This supplement was sponsored by American College of Lifestyle Medicine. It was edited and peer reviewed by *The Journal of Family Practice*.

SUPPLEMENT TO
THE JOURNAL OF FAMILY PRACTICE®

VOL 71, NO 1 | JANUARY/FEBRUARY 2022 | MDEDGE.COM/FAMILYMEDICINE

A FAMILY PHYSICIAN'S INTRODUCTION TO LIFESTYLE MEDICINE

Contents

The entire A Family Physician's Introduction to Lifestyle Medicine supplement, including the online exclusive articles below, can be found at https://www.mdedge.com/familymedicine/Introduction-to-Lifestyle-Medicine.

ONLINE EXCLUSIVES

Acknowledgments

The American College of Lifestyle Medicine would like to thank the following people for their help with manuscript preparation

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With special appreciation to:
Frontline Medical Communications Inc.

With special thanks to:

Cover Images: Center: Jose Louis Pelaez Inc/Getty Images; Clockwise: Oliver Rossi/Getty Images; Suntorn Somtong/EyeEm/Getty Images; Tetra Images/Getty Images; Enviromantic/Getty Images; PeopleImages/Getty Images

Making the Case for Lifestyle Medicine

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doi:10.12788/jfp.0296

Two global pandemics—SARS-CoV2 infection and obesity—recently intersected; this convergence exacerbated the virus' most harmful effects[1] and disproportionately affected underserved communities.[2,3] To a large extent, the underlying health conditions—reported by the US Centers for Disease Control and Prevention (CDC)—that heightened vulnerability to the virus are lifestyle-related and directly impacted by social determinants of health (SDoH) that, all too often, prevent the healthy choice from being the easy choice.[4] These unhealthy lifestyle behaviors increasingly affect healthcare expenditure, driving as much as 90% of healthcare dollars spent.[5] This has made the precepts of lifestyle medicine (LM) more relevant and more urgently needed than ever.[6]

LM, as defined by the American College of Lifestyle Medicine (ACLM), is the use of evidence-based, lifestyle, therapeutic intervention—including a whole-food, plant-predominant eating pattern, regular physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection—as a primary modality, delivered by clinicians trained in these modalities, to prevent, treat, and often reverse disease. ACLM's vision is to have lifestyle medicine be the foundation of all healthcare, fully integrated into family medicine and primary care.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

Regarded by some as a new and emerging field, history indicates that components of lifestyle medicine were first documented as early as 2500 years ago. Hippocrates, the Greek physician regarded as the father of medicine, often used lifestyle modifications, such as diet and exercise, to treat disease. He is quoted as saying, "Illnesses do not come upon us out of the blue. They are developed from small daily sins against Nature. When enough sins have accumulated, illnesses will suddenly appear." He is also reported to have said, "Just as food causes chronic disease, it can be the most powerful cure."

Today, 60% of American adults—and, sadly, too many children—now live with at least 1 chronic disease, and more than 40% have been diagnosed with 2 or more.[7] Too many physicians and patients alike may believe they are victims of their genes and they are destined to become chronically ill and dependent on pharmaceuticals. It should be alarming that type 2 diabetes (T2D) can no longer be referred to as "adult-onset diabetes" as many children[8] are now being diagnosed with this lifestyle-related chronic condition. The occurrence of Alzheimer's disease, linked to T2D,[9] is also rising at startling levels.

Early detection of chronic disease has too often been defined as prevention; despite early detection, trends of obesity, T2D, hypertension, and cardiovascular disease continue their upward trajectory.[10,11]

Mounting evidence indicates that modifiable behavioral risk factors drive the leading causes of mortality in the United States.[12] The Institute of Health Metrics and Evaluation, in its 2019 Global Burden of Disease Report,[13] analyzed data from more than 190 countries and found that what people eat, and fail to eat, is the leading cause of disease and death.

Addressing lifestyle is recommended as a first-line treatment option in many chronic disease guidelines.[14] However, when surveyed, physicians indicate having received little training in clinical nutrition and LM therapeutic modalities.[15]

Promising change, though, is underway: Patient demand is mounting, and provider awareness is growing about the

need for and value of LM. Increasingly, there is a recognition that medications and procedures have been insufficient to significantly alter the negative trajectory of our collective health. This is awakening the medical community and generating interest in the field of LM. The ACLM's goal is to educate, equip, and empower all providers, especially primary care providers (PCPs), to identify and facilitate the eradication of the root causes of disease with health restoration and whole-person health as the clinical outcome goal. This should be followed, when necessary, by disease management with the aim of medication de-escalation and halting disease progression.

Thus, an imperative should be to help fill the void of LM in medical education with a robust offering of resources across the education continuum. Organizations like the American Academy of Family Physicians (AAFP) and the ACLM are proactively taking steps to meet this demand, with AAFP's recent debut of its new resource entitled *Incorporating Lifestyle Medicine into Everyday Practice*[16] and ACLM's robust offering of LM resources that span the education continuum. These resources, coupled with the opportunity for certification through the American Board of Lifestyle Medicine, are helping to fuel the field's rapid growth.

While LM is not new, large-scale implementation of these evidence-based modalities into health systems is one of the greatest pioneering initiatives in the healthcare industry today. LM represents a physician-led, interdisciplinary, team-based model, often leveraging shared medical appointments (SMAs),[17] delivered either in person or virtually, to effectively treat groups of patients with chronic conditions. This scalable model supports the necessary behavior change that is central to LM intervention, while also capitalizing on the shared sense of community that is facilitated by group participation.

Deeply rooted in scientific evidence, LM is delivered through a variety of practice formats, including

- Private primary care
- Direct primary care
- Concierge medicine
- Hybrid (concierge/family practice)
- Health systems integration
- Specialist care (eg, cardiology, endocrinology, oncology)
- Community-based care

To date, challenges to system-wide healthcare adoption of LM include reimbursement models, misaligned quality measures, research gaps, health disparities, and challenges associated with unequal distribution of SDoH.[18]

Even so, the healthcare system shift from fee-for-service to value-based care will elevate the importance of eliminating, to the extent possible, the root causes of disease, rather than medicating and managing the symptoms. LM is synonymous with value-based care. As with all LM treatment, the objective is to rein in costs while producing superior patient outcomes and patient satisfaction through sustained behavior change. LM is also vital to achieving the Quadruple Aim: to enhance patient experience, improve population health, reduce costs, and improve the work life of healthcare providers.[19] LM reignites the passion for why most went into medicine—to become true healers—as a potential antidote to epidemic levels of provider burnout.

As physician practice of LM increases, research in the field has also expanded in recent years, within ACLM and externally. In 2020, the Ardmore Institute of Health convened the Lifestyle Medicine Research Summit[20] to (1) review the current state of knowledge in the core domains of healthy living and LM—nutrition, physical activity, stress, sleep, addictions, and positive psychology/social connections—and how they can be deployed clinically to not only prevent but also treat and actually reverse chronic disease; (2) prioritize research questions in each domain; and (3) apply new basic science knowledge (eg, epigenetics, microbiome, neuroplasticity) and research methods (modeling, artificial intelligence, existing national cohort studies using new methods, and hierarchies of evidence). Since the Summit, the COVID-19 pandemic has made this effort timelier and more meaningful. The Summit was unique in its breadth, cross-disciplinary attendance, and resulting dialog and output.

Analysis of LM reminds us that effective care requires not simply calls to education but resources where they are needed most, assessment of opportunity cost, and critical evaluation of interventions.[21] If LM's only focus is on the individual as the change agent, the result will likely be that people at lowest risk will have the greatest amount of intervention, while people carrying the greatest risk will not receive the support they need. Understanding the environmental drivers of unhealthy behaviors requires PCPs to work more closely with community and public health colleagues to develop neighborhood and regional approaches, particularly in disadvantaged areas.[21]

We must collectively shift from a system of disease and disability care to one of true "health" care, enabled by an LM-first approach that strives to identify and eradicate root causes with health restoration—whole-person health—as the clinical outcome goal.

In caring for chronically ill patients across all socioeconomic levels, family medicine physicians and other PCPs are on the front lines of addressing these ravaging, costly diseases that impact quality of life; yet many clinicians are only familiar with disease and symptom management through

EATING FOR HUMAN AND PLANETARY HEALTH

Further reinforcing the importance of dietary pattern—advocated as one of the pillars of LM—is its effect not only on our personal health but also on the health of the planet. ACLM and many others note that the leading cause of chronic disease and the leading cause of many global sustainability issues is one and the same: our Western dietary pattern.[22-24] Shifting to a whole-food, plant-predominant dietary lifestyle protects human health[25,26] and reduces commercial agriculture's carbon footprint, enabling the preservation of natural resources while also decreasing greenhouse gas emissions.[27-29]

pills and procedures. The urgent need to treat the root cause of lifestyle-related chronic disease led to the creation of this supplement. The goal is to provide family physicians with information on all aspects of LM. Rather than a comprehensive dive, the pages to follow offer introductory information on the definition of LM's 6 pillars; and how LM delivery is influenced by key determinants of health; how LM is being used to prevent, treat, and sometimes reverse multiple types of chronic disease; a peek into the current practice of LM; and what the future holds in education and policy. We hope readers will want to learn more. ●

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Nutrition—An Evidence-Based, Practical Approach to Chronic Disease Prevention and Treatment

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doi: 10.12788/jfp.0292

CASE STUDY

At an annual visit, Mr. S, a 58-year-old man with a history of class III obesity, hypertension, and prediabetes, asks what diet changes he can make to help him lose weight and improve his other medical conditions. He reports trying many weight-loss diets over the years, including low-carbohydrate and various calorie-restricted diets. All resulted in modest short-term, but no long-term, weight loss and did little to improve his other medical concerns. How does one counsel him?

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DISCLOSURES

The authors have no conflicts of interest to disclose.

INTRODUCTION

This patient's story represents a common clinical scenario faced by many primary care providers (PCPs)—one that medical school, residency, and other training have generally not adequately prepared clinicians to address. The aims of this review are to provide an introduction to a whole-food, plant-predominant eating pattern (a diet consisting predominantly or exclusively of whole plant foods such as fruits, vegetables, legumes, whole grains, nuts, and seeds) and its alignment with major medical societies' dietary recommendations; illustrate a spectrum of dietary change along a continuum from highly processed foods to less-processed plant foods; review current research to support a predominantly whole-food, plant-based (WFPB) dietary pattern for prevention and treatment of cardiovascular disease, overweight and obesity, and type 2 diabetes, as well as for cancer risk reduction; and provide practical guidance on promoting healthful dietary changes in clinical practice.

In his 2009 book, *In Defense of Food*, Michael Pollan famously advised to "eat food, not too much, mostly plants."[1] This pithy recommendation reflects the overwhelming consensus in the nutrition science literature: eating patterns that emphasize whole, plant foods and minimize calorie-dense, highly processed foods are associated with significant reductions in chronic disease risk and mortality.[2-6] Conversely, high intake of sodium and low intake of whole grains, fruits, nuts, seeds, and vegetables are among the leading dietary

risk factors for death and disability-adjusted life years worldwide.[7] For these reasons, the American College of Lifestyle Medicine (ACLM) recommends "an eating plan based predominantly on a variety of minimally processed vegetables, fruits, whole grains, legumes, nuts, and seeds."[8]

Predominantly WFPB eating patterns have grown in popularity in recent years, while also being rooted in long-standing cultural traditions from around the world, including the so-called Blue Zones, populations with greater-than-average longevity.[9] In contrast, Western-style diets (aka Standard American Diet, or SAD) typically emphasize ultra-processed foods made with added sugars and refined grains, as well as animal foods high in saturated fats such as meats and high-fat dairy products. This Western dietary pattern is associated with increased risks of mortality from cardiovascular disease, cancer, and all causes compared with diets higher in whole, plant foods.[10] Individuals are likely to experience health benefits from any progression they make along the spectrum from a typical Western-style diet to one based on less-processed plant foods (**FIGURE 1**). Of note, there are many approaches to WFPB eating patterns; many diets studied in the scientific literature represent positive shifts along a spectrum away from a SAD and toward more WFPB eating patterns. Evidence cited in this manuscript encompasses a variety of predominantly WFPB dietary patterns, including entirely WFPB, healthy Mediterranean, Dietary Approaches to Stop Hypertension (DASH), low-fat vegan, various types of vegetarian, and numerous other plant-predominant recommendations or guidelines.

Dietary patterns centered around whole, plant foods are also in alignment with dietary recommendations from numerous organizations, including the American College of Cardiology and the American Heart Association,[11] the American Cancer Society,[12] the American Institute for Cancer Research,[13] the American Association of Clinical Endocrinologists and American College of Endocrinology,[14] and Health Canada.[15] Moreover, the Academy of Nutrition and Dietetics states that "appropriately planned vegetarian, including vegan, diets are healthful, nutritionally adequate, and may provide health benefits for the prevention and treatment of certain diseases. These diets are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and for athletes."[16]

In considering predominantly plant-based diets, it is similarly important to emphasize minimally processed foods. For example, a number of studies have specifically highlighted the distinction between healthful and unhealthful plant-based diets in chronic disease outcomes. In a large prospective cohort study with 4.8 million person-years of follow-up (N=116,969), higher adherence to a healthful plant-based diet, emphasizing nutrient-dense, fiber-rich, minimally processed plant foods, was linked to a 25% lower risk of coronary heart disease.[4] In contrast, an unhealthful plant-based diet high in sweets, fried foods, refined grains, and added sugars was linked to a 32% increased risk of coronary heart disease.[4]

CASE STUDY (CONT'D)

Mr. S's PCP is pleased that Mr. S expresses interest in improving his diet and advises him about the benefits of a predominantly WFPB dietary pattern for addressing his weight, high blood pressure, and prediabetes. Mr. S asks about next steps.

EVIDENCE TO SUPPORT A PREDOMINANTLY WHOLE-FOOD, PLANT-BASED EATING PATTERN

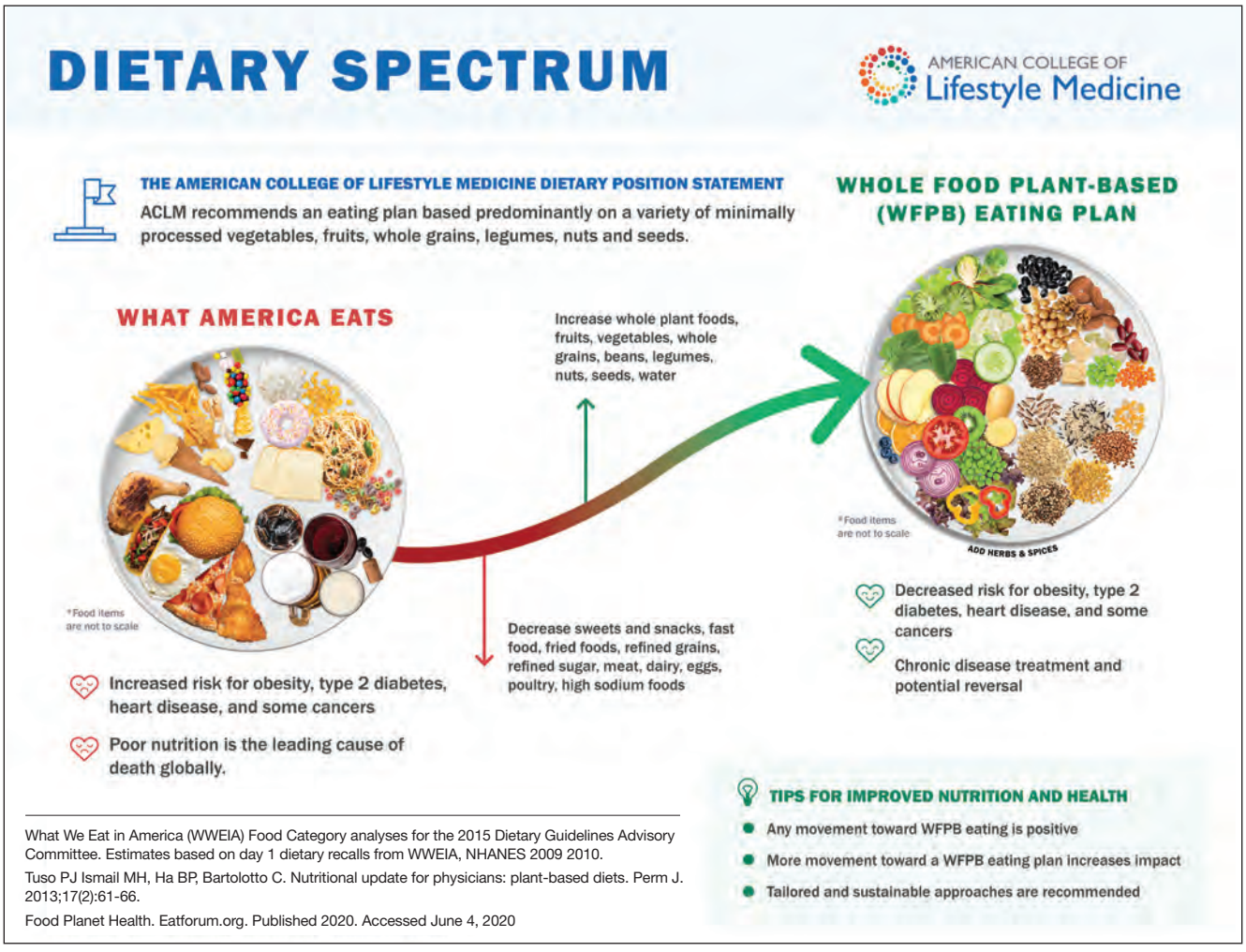
Cardiovascular Disease

Healthful plant-based diets appear to confer significant protection against ischemic heart disease, the leading cause of disability-adjusted life years globally among adults aged 50 years and older.[17] A 2012 meta-analysis and systematic review of prospective observational cohorts (N=124,706) found a 29% lower risk of ischemic heart disease mortality among vegetarians compared with nonvegetarians.[18] Similarly, a 2016 meta-analysis (N=72,298) found a 25% lower risk of ischemic heart disease among vegetarians.[19] Among a general population of 12,168 adults, having diets higher in plant foods and lower in animal foods was associated with significantly lower risks of cardiovascular disease, cardiovascular disease mortality, and all-cause mortality (16%, 31%-32%, and 18%-25%, respectively).[20]

In clinical trials, plant-based diets have been shown to improve key cardiovascular risk factors, including serum lipids and hypertension. A 2015 meta-analysis of randomized trials found that vegetarian diets significantly lowered blood concentrations of total cholesterol, low-density lipoprotein (LDL) cholesterol, and non-high-density lipoprotein (non-HDL) cholesterol (–13.9 mg/dL, –13.1 mg/dL, and –11.6 mg/dL, respectively); the effect was even greater for vegan diets.[21] The Portfolio diet, emphasizing plant-based foods, especially almonds, soy, plant sterols, and foods high in viscous fiber, reduced LDL cholesterol by 35%—significantly more than a control diet that was equally low in saturated fats but lacked emphasis on these specific elements.[22]

A wealth of literature supports the use of diets high in whole and minimally processed plant foods for the prevention and treatment of hypertension, perhaps most notably the DASH trials. The DASH diet, which emphasizes whole grains, fruits, and vegetables and limits sweets and red and processed meats, was found to lower blood pressure sig-

FIGURE 1. **The ACLM Dietary Position Statement and the spectrum of dietary patterns from Standard American Diet to an entirely whole-food, plant-based plate**



nificantly more than comparator diets (–5.5 mm Hg systolic, –3.0 mm Hg diastolic).[23] Modifications on the DASH diet may further reduce blood pressure, including a low-sodium DASH diet[24] and a plant-based diet rich in soy, nuts, and viscous fiber.[25]

Diets rich in whole, plant foods are also important for secondary prevention of cardiovascular disease. These diets are an integral component of successful cardiac rehabilitation programs that include diet, exercise, stress reduction, and group support and aim for comprehensive lifestyle change.[26] Additionally, the DASH and Mediterranean diets have been shown to improve secondary prevention of heart failure.[27]

Plant-based diets promote heart health by multiple potential mechanisms. First, they are higher in beneficial nutrients such as fiber, unsaturated plant fats, potassium, and antioxidants, and lower in potentially harmful nutrients such as cholesterol,[28] heme iron, saturated fats, and nitrite preservatives.[29] Second, plant-based diets are linked to healthier body weights, lower inflammation,[30,31] reduced risk of type 2 diabetes, lower blood pressure, and improvements in lipids, endothelial function, and gut bacterial profiles.[29] In addition, proportionally high intake of protein from plant vs animal sources has been inversely associated with cardiovascular and all-cause mortality.[32-35]

Overweight and Obesity

Plant-based diets are associated with lower body mass indices (BMIs).[36] In a cross-sectional analysis of baseline data from the Adventist Health Study-2[36] (N=60,903), participants' diets were classified as vegan, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian, and nonvegetarian. These categories were associated in a stepwise fashion with progressively higher unadjusted mean BMIs, from 23.6 kg/m^2 for vegan to 28.8 kg/m^2 for nonvegetarian diets (P<0.0001).

Interventional studies have similarly shown that plant-based diets of varying types can be used for weight loss—often more effectively than those higher in non-plant foods. A meta-analysis of interventional studies comparing weight loss between those assigned to vegetarian vs nonvegetarian diets showed greater weight reduction in the vegetarian diet arms.[37] Subgroup analyses of the vegetarian diets showed significantly greater weight loss for those following vegan vs lacto-ovo vegetarian diets.[37] In the BROAD study,[38] adults with overweight or obesity, and diabetes, ischemic heart disease, hypertension, or hyperlipidemia, were randomly assigned to either an intervention arm including group education about a low-fat, non-energy-restricted, WFPB diet or a control arm for 6 months, both of which otherwise received usual care.[38] The plant-based intervention group experienced clinically and statistically significant improvements in BMI (–4.4 vs –0.4 kg/m^2; P<0.0001) as well as hemoglobin A1c and waist circumference, compared to the control group.[38] In the 2013 American College of Cardiology/American Heart Association/The Obesity Society Guideline for the Management of Obesity, an expert panel reviewed available evidence to establish guidelines for the treatment of obesity and listed a variety of dietary approaches rich in plant foods, including low-fat vegan-style diets without formal prescribed energy restriction and lacto-ovo vegetarian and Mediterranean-style diets with prescribed energy restriction, as having high levels of evidence to support their use as diets effective for weight loss.[39]

Type 2 Diabetes Prevention and Treatment

A predominantly plant-based dietary pattern has been recommended by the American Association of Clinical Endocrinologists as the preferred dietary strategy for individuals with type 2 diabetes[40] and by the American Diabetes Association (ADA)[41] as a healthful dietary option. Plant-based diets are associated with markedly lower prevalence and incidence of type 2 diabetes, even after adjustments for BMI and non-dietary lifestyle factors. In the Adventist Health Study-2, vegans and vegetarians had approximately half the odds of having type 2 diabetes compared with nonvegetarians.[36] In the same population, among 41,387 adults followed for 2 years, the risk of developing type 2 diabetes was 62% lower for vegans, and approximately 40% to 50% lower for lacto-ovo and semi-vegetarians, compared with nonvegetarians.[42]

Furthermore, multiple studies have demonstrated a significantly lower risk of type 2 diabetes among individuals who consume diets rich in healthful plant foods and low in highly processed and animal foods, but who are not necessarily vegan or vegetarian. A 2019 meta-analysis of 9 studies including more than 300,000 participants from North America, Europe, and Asia reported a 30% decreased risk of type 2 diabetes among those whose diets emphasized healthful plant foods including fruits, vegetables, whole grains, legumes, and nuts, despite adjustments for key diabetes risk factors including BMI.[43]

Plant-based diets have also been shown to be effective for the treatment of type 2 diabetes. A 22-week randomized trial (N=99) compared a low-fat, plant-based diet with a conventional calorie-reduced ADA diet.[44] In the plant-based group, 43% of participants were able to reduce their diabetes medications, compared with 25% in the conventional group. Among participants whose medications were stable, those assigned to a low-fat, plant-based diet experienced significantly greater improvements in glycemic control (HbA1c change, –1.23% vs –0.38%; P=0.01). An additional 52 weeks of follow-up (total follow-up of 74 weeks) demonstrated sustained improvements in glycemic control and lipids for the plant-based group compared with the conventional group in analyses controlling for medication changes.[45] A 2014 meta-analysis of controlled clinical trials found that vegetarian diets were associated with a statistically significant reduction in HbA1c (–0.39 percentage points; 95% confidence interval: –0.62 to –0.15; P=0.001), compared with consumption of comparator diets.[46] A plant-based diet has also been shown to reduce symptoms of diabetic neuropathy.[47,48]

Cancer Risk Reduction

The American Cancer Society publishes diet and physical activity guidelines to reduce cancer risk on the basis of expert review of evidence.[12] In addition to controlling weight, achieving adequate physical activity, and eliminating or limiting alcohol intake, dietary recommendations align with a predominantly WFPB dietary pattern, including recommendations to eat ample whole grains and a rainbow of fruits and vegetables and to limit intake of red and processed meat, added sugars, highly processed foods, and refined grain products. The report also cites evidence reviewed in the Dietary Guidelines for Americans[49] and the American Institute for Cancer Research[50] that dietary patterns rich in plant foods and low in animal products and refined carbohydrates are associated with lower risks of breast and colorectal cancer. Conversely, even small amounts of processed meat and moderate amounts of red meat are associated with increased risk of colorectal cancer.[50] Maintaining a healthy weight is also of great importance in reducing risk of 13 common types of cancers[51]; 40% of all cancers in the United States are associated with overweight and obesity.[52] As noted previously, those eating predominantly plant-based diets are more likely to have a healthy body weight than those who are not, and plant-based dietary strategies can be effectively used for weight management in addition to conferring other health benefits.

CASE STUDY (CONT'D)

Mr. S is presented a range of options for dietary changes that incorporate more whole, plant foods. These recommendations range from small steps such as adding 1 to 2 additional servings of produce to his diet each day, to doing a 21-day plant-based challenge of eating an entirely WFPB diet. Mr. S reflects that he has not been successful with incremental changes in the past and thinks he'll be more motivated to continue if he sees a larger impact on his health more quickly, so he decides to make a bigger change and take on the 21-day challenge. The PCP praises him for his determination and arranges a follow-up visit with him in 1 month.

PRACTICAL ADVICE FOR ADDRESSING DIETARY BEHAVIOR CHANGE IN CLINICAL PRACTICE

Effectively counseling on behavioral lifestyle changes can be challenging, especially given the time constraints faced by PCPs and the limited training on this topic offered in traditional medical training. The 5 A's (Assess, Advise, Agree, Assist, Arrange) behavioral counseling framework, originally developed by the National Cancer Institute to assist with smoking cessation, is increasingly being used by PCPs to encourage behavior change among patients with overweight and obesity.[53] It is the model referenced by the US Preventive Services Task Force (USPSTF),[54] and is also the model used by Medicare for intensive behavior therapy for obesity.[55] The model is simple, easy to remember, and can be performed as a staged process over several visits, making it feasible to incorporate in most office visit settings.[53] For these reasons, we recommend providers use this framework as a starting place when counseling patients to take steps to move along a spectrum toward adopting a predominantly WFPB eating pattern.

In addition to counseling on dietary and other healthy behavior changes, it is important for physicians to also be role models of good health.[56] Patients perceive physicians who practice healthy lifestyles themselves as more credible and better able to motivate them to make healthy lifestyle choices than those who do not.[57] Adopting a WFPB eating pattern and leading a healthy lifestyle oneself will increase credibility and efficacy with one's patients when it comes to effecting behavior lifestyle changes.

Assess

The first step of the 5 A's framework as it relates to dietary intake and related behavioral lifestyle changes is to assess whether diet and/or weight is a priority for the patient. Having patients fill out a previsit questionnaire is an efficient method for ascertaining the patient's current dietary quality, potential concerns about diet/weight, and level of interest in making related changes. An example of a questionnaire that can be used is the Starting The Conversation (STC) nutrition assessment, which is an 8-item, simplified food frequency instrument designed for primary care and health-promotional settings.[58]

If time allows, it can be helpful to further use the tools of motivational interviewing, "a collaborative, person-centered form of guiding to elicit and strengthen motivation for change."[59,60] This could include asking the patient to rate on a scale of 1 to 10 both the importance of making a change and their confidence level in making said change. One might further ask a patient what it would take to move from their selected number to a higher number in order to give insight into perceived barriers and to make plans to address them, if possible. Regardless of the amount of time spent on assessing, starting with an area a patient has already identified as an issue and one they're interested in changing is one of the best ways to make sure the time a clinician spends on behavioral counseling is as high-yield and effective as possible. A patient may also have other life challenges or priorities a PCP might be unaware of that take precedence over making dietary changes. In that case, it is likely better to focus on what matters most to the patient and save a discussion of diet for a future office visit.

Advise

Once it is established that diet and/or weight is a priority for a patient, the next step is to advise the patient about their specific health risks related to diet/weight and the potential health benefits of moving toward a predominantly WFPB dietary pattern. Focusing on what is motivating to each individual is particularly helpful. For example, younger patients may be more interested in performance or benefits to appearance, whereas middle-aged and older patients may be more interested in disease prevention, treatment, or remission. If a patient has metabolic disease for which they take medication, such as type 2 diabetes or hypertension, emphasizing that a predominantly WFPB dietary pattern can help them lose weight, improve their blood glucose and blood pressure, and reduce or eliminate medications can be particularly motivating. Additionally, make sure it is clear that the goal is dietary changes that can be maintained long-term, because short-lived fad, or crash, diets are of limited utility and can even be harmful.[61,62]

Physicians typically receive very limited education on nutrition and weight management in medical school and postgraduate training and, as a result, report inadequate nutrition knowledge and low self-efficacy when counseling

TABLE 1. **Making goals into SMART goals**

Example of non-SMART goal	Example of SMART goal
I will eat more fruits and vegetables.	By the end of next week, I will increase my daily fruit and vegetable intake from 0 servings per day to 3 servings per day.
I will decrease the amount of soda that I drink.	Over the next 2 weeks, I will decrease my soda intake from two 12-oz cans per day to one 12-oz can per week.
I will learn how to make home-cooked plant-based meals.	During the next 4 weeks, I will use a specific cooking blog to learn and prepare 1 plant-based recipe per week at home.

SMART, Specific, Measurable, Achievable, Relevant, Time-Bound.

TABLE 2. **Foods to emphasize**

Category	Examples
Vegetables	Leafy vegetables (eg, kale, spinach, romaine, Swiss chard, collard greens, cabbage), garlic, onions, peppers, leeks, parsnips, potatoes, radishes, turnips, squashes, green beans, tomatoes, carrots, corn, peas, cauliflower, broccoli, cucumbers, eggplant, mushrooms
Fruits	Apples, bananas, kiwi, oranges, blackberries, strawberries, raspberries, blueberries, mango, cantaloupe, watermelon, honeydew, plums, pineapple
Legumes	Black beans, kidney beans, pinto beans, garbanzo beans, cannellini beans, lentils, lima beans, fava beans, soybeans
Whole grains	Quinoa, brown rice, oats, barley, wild rice, black rice, whole-grain tortillas/pasta/breads, whole-grain couscous, millet, teff
Nuts	Almonds, peanuts, pistachios, cashews, Brazil nuts, soy nuts, hazelnuts, walnuts
Seeds	Chia seeds, flax seeds, hemp seeds, pumpkin seeds, sunflower seeds

patients about diet and weight management.[63,64] Thus, the more that a PCP learns about the benefits of predominantly WFPB dietary patterns for chronic, noncommunicable diseases, such as obesity, cardiovascular disease, diabetes, hypertension, and many cancers, the better equipped they will be to advise patients on how to improve their dietary behaviors.

Agree

This step involves helping a patient identify and agree to specific steps they plan to take toward achieving their specific dietary change goal(s). Asking a patient how they feel about where they are now and where they'd like to be at discrete times in the future can help a provider to better understand a patient's short- and long-term goals. One way to assist patients in making changes is by using SMART goals (**TABLE 1**).[65] With SMART goals, patients can practice making goals that are specific, measurable, achievable, relevant, and time-bound.[66] When striving for larger, long-term, or more difficult goals, make sure to build in smaller, easier-to-achieve, short-term components of the goal (ie, an action plan) so the patient can frequently experience a sense of achievement during the process. This helps to foster confidence and maintain momentum and motivation toward achieving the larger goal. It can be helpful to, again, use the 1 to 10 scale for confidence in achieving the next component of a goal. If a patient rates their confidence as lower than a 7 out of 10, ask what it would take to increase confidence to a 7 or greater. If this is a barrier that can be addressed, help them make a plan to address it; if not, a more feasible action plan should be selected.[64]

Assist

After agreeing upon a SMART goal or specific action plan for a larger goal, clinicians should assist patients in achieving their objectives whenever possible. This can be done simply via a variety of formats and methods in typical clinical settings. Below are a few examples of ways to provide assistance to patients:

- **Handouts:** Provide handouts regarding the benefits of predominantly WFPB dietary patterns and how-to articles (eg, sample meal plans, grocery lists, tips on eating out or batch cooking, etc) that show simple steps patients can take to improve their diets. These can help increase interest and confidence in making dietary changes while patients are waiting to be seen and are easy to take home when they leave. **TABLE 2** lists categories of foods to emphasize along with examples; **FIGURE 2** illustrates relative proportions of these

FIGURE 2. **ACLM whole-food, plant-based plate**

The WFPB plate shows relative proportions of whole and minimally processed plant foods within their respective food categories. Following this plate method helps to ensure adequate intake of nutrients and a balanced diet. Refer to **TABLE 2** for examples of foods, and **TABLE 3** for more details about nutrient intake.

foods to recommend; and **TABLE 3**[67-70] reviews nutrients to consider in a WFPB eating pattern.

- **Multimedia:** Learning is enhanced with multiple modalities, and learners sometimes prefer formats other than reading. Therefore, consider providing or recommending videos, podcasts, audiobooks, documentaries, books, or other multimedia resources that patients can use to explore adopting dietary behavior changes.
- **ACLM Tools and Resources:** Go to the ACLM Tools and Resources webpage to explore evidence-based tools and resources for physicians, health professionals, and patients.[71] **TABLE 4** indicates additional resources (some available publicly, others to ACLM members only).
- **Referral for additional support**: Refer patients to appropriate clinician or allied health professional support (eg, a Certified Diabetes Care and Education Specialist [CDCES], registered dietitian, behavioral medicine psychologist, or weight management specialist).

TABLE 3. **Plant-based sources of selected nutrients**[67]

Nutrient	Food sources
Protein	Beans, lentils, peas, nuts, seeds, tofu, tempeh
Carbohydrate	Fruits, starchy vegetables, whole grains, legumes
Fat	Nuts, seeds, avocado, olives
Fiber	Fruits, vegetables, whole grains, legumes, nuts and seeds
Omega-3 fatty acids	Chia seed, ground flaxseed, walnuts, soybeans, tofu, tempeh, algae-based omega-3 supplement
Calcium	Fortified plant milks, low-oxalate leafy greens (such as broccoli, bok choy, cabbage, collard greens, kale, watercress), calcium-fortified tofu, almonds, sesame seeds, figs, and molasses
Iron	Beans, lentils, peas, nuts, leafy greens, soybeans, quinoa, dried fruit
Vitamin B_{12}	Fortified plant milks, nutritional yeast, cyanocobalamin supplement[68-70]*

*Vitamin B_{12} supplement is recommended for individuals who consume no animal-based foods.

