Interventions to Manage Weight During the Transition to Motherhood: Translating to Clinical Care

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The Pennsylvania State University
Symposium Objectives

• Describe a preconceptional and prenatal intervention to manage perinatal weight gain
• Highlight key lessons learned on building effective communications with clinics and providers
• Recommendations for translating research to practice
The Problem

- Most US women enter pregnancy
  - OW 45%, OB 30%
- Average maternal weight at time of 1st pregnancy increased
  - > 20% since 1980
  - 25% women weigh > 200 pounds
- GWG in excess of guidelines
  - OW 70%, OB 60%
- Maternal and fetal complications

(Flegal et al., 2010 – JAMA, 303; 235-241)
(Haugen et al., 2014 – BMC Preg & Childbirth, 14; 201-211)
(CDCP, 2009; IOM, 2009; Linne et al., 2004; NRC, 2007)
The Problem

- Limited effective strategies
  - reduce obesity before pregnancy
  - limit GWG in pregnancy
  - lose weight after pregnancy

- Transitional approach needed

Preconceptional → Perinatal → Postpartum
Perinatal Period
Perinatal Period

- Ideal time for intervention
- Evidence for interventions to reduce risk of high GWG
  - diet only, diet + exercise interventions can reduce risks by up to 20%
- Effects limited to normal weight women
  - OW/OB women exercise less and have trouble adhering to diet recommendations

(Muktabhant et al., 2015)
(Streuling et al., 2011; Sui et al., 2012; Choi et al., 2013)
Goal of R01

- Develop and test individually-tailored, adaptive intervention to manage GWG in OW/OB pregnant women
  - adapt dosages to unique needs of OW/OB women
  - utilize m-Health technology for self-monitoring
  - data visualization to understand relationships with HE/EX and GWG
  - dynamical systems modeling to optimize intervention efficiency/effectiveness
## Intervention Components

<table>
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<tr>
<th><strong>Education</strong></th>
<th><strong>Goal-Setting</strong></th>
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</table>
| • GWG/nutrition/EX guidelines  
• GWG plotting  
• Energy density, portion size, etc.  
• EX benefits, safety, strategies | • Principles, implementation intentions  
• Healthy eating/EX plans  
• Problem-solving/weekly feedback |

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<tr>
<th><strong>Self-Monitoring</strong></th>
<th><strong>Active Learning</strong></th>
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<tr>
<td>• Behaviors, feedback, overcoming barriers</td>
<td>• Healthy eating/EX sessions</td>
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Components: Evidence-based from model programs (DPP, Look AHEAD, past GWG interventions, and PI research on promoting healthy behaviors in pregnancy with the Theory of Planned Behavior (NIDDK 07586702).
Adaptive Dosages

More intensive as she is “less controlled” with managing GWG

Decision Rule: evaluate GWG every 3-4 weeks
Adapt intervention (step-up) if > GWG goal
Study 1 Feasibility Results

- Identified threshold of “too much intervention”
  - Mmst intensive dosage in the pilot was too much so we made modifications

- Protocol modifications
  - revised screening protocol (e.g., wider BMI range, excluded smokers)
  - increased efforts to recruit women into study sooner (~6-8 weeks gestation)

- Assessment Protocol
  - dropped Supertracker and ASA-24 – women greatly disliked
  - back-calculated method for EI vs. assessed EI

Currently in progress with Study 2 – fully adaptive intervention to manage GWG in OW/OB pregnant women (RCT design)
Collaboration with Geisinger Health Systems

- **Translation...**
- Improve OB care by managing GWG among high risk women to:
  - improve patient experience
  - reduce maternal-fetal complications
  - reduce prenatal and NICU costs
- Geisinger Quality Fund Proposal
Preconception Period
Call for Paradigm Shift

CDCP (2005): comprehensive strategy for improving women’s preconception health

“ensure that all U.S. women of childbearing age receive preconception care services, screening, health promotion, and interventions that will enable them to enter pregnancy in optimal health”
CePAWHS Phase I

- Prospective cohort study
- Population-based surveys of reproductive women
  - **$N = 2,002$**
- Goal: to establish prevalence of risk factors and identify subgroups at greatest risk preterm birth

28-county region with 3 mid-sized cities (Harrisburg, York, Lancaster) and a large rural population including from small towns and isolated rural areas

