PRIMARY CARE AND WIC COORDINATION TO PREVENT OBESITY FOR INFANTS: A RANDOMIZED CLINICAL TRIAL

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The Center for Childhood Obesity Research

Conducts research that provides an evidence base needed to develop successful childhood obesity prevention programs

Develop partnerships with public health professionals and communities to design and implement sustainable interventions
1 of 3 children in the U.S. are overweight or obese before age 5
Infants with rapid weight gain have…

- Higher BMI and fat mass in childhood\(^1\)
- Increased risk of obesity in adulthood\(^2\)
- Higher blood pressure in childhood\(^3\) and adulthood\(^4\)
- Reduced physical fitness in childhood\(^5\)
- Increased metabolic risk factors at 17 y\(^6\)

\(^{1}\)Sacco, J Clin Nutr, 2013; Koontz, Ped Obes, 2014; Taveras, Pediatrics, 2009; Stettler, \(^{2}\)Circulation, 2005;
\(^{3}\)Belort 2007 J Pediatr; \(^{4}\)Ben Shlomo, Hypertension, 2008; \(^{5}\)Van Deutekom, Int J Obes, 2015;
\(^{6}\)Ekelund, J Clin Endocrinol Metab, 2007
Responsive Parenting/Caregiving

Defined as a mother’s/caregiver’s prompt, contingent, & developmentally-appropriate interaction with child

Why target responsive parenting?

- Language development
- Attachment
- Emotional growth
- Social competence
- School readiness
- Self regulation
- Weight status?

Structure-based parenting may influence child eating behavior

Control

Psychological Control:
• Pressure
• Intrusiveness
• Dominance

Control in Feeding
• Restricts all access
• Hiding foods
• Parent perspective
• Takes food away

Structure

Behavioral Control:
• Routines
• Guidance
• Limit setting

Structure in Feeding
• Provides access
• Rules & routines
• Child perspective
• Parent provides, child decides

Overconsumption? Consumption in moderation?

Grodnick & Pomerantz, Child Devel Pers, 2009; Rollins, Savage, Birch, IJO, 2015
We often talk about what NOT to do...but, what guidance should be provided on what to do?
Do we need more than one manual?
The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) Study

Primary Aim: To evaluate a responsive parenting (RP) intervention that is designed to prevent rapid infant weight gain and childhood obesity at age 3 years among first-born infants.

Funding: NIDDK R01DK088244   Study protocol: Paul et al. 2014 BMC Pediatrics
Rapid weight gain from birth to 28 weeks

- CWG Mean = 0;
- CWG score >0 = faster weight gain, CWG score <0 = slower weight gain

Faster weight gain:
37% parenting
51% safety

Savage et al. JAMA Pediatrics 2016; Paul et al. JAMA 2018
**SIBSIGHT**

**Did not participate:** 5
- Unable to contact mother: 1
- Mother not interested: 4

**Number screened for eligibility:** 138

**Number eligible:** 122

**Number of participants enrolled:** 117

**Excluded from SIBSIGHT:** 16
- Newborn medical condition: 3
- Infant birth weight <2500g: 1
- Resides out of area or moving: 4
- Prematurity <36 weeks of gestation: 4
- Nonsingleton birth: 4
INSIGHT RP has protective effect on firstborn and secondborn sibling BMI

Firstborn children whose parents received the RP intervention with their first child had BMI that was 0.44 kg/m² (95% CI: −0.82 to −0.06) lower than controls, respectively.

Second-born children whose parents received the RP intervention with their first child had BMI that was 0.36 kg/m² (95% CI: −0.75 to 0.03) lower than controls, respectively.

Savage et al. 2021 Obesity
**Care delivery** - guidelines & recommendations, clinical decision support, best available evidence, workflow

**Family & individual engagement** - patient-reported risk assessment data, self-directed learning

**Community systems** - schools, WIC, etc.

**Big data** - integration and metrics
Build and evaluate a model for delivering consistent personalized messages to coordinate care across multiple settings – WCV and WIC - to support mothers and their children’s related health outcomes.