TABLE 4. **Suggested tools and resources for predominantly whole-food, plant-based dietary patterns**

Resource type	Name of resource
CME/CE online courses	Foundations of Lifestyle Medicine Board Review Course (lifestylemedicine.org/boardreview)
	Lifestyle Medicine Core Competencies (lifestylemedicine.org/lmcc)
	Food as Medicine for Medical Professionals (lifestylemedicine.org/food-as-medicine)
Academic and patient-facing curriculum	LM 101 Curriculum (lifestylemedicine.org/lm101)
	Culinary Medicine Curriculum (lifestylemedicine.org/culinary-medicine)
Benefits of Plant-Based Nutrition White Paper Series	ACLM Public-Facing (or Open-Source) Tools and Resources (lifestylemedicine.org/plant-based-nutrition)
Patient-facing tools and resources	ACLM Public-Facing (or Open-Source) Tools and Resources (lifestylemedicine.org/tools)
Clinical validated assessment tools and resources	ACLM Members-Only Portal
Lifestyle Medicine Shared Medical Appointment Toolkit	ACLM Members-Only Portal

For example, if a patient has a history of diabetes, it could be very helpful for the patient to meet with a registered dietitian/CDCES to better understand how shifting to a more plant-based, less processed diet can affect blood glucose and medication use. For a patient who identifies emotional eating as a barrier to making dietary changes, a behavioral medicine psychologist can aid them in distinguishing physiological from psychological hunger and help them develop strategies and techniques for minimizing the latter.[72]

- **Recommend classes and educational opportunities:** Provide patients with a list of classes available within your health system or community that teach nutrition, cooking, and food purchasing and acquisition skills emphasizing predominantly WFPB dietary patterns. This can be a useful way to share WFPB eating in ways specific to different cultural food practices. Additional potential benefits of group-based classes are community building, developing peer support networks, and increasing accountability. Interactive cooking classes wherein patients learn to cook and sample various plant-based dishes are especially useful for building skills and confidence in the kitchen.

Arrange

The next step is to arrange follow-up. Patients making dietary and other lifestyle changes initially require frequent check-

ins. As these changes become more ingrained in a patient's routine, check-ins can gradually be spaced further apart over time. These check-ins can be done in person and/or as synchronous telehealth visits by video or phone with various members of the healthcare team. Some practices and systems also have means of asynchronously checking in such as texting or secure email messaging. Using different team members and different modalities is important for a variety of reasons, including but not limited to time constraints of the busiest team members, adding different perspectives and expertise that may be useful to patients, and more flexible scheduling to meet patient scheduling needs. Using telehealth, texting, or emailing also reduces travel, time, and financial burdens for patients who might not otherwise be able to attend frequent appointments.

Many practices leverage shared medical appointments, otherwise known as group visits, for check-ins as well. Group visits have additional benefits such as providing peer support and giving patients and providers time to address knowledge, attitudes, and behaviors around making lifestyle changes. They also allow time to check in on medical conditions, order laboratory tests/studies, and ensure appropriate preventive health services are provided in a timely manner. For more information on starting shared medical appointments in your practice, ACLM offers a Lifestyle Medicine Shared Medical Appointment Toolkit, which includes a helpful guide; information on coding, billing, and virtual group visits; webinars on shared medical appointments; sample consent forms; a marketing flyer template; and more.[73,74]

CASE STUDY (CONT'D)

One month later, Mr. S presents for a follow-up visit. He reports that the 21-day challenge of eating only plant-based foods went very well and he feels more energetic and healthier than he has in years. When choosing less-processed and higher-fiber foods, he notices that he feels more satiated and is relieved he no longer needs to spend time trying to count calories. Instead, he now works on choosing appropriate portion sizes, paying more attention to hunger cues, and trying to use non-food rewards for his successes.

Vital signs are reviewed with Mr. S; he has lost 10 pounds and his blood pressure is now low enough to stop 1 of his 2 antihypertensive medications. Mr. S feels a 9 out of 10 level of confidence that he can continue the lifestyle changes he has made, so follow-up appointments are extended in 3-month intervals for the next year to help provide support and encouragement and to monitor his health conditions, especially any need for further reduction in medications.

OTHER CONSIDERATIONS RELATED TO DIETARY CHANGES

There are numerous factors beyond nutrition knowledge and food choices that affect dietary intake. Many of these are mentioned in the sidebar ("Factors Beyond Nutrition Knowledge That Affect Dietary Choices"). Others, related to social determinants of health, food insecurity, and cultural practices and cooking in families, are briefly addressed below.

Social Determinants of Health

For many, cost and access can be barriers to healthy eating. Although the relatively low-calorie density of a healthful plant-based diet can be beneficial in maintaining a healthy weight while feeling satiated, it can make it difficult for some with very limited food budgets to achieve adequate caloric intake. This is because foods higher in nutrient density, such as fruits and vegetables, are associated with higher per-calorie costs than refined grains and sweets.[75] In addition, the investment in equipment necessary for cooking, as well as access to a kitchen, may be obstacles for some individuals. However, those with even a modest food budget can eat a predominantly WFPB diet—if they know how to cook, meal plan, and have access to a kitchen.[76] For example, among the 3 Healthy Food Patterns recommended in the 2015-2020 Dietary Guidelines for Americans,[49] the Healthy Vegetarian dietary pattern was found to be $2.37 and $2.87/day/person less expensive than the Healthy US Style and Healthy Mediterranean Style dietary patterns, respectively.[77] Additionally, within this analysis, legumes, whole grains, nuts, seeds, and soy were found to be far more economical per kilocalorie than dairy, meat, poultry, eggs, and seafood.[77]

Food Insecurity

To this end, it is important to identify patients with food insecurity, defined by the US Department of Agriculture as the lack of consistent access to enough food to live a healthy and active life.[78] This is quick and easy to do using the validated 2-question Food Insecurity Screener.[79] In many communities, there are a variety of resources and services that can be used to increase access to free, healthy food for those in need. In the United States, these include federal government programs (such as the Supplemental Nutrition Assistance Program [SNAP] and the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]), food bank programs associated with Feeding America (search https://www.feedingamerica.org/ for the location nearest you), market match programs associated with farmers markets in selected locations that give participants double their SNAP dollars in vouchers for fresh produce, and many others. Additionally, there has been an increase in the availability of

FACTORS BEYOND NUTRITION KNOWLEDGE THAT AFFECT DIETARY CHOICES

Behavioral Health and Behaviors

- Trauma or abuse history, post-traumatic stress disorder (PTSD), depression, anxiety, substance use, chronic stress
- Binge eating disorder, anorexia, bulimia, other disordered eating, emotional eating/psychological hunger
- High intake of ultra-processed foods, especially refined grains and added sugars

Sleep and Pulmonary

- Untreated/undertreated obstructive sleep apnea, obesity hypoventilation syndrome, insomnia, poor sleep hygiene

Genetics

Neurologic

- Restless leg syndrome, dementias, traumatic brain injuries, neuromuscular disorders, seizure disorders, migraines, idiopathic intracranial hypertension

Digestive-Gastrointestinal

- Gastroesophageal reflux disease, irritable bowel syndrome, gastroparesis, history of bariatric surgery, inflammatory bowel disease, nausea, other gastrointestinal causes
- Microbiome

Endocrine

- Hypo-/hyperthyroidism, diabetes, elevated cortisol states/conditions, hypogonadism, other hormone derangements

Severe Medical Disease and Related Treatments

- Poor appetite associated with severe medical conditions such as heart failure, cirrhosis, and end-stage renal disease
- Cancer and side effects of cancer treatments

Pregnancy and Lactation

Aging and Related Changes in Sense of Taste and Appetite

Medication Side Effects

- Some medications in the following classes affect dietary intake and can contribute to weight gain: tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs), antipsychotics, antiepileptics, beta blockers, insulin, sulfonylureas, thiazolidinediones, corticosteroids, steroids, antihistamines
- Some medications affect dietary intake and can contribute to weight loss: bupropion, topiramate, zonisamide, venlafaxine, desvenlafaxine, stimulant medications or drugs, naltrexone, glucagon-like peptide-1 (GLP-1) agonists, sodium-glucose cotransporter-2 (SGLT2) inhibitors

Socioeconomic Status, Food Insecurity, and Food Access

Food and Family Traditions and Foodways, Cultural Traditions, and Religious Beliefs/Practices

Culinary Skills/Literacy, Kitchen Access, and Physical Limitations to Cooking

Built Environment and Food Environment

food pharmacies—dispensaries that give or sell healthy food upon receipt of a prescription from a healthcare professional for the treatment or prevention of food-related disease. Some of these services and organizations also offer cooking classes, tips, and recipes. For patients with limited food preparation experience, providing support for improving these skills is an important step in making healthy dietary changes.[80]

Cultural Factors and Families

Considering cultural factors and influences is another essential element in partnering with patients in making dietary behavior changes. We are all influenced by our cultures of origin and the people who surround us. Taking time to learn about the cultural food traditions of your patients can assist in tailoring recommendations, such as by recommending familiar plant foods, healthy cooking techniques, or local groceries and food establishments. Most cuisines can be tailored to focus on healthier aspects without excluding traditional foods entirely, and many traditional cuisines are healthier than modern, ultra-processed, and fast-food options.[76] Additionally, given that plant-based diets are healthful, adequate, and appropriate for all stages of life,[16]

encourage patients to engage their households in making healthy dietary changes; when changes are a family affair, they are more likely to be maintained. ACLM offers many pediatric-focused resources,[71] and more tips on assisting others in making dietary behavior changes can be found in the Culinary Medicine Curriculum.[76]

CASE STUDY

Mr. S follows up 1 year after first being advised on dietary behavior changes—specifically, the recommendation to move toward a predominantly WFPB dietary pattern. During this year, he has followed up with his PCP or a member of the healthcare team at least every 3 months and participated in multiple local classes and a conference focused on his desired dietary changes. Mr. S feels the dietary changes he has made have become part of his lifestyle; he doesn't consider himself to be on a diet. Other successes include increasing his physical activity, losing 30 pounds (~10% total body weight loss), achieving a normal blood pressure without antihypertensive medications, and returning to normoglycemia. He thanks his PCP and the rest of the healthcare team profusely for helping him to address the root cause of his chronic health issues and for his current good health.

CONCLUSION

In traditional primary care settings, healthcare providers commonly see patients with chronic, diet-related diseases, such as cardiovascular disease, type 2 diabetes, hypertension, hyperlipidemia, obesity, and more. There is compelling evidence that eating patterns rich in whole or minimally processed plant foods—ie, predominantly WFPB eating patterns—are associated with reduced risk for, and improvement in, these cardiometabolic conditions; they are also linked to lower risk of cancer. For these reasons, ACLM recommends a predominantly WFPB eating plan, a dietary pattern that is also aligned with guidelines from numerous professional health organizations.

Effective counseling on dietary behavior change is crucial to addressing the root causes of lifestyle-related, chronic diseases. There are many ways to assist patients in making dietary behavior changes that help them move along a spectrum away from diets closely linked with chronic diseases (ie, diets high in saturated fat, sodium, added sugars, and refined grains) and toward diets associated with longevity and lower disease risk (ie, diets rich in whole and less-processed plant foods). This review includes practical, evidence-based counseling methods, tools, and resources for addressing dietary behavior change in traditional clinical practice settings. ACLM offers lifestyle medicine and nutrition-related continuing medical education opportunities through online educational courses including the Foundations of Lifestyle Medicine Board Review, Lifestyle Medicine Core Competencies, Food as Medicine courses, and events such as the ACLM annual conference and more that can be accessed at lifestylemedicine.org/education.[81] In becoming familiar with the evidence supporting predominantly WFPB eating patterns and adopting effective techniques to support dietary behavior changes, healthcare providers have the potential to significantly reduce the burden of chronic disease in their patient populations. ●

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Lifestyle Medicine: Physical Activity

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doi: 10.12788/jfp.0253

"Eating alone will not keep a man well; he must also take exercise."
—Hippocrates

INTRODUCTION

Nearly half of all adults in the United States have at least 1 preventable chronic disease.[1,2] Seven of the 10 most common chronic diseases are positively influenced by physical activity.[1] The Centers for Disease Control and Prevention (CDC) estimates that getting enough physical activity could prevent 13% of breast and colorectal cancer, 8% of diabetes, and 7% of heart disease, as well as 1 in 10 premature deaths.[1] It has also been shown to aid in the management of, or as an adjunctive treatment for, colorectal cancer,[3] renal disease,[4] sleep apnea,[5] osteoarthritis,[6] hypertension,[7] cardiovascular disease,[8] type 2 diabetes,[9,10] and obesity.[11,12] Despite this knowledge, only 23% of adults meet both the aerobic and muscle-strengthening physical activity guidelines (**TABLE 1**), with only half of US adults meeting the aerobic activity guidelines.[13]

Physicians have an important role in counseling and prescribing physical activity to patients. Research has shown that physical activity promotion within primary care settings significantly increases physical activity levels in adults for up to 12 months.[14] Physicians who exercise regularly are more likely to counsel their patients about exercising.[15] Unfortunately, as recently as 2010, only 34% of US adults reported receiving exercise counseling at their last medical visit.[16] Although this lack of counseling is multifactorial, inadequate time and inadequate knowledge/experience regarding exercise are the most common barriers cited.[15,17] This paper reviews the basics of physical activity and focuses on ways to incorporate physical activity counseling, assessments, and referrals within the clinical practice.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

FOUNDATIONAL PHYSICAL ACTIVITY DEFINITIONS

Being able to clearly articulate the difference between physical activity, exercise, and health-related fitness is foundational to effectively counseling patients. Physical activity is defined as any bodily movement that is produced by the contraction of skeletal muscle that increases energy expenditure above a basal level.[2] Exercise represents a subset of physical activity that is characterized by being planned, structured, repetitive, and performed with the goal of improving health or fitness.[2]

For example, emptying a dishwasher is a form of physical activity that also meets some criteria for exercise (eg, it is repetitive, structured, and planned). However, it is not performed with the goal of improving health or fitness. Going for a brisk walk or doing 10 push-ups would meet the definition for exercise as these activities are repetitive, structured, planned, and performed with the intent of improving health or fitness. Although any amount of physical activity is better than none, it is important that adults engage in both general physical activity as well as purposeful exercise as part of their weekly physical activity. General physical activity can burn calories and is important in combating the negative effects of sedentary behavior[18]; however, exercise improves cardiorespiratory and strength fitness and leads to substantial health benefits.[1,19]

The physiologic effects of exercise are commonly assessed using the framework of health-related fitness. Health-related fitness includes 5 domains: (1) cardiorespiratory fitness, (2) muscular strength and endurance, (3) body composition, (4) flexibility, and (5) balance.[20] Means for primary care physicians to appropriately assess and prescribe interventions for each of these domains are discussed in detail below.

PHYSICAL ACTIVITY GUIDELINES

The Physical Activity Guidelines (PAG) from US Department of Health and Human Services are updated every 10 years,

TABLE 1. **Summary of US Department of Health and Human Services Physical Activity Guidelines (PAG) for healthy adults, 2nd edition**[2]

General PAG	Specific PAG
Inactivity should be avoided	150-300 min of moderate-intensity aerobic physical activity per wk OR 75-150 min of vigorous-intensity aerobic physical activity per wk
Aerobic activity should be spread throughout the wk	
Strength training should be of moderate or greater intensity	An equivalent combination of moderate and vigorous activity can be conducted to meet the recommended time duration
Health benefits can be achieved by adults who sit less and do any amount of moderate to vigorous physical activity	Additional health benefits can be achieved by doing more than 300 min of moderate-intensity physical activity per wk
	Strength training exercises should be done for all major muscle groups 2 or more days per wk.

with the most recent iteration published in 2018.[2] The PAG serves as a valuable tool for clinicians to help guide their patients on specific recommendations regarding frequency, duration, and type of physical activity one should participate in to achieve or maintain optimal health.

The guidelines listed in **TABLE 1**[2] can serve as a foundation for exercise prescription in healthy adults. When considering special populations such as people older than 65 years of age, pregnant and postpartum women, and those with chronic healthcare conditions, appropriate modifications to these guidelines are made.

Older adults (older than 65 years of age) should be cognizant of various physical or fitness level limitations that may preclude their ability to reach the above-noted guidelines.[21,22] In addition to aerobic and strength training, older adults benefit from adding balance exercises to their weekly regimen.[23]

In women who are pregnant or postpartum, the PAG is still at least 150 minutes of moderate aerobic activity spread throughout the week. Women in this cohort should maintain close follow-up with their healthcare providers in the event any modifications to their exercise programs need to be made.

Adults with chronic health conditions should follow the PAG in **TABLE 1**[2] but modify their exercise program under the direction of their healthcare provider and/or exercise specialist.[21] If those with chronic health conditions are unable to meet the PAG for healthy adults owing to various medical or physical limitations, they should be as physically active as these limitations allow.

When considering physical activity guidelines, individuals living with and beyond a cancer diagnosis are worth mentioning as a separate subpopulation. Traditionally, exercise has not been at the forefront of a comprehensive care plan within the field of oncology.[24] Evidence supporting the positive role of exercise in cancer prevention, treatment, and survival continues to evolve. As such, the American College of Sports Medicine (ACSM) International Multidisciplinary Roundtable on Exercise and Cancer recently published guidelines that support a minimum effective dose of 30 minutes of moderate-intensity aerobic exercise 3 times per week as an evidence-based intervention to help improve cancer-related health outcomes including, but not limited to, depression, anxiety, physical function, fatigue, and health-related quality of life.[25] The decrease in duration of moderate-intensity aerobic exercise is the one notable deviation from PAG in healthy adults. The remaining guidelines for this population are consistent with what is noted in **TABLE 1**.[2]

EVALUATING PHYSICAL ACTIVITY AND EXERCISE

Prior to performing any formal assessments, the clinician may find significant value in inquiring about the patient's preferences and values surrounding fitness.

- How do you feel about your current levels of physical activity?
- What role does physical activity play in your life?
- Is exercise or physical fitness important to you?
- Are there are types of physical activities that you enjoy?
- What would need to be different for exercise to be a priority for you?
- What do you need more or less of to improve your physical fitness?

A myriad of clinical tools have been developed to ensure exercise safety, evaluate health-related fitness domains, and aid in exercise prescription. Each of these tools are covered below.

EXERCISE VITAL SIGN

The exercise vital sign (EVS) is a simple, validated method for physicians to monitor patients' physical activity and initiate a conversation about exercise, and it can be entered into the

electronic health record (EHR). It is a self-reported exercise assessment consisting of 2 questions:

1. "On average, how many days per week do you engage in moderate to strenuous exercise (like a brisk walk)?"
2. "On average, how many minutes do you engage in exercise at this level?"

Additionally, physicians should consider asking their patients, "How many days per week do you perform muscle-strengthening exercises, such as body weight exercises or resistance training?"

Patients should be asked the EVS questions during each visit and then be screened according to the ACSM preparticipation recommendation below to clear them for exercise.[26]

EXERCISE CLEARANCE

Recently, the ACSM updated and simplified its exercise preparticipation screening guidelines based on the rationale that light- to moderate-intensity exercise is safe for most people.[27] Cardiovascular (CV) disease risk factors do not predict adverse CV events, and the risk of CV events is much higher during vigorous-intensity exercise. Recommendations are now for physician clearance as opposed to medical clearance or exercise testing, and are based on:

- the individual's current level of structured exercise
- the presence of major signs and symptoms suggestive of cardiovascular, metabolic, or renal disease
- the desired intensity of exercise

A helpful figure, created by Magal and Riebe,[28] that discusses the new preparticipation health screening recommendations can be found at doi: 10.1249/FIT.0000000000000202.

ASSESSMENT

An initial assessment should occur before developing an exercise program. The purpose of performing an initial assessment is to identify the individual's current fitness level; establish a baseline for future comparison and progression rate; identify needs; develop a safe and effective program; and determine short-, medium-, and long-term goals.

These assessments are usually conducted by an exercise specialist and fall into the 5 previously mentioned domains:

1. Body composition
2. Cardiovascular endurance
3. Muscular strength and endurance
4. Flexibility
5. Balance

Body composition. Gold standard methods of measurement include air-displacement plethysmography (BOD POD), underwater weighing, and dual-energy X-ray absorptiometry (DEXA), usually occurring in clinical or sports performance settings. Common field or in-office ways to assess this include body mass index (BMI) calculations, measuring waist circumference, performing skinfold measurements, or using a bioelectrical impedance device. All of these options have a window of error of approximately ± 4% to 6%.

Cardiovascular endurance. Cardiovascular endurance is defined as the ability to perform large-muscle, dynamic, moderate- to high-intensity exercise for prolonged time periods.

Field tests for measuring cardiovascular endurance include treadmill tests, various walk/run tests (eg, Rockport walking test, 12-minute walk/run), step testing, and ergometer testing.[28] Nonexercise methods of assessing cardiovascular fitness, or prediction equations, have also been developed as an alternative when traditional exercise testing is not feasible.[29]

Muscular strength. Muscular strength is defined as the maximum force a muscle group can produce at a specified velocity.[30] It is expressed as the maximum load an individual can lift while maintaining proper form (ie, 1 repetition maximum). Common methods to assess muscular strength include:

- Bench press and overhead press (upper body)
- Smith machine squat, leg press, and knee extension (lower body)

Local muscular endurance. Muscular endurance is the ability of a muscle group to execute repeated contractions over a period of time sufficient to cause muscular fatigue or maintain a specific percentage of maximum voluntary contraction for a prolonged period of time.

- Curl-ups (crunches)
- Push-ups

Flexibility. Flexibility is the ability to move a joint through its complete range of motion. Common methods to assess flexibility include:

- Joint range of motion assessment
- Sit-and-reach or modified/unilateral sit-and-reach test

FITT-P PRINCIPLE

A simple acronym known as the FITT-P principle is normally used to design cardiovascular and flexibility exercise programs, where the "F" stands for frequency, "I" for intensity, "T" for time (or duration), the second "T" for type (or mode) of exercise, and the "P" for progression.

CARDIOVASCULAR EXERCISE PRESCRIPTION

Frequency. Established guidelines suggest 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity CV exercise per week, or some combination. Time and desire are also common factors that determine the frequency of CV exercise training. When the goals pertain to

weight loss or improvement in aerobic capacity, increasing frequency is indicated.

Intensity. Intensity of CV exercise can be measured objectively by measuring heart rate in beats per minute, and subjectively by measuring RPE (rate of perceived effort) scales. Equations or field tests are used to determine the low and high end of an individual's CV training zone, but because these methods include a window of error, assessing intensity of effort both objectively and subjectively is important during initial testing and exercise.[31,32]

Time. The duration of CV exercise can vary from very short bouts (eg, 5 minutes for the very deconditioned) to 60 minutes or more. Fitness level, individual goals, motivation, and the type of CV exercise determine duration. Individuals with weight loss as a goal should strive to maximize weekly duration (eg, 200 to 300 minutes per week).

Type. There are 2 types of CV exercise:

1. Impact (eg, running)
2. Non-impact (eg, elliptical machine, swimming, cycling)

The general recommendation is to alternate between impact and nonimpact from session to session. The ratio is at the discretion of the coach or individual (eg, 3 sessions of impact exercise for every 1 session of nonimpact exercise).

Progression. Progression can occur by increasing frequency, duration, and/or intensity of exercise and is at the coach's or individual's discretion. For safety reasons, high-intensity interval training (HIIT) and sprint interval training (SIT) should not be programmed until the person can comfortably sustain at least 20 minutes of continuous aerobic exercise at moderate intensity.[33]

FLEXIBILITY EXERCISE PRESCRIPTION

Frequency. Frequency can range from 2 to 7 days per week. Restricted areas often require a higher frequency in days per week and/or sets performed per session to increase overall volume.

Intensity. The intensity of a stretch may vary based on an individual's tolerance of discomfort. The general recommendation is to stretch to the point of mild or moderate discomfort.

Time. The time, or duration, of a stretch can range from 20 seconds to longer than a minute and depends on the goal (ie, to maintain or improve joint range of motion) or type of stretch.

Type. Common types of stretching include passive, active, and proprioceptive neuromuscular facilitation (PNF). Although all types of stretching improve joint range of motion when performed properly, PNF stretching has been shown to be the most effective.[34]

Progression. Progression is only indicated at areas where movement restriction exists, and the purpose is to increase joint range of motion toward the normal range. Progression occurs with adequate frequency, volume, intensity, and duration, combined with finding a new end range, all of which create a stimulus whereby joint range of motion is increased.

STRENGTH EXERCISE PRESCRIPTION

Unlike cardiovascular and flexibility program design, where the prescription can follow the FITT-P principle, designing a strength training program is more complex. Examples of the variables involved in designing a strength training program include:

- Frequency
- Sets per muscle group
- Repetitions per set
- Objective (load) and subjective (relative effort) intensity
- Choice of exercise
- Order of exercise
- Rest between sets and exercise sessions
- Repetition tempo

Individuals new to strength training will have a learning curve for developing proper form, developing mind-muscle connections, determining initial loads and available range of motion, and understanding the general flow of a strength workout. This initial phase, known as the "familiarization phase" or "adaptation phase," may take several weeks before the individual is ready to progress. This underscores the need for professional guidance, at least initially.

A CALL TO ACTION FOR PATIENT REFERRAL

In 2019, 3 large organizations (the National Physical Activity Plan Alliance, the National Coalition for Promoting Physical Activity, and the National Physical Activity Society) and scores of government, medical, and fitness entities formed the Physical Activity Alliance (PAA). This new entity recognized unanimously that comprehensive physical activity guidance requires the coordinated efforts of the entire healthcare team.[34] It recognized that no single member of the healthcare team should be entirely responsible for promoting physical activity, and that more team members lead to a more comprehensive effort, which benefits the patient. Because of barriers such as lack of time, low reimbursement rates, and inadequate professional education and training, the PAA proposed a Physical Activity Care Continuum, in which the physician's primary role is to diagnose, provide a basic prescription and counseling, and then refer the patient to the appropriate rehabilitation or exercise professional.[35]

TABLE 2. **Roles and actions within the physician–rehabilitation–fitness pathway**

Role	Physician	Physical therapist (PT)	Exercise specialist (ES)
Patient/Client visit frequency and length	1 to 4 times/y 15-to-20 min session 5 min avg talk time for both doctor and patient Need to refer out and oversee pathway[36]	8 to 12 sessions on avg 30-to-60-min session length Need to refer out and advise exercise specialist[37]	5 sessions to several years 30- or 60-min session length
Body fat testing and weight management counseling	Can perform in clinic	Can perform in clinic	Can perform as part of assessment and counsel on weight management ongoing
Design and implementation of trigger point release treatment plan	Can educate on FITT-P principle and give general advice/recommendations	Can educate on FITT-P principle, design and initiate treatment plan, and monitor short-term	Can educate on FITT-P principle, design and monitor progress of treatment plan
Design and implementation of flexibility training treatment plan	Can educate on FITT-P principle and give general advice/recommendations	Can educate on FITT-P principle, design and initiate treatment plan, and monitor short-term	Can educate on FITT-P principle, design and monitor progress of treatment plan
Design and implementation of balance training treatment plan	Can educate on FITT-P principle and give general advice/recommendations	Can educate on FITT-P principle, design and initiate treatment plan, and monitor short-term	Can educate on FITT-P principle, design and monitor progress of treatment plan
Design and implementation of aerobic training treatment plan	Can educate on FITT-P principle and give general advice/recommendations	Can educate on FITT-P principle, design and initiate treatment plan, and monitor short-term	Can educate on FITT-P principle, design and monitor progress of treatment plan
Design and implementation of initial strength training treatment plan	Can educate on general strength training variables and answer basic questions	Can educate, initiate, and monitor early stages	Can educate, initiate, and monitor
Design and implementation of progressive strength training treatment plan	Can educate on general strength training variables and answer basic questions	Rarely has time to implement/oversee this stage Needs to refer out and avoid home exercise program whenever possible	Can educate, initiate, and monitor

FITT-P, Frequency Intensity Time (or duration) Type (or mode) of exercise Progression.

Patient services in the physician's clinic are described as the "spark that ignites the flame," with connection to community-based resources being "the fuel that sustains the fire."

The Call to Action includes 2 important points:

- Referrals by clinicians to community-based programs regularly occur and are documented. Data and outcomes are fully incorporated into EHR systems.
- The healthcare system is integrated with community systems and resources, such as referral networks, workplace wellness programs, school systems, and park networks.

TABLE 2 provides a general description of the roles and actions of each domain within the physician-rehabilitation-fitness pathway.

REFERRAL TO A REHABILITATION OR EXERCISE SPECIALIST

While physicians are ideally positioned to start the physical activity and exercise conversation with patients, it is helpful for many patients to have a qualified rehabilitation or exercise professional with whom they can also work to oversee their program and get more nuanced feedback. Whether this

TABLE 3. **Description of the academic and certifying or licensing requirements of exercise specialists**

Title	Academic requirements	Certifying/licensing organization
Exercise physiologist[38]	4-year bachelor's degree, usually in exercise science, kinesiology or related field. Completing a 1-to-2-year master's program in exercise physiology usually required for obtaining research or clinical opportunities. 2-to-3-year exercise physiology PhD degree typically required for academic and independent research positions.	No official certifying or licensing organizations exist that regulate the practice of exercise physiology. However, the American Society of Exercise Physiologists (ASEP) and American College of Sports Medicine (ACSM) offer Exercise Physiologist certifications that may be required by some employers.
Strength and conditioning specialist[39]	4-year bachelor's degree in any subject is required to sit for the Certified Strength and Conditioning Specialist (CSCS) certification exam. Certification in cardiopulmonary resuscitation (CPR) and automated external defibrillation (AED) is also required. Must complete a number of continuing education credits every 2 years as defined by the NSCA.	National Strength and Conditioning Association (NSCA)
Personal trainer[40]	Depending on the certifying organization, requirements can range from high school diploma/GED to a bachelor's degree from an accredited college or university, other than passing the personal trainer certification exam. Certification in cardiopulmonary resuscitation (CPR) and automated external defibrillation (AED). Must complete a number of continuing education credits or units every 2 to 3 years depending on certification agency.	Numerous trainer certifying organizations exist, including American College of Sports Medicine (ACSM), American Council on Exercise (ACE), International Sports Science Association (ISSA), National Academy of Sports Medicine (NASM), National Exercise & Sports Trainers Association (NESTA), National Federation of Professional Trainers (NFPT), and National Strength & Conditioning Association (NSCA).
Physical therapist[41]	4-year bachelor's degree followed by completion of a 3-year Doctor of Physical Therapy (DPT) program and licensing through the Federation of State Boards of Physical Therapy.	Each state has their own specific board certification requirements. Must pass state-administered national licensing exam. Individual states may require continuing education or may have in place other standards to maintain licensure.
Athletic trainer[42]	4-year bachelor's degree in athletic training or related discipline, such as exercise physiology or kinesiology. 2-year master's degree in athletic training programs are available, but a graduate degree is not required. Certification in cardiopulmonary resuscitation (CPR) and automated external defibrillation (AED).	National Athletic Trainers' Association (NATA) Board of Certification. Candidates are required to pass the Board of Certification (BOC) exam to practice as an athletic trainer. Certain states have their own certification exams and require in-state licensure or registration to practice.

is a referral to a physical therapist or athletic trainer for injury rehabilitation, an exercise physiologist for cardiac rehabilitation, or a strength and conditioning coach or personal trainer to help design a progressive resistance training program, there are professionals available to fit the needs and conditions of any patient. The qualifications and licensing requirements for each exercise specialist are included in **TABLE 3**.

It is important to recognize that patients can be referred to rehabilitation or exercise professionals in hospital settings, independent clinics (eg, rehabilitation, wellness), and commercial settings. The simplest approach in making this connection is for the physician to first utilize shared decision-making to identify the best setting to refer the patient to. Once the setting has been determined, either the physician or the patient should ask the facility manager to assist with finding the appropriate trainer. Trainers should be instructed to provide occasional feedback to the physician regarding patient progression and health status. This information can then

be entered into the patient's medical records. Hospitals and independent clinics may provide an additional layer of safety because the patient is being trained within a clinical setting under the watchful eye of other healthcare providers.

Lastly, it is critical to recognize the roles of each professional involved in the physician-rehabilitation-fitness pathway, which are succinctly summarized in **TABLE 2**. It is important for physicians to understand and to further educate themselves on the exercise prescription principles previously described in this section to be better prepared to disseminate this information when counseling patients.

CONCLUSION

Physical activity and exercise play critically important roles in preventing and treating chronic disease. Family physicians are well positioned to discuss physical activity with patients, provide general counseling on physical activity prescriptions using the FITT-P principle, and refer patients to rehabilitation or exercise specialists within the community when appropriate. ●

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Lifestyle Medicine and Stress Management

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doi: 10.12788/jfp.0285

INTRODUCTION

"Stress" is ubiquitous in modern society, and it has been further exacerbated by the COVID-19 pandemic. In the report titled *Stress in America 2020: A National Mental Health Crisis*, issued by the American Psychological Association, it was concluded that the United States is in the midst of a stress-related mental health epidemic that could result in serious long-term health consequences.[1] While there are many catalysts of stress, frequently reported sources in the United States include finances, work, relationships, ill-health, and, more recently, existential concerns about the future of the nation and climate change.[1]

Stress is unequivocally linked to poor health outcomes, as detailed in this article, due to both its physiologic and behavioral effects. Accordingly, the provision of stress management techniques constitutes an integral component of leading lifestyle medicine interventions.[2,3] The American College of Lifestyle Medicine considers stress management to be one of the 6 pillars of lifestyle medicine, alongside healthful eating, physical activity, sleep, social connection, and the avoidance of risky substances.[4] Notably, many of the pillars of lifestyle medicine are also evidence-based approaches for managing stress, demonstrating the interconnectedness of these pillars of health and well-being.

This article examines the reciprocal relationship between stress and health and builds a case for the importance of stress management knowledge for family physicians in the prevention, management, and treatment of chronic diseases. It also explores lifestyle medicine practices for managing stress, with special attention given to mindfulness-based activities, and provides practical strategies for managing stress.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

STRESS AND HEALTH

Building on the pioneering studies of Hans Selye,[5] who first coined the term "stress response" to explain the activation of the hypothalamic-pituitary-adrenal axis in response to a "stressor," there is now overwhelming evidence linking chronic stress to poor health outcomes. Numerous and diverse illnesses, including coronary artery disease,[6] heart failure,[7] asthma,[8] rheumatoid arthritis,[9] and psoriasis,[10] to name a few, are known to be directly moderated by stress. Not surprisingly, stress is also intimately related to mental illness—especially anxiety.[11]

Stress can affect physical health outcomes in 2 ways. First, it has direct physiologic consequences consistent with activation of the sympathetic nervous system, including cardiovascular responses, alterations in gut function, and even downregulation of immune function.[11] Indeed, psychoneuroimmunology studies have demonstrated that stress results in significantly slower wound healing.[12] In addition to the physiologic changes that accompany the stress response, stress can adversely affect health behaviors resulting in poorer dietary choices, inactivity, disordered sleep, and substance use.[13-16] As a topical example, nearly half of adults (49%) reported their behavior has been negatively affected by the stress caused by the COVID-19 pandemic,[1] and eating disorder–related hospital admissions have doubled.[17] Once developed, stress can further compound the challenge of behavior change, making the practice of healthy behaviors more difficult. For these reasons, evidence-based stress management should be considered foundational for the management of chronic health conditions.

STRESS MANAGEMENT

It is important to qualify that stress is not necessarily nega-

tive. In their seminal paper in 1908, Yerkes and Dodson[18] described the relationship between arousal/stress and performance as an "inverted U," with low levels of psychological arousal resulting in poor performance, moderate levels of arousal conferring optimal performance outcomes, and high levels of arousal resulting in diminished performance. This relationship infers that some level of arousal/stress, which varies between individuals, is required for optimal functioning. Only high levels of arousal/stress, more appropriately referred to as "distress," are detrimental to function and performance. Further, even high levels of sympathetic activation (associated with the "stress response") may be beneficial in the short term as such levels optimize our ability to "fight or flight." It is prolonged, chronic activation of the stress response that is most deleterious.

Stress management can be achieved in 2 ways: by reducing exposure to a stressor(s) and/or practicing techniques that alleviate stress. As modern living presents an increasing number of stressors and reducing exposure to these can be challenging, there is an increasing emphasis on the practice of stress-relieving techniques.

