Emergency Room Process
  - L&D Capacity, L&D Personnel & Policy
  - Neonatologist Practice Patterns

- **Health Plan/Insurance:**
  - Case Management
  - Direct Prenatal Care Access
  - Copay/Deductible

12.3% Preterm Birth
1,600+NICU days per 1000 births
Etiology Theories

Multifactorial Hypotheses

- **Maternal**
  - Genetic
  - Placental Abruption
  - Infection
  - Anatomical
    - Incompetent cervix
    - Over distention
      - Polyhydramnios
      - Multiple Gestation
  - Stress
  - Hormonal Dysfunction

- Psychosocial/Behavioral
  - Smoking
  - Drugs
  - Alcohol

- Pre-existing disease
- Pregnancy diseases
  - PIH
  - Eclampsia

- Clotting Disorders
- Iatrogenic

- **Unknown**
Etiology Theories, cont’d

- **Fetal**
  - Anomalies
  - Multiple Gestations
  - Blood Incompatibilities
  - Placental Thrombosis/Insufficiencies
  - *Unknown*
Risk Factors for Preterm Birth

50% of PTB’s = High Risk Pregnancy Factors
- History Of Previous Preterm
- Multiple Gestation
- Maternal Age
- Medical Risk Factors
- High Blood Pressure
- Diabetes
- Infections

50% of PTB’s = No Identifiable Risk Factors

"Reliance on risk factors alone will fail to identify over 50% of women who will have a preterm delivery."^1

Antenatal In-patient Hospital Costs

- 46,179 Patients
- 4,016 (9%) Antenatal Hospitalizations
- 15.7% had more than one hospitalization
- $36 Million Antenatal Costs ($1,550/day)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Incidence</th>
<th>Average LOS</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm Labor (PTL)</td>
<td>24%</td>
<td>3.4 days</td>
<td>$5,642</td>
</tr>
<tr>
<td>Hyperemesis</td>
<td>9%</td>
<td>3.0 days</td>
<td>$4,167</td>
</tr>
<tr>
<td>Hypertensive Disorders</td>
<td>9%</td>
<td>4.6 days</td>
<td>$7,145</td>
</tr>
<tr>
<td>Preterm PROM (PPROM)</td>
<td>6%</td>
<td>12.6 days</td>
<td>$20,753</td>
</tr>
<tr>
<td>Diabetes</td>
<td>3%</td>
<td>3.1 days</td>
<td>$4,591</td>
</tr>
</tbody>
</table>

Average Costs for Infants Admitted to NICU

Gestational Age at Delivery Assuming $3000 per day costs

What is Driving NICU Costs?

- Preterm births are increasing
- Smaller and earlier infants are surviving
  - Technology/ventilation improvements
  - Surfactant
  - Corticosteroids
- NICU Proliferation
- Infertility and Multiple Gestation Increases
US Preterm Birth Rates

Source: National Center for Health Statistics, Final Natality Data
Prepared by March of Dimes Perinatal Data Center, 2004

27 Percent Increase 1981-2001

Percent of Live Births


9.4 10.8 11.9 12.1 12.3

March of Dimes 2007 Goal
Surgeon General 2010 Goal
10.1 7.6

* 2004 Preliminary Data = 12.5% PTB

Source: National Center for Health Statistics, Final Natality Data
Prepared by March of Dimes Perinatal Data Center, 2004
Frequent Stop Loss Insurance Risk --Cost Impact Categories

- Cancer
- Transplants
- Maternal/Fetal medical
- Progression of Chronic Diseases
  - CHF, CAD, cardiac
  - Diabetes
  - ESRD
  - Etc
- Trauma and acute catastrophes
How Disease Management Can Help Stop Loss Insurers

- Theoretically, disease management type interventions can help stop loss insurers by either reducing cost or reducing riskiness of the insured group.

