Interventions to Improve Nutrition and Prevent Overweight & Obesity in the First 2 Years of Life

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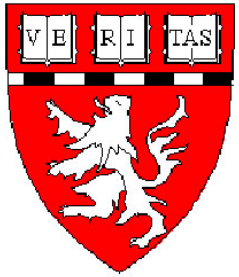

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Goals of this Presentation

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- Describe interventions implemented during pregnancy through age 24 months that aimed to improve infant nutrition and prevent childhood overweight or obesity;
- Discuss lessons learned from existing studies and gaps and opportunities to inform and enhance the development of future interventions.

Systematic Review of Interventions in the First 1000 Days

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- Systematic review of interventions implemented during the “First 1000 Days” that included prevention of childhood overweight and obesity;
- Inclusion criteria was English-language studies:
  1. Intervention study with a control group
  2. Intervention implementation in first 1000 days
  3. Study outcome including overweight or obesity outcomes collected between age 6 months and 18 years
  4. Published between 1980 to 2014.
- Identified 34 completed studies from 26 unique interventions; 9 were found to be effective in improving childhood weight status.

Blake Lamb et al.

Updated Literature Review of Interventions through 2019

- Literature review of interventions published between 2015 to 2018 (Dattilo et al, *in press*) and 2019 that included prevention of childhood overweight and obesity OR improvement in nutrition practices or infant feeding;
  - Identified 10 publications from 9 unique interventions (Gross, 2016; McEachan, 2016; Savage and Paul, 2016 and 2018; Fiks, 2017; Taylor, 2018; van Grieken, 2017; Mennella, 2018; Wall, 2019; Chaparro, 2019).
- USDA's Nutrition Evidence Systematic Review as part of the Pregnancy and Birth to 24 Months Project;
  - Three systematic reviews on feeding (Spill 2019; Spahn 2019).

Summary of Existing Studies

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1. Interventions primarily focused on individual-or family-level behavior changes;
2. Many are nurse- or health professional led;
3. Average contact hours in P/B-24 is ~8 hours;
4. Manualized curricula or program delivered via home or clinical visits;
5. Skills-based, education on feeding mode and practices (including responsiveness), some include sleep;
6. Encourage delay of introduction of complementary foods and beverages;
7. Emerging concepts: varying protein and free amino acid content of infant formula; repeated exposure to foods; influence of maternal diet during pregnancy and lactation.

What Works?

- Healthy Beginnings (Wen et al., 2012 and 2015)
  - 667 first time mothers and their infants; socially and economically disadvantaged areas of Sydney, Australia
  - 8 home visits lasting 1-2 hours each by a community nurse (1 visit prenatally and 7 visits up to 24 months after birth);
  - Targets: Breastfeeding, infant feeding and activity, family nutrition and activity;
  - At age 2 years: BMI was 0.29 kg/m^2 lower in intervention group vs. controls;
  - At age 5 years: No sustained effects on BMI and no effects of the early intervention on dietary behaviors, quality of life, physical activity, and TV viewing time.

What Works?

- NOURISH RCT (Daniels et al. 2012, 2013, 2015)
  - 698 first-time mothers and their healthy term infants;
  - Two, 3-month group education modules starting at ages 4-6 and 13-15 months: skills-based program focused on parenting practices that mediate children's early feeding experiences; "protective" complementary feeding practices; led by dietitian and psychologist.
  - At 13-15 months: Lower BMI z-score in intervention group (0.23 units [Ix] vs. 0.42 units [control group]);
  - At 2 and 5 years: Increased use of protective feeding practices but no difference in BMI z-score or prevalence of overweight or obesity.

What Works?

	Introduction of Solids 	Control
Soothe/Sleep 	N = 42 2 interventions	N = 39 1 intervention
Control	N = 38 1 intervention	N = 41 0 interventions

- SLIMTIME RCT (Paul et al., 2011)
  - 2x2 intervention design with 160 mother-infant dyads, nurse led;
  - 1) Soothe/ Sleep: Mothers taught to use alternate soothing strategies in response to fussiness;
  - 2) Introduction of Solids: delay complementary foods until 4 months, avoid putting infant cereal into bottles; and pay attention to hunger/satiety cues;
  - At 12 months: Lower weight-for-length percentile in the group that received both interventions compared to other 3 groups.

What Works?

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- Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) RCT (Savage et al., 2016; Paul et al., 2018)
  - Responsive parenting intervention on infant weight gain and overweight prevention;
  - RCT design with 291 mother-infant dyads;
  - Research nurses conduct visits @ 3, 16, 28, and 40 weeks, center visits at 1 and 2 years, and telephone calls at 18 and 30 months;
  - Curriculum included messages about infant feeding (recognizing hunger and satiety cues), sleep hygiene, active social play, emotion regulation, alternatives to feeding to soothe, and growth chart education.

What Works?