A variety of lifestyle-based practices can play an important role in ameliorating the stress response, as presented below. However, it is also acknowledged that stressed individuals can find it more challenging to follow through on positive lifestyle choices. Indeed, conditions of stress can often mobilize individuals towards unhealthy and even counterproductive behaviors, as discussed below. Increasing awareness of the benefits of these healthy lifestyle behaviors for managing stress (and related affective conditions such as depression and anxiety) and supporting patients to adopt them can be beneficial.

NUTRITION

It is well recognized that psychological stress can alter feeding behaviors by influencing the production of neuropeptides (eg, ghrelin, somatostatin, galanin) and neurotransmitters (eg, norepinephrine, serotonin, dopamine) that in turn affect appetite and result in an increased propensity for consuming high-fat foods.[13,19] Conversely, there is growing interest in the influence of nutrition on affective states, with several studies demonstrating the benefits of nutrition interventions for the management and treatment of depression.[20,21]

One of the confounders of researching the influence of diet on stress is differing views on what constitutes a healthy diet. One study concluded that the ability of diet quality to ameliorate the effects of high stress is small, but their conceptualization of a "high-quality" diet included soft margarines, unsweetened dairy, and oils.[22] While there is some debate regarding specific food items that constitute a healthy diet, there is a consensus that the consumption of whole, plant-rich foods produces positive health outcomes, and this is a position promoted by the American College of Lifestyle Medicine. Certainly, vegetarian diets have been associated with reduced stress.[23]

Plant foods may aid stress management and other psychological conditions through a "psychobiotic" effect, in which the gut microbiota influences brain function through neural and hormonal pathways.[13,24,25] The gut microbiota is especially influenced by diet quality and, while the Western diet is associated with dysbiosis, a high-fiber diet (eg, whole, plant-based foods) promotes a gut microbial profile associated with good physical and mental health.[26] Consequentially, attention to consuming more servings of fruits, vegetables, whole grains, and legumes should be encouraged as a stress-coping strategy.

EXERCISE

Like nutrition, physical activity constitutes a cornerstone of positive physical and mental health.[27,28] However, a systematic review of 168 studies concluded that psychological stress and physical activity are inversely related, indicating that stress impairs an individual's efforts to be physically active.[14] Notwithstanding the challenge that being stressed presents to being physically active, exercise is of tremendous benefit for stress management.

Simply put, the stress response prepares the body for "fight or flight"—both of which are physical pursuits—and the act of physical exertion allows the body and brain to return to homeostasis. From a physiologic perspective, physical activity may aid stress management as it activates the release of beta-endorphins and other neurotransmitters, increases thermogenesis, aids in the regulation of the hypothalamic-pituitary-adrenal axis, and even increases neurogenesis.[27,29] A systematic review concluded that a single bout of exercise (30 minutes at 50% maximal oxygen uptake) could have a significant impact on blood pressure responses to a psychosocial stressor.[30] Similarly, 10 minutes of exercise has been shown to improve levels of vigor and reduce total negative mood.[31] In addition to the physiologic benefits of exercise, it has been proposed that from a psychological viewpoint, exercise may confer a "time out" effect by offering a distraction from daily cares and worries.[32]

To date, most studies have focused on the benefits of low- to moderate-intensity aerobic exercise for the management of mental health conditions, but studies are investigating the benefits of other types of activities such as resistance exercise and high-intensity activities.[29,33] There is emerging evidence that higher-intensity exercise may confer additional mood-enhancing benefits.[29] While more research is required

to understand better the influence of different forms of exercise on mental health, as well as optimal dosages and durations, individuals suffering from stress should be encouraged to aim for the National Physical Activity Guidelines goal of 30 minutes of moderate-intensity activity on most days.[34]

SLEEP

As with both diet and exercise, there is a reciprocal relationship between stress and sleep. Notably, health professionals in numerous countries appear to be especially vulnerable to stress-mediated poor sleep hygiene.[35,36] Indeed, stress is a major contributor to insomnia, and sleep system responses to stress are influenced by genetics, having a family history of insomnia, the female gender, and the type of stress being experienced.[15] Poor sleep can compound stress levels as sleep deprivation results in the human brain being more attuned to negativity.[37] Notwithstanding the effect of stress on sleep quality and quantity, from a stress management viewpoint, attention should be given to prioritizing sleep and pursuing good sleep.

The National Sleep Foundation's guidelines recommend that individuals get 7 to 9 hours of sleep per night—a recommendation that at least one-third of adults fail to meet.[38] Three especially important contributors to poor sleep hygiene are physical inactivity, caffeine usage, and exposure to "night light pollution."[39] These can be addressed by encouraging patients to be more active (especially in the morning), curb or cease the consumption of caffeine (especially later in the day), and avoid bright light (especially screens that emit "blue" light) in the hour before bed.

SOCIAL CONNECTION

Social connection is a well-established determinant of mental and emotional well-being, physical health outcomes, and longevity.[40] Humans appear to be "wired" for social connection, which is why the social isolation and associated loneliness due to COVID-19 lockdowns have been such a concern.[41] In the context of stress management, social support can buffer the negative effects of stress on mental and physical health.[42]

Unlike eating patterns and physical activity levels, which tend to suffer in response to stress, studies indicate that humans are more likely to exhibit prosocial behavior and seek social connection when stressed.[43] This behavioral response has been referred to as the "tend-and-befriend" pattern and is observed in both males and females.[44] According to the Social Baseline Theory, when faced with a stressor, individuals with strong social support perceive less threat, which reduces cognitive and physiologic effort, thereby mitigating the stress response.[45]

The importance of maintaining social ties as a deliberate stress management strategy should not be underestimated. Individuals encountering high levels of stress should be encouraged and enabled to remain connected to friends and family, and, where necessary, to reach out to broaden their social network. Interestingly, even brief social interactions with acquaintances, referred to as "micromoments of connection," can produce positive health benefits.[46]

AVOIDANCE OF RISKY SUBSTANCES

Stress is associated with increased substance (eg, alcohol, drugs, tobacco) usage, dependence, and relapse.[16] In the context of COVID-19, a phenomenon referred to as the Behavioral Immune System (BIS), in which individuals practice certain behaviors to avoid contracting illness, is associated with increased stress and anxiety that leads to increased substance use.[47] Not surprisingly, the use of alcohol, drugs, and tobacco is counterproductive for long-term stress management and can indeed lead to further complications that exacerbate stress. Hence, patients should be advised to avoid these substances—even though doing so may be quite difficult for them.

TIME IN NATURE

While not considered a "pillar" of lifestyle medicine, there is growing evidence for the stress-relieving benefits of time in nature. A meta-analysis of 32 studies concluded that exposure to natural environments leads to less negative affect and greater positive affect.[48]

Time in nature might confer stress-relieving benefits through several mechanisms,[49] but a prominent theory is that modern living makes high demands of our information-processing skills, leading to mental strain. Conversely, natural stimuli, such as landscapes and animals, effortlessly engage our attention, leading to less mental fatigue.[50] As the evidence continues to accumulate regarding a link between time in nature and health (both mental and physical), exposure to nature should be considered a more frontline therapy for stress management.

MIND-BODY PRACTICES

A large body of literature demonstrates the efficacy of a range of practices for managing stress, including biofeedback,[50] prayer,[50] yoga,[51] tai chi,[52] and various forms of meditation.[53,54] Though a concise umbrella term has not been coined to encompass the full scope of these tools, for the purposes of this manuscript we will refer to methods demonstrated to engage the relaxation response and increase parasympathetic activation through nonjudgmental focused attention and/or through intentional movement as "mind-body practices."

Known short-term effects of mind-body practices that activate the relaxation response include slowed heart rate, lowered blood pressure, reduced serum cortisol, improved cognitive function, and lower perceived stress.[51] After several weeks of daily practice, mind-body practices have been shown to result in numerous physiologic changes such as lower peak cortisol levels and fewer cortisol spikes,[55] improved immune function,[56,57] delayed ST-segment depression on stress electrocardiogram of patients with coronary artery disease,[58] improved insulin sensitivity in metabolic syndrome,[59] increased heart rate variability,[60] downregulation of proinflammatory genes and biomarkers,[61] epigenetic modifications,[62,63] and even reversal of telomere shortening.[64,65] The long-term practice of mind-body relaxation techniques (eg, years of daily practice) is associated with appreciable growth of the hippocampus and left prefrontal cortex[65,66] and improved function of the amygdala,[67] which is in turn associated with cognitive and affective benefits.

An evidence-based practice that is increasingly used for stress management is mindfulness. Mindfulness can be defined as a nonjudgmental state of intentionally focused attention to the present and what is happening around or inside an individual at that moment.[68] The advantage of mind-body techniques is that they do not require significant time commitment or training, and hence can be easily practiced in most settings, including brief clinical visits. For example, brief mindful stretching, giving attention to the sensation of one's feet on the ground when walking or sitting, or using one's conversational partner/patient as a focus of mindful attention, can be used under virtually any circumstances. Indeed, any informal activity can be done mindfully—dancing, walking, guitar playing, woodworking, tooth brushing, and even dish washing. With only 1 or 2 minutes to dedicate, more formal mind-body activities, such as box breathing[69] (used in military training and combat), body scans,[70] and brief seated[71] or walking meditations,[72] can be practiced either alone or with a digital guide.

It is important to note that mindfulness practices can be challenging for patients with histories of emotional trauma.[73] Although such history is not a contraindication and can, in fact, yield subjective and physiologic benefits,[74] it is recommended the patient be informed of this possibility and encouraged to coordinate with their mental health provider. In the case that a patient finds a particular mind-body practice disagreeable due to exacerbation of emotional trauma, the patient may discontinue and try another mind-body technique. Mindful movements appear to hold a lower risk of this adverse effect than purely cognitive-based practices.[75]

When unhealthful behaviors such as smoking[76] and overeating[77] are to be addressed, mind-body techniques should be considered as adjuncts to usual care. Promoting the nonjudgmental focused attention of mindfulness can bring increased recognition of potential triggers and awareness of poor choices as they are being made, without yielding the self-judgment that can often exacerbate maladaptive coping strategies.[78-80] In turn, this presents the opportunity to intervene intentionally and redirect behavior rather than acting reflexively—an approach to behavior modification sometimes referred to as mindfulness-based cognitive therapy. Mindfulness can also be used both as a substitute for maladaptive coping mechanisms and to build resilience that supports successful behavior modification by better managing the associated stress.

As with any behavior, adherence to mind-body activities is more likely if it is aligned with the patient's interests, needs, and personality. For example, biofeedback activities might resonate with a data-oriented patient, while mindful movements may be better for a patient with attention-deficit/hyperactivity disorder who may find it challenging to sit still. Other mind-body practices may be selected to benefit certain comorbidities. For example, an evening body scan (involving mindful attention to different regions of the body) for a patient experiencing stress-induced insomnia may help reduce or avoid sedative-hypnotics,[81] tai chi may be appropriate for a patient at risk for falls,[82,83] and mindful eating may assist patients with diabetes and a tendency toward unhealthful dietary choices.[81] Conversely, some comorbidities may be a relative contraindication. For example, breath-focused practices should, in general, be avoided in patients for whom breathing is not comfortable, as with patients suffering from chronic obstructive pulmonary disease. Mind-body techniques can also be used to good effect as an adjunctive treatment for conditions such as panic disorder and chronic pain.[86,87] It is often beneficial to acquaint a patient with a variety of mind-body modalities suitable for a range of circumstances (still or moving, alone or in company, seconds or minutes), and to engage in shared decision-making to identify the practices best tailored to the patient's interests and needs.

Notably, mind-body practices have been shown to have demonstrated benefits for healthcare providers—reduced perceived stress, fewer medical errors, improved job satisfaction, and lower burnout[88-90]—as well as for their patients—improved adherence, outcomes, and a greater perception of provider empathy.[90] When used by surgeons, mind-body practices have been shown to improve physical function and mental focus during long or difficult procedures.[91] Given the well-documented epidemic of burnout and stress-related illnesses in the medical profession,[92] the connection between mind-body practices and job satisfaction is particularly rel-

evant, and brief mind-body activities can often be integrated into a provider's busy day (eg, walking a hall, speaking with a patient or colleague, performing surgery, etc).[93] While the optimal frequency and duration of mind-body practices are yet to be determined, appreciable benefits have been observed with consistent practice of approximately 10 minutes daily,[94,95] which puts these benefits within the reach of any interested provider.

MULTIMODAL APPROACHES FOR STRESS MANAGEMENT

This article has explored several evidence-based approaches that can be used to build a versatile stress management "toolkit." While patient preferences and interests are an important consideration when prescribing stress management options, it is also important to recognize that stress may be best managed through a multimodal approach that incorporates a variety of strategies and practices.[96-99] Interventions that have applied a multimodal approach have suggested that a compounding benefit may occur.[98,99] Hence, introducing a variety of stress management options to patients is recommended. ●

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Sleep and Health—A Lifestyle Medicine Approach

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doi: 10.12788/jfp.0295

INTRODUCTION

Sleep is vital for health and healing, yet it may not be getting the attention it deserves as a requirement for physical as well as mental and emotional health. Insufficient or disordered sleep is associated with serious disease, morbidity, and mortality.[1] Moreover, poor sleep has presented challenges to public health and safety. It is also the foundation upon which other lifestyle therapies, such as diet and exercise, are improved. It is very difficult for patients to adhere to a healthy diet and exercise when fatigued and not afforded mental clarity.[2]

The perspective of sleep as preventive medicine is furthered by appreciating its 2-way impact: Poor sleep increases the risk of disease and illness, as well as the converse, disease and illness disrupt sleep. This often creates a vicious cycle in which the cumulative effect is deepened morbidity and mortality.[3] Modern medicine has developed treatments with a focus on pharmacology and interventions that have been helpful. Yet, for the family physician, the burden and the growth of sleep challenges will require reframing with a focus on prevention.

RISKS ASSOCIATED WITH POOR SLEEP

Sleep disorders negatively impact both short- and long-term health. The more immediate effects reduce a sense of well-being and performance.[4] Moreover, excessive daytime sleepiness is commonly experienced, although not always recognized and/or connected to poor sleep. Accumulated effects of disordered sleep include premature mortality, cardiovascular disease, hypertension, obesity, metabolic syndrome, diabetes and impaired glucose tolerance, immunosuppression, inflammation, cancer, cognitive impairment, and psychiatric disorders such as anxiety and depression.[5]

SLEEP AND OBESITY

Today, we are witnessing 2 epidemics: increasing obesity and increasing sleep disorders.[6,7] Obesity is reaching overwhelming proportions throughout the developed world and is attributed largely to industrialization, increased food consumption, and lower levels of physical activity.[7,8] The role of sleep in obesity is becoming increasingly understood. Sleep deprivation and disorders have been hypothesized to contribute toward obesity by decreasing leptin, increasing ghrelin, and compromising insulin sensitivity.[9] There is a negative relationship between sleep duration and central adiposity. This has been recognized as a significant risk factor in the pathophysiology of obstructive sleep apnea in adults. Furthermore, obstructive sleep apnea is associated with increased body mass index.[10]

SLEEP AND HEART DISEASE

Atherosclerotic cardiovascular disease (ASCVD) is one of the most prevalent diseases in industrial nations. Even with an improved ability to diagnose and treat ASCVD, the disease and its consequences are important contributors to morbidity and mortality. Therefore, it is necessary to go beyond the management of traditional ASCVD risk factors and seek other factors and comorbidities that might contribute to its development and progression.[11]

SLEEP AND DIABETES

The increasing prevalence of type 2 diabetes (T2D) can be attributed to dramatic lifestyle changes in response to the industrialization of modern society that may not be limited to changes in diet and physical activity.[12] As with cardiovascular disease, one such factor strongly associated with the

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DISCLOSURES

The authors have no conflicts of interest to disclose.

development and progression of T2D is sleep. Population studies have observed a U-shaped relationship between sleep duration and T2D risk; those who self-report habitually sleeping less than 7 hours or more than 8 hours are at increased risk.[13] Decreased insulin sensitivity due to short sleep duration is observed among patients and in laboratory studies.[14-23] Furthermore, when sleep time is extended in short sleepers, insulin sensitivity improves.[24]

SLEEP AND IMMUNITY/INFLAMMATION

Poor immune status and increased inflammation are also associated with poor quantity or quality of sleep. There are no clear studies indicating whether inflammation causes poor sleep or the reverse. However, the combination of poor immune status and increased inflammation puts patients at risk for poor sleep and poor health. It is appropriate for the immune system to be turned on in the setting of infection or illness, but inflammation may be observed when the immune system is triggered. It is increasingly appreciated that lifestyle practices, especially poor sleep, directly impact both inflammation and immunocompetence.[25-27]

As vaccinations have been a cornerstone of preventive medicine, it is important to draw the connections between sleep and vaccinations. Sleep promotes antiviral immunity by supporting the adaptive immune response,[28] with evidence that experimental and naturalistic sleep loss is associated with poorer immunologic memory after a vaccination.[29-31] For example, one may not achieve the full benefit of the hepatitis B series as well as the hepatitis A and influenza vaccinations if followed by less than 6 hours of overnight sleep.

SLEEP AND SAFETY

Sleep problems are associated with accidents and human errors.[32] Insomnia and poor sleep are major contributors to unintentional fatal injuries in general as well as in fatal motor vehicle injuries.[33] Traffic accidents and injuries among shift workers are also more likely to occur during nighttime hours. This surges around 2:00 to 3:00 AM, when there is the greatest tendency toward sleep with the circadian rhythm.[34]

BENEFITS OF HEALTHY SLEEP

The casual view of sleep as simply a dormant and passive unconsciousness with the suspension of normal bodily activities shifted as neurology laid the foundation for understanding sleep using electroencephalography (EEG). The brain is very active during sleep, in which vital restoration of the mind and body occurs with each night's rest. Sleep affects our daily functioning and is essential to our physical, mental, and emotional health. William Shakespeare so insightfully and aptly described sleep as "nature's soft nurse." Quality sleep improves learning, memory, and mood and enhances motivation for other lifestyle-enhancing behaviors, such as exercise and healthy food choices.[35-38]

AMOUNT OF SLEEP NEEDED

The simple response to the question of "how much sleep do I need?" is the sleep time that permits a person to be wide awake, alert, and energetic throughout the day without the aid of stimulants such as coffee. The vast amount of the adult population requires about 8 hours of sleep.

The National Sleep Foundation Scientific Advisory Council has recommended sleep ranges for all age groups (see **TABLE 1**).[39]

Optimal sleep for an individual varies from person to person and during their lifetime. Moreover, some adults do not fit into the guidelines for optimal sleep. Requiring more than 9 hours of sleep (being a "long sleeper") or needing less than 6 hours (being a "short sleeper") does not reflexively diagnose an individual with a sleep disorder. There are genetic predispositions that allow people to be outside of the recommended sleep parameters and have normal and healthy daytime functioning. Approximately 5% to 10% of the adult population are "long sleepers," and about 5% function well as "short sleepers."[39]

ASSESSING SLEEP CHALLENGES

Although more than half of primary care patients may experience insomnia, only about one-third report this problem to their physicians. With only 5% of people seeking treatment,[40,41] the vast majority of people with insomnia remain untreated.[42] Given the fast pace of primary care visits and the time needed to understand underlying etiology, it is not surprising that two-thirds of patients with insomnia report a poor understanding of treatment options, and many turn to alcohol (28%) or untested over-the-counter remedies (23%).[40]

Asking patients about daytime fatigue is likely to elicit reports of sleep problems. In addition to daytime fatigue, the presenting problems may include anxiety, depression, loss of libido, hypertension, lack of concentration, concerns about possible attention-deficit/hyperactivity disorder, weight gain, relationship problems, and concerns about memory loss. Before initiating pharmacologic and/or behavioral treatment, it is important to rule out a few common and often overlooked etiologies for poor sleep. These include (1) circadian rhythm disorders, (2) eating habits, and (3) poor sleep hygiene.

A brief interview is often sufficient to assess for circadian rhythm disorders. When asking the patient, "Do you consider yourself a night owl?" or "If you did not have early morning

responsibilities, when would you prefer to go to sleep?" you are listening for those who prefer early bedtimes or those who prefer to go to bed at midnight or later. It is the mismatch between the body's preferred bedtime and scheduling demands that is causing the sleep problem.

Eating patterns and food choices influence overall health as well as sleep health. Individuals consuming an excessive number of calories report short sleep time and quality.[43] Concentrated carbohydrates such as sugars, just like caffeine, act as stimulants on the body, influencing a wide range of neurotransmitter shifting that makes the ability to fall asleep and stay asleep more difficult.[44] Individual variance in food tolerance, such as spicy foods and dairy, also impacts the ability to physically be soothed to be able to sleep. Large meals eaten close to bedtime typically disrupt sleep onset and/or sleep quality. As discussed earlier, poor sleep creates the hormonal and neurochemical basis for food cravings. Again, we see the vicious cycle of poor sleep leading to both overconsumption and poor food choices, limiting restorative sleep.

Sleep hygiene issues such as depriving oneself of sleep to enjoy nighttime activities and the use of electronics late into the night can create sleep difficulties that patients may be willing to modify.

TREATMENT OF INSOMNIA

The paradigm of therapy starts with etiology: comorbid insomnia due to another sleep disorder or a medical disorder that requires treatment of the underlying process or the more common psychophysiologic insomnia requiring cognitive and behavioral approaches. Cognitive behavioral therapy for insomnia (CBT-I), which is a well-established, evidence-based, and efficacious treatment for insomnia,[45-48] is commonly prescribed for depression. However, clinical trials have shown it is the most effective long-term solution for those with insomnia.[49] Patients already on a prescribed sleep aid can be tapered off the drug and started on CBT-I concurrently.

The positive effects of CBT-I on sleep quality are robust over time.[50,51] CBT-I has been found to be 70%–80% efficacious in populations with a variety of comorbid medical conditions,[52] including comorbid insomnia,[53] comorbid psychiatric conditions,[54] and chronic pain.[55-58]

CBT-I helps identify the negative attitudes and beliefs that hinder sleep and replaces them with positive thoughts, effectively "unlearning" the negative beliefs.[59] The behavioral aspect of CBT-I focuses on helpful sleep habits and avoiding unhelpful sleep behaviors. Behavioral techniques—CBT-I over a period of 6-8 weekly sessions for most adults in either individualized- or group-based administration of CBT-I—have been shown to be effective,[52,60,64] yet these techniques are greatly underutilized in comparison to pharmacologic approaches. There is an app called CBT-I Coach that is both evidence-based and available at no cost.[65] More recently, digital cognitive behavioral therapy for insomnia was shown to promote later health resilience during the coronavirus pandemic.[65]

TABLE 1. **Recommended sleep duration by age group[39]**

Age group	Sleep hours per day
Newborns (0-3 months)	14-17
Infants (4-11 months)	12-15
Toddlers (1-2 years)	11-14
Preschoolers (3-5 years)	10-13
School-age children (6-13 years)	9-11
Teenagers (14-17)	8-10
Younger adults (18-25)	7-9
Adults (26-64)	7-9
Older adults (≥65)	7-8

LIFESTYLE AS TREATMENT

The important impact of lifestyle behaviors on sleep must be appreciated. Supporting the patient's connection to their environment, healthy nutrition, exercise, and stress management provides opportunities for better health and sleep.

The impact of the environment on sleep health is highlighted by the effect of the diurnal light and darkness cycle on sleep quality and duration. Light is the strongest synchronizing agent for the circadian system. Moreover, it is the strongest external cue to stimulate the reticular activating system in the brain and alertness. A proposed mechanism includes the suppression of endogenous melatonin. Blood levels of the pineal hormone melatonin are high at night and low during the day.[66] A cornerstone of healthy sleep is routine, as well as regular patterns. The modern era, with digital screens and 24-hour expectations, has challenged our physiology to promote sleep. As melatonin production is inherently reduced from adolescence to adulthood, this begins to explain why some individuals benefit from supplementation of melatonin to induce and promote sleep. For this to be effective, partnership and buy-in from the patient are essential given the commitment needed. Furthermore, the family physician may wish to collaborate with a sleep medicine specialist, given the complexity of dosing and timing.

In recent years, many nutritional supplements have been used to benefit sleep wellness. However, the relationship between nutritional components and sleep is complicated. Nutritional factors vary dramatically with different

diet patterns and depend significantly on the digestive and metabolic functions of each individual. Moreover, nutrition can significantly affect the hormones and inflammation status that directly or indirectly contribute to insomnia. With the rise of personalized medicine and personalized nutrition, there has been a growing body of research and clinical experience on individualizing nutritional factors, carbohydrates, lipids, amino acids, and vitamins to promote sleep and reduce sleep disorders.[67] Simply put, nutrition and dietetics are important opportunities for better sleep health.

The National Sleep Foundation's 2013 Sleep in America poll highlighted the association between exercise and better sleep.[68] It is thought that a physically active daytime uses adenosine triphosphate resources such that the cleaving of the phosphate bonds results in a higher amount of adenosine by bedtime. Adenosine promotes sleep induction and deep sleep stages. Exercisers, compared with nonexercisers, are more likely to report restorative sleep. Poor sleep makes us less likely to exercise, which in turn leads to relative difficulty falling asleep or falling back asleep in the middle of the night and waking up too early.[69-71] Thus, there is a vicious cycle of reduced physical activity and reduced sleep. Although the timing of exercise has been widely debated, it is likely to be based on individual experience. Regardless, daily physical activity promotes nightly rest.

Stress and sleep are closely related as a result of the substantial overlap in neurotransmitter signaling and regulatory pathways between the neural centers that modulate mood and the sleep-wake cycle. Both acute and chronic stressors, and individual variability in coping with stress, are major determinants of sleep quality and quantity. Different approaches to stress reduction demonstrate opportunities to promote sleep onset, sleep maintenance, and daytime robustness. As with both nutrition and exercise, there are different levels of sleep benefits with stress reduction. Individualizing approaches offers a greater likelihood for sleep health and overall health.[72,73]

As outlined in this article, there is a great opportunity to help patients see the relationship between successful sleep and their food intake, exercise, and stress management. As this is the province of preventive lifestyle medicine, it is a key to optimal health. Some patients approach sleep using pharmaceutical aids, and there is an opportunity for family physicians to educate and offer patients resources for healthy sleep. Lifestyle medicine and healthy sleep are essential pillars that we can offer to all of our patients for true health and healing. ●

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Avoidance of Risky Substances: Steps to Help Patients Reduce Anxiety, Overeating, and Smoking

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doi: 10.12788/jfp.0244

CASE STUDY

A 40-year-old white man presented to my office with the chief complaint of anxiety. He described how, a few months earlier, when he was driving on the highway, he suddenly had the thought, "Oh, no, I'm in a speeding bullet. I might kill someone." This was accompanied by the sudden onset of racing heart, sweating, and shortness of breath. Similar episodes followed and, despite the fact that he had never been in a car accident, he now avoided driving on the highway and even felt a bit nervous driving on local roadways.

A full history revealed that the patient met criteria for both panic disorder and generalized anxiety disorder. Of note, he also had hypertension, steatohepatitis, obstructive sleep apnea, and a body mass index (BMI) > 40.

BACKGROUND

Anxiety disorders are the most common mental illnesses in the United States,[1] with an estimated 31.1% of adults experiencing an anxiety disorder at some time in their life.[2] According to the Centers for Disease Control and Prevention, the prevalence of obesity was 42.4% in 2017-2018.[3] Yet, for patients who present with either of these conditions, busy physicians have only a few minutes in which to counsel patients about stress reduction or lifestyle modification practices (and prescribe medications as appropriate). Patients who present with both (as my patient did) can be challenging for the most seasoned family physicians.

In medical school and residency, I learned the nuts and bolts of how to treat anxiety (eg, selective serotonin reuptake inhibitors [SSRIs] are still first-line treatment, number needed to treat = 5.15),[4] and the straightforward theory of weight loss (more calories out than in). But I found it pretty unsatisfying to have to prescribe an SSRI to more than 5 patients to see a significant response in 1 of them, and all of my patients knew the calories in/out formula walking in the door—they just could not always follow it.

So, I started studying habit change in my laboratory to see what I had missed. There are simple principles of positive and negative reinforcement that are at the root of forming any habit, and they break down to this: if a behavior is rewarding, we will keep doing it. To form a habit, we only need a trigger, a behavior, and a reward. For example, with positive reinforcement, if we see a piece of cake (trigger), eat it (behavior), and it tastes good (reward), we learn to repeat the behavior through dopamine firing in the reward centers in our brain. The same is true for negative reinforcement: if we are stressed, eat a piece of cake, and feel better, we learn to repeat that behavior as well, because we distracted ourselves and/or enjoyed eating the cake, which reduced the negative feeling of the stress. In a nutshell, positive reinforcement helps us learn to repeat behaviors that feel good (ie, have positive outcomes) and negative reinforcement helps us learn to repeat behaviors that reduce bad feelings (ie, reduce negative outcomes). Both positive and negative reinforcement form "habit loops" that people repeat over and over.[5-7] The term

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DISCLOSURE

Dr. Brewer owns stock in, and serves as a paid consultant for, Sharecare Inc., the company that owns the mindfulness apps described in this manuscript.

habit loop was first described by Charles Duhigg, and will be used in this article from this point forward.[8]

Reinforcement learning is also critical for changing habits (including worrying, which is a key component of anxiety and can be negatively reinforced due to the rewarding sense of being in control or problem solving—even if one is not truly in control).[9-11] In particular, the reward value of a behavior gets laid down in our brain so that, when given a choice between 2 behaviors, we can easily decide which one to pick—or more accurately—we habitually pick the behavior that has a higher reward value. For example, if children are served broccoli and cake at the same time at dinner, which one they'll pick is a no-brainer.

This reward value hierarchy is the key to breaking unhealthy habits.[12] To reduce the likelihood of overeating or smoking (or even worrying), one needs to reduce the reward value of the unhealthy behavior—the corollary is true for increasing healthy habits. This process has been studied from bench to bedside: neuroscience research has identified key brain regions and networks (eg, the orbitofrontal cortex) that lay down and store the reward value of behaviors,[12-15] including relatively recent clinical studies[16-18] that have linked brain and behavioral mechanisms.[12,19]

Importantly, changing reward value is not an intellectual process. We cannot think our way out of anxiety or into better health. To update the reward value of a habit, we must be very clearly aware of how rewarding the behavior is right now, not when it was first laid down (eg, the reward value of eating lots of cake was reinforced with every birthday party we attended as a kid). And reward value is relative. So, the reward hierarchy can be changed in 2 ways: decreasing the reward value of the old behavior or comparing it with other behaviors that are more rewarding. One can think of the more rewarding behaviors as "bigger, better offers" that our brains will pick if given a choice. For example, curiosity feels better than a craving or worry.[20] When someone has a craving for cake or a cigarette, they can get curious about what that urge feels like in their body, which not only brings curiosity to the front of awareness, but also helps individuals see that their cravings do not last forever. By simply being curious about the cravings, people can ride them out without smoking or eating cake.[21]

Fortunately, there are specific ways to train awareness to help with this process, such as mindfulness training, and the evidence base is building, suggesting that it can help with habit change.[6,7,20,22-24] Mindfulness can be operationally defined as bringing awareness and curiosity/nonjudgment to present-moment experience.[25,26] For example, studies have found that mindfulness training outperforms cognitive therapy 5-fold in helping people quit smoking and targets specific neural pathways for its effects.[18,27] Another study found a 40% reduction in craving-related eating with app-based mindfulness training (Eat Right Now).[17] Furthermore, a recent study of app-based mindfulness training for anxiety (Unwinding Anxiety) demonstrated a 57% reduction in Generalized Anxiety Disorder-7 (GAD-7) scores in anxious physicians,[28] and a randomized controlled trial of the same program showed a 67% reduction in GAD-7 scores in people diagnosed with generalized anxiety disorder.[29]

INTERVENTION

In the clinic, patients can follow a simple 3-step process based on the research described above.[20]

STEP 1: Recognize habit loops. Map out the trigger, behavior, reward (or result if the behavior is not rewarding anymore) sequence so that you can see the cause-and-effect relationship that reinforces the behavior. Free worksheets that briefly describe what a habit loop is and how to map it can be downloaded at www.mapmyhabit.com or clinicians and patients can collaboratively write this down on a piece of paper.

STEP 2: Update reward value. Focus on the result of the behavior. Notice what it feels like in your body when you overeat or eat junk food. Notice what a cigarette tastes and smells like. Ask yourself, "What do I get from this?"

STEP 3: Find the bigger, better offer (BBO). There are many BBOs when it comes to unhealthy habits. As mentioned above, curiosity feels better than cravings and can be trained to be used in situations when strong urges come on. When it comes to eating, you can compare what it is like to stop when full vs overeating or to eat healthy foods vs processed food, to see which one feels better both immediately and afterward (eg, which one leads to lethargy, indigestion, mood swings, etc).

CHALLENGES

Busy physicians may find it challenging to spend any extra time in clinic visits providing psychoeducation. Additionally, if a physician is more comfortable with prescribing medications and/or a patient is expecting a prescription, trying out a new approach can feel uncomfortable, as one or both participants may be moving out of their comfort zones (eg, the expectation to prescribe/receive medication). Fortunately, extra time can be billed, and the above-stated 3-step process can begin with just the few minutes it takes to map out a habit loop together with a patient in the clinic. Then, instruct the patient to start mapping these habit loops out in daily life while asking themselves the question, "What do

I get from this?" Additionally, with a small amount of practice, prescribers can quickly feel more comfortable exploring this approach, with the added benefit of increasing empathetic connection with patients (eg, mapping out a habit loop together shows a patient that a clinician hears and understands the concerns, and it also helps the clinician confirm an accurate understanding of the patient's experience).

CASE STUDY

In our first clinic visit, my patient was not interested in taking a medication for anxiety, so I mapped out his habit loops with him. Trigger: thoughts of getting in a car accident. Behavior: avoid driving. Reward: reduction of panic attacks. I gave him a coupon code for free access to the mindfulness training app my laboratory had studied with the instructions to map out his habit loops before the next visit. At his next clinic visit 2 weeks later, he described how he had mapped out a number of habit loops, including one in which anxiety triggered stress-eating. Using mindful awareness, he had realized that stress-eating was not rewarding and had largely stopped this behavior (resulting in a 14-pound weight loss). During the next year, he lost more than 20% of his weight and his blood pressure and liver enzymes returned to normal levels. His anxiety returned to normal, and he started working as an Uber driver.

CONCLUSION

Current approaches to obesity, anxiety, and other behaviors that are driven by reinforcement learning (eg, smoking) may not be taking into account well-established theoretical models. Novel approaches that specifically target these mechanisms through using awareness to update the reward value of behaviors show promise (eg, mindfulness training), which may help the field move away from willpower and cognitive control–based interventions that currently predominate (eg, calorie restriction). My lab has found direct correlations between anxiety and physician burnout.[28] Understanding the basics of how this process works can give clinicians simple tools to not only reduce their own stress and anxiety but also to improve their relationships with their patients and to improve patient outcomes more broadly. A physician who has used these methods to manage his/her own stress may be able to counsel patients more effectively from a position of authenticity and wisdom beyond simply recommending that one follow standard guidelines. ●

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Positive Social Connection: A Key Pillar of Lifestyle Medicine

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doi: 10.12788/jfp.0245

A PILLAR OF HEALTH

During the past several years, and particularly during the COVID-19 pandemic, there have been rising concerns about social isolation and loneliness as public health issues. Notably, the National Academies of Sciences, Engineering, and Medicine (NASEM) published a consensus report on the medical and healthcare relevance of social isolation and loneliness.[1] The committee concluded that there is substantial evidence that social isolation and loneliness are associated with a greater incidence of major psychological, cognitive, and physical morbidities, with the strongest evidence found for risk for premature mortality.[1] Conversely, several meta-analyses and large-scale prospective epidemiologic studies document the protective effects of social connection.[1,2] For example, a meta-analysis of 148 independent studies demonstrates that those who are more socially connected had a 50% increase in survival odds relative to those scoring lower on measures of social connection.[3] Controlling for age, initial health status, and a variety of other potential confounding factors, there is a robust body of evidence establishing social connection as an independent protective factor and social isolation and loneliness as risk factors for premature mortality from all causes.[1,2]

Socially isolated patients (those with inadequate social resources) experience poorer clinical outcomes, including increased hospitalization and higher medical costs.[4] Social isolation significantly predicts a greater risk for coronary heart disease and stroke,[5] type 2 diabetes,[6] and susceptibility to viruses and upper respiratory illnesses.[7] Furthermore, there is evidence of the mechanisms by which social connection may influence morbidity and mortality, including psychological factors such as perceived stress[8] and depression; behavioral factors such as sleep,[9] physical activity, and smoking[10]; and biological factors such as inflammation.[11] Put simply, one's social well-being can significantly influence chronic disease morbidity and mortality. However, few healthcare professionals discuss this with their patients.[12] Explicit acknowledgment of the health effects of social connection/isolation within the medical community, establishing a biopsychosocial/emotional approach to health, is a potentially important step in addressing this gap.