- Medical management would do this by:
  - Reducing the number of people hitting the stop loss limit.
  - Reducing the total costs at the individual level for those who did hit the stop loss limit.
  - Reducing the variation (standard deviation, coefficient of variation) of costs at the individual level above the stop loss limit.
Medical Management: CQI and Shifting Bell Curves

- Improvement:
  - Shifting the curve
  - Narrowing the curve
  - Dropping the tail

- Savings: differences in the integrated area under the curves.
Effect of DM on Maternity Cost Structure

- Study was conducted on a large health plan in our data repository, having some 1.3 million members.
- Some 6,200 deliveries were represented.
- A baseline and 1 year follow-up were evaluated.
- Costs per maternity case were examined and results included
  - Number of individuals – decreased
  - Total costs/case – average cost per case decreased for stop loss cases. Costs/case decreased more for the most expensive cases.
  - Costs above the stop loss attachment point – decreased for all but highest level (which had only 13 cases).
  - Standard deviation of costs above attachment point – increased for this client. Coeff of variation was less for the highest cost cases.
# Impact of DM on Maternity Stop Loss

<table>
<thead>
<tr>
<th>Client/Lives</th>
<th>StopLoss Attach Pt</th>
<th>Total OB Cases</th>
<th>% Change in Cases Hitting Stop Loss</th>
<th>Stop Loss Cases as % of Total % Change</th>
<th>% Change Average Stop Loss Cost/Case</th>
<th>% Change Average $ Above Stop Loss</th>
<th>% Change SD/CV Costs Above Stop Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 1.3 Million (8,200 deliveries)</td>
<td>$ 75,000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>$150,000</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>$175,000</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>$200,000</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

- For this client, which has an aging population, the number of deliveries is declining overall.
- The average cost per OB case declined in all stop loss attachment point levels.
- The amount of cost above the stop loss attachment point declined in all levels.
- The variation in stop loss exposure was significant in all levels, but was less at the highest level.
Maternity DM and Stop Loss: Percent Change over One Year of Program

Maternity DM Impact

<table>
<thead>
<tr>
<th>Pct Change</th>
<th>Total OB Cases</th>
<th>OB Cases Hitting Stop Loss</th>
<th>Average$ per Stop Loss Case</th>
<th>Avg$ Above Stop Loss Level</th>
<th>Stdev$ Above Stop Loss Level</th>
<th>Coef Var$ above Stop Loss Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30.0%</td>
<td>$75,000</td>
<td>$150,000</td>
<td>$175,000</td>
<td>$200,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cost Band Data

Within individual cost bands, average cost per case declines in each band. There seems to be an impact on variation as well.

Removing outliers >$100,000, both cost and variation declined.

<table>
<thead>
<tr>
<th>Period</th>
<th>Cost Band</th>
<th>N</th>
<th>% of Total N</th>
<th>Total OB$</th>
<th>Avg OB$</th>
<th>Std OB$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj 2003</td>
<td>&lt;50k</td>
<td>9115</td>
<td>98.68%</td>
<td>$78,301,792</td>
<td>$8,590</td>
<td>$5,728</td>
</tr>
<tr>
<td>2004</td>
<td>&lt;50k</td>
<td>8136</td>
<td>98.79%</td>
<td>$64,523,886</td>
<td>$7,931</td>
<td>$5,070</td>
</tr>
<tr>
<td>% Change</td>
<td>0.11%</td>
<td></td>
<td>-7.68%</td>
<td>-11.49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj 2003</td>
<td>50k - 99k</td>
<td>74</td>
<td>0.80%</td>
<td>$5,962,965</td>
<td>$80,581</td>
<td>$16,450</td>
</tr>
<tr>
<td>2004</td>
<td>50k - 99k</td>
<td>56</td>
<td>0.68%</td>
<td>$3,958,316</td>
<td>$70,684</td>
<td>$15,395</td>
</tr>
<tr>
<td>% Change</td>
<td>-15.13%</td>
<td></td>
<td>-12.29%</td>
<td>-6.41%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj 2003</td>
<td>100k - 199k</td>
<td>32</td>
<td>0.35%</td>
<td>$4,694,595</td>
<td>$146,706</td>
<td>$27,099</td>
</tr>
<tr>
<td>2004</td>
<td>100k - 199k</td>
<td>31</td>
<td>0.38%</td>
<td>$4,368,214</td>
<td>$140,910</td>
<td>$31,481</td>
</tr>
<tr>
<td>% Change</td>
<td>8.65%</td>
<td></td>
<td>-3.95%</td>
<td>16.17%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>200k - 399k</td>
<td>13</td>
<td>0.14%</td>
<td>$3,626,750</td>
<td>$278,981</td>
<td>$52,970</td>
</tr>
<tr>
<td>Adj 2003</td>
<td>200k - 399k</td>
<td>13</td>
<td>0.14%</td>
<td>$4,061,960</td>
<td>$312,458</td>
<td>$59,326</td>
</tr>
<tr>
<td>2004</td>
<td>200k - 399k</td>
<td>9</td>
<td>0.11%</td>
<td>$2,407,532</td>
<td>$267,504</td>
<td>$58,232</td>
</tr>
<tr>
<td>% Change</td>
<td>-22.35%</td>
<td></td>
<td>-14.39%</td>
<td>-1.84%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj 2003</td>
<td>400k +</td>
<td>3</td>
<td>0.03%</td>
<td>$1,703,122</td>
<td>$567,707</td>
<td>$71,637</td>
</tr>
<tr>
<td>2004</td>
<td>400k +</td>
<td>4</td>
<td>0.05%</td>
<td>$2,155,430</td>
<td>$538,858</td>
<td>$59,094</td>
</tr>
<tr>
<td>% Change</td>
<td>49.54%</td>
<td></td>
<td>-5.08%</td>
<td>-17.51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>All</td>
<td>9237</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>All</td>
<td>8236</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
So, given all this information, does medical management as a strategy have anything to offer?
Medical Management

