Management of Obesity in Pregnancy
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Funding for this project is provided in part by The Duke Endowment
Learning Objectives

1. Understand the increased risks of varying medical and obstetrical conditions in the obese population

2. Develop a management plan for obese patients both before and during pregnancy

3. Understand the risks of prior bariatric surgery on pregnant patients
Obesity is the most common health issue among women of childbearing age, affecting 1/3 of all women.
- 7.5% of women have a BMI >40

The Pregnancy Medical Home Care Pathway on Management of Obesity in Pregnancy describes best practice management of three groups:
- Women with BMI 30-40
- Women with BMI >40
- Women with a history of bariatric surgery
Obesity Rates 2015

Leanest State: Colorado (21.0)

Fattest State: Mississippi (35.1)

Percentage of Obese Adult Population
(3-year average from 2012-14 CDC Behavioral Risk Factor Surveillance System data)
BMI and Mortality

A 1976-1978 cohort
No. of participants = 13,704
No. of deaths = 10,624

B 1991-1994 cohort
No. of participants = 9,482
No. of deaths = 5,025

C 2003-2013 cohort
No. of participants = 97,362
No. of deaths = 55,802

Afzal S et al JAMA 2016;315;1989
Preconception Care

Two priorities prior to conception:

- Identification and management of comorbid conditions
  - Screen for metabolic syndrome/other conditions
    - Hypertension screening
    - HgbA1c for diabetes
    - Metabolic panel
    - TSH
  - Urine protein/creatinine ratio
  - Consider EKG in patients with BMI >40 and in those with BMI >30 with other comorbidities
Preconception Care

Two priorities prior to conception:

- Aggressive weight loss management
  - Nutritional consultation
  - Exercise
  - Referral for bariatric surgery
    - BMI > 35 with 2 or more comorbid conditions
    - BMI > 40

Folic acid supplementation:

- 1mg daily
- Consider 4mg daily if other factors are present
Prenatal Care – 1st Trimester

- Screen for comorbidities:
  - Hypertension screening
  - HgbA1c and early GTT for diabetes
  - Metabolic panel
  - TSH
  - Urine protein/creatinine ratio
  - Consider EKG in patients with BMI >40 and in those with BMI >30 with other comorbidities

- Nutritional consultation
  - IOM weight gain recommendation: 11-20 pounds
  - Folic acid supplementation
# Recommended Weight Gain

## IOM

<table>
<thead>
<tr>
<th>Prepregnancy Weight Category</th>
<th>Body Mass Index*</th>
<th>Recommended Range of Total Weight Gain (lb)</th>
<th>Recommended Rates of Weight Gain† in the Second and Third Trimesters (lb) (Mean Range [lb/wk])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than 18.5</td>
<td>28–40</td>
<td>1 (1–1.3)</td>
</tr>
<tr>
<td>Normal weight</td>
<td>18.5–24.9</td>
<td>25–35</td>
<td>1 (0.8–1)</td>
</tr>
<tr>
<td>Overweight</td>
<td>25–29.9</td>
<td>15–25</td>
<td>0.6 (0.5–0.7)</td>
</tr>
<tr>
<td>Obese (includes all classes)</td>
<td>30 and greater</td>
<td>11–20</td>
<td>0.5 (0.4–0.6)</td>
</tr>
</tbody>
</table>
Prenatal Care – 1st Trimester

- Discuss perinatal risks:
  - Fetal anomalies (higher risk, less likelihood of detection)
  - Gestational diabetes
  - Preeclampsia
  - Macrosomia
  - Cesarean delivery/wound complications
  - Stillbirth

- Ultrasound for accurate dating
Prenatal Care – 1st Trimester

- Suspected sleep apnea
  - Snoring, excessive daytime sleepiness, witnessed apneas, or unexplained hypoxia
    - Increased risk of preeclampsia, cardiomyopathy, pulmonary embolism and mortality
  - Refer to sleep specialist

- Low dose aspirin
  - 81mg daily for BMI >40 or BMI >30 with additional risk factor
  - Initiate at 12-16 weeks
  - Can initiate up to 28 wks

Consider referral to high-risk OB or maternal-fetal medicine for continued care for BMI > 50 or per institutional protocol.
Prenatal Care – 2\textsuperscript{nd} Trimester

- Monitor weight gain
  - 50\% with weight gain greater than recommendation
- Detailed anatomy ultrasound – address limitations with patient
  - 20-30\% reduction in anomaly detection
- Consider OB anesthesia consult for BMI > 50 or per institutional protocol
## Congenital Anomalies