THE CONTINUUM OF SOCIAL CONNECTION

These chronic health and mortality findings are based on scientific evidence accrued utilizing diverse conceptualization and measurement approaches, including the structure (existence of relationships and social roles), function (actual or perceived support or inclusion), and quality (positive and negative affective qualities) of relationships.[13] Each aspect consistently predicts morbidity and mortality,[3] but they are not highly correlated, suggesting each may be contributing to risk and protection independently. When multidimensional assessments that encompass the structure, function, and quality of social relationships were considered, the odds of survival were 91%, relative to 50% when these components were averaged.[3] Thus, on the basis of converging evidence, the umbrella term "social connection" refers to a multifactorial construct used to predict health risk (when low) and protection (when high).[13]

On the basis of aggregate data, the evidence supports a continuum from risk to protection. Data from four nationally representative samples document a dose-response effect of social connection on physiologic regulation, including blood pressure, body mass, and inflammation, and health disorders across the life course from adolescence to older age.[14] These data suggest a causal continuity of influence on biomarkers of disease, with early emergence and persistence during the life course. Insufficient social connection, whether it is because of poor quality or infrequent contact, can lead to physiologic dysregulation and, over time, poorer health. Thus, disrupt-

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DISCLOSURE

The author has no conflicts of interest to disclose.

ing the physiologic dysregulation associated with social disconnection, or maintaining regulation associated with positive social connection, may be key to delaying or preventing chronic disease later in life. Like other lifestyle factors, one's level of social connection can become a chronic pattern that can put a patient on a path to better or poorer health.

ROLE OF PHYSICIANS

Is it possible to prevent, treat, or even reverse diseases and health problems by enhancing positive social connection? Evidence has amassed on the strong causal associations between social relationships and mortality as well as other health outcomes,[1,14,15] and there is emerging evidence of impacts on healthcare utilization.[1] Nonetheless, important questions remain as to how we can translate this evidence to promote health. Although efforts to promote health go beyond the medical community, physicians can take an active role. Indeed, the NASEM consensus committee recommends that physicians include assessing and promoting social connection as part of ongoing primary, secondary, and tertiary prevention and care.[1]

When benchmarking the magnitude of effects of social connection on mortality risk, the effects are comparable with and in some cases exceed those of other lifestyle factors such as smoking cessation, alcohol consumption, body mass index, and physical activity, as well as medical interventions such as antihypertensive medications and flu vaccinations.[3,13] However, the public tends to underestimate the importance of social factors relative to these other factors[16]—factors physicians routinely discuss with patients. Thus, it is important to educate patients on the importance of social connections for health—emphasizing evidence demonstrating that it is an important health risk factor.[1] Such education may include practical evidence-based steps individuals can take to apply this in their lifestyle (eg, joining social groups, mindfulness practices, volunteering). Education and awareness are needed to buoy preventive efforts because prevention may be more effective than trying to reverse the severe health consequences resulting from long-standing patterns. Social connection also significantly influences other lifestyle factors (eg, nutrition, physical activity, sleep) implicated in chronic disease development and progression,[17] via social encouragement, social control, and social norms that guide behavior. Thus, promoting positive social connection and supports has the potential to help patients achieve other treatment goals.

Just as physicians routinely assess other risk factors, assessment of patients' level of social connection is needed. The Institute of Medicine identified social connection/isolation as one of the 10 domains most crucial to influencing health outcomes and treatment effectiveness and recommended the inclusion of social connection/isolation in the electronic health record (EHR).[18] Routine assessment, using validated instruments (eg, PROMIS,[19] the UCLA Loneliness Scale,[20] or the Social Network Index),[21] allows for identification of early risk and any changes may be tracked over time.

By identifying patients at risk, mitigation steps can be taken to disrupt or reverse further progression. Physicians and other healthcare professionals can discuss with a patient factors that may have contributed to changes in social connection and tailor their approaches to the patient's background, needs, and desires.[1] There are many examples of coordination between the healthcare system and community-based social care providers included in the National Academies' report *Integrating Social Care into the Delivery of Health Care*.[17] Referrals should also take into account barriers to access. For example, physicians often explain the benefits of exercise but struggle getting patients to actually exercise. Just as patients may not have access to a pool or prefer walking to swimming, patients may lack access to existing social supports or community-based social programs, and patients may prefer some social programs over others. Thus, tailored approaches that address underlying causal factors are needed. Physicians may access Commit to Connect, housed within the Department of Health and Human Services' Administration for Community Living, to identify best practices and evidence-based interventions.[22] Further, data from 106 randomized clinical trials and more than 40,000 patients revealed that patients who received psychosocial support in addition to treatment as usual were 20% more likely to survive and 29% more likely to survive longer than patients who just received standard medical treatment.[23] This suggests support provided to patients within clinical settings significantly improves treatments outcomes.

CONCLUSION

Lifestyle and behavior are widely recognized as the prime drivers of chronic disease, and the degree of social connection is just as influential yet is currently underappreciated by most patients as relevant to health. Thus, promoting positive connection in clinical care settings is recommended across the life course, from pediatrics to geriatrics. It may be possible to improve prevention and treatment of the leading chronic diseases and increase life expectancy by enhancing positive social connection. ●

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Type 2 Diabetes Prevention and Management With a Low-Fat, Whole-Food, Plant-Based Diet

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doi: 10.12788/jfp.0252

INTRODUCTION

Quality care for people with type 2 diabetes (T2D) is a significant concern for family practice clinicians. Lifestyle medicine (LM) and, specifically, a whole-food, plant-based (WFPB)[1] dietary pattern are important therapeutic options, supported by a large body of evidence. This review examines the most current research on low-fat, plant-based diets and explores the mechanisms beyond glycemic control and weight loss by which the diet may improve health outcomes for individuals living with T2D and for those at risk for the disease. It also shares practical takeaways for family physicians, nurse practitioners, and the entire healthcare team.

According to the Centers for Disease Control and Prevention, as much as 10.5% of the US population has T2D and approximately one-third (34.5%) has prediabetes.[2] Many with diabetes are not diagnosed (26.9 million people diagnosed and 7.3 million underdiagnosed or not diagnosed).[2] Solutions for resolution of T2D are needed more urgently than ever.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

Current treatment guidelines for T2D recommend a target glycated hemoglobin level (HbA_{1c}) of 7% or less for most non-pregnant adults, with the important caveat that the target HbA_{1c} be individualized based on patient and disease factors (eg, age, duration, or vascular complications).[4,5] Major randomized clinical trials on the benefits of lowering HbA_{1c} with intensive glycemic control using medication combinations and/or multiple daily injections of insulin, generally defined as HbA_{1c} <7%,[6] have been disappointing in reducing the macrovascular and microvascular complications of diabetes.[6-9] In a meta-analysis of data from 13 randomized controlled trials, intensive glucose-lowering treatment showed no benefit on all-cause mortality or death from cardiovascular comorbidities in adults with T2D; in fact, a 19% increase in all-cause mortality and a 43% increase in death from cardiovascular events were revealed. The same meta-analysis showed that intensive glucose-lowering treatment was associated with a 10% absolute risk reduction of microalbuminuria; however, no significant benefit on microvascular endpoints of clinical significance, such as renal failure, neuropathy, retinopathy, or visual deterioration, were seen. Furthermore, intensive glucose-lowering treatment was associated with a significant 2-fold increased risk of severe hypoglycemic events.[10]

Current treatment for T2D in the United States usually includes ≥1 medications prescribed for glycemic control. Between 2010 and 2012, 88% of people with diabetes were taking ≥1 oral or injectable diabetes medications, or a combination of both.[11] Insulin, human or analog, has been used as the centerpiece of intensive antihyperglycemic therapy. The price of insulin increased by 353% over the 15-year period between 2001 and 2016.[12] Besides insulin, there are now 11 additional classes of medications available in the United States to manage hyperglycemia, with 170 new agents for diabetes and diabetes-related conditions in development.[13] Aggressively lowering HbA_{1c} with intensive medication use has not demonstrated the outcomes desired and expected by

clinicians and patients. In response to the newly recognized risks and lack of significant benefits of intensive pharmacologic glucose lowering, especially in older adults, along with the demands and expense involved, the American Diabetes Association has called for shared decision-making with patients as well as a patient-centered approach with more emphasis on cardiovascular risk reduction through healthy habits, such as smoking cessation.[14] These initiatives are welcome and may help to promote a shift from a culture of medication primacy for T2D to one that embraces "intensive" therapeutic lifestyle and dietary changes. LM practice emphasizes informed consent with patient education and empowerment when setting a course of treatment[15]; family physicians and other healthcare team members can facilitate healthy behavior changes by fully discussing expected outcomes, risks, and benefits of both pharmaceutical and evidence-based LM interventions.

T2D is a largely preventable disease, and the epidemic rise in its incidence and prevalence calls for a paradigm shift in lifestyle and dietary patterns. As described in this paper, researchers have demonstrated that a low-fat, WFPB diet addresses the underlying pathophysiology of T2D and offers health benefits beyond glycemic control. A low-fat WFPB diet includes unrefined whole grains, legumes, vegetables, fruits, and nuts, and excludes all animal products (such as meat, poultry, fish, dairy, or eggs)[6] with no known negative side effects. This dietary pattern is consistent with recommendations from the American Association of Clinical Endocrinology (AACE) to follow a plant-based diet with higher polyunsaturated and monounsaturated fatty acids, avoid trans-fatty acids, and limit saturated fatty acids.[16] However, the WFPB diet discussed in this article aims to avoid all animal foods with an overall low-fat nutrient profile. Many LM nurses and physicians utilize a low-fat WFPB diet as first-line treatment for T2D[17-27]; this treatment option offers superior quality of life benefits in comparison to pharmacologic treatment. Low-fat, unprocessed diets with no animal foods have been found to be acceptable to patients and offer challenges in adherence no greater than any specific dietary change.[28]

DIETARY PATTERNS AND RISK FOR T2D

Gradations of adherence to different types of plant-based diets ("healthful" and "unhealthful") have been associated with diabetes risk. A diet that emphasized plant foods and that was low in animal foods was associated with a reduction of about 20% in the risk of diabetes; moreover, a "healthy" plant-based diet that mostly included whole grains, fruits, vegetables, and nuts had a 34% diabetes risk reduction. In contrast, individuals who followed an "unhealthy" plant-based diet (including large amounts of nutrient-poor, calorie-dense foods such as refined grains and sugar-sweetened beverages) had a 16% higher risk of diabetes. These associations were independent of body mass index (BMI) and other diabetes risk factors.[29] Other important work has focused on the Seventh-Day Adventist population. The Seventh-Day Adventist religious denomination exhibits a variety of dietary habits; while about half are omnivorous, many are vegetarian including vegans, lacto-ovo-vegetarians, semi-vegetarians, and pesco-vegetarians.[30] Church doctrines recommend vegetarian practices and abstinence from the use of tobacco and alcohol; hence, this presents an ideal opportunity to compare various vegetarian dietary patterns while controlling for known non-dietary confounders like alcohol and tobacco. Several findings relevant to T2D have been reported among the Adventist cohorts, including significantly lower body weight among vegans (mean BMI 23.1 kg/m^2) vs non-vegetarians (28.3 kg/m^2) (P=0.0001). Vegan Adventists were 49% less likely to have T2D compared to non-vegetarian Adventists, with analyses adjusted for age, sex, ethnicity, education, income, physical activity, television watching, sleep habits, alcohol use, and BMI (P=0.0001). Further, while both lacto-ovo-vegetarians and vegans had reduced risk for hypertension, T2D, and obesity, vegans experienced greater risk reduction for those diseases.[30]

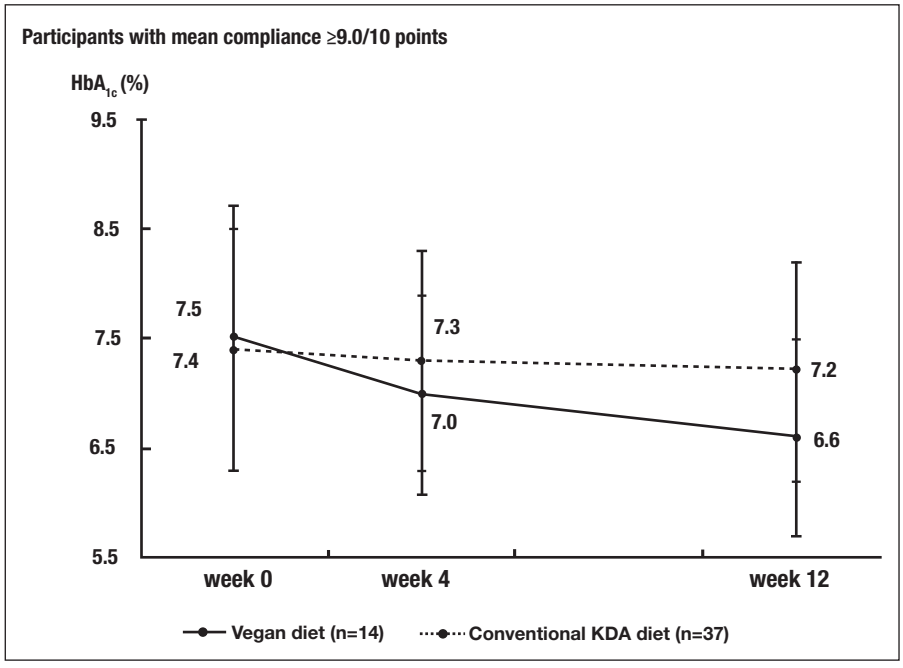
INTERVENTION RESEARCH ON WFPB DIETS AND T2D

A plant-based nutrition program was implemented as a randomized controlled trial in the corporate setting (10 GEICO US-based offices) among employees >18 years of age with BMI ≥25 kg/m^2 and a previous diagnosis of T2D. The 142 participants in the intervention group were asked to follow a low-fat (<3 grams per serving) plant-based diet consisting of whole grains, vegetables, legumes, and fruits, and limiting added oils, with no restriction on energy intake for 18 weeks, and to avoid all animal products (meat, poultry, fish, dairy products, and eggs) while favoring foods low on the glycemic index.[31] Low-fat plant-based meal options were made available to participants at their worksites, along with educational classes, group support sessions, and cooking classes. Individuals at the control sites made no dietary changes, were given no dietary guidance or classes, and no plant-based meal option was made available to them during the study. All participants were asked not to alter their exercise patterns during the 18-week study period and to remain on their baseline medication regimen as prescribed by their primary care physicians, unless modified by those physicians.

Measurements taken at week 0 and week 18 included body weight, blood pressure, plasma cholesterol and tri-

glycerides, high-density lipoprotein and low-density lipoprotein cholesterol, and HbA_{1c}. Mean body weight decreased by 2.9 kg in the intervention group vs 0.06 kg in the control group (P<0.001), BMI fell by 1.04 kg/m^2 in the intervention group vs 0.01 kg/m^2 in the control group (P<0.001), and weight loss of ≥5% of body weight was more frequent in the intervention group (37%) compared with the control group (11%; P<0.001).[31] Beyond body weight reduction, which has been proven to improve glycemic control, the intervention group experienced benefits in plasma lipid concentrations and blood pressure, which can help alleviate morbidity and mortality from cardiovascular events such a stroke and myocardial ischemia, for which T2D is a strong risk factor.[32]

FIGURE. **Participants with highest mean compliance to vegan diet[33]**



Another study compared a standard diabetic diet and a plant-based, brown-rice-centric diet and their effects on HbA_{1c} in 2 groups of adult Korean patients with diabetes on hypoglycemic medications with baseline HbA_{1c} levels between 6% and 11%. The plant-based diet group (n=47) was asked to consume whole grains, vegetables, fruits, and legumes; furthermore, they were instructed to eat brown rice and avoid white rice, avoid highly processed food made of rice or wheat flour, avoid all animal food products, and favor low–glycemic-index foods (ie, legumes, green vegetables, and seaweed). Amount and frequency of food consumption, caloric intake, and portion sizes were not restricted, and participants were monitored over a 12-week period.[33]

The control group (n=46) followed the treatment guidelines for diabetes recommended by the Korean Dietetic Association (KDA) in 2011, which include grains, meats, vegetables, fats and oils, milk, and fruits: participants were asked to (1) restrict their individualized daily energy intake based on body weight, physical activity, need for weight control, and compliance; and (2) achieve total calorie intake comprised of 50% to 60% carbohydrate, 15% to 20% protein (if renal function is normal), <25% fat, <7% saturated fat, minimal trans-fat intake, and ≤200 mg/day cholesterol. Participants were asked to maintain their baseline exercise regimens, to record their daily food intake, and to maintain their current medication(s), though dose reduction was permitted when it was necessary according to a physician's judgment. Glycemic control was the primary endpoint, and the HbA_{1c} levels of both groups significantly decreased over time: –0.5% in the vegan diet group (P<0.01) and –0.2% in the KDA diet group (P<0.05).[33]

Furthermore, dieters with high compliance (followed the diet strictly >90% of the time) had a larger effect, with HbA_{1c} decreased by –0.9% in the vegan group (n=14) and –0.3% in the KDA group (n=37) (interaction between group and time P=0.010; see **FIGURE**).[33] These differences remained significant after adjusting for energy intake or waist circumference.[30,34]

Two recent randomized controlled trials studied the effect of plant-based dietary intervention on insulin sensitivity and beta-cell function. Both demonstrated increased beta-cell glucose sensitivity in intervention groups along with decreased fasting insulin resistance (IR) compared to control groups.[35,36] A 16-week trial demonstrated that a plant-based dietary intervention elicited increased beta-cell glucose sensitivity and decreased fasting IR with a significant reduction in BMI in overweight participants assigned to the intervention group (n=38) compared to the control group (n=37), which showed no improvement in sensitivity. Visceral fat volume was reduced only in the intervention group (interaction between group and time P<0.001).[35]

Further, the second trial demonstrated that reduced body weight, improved glycemic control, and reduced insu-

lin concentrations are feasible among overweight non-diabetic individuals using a plant-based dietary intervention (n=122), likely due to the reduction of lipid accumulation in muscle and liver cells from reduced energy intake. Participants' fasting plasma insulin concentrations decreased by 21.6 pmol/L compared to no significant change in the control group (n=122, 23.6 pmol/L; 95% CI: –5.0 to 54.3; between-group P=0.006).[36] Postprandial energy expenditure increased in the plant-based group as well, which is associated with decreased fat mass and increased insulin sensitivity.[37,38] These trials suggest that low-fat, plant-based diets have the potential to rapidly reduce lipid accumulation in muscle and liver cells, which can improve glycemic control and beta-cell function in those suffering from diabetes.[39,40]

BODY WEIGHT AND T2D RISK

Overweight and obesity continue to be strong risk factors for developing T2D, and an analysis of data from the Nurses' Health Study (NHS), with more than 200,000 participants followed up to 40 years, recently displayed the strength of that association. Through the first 8 years of NHS, the risk of diabetes incidence in women with high-normal BMI (23-23.9) was 3.6 times greater than those with BMI <22. Furthermore, weight gain after 18 years of age was a strong risk factor: compared with those who maintained a stable body weight through 1984, the relative risk (RR) of diabetes was higher than 17 for those who gained ≥35 kg.[41]

In the extended follow-up period, women with a BMI of ≥35 vs <22 had an age-adjusted RR of 93.2 for developing diabetes. Weight loss was actually shown to be protective against the development of diabetes: ≥5 kg of weight loss after 18 years of age was associated with an almost 50% lower risk of developing diabetes.[41]

WFPB diets offer an effective method for weight loss among overweight and obese adults. Researchers compared the effectiveness of 5 different diets in a 6-month, randomized controlled trial: totally plant-based/vegan diet (omitting all animal products), omnivorous diet (excluding no foods), semi-vegetarian diet (occasional meat intake), pesco-vegetarian diet (excludes meat except seafood), and vegetarian diet (excludes all meat and seafood but contains eggs and dairy products). The vegan group lost the most weight (–7.5% ± 4.5%), and lost significantly more than the omnivorous (3.1% ± 3.6%), semi-vegetarian (–3.2% ± 3.8%), and pesco-vegetarian (3.2% ± 3.4%) groups (P=0.03 for all).[42]

OTHER MECHANISMS FOR WFPB DIETS AND T2D TREATMENT

A low-fat WFPB diet has other potential qualities that can both prevent and manage T2D besides controlling blood glucose levels and mitigating risk factors like overweight and obesity. One possible alternative explanation for the success of this diet is the role of intramyocellular lipids (IMCL) in IR in skeletal muscle. It is widely accepted that IR, defined as impaired glucose uptake response to physiologic concentrations of insulin, precedes the clinical presentation of T2D.[43] Skeletal muscle, not a natural storage site for excess fat, accumulates lipids when the number and size of adipocytes, the normal storage site for excess fat, are inadequate to store excess fat.[43,44] IR in skeletal muscle has been a focus of much research and review: skeletal muscle is the largest organ in the body and plays a critical role in glucose homeostasis, accounting for up to 40% of body mass and up to 80% to 90% of insulin-stimulated glucose clearance.[43] Insulin promotes glucose control by enhancing glucose uptake in skeletal muscle and other tissues and by inhibiting glucose production in the liver.[45,46] The 2 most commonly cited IMCL lipid intermediates causing skeletal muscle IR are ceramides and diacylglycerol, but the role of these intermediates in IR is still debated.[43]

Skeletal muscle IR is detectable years before beta-cell failure and hyperglycemia, the hallmarks of T2D, and thus, understanding the development of IR and creating remedial mechanisms for affected populations could provide an early intervention to arrest the T2D epidemic.[43] It is undisputed that dietary fatty acid intake is central to lipid-induced IR in skeletal muscle, and that maintaining the dynamic lipid balance is key to human health.[43,47] As Kitessa and Abeywardena explain, "[Dietary fatty acid intake] is the one lever that can be dialed up/down to regulate the flow of lipid intermediates into organs not intended for lipid storage."[43]

In a study of early weight-loss intervention (from hypocaloric diets) on the IR offspring of individuals with T2D, the relationship between IMCL and skeletal muscle IR showed that weight loss produced a 30% reduction in IMCL with a 60% increase in insulin sensitivity.[48] In a Japanese study, 37 non-obese male participants were fed a high-fat diet (60% calories from fat, 45% of which was saturated fat). After 3 days, IMCL levels had increased by 30% (P<0.01).[49] Since vegan diets produce the most weight loss[42] and typically include very little saturated fat, a low-fat WFPB diet may act as a protective mechanism against the accumulation of IMCL in skeletal muscle, reducing IR and T2D.[50]

Another factor that offers protection against T2D for those who consume a low-fat WFPB diet is their minimized consumption of persistent organic pollutants (POPs), which are known to cause endocrine disruption.[51] POPs, which are either man-made or by-products of industrial processes, are hazardous chemicals that are resistant to environmental decay through chemical, biological, and photolytic means:

POPs, which are omnipresent in the environment and food chain, are capable of bioaccumulating in human and animal tissue and have a substantial impact on human health and the environment.[51,52]

Human exposure to POPs occurs primarily through the consumption of animal fats, including fatty fish, meat, and dairy products.[51] Initially, POPs were notorious for their ability to affect reproduction and promote cancer, but recent studies have highlighted their ability to amplify development of metabolic diseases like obesity and T2D.[52] Cross-sectional studies have shown the association between serum concentrations of POPs and prevalence of diabetes, and these studies are supported by prospective and experimental data.[51,53,54]

POPs have been described as "obesogens," functionally defined as chemicals that shift homeostatic metabolic set points, interrupt appetite controls, disturb lipid homeostasis to promote adipocyte hypertrophy, stimulate adipogenic pathways that encourage adipocyte hyperplasia, or otherwise alter adipocyte differentiation during development.[54] Animal products may be a double-edged sword to those at risk for T2D via dietary saturated fat and altered metabolic pathways from POPs.

Finally, an underlying mechanism foundational to the effects of healthy diet is the gut microbiota. A healthful WFPB diet can promote a gut microbiome environment that promotes the metabolism of fiber and polyphenols and discourages the metabolism of bile acids, choline, L-carnitine, and amino acids, further reducing T2D risk; a healthy gut microbiota can also help correct imbalances related to inflammation and metabolic dysfunction.[29,55]

TRANSLATING RESEARCH INTO PRACTICE: TAKEAWAYS FOR FAMILY PHYSICIANS AND NURSE PRACTITIONERS

Primary care clinicians have unique opportunities to support patients in creating their own culture of health and sustainable lifestyle habits to reduce risk for T2D, as well as to potentially improve glycemic control. The following strategies may be useful:

- **Consider prescribing a plant-based diet to all patients for diabetes prevention or treatment.**
  Nutrition prescriptions are increasingly used to formalize healthy lifestyle habits. For more information on prescribing a WFPB diet, supported with SMART goal setting, please see articles in this supplement by Campbell (eS117-eS123) and Hauser/McMacken (S5-S16).
- **Reframe treatment goals to focus on quality of life and medication reductions.**
  Patients may not be aware that aiming to reduce medications through lifestyle changes is possible. Improvements in quality of life may be appealing and motivating for patients to consider. Involving patients in a refreshed discussion about treatment goals may reinvigorate the patient-provider relationship and the treatment plan.
- **Reframe treatment strategies with a patient-centered approach to focus on lifestyle instead of medication.**
  Following a reframing of treatment goals, engaging in discussion with patients about the potential negative side effects of oral or injectable hypoglycemic drugs, as well as alternative options, may influence patients to be more open to lifestyle changes at any time across the disease spectrum. Important side effects for oral agents can include liver disease, fluid retention, weight gain, increased risk for fractures, increased risk for bladder cancer, hypoglycemia, headache, stomach upset, and diarrhea.[56-58] Important potential side effects of injectable medications include weight gain, inflammation, hypertension, dyslipidemia, atherosclerosis, heart failure, and arrhythmias.[59] In contrast, there are no known negative side effects to a low-fat WFPB diet.[60]
- **Provide education to patients on benefits and how to eat a WFPB diet.**
  As many as 89% of patients were not aware of using a plant-based diet for the prevention and management of T2D and many of them cited low confidence in adopting a plant-based eating pattern. However, two-thirds of the patients expressed willingness to follow a plant-based diet for the short term and interest in attending a vegetarian education program, contrary to the belief cited by most diabetes educators that patients would find a plant-based diet too difficult to follow and would not find it an acceptable recommendation.[61] Make referrals to clinicians, health coaches, and educational programs that specialize in plant-based nutrition (see references below).
- **Support long-term adherence with ad libitum recommendations.**
  Ad libitum intake of low-fat, whole, plant-based foods naturally causes a reduction in total calories,[62] allowing patients to still reap the benefits of weight loss: This factor can help motivate those who feel that diets are too difficult to follow due to hunger.[63] Patients who adjust insulin based on carbohydrate intake still need to count carbs; they may need support to recalculate carb-to-insulin ratios as they are likely to find that they need less insulin.[64]
- **Facilitate social support groups.**
  Worksite, plant-based nutrition programs have been

well accepted by participants, as was the case with the GEICO study. Worksites offer convenient and supportive environments for health promotion programs because there is no travel time and participants often have common interests and goals, as well as a preexisting camaraderie.[65] This satisfaction, along with the significant health benefits from the plant-based diet group mentioned previously, suggest that worksite interventions could offer a path forward in getting more people to try plant-based diets.[31] In addition to worksite programs, facilitating patient support groups with a medical practice, such as weekly or monthly potlucks, or referring patients to community resources provides important long-term social support.

- **Use resources that are now widely available.** The American College of Lifestyle Medicine (ACLM) offers a variety of patient-facing educational resources, available under the Practice Tools and Resources tab on lifestylemedicine.org, to support patients in transitioning toward and maintaining a WFPB diet, including the Food as Medicine Jumpstart, WFPB Plates for Adults and Children, Nutrition Myths, and other educational resources and infographics. The Physicians Committee for Responsible Medicine (PCRM) offers many resources, including a free 21-Day Vegan Kickstart App or online tool (https://kickstart.pcrm.org/en) that provides meal plans, recipes, and advice from plant-based nutrition experts. Continuing medical education on plant-based nutrition is available through ACLM and PCRM (www.NutritionCME.org).

CONCLUSION

As the incidence and prevalence of diabetes continues to rise, the time is now for clinicians to recommend a low-fat WFPB diet to all of their patients, but especially to those patients living with and at risk for T2D. WFPB diets can prevent T2D, as well as change the course of the disease, by controlling blood sugar naturally with no known negative side effects. The benefits of the diet are clear, but more education is needed for both clinicians and their patients on these benefits and how to promote dietary change effectively and sustainably. Practitioners can support patients in successful, long-term change by recommending useful resources and tools to facilitate adherence; practitioners can access resources for patient support through ACLM (lifestylemedicine.org). ●

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Cardiovascular Disease and Lifestyle Medicine

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doi: 10.12788/jfp.0251

INTRODUCTION

Despite numerous advances in our understanding of cardiovascular disease (CVD) pathophysiology, pharmacology, therapeutic procedures, and systems improvement, there hasn't been an expected decline in heart disease–related mortality in the United States since 2010.[1] Hypertension and diet-induced risk continue to be the leading causes of cardiovascular morbidity.[2] During the COVID-19 pandemic, for the year 2020, heart disease, a vastly preventable condition, remained the leading cause of death, outnumbering COVID-19-related deaths by 345,599.[3] Given the degree of disease burden, morbidity, and mortality, there is an urgent need to redirect our focus toward prevention and treatment through simple and cost-effective lifestyle strategies.[4]

CURRENT BURDEN OF CARDIOVASCULAR RISK FACTORS

Over the course of the past century, heart disease has been the leading cause of death, except during the years of the flu pandemic of 1918-1920. During the first decade of the 21st century, annual age-adjusted decline in mortality rates for total CVD was around 5%. Starting around 2011, this trend in decline slowed down significantly, averaging <1% per year.[5] During the same period, deaths attributable to heart failure (HF) increased by 20%.[6,7] As per the American Heart Association's (AHA) 2021 Heart Disease and Stroke Statistics, the prevalence of cardiovascular risk factors among American youth ages 12 to 19 continues to be high: smoking, non-ideal body mass index (BMI), physical activity, cholesterol, blood pressure, and diabetes are at 4.3%, 36.7%, 74.6%, 22.8%, 18.8%, and 13.8%, respectively. Adherence with the AHA's Healthy Diet Score is listed as 0.0%.[8]

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DISCLOSURES

The authors have no conflicts of interest to disclose.

Given these trends, the AHA issued the Presidential Advisory on 2030 Impact Goals focusing on increasing health span and well-being through primordial, primary, and secondary preventive strategies.[9] Starting preventive and healthy lifestyle strategies early in life is the most effective and efficient way to accomplish the goals of expanding health span, while further expanding life span. Children and young adults provide a window of opportunity to promote health and prevent disease.[10-12] This review will outline the role of lifestyle in the development of CVD and review lifestyle modalities for the family physician to address in their care of patients at every stage of life and condition.

GENETIC RISK OF CARDIOVASCULAR DISEASE AND LIFESTYLE

In the clinical practice of cardiovascular medicine, we often hear patients say, "Doc, the disease runs in my family." However, single-gene disorders are rare causes of CVD and related risk factors. Most of the genetic risk related to CVD is under the influence of a complex interplay between multiple genes and their expression. This is quantified by a polygenic risk score (PRS).[13] Among the UK Biobank participants, individuals with high cardiorespiratory fitness showed 43% lower risk of coronary heart disease (CHD), despite a high PRS.[14] From another analysis of the UK Biobank, it was noted that in the setting of high genetic risk, unfavorable lifestyle, compared to favorable lifestyle, increased the risk of stroke by 66%.[15] In an analysis of 3 prospective cohorts including 55,685 participants, it was noted that the 20% with highest PRS had a 90% higher risk of cardiac events. Interestingly, among individuals with a high PRS who conformed to healthy lifestyle, the risk of events was lowered by 46%. Based on these observations, healthy lifestyle significantly lowers event rates, even in the setting of high genetic risk.[16]

STABLE CORONARY ARTERY DISEASE AND LIFESTYLE

The INTERHEART study demonstrated that nearly 90% of the population-attributable risk of myocardial infarction (MI)

across the world in both men and women is explained by 9 risk factors that are modifiable.[17] These include abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, lower consumption of fruits and vegetables, higher consumption of alcohol, and a lack of regular physical activity. In the 15-year follow-up of the COURAGE trial, which tested medical therapy versus revascularization in patients with stable ischemic heart disease, it was noted that the individuals with the highest number of controlled risk factors (smoking cessation, physical activity, proper nutrition, weight management, controlled blood pressure, and controlled low-density lipoprotein cholesterol [LDL-C]) had the lowest mortality.[18] However, adherence to healthy diet (whole grains, vegetables, fruits) continues to be very poor among patients with established CHD,[19] and a large percentage of patients with stable CHD continue to smoke.[20] Compliance with exercise, physical activity, and referral to cardiac rehabilitation among post-MI patients and patients with stable CHD continues to be poor.[21] Comprehensive lifestyle-centered programs as outlined in the Lifestyle Heart Trial and Mount Abu Open Heart Trial have shown benefits in terms of improved metabolic parameters, reduction in angina burden, and quality of life.[22,23] Similarly, in a meta-analysis of 14 randomized controlled trials (RCTs), structured lifestyle intervention in individuals with established coronary artery disease (CAD) has been shown to lower the relative risk of fatal cardiovascular events by 18%.[24]

ATRIAL FIBRILLATION AND LIFESTYLE

Atrial fibrillation (AF) is the most common cardiac arrhythmia, and the lifetime risk of developing AF after age 55 is ~37%.[25] A vast majority of this burden is due to lifestyle-related factors and preventable comorbidities such as obesity, diabetes, hypertension, and obstructive sleep apnea.[25] Based on multiple observations, there is a strong association between obesity and AF.[26-29] In an age- and gender-adjusted meta-analysis of 51,646 participants from 7 cohort studies, estimates from Mendelian randomization were significant and consistent with a causal link between BMI and AF.[30] Weight loss of 10% or greater has been shown to significantly lower the burden of AF.[31-35] Similarly, regular exercise within the guideline-recommended levels has been shown to lower the burden of AF.[36-39] Interestingly, extremes of endurance exercise, achieved by <1% of the general population, have been shown to increase the risk of AF.[40-42] Mind-body practices such as yoga also have been shown to lower the burden of AF.[43] As outlined earlier, these risk factors and the related disease burden can be prevented and treated with healthy lifestyle strategies. Recently the American Heart Association issued its Scientific Statement on Lifestyle and Risk Factor Modification for Reduction of AF.[25]

CONGESTIVE HEART FAILURE AND LIFESTYLE

The prevalence of HF continues to increase.[8] Most of the risk factors related to HF are preventable by healthy lifestyle choices.[44,45] In the Cardiovascular Health Study, it was noted that adherence to healthy lifestyle is associated with lower risk of developing HF.[46] Results from 2 large Swedish prospective cohorts showed that adherence to healthy lifestyle behaviors is associated with significantly lower risk of HF.[47,48] Similarly, data from the Physicians Health Study showed that adherence to healthy lifestyle is associated with significantly lower lifetime risk of HF.[49]

In a Finnish study of 18,346 men and 19,729 women with 14.1 years of mean follow-up, it was shown that compliance with all healthy lifestyle factors (abstaining from smoking, mainintaing a healthy BMI, regular physical activity, increased consumption of vegetables and fruits, and limiting alcohol consumption) was associated with significantly lower risk of HF.[50] Based on observational studies, obesity appears to be causally linked to HF.[51,52] It was noted in the Framingham Heart Study that for every 1-unit increase in BMI, the risk of HF goes up by 5% in men and 7% in women.[51] Similar observations are noted in subsequent recent studies.[53,54]

In the setting of existing HF, there is an obesity paradox, where higher BMI appears to be protective.[55] At this time there is not much evidence in support of weight loss and improved HF outcomes. However, weight loss helps with quality of life, symptom relief, and improvement of other comorbid conditions such as hypertension, diabetes, and obstructive sleep apnea.[54]

In an observational study with 19,485 participants and 127,110 person-years of follow-up, it was noted that poor cardiorespiratory fitness accounted for ~50% of HF risk.[56] In patients with HF, level of physical activity is a predictor of better prognosis, independent of BMI.[55,57]

Plant-based dietary patterns have been shown to play a key role in the prevention of cardiovascular risk factors.[58] In a population-based cohort of 32,921 men, it was noted that a Mediterranean dietary pattern lowers the risk of HF.[59] In a prospective analysis of 16,068 individuals over 8.7 years, it was noted that a plant-based dietary pattern lowers the risk of HF by 41% (hazard ratio [HR] 0.59; 95% confidence interval [CI]: 0.41-0.86; P=0.004).[60] In a meta-analysis of 2 small studies, it was noted that mindfulness practices such as yoga improved peak VO_2 and improved quality of life.[61] Mindfulness-based practices have been shown to improve symptoms in patients with established HF.[62] Lifestyle strategies should be an integral part of prevention and management of HF.