### Anticipated Opportunities for Coordination by Infant Age

<table>
<thead>
<tr>
<th></th>
<th>Newborn</th>
<th>1 mo.</th>
<th>2 mo.</th>
<th>3 mo.</th>
<th>4 mo.</th>
<th>5 mo.</th>
<th>6 mo.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Child Visits (WCV)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>WIC Visits</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Objective 1: Tailor curriculum to ensure cultural appropriateness, and evaluate delivery mode and use of health information technologies.

Funding Support: Maternal and Child Health Research HRSA 1 R40MC283170100;
Co-PI’s: Savage, Bailey Davis
Conflicting Messaging: Parents Confused about Growth

“His doctor thinks that he’s at a proper weight and health, where his WIC nutritionist thinks that he’s overweight and in risk of getting like diabetes and stuff.”

-Mother of Infant receiving WIC and Pediatric Well Child Care

“We might be talking about the weights on the charts so then they [mothers] might say, ‘well the doctor always has a different percent or different number’ than we have so then they would sometimes listen to the doctor instead of us. And sometimes I’ll get like a little offended, cause we might say they’re overweight but according to the doctor they’re okay.” – WIC Nutritionist

“...I don’t know what that is, you know if we just have, if we’re using the same growth curves or not or what is, what is the scale, but I notice that too. We have parents coming in saying they’re underweight but they’re not, you know. Or they’ll have a four-month-old and they’ll say well they weigh too much for their height, and I’m like well they’re four months.” -Pediatrician

Conflicting Messaging: Parents Confused about Feeding

“My doctor had told me to start giving him cereal at night, where WIC was... stern against him having cereal until... he was 6 months. But... he was about 3 months when the doctor said go ahead... it’s not going to hurt him...”

-Mother of Infant receiving WIC and Pediatric Well Child Care

“Mom will not start solids before four months, so we’re following up with that, and she’ll say ‘well no we started that last month because he was, you know, taking too much formula and the doctor said it was fine.’” - WIC Nutritionist

“WIC is telling them to introduce solids is much earlier stage than what the American Academy of Pediatrics guidelines are. So, um, some of them are starting to get cereal and baby food at 3 ½ months or 4 months of age where the AAP is pushing more toward 6 months and they are telling me that this is what WIC has been giving us.” - Pediatrician

Coordinating Care: Strategy to Clarify Messages for Parents

“Sometimes you can explain the same thing the doctor said, but in a different way and the mom will just thank you, because you brought it to her level, and so it’s the same message, but explained in a different way.”

-WIC Nutritionist

“...if the WIC feels okay mom is doing a good job, I want to know the mom is doing a good job so I don’t have to again like you know like give her a positive reinforcement [and] I can concentrate more on like something else.”—Pediatrician

“I don’t think that would bother me at all because then they could learn from each other and hopefully... they can get on a system that works and collaborates with both and then they’d be on the same page.”—Mother of infant receiving WIC and Pediatric Well Child Care

**Objective 1:** Tailor curriculum to ensure cultural appropriateness, and evaluate delivery mode and use of health information technologies.

Y1: Focus groups, Data sharing, integration & display, Training

Y2/3: Recruitment, Intervention, Data Collection

Y4: Data analysis, Manuscripts, Next Grant

**Objective 2:** Establish the efficacy of providing coordinated, personalized care on responsive parenting across multiple settings to prevent overweight at 6 months of age.

