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Addressing Barriers to Healthy Eating Through Food as Medicine Initiatives

Abstract: *Poor diet is the number one risk factor for death globally; yet, few adults meet the dietary guidelines for optimal health. Food is medicine initiatives including food pharmacies, produce prescriptions, and medically tailored meals are emerging models to improve diet and reduce diet-related disease. These initiatives target barriers to healthy eating, including access, nutrition knowledge, culinary skill, motivation, and support. The following will discuss significant barriers to healthy eating and describe the strategies employed within these initiatives to overcome such barriers.*

Keywords: food pharmacy; produce prescription; food insecurity; nutrition; food as medicine

Background

"Let food be thy medicine"—Hippocrates was among the earliest to affirm that foods hold healing properties. We now know that 1 in every 5 deaths globally can be attributed to poor diet, more than any other risk factor.[1] And yet, only 12.3% and 10.0% of adults met the fruit and vegetable intake recommendations in 2019.[2] As such, there is exists a significant opportunity to improve health through diet.

The food as medicine concept has gained traction recently, prompting the White House Conference on Hunger, Nutrition, and Health, held in September 2022, with an objective to increase healthy eating so fewer Americans experience diet-related disease.[3] In an effort to reach this goal, more than $8 billion has been committed to support start-up companies, community-based organizations, philanthropies, research, and education in this area. Integrating food as medicine approaches in healthcare is among the pillars emphasized in the White House Strategy.[3] Food pharmacies, produce prescriptions, and medically tailored meals are novel approaches to integrating nutrition in healthcare that have grown in popularity as of late.[4] These food as medicine initiatives have been shown to improve fruit and vegetable consumption, lower BMI, reduce A1c in patients with diabetes, and even reduce healthcare costs.[5-9]

> "Culinary medicine programming helps participants acquire the skills, tools, and resources necessary to adopt nutritious home-cooking behaviors."

A food pharmacy is a program that provides grocery items, selected by a health professional with training in nutrition, to prevent, manage, or reverse chronic disease. The food pharmacy may be co-located within a medical clinic, or embedded within a community-based organization,

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church, or school. Some food pharmacy programs offer mobile markets which allow participants to collect grocery items in their neighborhood, while others deliver foods directly to the participant's home. Food pharmacies often provide food at low- or no-cost to the participant.

A produce prescription is a written dietary recommendation from a healthcare provider. As the name implies, produce prescriptions are most commonly written to increase the consumption of fruits and vegetables, though other beneficial dietary modifications may also be prescribed. Produce prescriptions often double as vouchers or debit cards for free or discounted food items associated with the prescription. These prescriptions can be redeemed at various locations, including grocery stores and farmer's markets.

Medically tailored meals are fully prepared meals, designed by a health professional with training in nutrition, intended to treat patients with complex medical conditions who are unable to shop or prepare meals on their own. Most medically tailored meal programs provide individualized nutrition counseling which accompanies the meals themselves.

These foods as medicine interventions vary in design, but all primarily focus on removing barriers to healthy eating with the intent of preventing or managing chronic disease. Barriers to healthy eating include lack of access to healthy foods (either geographically or due to cost), lack of knowledge as to what a healthy diet is, lack of culinary skills or experience to prepare healthy meals, and lack of support in modifying and sustaining healthy eating patterns.[10] The following highlights barriers to healthy eating and describes aspects of food as medicine interventions aimed at addressing these barriers.

Financial Barriers

Socioeconomic status is a significant barrier to healthy eating, with low-income households known to have lower diet quality and increased risk for food insecurity than higher income households.[11] Food insecurity is known to increase the risk of many chronic health conditions including asthma, arthritis, cancer, heart disease, and diabetes.[12] A recent systematic analysis of food as medicine interventions found that most programs target low-income populations and provide food to participants at low- or no-cost.[5] Of the seventeen studies included in the analysis, eleven provided fresh fruit and vegetable vouchers (ranging between $7-$40/week), 3 provided free healthy food boxes, 2 provided no-cost meals, and 1 provided fruit and vegetable samples. The meta-analysis found that daily fruit and vegetable consumption was higher and BMI was lower with food pharmacy interventions.