PILLARS OF LIFESTYLE MEDICINE AND CARDIOVASCULAR DISEASE

The American College of Lifestyle Medicine defines lifestyle medicine as the use of evidence-based lifestyle therapeutic intervention—including a whole-food, plant-predominant eating pattern, regular physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection—as a primary modality, delivered by clinicians trained and certified in this specialty, to prevent, treat, and often reverse chronic disease. Using these 6 pillars, the family physician is in an optimal position to educate, activate, and initiate a lifestyle-first approach with patients at risk for or with established heart disease. The evidence for these pillars is reviewed below.

Nutrition

Diet-induced risk continues to be one of the leading causes of CVD and disability,[2] with suboptimal diet estimated to be responsible for 1 in 5 premature deaths worldwide.[63] High intake of dietary sodium and low intake of whole grains and fruits are the leading contributing factors.[64,65] In a recent analysis of the Framingham Cohort, it was noted that every additional daily serving of ultra-processed foods is associated with a 7% (95% CI: 1.03-1.12), 9% (95% CI: 1.04-1.15), 5% (95% CI: 1.02-1.08), and 9% (95% CI: 1.02-1.16) increase in the risk of hard CVD and CHD events, overall CVD, and CVD mortality, respectively.[66] Similarly, in a recent large prospective observational study, it was noted that the consumption of ultra-processed foods is associated with a significant increase in the risk of cardiovascular, coronary, and cerebrovascular disease.[67]

In a systematic review and meta-analysis of 30 RCTs, it was noted that the DASH diet (fruits, vegetables, nuts, seeds, legumes, low-fat dairy, and lean meats) significantly lowered systolic and diastolic blood pressure.[68] In another large meta-analysis and systematic review of RCTs, DASH showed the largest net effect of lowering systolic and diastolic blood pressure.[69] In a meta-analysis of 32 observational studies, it was noted that the consumption of vegetarian diets is associated with lower systolic and diastolic blood pressure.[70]

Accordingly, multiple US and international cardiovascular society guidelines support the DASH dietary pattern for the prevention and treatment of hypertension with class I indication and level of evidence A.[71,72] In a meta-analysis and systematic review, a vegetarian diet was associated with lower concentrations of total cholesterol (–29.2 and –12.5 mg/dL; $P<0.001$), LDL-C (–22.9 and –12.2 mg/dL; $P<0.001$), and high-density lipoprotein cholesterol (HDL-C) (–3.6 and –3.4 mg/dL; $P<0.001$).[73] In a systematic review and meta-analysis of RCTs, it was noted that vegetarian diets significantly and favorably lowered all lipid parameters, except triglycerides.[74] Similarly, in another systematic review and meta-analysis of controlled trials, a plant-based Portfolio dietary pattern rich in plant sterols and soluble fiber has been shown to lower LDL-C by 17%.[75]

Current clinical practice guidelines from multiple medical societies, in addition to evidence-based medical therapies, support a predominantly plant-based dietary pattern for lipid lowering.[76,77] Despite some limitations posed by epidemiology and the paucity of large, long-term RCTs, the overwhelming majority of nutritional research supports increasing the consumption of unprocessed plant-based foods. Consistent with the totality of available data, a plant-predominant dietary pattern is supported by the American College of Cardiology/American Heart Association (ACC/AHA)[76] and the US Department of Agriculture.[78] Within the spectrum of plant-based diets, it is important to make a distinction between the healthful and unhealthful plant-based diets. Compared to healthful plant-based diets, consumption of unhealthful processed plant-based diets is associated with higher risk of CHD.[79] Given that poor diet quality is now one of the leading risk factors, it is of paramount importance that diet screening be incorporated into every clinical encounter. Recently the AHA issued its Scientific Statement on Rapid Diet Assessment Screening Tools for Cardiovascular Disease Risk Reduction Across Healthcare Settings.[80] The American Society for Preventive Cardiology (ASPC) has recently outlined "Top 10 Dietary Strategies for Atherosclerotic Cardiovascular Risk Reduction" (**TABLE**).[81]

Physical Activity

The 2018 Physical Activity Guidelines for Americans and the 2019 ACC/AHA CVD Primary Prevention Clinical Practice Guidelines recommend that adults accumulate at least 150 min/week of moderate-intensity or 75 min/week of vigorous-intensity aerobic activity (or an equivalent combination) and perform muscle-strengthening activities at least 2 days/week.[76,82] The US Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System shows that the prevalence of physical inactivity (PI) between 2015 and 2018 was 31.7% for Hispanics, 30.3% for non-Hispanic Blacks, and 23.4% for non-Hispanic Whites.[83] About 75% of American youth ages 12 to 19 are not meeting ideal physical activity goals.[8] Sedentary behavior (SB) and PI are associated with increased mortality. PI accounts for 9% of premature deaths globally.[84]

In a systematic review and meta-analysis of 47 studies, it was noted that PI is associated with increased all-cause CVD incidence and CVD mortality.[85] The cardiovascular benefits of physical activity are mediated by antithrombotic, anti-

TABLE. **Top 10 dietary strategies for atherosclerotic cardiovascular risk reduction**[81]

1. Incorporate nutrition screening into medical visits to assess dietary quality and determine need for referral to an RDN
2. Refer patients to an RDN for medical nutrition therapy, when appropriate, for prevention of ASCVD
3. Follow ACC/AHA Nutrition and Diet Recommendations for ASCVD Prevention and Management of Overweight/Obesity, Type 2 Diabetes (T2DM) and Hypertension
4. Include NLA nutrition goals for optimizing LDL-C and non-HDL-C and reducing ASCVD risk
5. Utilize evidence-based heart-healthy eating patterns for improving cardiometabolic risk factors, dyslipidemia and ASCVD risk
6. Implement ACC/AHA/NLA nutrition and lifestyle recommendations for optimizing TG levels
7. Understand the impact of saturated fats, trans fats, omega-3 and omega-6 polyunsaturated fats and monounsaturated fats on ASCVD risk
8. Limit excessive intake of dietary cholesterol for those with dyslipidemia, diabetes and at risk for heart failure
9. Include dietary adjuncts such as viscous fiber, plant sterols/stanols and probiotics
10. Implement AHA/ACC and NLA physical activity recommendations for the optimization of lipids and prevention of ASCVD

ACC, American College of Cardiology; AHA, American Heart Association; ASCVD, atherosclerotic cardiovascular disease; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; NLA, National Lipid Association; RDN, registered dietitian nutritionist; TG, triglycerides.

atherogenic, antiarrhythmic, and hemodynamic effects.[86,87] In addition, regular physical activity has been shown to offer psychological, emotional, and social benefits.[88,89] Physical activity has been shown to offer benefit for CVD risks such as hypertension,[90] hyperlipidemia,[91-93] and diabetes.[94] The overall cardiovascular benefits of physical activity are well established and are supported by a level I recommendation by the current ACC/AHA guidelines on primary prevention.[76] Similarly, exercise and physical activity have been shown to offer significant benefits in patients with established CAD[95,96] and HF.[97]

Sleep

According to a consensus statement by the American Academy of Sleep Medicine and Sleep Research Society, 7 to 8 hours of sleep at night is considered ideal for optimal health.[98] According to the CDC, 35% of adults report sleeping less than 7 hours per night.[99] A systematic review and meta-analysis of prospective studies that included 474,684 participants showed that both short (<7 hours) and long (>9 hours) sleep durations are associated with an increased risk of CVD and mortality.[100] Similarly, in a recent dose-response meta-analysis, it was noted that deviation from the recommended 7 to 8 hours of sleep is associated with increased risk of CVD and mortality.[101]

In an analysis of 461,341 UK Biobank participants free of CVD, it was noted that short sleep duration (<6 hours) was associated with 20% higher adjusted risk (HR 1.20; 95% CI: 1.07-1.33) and longer sleep duration (>9 hours) was associated with 34% higher risk (HR 1.34; 95% CI: 1.13-1.58) of MI. These associations were independent of various sleep traits, and the Mendelian randomization was consistent with the causal relationship between sleep duration and MI.[102]

In an analysis of the MESA cohort, it was noted that sleep irregularity was associated with an increased risk of CVD, independent of traditional risk factors.[103] Based on these observations, a disturbed sleeping pattern appears to be a novel risk factor and causally linked to CVD. Given these implications, evaluation of sleep hygiene—in addition to screening for obstructive sleep apnea—should be a routine part of the scope of care for family physicians and cardiovascular specialists.[104]

Stress and Emotional Well-being

Mental health is defined by the World Health Organization as "a state of well-being in which an individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community."[105] Components of positive psychology include positive emotions, sense of purpose/connection, gratitude, resilience, and happiness. Negative psychology, on the other hand, constitutes chronic stress, depression, anxiety, anger, hostility, negative emotion, and overall dissatisfaction. These psychological factors play a significant role in the development of cardiovascular disease.

In the INTERHEART study, it was noted that the population-attributable risk of developing MI was 35.7% and 32.5% from smoking and psychosocial factors respectively.[17] In addition, a meta-analysis of 118,696 participants from 6 studies noted that perceived stress from various sources increased the risk of CHD and related mortality by 27%.[106] A 2018 analysis of 151,144 participants from 9 studies has shown a 61% increased risk of CHD with post-traumatic stress disorder.[107] Acute bouts of anger/hostility and chronic anger have been linked to increased risk of CHD.[108,109]

In a recent meta-analysis of 2 cohorts from the Nurses' Health Study and Veterans Affairs Normative Aging Study, it was noted that after adjusting for other variables, women in the highest optimism quartile had a 14.9% longer life expectancy and a 35% reduction in cardiovascular events after adjusting for other variables.[110] Depression at baseline is associated with a 60% increased risk of all-cause mortality and 70% increased risk of MI.[111]

Treatment of psychological factors in the context of CVD prevention and treatment can be approached in many ways. The 2017 Scientific Statement on Meditation and Cardiovascular Risk Reduction by the AHA outlines the benefits and supports such practices.[112] It is important to screen for depression and stress in all patients, including those with established CVD, since early diagnosis and treatment will improve outcomes.[113] Simple tools such as the Patient Health Questionnaire-2 Depression Screen are very useful.[114] The 2021 Statement on Psychological Health, Well-Being, and the Mind-Heart-Body Connection by the AHA is a very useful resource for primary care physicians.[115]

Substance Misuse

Smoking. Over the course of the past 50 to 60 years, due to public health policy and anti-tobacco campaigning, there has been a significant decline in smoking. However, 20% of American adults and 4% of youth ages 12 to 19 are currently smoking.[8] It is estimated that tobacco smoke contains about 7000 toxic chemicals and 69 carcinogens.[116] These chemicals and toxins are implicated in CVD through various mechanisms such as changes in heart rate, blood pressure, inflammation, endothelial dysfunction, thrombosis, dyslipidemia, and autonomic dysregulation.[117]

All-cause mortality among male smokers ages 55 to 74 and female smokers ages 60 to 74 is at least 3 times higher than among those who never smoked.[118] Among patients with established CAD, smoking is associated with a marked increase in the risk of sudden cardiac death.[119] Smoking is associated with significantly increased odds of peripheral artery disease,[120] aortic aneurysms,[121] and stroke.[122] Similarly, smoking is associated with increased risk of AF and ventricular arrhythmias.[123,124] Secondhand smoke and the use of smokeless tobacco is associated with increased risk of CVD.[125,126]

Alcohol. According to the most recent data, around 85% of people over the age of 18 reported that they consumed alcohol at some point in time in their life. Close to 95,000 people die from alcohol-related disease every year in the United States.[127] In the United States, a standard drink contains roughly 14 grams of pure alcohol. This is equivalent to 12 ounces of regular beer (5% alcohol), 5 ounces of wine (12% alcohol), and 1.5 ounces of distilled spirits (40% alcohol).[128] Most medical society guidelines recommend limiting alcohol consumption to 2 drinks/day for men and 1 drink/day for women.[78] There may be some cardiovascular benefit to drinking within the recommended limits.[129] However, the most recent US dietary guidelines state that "Emerging evidence suggests that even drinking within the recommended limits may increase the overall risk of death from various causes, such as from several types of cancer and some forms of CVD. Alcohol has been found to increase risk for cancer, and for some types of cancer, the risk increases even at low levels of alcohol consumption (less than 1 drink in a day)."[78] In a recent analysis of 17,059 participants from the third National Health and Nutrition Examination Survey (NHANES III), the risk of stage 1 and 2 hypertension increased significantly in moderate drinkers (7-13 drinks/week) and heavy drinkers (≥14 drinks/week) when compared with individuals who never consumed alcohol.[130] Even the consumption of small amounts of alcohol has been shown to increase the risk of atrial fibrillation.[131]

Given the relationship between substance misuse and CVD, it is important that the use of tobacco and alcohol be discussed at every primary care visit. For successful achievement of tobacco cessation and maintenance, professional, individual, interpersonal, and community resources should be employed.

Social Connection

Social support is best defined as "information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations."[132] Social isolation is often defined as the lack of social connection, and loneliness as the feeling of being alone, despite social connections.[133] The rates of social isolation and loneliness are increasing in the United States. As reported in the recent 2020 report by the National Academies of Sciences, Engineering, and Medicine, close to 30% of adults 45 and older are lonely and nearly 25% of adults over 65 are socially isolated.[134]

In a prospective analysis of 32,624 male healthcare professionals over 4 years, it was noted that poor social support was associated with a significantly increased risk of stroke and cardiovascular mortality.[135] It has been reported that established CHD, unmarried status, and the absence of a close confidant significantly increased the risk of mortality.[136] However, in a large RCT of patients with established CVD and MI, enhanced social support and cognitive behavioral therapy did not lower all-cause and cardiovascular mortality.[137] Screening for social isolation and loneliness is an important role of the family physician. The 2015 Scientific Statement by the AHA is a useful resource for primary care and cardiovas-

cular healthcare professionals to increase their awareness of social support and the role it plays in clinical outcomes.[138]

SUMMARY

Progress to reduce CVD mortality has plateaued in the United States, and death and disability from CVD exceeded that from COVID-19 in 2020. There is an urgent unmet need to redirect our focus toward lifestyle to not only prevent but also treat CVD through effective lifestyle strategies. As outlined in this review, a vast majority of cardiovascular risk factors and established CVD can be approached through the 6 lifestyle pillars utilizing a lifestyle-first or lifestyle-plus pharmacologic and procedural treatment plan at both the family physician and cardiovascular specialty level. The American Academy of Family Physicians has outlined various practice tools for the successful incorporation and implementation of lifestyle medicine into family practice.[139] With constructive and cooperative partnership between the public, healthcare professionals, educational institutions, health insurance agencies, and policymakers, we must bring about this paradigm shift in the interest of individual and national health. ●

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Primary Care Clinicians, Cancer Survivorship, and Lifestyle Medicine

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doi: 10.12788/jfp.0243

Primary care physicians (PCPs) are routinely expected to manage patients with complex medical problems and will now be called upon to address a growing population of cancer survivors. The current number of oncologists may not be able to keep up with the demands of the growing number of survivors. An inflection point is emerging in which PCPs will need to assume the long-term care of these patients.[1] Cancer survivors need a smooth transition from acute cancer therapies to long-term cancer care; primary care providers must integrate with oncologists to assist in this transition.[2] Although high-profile campaigns are dedicated to cancer awareness, treatment, and fundraising, none address the fundamental issue of lifestyle choices and their impact on not only cancer prevention but survivorship as well. The incorporation of lifestyle medicine recommendations plays a significant role in this transition, as discussed in the body of this manuscript.

Cancer is the second-leading cause of mortality in the Western world and will soon exceed cardiovascular disease as the primary cause.[3] In the United States, approximately 1.8 million patients were diagnosed with cancer resulting in nearly 600,000 deaths in 2020.[4,5] Because more than 75% of patients with malignancies survive 5 years or longer after treatment, cancer often becomes a chronic condition.[6] Other chronic conditions are often the result of lifestyle and are responsible for most of our healthcare expenditure.[1] Currently, nearly 17 million Americans have a history of cancer; this number is projected to exceed 22 million by 2030.[7]

The deciphering of the human genome has revealed many secrets of the influences of genes and their variants on multiple chronic conditions. With such understanding, we have also come to realize that the impact of genetic influences on the development of malignancies may, in fact, only be minimal, accounting for only 5%-10% of cancers.[8] This underscores the importance of lifestyle as it relates to cancer. Avoiding tobacco, minimizing UV exposure, minimizing alcohol intake, and adhering to safe sexual practices are commonsense measures that are well understood to reduce certain future cancer risks. Less addressed is the importance of dietary recommendations and their relevance in cancer prevention and survivorship.[9] The Western diet, high in saturated fats, sugar, and highly processed foods, is inflammatory in nature and interferes with our immunity.[10] The low consumption of fruits and vegetables (fiber) results in an increase in dysbiosis and gut inflammation, resulting in immunity suppression.[11-13] Because a large portion of our immune response is dependent on the gut microbiome, the nutrients we feed these organisms control their actions as well as their protective effects through the production of

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DISCLOSURES

The authors have no conflicts of interest to disclose.

TABLE 1. **General recommendations for all cancer survivors: Dietary**[1,15,16,a]

Decrease substantially or eliminate	Increase or consume heavily
Inflammatory foods (no fiber)	Anti-inflammatory foods (high fiber)
Low-nutrient/high-calorie foods • Meat, processed/cured meats, and animal dairy products (milk, cheese, eggs, etc) • Highly refined sugars/sugar substitutes (including high-fructose corn syrup, Stevia, Truvia, Splenda, Equal, Sweet'n Low, etc) • Highly processed foods, alcohol, and sugar/sugar substitute–sweetened beverages	**High-nutrient/low-calorie foods** • Whole grains, vegetables, fruits and pulses (legumes) such as beans/lentils, and calcium-fortified plant-based dairy (soy, almond, rice, oat) **High-nutrient/high-calorie foods: In moderation** • Nuts, seeds, and avocados

[a] Dietary and stress-reducing recommendations are well documented.

short-chain fatty acids. These serve to protect the colonic endothelial layer, decreasing the flow of toxins into the circulatory system that increase inflammation.[14,15] Foods with inflammatory properties vs foods that are anti-inflammatory are summarized in **TABLE 1**.[1,15,16]

Breast cancer is the most common malignancy among women, affecting 2.4 million women worldwide and claiming the lives of more than 625,000 annually.[17] Poor dietary patterns and sedentary lifestyles result in inflammation, obesity, and an excess of estrogen, which are major risk factors for breast cancer.[16,18] Prostate cancer is the most common malignancy among men, affecting 1.6 million worldwide and taking the lives of nearly 400,000 annually.[16,17] As with breast cancer, prostate cancer is associated with dietary factors, obesity, and inflammation, which is also associated with disease aggressiveness. A higher intake of animal foods appears to be correlated with prostate cancer.[16,19] Colorectal cancer is the third most commonly diagnosed non–gender-specific cancer, affecting 1.7 million worldwide and claiming the lives of 832,000 annually.[16,17] Risk factors for colorectal cancer include a lack of physical activity, obesity, and the dietary components of the standard American diet: a high consumption of red meats and/or processed foods, and a low consumption of vegetables, grains, fruits, legumes, and fiber, resulting again in the promotion of inflammation.[16,20]

To date, more than 100 different cancers have been identified. Guidelines for follow-up of cancer survivors with site-specific cancers are readily available and are in print from numerous professional organizations, including the American Society of Clinical Oncology, the National Comprehensive Cancer Network, the American College of Surgeons, and the American Cancer Society. It is unreasonable to expect any oncologist or PCP to keep up-to-date with the entirety of all such recommendations; importantly, many guidelines have not been proven to be effective in decreasing recurrence nor in improving overall disease-free survival. On the other hand, extensive evidence exists that lifestyle changes can have a major impact on cancer survivorship.[1,15,16,21-23]

Cancer patients face a unique predicament in that any new ache or pain, lump or bump, or rash or itch may be a sign of a potential recurrence; such fears are omnipresent because the number one concern of most is recurrence. The mission of survivorship care is to move a patient forward to resume a normal life. The role of the PCP is to reassure the patient that such fears, although real, are poorly substantiated, and that the patient is being carefully monitored for any future adverse event that might signal the return of cancer or the development of a secondary primary malignancy. Nonetheless, the fear of recurrence leads to emotional concerns and requires behavior modifications.[24] Although non-lifestyle factors, such as genetic variants, have been associated with susceptibilities to the development of a majority of chronic diseases, there is evidence that the hereditability of such aberrations may, in fact, only be modest, as previously mentioned.[8,25] As such, lifestyle medicine has now become recognized as an important intervention to prevent and reverse many chronic conditions. Primary care physicians can help their patients who are cancer survivors, as well as other patients, by becoming familiar with ideas and treatments arising from a lifestyle medicine perspective.[16]

Lifestyle medicine is rapidly emerging as a new subspecialty, but it is far from being new; in fact, it has been practiced for thousands of years.[1,15,16] As opposed to conventional medicine, which focuses on disease management with a "pill for every ill," lifestyle medicine addresses the prevention and reversal of chronic conditions by empowering patients to assume responsibility for their own well-being by adopting healthy lifestyle modifications. In no one is this a more important and potentially effective intervention than cancer patients. Decades ago, a cancer diagnosis was considered a death sentence; this is no longer true, as survival rates have dramatically increased. The positive effects of lifestyle medi-

cine interventions have been demonstrated in patients with chronic conditions, including cancer.[1,16,26] We, as healthcare professionals, have an opportunity to intervene and to affect the health and well-being of cancer survivors.

Cancer survivorship is not simply a function of monitoring for recurrence and secondary malignancies; it also involves reducing the mortality resulting from comorbidities that can be modified through the adoption of a healthy lifestyle: a whole-food, plant-based diet; maintenance of a healthy body mass index (BMI); and stress management.[1,27] The two leading causes of death in the Western world are cardiovascular disease and cancer.[16] These diseases share common risk factors including obesity and inflammation; addressing these issues can impact not only cancer, but also multiple other chronic conditions, such as diabetes, hyperlipidemia, obesity, cardiovascular disease, and even dementia.[15]

Inflammation is responsible for the majority of chronic conditions and fuels obesity and diabetes, which are both risk factors for the development of many malignancies.[28] The state of chronic inflammation in which the Western world currently lives is primarily the result of the many ultra-processed foods that we consume. Processing procedures strip the nutritional value of foods and add dozens, if not hundreds, of chemicals to decrease cost of production, increase shelf life, and make foods taste better; none of these chemicals were ever meant to be consumed by the human body, which triggers an immune response that leads to a state of chronic inflammation.[14,15] The importance of healthy lifestyle changes (maintaining a near-normal BMI, consuming a healthy diet, increasing physical activity, and managing stress) has been documented to be effective in decreasing cancer development and progression.[1,28,29] Physical activity is important in managing obesity, which is associated with insulin resistance and contributes to the development of the metabolic syndrome.[15] Physical activity is not simply a strategy for weight control; it decreases the inflammatory reaction of the body and mitigates carcinogenesis.[30] Physical activity decreases stress and can reduce unhealthy patterns related to "emotional eating" and obesity, which is a risk factor for nearly all cancers.[31]

Of recent interest is the recognition of the importance of the human gut microbiome and its role in the development of cancer.[15,16] The gut microbiome harbors more than 100 trillion bacteria, yeast, fungi, and protozoa that are responsible for providing up to 70% of immunity; this synergistic association is largely dependent on diet.[32] The microbiota has now been recognized as playing a major role in breast, colon, and prostate cancers.[15,16] Alterations in the gut microbiome, as influenced by our Western lifestyle, are directly related to the development of chronic conditions. Evidence for a strong correlation between gut microflora dysbiosis and disease is expanding exponentially and is particularly relevant to the development of cancer as well as cardiovascular disease; both are exacerbated by the many therapeutics used in the treatment of cancers.[15,33-36]

CLINICIAN EDUCATION REGARDING BENEFITS OF HEALTHY LIFESTYLE RECOMMENDATIONS

Clinicians may have difficulty in finding reliable lifestyle medicine resources for their own education. Some well-recognized and respected programs are listed below:

- Plant-based nutrition certification, Cornell University: https://ecornell.cornell.edu/certificates/nutrition/plant-based-nutrition/
- American College of Lifestyle Medicine certification: https://www.lifestylemedicine.org/ACLM/Certification/Become_Certified.aspx
- Lifestyle conference attendance (eg, The Plantrician Project: www.plantricianproject.org)
- T. Colin Campbell Center for Nutrition Studies: http://nutritionstudies.org
- Physicians Committee for Responsible Medicine: www.pcrm.org

Screening tests for cancer, eg, mammography for breast cancer, prostate-specific antigen for prostate cancer, and fecal immunochemical test and colonoscopy for colon cancer, are not preventive; they only serve to detect cancer and are, therefore, reactive. *Cancer detected is a failure of prevention.* Lifestyle medicine's crucial role focuses on the prevention of disease. PCPs can take a proactive approach by preventing cancer through the prescription of lifestyle modifications as early as possible, beginning with encouraging parents of young children to adopt a healthy diet and exercise habits.[37] It is time to transition youth away from sedentary activities (gaming and internet time) and consumption of processed snack foods/convenience-based meals and encourage face-to-face social interactions and physical activities.[37,38]

Fully recognizing the enormous time pressures placed on PCPs, we advocate for 3 principles to be provided to patients (**TABLE 1**[1,15,16]; **TABLE 2**[1,16]; **TABLE 3**[15,28,39-44]). Incorporating lifestyle medicine regarding cancer survivorship need not be difficult. Numerous resources are available for a rapid education in lifestyle medicine (see Sidebar: Practitioner Education Regarding Benefits of Healthy Lifestyle Recommendations).[16]

Current guidelines for postcancer care may need to be updated frequently as new information and therapeutics become available. We may already be overdriven by surveil-

TABLE 2. **General recommendations for all cancer survivors: Stress reduction (anti-inflammation)**[1,16,a]

Promote/recruit social support (family, friends, and community)
Exercise: 30 minutes/day, 5-7 days per week of aerobic (low or high intensity)/anaerobic activity
Practice stress-reducing activities: Mindfulness, aromatherapy, journaling, gardening, etc

[a] Dietary and stress-reducing recommendations are well documented.

TABLE 3. **General recommendations for all cancer survivors: Supplements**[15,28,39-44,a]

Supplement	Recommended dosage
Multivitamin with trace elements and minerals	1 tablet/day
Aspirin[42-44]	81 mg/day (caution if concurrent anticoagulant therapy)
Vitamin D_3	2000 IU/day
Calcium citrate (if calcium carbonate, take with food)	1200 mg/day
Flaxseed oil	1000 mg/day (ground flaxseed: 2-3 tbsp/day)

[a] Emphasis should be placed on meeting nutritional needs from Table 1. Supplement suggestions are based on preliminary findings and should be discussed with each patient.

lance guidelines that further burden the healthcare system. Numerous organizations recommend a history and physical examination every 3 to 6 months for 2 to 5 years; yet there is little evidence of the effectiveness of this in decreasing recurrence nor in increasing overall disease-free survival. A recent publication addresses the ineffectiveness of close surveillance in oral pharyngeal squamous cell carcinoma.[45]

Although each cancer requires surveillance after treatment, many are specific to certain malignancies.[21] Most recurrences appear within the first 2 years of initial diagnosis. Patients should be closely monitored by oncologists and their surgical oncology colleagues for an initial 12 to 24 months. Basic recommendations are presented in (**TABLE 4**); such recommendations are based on disease state and the lack of new symptoms (detection of a new mass, skin lesion, localized bone pain, new onset of chronic headaches, cough, etc). Long-term follow-up of cancer patients will become routine in the primary care setting.

In the long-term care of cancer survivors, attention should also focus on the potential long-term side effects of therapies used in treatment. For example, multiple comorbidities often overlap (eg, diabetic neuropathy may be exacerbated by chemotherapy-associated neuropathy). Specific attention must be directed to conditions such as cardiovascular disease resulting from chemotherapy, radiation, and monoclonal antibody therapies.[1,15] Secondary primary malignancies now account for nearly 17% of all malignancies, as reported by the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.[1] Lifestyle recommendations are now recognized as a factor in decreasing the development of secondary malignancies, as they minimize the chronic inflammatory state of the Western population.[1] Numerous proposals have been put forth to decrease the development of such malignancies, including modifications of toxic therapies currently used to treat primary cancers.[46,47]

Thromboembolic events (deep venous thrombosis and pulmonary embolism) are serious consequences common to all malignancies.[1] Osteoporosis is a silent disease often unrecognized until a fracture event. This is a major concern because hormonal blockade therapies can result in demineralization of bones and, occasionally, a lethal event. Additionally, multiple commonly prescribed drugs, ie, proton pump inhibitors, glucocorticoids, and psychotropic and antidepressant agents, can also contribute to bone weakening.[1] An important challenge is to ensure long-term adherence to therapies that require a minimum of 5 to 10 years of adherence, such as the recommendation of long-term antiestrogen therapy for breast cancer.[1] Attention must be paid to the interactions between medications that may result from polypharmacy-based practices.[15]

Many patients inquire about the use of supplements to protect them from cancer. There are more than 15,000 available supplements on the market—the majority of which have not been proved to have any effect on cancer development or recurrence. All are labeled with "This statement has not been evaluated by the Food and Drug Administration." The best advice for patients is to obtain their core nutrients and phytonutrients from natural, healthy whole foods.

General recommendations for cancer survivors, in addition to dietary advice and physical activity, include daily consumption of vitamin D_3 (2000 IU/day), aspirin (81 mg/day),

TABLE 4. **Minimal imaging and laboratory testing follow-up recommendations following initial diagnosis**[a]

Diagnosis	Recommendation
Breast cancer	Monthly BSE Annual mammography/tomosynthesis in conjunction with CBE If *BRCA* gene positive: annual mammogram/tomosynthesis alternating with MRI every 6 months
Prostate cancer	PSA every 6-12 months after diagnosis for first 5 years, then annually Referral for investigation of urinary symptoms
Colorectal cancer	CEA every 6 months Colonoscopy 1 and 4 years following surgery, and then at 5-year intervals

BSE, breast self-examination; CBE, clinical breast examination; CEA, carcinoembryonic antigen; MRI, magnetic resonance imaging; PSA, prostate-specific antigen.

[a] Regarding *BRCA*, annual mammography and CBE should be done in close conjunction as a normal mammogram does not negate a CBE. Mammography is only 80% accurate, and a CBE is a necessity to confirm or refute a radiologic evaluation. These minimal recommendations are based on stage and aggressiveness of a cancer diagnosis. Note: Such recommendations are subject to change as new information becomes available.

and ground flaxseed (2-3 tablespoons daily) **(TABLE 3)**.[15,39-44] All are anti-inflammatory, as are the dietary recommendations presented. In addition to its anti-inflammatory properties, ground flaxseed is an excellent source of fiber, which further results in a decrease in colon and breast cancer recurrence through microbiome enhancement.[15,48,49]

PCPs are already naturally disposed to guiding patients toward the adoption of a healthy lifestyle.[50] A cancer diagnosis presents a tremendous opportunity for the PCP to introduce the importance of lifestyle medicine recommendations, not only as they relate to the malignancy but also to address overall health. A patient diagnosed with cancer is vulnerable and may seek any intervention that may impact overall survival; lifestyle medicine may be exactly what they need. Numerous resources are available for PCPs to become more prepared and confident in the delivery of such care.[1,15] Multiple cancer survivorship issues should be addressed, and numerous variations in care models have been put forth. Healthcare organizations across the country provide varying levels of survivorship care in multiple departments, and such models are in a state of flux and require further refinement.[51] Ultimately, long-term care of cancer survivors will end up in the domain of primary care. As cancer survivorship becomes a more prominent chronic condition management issue for PCPs, lifestyle medicine principles can help optimize health outcomes for this population—the challenge is formidable, but the reward is commensurate. ●

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Lifestyle Medicine: Shared Medical Appointments

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doi: 10.12788/jfp.0278

INTRODUCTION

A clinical encounter in which healthcare is offered and delivered in a group setting is known as a shared medical appointment (SMA). All participants receive healthcare services, including education, counseling, physical examinations, and clinical support, within a group environment. The earliest described versions of SMAs include drop-in group medical appointments (DIGMAs) and Cooperative Health Care Clinics (CHCCs).[1] DIGMAs include patients from a single provider's panel who may have differing diagnoses, and these patients can drop in and out of the group visit as needed. For example, 21 patients could come and go during a 2-hour window as they meet with the provider and have their medical needs addressed. This would be instead of scheduled individual visits in which 1 patient might be seen every 15 minutes. CHCCs focus more on specific diagnoses or behaviors, and patients are scheduled to be present for the entire time. For instance, 10 patients could all be scheduled for a CHCC visit at the same time to have their hypertension addressed. More recently, programmed SMAs (pSMAs) have been described as a defined sequence of SMAs that offer specific educational content on a particular topic.[2] One particular type of pSMA is lifestyle medicine shared medical appointments (LMSMAs), in which the focus is on lifestyle changes that have the potential to improve health outcomes. This article will summarize the benefits of LMSMAs for patients, providers, and health systems; describe author experiences with one type of LMSMA; and offer guidance related to the implementation of such services.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

SHARED MEDICAL APPOINTMENTS BENEFITS

SMAs have been researched targeting a variety of topics and conditions. Egger et al[2] offered a pSMA intervention for weight loss consisting of 16 to 18 weekly visits, with reported benefits in cost savings, participant and provider satisfaction, and time efficiency. A qualitative study of veterans participating in SMAs concluded that these group visits are innovative and offer high levels of patient satisfaction and identified "empowerment, teamwork, convenience, and positive provider characteristics" as some of the many positive themes.[3] A retrospective review of a breast cancer survivorship SMA that offered education and experience in culinary medicine, nutrition, physical activity, and stress relief practices demonstrated a significant weight reduction post-intervention.[4] Reports of quality of life, depression, and perceived stress trended positively, and patients reported a statistically significant decrease in average weekly fat consumption of 31%. A narrative review of a multidisciplinary, nonpharmacologic SMA by Menon et al[5] showed that it was associated with decreased costs and improved diabetes-related behavior and lifestyle. Znidarsic et al[6] conducted a pre- and post-analysis of a chronic pain SMA that included 178 participants and concluded that the participants reported reduced pain and improved social, physical, and mental health measures. Overall, these research findings have demonstrated significant improvements utilizing SMAs for a variety of lifestyle-related factors such as weight, dietary intake, and stress reduction.[2-5]

SMAs have many benefits for the participant. The SMA interactions with other patients, healthcare providers, and clinicians may be a means to combat isolation,[7] which is a significant health concern. These patients can learn from and share with each other while realizing that they are not alone in their experiences. They also have the opportunity to meet individually with the clinician. Those participating individuals who are doing very well may inspire those who

are struggling. The total amount of time they are with their provider, although shared with others, is substantially longer than the time they would have for individual appointments. Convenience may also be a benefit, with participants having options about when to participate.[7]

Healthcare teams; healthcare purchasers, including insurers; and healthcare systems may also benefit.[9] Physicians have an opportunity to work closely with other team members and to utilize their time efficiently. They can make impactful statements to the group instead of repeating these same statements during individual appointments. The pressure of time constraints is relieved in that there are not multiple appointments in a row with SMAs, as there are during traditional medical appointments. Also, patient notes can be recorded by a facilitator, allowing the provider to fully engage with the participants.[2] Potentially, SMAs may enhance clinician well-being, prevent burnout, and improve retention.[8]

When compared to traditional one-on-one visits, SMAs are cost-effective and in some cases profitable.[10-12] While more research in primary care cost-effectiveness is needed, many researchers have found benefit among certain populations. Clancy et al[10] noted a significant decrease in outpatient visit charges among patients with diabetes who participated in SMAs, which was thought to be related to a decrease in specialty medical visits. Sidorsky et al[11] demonstrated that SMAs provided a better return on investment than traditional clinic visits across multiple specialties including dermatology, plastic surgery, gastroenterology, oral health, and orthopedic surgery. This article indicated that the mean reimbursement rate would have to fall below 10% for the SMA profitability to be less than that of a traditional one-on-one model. This finding is also supported by the work of Seesing et al[12] when applied to the specialty of neurology. Per the article, an SMA was fiscally viable when the group size was maintained at a minimum of 6 patients and at least 75% of the patients were evaluated by the treating neurologist.