<table>
<thead>
<tr>
<th>Congenital Anomaly</th>
<th>Increased Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neural tube defects</td>
<td>OR, 1.87; 95% CI, 1.62–2.15</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>OR, 2.24; 95% CI, 1.86–2.69</td>
</tr>
<tr>
<td>Cardiovascular anomalies</td>
<td>OR, 1.30; 95% CI, 1.12–1.51</td>
</tr>
<tr>
<td>Septal anomalies</td>
<td>OR, 1.20; 95% CI, 1.09–1.31</td>
</tr>
<tr>
<td>Cleft palate</td>
<td>OR, 1.23; 95% CI, 1.03–1.47</td>
</tr>
<tr>
<td>Cleft lip and palate</td>
<td>OR, 1.20; 95% CI, 1.03–1.40</td>
</tr>
<tr>
<td>Anorectal atresia</td>
<td>OR, 1.48; 95% CI, 1.12–1.97</td>
</tr>
<tr>
<td>Hydrocephaly</td>
<td>OR, 1.68; 95% CI, 1.19–2.36</td>
</tr>
<tr>
<td>Limb reduction anomalies</td>
<td>OR, 1.34; 95% CI, 1.03–1.73</td>
</tr>
</tbody>
</table>
Prenatal Care – 3rd Trimester

- Repeat gestational diabetes screening
- Consider serial growth ultrasound if pannus precludes accurate fundal height assessment
- Consider weekly NST/AFI after 36 weeks
- Consider referral to high-risk OB or maternal-fetal medicine for delivery planning for BMI > 50 or per institutional protocol
## Adverse Outcomes

Rates per 10,000 births

<table>
<thead>
<tr>
<th>Maternal BMI</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal death</td>
<td>76</td>
<td>82 (95% CI, 76–88)</td>
<td>102 (95% CI, 93–112)</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>40</td>
<td>48 (95% CI, 46–51)</td>
<td>59 (95% CI, 55–63)</td>
</tr>
<tr>
<td>Perinatal death</td>
<td>66</td>
<td>73 (95% CI, 67–81)</td>
<td>86 (95% CI, 76–98)</td>
</tr>
<tr>
<td>Neonatal death</td>
<td>20</td>
<td>21 (95% CI, 19–23)</td>
<td>24 (95% CI, 22–27)</td>
</tr>
<tr>
<td>Infant death</td>
<td>33</td>
<td>37 (95% CI, 34–39)</td>
<td>43 (95% CI, 40–47)</td>
</tr>
</tbody>
</table>

Aune D et al JAMA 2014;311:1536–46
Stillbirth by Gestational Age
Stratified by BMI

Yao R et al AJOG 2014;210:457.e1-9
Delivery

- Induction/Delivery per institutional protocol
  - Increased labor time, oxytocin dose and cesarean
  - Fetal monitoring
  - Early OB Anesthesia consult
  - Patient transportation
  - OR preparation
  - Shoulder dystocia/PPH
  - Consider SCDs for patients with induction and prolonged bed rest
Delivery

Primary cesarean - in patients with BMI > 60, there are instances where inability to perform emergent cesarean may preclude attempt at vaginal delivery.

Cesarean delivery:

- 3g cefazolin with delivery
- Hibiclens shower/wipe prior to cesarean
- Operative prep per local protocol
- SCDs for all cesarean patients
- Consider negative pressure wound dressing in high-risk patients (BMI > 40, chorioamnionitis in labor, prolonged labor)
Morbid Obesity Impact
Cefazolin tissue levels

Pevsner L et al Ob Gyn 2011;117:877-82
Morbid Obesity Impact
Cefazolin tissue levels

