

Invited Commentary

Food Is Medicine—The Promise and Challenges of Integrating Food and Nutrition Into Health Care

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Diet-related diseases produce crushing health and economic burdens. The estimated US costs of diabetes, cardiovascular diseases, obesity-related cancers, and other obesity-related conditions are approximately \$1.72 trillion per year,¹ or 9.3% of the gross domestic product. This burden creates tremendous stress on government budgets, private businesses, and families. Marginalized groups often suffer most, with significant disparities in both diet and health leading to illness, suboptimal school and work performance, increased health costs, and lower productivity and wages.

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Although the important role of food in health is increasingly recognized, nutrition has not traditionally been well integrated into health care systems. One obstacle has been demonstrating the efficacy and cost implications of specific nutritional interventions. In this issue of *JAMA Internal Medicine*, Berkowitz and colleagues² evaluate one nutrition-focused intervention—free provision of medically tailored meals (MTMs) at home—and subsequent health care use. Using the Massachusetts All-Payer Claims database, the investigators matched individuals receiving MTMs with nonrecipients and assessed hospitalizations, skilled nursing facility admissions, and total health care expenditures. Outpatients were eligible for MTMs if they had a complex medical condition (eg, HIV, cancer, diabetes, end-stage renal disease, congestive heart failure) and were certified by a social worker or clinical health care professional as having substantial social barriers to healthy eating (eg, poverty, food insecurity).

Medically tailored meals were provided by a local not-for-profit organization, Community Servings, as 10 weekly ready-to-eat meals personalized by a registered dietician to each patient's medical needs. Patients received MTMs until they voluntarily withdrew or had improved social circumstances that obviated their need for MTMs, based on clinical assessment. As with MTM programs in other states, funding was provided to Community Servings from philanthropy and the Ryan White Act, the only major health care legislation that includes “medical nutrition therapy” as a core medical service.

For the analysis, nonrecipients in Massachusetts were selected and matched based not only on individual sociodemographics, comorbidities, and neighborhood characteristics, but also on the preintervention health care use of each MTM recipient. Although observational, this design is a strong methodologic approach to adjust for differences between MTM recipients and nonrecipients, with the main residual difference being living within or outside of the service area of the MTM provider.

Among recipients, the median duration of MTMs was 9 months (interquartile range, 6.0-18.0 months). Following matching and adjustment, receipt of MTMs was associated with approximately 49% fewer inpatient admissions (95% CI, 20%-

78%) and 72% fewer skilled nursing facility admissions (95% CI, 40%-99%) over almost 2 years of follow-up, with a net savings in total health care costs (including program participation costs, approximately \$12 per day) of \$753 per person per month, or a 16% relative reduction in mean expenditures. In absolute terms, there were approximately 0.5 fewer hospital admissions per year and 0.9 fewer skilled nursing facility admissions per year for each person receiving MTMs. As summarized by Berkowitz and colleagues,² these findings support other observational studies that providing MTMs is associated with reduced health care use and net cost savings.

The intervention design could not determine which feature of MTMs might be responsible for such benefits. For example, decreased use could result from improved clinical status from personalized nutritional tailoring. In patients with economic and social barriers, provision of free meals could help to reduce financial pressure, freeing income for other purposes (eg, medication co-pays) and reducing mental stress. Benefits could arise from basic availability of generally healthful food, providing an alternative to highly processed packaged foods and fast foods, or to no food. In support of combined mechanisms, in a small crossover trial among low-income patients with diabetes, MTMs increased general dietary healthfulness (more vegetables, fruits, and whole grains; less alcohol and added sugar), lowered hypoglycemic episodes by 27% ($P = .03$), reduced self-perceived food insecurity by 32% ($P = .047$), and reduced the number of days with poor quality of life due to mental stress by 41% ($P = .03$).³ Whatever the precise mechanism, the potential for cost-savings from MTMs is striking: based on the present investigation, approximately \$9000 saved per patient per year.

Such estimated savings warrant expanded evaluation, at scale, of the health and economic benefits of MTMs as well as other food-based health care interventions. Some of this work has started: the state of California is currently testing the health and use effects of MTMs in a \$6 million intervention across 6 counties. Because the California intervention, like the present research, is quasiexperimental, other ongoing randomized trials of MTMs will help to further assess and confirm the clinical and cost benefits.

To date, MTM programs have relied primarily on not-for-profit organizations that have evolved from nutritional support for patients with HIV or AIDS to other complex chronic illnesses. Another food-based health care intervention, Produce Prescriptions, has similarly been championed by the non-profit Wholesome Wave, allowing health care professionals to give so-called prescriptions for fruits and vegetables to patients, supported by coupons and other financial incentives.

For full scale implementation and effect, such interventions will need to be integrated into large private and public insurance

programs. Recognizing the potential for cost-savings, some private health care payers have begun to take action. In 2017, Geisinger Health in Pennsylvania launched the Fresh Food Pharmacy, providing primary care prescriptions to patients with diabetes to ensure access to 10 weekly meals of fresh, healthy food.⁴ In initial findings, average hemoglobin A_{1c} levels dropped from 9.6% to 7.5% (to convert to proportion of total hemoglobin, multiply by 0.01) at 1 year. In 2018, John Hancock announced it was upending its traditional business model by replacing all life insurance policies with John Hancock Vitality, a program that provides financial incentives and other rewards for healthier lifestyle, including up to \$600 per year for purchasing healthier food.⁵ The federal government is also taking notice.⁶ Although the 2018 federal Farm Bill missed an opportunity to enact a Senate amendment piloting MTMs in health care, it expanded a fruit and vegetable incentive program in the Supplementation Nutrition Assistance Program and added a new \$25 million Produce Prescription Program to implement and evaluate fruit and vegetable prescriptions in health care. Our research suggests that such programs will be cost effective or even cost saving.^{7,8} Recent federal approval for Medicare Advantage plans to expand their scope of supplemental health-related benefits may further accelerate coverage of such food-based therapies.

As nutrition-focused interventions become more widely accepted for improving health and costs, empirical questions about patient screening and service matching need to be addressed. Standardized assessments that can be administered by diverse care team members will be needed for screening and referral to the right program, such as MTMs, produce prescriptions, and nutrition counseling. As more organizations begin

administering food-based health care interventions, the optimal program delivery and administering agencies (eg, public, private, nonprofit) must be identified. For all of these programs, the quality, reliability, and scalability will be integral to success.

Additional approaches must rigorously incorporate nutrition into health care, such as the idea that holistic food is medicine.⁶ This intervention should include more questions on nutrition, lifestyle, and behavior change on medical licensing examinations and specialty certifications to spur systematic changes in medical education and training, incorporation of nutrition and food security screening tools into electronic health record standards, and changes to procurement standards for hospital cafeterias and patient food services. Mobile technologies can be evaluated to test innovative platforms for healthier eating that combine shared proximal goal setting, self-monitoring, peer support, regular feedback, gamification, and financial incentives. Goals and strategies of currently disconnected large federal programs, such as the Supplementation Nutrition Assistance Program and Medicare & Medicaid, which frequently cover the same individuals, should be integrated and harmonized.

As health care professionals move toward accountable care, risk-sharing payment models should invest in nutrition for meaningful cost savings and improved patient outcomes. All of these programs should include special focus on vulnerable and sensitive groups and address social determinants of health. Given their potential for significant health benefit and cost-savings, MTMs may represent the tip of the spear for a national evolution toward such food-is-medicine approaches.

ARTICLE INFORMATION

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