IMPLEMENTATION OF LIFESTYLE MEDICINE SHARED MEDICAL APPOINTMENTS

Lifestyle medicine clinic visits focus on the "use of evidence-based lifestyle therapeutic intervention, including a whole-food, plant-predominant eating pattern, regular physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection, as a primary modality, delivered by clinicians trained and certified in this specialty, to prevent, treat, and often reverse chronic disease."[13] The fundamental nature of lifestyle medicine lends itself very well to a group-based, multidisciplinary delivery approach. While these LMSMAs have been described only more recently in the literature, the historical experiences of SMAs can be of guidance in the planning and delivery of this model.

A well-planned and -supported LMSMA is essential for optimal outcomes. The atmosphere of these groups should be relaxed and fun, offering the participants a chance to explore, learn, and share. The entire healthcare team needs to know how to conduct LMSMAs, which may require training and experience. LMSMAs should be seen not as a replacement for individual visits but as a means to provide optimal services and enhance outcomes.[14] These LMSMAs tend to support behavioral change over time through presenting information and reinforcing healthy lifestyle changes. It may even be beneficial for participants to witness the triumphs and struggles of other group members as they navigate their condition.[7]

There are some special considerations when implementing LMSMAs, including confidentiality and privacy, appointment location, and patient and staff census levels. Additionally, the need for accurate and complete documentation and billing is paramount to ensuring the cost-effectiveness of this delivery model.

Providers must address confidentiality and privacy concerns. One recommendation to do this is to inform the group that if there is anything that needs to be addressed privately, an opportunity can occur during a break or after the LMSMA concludes.[14] Distributing a standard confidentiality form for the participants' signatures is an important legal consideration. Participants must be allowed to join and leave willingly. LMSMAs are usually delivered over a 2-hour period and should include time for individual consultation with the healthcare clinician.[15]

Traditionally, group visits have been conducted in person. In this instance, facilities need to be well lit, roomy enough to accommodate the group, and comfortable, with an exam room nearby. With the onset of the COVID-19 pandemic, many SMAs were converted to a virtual platform. The delivery method is beneficial as it eliminates transportation and physical space barriers. However, this method does initially present challenges with respect to internet access and familiarity with group conferencing technology. The Medicare Diabetes Prevention Program (MDPP) example provided here represents a real-time adjustment from in-person to virtual presentation.

The following is one experience related to LMSMAs. In August 2019, an MDPP was implemented by the primary author within a suburban continuing care community in Indiana for 11 individuals ranging in age from 75 to 87 years. While the MDPP doesn't require provider oversight, these group visits do offer lifestyle interventions within a group setting and have demonstrated considerable positive out-

comes related to activity levels, weight loss, and prevention of diabetes.[16] In February 2020, the pandemic made it necessary to move the group to an online format. While the first few sessions required extra time and effort, all members of this cohort were able to successfully attend virtually via Zoom for the remainder of the program. While initially the goal was to just maintain the MDPP, many benefits were experienced. The group was able to maintain a social connection virtually and continued to learn and share. This LMSMA was convenient for the provider and facilitator, as there was no longer time needed to commute and set up the room.

For future virtual LMSMAs, the MDPP facilitators plan to offer individual sessions, in the beginning, to assist with technology orientation to make certain the participants are able to connect and participate virtually. It was encouraging that all members of this cohort, despite advanced age and the healthcare team's inability to assist them in person to get them started, were able to connect and participate fully. This group's higher educational attainment and socioeconomic status may have contributed to their success. The ability and resources needed to attend virtually must be considered. Overall, the experience was positive and all members successfully completed the program.

GROUP SIZE AND STAFFING

Participant census is critical to participant and provider satisfaction as well as to financial viability. Limiting the number of participants ensures that there is enough time for everyone. However, adequate numbers (10-12 participants) are needed to foster group dynamics and promote an appropriate return on investment.[15] It is prudent to start small and grow as needed, such as with a pilot project.

Adequate staffing is required, with a minimum of 1 physician or non-physician clinician and 1 support person. Traditionally, the group leader is a physician, physician assistant, or advanced practice registered nurse such as a nurse practitioner. An exception to this is the MDPP, which can be run by a trained facilitator. Additional team members allow for the incorporation of a multidisciplinary approach and may include but not be limited to nurses, dietitians, exercise and mobility specialists, and behavioral health specialists. Dedicating a staff member to arranging visits and follow-ups, recording vital signs, and taking notes is helpful for improving session flow.[15]

BILLING

Three potential revenue sources for SMAs are private pay, contract billing, and traditional fee-for-service. While it is beyond the scope of this paper, prior to beginning an LMSMA, much groundwork will need to be laid to address other aspects prior to billing, including gaining familiarity around the ever-changing policies, laws, reimbursement fundamentals, privacy issues, and liability concerns. The Centers for Medicare & Medicaid Services is currently considering implementing a separate model under the CMS Innovation Center to test and evaluate virtual MDPP services.[17] If this does occur, this may be an avenue for billing for virtual MDPP visits, which is not currently in place. For the traditional fee-for-service, evaluation and management codes are generally utilized for established patients. The 99212 to 99214 codes may be appropriate based on the complexity of the individual portion of the visit. Time-based billing should not be utilized for LMSMAs because this type of billing only captures the time associated with an individual visit. For example, in a 60-minute SMA, the clinician does not spend the full 60 minutes focused on one individual patient. Therefore, billing codes should be based on the evaluation and management code that aligns with the level of medical complexity required by each individual patient. Additionally, new patients should have an initial one-on-one visit with a clinician prior to enrolling in an LMSMA.[18] The **TABLE** provides more potential billing options. Along with providers, other healthcare professionals such as dietitians, nurses, psychologists, and nurses can bill utilizing their National Provider Identification (NPI) number.[15] Working with a billing specialist can help to ensure proper billing to optimize reimbursement.

DOCUMENTATION

Complete and accurate documentation promotes safe patient care while also providing justification for billing and compliance. Each visit should be documented in the individual patient's health record. This documentation will support the level of evaluation and management code submitted for reimbursement. The documentation should still include an appropriate history and physical that evaluates the chronic medical condition(s) being treated via the LMSMA as well as any pertinent medications being utilized and recent laboratory results. The assessment and plan should describe the content delivered during the group portion of the visit as well as concerns addressed during the private individual time, including medication adjustments, refills, and laboratory evaluations.

CONCLUSION

SMAs have demonstrated many positive attributes that make them a credible option within the treatment regimen of multiple common chronic diseases. LMSMAs are uniquely positioned to provide evidence-based lifestyle counseling, including motivational interviewing and health behavior goal setting, to address these chronic diseases. While these require

TABLE. **Billing code options**[15]

Type of code	Number
Evaluation and management	99212-99214
Medical nutrition therapy	97804
Behavioral therapy for cardiovascular disease	G0446
Intensive behavioral therapy for obesity	G0447
Health and behavior assessment and intervention	96164
Diabetes self-management training	G0109

thoughtful planning, training, and engagement of staff, healthcare leaders, and participants, the efforts may result in improved costs, improved satisfaction of both patients and healthcare workers, and other positive outcomes. As our healthcare system rapidly changes, the LMSMA model can offer solutions to the many family medicine providers who are searching for ways to maximize the use of their time while having the potential to improve patient outcomes and decrease costs. ●

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Lifestyle Medicine Education: Essential Component of Family Medicine

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doi: 10.12788/jfp.0273

INTRODUCTION

The Future of Family Medicine report, released in 2004, concluded that the US healthcare system was inadequate and unsustainable, and that without transformation, the specialty of family medicine might be in danger of extinction.[1,2] From this call to action, a host of innovation and projects were born. These include the *Annals of Family Medicine,* launched with the goal of improving and expanding primary care–focused research.[2] The Preparing the Personal Physician for Practice (P4) Initiative for innovation in family medicine residency education was launched in 2007 and continues to be mined for lessons on graduate medical education redesign.[3-5] Family Medicine for America's Health and Health is Primary initiatives followed in 2012 and 2014 with a particular focus on the triple aim of improving population health, experience of care, and per capita cost, as well as positioning family medicine as an essential player in the changing healthcare climate.[6,7]

After nearly 2 decades, family medicine has achieved many of the initial aims of the Future of Family Medicine report and has helped shape national health policy. Yet the fact remains that healthcare in the United States remains inadequate and unsustainable. It is unsustainable financially in that more than 90% of the $3.8 trillion in healthcare expenditures is spent on chronic disease and mental health conditions.[8] Healthcare costs grow faster than inflation, and individuals and corporations alike struggle under the financial burden of obtaining healthcare.[9,10] One example: An explosion of new medications for diabetes has revolutionized the national guidelines, yet the diabetes epidemic grows unabated.[11] Despite all the innovations in healthcare design, delivery, technology, patient-centered efforts, medical home initiatives, and data analysis, as well as pharmacologic advances, we have failed to advance in our efforts to help individuals and society at large with the foundational elements that support healthy lifestyle behaviors.

This is not for any lack of desire on the part of family physicians. Although physicians believe it is their responsibility to address lifestyle issues during patient encounters,[12-14] many still fail to do so consistently.[15-17] A mere 14% of residents believed they possessed the knowledge and training to counsel patients regarding nutrition.[13] Furthermore, despite the fact that 76% of residents reported confidence that physical fitness should be a priority and 88% reported understanding the benefits of physical activity, less than 50% felt confident in their ability to implement personal physical fitness behavior, and most felt ill-equipped to lead healthy lives themselves.[14] If residents are not confident in their own ability to implement healthy behaviors for themselves, how

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DISCLOSURES

The authors have no conflicts of interest to disclose.

can they be expected to effectively prescribe lifestyle change for their patients?[18] In addition to a lack of sufficient education and training, a dearth of high-quality clinically relevant evidence and clear lifestyle change protocols has made it difficult to prescribe and facilitate change in a way that is both realistic and sufficiently efficacious.

Healthy lifestyle and health behavior change has always been, and must always be, a core element of family medicine. Family physicians excel at developing deep, long-lasting relationships, and it is the bonds of trust in these relationships that allow physicians to encourage and support patients in difficult lifestyle change. A deeper focus on lifestyle medicine with the aim of better education, clear actionable lifestyle medicine treatment protocols, and a system of mentorship holds the promise not only to reinvigorate the health of our patients but to further revolutionize family medicine training and practice. If we are to arrest, let alone reverse, the unsustainable trajectory of our nation's health and healthcare system, addressing core lifestyle-treatable diseases and conditions surely deserves our greatest efforts.

Routine chronic care visits can become moments of transformation if physicians have the educational knowledge and skills to implement lifestyle behavior change as a therapeutic modality among patients. This article summarizes efforts underway in undergraduate medical education, graduate medical education, fellowships, and continuing medical education (CME) to infuse all levels of training with lifestyle medicine education. Such a transformation is illustrated below with patient MM, who was treated by his primary care provider (PCP), a family medicine physician who is a board-certified lifestyle medicine diplomate practicing at an employer-based clinic in rural Indiana. Of note, Indiana ranks 41st in the 2019 America's Health Rankings.[19]

CASE PRESENTATION

In late 2020, MM, a 63-year-old man, presented for follow-up laboratory tests. He had visited his PCP 1 year earlier describing hoarseness of voice and fear of having throat cancer. He had a history of smoking (50 pack-years) and had quit in 2006. He was a heavy drinker, but subsequently reduced drinking to only 1 to 2 beers per week. He denied drug use and had a history of hypertension that was being medically managed. His esophagogastroduodenoscopy indicated esophagitis but no evidence of cancer. After referral to an ear, nose, and throat (ENT) specialist, he was prescribed a high-dose proton pump inhibitor and treated for allergies. This resulted in improvement of his hoarse voice. After the course of a year, with 5 subsequent visits, he presented for a follow-up lab appointment, where he was diagnosed with prediabetes and dyslipidemia. This prompted MM to initiate lifestyle changes to address the hypertension, prediabetes, and dyslipidemia. Six months later, during another follow-up appointment, his PCP assessed how he was progressing with his behavior change goals. See the **TABLE** for a description of the case.

All too often, when patients present with prediabetes and/or dyslipidemia, lifestyle is not addressed as a foundational therapeutic modality. No action is taken or oral pharmacotherapy alone is advised. Additionally, many patients with chronic diseases rooted in lifestyle behaviors, as evidenced by this patient's clustering of hypertension, prediabetes, and dyslipidemia, are unaware that lifestyle modifications are a foundational part of the treatment options available to them. Medical education transformation via implementation of a lifestyle medicine curriculum emphasizing not only health promotion but also disease remission and reversal is critical to ensure physicians' confidence and ability to address lifestyle with patients.

LIFESTYLE MEDICINE TRAINING IN UNDERGRADUATE MEDICAL EDUCATION

A number of medical schools throughout the country are leading the way in lifestyle medicine training in medical education, specifically including Harvard Medical School, University of Oklahoma-Tulsa School of Community Medicine, A. T. Still University School of Osteopathic Medicine in Arizona, University of South Carolina School of Medicine Greenville, and Loma Linda University Health. These schools of medicine have led in the development and implementation of lifestyle medicine through a variety of opportunities that include pre-matriculation sessions, required and voluntary integration into the basic science and clerkship years, exercise and culinary medicine events, Lifestyle Medicine Interest Groups, and lifestyle medicine track development, all with a focus on both personal self-care and patient applications of lifestyle medicine.[20]

Challenges and opportunities associated with integration of lifestyle medicine across undergraduate medicine education include lack of awareness of the efficacy of lifestyle medicine, lack of time to implement, and lack of standardized curriculum. Awareness around the powerful effect of lifestyle medicine is yet to be realized by most medical educators, both biomedical and clinical.[20] However, a number of bills have been introduced into Congress that would bring greater awareness of the need to implement lifestyle training in undergraduate medical education.[21-23] Again, many medical school educators, particularly in the pre-clinical years, cite lack of time to deliver content based on the traditional highly compacted, fast-paced medical curriculum. Although

TABLE. **Patient case description**

Follow-up lab appointment	
Medical history	Hyperlipidemia, hypertension, and prediabetes
Family history	Ischemic heart disease (father) and diabetes (father, brother)
Medications	Omeprazole 40 mg po qd, fluticasone nasal spray qd, cetirizine 10 mg 1 tablet po qd, lisinopril/hydrochlorothiazide 20/25 mg 1 tablet po qam, pravastatin 40 mg po qhs, atenolol 100 mg po qd, metformin 500 mg po BID, baby aspirin 81 mg po qd, multivitamin
Vital Signs	257 lb, BMI 38 kg/m^2, pulse 61 bpm, BP 146/82 mm Hg
Physical exam	Obese male, NAD; cardiovascular, RRR; respiratory, CTAB, no w/r/r; ambulating without assistance
Lab work	HbA1c 5.9%, FBG 108 mg/dL, AST 48 U/L, ALT 64 U/L, TG 182 mg/dL, TC 147 mg/dL, LDL-C 72 mg/dL, HDL-C 39 mg/dL
Patient plan	1) Continue on the high-dose omeprazole as instructed by ENT specialist. 2) Work on adding in more fruits, vegetables, whole grains, beans, and legumes; he was given a handout on whole-food plant-based nutrition. 3) Set goal to lose 5-10 pounds. 4) Begin to exercise, starting with low-intensity and slowly building up to 150 minutes of moderate-intensity exercise per week, with twice-a-week strength training. 5) Follow up in 6 months with repeat HbA1c at that time.
Follow-up 6-month lifestyle change appointment	
Interval history	MM lost 8 pounds and reported walking 1 mile per day. He increased vegetables in his diet, cut out refined breads and pastas, reduced sodium and fat intake. His energy improved. Home BP logs improved from an average of 130/60-70s mm Hg to 120s/60-70s mm Hg. Subjectively, he reported acid reflex improvement; he continued on his omeprazole. MM reported feeling excited and engaged in his health and ready to continue healthy changes.
Vital signs	249 lb, BMI 36.8 kg/m^2, pulse 74 bpm, BP 125/78 mm Hg
Physical exam	Obese male, NAD; cardiovascular, RRR; respiratory, CTAB, no r/r/w; ambulating without assistance
Lab work	HbA1c decreased 0.8% to 5.1%
Patient plan	1) Continue exercising and making changes to diet in order to keep losing weight. 2) Reduce metformin to 1 tablet by mouth daily. 3) Return for repeat fasting labs and annual physical in 6 months.

ALT, alanine aminotransferase; AST, aspartate aminotransferase; bid, twice daily; BMI, body mass index; BP, blood pressure; bpm; beats per minute; CTAB, clear to auscultation bilaterally; FBG, fasting blood glucose; HbA1c, glycated hemoglobin; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; NAD, no acute distress; po, orally; qam, every morning; qd, daily; qhs, every night; RRR, regular rate and rhythm; r/r/w, rales, rhonchi, wheezes; TC, total cholesterol; TG, triglycerides.

these challenges are very real, various medical schools have found unique ways to integrate lifestyle medicine into existing curricula. Many of these schools are working within the system-based education schedule in which students can increase competencies in the mechanisms of action of lifestyle interventions with regard to their effect on each organ system and chronic disease condition.[20] Finally, a lack of standardized lifestyle medicine curricula, as well as a lack of lifestyle medicine biomedical and clinical content expert faculty, is a challenge for medical schools.[20]

These challenges are being met through multiple avenues, including the increasing selection of evidence-based curricular resources offered by the American College of Lifestyle Medicine (ACLM) and the Lifestyle Medicine Education Collaborative (LMEd) efforts; in addition, physicians, professionals, and practitioners are increasingly becoming certified in lifestyle medicine through the American Board of Lifestyle Medicine (ABLM) and ACLM certification exam, which enables schools to have access to these trained professionals as faculty.[24,25]

Curriculum standards have also been outlined to support the integration of lifestyle medicine within undergraduate medical education and to recognize schools that are successful in this endeavor. Furthermore, according to

the curriculum standards, for students attending medical schools with robust lifestyle medicine integration, a pathway has been defined whereby continued practicum training in residency can lead to eligibility for the Lifestyle Medicine Physician certification exam offered by the ABLM.[26,27]

LIFESTYLE MEDICINE TRAINING IN GRADUATE MEDICAL EDUCATION

The Lifestyle Medicine Residency Curriculum (LMRC) was created to meet the demand for lifestyle medicine training within the graduate medical education framework, and although developed independently from family medicine residency redesign efforts, the LMRC incorporates many of the Future of Family Medicine's goals, principles that emerged from the P4 initiative, and aims of family medicine's greater transformation efforts.[1,3,5-7,20,28] The training environment has a significant impact on physician practice behaviors, and the LMRC is designed to influence how physicians in training implement lifestyle medicine into daily practice.[3,5]

The LMRC is built around the concept that lifestyle medicine knowledge acquisition is necessary but not sufficient to create changes in physician practice behaviors. Rather, knowledge acquisition along with observation of preceptor modeling and opportunities to implement the principles into one's own practice pattern are ideal to facilitate lifestyle medicine practice integration. As P4 education redesign efforts showed, when residents and faculty joined in a "learning together" approach, this determined whether practice transformation was successful.[5] As such, the LMRC has both didactic and practicum requirements that enable the residents to apply lifestyle medicine principles throughout residency training in a variety of settings. More specifically, there are 100 hours of educational didactic material, in addition to several practicum components including 400 documented lifestyle medicine–related patient encounters along with group and intensive therapeutic lifestyle change (ITLC) hours.[29] Completion of all LMRC requirements enables the resident to be eligible for the Lifestyle Medicine Physician certification exam offered by the ABLM.[26]

The LMRC is particularly relevant within the field of family medicine, where adoption of primary care principles and continuity relationships over time best support lifestyle-related behavior change.[11,28] Although practicing lifestyle medicine is the very definition of "patient-centered" and is the foundation of most chronic disease management algorithms, we have struggled to define and operationalize this in practice and often fail to implement these foundational aspects of the algorithms.[30-32] Family medicine residency programs have a history of innovation, and innovation in turn attracts a higher caliber and greater number of graduates from educational institutions in the United States.[5] As of 2021, 82 total programs are offering the LMRC. Of those, 46 are family medicine programs, representing the highest uptake for LMRC implementation of any American Board of Medical Specialties specialty, at 56% of total programs.

LEADERS OF LIFESTYLE MEDICINE IN FELLOWSHIP TRAINING

The Lifestyle Medicine Specialist Fellowship (LMSF) is designed to meet the second tier of lifestyle medicine certification through a 12-month training program.[20,26] The LMSF emphasizes higher-level clinical and scholarly activity training in lifestyle medicine. This includes deprescribing protocols and appropriate dosing of lifestyle medicine across the disease severity spectrum, including ITLC programs, in order to demonstrate significant chronic disease symptom improvement or disease remission. Currently only 1 LMSF exists,[33] with the hope of supporting the development of additional sites in the near future.

CONTINUING MEDICAL EDUCATION AND MAINTENANCE OF CERTIFICATION

The ACLM offers lifestyle medicine–related CME, American Academy of Family Physicians–prescribed credits, and American Board of Lifestyle Medicine Maintenance of Certification credits through events such as the annual ACLM conference and symposia, as well as through online courses such as "Foundations of Lifestyle Medicine Board Review," "Lifestyle Medicine Core Competencies," "Reversing Type 2 Diabetes and Insulin Resistance With Lifestyle Medicine," "Physician and Health Professional Well-Being," "Food as Medicine," and more at lifestylemedicine.org/education.[25]

CONCLUSION

An emphasis on lifestyle medicine education across the medical training spectrum is an ideal goal for family physicians, who are trusted and influential healthcare workers and intimately integrated in the health of their communities. Family physicians lead by modeling healthy behaviors. Family physicians lead by empowering patients to take charge of their own health and chronic disease management through lifestyle behavior change. Family physicians lead through educational transformation and bettering physician practice patterns. With broadened education on the relationship between chronic disease and lifestyle choices, clear actionable lifestyle medicine treatment protocols, and a system of mentorship, family physicians will lead in turning the nation's health and healthcare system to a more positive trajectory. ●

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The Future of Lifestyle Medicine for Family Physicians

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doi: 10.12788/jfp.0265

Restoring health and providing true value-based care through lifestyle medicine offers both patients and clinicians a hopeful, healing alternative to chronic disease and disability management. Most chronic conditions that family practice clinicians treat are lifestyle-related, with type 2 diabetes, obesity, hyperlipidemia, and heart disease well recognized as prototypal lifestyle-related conditions.

The prevalence of obesity and diabetes has risen to epidemic levels under our watch over the past 3 decades.[1] Sadly, despite enormous pharmacologic advancements to address control of type 2 diabetes, a recent *New England Journal of Medicine* article reported worsening control of hemoglobin A1c since 2010.[2] Clearly, a lifestyle-first approach to identify and eradicate the root causes of these conditions must be undertaken if we are to address both their prevalence and their disabling impact on human health and well-being.

With the ravages of COVID-19 exposing the urgent need to bolster the foundational health of our nation against "underlying conditions" and the disproportionate prevalence of chronic disease vulnerabilities among our populations of color, the time is now to make lifestyle medicine the foundation of all health and healthcare. The steps to making that vision reality are clear:

- Medical and health professionals' education and training at all levels need to include the evidence-based comprehensive lifestyle medicine curriculum that has been so sorely lacking. While this is starting to take place (see "Lifestyle Medicine Education: Essential Component of Family Medicine" [p. S66]), it must be universal for clinicians to be equipped to meet the first recommendation of chronic disease guidelines—to address lifestyle. Rather than focusing most on meeting documentation requirements of electronic medical record fields, physicians must be capable of providing meaningful knowledge and resources for patient lifestyle change.
- The family physician may need to rethink traditional practice and care delivery. A team-based approach, shared medical appointments, physical provision of care outside the traditional medical facility, and other paradigm change will be necessary. The time is now to plan for practice changes that will allow family physicians to obtain successful clinical outcomes and achieve success in value-based or capitated contracts.
- Health policy, regulations, and reimbursement must be updated to incentivize outcomes rather than process, allow care to be brought closer to the patient, acknowledge all members of the healthcare team, and support care delivered in the best format for successful behavior change. Quality measures should not penalize medication de-escalation. National Provider Identifier (NPI) number requirements for care delivery location need expansion, especially if we are to truly address lifestyle-related chronic disease health disparities and social determinants of health. Electronic medical records and coding need to be inclusive of lifestyle medicine practice specifics. Work by the American College of Lifestyle Medicine (ACLM) is addressing these needs.

Interest in lifestyle medicine is trending upward, with interest shown by medical students,[3] family medicine residents,[4,5] practicing physicians, and large health systems.[6] Recent articles[7,8] show that increasing numbers of physicians are turning to lifestyle medicine practice as a career path away from burnout. This is a significant development, as a 2020 report from Medscape[9] states that 42% of physicians

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DISCLOSURES

The authors have no conflicts of interest to disclose.

reported being burned out in 2020. With career satisfaction waning, doctors are seeking alternatives to the status quo, thus gravitating toward lifestyle medicine—with a desire to treat root causes of disease, as opposed to focusing primarily on disease management.

Founded in 2004, ACLM has a rapidly expanding membership base of more than 7000 physicians and other health professionals across the United States, also serving as a primary voice within the World Lifestyle Medicine Council. Its members represent the broad diversity of the medical profession, reflecting the interdisciplinary "team-based" approach of lifestyle medicine clinical practice: physicians, specialty physicians, physician assistants, nurses, allied health professionals, researchers, educators, students, lifestyle medicine thought leaders, healthcare executives, and health coaches. ACLM provides live and online CME- and CE-accredited events and educational offerings[10] across the medical education continuum, board and professional certification opportunities, clinical practice tools, patient education resources, networking opportunities, and advocacy—all designed to manifest the vision of lifestyle medicine becoming the foundation of health and all healthcare.

The contents of this supplement were not meant to be exhaustive, but rather to serve as an introduction to the concept of lifestyle medicine for family medicine physicians. Its definition, its current use in management of chronic diseases, and the practice itself were only briefly described. Nevertheless, the research findings detailed in this supplement—as well as pearls from the lifestyle medicine author experts—can be utilized immediately by readers.

It is likely that medical schools and residencies will increasingly incorporate comprehensive lifestyle medicine curricula into their training programs. However, our current workforce of family medicine clinicians is at the front line of managing decades-long epidemic levels of chronic disease and the current infectious disease pandemic. ACLM stands as a partner to family physicians to offer the resources and tools that are urgently needed to address chronic disease through a lifestyle, root-cause approach. This approach provides a pivotal path for true healthcare reform and health restoration for our nation. ●

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The Call for Lifestyle Medicine Interventions to Address the Impact of Adverse Childhood Experiences

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doi: 10.12788/jfp.0256

Since the landmark ACE Study, researchers have associated early-life adverse stress inflicted by extreme poverty, household dysfunction, abuse, and community violence to later manifestations of diabetes, mental illness, cancer, chronic pulmonary disease, cardiovascular disease, obesity, and premature mortality.[1-4] Adverse childhood experiences (ACEs) are highly prevalent across the United States. According to the National Child Health Organization, just under half (45%) of children in the United States have experienced at least one ACE.[5] One in 10 children nationally has experienced 3 or more ACEs, placing them in a category of "especially high risk." Furthermore, ACEs often accompany other prevalent adverse environmental and societal exposures (such as air pollution, poverty, community violence, bullying, and discrimination), which are all chronic stressors that also promote adverse health outcomes.[6] ACEs and additional environmental stressors may interact to create even greater harm.[7] Alarmingly, all these chronic stressors were likely made worse in the face of the recent COVID-19 pandemic. Left unabated, frequent or extreme activation of the body's stress response system can become toxic; in the absence of protective mechanisms, lasting adverse biological changes can occur.[8]

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DISCLOSURE

The authors have no conflicts of interest to disclose.

CURRENT ACE INTERVENTIONS AND EVALUATION

Various ACE interventions have been created and implemented, and systematic reviews have been conducted assessing the effectiveness of these interventions (**TABLE 1**). ACE intervention treatments range from parenting education and home visitation, trauma-informed care, eye movement desensitization and reprocessing, mindfulness, and cognitive-behavioral therapy (CBT) to other types of psychological therapy. On the basis of a recent systematic review, it is readily apparent that the majority of ACE interventions seek to improve mental resilience through clinical or counseling settings.[9] A recent review of previous systematic reviews looked at interventions for ACEs. The researchers found that the most effective method of intervention for people who experienced sexual abuse during childhood is CBT. No interventions were tested for their effectiveness in treating the consequences of ACEs if the interventions were applied at the community or social level because those interventions do not look at ACEs specifically. Furthermore, a majority of the systematic reviews showed mixed results across interventions (ie, reviews of studies for a specific intervention had findings that ranged from positive to no effect).[9]

To our knowledge, there is currently no intervention addressing not only ACEs, but also additional chronic stressors, through a multifaceted lens. In their systematic review, Lorenc et al go further and point out the lack of community-

TABLE 1. **ACEs intervention approaches**

Intervention type	Intervention description and brief evaluation
Parenting education programs	**Intervention description:** Parenting education programs address inadequate parenting skills, attitudes about child rearing, and dysfunctional parenting habits. **Impact assessment:** A systematic review shows parenting education programs have a marginal impact on other risk factors such as depression and stress. Parenting education programs appear effective, although mixed results across randomized control trials (RCTs) indicate that additional RCTs are needed.[23-25] In assessing parent education programs, it did not appear that the location of the education (either at the clinic or at home) influenced the positive results.
Trauma-informed care (TIC)	**Intervention description:** TIC includes the entire healthcare team and helps physicians approach treatment of common conditions in people who have experienced trauma in a different way. It is based on 5 steps[26]: • Acknowledge and understand the ACEs the individual experienced • Provide a safe place and gain the trust of the patient • Make the healing process a joint process • See the individual as resilient and strong • Have a sensitive healing process to cultural and historical issues **Impact assessment:** Though TIC has the potential to promote healthier outcomes, given that the practice widely varies across healthcare providers, caution should be used in considering it the sufficient response to a complex problem. Despite the use of TIC in healthcare settings, there are few published studies assessing the impact of TIC on the child or on family outcomes.[28] Additionally, there is a critical need for RCTs assessing the impact of TIC.[25,29]
Eye movement desensitization and reprocessing (EMDR)	**Intervention description:** EMDR is a new, nontraditional type of psychotherapy for the treatment of ACEs. During EMDR therapy, the client attends to emotionally disturbing material in brief sequential doses while simultaneously focusing on an external stimulus. Therapist-directed eye movements are the most commonly used external stimulus but a variety of other stimuli including hand-tapping and audio stimulation are often used. It is believed that EMDR therapy facilitates the accessing of the traumatic memory network, so that information processing is enhanced, with new associations forged between the traumatic memory and more adaptive memories or information.[30] **Impact assessment:** A growing body of research indicates that despite the lack of homework attached to EMDR therapy and its use of fewer sessions, it is as effective as CBT in treating traumas, including ACEs.[31,32]

level interventions.[9] ACEs and their consequences are a tremendous burden for our society, and there is a critical need to develop interventions at the individual, family, and community level that can help prevent and mitigate the harms caused by ACEs and other stressors.