• **Comprehensive Approach Needed**
  - Pregnancy identification and referral
  - Risk stratification
  - Risk-specific interventions
  - Case management
  - NICU Case management
  - Outcomes measurement
Management Programs Should

• Focuses on maintaining the health of the pregnant woman and decreasing risks through education and high-risk obstetrical nurse case managers

• Addresses the needs of payers, families and employers

• Reduces poor birth outcomes and related costs
Management Components

- **Surveillance and identification** - Periodic obstetrical assessments
- **One-on-one case management** expertise and ongoing support,
- **Home care in lieu of hospitalization** for high risk pregnancies
- **Focus on high cost NICU causes and readmits.**
- **Timely Education** - book, web based and newsletters. Multiple channels of communication.
- **Access to maternity nurses 24x7** through the call center RN/MD consultation.
IDENTIFY risk factors that may impact healthy birth outcomes and educate families about behavior changes.
Program Flow

Initial Risk Assessment
- Education
- BabyLine
- e-OB Newsletter
- Reporting

Follow-Up Risk Assessment
- Education
- BabyLine
- e-OB Newsletter
- Reporting

Case Management Stratified by Risk

Risk Factors

OUTCOMES
• **EXTEND** the pregnancy and improve birth weight through specialized maternity case management.
Case Management: Proactive Rather than Catastrophic

**Level I:**
- Teenage Pregnancy Maternal age < 18
- Advanced Maternal Age Maternal age > 35
- Smoking during pregnancy
- ETOH use during pregnancy
- Recreational drug use during pregnancy
- Barriers to obtaining adequate prenatal care
- Domestic Abuse [urgent notification MD]

**Level II**
- History of conditions
- History of Recurrent Pregnancy loss
- History of Preterm Labor
- History of Gestational Diabetes
- History of Pregnancy Induced Hypertension
- History of Neonatal Death or Stillbirth
- History of Low Birth Weight baby [less than 5 lbs at birth]
- History of Preterm Delivery
- History of Post Partum Depression
- History of Chronic Hypertension
- Other Current Medical Conditions
- Cardiac condition receiving treatment and/or medication
- Blood clotting condition
- Renal condition receiving treatment and/or medication
- Diabetes Mellitus – Type 1
- Diabetes Mellitus – Type 2
- Family History of genetic disorder and/or birth defect

**Level III**
- Current Pregnancy Conditions
  - Multiple Gestation
  - Non-adherence to prescribed activity restrictions and/or medications
  - Lack of support
  - Hyperemesis Gravidarum receiving treatment and/or medication
  - Pregnancy Induced Hypertension
  - Preterm Labor
  - Preterm Labor receiving treatment and/or medication
  - Preterm Labor no treatment – condition unresolved
  - Preterm Labor unknown resolved condition
  - Preterm Labor cervical change
  - Non-adherence to prescribed activity restrictions and/or medications
  - Lack of support
  - Gestational Diabetes
  - Potential Rupture Membranes [urgent notification MD]
  - Polyhydramnios
  - Oligohydramnios
  - Placenta Previa
  - Placental Abruption