Funding Support: Maternal and Child Health Research HRSA 1 R40MC283170100; Co-PI's: Savage, Bailey Davis
Community Systems
Integration of clinical care and community

Mom and Infant
PCP
WIC

Treatment (n=145):

Mom and Infant
PCP
WIC

Standard of Care Control (n=145)

Participants were consented when baby was < 35 days old

Funding Support: Maternal and Child Health Research HRSA 1 R40MC283170100; Co-PI’s: Savage, Bailey Davis

Protocol: Savage et al., BMC Pediatrics, 2018
WEE Baby Care Study Design

Control: Standard Care
N = 155

Intervention: Integrated Care
N = 131

- Participants were consented when baby was < 35 days old
Participants had a median income of $10,000 to $24,999

<table>
<thead>
<tr>
<th>Race and Ethnicity</th>
<th>% of all participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White Caucasian</td>
<td>65%</td>
</tr>
<tr>
<td>Non-Hispanic African American</td>
<td>15%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Martial Status</th>
<th>% of all participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>27%</td>
</tr>
<tr>
<td>Single or divorced</td>
<td>44%</td>
</tr>
<tr>
<td>Single but living with partner</td>
<td>27%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>% of all participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some high school</td>
<td>11%</td>
</tr>
<tr>
<td>High school graduate</td>
<td>50%</td>
</tr>
<tr>
<td>Some technical school</td>
<td>30%</td>
</tr>
<tr>
<td>College graduate</td>
<td>8%</td>
</tr>
</tbody>
</table>

25
Intervention components

1. Personalized messaging using Early Healthy Living screening tool
Digital Tools:

Patient-Reported Outcome Measure (PROM)

Involve Patients
- Patient-Reported Outcome Measures
- Risk Calculators

Involve Clinicians
- Progress Note
- Synopsis Report
- 1-click Referral

Variables
- Access
- Leadership
PROM: working definition


validated questionnaire

developed in collaboration between patients, clinicians, and other pertinent stakeholders

systematically applied

mediated digitally

completed directly by a qualified proxy

composed of disease-specific or preference-based measures

consisting of content pertaining to the patient’s physical condition and well-being

providing objective and/or subjective outcomes, and individual and/or population data
Coordinated Care Curriculum centered on the patient

- Patient Reported Data
- Food, Sleep, Activity, Responsive Parenting
- Every well child visit 0-24 mo.
- Clinical Decision Support to inform Preventive Counseling
Parent Completes Early Healthy Living (EHL)
Immediate personalized feedback (pdf)
Educational materials, links

Parent Concerns
Parent sets an agenda by choosing topics to discuss with provider

EHR Integration
ExpressLane Well Visit Progress Note
Parent agenda featured, obesogenic responses in bold

Documentation check-boxes
BMI, Nutrition Counseling, Physical Activity Counseling (HEDIS)
Anticipatory Guidance Educational Materials (dropdownlist)
Intervention components

1. Personalized messaging using Early Healthy Living screening tool

2. Evidence-based responsive parenting and nutrition curriculum
Coordinated Care Curriculum

Welcome to the WEE Baby Care Study!

Parents face many challenges when it comes to their newborn babies. We hope that these handouts will teach you to look, listen and respond to your baby.

This packet provides information about:

- Feeding Your Baby
  Pages 1-16
- Soothing Your Baby
  Pages 19-23
- Your Baby's Sleep
  Pages 24-37
- Playing with Your Baby
  Pages 38-46

Our goal is to help you be the best parent you can be so you can have a healthy & happy baby!

Intervention components

1. Personalized messaging using Early Healthy Living screening tool

2. Evidence-based responsive parenting and nutrition curriculum

3. Electronic Data Sharing and Coordination of Care between Pediatricians and WIC Nutritionists
## Data sharing between well-child visits and WIC

**Bidirectional**

Pediatricians ↔ WIC Nutritionists

- Name (child/parent)
- Child date of birth
- WIC participant
- Visit date
- Preventive Education
  - SmartSet discussion points
  - Nutrition Education Topic Codes
- 80-character, free-text comment

**Unidirectional**

Pediatricians → WIC Nutritionists

- Child’s health insurance
- Hemoglobin/Hematocrit
- Length/Weight
- Brand and product name of formula
- Food allergies
- Special pediatric conditions
- Medical diagnoses (e.g., reflux, diabetes)
- Immunizations
# Pediatrician view in EPIC