OPPORTUNITIES FOR ACE INTERVENTION ADVANCEMENT

In developing new and innovative approaches for addressing adverse outcomes associated with ACEs, it is important to consider their mechanisms of action. Researchers postulate that an inflammatory process may be responsible for the adverse biological changes associated with toxic chronic stress that result from things like ACEs. A growing body of research supports this theory. Furthermore, the inflammatory process may commence in early life, as studies have revealed that ACEs are associated with increases in systemic inflammatory markers (ie, C-reactive protein, fibrinogen, and pro-inflammatory cytokines) and biological changes that may already be evident in childhood.[10-13] Additional chronic stressors (like air pollution) also have a systemic inflammatory effect that promotes adverse health outcomes. It is generally well known that increased systemic inflammation is a risk factor for an increase in chronic diseases and a reduction in lifespan. Alterations in inflammatory markers are now identified as candidate biomarkers for not only mediating the health consequences associated with ACEs, but potentially mitigating the harm from other chronic stressors and subsequently improving healthy longevity.[8]

TABLE 1. **ACEs intervention approaches *(cont'd)***

Intervention type	Intervention description and brief evaluation
Mindfulness-based stress reduction (MBSR)	**Intervention description:** MBSR is an 8-week program that offers intensive mindfulness training to assist people with stress, anxiety, depression, and pain. Developed at the University of Massachusetts Medical Center in the 1970s by Professor Jon Kabat-Zinn, MBSR uses a combination of mindfulness meditation; body awareness; yoga; and exploration of patterns of behavior, thinking, feeling, and action.[33] **Impact assessment:** A recent literature review of mindfulness-based approaches has identified many research studies with positive outcomes.[12] Mindfulness was observed to be effective in minimizing posttraumatic stress disorder (PTSD), depression, and anxiety that are a result of trauma. MBSR was found effective for both children and adults. In adults, it leads to bettering the physical and emotional health of a person after being exposed to ACEs or trauma during childhood.[12]
Cognitive behavioral therapy (CBT)	**Intervention description:** CBT is a psychosocial intervention that aims to improve mental health. CBT focuses on challenging and changing unhelpful cognitive distortions and behaviors, improving emotional regulation, and developing personal coping strategies that target solving current problems. **Impact assessment:** Systematic reviews show the strongest findings for CBT in the treatment of ACEs. Further research is needed to determine best practices around CBT and if results can be replicated within various communities.[9,33]
Solution-focused brief therapy (SFBT)	**Intervention description:** SFBT is a collaborative treatment that focuses on helping clients construct solutions rather than focus on their past experiences. **Impact assessment:** A meta-analysis of RCTs of SFBT in medical settings for patients' health-related psychosocial (eg, depression, psychosocial adjustment to illness), behavioral (eg, physical activity, nutrition score), and functional health (eg, body mass index, individual strength) outcomes indicates an overall significant effect of SFBT on improving psychosocial outcomes.[34] Use of SFBT with children and families has also shown promise, although larger research studies with better designs and a focus on treatment of ACEs are needed.[35,36]

Positive protective lifestyle factors (ie, plant-based diet, rest, time outdoors in nature), especially those supported by lifestyle medicine, have been shown to reduce systemic inflammation.[14-16] Our research team, assessing centenarians living in a region known around the world for its extraordinary health and longevity, discovered that they had not only lived long and healthy lives, but did so despite tremendous ACEs and hardships in childhood along with additional environmental stressors.[17] The positive lifestyle factors they experienced in their childhood and across their lifespan (eg, physical activity, time in nature, routine rest, plant-based diet, connection with family and friends, faith foundation, helping others, and a positive outlook on life) likely afforded protection against adversity. Furthermore, a growing body of evidence shows that a few of these factors are able to positively influence one another and potentially enhance the ability to offset inflammation and subsequent adverse biological changes.[18] Positive and protective lifestyle factors can increase the life of the individual and prevent or delay diseases; this may promote a healthier lifespan for those burdened by ACEs.[19-22]

Ultimately, a combined approach addressing whole patient care (mind, body, and spirit) may prove the most effective in the battle against ACEs. Given that ACEs rarely occur in isolation and often negatively and synergistically interact with other chronic stressors, it is important to address ACEs in light of this context. Interventions that interact synergistically and also address additional environmental stressors are critically needed, and positive lifestyle factors fit the bill. **TABLE 2** provides a list of opportunities for interventions building on positive lifestyle factors. Especially needed are interventions that can offset systemic inflammation. Combined intervention approaches may prove the most effective. Not only may promoting lifestyle factors mitigate the damage from ACEs among patients and their families, but they may also prove helpful in improving the health of healthcare workers during and recovering from the COVID-19 pandemic. Trauma is widespread with the potential to be exceptionally debilitating and devastating; thus, it is vital that we start implementing positive lifestyle interventions to minimize the effect of ACEs and trauma on as many people as possible. ●

TABLE 2. **Potential protective lifestyle intervention opportunities**

Patient and family care	• **Encourage greater screening for positive lifestyle factors.** Encourage greater emphasis on screening for healthy lifestyle factors (rather than just a few questions on an appointment survey) for both parents and children, along with screening for ACEs. A standard Whole Health Lifestyle Questionnaire should be developed for screening in the clinical setting and could include questions from all of the categories identified through the resilient centenarian research[17] such as: physical activity, time in nature, routine rest, plant-based diet, developing and strengthening family and friend relationships, faith foundation, ability to help others, and positive outlook on life. We recommend using pre-appointment wait time to collect more in-depth information on these whole health (resiliency factor) questions.
	• **Develop and promote appealing media and conversations.** Increase awareness (through conversations with families, concise and appealing brochures, providing coloring books, etc.) of the importance of protective lifestyle factors in general, but especially among those who have ACE exposures.
	• **Use key health partners.** Partner with health coaches to provide onsite educational services with a "learn it, live it, evaluate, and adapt it" approach for encouraging families to put protective lifestyle activities into practice.
	• **Combine interventions.** Combining lifestyle interventions with ongoing ACE treatments may prove successful. One such example is the Nurse-Family Partnership (NFP).[37] The NFP is a prevention strategy to help reduce child abuse and neglect, reduce the likelihood of mothers giving birth to additional children while in their late teens and early 20s, reduce prenatal smoking among mothers who smoke, and improve cognitive and/or academic outcomes for children born to mothers with low psychological resources. Providing additional healthy lifestyle promotion (ie, plant-based diet, positive mindset, spiritual connection, time in nature, rest) to this program may prove even more successful.
Medical professional development	• **Provide continuing medical education opportunities.** Provide continuing medical education opportunities on lifestyle factors to educate and encourage health professional training.
	• **Screen healthcare employees.** Encourage and provide opportunities for medical professionals to anonymously screen for their own lifestyle resiliency factors, especially in the face of the pandemic and physician burnout.
	• **Create healthcare facility interventions for employees.** Create intervention opportunities (ie, within hospital settings and beyond) to help medical staff learn about lifestyle factors and put them into practice. This is especially needed in the wake of the COVID-19 pandemic.
Community engagement	• **Promote key partnerships.** Healthcare institutions can partner with local community-based organizations, school districts, and other agencies to develop whole health (mental, physical, spiritual, social, and emotional) programs targeting ACEs through lifestyle promotion. Programs can be at the community or individual level (targeting both adults and children).
	• **Lobby for funding.** Medical professionals can lobby for funding to support community-level programs that target ACEs. This aspect is especially needed in the wake of the COVID-19 pandemic.
Scientists and research institutions	• **Encourage lifestyle research.** More research that assesses the impact of lifestyle medicine on ACEs is critically needed. To date, little research has been conducted assessing the impact of protective lifestyle factors on mitigating the adverse effects of ACEs, especially around mitigating the associated inflammatory response. Partnering with schools of public health engaged in lifestyle research can prove fruitful in developing and assessing innovative lifestyle intervention for ACEs. Future research could also explore the impact of positive lifestyle trainings/exposures on subsequent generations of offspring.
	• **Develop more research on the impact of interventions for ACEs on inflammation.** More research is needed to assess the impact of current treatments for ACEs on mitigating the ACE-associated adverse inflammatory response.
	• **Assess combined interventions.** Research is needed to assess the impact of combined interventions for ACEs, especially of positive lifestyle-factor approaches along with other treatment modalities.

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Optimizing Health and Well-Being: The Interplay Between Lifestyle Medicine and Social Determinants of Health

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doi: 10.12788/jfp.0247

Social determinants of health (SDoH) and lifestyle are increasingly being recognized as critical factors in predicting health outcomes for populations as well as individuals. According to the World Health Organization (WHO), SDoH comprise the conditions into which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life, including economic policies and systems, development agendas, social norms, social policies, and political systems.[1] Healthy People 2020, an initiative implemented to identify, reduce, and eliminate inequities in healthcare, established 5 areas of SDoH: economic stability, neighborhood and built environment, health and healthcare, social and community context, and education.[2]

These SDoH are fundamental contributors to poor health, including chronic health conditions such as hypertension, heart disease, stroke, type 2 diabetes, obesity, osteoporosis, and multiple types of cancer, which are among the most common, costly, and preventable of all health conditions.[3] A survey commissioned by Kaiser Permanente found that 78% of those surveyed had at least 1 unmet social need.[4]

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DISCLOSURES

The authors have no conflicts of interest to disclose.

The Centers for Disease Control and Prevention (CDC) identifies addressing SDoH as the primary approach to achieving health equity.[5]

The lifestyle of an individual is inextricably intertwined with SDoH. Research shows that 80% of chronic diseases and premature death could be prevented by not smoking, being physically active, and adhering to a healthful dietary pattern.[6] Cardiovascular disease, diabetes, stroke, dementia, and cancer are all influenced by lifestyle choices.[7] Not coincidentally, 80% or more of all healthcare spending in the United States is tied to the treatment of conditions rooted in unhealthy lifestyle choices.[3] SDoH interact synergistically and can create a situation that affects an individual's ability or willingness to follow a healthy lifestyle. Consequently, a pattern of hopelessness may be established when individuals feel that they have little or no control over improving their environments. Diet quality and physical activity, 2 major lifestyle factors that directly affect health, are frequently impacted by social forces that are a part of daily life and limit personal choices. One study found that low socioeconomic status was associated with a higher prevalence of smoking and that a low level of education was associated with lower levels of physical activity.[8]

Lack of access to healthcare is often cited as a major reason for health disparities, but another explanation might be that the United States overinvests in the costliest aspects of medical care while largely ignoring the other factors that influence a person's health.[9] Health is influenced by 5 factors—genetics, social circumstances, environmental exposures, behavioral patterns, and healthcare. While behavioral patterns account for about 40% of premature death, healthcare factors account for only 10%.[1,10]

Social barriers to lifestyle changes that are the result of a patient's environment should be identified and addressed

in order to improve health. It is important to acknowledge that social factors confer health benefits to certain populations while causing harm to others. For example, economic status: economic stability can confer health benefits, while economic instability can confer health risks.[11] In addition, the conditions in which people live explain in part why some groups of Americans are healthier than others. Large differences in life expectancy can be found in geographically proximate ZIP codes.[12]

Anthony Iton, MD, MPH, JD, senior vice president of the Los Angeles–based Healthy Communities of The California Endowment, explains the effect of the SDoH using a unique construct of the ABCs, suggesting that it's a matter of *A*gency, *B*elonging, and *C*hanging the odds. *Agency* is the ability to take on and successfully manage challenges. *Belonging* refers to the sense that patients are a part of a community that values them, and *Changing* the odds includes self-empowerment in schools, employment, and access to healthy foods. These ABCs of SDoH are cumulative and synergistic, for either good or bad.[13] A lack of agency, a poor sense of belonging, and an inability to change one's odds can have a profound negative influence on a person's outlook and hope for the future. This is a setup for chronic stress, which, over time, has been shown to be highly detrimental to health.[14-16]

As noted in a recent Viewpoint published in the *Journal of the American Medical Association*, "The power of these societal factors is enormous compared with the power of healthcare to counteract them."[17]

Unfortunately, these are not issues that are relegated to the past in American society. They are happening now and are getting worse. For example, according to the CDC, both type 1 and type 2 diabetes are steadily increasing among young people ages 10 to 19, with the steepest increases among non-Hispanic Blacks, Hispanics, and Asians/Pacific Islanders.[18]

ROLE OF LIFESTYLE MEDICINE

Lifestyle medicine is the use of evidence-based lifestyle therapeutic approaches as a primary modality for the prevention, treatment, and reversal of chronic disease.[19] It comprises 6 core tenets: 1) a whole-food, plant-predominant diet, 2) regular physical activity, 3) restorative sleep, 4) stress management, 5) avoidance of risky substances, and 6) positive social connections.[3] Because the most common chronic illnesses are largely related to unhealthy lifestyles, the use of a lifestyle medicine approach to care can be powerful because it addresses the root cause of the problem. These lifestyle medicine modalities, when used in the proper combination and in the appropriate therapeutic dosage based on individual patient need, have proven to be a powerful intervention.[20]

The role of lifestyle medicine is to be the essential foundation for the successful optimization of health and well-being. Such interventions are just as important to overall patient care as medications and surgery can be when appropriately applied.

FOOD AS MEDICINE

Dietary lifestyle is a critical tenet of lifestyle medicine and can be used as an example of how the 6 pillars interact with SDoH. It has been estimated that 1 of every 5 deaths globally is attributable to poor diet, even more than those attributed to tobacco use.[21] The American College of Lifestyle medicine (ACLM) has issued an official position statement on diet for the treatment and potential reversal of lifestyle-related chronic disease, that states, "For the treatment, reversal, and prevention of lifestyle-related chronic disease, the ACLM recommends an eating plan based predominantly on a variety of minimally processed vegetables, fruits, whole grains, legumes, nuts, and seeds."[22]

An individual's interactions with healthcare providers who are well educated on the tenets of lifestyle medicine offer important opportunities for counseling on evidence-based food and nutrition interventions. These dietary interventions can play a prominent role in the prevention, management, treatment, and, in some cases, reversal of disease.[21] However, several factors present barriers to improving patients' dietary patterns. A large body of evidence-based research demonstrates the efficacy of this type of diet[7]; however, social disadvantage is associated with lower fruit and vegetable consumption and higher consumption of red and processed meat (and highly processed foods).[23-25] Before nutrition education can be successful, SDoH must be addressed, including food insecurity.

Food insecurity is a pervasive public health issue in the United States that is associated with increased body weight and with multiple chronic diseases, including type 2 diabetes and poor cardiovascular health.[26] In 2018, 11% of households in the United States reported being food insecure,[27] an increase from 1999, and the problem is greater in non-Hispanic Black and Hispanic adults compared with non-Hispanic White adults. In addition to food insecurity, there is the issue of patients who live in "food deserts" and "food swamps." Food deserts, defined as residential areas with limited access to affordable and nutritious food, have been associated with obesity. Food swamps describe neighborhoods where fast food and junk food far outnumber healthy alternatives. One study found that food swamps were more significantly associated with obesity than food deserts. Low-

income and racial and ethnic minorities are more likely than Whites to live near unhealthy food outlets and have decreased mobility due to lack of accessible transportation.[28] However, it is not just a matter of making healthful foods more available. Research also suggests that some types of foods are implicated in addictive-like eating behaviors. Highly processed foods that are high in fat and sugar, which are common in food swamps, appear to be particularly associated with addictive-like eating behaviors and are more likely to lead to overeating, weight gain, and increased risk of poor health.[29] Physicians can help their patients by making them aware of the problem and helping them find ways to work through their addictive-like behaviors. Referrals to behavioral health and diet/nutrition professionals can be helpful.

ADDITIONAL INHERENT BARRIERS TO LIFESTYLE MEDICINE

Patient access to education about a healthy lifestyle may be limited owing to race, sex, gender identity, or sexual orientation. As a result, discrimination has been suggested as an addition to SDoH.[30] Social factors such as income, education, occupation, and social inequity on the basis of race and ethnic group can have a direct impact on the ability of individuals to effect change in their SDoH to establish and maintain a healthy lifestyle. Research suggests that even when presented with healthful choices, people tend to make choices on the basis of their social determinants, which provide the context for life choices, whether healthy or unhealthy. Race and gender identity, along with stressful life events, can hinder motivation as well as the ability to adopt a healthy lifestyle.[31] Physicians and other health professions can provide hope to their patients who are suffering under conditions of stress, as well as refer them to behavioral health professionals.

Low literacy is another factor that commonly affects health outcomes. It often goes hand in hand with low health literacy. Some of the greatest disparities in health literacy occur among racial and ethnic minority groups from different cultural backgrounds and those for whom English is not the first language. When patients receive written health communication materials that don't match their reading level, patient education is ineffective. Improvements in health practices that address low health literacy may help to reduce disparities in health. According to Healthy People 2020, limited health literacy may be difficult to recognize, and experts recommend that practices assume all patients and caregivers may have difficulty comprehending health information and should communicate in ways that anyone can understand.[32]

PATIENT CARE

One survey found that although physicians believe it is their responsibility to educate patients on the tenets of lifestyle medicine as part of routine patient care, many cite the lack of knowledge, time, available resources, and reimbursement.[33] For SDoH to make a significant difference in disease outcomes, medical education that incorporates the tenets of lifestyle medicine must improve. Many physicians may recommend that patients stop smoking or lose weight. However, our observation is that the majority of medical schools do not train students on how to assess and render a comprehensive lifestyle medicine prescription, which includes personalized and therapeutic dosing of sleep, physical activities, nutrition/diet, and stress management for patients. Although lifestyle medicine education is currently minimal, there are exceptions. Some medical education programs have been established that offer lifestyle medicine fellowships or residencies and lifestyle medicine tracks.[34]

SDoH can interfere with the practice of lifestyle medicine. Before recommending the steps that comprise a healthy lifestyle to patients, it is important to understand the possible limits that their unique SDoH impose and what they are realistically able to do and what is out of their reach economically, educationally, or socially. For example, eating a healthful diet, minimizing stress, maximizing sleep, and creating and maintaining positive social interactions may be difficult to attain or maintain if household income is inadequate or unstable or both.

Although health disparities are the result of a complex interaction of racial, economic, and education factors, the status of SDoH has been shown to be greatly affected by where an individual lives. In cities across the United States, the average life expectancies in certain communities are 20 to 30 years shorter than for those living just a few miles away. Where patients live often indicates economic status, availability of healthy foods, safety, and access to quality education and green space. Knowing where a patient lives may provide insight as to their limits on changing their SDoH. The lack of any of these important lifestyle factors creates stressors. Stress is now recognized as a universal premorbid factor associated with many risk factors for chronic diseases. Although acute stress in response to environmental demands is expected, chronic, excessive stress causes cumulative negative impacts on health, partly due to chronically elevated levels of cortisol.[35] A chronic state of stress caused by environmental stress and uncertainty can result in a feeling of hopelessness, which in itself is stressful and can result in hyperlipidemia, insulin resistance, hyperglycemia, hypertension, and abdominal adiposity.[35] A significant body of evidence indicates that chronic stressors can influence the development of cardiovas-

cular disease and trigger cardiovascular events independently of classical cardiovascular disease risk factors.[36]

Diabetes is an example of a condition in which SDoH significantly impact a patient's ability to apply the tenets of lifestyle medicine to manage their health.[37] Minority populations have been shown not only to suffer a greater burden of the disease but to exhibit poorer self-management and to experience more diabetes-related complications compared with non-Hispanic Whites. This results in poorer diabetes outcomes and higher rates of mortality for minority populations.[38,39] Research has demonstrated that lifestyle medicine can increase the chance of remission of type 2 diabetes in many patients. A randomized controlled trial in which overweight or obese subjects diagnosed with type 2 diabetes were provided with intensive lifestyle intervention demonstrated that intensive intervention was associated with a greater likelihood of partial remission of type 2 diabetes, without the need for insulin or hypoglycemic agents, when compared with typical diabetes support and education.[39]

LIFESTYLE MEDICINE, SDOH, AND COVID-19

The COVID-19 pandemic has highlighted existing health disparities and created opportunities for lifestyle medicine to address some of the root causes.[40] The pandemic has resulted in changes in families' home food environments and has increased food insecurity in several places across the country. One recent survey found that the percentage of families reporting very low food security has increased by 20% since the pandemic began.[41] The pandemic and increased food insecurity are also expected to increase the prevalence of childhood obesity in the United States.

In response, the ACLM has created the HEAL Initiative (Health Equity Achieved through Lifestyle medicine), with the purpose of harnessing the power of lifestyle medicine via communities to achieve health equity. Current metrics show that people infected with COVID-19 who also have chronic health conditions are at increased risk for severe illness compared with previously healthy individuals. In fact, aside from age, chronic disease is the greatest predictor of poor outcome of COVID.[42] Many of these chronic health conditions, such as type 2 diabetes, cardiovascular disease, hypertension, and obesity, could have been addressed before the pandemic though the tenets of lifestyle medicine. Of these, hypertension was found to be the leading metabolic risk factor in New York's 2020 COVID-19 epidemic.[43] When any of these chronic conditions are coupled with negative SDoH, the prognosis is dire. If applied preventively, the tenets of lifestyle medicine seem to be able to strengthen the immune system and reduce the health disparities associated with COVID-19. Moreover, another study that collected data on COVID-19 patients in New York City concluded that access to services in a comprehensive healthcare environment may attenuate, if not eliminate, racial/ethnic differences in COVID-19 mortality rates.[44,45]

DISCUSSION

Simultaneously focusing on SDoH and lifestyle medicine offers an overarching strategy for healthcare that addresses the root causes of the most prevalent and highest-cost illnesses in the United States.[2] Too often, health industry policies fail to appreciate the benefit of preemptively focusing on lifestyle factors as a proven way to prevent disease. Many medical students and physicians do not receive adequate training in the basics of lifestyle medicine—nutrition and physical activity or the SDoH. Lifestyle medicine as an intervention can happen only through education that supports positive behavior change, encouragement of patients' participation in their health, and treatment of underlying causes of disease, while considering the patient's environment. SDoH, such as low socioeconomic status, food insecurity, and low-quality or lack of education, often play determinative roles in attempts to reverse unhealthy lifestyle habits. Healthcare professionals must be skilled in assessing SDoH and take them into consideration when advising individual patients on the tenets of lifestyle medicine.

Physicians and other providers, particularly large healthcare systems, should work with payers to look for ways to collectively support private/local government partnerships. Working together has the potential to make a meaningful difference in improving the SDoH within disadvantaged communities.

Physicians and other healthcare providers should begin to incorporate the concept of SDoH into their practices if they are going to accurately identify and effectively address patients' obstacles to good health practices. Unless practitioners have information to the contrary, healthcare providers should assume that each patient has one or more social needs that they are dealing with. Once they have been identified, the healthcare provider should consider how patients' specific circumstances will impact their ability or inclination to follow health recommendations. Think about how best to place patients with community organizations whose mission it is to serve those in need. These organizations are often funded by foundations and are known by hospital discharge planners and social workers in the community. But perhaps most important is that trust is fostered by demonstrating sincere interest and caring. When patients trust their healthcare providers, it opens the door to unfiltered sharing of information that is essential to addressing their SDoH.

There is a need to redesign the focus on health and

healthcare at every level—intrapersonal, interpersonal, institutional, community, and systemic—to address the SDoH and improve health equity across all locations and population groups. ●

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Lifestyle Intervention and Alzheimer Disease

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doi: 10.12788/jfp.0286

BACKGROUND

Alzheimer disease (AD), the most prevalent type of dementia, represents the fastest-growing epidemic both in the United States and globally.[1] Currently, nearly 50 million individuals worldwide have been diagnosed with AD, and in the United States alone, there are more than 6.2 million who live with the diagnosis, with 1 new person diagnosed every 64 seconds.[2,3] Analysis projects an increase to 152 million diagnoses worldwide by 2050.[4] The emotional and financial costs of AD are staggering. In comparison, heart disease costs the US healthcare system approximately $120 billion, while AD costs $355 billion in direct costs and another $257 billion in indirect costs.[1] Furthermore, these costs are expected to grow to more than $1.1 trillion in the next 20 years, significantly affecting the healthcare system.[2]

Despite billions of dollars of investment over the last few decades for the treatment of AD, the US Food and Drug Administration (FDA) has approved only 1 drug—Aduhelm (aducanumab-avwa)—for disease course alteration. Due to its minimal demonstrated benefits and potential adverse effects, its approval has been controversial.[5,6] Yet our understanding of dementia etiology suggests that prevention or delay of onset of disease, through a comprehensive lifestyle intervention, may be a powerful option, as delaying symptoms by only 5 years may result in 41% fewer cases.[7,8]

To date, our myopic approach to AD has hindered a detailed look into cognitive decline and lifestyle.[9] Our focus has been on only 2 molecules, amyloid-beta (Aβ) peptide and hyperphosphorylated tau (p-tau), based on initial research demonstrating their role in the initiation and progression of disease.[10] Consequently, for the last few decades, the singular focus of research has been to block creation and accumulation of these proteins.[11] However, no drug targeting these proteins has demonstrated clinically meaningful results in AD treatment in clinical trials.[12] Yet there is plenty of research that implicates other factors in propagating or accelerating the disease process, including inflammation, oxidation, glucose dysregulation (insulin resistance/diabetes), lipid dysregulation, and direct toxic metabolic and traumatic processes.[13-17] Recognition of that has led to current interventional studies focusing on the effects of lifestyle intervention on individuals at risk of developing AD.[18,19]

RESEARCH ON PREVENTION

The results of 2 population studies concluded that, in individuals older than 65 years, "a healthy lifestyle as a composite score is associated with a substantially lower risk of Alzheimer's dementia." These studies, along with others, point to 5 fundamental lifestyle factors—nutrition, exercise, stress management, restorative sleep, and mental and social optimization—that can significantly affect one's risk of developing dementia.[7] An easy way to remember the core lifestyle elements is the acronym NEURO. In NEURO, N is for Nutrition, E stands for Exercise, U is for Unwind (stress management), R represents Restorative sleep, and O stands for Optimizing social and mental activity.

NUTRITION

Nutrition is an important lifestyle factor in dementia prevention. The brain, being a highly active organ, has a very high metabolic requirement and, consequently, is greatly affected by nutrition. Nutrition can have a positive or negative effect on glucose regulation, lipid regulation, inflammation, and oxidation.

Recent data on dietary intervention and dementia prevention show a variation on a single theme: a diet high in

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DISCLOSURES

The authors have no conflicts of interest to disclose.

unprocessed plant-based foods; rich in phytonutrients, fiber, and polyunsaturated fats, especially omega-3 fatty acids; with or without fish; and low in processed foods—which are predominantly high in refined carbohydrates, saturated fats, and trans fatty acids—salt, and sugar, is protective and has been associated with a lower risk of AD and all-cause dementia.[20-24]

There appears to be a strong relationship between adherence to a Mediterranean diet (MD) and reduced risk of developing AD. Multiple observational studies have indicated that higher adherence to a MD is associated with reduced risk of AD and slower rates of cognitive decline.[25-27] In the PREDIMED (Prevención con Dieta Mediterránea) study, MD supplemented with nuts or olive oil produced improved cognitive function.[28] The Dietary Approaches to Stop Hypertension (DASH) diet is another dietary pattern which is also associated with improved cognitive outcomes.[29] Both MD and DASH dietary patterns have similar components, emphasizing a plant-predominant diet while limiting the consumption of red meat and other sources of saturated fats. MD is a cultural diet that specifically highlights daily intake of greens, beans, extra-virgin olive oil (monounsaturated fat), potatoes, and fish, along with some moderate consumption of wine, while DASH restricts intake of sodium, processed sweets, and saturated fat.[30]

A hybrid of the 2 aforementioned diets, the Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND), was created by Martha Morris at Rush University, with modifications based on the evidence, to highlight foods that are protective for the brain.[31,32] The MIND diet uniquely specifies green leafy vegetables, as they possess the most potent neuroprotective qualities. Green leafy vegetables are rich sources of lutein, folate, vitamin E, beta-carotene, and polyphenols; these nutrients are related to brain health.[31,32] In the Rush Memory and Aging Project, the rate of decline among those who consumed 1-2 servings per day was the equivalent of being 11 years younger in age compared to those who rarely or never consumed green leafy vegetables.[31,32] Among fruits, only berries have been associated with slowing cognitive decline, in the Nurses' Health Study.[31,32] Other food components of DASH and MD included in MIND are extra-virgin olive oil, nuts, whole grains, and low-fat sources of protein, such as legumes and poultry on rare occasions.

Nevertheless, certain foods included in DASH and MD are not included in the MIND diet due to lack of evidence of their importance in brain health, including high consumption of fruits (3-4 servings in both DASH and MD), dairy (DASH), potatoes, and high fish consumption (2 servings per day and 6 fish meals per week in DASH and MD, respectively).[33] The MIND diet also recommends no more than 1-2 fish meals per week as sufficient to lower dementia risk, with no additional benefit from higher numbers of servings.[31,32] There is also evidence that the benefits of fish, often highlighted in MD, may be related to the higher concentration of omega-3, which may be found in fish or plant-based sources such as algae, quinoa, flax seed, hemp seeds, and even nuts like walnuts.[34]

A recent meta-analysis of 9 studies with 31,104 participants looked at the relationship between nutrition and cognitive impairment as well as dementia.[35] The meta-analysis revealed that increased consumption of fruit and vegetables was associated with a significant reduction in the risk for cognitive impairment and dementia (odds ratio [OR] 0.80; 95% confidence interval [CI]: 0.71-0.89). Further analysis demonstrated that a dose response effect was seen with incremental increase in consumption of 100 g per day of fruits and vegetables with a 13% (OR 0.87; 95% CI: 0.77-0.99) reduction in cognitive impairment and dementia risk.[35]

EXERCISE

The brain is significantly affected by exercise, as exercise has consistently shown beneficial effects on metabolic rates and processes, vascular health and vasogenesis, psychological processes such as anxiety and depression, and rapid proliferation of neuronal connections.[36-40] In the last 2 decades we have learned a great deal about the regenerative power of exercise on the brain. Moreover, it has become clear that not all exercise is equal. High-intensity aerobic exercise for longer durations is better, although there may be an upper limit to this.[41] For most of the population the upper limit should not be of great concern, as today a greater proportion of the population than ever before lives a sedentary life.[42]

Aerobic exercise is very important for general and brain health, as evidenced in a meta-analysis that included 16 studies with more than 160,000 participants, in which regular physical activity resulted in a 45% lower risk of developing AD (hazard ratio 0.55; 95% CI: 0.36-0.84; P=0.006).[43] A European multicenter study (LADIS: Leukoariosis and Disability) on the effects of exercise on 639 elderly subjects demonstrated a 40% lower risk of cognitive impairment and dementia, as well as a 60% lower risk of vascular dementia.[43] Baker et al studied the effects of intensive exercise vs stretching on those suffering from mild cognitive impairment (MCI), with the intensive exercise group demonstrating greater blood flow to the frontal lobe, increased brain size, better executive function, and protection against cognitive decline, despite strong genetic risk for AD.[44]

Furthermore, multiple studies have consistently demonstrated better brain health with strength training. In a 2010 meta-analysis of 15 studies, strenuous exercise resulted in a 38% reduced risk of cognitive decline.[45] Mavros et al dem-

onstrated that resistance training, over a 6-month period, in subjects experiencing MCI improved cognition to normal levels in 47% of individuals. These outcomes were maintained for 18 months, and greater leg strength had a much higher correlation with better brain health and size.[28]

In a meta-analysis that brought together 11 studies and looked at 3 different interventions (aerobic exercise, strength training, and multimodal exercise), it was found that exercise, aerobic exercise in particular, benefited global cognition in MCI patients. Yet a third factor that has emerged in the last few years is the fact that sedentary behavior, independent of exercise, has a powerful negative influence on health and cognition.[46] It is thus apparent that adding exercise and regular movement to a daily routine is critical for brain health.[47]

UNWIND: STRESS MANAGEMENT

There is evidence that persistent bad stress is associated with greater cognitive decline and smaller brains. Bad stress has been defined as the kind of behaviors, thoughts, and emotions that do not serve one's purpose, do not have clear directions, and do not result in clear, achievable successes. There is much research on the effects of bad stress on growth hormones, insulin resistance, thyroid function, sex hormones, and the immunologic system through the limbic, hypothalamic, pituitary, and endocrine system.[48-50] Bad stress also reduces brain-derived neurotrophic factor, inhibiting the growth of new connections between neurons.[51] Alternatively, stress, when well-defined, goal/purpose-oriented, and success-oriented, can promote cognitive and neuronal growth.[52] In a study by Lupien et al, elderly participants with increased stress-associated cortisol levels had a 14% reduction in hippocampal volume and impaired memory.[53]

Activities shown to reduce stress, such as meditation and mindfulness, have resulted in lower neural inflammation, reduced atrophy, and better brain function.[54] Harvard University researchers demonstrated that experienced meditators had thicker cortical volume and a larger cortex in regions of the brain associated with attention and sensory processing and this effect was more pronounced in older individuals, suggesting a greater effect of meditation on older individuals.[55,56]

RESTORATIVE SLEEP

The brain, which can consume up to 25% of the body's energy, is constantly working and gathering data, both passively and actively. Thus, it requires 7 to 8 hours of deep restorative sleep (4 to 5 cycles of different sleep phases, especially deep sleep and resting eye movement). This allows the brain to cleanse and organize thoughts and memories for better function.[57]

Rouch et al demonstrated that alteration of melatonin release, as seen in shift workers, may contribute to cognitive impairment. Further, in the VISAT study, male shift workers demonstrated lower cognitive function in a dose-response fashion, as those with greater periods of shift work had greater difficulty with memory, but had better cognitive function after halting shift work for at least 4 years.[58] In another study, sleep deprivation demonstrated cellular changes that led to microglia (the brain's janitors) starting to phagocytize normal brain tissue rather than performing their usual cleansing function. In the long term, this led to brain atrophy.[59] In a meta-analysis of 7 studies comprising more than 13,000 participants, sleep apnea increased the risk for developing AD by as much as 70%.[60] Although sleep medications may be helpful in the short term, there is evidence that some agents, such as benzodiazepines, may have negative long-term effects.[61,62] Of note, sleep hygiene and cognitive behavioral therapy can help resolve a significant number of sleep disorders influenced by environmental and psychological issues.[63]

OPTIMIZE (SOCIAL AND MENTAL ACTIVITY)

Currently, one of the most important factors contributing to redundancy of neuronal connections and neuroplasticity is the level of cognitive activity an individual has engaged in throughout their life. Each of the 87 billion neurons we possess can make as few as a couple, or as many as 30,000 connections,[64] and this number is determined by how one pushes, stresses, and challenges the brain around one's purpose.[65] Mental and social optimization has been shown to impart tremendous protection against degenerative diseases, an aspect called cognitive reserve, and this is probably the most important factor in risk reduction.[66]

Cognitive, social, and intellectual activity, jointly with higher education and occupational attainment, have been shown to decrease the risk of cognitive decline and dementia by increasing cognitive reserve (the capacity of the brain to resist the effects of neuropathologic damage).[67,68] Observational studies consistently show that people who engage in mentally stimulating activities are less likely to develop AD (risk ratio 0.54).[66,69-71] In a comprehensive review led by Barnes, it was demonstrated that approximately 19% of AD cases worldwide are potentially attributable to lower levels of education.[72] Developing cognitive reserves that enable individuals to continue functioning at a normal level, despite experiencing neurodegenerative and neurovascular changes, seems to have a high impact on disease onset. For example, the beneficial impact of bilingualism on brain reserve, and consequently on AD risk and cognition, has been highlighted recently. Studies suggest that lifelong bilingualism

may delay the onset of dementia by 4 years by contributing to cognitive reserve and, consequently, protecting against dementia.[73]

The protective power of lifelong cognitive activity was clearly demonstrated in a large-scale study of 678 Catholic nuns 75 to 107 years of age. Data captured from this population included early and midlife risk factors from archives, annual physical and cognitive testing in old age, and postmortem neuropathologic evaluation of the participants' brains. Postmortem evaluation of the brains of one group of nuns demonstrated significant pathology (neocortical neurofibrillary tangles), yet during life these nuns did not exhibit dementia. Another group of nuns demonstrated minimal postmortem brain pathology, yet they showed a greater incidence of dementia. Further analysis of contributing factors indicated that the main difference was that the cognitively protected group, despite much pathology, had developed greater cognitive reserve, demonstrated by the complexity of their language.[74,75] Other factors such as intelligence quotient and education have also been demonstrated to confer cognitive reserve.[64] Multiple studies have demonstrated that a decline in cognitive activity over the years consistently leads to cognitive decline and even brain atrophy, while stimulating brain activity can lead to greater reserve, cognitive capacity, and even brain size.[76-79]

Recently, there has been greater interest in knowing whether one can build cognitive reserve, capacity, and protection through video games. There is promising evidence that as the games become more sophisticated and personalized, they may provide a tremendous armamentarium of tools for building brain reserve and capacity. The 2014 ACTIVE (Advanced Cognitive Training in Vital Elderly) study examined the effects of cognitive training on 2785 healthy older adults. The study looked at 3 cognitive domains over several time periods (1, 2, 3, 5, and 10 years) after training. The results demonstrated long-term benefit in reasoning and processing speed, but not memory.[80]

The London taxi driver study revealed that involvement in complex activities like studying for a difficult visuospatial task (eg, learning the driving routes in London), resulted in greater cognitive capacity, as well as larger brain volume, specifically in the area dedicated to memory, the hippocampus.[81] The Wisconsin Registry for AD Prevention looked at the effects of lifetime job complexity on brain health and found that greater job complexity was associated with better cognitive performance and greater reserve.[82] In 2018, a meta-analysis of the effects of cognitive games/interventions in individuals with MCI revealed that focusing on a person's particular cognitive weakness (specific neuropsychological domain) led to improved cognitive function.[83]

COMBINATION OF LIFESTYLE FACTORS

Recently, the Lancet Commission on Dementia Prevention, Intervention, and Care, comprising scientists and psychiatrists, stated that as many as 40% of dementia cases could be attributed to modifiable risk factors including low education, midlife hearing loss, obesity, hypertension, late-life depression, smoking, physical inactivity, diabetes, and social isolation.[84]

The FINGER (Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability) interventional study analyzed the effects of comprehensive lifestyle intervention in 1260 individuals in their 60s and 70s at risk of developing dementia. The results demonstrated improvement in cognition in those receiving the comprehensive lifestyle intervention.[85]

Two similar studies in the Netherlands and France also demonstrated cognitive improvement in those at risk for developing dementia who had received a comprehensive lifestyle intervention.[86]

Currently, the only community-based intervention and research program at the national level is being conducted online at Brain Health Revolution. This is an innovative translational model that aims to inculcate healthy lifestyles into people's homes while measuring sustainable change.

