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EDITORIAL

The role of families and providers in preventing childhood obesity when we take a systems approach to ending the epidemic

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Introduction

Obesity is now a global public health issue. According to the newest analysis by the International Obesity Task Force approximately 1.5 billion adults, 200 million school aged children, and 40 million children under the age of five are either overweight or obese [1]. This is twice the number of people who are suffering from famine, malnutrition, and starvation [2]. The US is the heaviest nation with over 60% of all adults and 30% of children overweight or obese [3,4]. The economic burden of obesity in the US alone is staggering. Direct and indirect medical care costs in the US related to obesity have been estimated to total $147 billion dollars annually [5].

These alarming data give pause, and highlight the urgency to develop effective obesity prevention strategies. Without effective strategies to slow the development of childhood obesity and subsequent co-morbid conditions (i.e., diabetes), it is estimated that our current generation of young children will have not the life expectancy of their parents' generation [6]. Undeniably, tremendous resources have been dedicated to the obesity problem in the form of formal research interventions and community outreach programs – yet our interventions and programs generally fail and those that do show a measurable change are only modest in effect size, rarely replicated, and difficult to sustain. As a result, most of our efforts continue to be ineffective and we have not achieved a decrease in the obesity prevalence.

This year the Institute of Medicine (IOM) evaluated progress made in implementing a wide range of obesity-prevention strategies and identified critical steps for the nation to accelerate progress in preventing obesity over the next decade [7]. The IOM's recommendations, when implemented together, could profoundly reshape the environments where people live, learn, work, and play. Notably, they do not place the onus on individuals but instead call for policy, system and environmental changes.

The multiple, non-linear, often time-delayed, bi-directional and counter-intuitive forces at the local, state and national levels that are sustaining the obesity epidemic are too complex to solve by manda-

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ting individual behavior change without concomitant system change [8-11]. In order to dramatically improve the public's health for generations to come, scientists and policy makers need to apply systems science methods to understand the obesity-sustaining forces acting on individuals, with focused attention on critical periods of development (i.e., preconception, prenatal, postpartum, early childhood).

Shifting perspectives

As a society, we need to shift our perspective of best times to intervene to maximize the health and well-being of our citizens. It is well established that childhood health care must begin before birth. This prenatal attention should be expanded to obesity prevention. Evidence from basic research, prevention research, and systems research suggest that intervening during and prior to pregnancy can have an a cross-generational effect on health [11].

A key element of the obesity epidemic is the vicious cycle of obese women producing offspring with a tendency to develop obesity, who then develop into obese adults and become obese parents themselves (Figure 1). Appropriate weight gain during pregnancy reinforces maternal health, as well as fetal health, and childhood health. However, approximately 45% of US women gain in excess of the clinical guidelines established by the IOM two decades ago [12,13].

Ideally women will establish a healthy weight before conception; but because 50% of pregnancies are unplanned [14], it is initially more feasible to intervene during the 40 weeks of pregnancy and the first postpartum year. Greater gestational weight gain has been associated with greater offspring body mass index (BMI) in childhood, in adolescence and, most recently, in early adulthood [15-17]. This is thought to be due to developmental programming and over nutrition in utero [18-21], in addition to environmental exposure to the same obesogenic lifestyle as the mother [22-27]. Excessive gestational weight gain is also associated with excessive postpartum weight retention [28,29], which can exacerbate the cycle of maternal-infant health complications in subsequent pregnancies. Helping mothers avoid excessive weight gain during pregnancy and excessive weight retention postpartum may constitute unique opportunities for true prevention of childhood obesity.

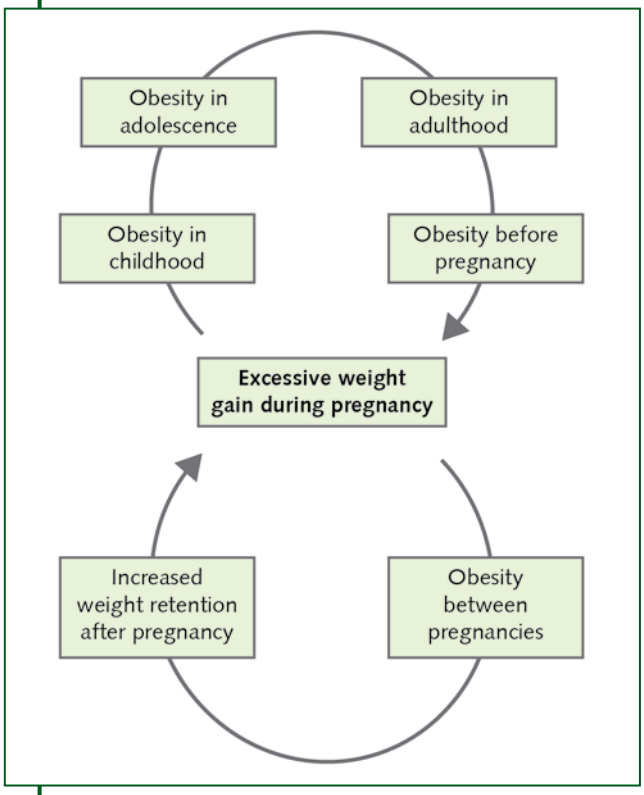

Figure 1. The intergenerational vicious cycle of obesity that begins with excessive weight gain during pregnancy

Efforts to interrupt the cycle of maternal-infant health complications that begin with obesity in pregnancy can be derived by enabling mothers to act in accordance with IOM guidelines. Although behavior change is not easy to achieve, initiating preventative strategies around the time of pregnancy has resulted in sustained behavior change regarding other health decisions. For example, Cochrane reviews of interventions to reduce smoking and alcohol consumption during pregnancy demonstrated effectiveness in changing maternal health behaviors [30,31].