<table>
<thead>
<tr>
<th>Early Healthy Lifestyles Data (PATIENT REPORTED)</th>
<th>WIC Coordinated Data</th>
<th>Provider Review and Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Date: Clinic</td>
<td>Date WIC nutritionist completed form:</td>
<td></td>
</tr>
<tr>
<td>Survey Source: Clinic</td>
<td>WIC Nutritionist Comment: Mom adding fruits/veg to formula bottles; enc d/c &amp; waitng to offer from spoon.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beverages</th>
<th>Select beverages that your child drank in the past week.</th>
<th>Breastfeeding basics discussed:</th>
<th>Breastfeeding problems discussed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastmilk</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Formula</td>
<td>True</td>
<td>Discussed formula preparation: Yes</td>
<td>Discussed formula preparation</td>
</tr>
<tr>
<td>Milk</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Water</td>
<td>N/A</td>
<td></td>
<td>After 6 months, water can be provided at snack times or in between feedings.</td>
</tr>
<tr>
<td>100% Juice</td>
<td>N/A</td>
<td>Discussed limiting juice intake:</td>
<td>N/A</td>
</tr>
<tr>
<td>Fruit Punch, fruit drink, iced tea, lemonade, soda</td>
<td>N/A</td>
<td>Discussed limiting high sugar foods and beverages: N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottle</th>
<th>When preparing a bottle, how many ounces did you put in the bottle at each feeding?</th>
<th>5-6 ounces</th>
<th>Discussed bottle feeding practices: Yes</th>
<th>Infants 4-6 months: offer 5-8 oz. 5-6 times per day.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Discussed dental health/nursing bottle mouth: Yes</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Sample WIC Nutritionists’ View

## Immunizations

<table>
<thead>
<tr>
<th>Immunization</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP/DTPA</td>
<td>2/28/2017</td>
</tr>
<tr>
<td>Hep B</td>
<td>8/20/2016</td>
</tr>
<tr>
<td>MMR</td>
<td></td>
</tr>
<tr>
<td>Polio</td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>1/3/2017</td>
</tr>
<tr>
<td>Hib</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>2/28/2017</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>2/23/2017</td>
</tr>
</tbody>
</table>

## EHL Questionnaire

### Appointment Relationship

What is your relationship to the child being seen for an appointment today: I live with the child and care for the child regularly.

### Beverages

- The child has had Breastmilk in the past week: [ ]
- The child has had Milk in the past week: [ ]
- The child has had 100% Juice in the past week: [ ]

**Provider Discussion Topics:** Breastfeeding Basics Discussed, Discussed Formula Preparation, Discussed Water, Hydration Needs, Discussed Limiting Juice Intake.

### Bottle

When preparing a bottle, how many ounces did you put in the bottle at each feeding: 5-6 oz.

**Provider Discussion Topics:** Discussed Bottle Feeding Practices.

### Food to Soothe

I sometimes nurse, give a bottle, or something to eat as a way to keep the child quiet or to calm them when they are upset: [ ]

**Provider Discussion Topics:** Discussed Avoiding Using Food to Soothe.

### Hunger and Fullness

- When it comes to eating, the child doesn’t eat enough: [ ]
- When it comes to eating, the child eats too much: [ ]

**Provider Discussion Topics:** Discussed Parent Concern: Doesn’t Eat Enough, Discussed Parent Concern: Is Always Hungry.

### Repeated Exposure

- When it comes to eating, the child spits out healthy food: [ ]
- When it comes to eating, the child is picky: [ ]

**Provider Discussion Topics:**
Data from PCPs in pediatric clinics to WIC clinics:
- Parent responses to EHL assessment tool
- PCP documentation of provided RP care
- PCP comment to WIC nutritionist
- Demographics
- Hemoglobin and hematocrit
- Encounter problem list
- Breastfeeding status
- Weight and length
- Diagnoses
- Immunizations
- Formula use

Data from nutritionists in WIC clinics to pediatric clinics:
- WIC nutritionist documentation of provided RP care
- WIC nutritionist comment to PCP
Care Coordination Opportunity