Pevsner L et al Ob Gyn 2011;117:877-82
NPWT for C-Sections

• Prospective study of C-section patients with risk factors for wound complications compared to historical controls
• n=319 (110 NPWT, n=209 control)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Control (n=209)</th>
<th>NPWT (n=110)</th>
<th>P-value</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Complication Rate</td>
<td>44 (21.0%)</td>
<td>7 (6.4%)</td>
<td>0.0007</td>
<td>0.255 (0.111, 0.587)</td>
</tr>
<tr>
<td>Wound Infection</td>
<td>24 (11.5%)</td>
<td>3 (2.7%)</td>
<td>0.008</td>
<td>0.216 (0.064, 0.964)</td>
</tr>
<tr>
<td>Endometritis</td>
<td>14 (6.7%)</td>
<td>1 (0.9%)</td>
<td>0.023</td>
<td>0.128 (0.003, 0.865)</td>
</tr>
<tr>
<td>Wound separation</td>
<td>8 (3.8%)</td>
<td>3 (2.7%)</td>
<td>0.754</td>
<td>0.704 (0.118, 3.016)</td>
</tr>
<tr>
<td>All wound complications (separation/infection combined)</td>
<td>32 (15.3%)</td>
<td>6 (5.4%)</td>
<td>0.0098</td>
<td>0.319 (0.129, 0.789)</td>
</tr>
</tbody>
</table>
Subjects Who Experienced An SSO

- PIMS (N=39): 5.1%
- SOC (N=43): 16.3%

$p = .15$

Subjects Who Experienced An SII

- PIMS (N=39): 2.6%
- SOC (N=43): 14.0%

$p = .11$
Total Analgesic Use For Hospital Stay

<table>
<thead>
<tr>
<th></th>
<th>Prevena</th>
<th>Standard of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>6882</td>
<td>6924</td>
</tr>
<tr>
<td>p=0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Daily Use Equivalents</td>
<td>1.65</td>
<td>1.51</td>
</tr>
<tr>
<td>p=0.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenteral Morphine mg Equivalents</td>
<td>55.9</td>
<td>79.1</td>
</tr>
<tr>
<td>p=0.036</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Post Delivery

- Cesarean delivery:
  - OT/PT consult post-delivery if difficulties with wound care or ADLs are anticipated

Lactation consult

- Consider low molecular weight heparin in highest-risk patients (BMI> 50, chorioamnionitis in labor, prolonged labor, preeclampsia)
  - Initiate at 12-24 hours post-delivery
  - BMI 40-60 – 40mg twice daily
  - BMI > 60 – 60mg twice daily
Postpartum Care

- Provide comprehensive postpartum care as per guidance in the PMH Care Pathway on Postpartum Care and the Transition to Well Woman Care
- Incisional check at 5-7 days
  - Remove external wound vacuum, if utilized
- Review contraceptive options
  - IUD or implant are preferred methods
- Nutritional counseling
- Encourage breastfeeding
Postpartum Care

- Ensure transition to primary care provider
- Consider bariatric surgery referral:
  - BMI > 40
  - BMI > 35 with 2 or more comorbid conditions
Prior bariatric surgery

- Most patients remain obese following bariatric surgery – follow guidelines for management of obesity in pregnancy

- Three primary bariatric approaches:
  - Gastric lap band (restrictive)
  - Vertical sleeve gastrectomy (restrictive)
  - Roux-en Y (restrictive and malabsorptive)

- Review risks/benefits of pregnancy after bariatric surgery
  - No difference in pregnancy outcomes with restrictive vs. malabsorptive
  - Recommend delaying pregnancy 18-24 months after surgery
Prior bariatric surgery – 1st trimester

- Maternal-fetal medicine or high-risk OB consult; consider transfer of care
- Consider proton pump inhibitor
- Consider low-dose aspirin
- Review nutritional considerations
- Labs – CBC, ferritin, iron, vitamin B12, RBC folate (not serum folate), vitamin D, calcium, drug levels if therapeutic drug level is critical (absorption of oral meds may be decreased)
Prior bariatric surgery – 2nd trimester

- Diabetes screening – 50% cannot tolerate oral glucose tolerance test due to dumping syndrome
  - If able to drink a 12-ounce soda, likely able to tolerate GTT
  - Consider GTT alternatives
- Labs – CBC, iron, ferritin, calcium, vitamin D, drug levels as needed, diabetes screen at 24 – 28 weeks
Prior bariatric surgery – 3rd trimester

- Many women may require labor induction/augmentation and have longer labor as most post-bariatric patients remain obese
- Prior bariatric surgery is not an indication for cesarean delivery
- Consider pre-labor consultation with bariatric surgeon if extensive abdominal surgery
Prior bariatric surgery – postpartum

- Use caution with NSAIDs to avoid gastric ulceration
- Contraceptive counseling
- Recommend lactation consultation if breastfeeding
- If breastfeeding encourage
  - calcium citrate supplementation 1500 mg
  - vitamin D 400-800 IU
  - vitamin B12 500-1500mg daily
Questions?

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Funding for this project is provided in part by The Duke Endowment