To date, existing interventions to prevent excessive weight gain are so limited in number and effectiveness, that both the IOM [32] and the Agency for Health care Research and Quality (AHRQ) [33] have identified this as a major research gap. Interventions based on physical activity and dietary counseling, usually combined with supplementary weight monitoring [34,35], have had modest success in reducing the amount of excessive weight gained during pregnancy, but few efforts have been effective enough for women to gain within their IOM target range [36,37].

Thus, we need to design effective interventions that prevent excessive weight gain during pregnancy that are widely effective, practical, cost-effective, and have mechanisms for widespread diffusion. We should conduct comparative effectiveness research comparing important public health interventions currently in place, such as different models of prenatal care (i.e., traditional individual prenatal care vs. group prenatal care), and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Program – how might these be systematically altered to increase the proportion of women who achieve healthy weight gain during pregnancy? We need to support initiatives, such as Baby Friendly Hospitals, that support and encourage breastfeeding. We need to apply systems science methodologies to simulate the impact of various policy decisions and how they play out over time – before actually putting them into practice [38]. Once effective interventions are identified, we will need to boldly shape policies to put them in place for all women. Insurers might help make them sustainable by covering obesity prevention and treatment services before they are associated with type 2 diabetes or high blood pressure.

Beyond the prenatal period, early childhood is another critical period of development that should be targeted for obesity prevention. Children's lives are embedded in the context of their family. The home environment provided by parents is the setting in which genetic predispositions for becoming overweight or obese are expressed [39]. We know families play a critical role in child weight trajectories. We do not know the relative influence of parenting parameters on child weight. We do not understand the underlying mechanisms that are influencing weight trajectories, although we know that parental modeling alone cannot explain child weight. While family-based approaches to obesity prevention are deemed necessary in pediatric obesity treatment, family theories are conspicuously missing from our research and practice [40]. We need to apply systems science methodologies to understand the effects of family dynamics on child weight and to identify key ingredients and leverage points, and how they change over time.

To date, there are very few pediatric obesity programs that successfully prevent or decrease obesity [41,42]. The most successful programs are comprehensive, and include: parenting skills training (e.g., learning to set limits, role model, and use positive reinforcement), behavior modification training (e.g., self-monitoring of diet and physical activity, goal setting, modeling, and limit setting), promotion of physical activity and nutrition education [43].

Successful programs are time-consuming, costly, and difficult to maintain. The majority of programs cannot easily be incorporated into standard pediatric health promotion activities (e.g., well child visits), daily school activities, much less family routines. To advance care, we need to promote policy, system and environmental changes, to make it possible for families to choose a default healthy lifestyle. But, in the absence of a sweeping policy agenda to create child-friendly, health-promoting communities, what are families and providers caring for children to do today?

What are families and providers to do?

Despite the overwhelming difficulty for parents and families to make lifestyle changes to promote their children's health and well-being, there may be some "simple" answers. Recent literature has highlighted that "simple" changes can have a profound effect on children's weight status. Most noticeably, limiting

computer/TV/video screen-time can significantly influence children's risk for becoming overweight [44-46]. By just turning off the television, parents are encouraging their children to be more active. Household routines around meal-times can also impact children's risk for obesity. Health care providers need to encourage families to take the time to sit down together for a meal [44,47,48]. Establishing sleep routines, early in childhood, is another avenue for parents to promote the health and well-being of their children [44,47]. These "simple" changes can have a significant impact on children's weight trajectory, and thus their risk for becoming overweight and obese.

Changing the focus of interactions from preventing and treating obesity to promoting health and well-being, may help families be more inclined to work with their health care providers. Parents may be more open to modifying behaviors and instituting small changes that they see as generally benefitting their child's school performance, happiness or social popularity. Focus on improving success in life could be a "stealth" intervention to prevent obesity.

We know family norms reinforce behaviors. Parents might ask: «What, when, and how much do family members eat?», «How physically active are family members?», «How much support do family members offer each other?», «Are undue burdens placed on individuals (e.g., parent expected to cook different meals for family members with different preferences; child expected to resist unhealthy snacks that are readily available)?».

Providers can advise families «to integrate physical activity every day in every way» and «to make water the beverage of choice», and they can play a enormous role in bringing about systems change by jumping into the public policy debate (locally and nationally).

Summary

While we may not understand why our anti-obesity interventions typically fail, we should no longer be surprised by this fact. A complex system of obesogenic forces is sustaining the epidemic in ways we still don't understand. What is needed is a comprehensive coordination of efforts, guided by systems science, and backed by bold, evidence-based policy making. This approach holds the greatest promise of dramatically improving the public's health and being sustainable for the generations to come.

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