Well-Child Visit with heights/weights, immunization, provider education on SmartSet, and/or provider free-text comment

WIC Visit with WIC Nutritionist

WIC Nutritionists enter nutrition topic codes

WIC Nutritionist signs off on visit (required)

WIC Nutritionist writes free-text comment (optional)
Well-Child Visit

Data Sharing

Care Coordination Opportunity

WIC Visit with WIC Nutritionist

WIC Nutritionists enter nutrition topic codes

WIC Nutritionist signs off on visit (required)

WIC Nutritionist writes free-text comment (optional)

Well-Child Visit

Provider enters education on SmartSet, and/or provider free-text comment
Model to Evaluate Care Coordination during 6 months of Data Sharing

- **Birth**: 
  - **Caring**
  - ✓ Data Sharing
  - ✓ WCV → WIC Care Coordination Opportunity
  - ✓ WCV → WIC Care Coordination

- **1 mo.**: 
  - WCV → WIC

- **2 mo.**: 
  - WCV → WIC

- **3 mo.**: 
  - Data Sharing

- **4 mo.**: 
  - ✓ Data Sharing

- **5 mo.**: 
  - WCV → WIC

- **6 mo.**: 
  - ✓ Data Sharing

- ✓ WCV → WIC Care Coordination Opportunity
- ❑ WCV → WIC Care Coordination
Big Data Integration and Metrics

**Preliminary Results**

- Most (84%) mother-infant dyads attended the expected 4 WCVs
- About half (44%) of mother-infant dyads attended the expected 3 WIC visits
- About half (48%) of parents completed EHL 4 times in 6 months
- Parents completed EHL 53.2% at PCP
- PCPs documented 35.3% of visits, but documented education at least once for 60% of treatment infants
- WIC nutritionist documented at 100% of visits, utilizing free-text comment

**Lessons Learned**

- Engaging end-users in the development and design of the intervention does not guarantee adoption
  - WIC readily adopted study-specific education codes and free-text comment
  - Pediatricians documented study-specific counseling less than half of the time and did not use free-text feature
- Changes to the EHR and QuikWIC are ongoing at both system and local levels

Kling et al., *JMIR*, 2020
WEE Baby Care Study

- Parent/infant dyads attended 3.5 WCVs and 2.3 WIC visits, 6 months
- Clinicians documented provided responsive parenting care at 35% WCVs and shared data with WIC after 100% of visits
- WIC visit followed WCV 50.3% of the time, so there were 1.8 WCV to WIC visit care coordination opportunities
  - WIC coordinated care by documenting responsive parenting care at 66.7% of opportunities
- WCV followed WIC visit 59% of the time, so there were 0.9 WIC to WCV care coordination opportunities
  - Clinicians coordinated care by documenting responsive parenting care at 44% of opportunities

<table>
<thead>
<tr>
<th>Study-team Developed Education Topics</th>
<th>Topics n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age range of infants in months at WIC nutritionist visits</td>
</tr>
<tr>
<td></td>
<td>Birth - 2 mths.</td>
</tr>
<tr>
<td>Hunger and fullness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>65 (46)</td>
</tr>
<tr>
<td>Nighttime feedings</td>
<td>9 (6)</td>
</tr>
<tr>
<td>Food to Soothe</td>
<td>44 (31)</td>
</tr>
<tr>
<td>Bottle feeding practices</td>
<td>35 (25)</td>
</tr>
<tr>
<td>Night waking</td>
<td>21 (15)</td>
</tr>
<tr>
<td>Bedtime routines</td>
<td>33 (23)</td>
</tr>
<tr>
<td>Self-soothe to sleep</td>
<td>34 (24)</td>
</tr>
<tr>
<td>Tummy time</td>
<td>12 (8)</td>
</tr>
<tr>
<td>TV in bedroom</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Parent use of electronic device</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Savage et al. Society of Behavioral Medicine . 2020
Primary outcome findings
Thank you!

Contact: jsavage@psu.edu

For more information, see our website at: www.hhd.psu.edu/ccor