**Level IV**
- Catastrophic
- Out of Network
- Trauma
• MINIMIZE the need for hospitalization through industry-leading homecare services.
OB Homecare Services - Overview

Homecare Service Approaches:

- **Pre-Term Labor Services (some hotly debated!)**
  - Home Uterine Activity Monitoring
  - Subcutaneous Tocolytic Infusion Therapy
  - 17P Administration Services
- **Nausea and Vomiting in Pregnancy**
  - Zofran and Reglan Subcutaneous Infusion Therapy
- **Diabetes in Pregnancy**
- **Pregnancy Induced Hypertension Management**
- **Anticoagulation Therapy**
• **REDUCE** NICU admissions and length of stay through proactive prenatal interventions and NICU care management.
Key Factors Driving Newborn Costs

- NICU Utilization
  - Unnecessary higher level NICU stays for grower/feeder infants
  - Delays in scheduling and provision of NICU services
  - Prolonged NICU stays awaiting discharge planning
  - Unscheduled NICU readmissions
• DOCUMENT clinical improvements, financial savings and patient satisfaction.
• What types of results can be expected?
Economic Impact Potential

- Programs reduce costs and improve outcomes through
  - Decreased length of NICU admission
  - Decreased number of ER visits
  - Reduced number of NICU readmissions within 30 days
  - Improved coordination of NICU care amongst the multi-disciplinary team
  - Post NICU infant care
# Medical Management Clinical Results

<table>
<thead>
<tr>
<th></th>
<th>Managed*</th>
<th>National Birth Data(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preterm birth rate, All births</strong></td>
<td>9.0%</td>
<td>12.1%</td>
</tr>
<tr>
<td><strong>Low Birth Weight rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singletons</td>
<td>4.7%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Twins</td>
<td>53.9%</td>
<td>55.4%</td>
</tr>
<tr>
<td>Triplets</td>
<td>98.1%</td>
<td>94.4%</td>
</tr>
<tr>
<td><strong>Very Low Birth Weight rate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singletons</td>
<td>0.7%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Twins</td>
<td>5.2%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Triplets</td>
<td>27.8%</td>
<td>34.5%</td>
</tr>
<tr>
<td><strong>NICU days per 1,000 births</strong></td>
<td>1,142</td>
<td>1,614(^2)</td>
</tr>
</tbody>
</table>

\(^*\)Results include 11,732 births (Commercial/Medicaid)


## Medical Management Financial Results

<table>
<thead>
<tr>
<th></th>
<th>Managed&lt;sup&gt;2&lt;/sup&gt;</th>
<th>National Birth Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICU days per 1,000 births</td>
<td>1,073</td>
<td>1,614&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Number of NICU Days Saved per 1,000 Births</td>
<td>541</td>
<td></td>
</tr>
<tr>
<td>Estimated cost per NICU Day</td>
<td>$2,000</td>
<td></td>
</tr>
<tr>
<td>Total Projected Cost Savings per 1,000 Births</td>
<td>$1,082,000</td>
<td></td>
</tr>
<tr>
<td>Total Projected Cost Savings per Birth</td>
<td>$1,082</td>
<td></td>
</tr>
<tr>
<td>ROI</td>
<td>6.3:1</td>
<td></td>
</tr>
</tbody>
</table>

2. Managed results include 10,467 births (Commercial/Medicaid)
Managed Financial Results – Commercial vs Medicaid

REDUCTION IN TOTAL NICU COSTS PER DELIVERING MEMBER

National Average based on benchmark of NICU data from 7 health plans/employers claims data (1998-2002).
Near Term Industry Movement

- Preconception Program
- Web enabled interactions with high risk members
- Inter-conception Management of High Risk Pregnancy
- Post Partum Depression Program
- Pediatric First Year of Life
Future Emerging Technologies Initiatives (Future)

- Infant and Pediatric Health
- Women’s Health Specific Wellness
- New Emergent Diagnostics or Drugs
- Genetic Screening - Trimester Screens + Nuchal Cord Ultrasound
- Cord Blood Genetic Analysis/Screening
Thank You!