While increasing diet quality in low-income populations is extremely important, healthy eating is also a challenge for those with higher-incomes. In fact, 89% of American adults at the highest income level are not consuming the recommended amount of vegetables on a daily basis.[13] Financial incentives have been shown to improve diet quality even among higher socioeconomic strata, making this strategy important to consider when designing programs to improve dietary patterns for broad populations.[14]

Geographic Access Barriers

Another barrier related to access is the lack of geographical proximity or ability to reach places where healthy grocery items are available. Many low-income urban and rural neighborhoods have limited access to full-service grocery stores, and many residents of these neighborhoods lack access to public transportation or a personal vehicle to get to a grocery store.[15] Physical access to food limits the effectiveness of some food voucher programs, as well. Some produce prescription programs have identified inconsistent uptake of benefits due to lack of transportation to the grocery stores or Farmer's markets where the vouchers can be redeemed.[16,17] In an effort to ensure food vouchers can be conveniently redeemed, some food as medicine programs have employed mobile produce markets or school-based food pharmacies so the benefits are closer to home and don't require transportation.[18,19] Another recently launched program is using existing grocery store infrastructure to deliver healthy meal boxes directly to the home of participants.[20]

Knowledge and Culinary Skill Barriers

Nearly 8 in 10 Americans report finding conflicting information about what foods they should be eating and those to avoid, causing confusion and casting doubts on appropriate food choices.[21] Further, patients do not always receive adequate nutrition counseling during routine office visits to their provider. A study which observed the frequency and duration of healthy lifestyle counseling provided by family medicine physicians across 84 clinics found that, on average, less than 1 minute is devoted to counseling on diet, exercise, or smoking cessation.[22]

Produce prescriptions are a helpful tool in increasing knowledge of healthful dietary patterns. Produce prescriptions written by healthcare providers affirm the importance of the food prescribed in preventing or managing the patient's condition and may increase motivation to make a beneficial dietary modification.[23] It has been shown that lifestyle-related advice from a provider is more effective in

changing behavior when complemented by a written prescription for change.[24]

In addition to written prescriptions, many food as medicine interventions contain an educational aspect to their programming. This ranges from providing take-home materials to interactive educational sessions.[5,19] A few food as medicine interventions are incorporating an emerging model of nutrition education: "culinary medicine"—which combines traditional clinical medicine with practical aspects of food preparation and cooking.[5,25,26] Culinary medicine programming helps participants acquire the skills, tools, and resources necessary to adopt nutritious home-cooking behaviors.

Discussion and Conclusions

To adopt and maintain a given behavior, most people need more than information. To have the ability to act, they may need increased access, confidence, and support. Food as medicine interventions will be most effective if they incorporate these behavior change strategies into their programming. As described above food pharmacies, produce prescriptions, and medically tailored meals can decrease financial barriers to healthy eating and, when designed appropriately, may also improve physical access to healthy foods. The health belief model posits that an individual will change a behavior if they perceive a threat secondary to the behavior and believe changing the behavior will effectively avert this threat.[27] Produce prescriptions help patients associate their eating patterns to their health outcomes and providers who take the time to write a produce prescription affirm the importance and effectiveness of dietary modification in managing risk from chronic disease. The social cognitive theory, and more specifically, the social learning theory, suggests motivation to change behavior is enhanced when an individual believes the behavior is important and has the confidence to successfully change the behavior.[27] The nutrition education, particularly the culinary medicine education, that is included in food as medicine interventions enhances the knowledge and skills to make healthy foods from home, which increases self-efficacy and may increase success with behavior change.

While most studies of food as medicine interventions to date are small, lack rigorous study designs, and have limited duration of follow-up, the findings observed are promising and warrant further evaluation at scale. Many of the published food as medicine interventions are grounded in behavior change science and address the most common barriers to healthy eating. Comparative efficacy assessments are needed to determine which components, at what intensity and duration, are most effective in modifying eating patterns and conferring beneficial health outcomes.

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