CePAWHS Preconception Predictors of GWG

- Examined preconception predictors (weight status, age, parity, health behaviors) of GWG
  - 1,420 \( (n=103) \) not pregnant at baseline but gave birth by 2 yr FU
- Found:
  - average GWG 33 lbs; 51% exceeded IOM GWG guidelines
  - preconception overweight = 3-fold increased odds of high GWG
  - preconception PA (meet guidelines) = reduced odds \( (p=.06) \)

Key Finding: preconception weight status and PA levels are prime targets for intervention to reduce high GWG

<table>
<thead>
<tr>
<th>Weight Status</th>
<th>Pounds</th>
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<tr>
<td>Underweight</td>
<td>28-40</td>
</tr>
<tr>
<td>Normal</td>
<td>25-35</td>
</tr>
<tr>
<td>Overweight</td>
<td>15-25</td>
</tr>
<tr>
<td>Obese</td>
<td>11-20</td>
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CePAWHS Phase 2

- Community-delivered, group intervention led by trained facilitators
- Targeted outcomes:
  - knowledge, self-efficacy, intention, behavior change, and health status improvement
- Behaviors:
  - stress, nutrition, PA, tobacco/alcohol exposure, gynecological infections, preparing for pregnancy

CePAWHS *Strong Health Women RCT*

- Recruitment \((n=692)\)
- Baseline Risk Assessment
- **Random Assignment**
  - **Intervention \((n=473)\)**
    - six (2 hr sessions)
    - over 12 weeks
  - **Control \((n=219)\)**
- Follow-up Risk Assessment \((n=362)\)
- Follow-up telephone surveys at 6 and 12 months

Pre-Post Intervention Results

- Intervention group significantly more likely than controls to report higher
  - self-efficacy for eating healthy foods
  - intention to eat healthy/engage in PA
  - frequency of reading food labels
  - PA consistent with guidelines
  - daily use of multivitamin with folic acid
- Expected direction but N/S
  - weight, waist circum, non-fasting blood glucose, lipids
- Dose-response
  - more PA, attended more sessions

SHW 12-Month Follow-up

- Examined 12-month effects of SHW intervention on BMI and weight \((n=362)\)
- Found:
  - intervention women had significantly lower weight & BMI than controls
  - 45 women became pregnant …

SHW Preconception Intervention

Among those who became pregnant during the follow-up (n = 45) …

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<tr>
<th>Preg at follow-up (n = 45)</th>
<th>INT</th>
<th>CON</th>
<th>p</th>
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<tbody>
<tr>
<td>GWG (pounds)</td>
<td>23.4</td>
<td>41.4</td>
<td>.02</td>
</tr>
<tr>
<td>GWG (controlling for prepreg obesity*)</td>
<td>23.8</td>
<td>34.2</td>
<td>.13</td>
</tr>
<tr>
<td>GWG exceeded IOM guidelines**</td>
<td>43%</td>
<td>56%</td>
<td>.65</td>
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*Obesity defined as BMI > 30.0.
** Mother’s GWG exceeded IOM (2009) guidelines for pre-pregnancy BMI category.

SHW preconception intervention appears to also help women manage their GWG, although rates still exceed IOM guidelines for OW/OB women.
**SMART SHW**

- Pilot study to extend SHW to integrate smartphones to deliver portions of the content
- Develop weight management content
- Feasibility results
  - OW/OB women – good user acceptability of phone-based delivery
  - salient beliefs
Lessons Learned
Lessons Learned & Recommendations

• Recruiting preconception and pregnant women
  • community and clinic methods
• Community and clinic collaborations
  • establishing relationships: clinics, Family Health Council
• Work toward overcoming challenges
  • getting women focused on preconception health!!
  • changes to perinatal care (more focus on mom’s health)
  • consistency in rec’s for OW/OB women (weight loss before pregnancy?)
  • translating intensive interventions to effective practice
Collaborative Team

- Dr. Jennifer S. Savage, Center for Childhood Obesity Research and Department of Nutritional Sciences, The Pennsylvania State University
- Dr. Lisa Bailey-Davis, Geisinger Health Systems
- Dr. Daniel E. Rivera, Control Systems Engineering Laboratory, School for Engineering of Matter, Transport, and Energy, Arizona State University
- Drs. Linda Collins, Joshua Smyth, Barbara Rolls, Rick Legro, Jamey Pauli, Erica Rauff, Diana Thomas, Yueng Dong, Brandi Rollins, Katie Balantekin
- Abigail Pauley, Lindsey Hess, Allen Kunselman, Courtenay Devlin, Penghong Guo, Krista Leonard, Emily Hohman

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