- INSIGHT RCT Outcomes – at 12 months (Savage et al., 2016)
  - Reduced rapid weight gain during the first 6 months after birth and overweight status at age 1 year.
- INSIGHT RCT Outcomes – at 3 years (Paul et al., 2018)
  - Reduction of mean BMI z scores at 3 years (-0.13 in the responsive parenting group vs 0.15 in the control group), but no differences in mean BMI percentiles (47th in the responsive parenting group vs 54th in the control group);
  - Children who did not receive the intervention had a *trend towards* greater odds of having overweight (19.8% v. 11.2%; p=0.07) or obesity (7.8% v. 2.6%; p=0.09).

What Works?

- Prevention of Overweight in Infancy (POI) RCT
  (B. Taylor et al., 2011, 2017; R. Taylor et al., 2018)
  - 802 mothers and their healthy term infants; led by lactation consultants, nurses, dietitians, and nutrition graduates;
  - Received 7 visits from 2 weeks of age to 2 years focusing on educational guidance around food, activity, and breastfeeding; sleep; or the combination of the two;
  - At 2 years: Infants in both sleep groups had lower odds of having obesity than the food, activity, breastfeeding group (OR: 0.51 [95% CI, 0.28–0.90]; P = .022);
  - At 3.5 and 5 years: Children in the sleep groups, had lower BMI z scores than the other two groups.

What Works?

- Although some trials have not shown changes in growth, they have shown improvements in feeding practices:
  - Continuation of breastfeeding at 6 & 12 months (Cloutier et al., 2018);
  - Increased exclusive breastfeeding and reduced complementary foods and liquids in 3-month-old infants (Gross et al., 2016)
  - Decrease in adding cereal to bottle (Fiks et al., 2017);
  - Increase in feeding on demand (Morandi et al., 2019);
  - Decrease in pressure to finish food (Fiks et al., 2017);
  - Decrease in sweetened beverages (van Grieken et al., 2017).

Infant Formula Studies

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- Amount and form of protein in infant formula may affect satiation and energy intake and influence weight gain and body fat.
- Representative examples:
  1. Infant Formula RCT (Mennella et al. 2018).
     - 113 healthy term infants randomized to receive cow-milk formula (CMF) or extensively protein-hydrolyzed formula (EHF) from ages 0.5 to 12.5 months;
     - Infants drinking CMF had higher weight z scores and early rapid weight gain between 0.75 to 4.5 months.

"Follow On" Formula

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2. Growing Up Milk "Lite" RCT (Wall et al. 2019)
   - 160 healthy 1-year olds randomly assigned to receive either Growing Up Milk "Lite" (GUMLi) (reduced protein with synbiotics and micronutrients added) compared with standard cow milk for 12 months;
   - At 2 years of age, children who consumed GUMLi with a lower protein content than cow milk over 12 months had a lower percentage of body fat.

Highlights from Pregnancy and Birth to 24 Months Project (1 of 2)

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Systematic reviews of interventions to improve nutrition and/or feeding:

1. Moderate evidence that repeated exposure to vegetables or fruits is likely to increase acceptability of the exposed foods in infants and toddlers (Spill et al. 2019);
2. Limited to moderate evidence that flavors originating during pregnancy and lactation can influence flavor transfer to amniotic fluid and breast milk and potentially increase acceptance of similarly flavored foods when re-exposed during infancy and childhood. (Spahn et al. 2019)

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1;109(Supplement_7)

Highlights from Pregnancy and Birth to 24 Months Project (2 of 2)

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3. Caregiver feeding practices and child weight outcomes (Spill et al. 2019).
   - Moderate evidence that providing responsive feeding guidance to teach mothers to recognize and respond appropriately to children's hunger and satiety cues can lead to "normal" weight gain and/or "normal" weight status in children aged ≤2 years;
   - Moderate evidence that restrictive feeding practices are associated with increased weight gain and higher weight status, and pressuring feeding practices are associated with decreased weight gain and lower weight status.

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Gaps and Opportunities

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1. Few studies beginning in pregnancy; Few (none?) engaging partners/fathers;
2. Need more interventions that inform prevention and choices for parents who are infant formula feeding;
3. Need studies that examine and test implementation strategies to promote adoption/uptake, sustainability, fidelity, e.g. comparing approaches to delivery by nurses vs. health coaches, community health workers, technology, and costs, etc.
4. Interventions that include sleep appear to enhance standard food, activity, and breastfeeding guidance and improve effectiveness;

Gaps and Opportunities

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5. Several of the existing interventions do not have sustained effects in long-term follow up studies.
6. Systems-level interventions and those utilizing community-based settings are under-represented (WIC food package changes the exception; Chaparro et al. 2019);
7. Few interventions working specifically with low-income families or include mitigation of the social context or upstream influences on obesity, such as government policies (e.g. food subsidies) or private sector practices.

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