ADDITIONAL RISK FACTORS

Some additional factors that have been shown to increase the risk for developing dementia are smoking, excessive alcohol use, other toxins (eg, lead, mercury, aluminum, carbon monoxide), head trauma, hearing loss, vitamin deficiency (B12, D), thyroid disease, and chronic inflammatory states. These factors can significantly contribute to increased risk of developing dementia, depending on the extent and duration of the risk factor.[83,87-91]

DISCUSSION

The research reported in this review includes many of the seminal studies that have looked at the environmental and lifestyle factors that contribute to the development and avoidance of dementia. To date, there is only 1 pharmaceutical treatment (Aduhelm) that has been shown to potentially slow down progression of early-stage AD, and it is not without controversy. Given that the evidence for the effects of comprehensive lifestyle intervention is significant, it is imperative that all healthcare providers, particularly family medicine physicians, are aware of the risk factors for dementia and the interventions that can positively affect cognitive decline.

Individual factors such as diets low in saturated fat, processed food, and processed sugar have been shown to reduce the risk of dementia by more than 50%.[32] Simple exercises can

reduce the risk of developing dementia by as much as 45%.[43] The same is true for stress management, restorative sleep, and cognitive activity. Importantly, when relevant changes to the aforementioned factors are made, the effects on brain health can be significant. Although the estimates vary greatly, there is agreement that between a 33% and 60% reduction in risk of AD is possible.[7] Based on our review of the literature, which demonstrated that the percentage of AD driven by high-penetrance genes such as presenelin-1 (PSEN1), presenelin-2 (PSEN2), and Alzheimer's precursor protein (APP) constitutes only 3% to 6% of all cases of AD, and that the majority of other cases are predominantly driven by lifestyle factors, we believe the number is closer to, if not higher than, 60% for those who diligently adhere to the NEURO approach.[7,92]

Given the potential benefits of the intervention on health in general and on dementia, even modest risk reduction would have tremendous effects on healthcare and the community in general. What is most empowering is that the influence on the outcome is not binary; rather, it falls along a spectrum depending on genetic risk and compliance with all the different lifestyle variables. Given that, to date, no single drug can influence the onset or course of dementia, any change in lifestyle can have significant public health consequences. What makes this approach to the "tsunami" that is dementia even more important is that it also has a positive effect on cardiovascular outcomes, cancer risk, and diabetes, as well as a tremendous effect on the greater cost of healthcare, given that the intervention is inexpensive and involves everyday life events.

BEST PRACTICES IN LIFESTYLE MEDICINE FOR AD PREVENTION

The authors' recommendation to family physicians is to make lifestyle education, resources, and intervention part of their clinical armamentarium for all patients, but especially those in midlife and of older age who are at greater risk for developing dementia. This includes information, resources, and a multidisciplinary approach to prevention as it pertains to management of metabolic risk factors (hypertension, high cholesterol, and insulin resistance/diabetes), inflammatory and infectious diseases, toxic contributors (alcohol, cigarette smoking, illicit drugs, heavy metals), traumatic brain injuries, sleep disorders, and psychiatric factors (depression, anxiety). Although all patients would benefit from this approach, given resource management, greater focus may be placed on those at imminent risk such as patients with early-stage memory and cognitive disorders. This means detecting cognitive deficits at their earliest stage using valid sensitive neuropsychological tools such as MoCA (Montreal Cognitive Assessment), Mini-Cog, CANTAB (Cambridge Neuropsychological Test Automated Battery), NEUROSpect, and others.

Furthermore, dementia should be approached similarly to cardiovascular disease, with as great an emphasis on prevention as on treatment. Family physicians and other primary care physicians ought to be first in line in moving toward this paradigm shift if we hope to make a difference.

AUTHORS' RECOMMENDATIONS

Nutrition:

- Reduce refined carbohydrates and processed sugars.
- Reduce saturated fat; consume polyunsaturated fat sources from plants.
- Reduce animal products (meat, poultry, and dairy), especially processed meats.
- Reduce processed foods.
- Consume more plants of all varieties (especially whole grains, green leafy vegetables, berries, cruciferous vegetables, spices, herbs, nuts, seeds, and green tea).
- Reduce salt consumption.

Exercise:

- Incorporate aerobic exercise, such as brisk walking, jogging, biking, swimming, dancing, etc for at least 150 minutes per week.
- Incorporate strength training, especially leg-strengthening exercises, 3 to 5 days per week.
- Create an environment where there is movement throughout the day.
- Add stretching and balance exercises to reduce injury.

Unwind (stress management):

- Identify one's good and bad stresses, specifically working toward increasing good (purpose-driven, success-oriented) stress and reducing bad stressors.
- Introduce meditation and mindfulness techniques: two 3-minute increments per day and increasing the duration as technique improves.

Restorative sleep:

- Introduce a regimented sleep pattern—going to bed the same time and waking up 7 to 8 hours later every day.
- Eliminate noise from sleep space, either by noise-reducing measures around the windows and doors, wearing earbuds, or presence of white noise during sleep.
- Eliminate blue light up to a half hour before sleep.
- Avoid eating at least 2 hours before sleep.

Optimize:

- Lead a purpose-driven life.
- Engage in complex real-life activities (involving mul-

tiple cognitive domains of the brain), such as playing musical instruments; learning to dance; learning languages; leading a project; being part of a book club; writing a blog, article, or book; etc.
- Consistently engage in cognitively challenging activities to continually push the brain to adapt.

Other recommendations:

- Abstain from smoking, eliminate or significantly reduce alcohol use (not more than 1 glass of wine per night), avoid head trauma (helmet use, seat belt use, and sport safety), and use hearing aids if experiencing hearing loss. ●

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Lifestyle Medicine as Treatment for Autoimmune Disease

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doi: 10.12788/jfp.0298

Autoimmune disease (AID), a malfunction of the immune system in which it begins to fight its own healthy cells, is a significant and growing problem in our patient populations. Some estimate that up to 24 million people are affected in the United States, with another 8 million showing positive antibodies predictive of future AID development.[1] There are more than 80 types of AID, including common pathologies such as type 1 diabetes, systemic lupus erythematosus (SLE), multiple sclerosis (MS), and rheumatoid arthritis (RA) as well as rarer diseases that may take years to diagnose. The numbers of AIDs in industrialized nations are increasing at a higher rate than those in non-industrialized nations.[2] While definitive causation is still being investigated, AID is strongly associated with multiple factors including genetics, environmental exposure,[3,4] hormonal changes, infections,[5] and lifestyle.[6,7]

Lifestyle is one of the few modifiable risk factors impacting the development of AID. There is emerging evidence indicating lifestyle medicine is a potential tool to treat AID. Making appropriate lifestyle changes could be the simplest way to slow or stop the increase of AID in industrialized nations.

DIET

Diet is one of the most influential lifestyle factors contributing to the rise of inflammatory and autoimmune diseases in developing countries.[8] A whole-food, predominantly plant-based diet improves immune function and reduces the burden of AID in several ways. It improves the diversity of the gut flora, helps maintain the integrity of the intestinal lining, reduces inflammation and obesity, and maximizes nutrition.[9,10]

A number of studies have specifically looked at RA and diet. One year-long study started with a 7- to 10-day fast, then went to 3.5 months of a gluten-free vegan diet, followed by gradual adoption of a vegetarian diet for the remainder of the study period.[10] Kjeldesen-Kragh et al[10] noted several significant improvements in RA disease activity variables after just 1 month, including number of tender joints, Ritchie's articular index, number of swollen joints, pain score, duration of morning stiffness, and grip strength. The improvements also included objective measurements such as decreased erythrocyte sedimentation rate, C-reactive protein, and white blood cell count, improvements that persisted for 1 year after the study was completed.[10]

A decreased risk in other AIDs has been demonstrated in other studies. A study extrapolating data from the 2013 Adventist Health Study-2 cohort demonstrated a lower incidence of hypothyroidism in participants following vegan diets compared to omnivorous, lacto-ovo vegetarian, semi-vegetarian, and pesco-vegetarian diets after controlling for demographic and body mass index variables.[11]

Research has also been done on psoriatic arthritis and SLE. An observational study was performed on psoriatic arthritis patients and adherence to a Mediterranean diet, which is rich in fruits, vegetables, legumes, whole grains, and fish. Results of the study showed that higher disease activity, measured by the Disease Activity Index for Psoriatic Arthritis (DAPSA), was associated with a lower adherence to the Mediterranean diet.[12] The DAPSA includes reporting of the number of swollen joints (out of 66 joints) and tender joints (out of 68 joints), patient assessment of disease activity and pain, and C-reactive protein levels.

A prospective study of lupus patients in Japan using food frequency questionnaires showed that vitamin B6 and dietary fiber were inversely associated with disease activity.[13]

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DISCLOSURES

The authors have no conflicts of interest to disclose.

Human trials and case reports studying the effect of diet on patients with inflammatory bowel disease, especially those with Crohn's disease, have shown improvement of clinical outcomes by decreasing animal products and increasing whole plant foods. One trial showed that remission was maintained in 15 of 16 (94%) in the group on the semi-vegetarian diet (SVD) vs 2 of 6 (33%) in the group on the omnivorous diet. Remission rate with SVD was 100% at 1 year and 92% at 2 years. The semi-vegetarian diet showed significant reduction in the time to relapse compared to that in the omnivorous group (P=0.0003, log rank test) and remission was maintained at 2 years.[14] In contrast, in a separate study of cases of moderate to severe disease, only 57% of cases were reported to achieve a 6-month clinical remission using infliximab and azathioprine with no dietary intervention.[15]

STRESS

Excessive stress or the inability to adequately manage stress is known to trigger and exacerbate AID. Many retrospective studies have found that up to 80% of patients report uncommon emotional stress before disease onset.[16] We know that stress can trigger the innate immune system to provoke an acute-phase response, perpetuating an inflammatory response.[16]

Psychological stress responses are also closely tied to the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis, and these amplify the activation of the immune system. Studies on patients with RA have shown that social elements, like having supportive relationships and developing effective coping strategies, can be useful prognostic tools in the progression of disease.[17,18] A 24-year study in patients with SLE found that trauma and post-traumatic stress disorder (PTSD) were associated with higher SLE risk.[17] A retrospective study in Sweden explored the relationship of stress-related disorders and AIDs over a 32-year period. During a mean follow-up of 10 years, the incidence rate of AIDs was 9.1, 6.0, and 6.5 per 1000 person-years among the exposed, matched unexposed, and sibling cohorts, respectively (absolute rate difference, 3.12; 95% confidence interval [CI]: 2.99-3.25] and 2.49 [95% CI: 2.23-2.76] per 1000 person-years compared with the population- and sibling-based reference groups, respectively). It was found that an exposure to a stress-related disorder was significantly associated with increased risk of AID compared with unexposed individuals and siblings.[18] A diagnosis of RA, similar to many AIDs, signifies an ongoing daily struggle with a variety of symptoms that may include pain, limitations in function, reduced mobility, and chronic fatigue.[16] Equipping patients with and/or educating them about resources that can help manage and reduce stress may be a potential way to downregulate the chronic burden of their disease.

SLEEP

Poor sleep and altering of natural circadian rhythms have been shown to worsen many disease states, autoimmune and otherwise. Getting fewer than 7 hours of sleep per night has been correlated with triggering SLE flares, and studies of SLE in animal models suggest that sleep deprivation is a factor in the onset of disease.[19] Chronic insomnia may also be linked to as high as a 70% increased risk for developing an AID, such as Sjögren syndrome.[20]

In a cohort study, it was found that the risk of AIDs, including SLE, RA, ankylosing spondylitis, and Sjögren syndrome, in patients with non-apnea sleep disorder, was significantly higher than in controls (adjusted hazard ratio 1.47; 95% CI: 1.41-1.53). This study used the data from 84,996 adult patients with non-apnea sleep disorder diagnoses recorded in the Taiwan National Health Insurance Research Database between 2000 and 2003, after excluding those with antecedent autoimmune diseases. A comparison cohort of 84,996 participants was formed by age-, gender-, income-, and urbanization-matched controls.[21]

Asking our patients about and working with them to improve the quality and quantity of their sleep appears to be vital in the treatment of AID.

EXERCISE

Educating patients about the benefits of physical activity is an important component in the practice of lifestyle medicine and has a large impact on AID. A review article by Sharif et al[22] noted that patients with AIDs tend to be less physically active than the general population. Those with RA who were physically active were found to have milder disease. Physical activity in patients with MS decreased fatigue and improved mobility, mood, and cognitive abilities. Increased physical activity in patients with SLE was correlated with a better quality of life and cardiovascular disease profile. Better quality of life and decreased pain and disease severity were noted in systemic sclerosis patients with increased physical activity.[22]

A randomized controlled study compared the effect of physical therapy vs usual care in patients with scleroderma. The patients selected had either a disability ratio of 0.5 on the Health Assessment Questionnaire Disability Index (HAD-QI), decreased mouth opening, or a limited range of motion of more than 1 joint. The intervention was personalized to their disability. All patients in the intervention group, regardless of their disability, received muscle strengthening exercises, respiratory exercises, and functional rehabilitation. The intervention was supervised for the first month, followed by 11 months of home-based exercises. After 1 month, there was a significant reduction in disability score and pain and an improvement in hand mobility.[22]

SMOKING

Smoking can cause a number of different diseases including cancer, heart disease, and chronic obstructive pulmonary disease. In addition, smoking can also contribute to AIDs such as RA, arthritis, and SLE. In a meta-analysis, patients who had ever smoked had a 1.89-fold increased risk of RA.[23] Smoking can also increase anti-citrullinated antibodies in RA. In the Nurses' Health Study, patients who were current smokers or had a >10-pack-year history had an elevated risk of developing lupus compared to those who never had smoked.[24]

CONCLUSION

Primary care clinicians have the opportunity to help patients with AID, to support them in managing and reducing the effects of their disease, and, in some cases, to help them bring about remission of their disease with lifestyle medicine. A growing body of evidence is demonstrating the benefits of treating or reducing the risk of AIDs with lifestyle medicine. Recommendations that focus on optimizing a healthful diet, reducing stress, improving sleep, encouraging exercise, and avoiding smoking have been shown to significantly improve outcomes for patients with AID. Additionally, the same lifestyle changes that can improve AID are also those recommended to reduce the burden of many other comorbidities. Although more research is needed, on the basis of the information we currently have regarding how lifestyle changes can affect the causation and perpetuation of these diseases with no risks, there is much to be gained by prescribing lifestyle medicine modalities to our patients as an adjunct to standard treatment protocols. ●

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A Coach Approach to Facilitating Behavior Change

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doi: 10.12788/jfp.0246

Behavior change is the foundation for effective lifestyle prescriptions. The adoption and sustainment of health-promoting behaviors—including eating a well-balanced diet of predominantly whole, plant-based foods, increasing physical activity, managing stress, improving sleep, avoiding and mitigating risky substance use (tobacco and alcohol), and establishing and maintaining positive relationships—has the greatest potential of any current approach to decrease mortality and morbidity and improve quality of life.[1-3]

Despite the compelling clinical and economic case for coaching patients on health behavior change, the current structure of the healthcare system in the United States disproportionally focuses on managing acute medical conditions, with time constraints placed on patient visits and the need to address multiple agenda items within a limited time frame. As such, most physicians are accustomed to a more directive style of communication, in which instructions, advice, and education are readily offered, but often with minimal input from the patient. While this type of expert approach is necessary in conducting diagnostics and prescribing medications, procedures, and therapeutic lifestyle direction for the patient's medical conditions, such an approach often yields limited success in encouraging the adoption of healthy behaviors, as knowledge of improved behaviors alone is not sufficient.[4] This article aims to equip family physicians with an understanding of the theoretical underpinnings and practical skills to facilitate behavior change that can be translated into clinical practice to support patients effectively in cultivating health-promoting lifestyles.

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AUTHOR DISCLOSURES

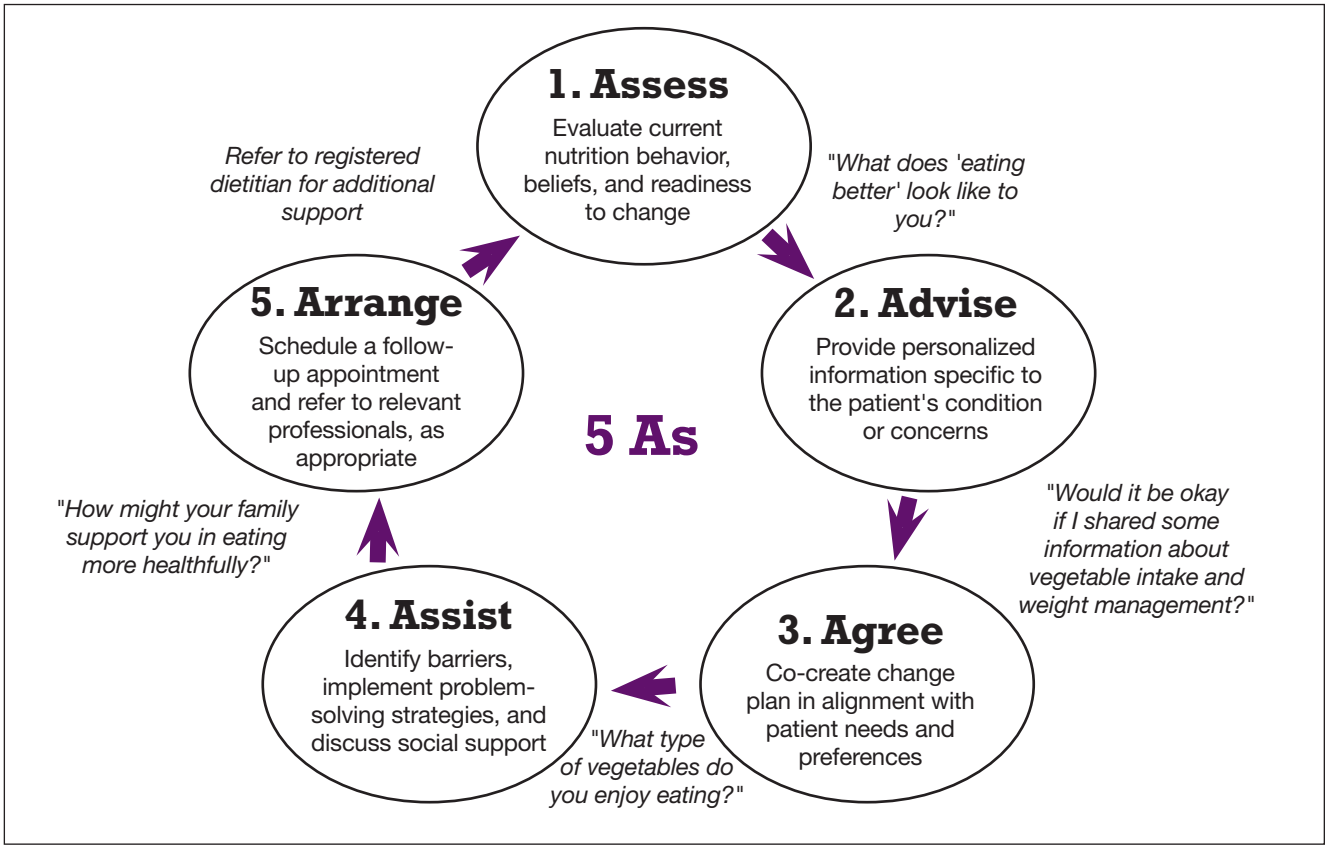
Dr. Matthews and Dr. Collings have no conflicts of interest to declare. Ms. Moore is CEO and shareholder of Wellcoaches Corporation.

ENGAGING IN CONVERSATIONS ABOUT CHANGE

Motivational interviewing (MI) is a collaborative communication style utilized to strengthen patients' motivation and commitment to change.[5] This patient-centered approach requires specific training on the spirit, skills, and processes to facilitate behavior change. The core skills of MI are open-ended questions, affirmations, reflections, and summaries—commonly referred to as OARS. Open-ended questions invite patients to provide thoughtful, narrative-like responses, while also maintaining autonomy over the direction of the conversation. Affirmations are statements that accentuate a patient's strengths, intentions, past successes, or efforts. Reflections convey empathy and interest, letting the patient know the physician is actively listening and understanding, while also helping to guide the conversation forward. Summaries provide a recap of what the patient has shared, and can also be utilized to transition from one topic to another within the clinical visit.

It is not uncommon for patients to feel ambivalent about behavior change, in which they express reasons both for and against change.[6] A critical skill for family physicians to develop is the ability to recognize and effectively elicit *change talk* (eg, motivations, values, and reasons that reflect a desire to change), which is a core aspect of MI. Through change talk, patients are empowered to work through ambivalence and commit to making a change. For example, for a patient who expresses interest in and ambivalence toward engaging in more physical activity, a powerful open-ended

FIGURE 1. **The 5 As**[a]



[a]Figure 1 was created by Jessica A. Matthews, DBH, MS, NBC-HWC, DipACLM

question, such as, "What are your top 3 reasons for wanting to be more physically active?" can offer valuable insights into the patient's personal motivators, prompting positive reasons for the contemplated behavior change. Given that it is not uncommon for patients to pair change talk (eg, "Walking gives me more energy") with sustain talk—the barriers, challenges and reasons that reflect a desire not to change (eg, "I don't have time to exercise")—it is important for physicians to recognize that this is not indicative of the patient being difficult or resistant to change, but rather it is a normal aspect of ambivalence. Utilizing reflections—such as double-sided reflections (eg, "You don't have time to exercise, and when you go for a walk you feel more energized")—can be particularly helpful in engaging the patient in increased change talk, which generates positive momentum in the direction of health behavior change.

Research indicates that when used in primary care settings, MI can be more effective than usual care or information shared through didactic materials in helping patients achieve targeted outcomes, such as blood pressure reduction, weight loss, and smoking cessation.[7] However, the effects of MI on patient outcomes can vary greatly, particularly due to provider qualifications, training, and practice, higher levels of which have been shown to be more efficacious.

A PRACTICAL FRAMEWORK FOR FACILITATING BEHAVIOR CHANGE

One practical framework referenced by the US Preventive Services Task Force (USPSTF) that family physicians can utilize to promote patient health behavior change is known as the 5 As—Assess, Advise, Agree, Assist, and Arrange. Adapted from tobacco cessation interventions in clinical practice, this brief, patient-centered approach can serve as a guide to help increase patient motivation and influence mediators of behavioral change. **FIGURE 1** offers an example of how the 5 As can be utilized in addressing nutrition behavior.

A review of the literature focused on weight management in family practice settings found that physicians will frequently Assess and Advise, but more seldom Agree, Assist, or Arrange.[8] However, patients appear to desire the Assist and Arrange aspects the most. These findings highlight the need for physicians who utilize this approach to implement all 5 steps in

TABLE 1. **Comparing an expert approach vs a coach approach**

Expert approach	Coach approach
Assumes ownership of patient's health	Empowers patient to take ownership of their health
Healthcare provider as the expert	Patient as the expert in their own life
Patient told what to do	Patient is an active partner in creating action steps to accomplish the lifestyle prescription
Leads the process	Guides the process
Delivers the right answers	Asks the right questions
Motivates to comply	Uncovers motivation within

[a]Table 1 was created by Jessica A. Matthews, DBH, MS, NBC-HWC, DipACLM; Margaret Moore, MBA; and Cate Collings, MD, MS, FACC, DipABLM

TABLE 2. **Utilizing the Elicit-Provide-Elicit framework to share information[5,a]**

Elicit	Provide	Elicit
Ask for permission or clarify what the patient already knows: • Would it be okay if I share some information with you about…? • Would you like to know more about…? • What do you know about…? • What information can I help to provide about…?	Provide information in a focused, concise, and neutral way: • Studies have shown… • What some patients find helpful is… • Research suggests... • What we know is...	Assess the patient's understanding or ask for a response: • With this information in mind, what do you think would be the best next step? • What is your takeaway from the information we've discussed?

[a]Adapted from chapter 11 of *Motivational Interviewing* (p. 139-145).[5]

order to meet patient needs and optimize effectiveness. This would also help address the limitations in the currently available evidence given the inconsistent assessment and nonstandardized definitions of each aspect of the 5 As framework.

A COMPELLING CASE FOR EMBRACING A COACH APPROACH

Health and wellness coaching is a growth-promoting relationship designed to facilitate positive and sustainable lifestyle changes that support optimal health. Family physicians trained in a "coach approach" can support patients in cultivating the knowledge, skills, tools, and confidence needed to become active participants in their care in order to reach self-determined behavioral goals and prevent or treat chronic diseases.[9,10]

The coach approach is different from the expert role, which is the predominant relational mode in healthcare. While the expert approach focuses on identifying problems and takes the lead in defining the visit agenda and prescribing the recommended lifestyle treatment, a coach approach empowers the patient to take ownership of their health and well-being and lead the individual process of change toward the recommended lifestyle adoption **(TABLE 1)**.

At the heart of the coach approach is a recognition not only that patients have the capacity for change, but that they have valuable insights and significant potential to expand awareness and possibilities in how best to live their lives. By establishing positive relationships in which patients feel supported and empowered to recognize and leverage their strengths, they can begin to generate possibilities, initiate actions, and motivate the self-regulation needed to support meaningful, lasting changes.[11]

It is important to recognize that there is a continuum of communication styles that can be utilized to varying degrees within clinical visits. At one end of the continuum is a directing style, in which instructions, information, and advice are readily given yet with minimal input from the patient. At the other end of the continuum is a following style, which employs good listening and trust in the patient's own wisdom while refraining from providing direct information or input. In the middle of this continuum, however, lies a guiding style, which skillfully blends active listening while also offering expertise where needed in the process.[5] This style of communication embodies a coach approach in an MI-consistent framework to elucidate what information patients may want and need while also honoring their autonomy, making it

particularly well suited for helping patients navigate health behavior changes.[6] **TABLE 2**[5] demonstrates the Elicit-Provide-Elicit framework from MI to offer family physicians a practical model to share pertinent information with patients while maintaining the spirit of a coach approach.

Despite some of the current limitations in the rapidly growing body of literature—such as consistent definitions and applications of coaching as well as lack of appropriate controls in study design to better examine coaching effect[12]—there is clear and promising evidence of the effectiveness of a coach approach in improving internal motivation and self-efficacy, supporting behavior change, and improving health outcomes and quality of life. Whether provided in person or via telehealth, health and wellness coaching has shown statistically significant improvements in physical and mental health status among adult patients with chronic diseases.[13] Health and wellness coaching has been found to be particularly effective among patients with diabetes and obesity,[14] yielding clinically relevant improvements in glycated hemoglobin (HbA1c)[12,14,15] and reductions in weight and body mass index (BMI).[12,14,16] The most consistent effects of health and wellness coaching have been observed in both exercise and nutrition behavior, with promising emerging evidence of reductions in blood pressure and low-density lipoprotein cholesterol (LDL-C) as well.[12,14] Although more research is needed to understand the optimum format (eg, in-person, telephonic, group, video-based) and dosing (eg, duration, frequency, number of sessions) of health coaching for affecting outcomes, the longitudinal patient-provider relationship in family medicine provides an ideal opportunity for effective continued coaching.

THE COACH APPROACH TO CLINICAL VISITS

The path to lasting health behavior change is complex, influenced by a multitude of factors, including intrapersonal, interpersonal, community, institutional, and public policy factors. Even with the best of intentions, family physicians watch patients get overburdened by life's stresses, gain weight, and navigate declining health rather than follow a path toward optimal well-being. The coach approach offers skills that guide physicians, even in brief visits, to support patients in applying the levers for behavior change: cultivating autonomy, intrinsic motivation, positivity, strengths, confidence, readiness to change, and commitment to action.

The intentional use of the verb "cultivate" is to confirm that the coach approach doesn't press or push, just as one can't make a plant grow using those approaches. Rather, physicians can cultivate the conditions for patients to find their own way and their own resources, simply by being completely present and engaged, asking open questions that open minds followed by offering reflections that deepen personal exploration and set the stage for intentional action. Rooted in various models, methods, and theories of health behavior change is a set of coaching questions, summarized here, that physicians can put into immediate use during clinical visits.

1. Cultivate connection

How can I most help you today? What would you like me to know before we start? What's on your mind? What have you been working on since our last visit, and what have you learned in the process?

The first step for physicians is to take a deep breath and pause the fast-paced, thinking mind, slowing down to allow for undivided attention to connect and attune to the patient in a warm, heartfelt manner. Arriving in an open, accepting, and welcoming state of mind allows the patient to relax, feel valued, deepen trust, and remember what they want to discuss. In the first words and questions spoken, physicians convey their benevolence and that they genuinely care. Creating a safe space of unconditional positive regard allows for a place of psychological safety for patients to be open and honest.[17]

When physicians take time to connect with patients and learn more about them on a personal level, patients are more likely to rate their medical care as excellent.[18] Additionally, fostering a patient-provider relationship rooted in trust, empathy, and respect—key components of a successful therapeutic relationship—has been shown to have a small yet statistically significant effect on healthcare outcomes.[19]

2. Cultivate motivation

What is most important to you about this visit? What is important to you about your illness, your health, now and in the future? What do you most want for your health?

Revealed in self-determination theory (SDT), the primary human psychological need, across cultures, is the need to feel autonomous and not controlled.[20] When patients are invited to share what's important for them, at any stage of the visit, their autonomy and internal motivation are both activated. According to SDT, internal *positive* motivation ("I want to do this because it is good for me and my future") is more effective in leading to sustainable behavior change than "should"-based motivation ("I should do this so I avoid feeling bad") and external motivation ("You think I should do this").[21]

3. Cultivate positivity

What is going well for you? What is going well for your health? What are you feeling good about in your life? What are you most looking forward to?

Positive emotions, particularly when they are shared with others, quickly calm the sympathetic nervous system, open patients' minds to new possibilities, and improve creativity and strategic thinking. Appreciative inquiry (AI), widely used in coaching, comprises questions that get patients to talk about their best accomplishments, what conditions generate their best moments, what strengths they feel proud of, and what they enjoy most. AI shifts deficit thinking to possibility thinking, in which the physician's objective is to foster a collaborative conversation that draws out, builds upon, and fosters newfound appreciation of the patient's capabilities.[22]

4. Cultivate self-compassion

It sounds as though you are feeling anxious about this situation. I understand that you are frustrated with the lack of progress. I appreciate that this isn't easy for you.

Compassion for others as well as compassion for ourselves—known as self-compassion—can soothe negative emotions (eg, worry, anxiety, fear, sadness, anger, frustration, self-doubt, grief). Self-compassion is defined as being kind and gentle to one's emotions and adopting an accepting, nonjudgmental attitude toward inadequacies and failures, recognizing that they are part of the shared human experience.[23] Self-compassion may give rise to proactive behaviors aimed at promoting or maintaining health and well-being and may be more effective than self-criticism in motivating behavior, as research has shown a strong positive association with connectedness, self-determination, and subjective well-being.[23,24] By reflecting patients' emotional states with kindness, understanding, and acceptance, physicians can stimulate patients to feel self-compassion and to feel the empathy and desire the physician has to support them. Interestingly, a study of physician empathy found that patients with diabetes whose physicians had high empathy scores were more likely to have better control of HbA1c and LDL-C than patients of physicians with low scores.[25]

5. Cultivate strengths

What strengths have you used in other domains of your life that you can use for your health? How could you use one of your strengths in a new way to make this change or address this challenge?

Strengths-spotting: I've noticed that you really do your homework (that you are good at planning, that when you are determined you succeed, that you know what's important to you).

Grounded in positive psychology principles, coaching is strengths-based, helping patients better appreciate their strengths and capacity to make healthy lifestyle changes. Physicians who embrace a coach approach can also be "strengths-spotters," offering affirmations that acknowledge a patient's strengths, traits, and positive actions in the narratives they share. Strengths assessment tools, such as the Values in Action (VIA) Character Strengths survey, provide a starting point for supporting patients in using their character strengths in new ways to overcome challenges and pursue health behavior goals. Through increasing patients' awareness of their personal strengths and bringing attention to them in clinical encounters, those strengths can be leveraged and built upon on the change journey.[26]

6. Cultivate readiness to change

What are the good things that will happen if you make this change? How will your life be better? How will you feel better? What are you confident you can do or change before we meet next? What would improve your confidence a little?

The Transtheoretical Model (TTM) outlines that change unfolds over time through a series of stages and processes, with readiness to make behavior change primarily driven by 2 forces—the internal motivation to change and the confidence that change is possible.[27] Physicians can help patients access their internal motivation by exploring the small benefits of a change (some version of "I feel better") and larger benefits around identity ("I will be a good role model"; "I will be able to make my world better").

Borrowing from MI, a scaling question—also known as a "ruler"—is a 1-10 qualitative self-assessment that generates self-awareness and can be easily used in a brief visit.[6] This approach is called "coaching by numbers." A general rule is for the patient to have a score of 7 or above for both motivation and confidence before proceeding into action.[28]

Below are examples of how physicians can coach by numbers around confidence to make a health behavior change:

- How confident are you in taking this action in the next week, on a scale of 1-10? (self-awareness)
- Why is the score not lower? (draw out strengths, confidence, and further change talk)
- What would be an optimal score? (identify ideal self)
- What would it take to increase your score by 1 point? (realistic goal).

7. Cultivate commitment to action

What action are you ready to take? What are you wanting to commit to do before our next visit? What other support do you need to keep your motivation and confidence going?

To close the visit, ask the patient what they are ready, willing, and able to commit to do in a specific time frame. Help them choose a behavioral goal focused on the process of change (eg, performing relaxation techniques twice a day),

as opposed to solely a general goal around a desired outcome (eg, reduce my blood pressure). For more detailed guidance as to how to support patients in creating realistic action plans, particularly during brief visits, physicians may consider learning more about Brief Action Planning (BAP). BAP is an efficient, evidence-informed, step-by-step self-management support strategy for facilitating goal setting and action planning utilizing the skills of MI to build self-efficacy for behavior change.[29]

Conclude the encounter by conveying gratitude and hope (eg, "Thank you for our time together and for a fruitful conversation. I am looking forward to learning about what you do and what you learn next time we meet").

A TEAM-BASED APPROACH TO HEALTH BEHAVIOR CHANGE

While physicians have the opportunity to improve patient engagement and outcomes with a coach approach, a well-implemented team-based approach has the potential to enhance the efficiency, effectiveness, and value of care.[30] Not only does collaborating with other clinicians—including, but not limited to, registered dietitians, licensed mental health professionals, and health and wellness coaches—allow for a more robust and individualized approach to health behavior prescriptions, but such multifaceted approaches may be more impactful in supporting optimal lifestyle behaviors.

While there are areas of overlap between licensed mental health professionals and health and wellness coaches, given their shared skills and abilities to facilitate positive behavior change, it is important to distinguish the clear differences between these professionals because of the varying needs and experiences of patients. Specifically, health and wellness coaches do not diagnose or treat conditions, nor do they provide therapeutic psychological interventions. Rather, the scope of practice of health and wellness coaches is to empower patients to develop and achieve self-determined health and wellness goals by mobilizing internal strengths and external resources along with developing self-management strategies to enact and sustain positive lifestyle changes.[31] Licensed mental health professionals take a present and past focus to elucidate the "why" underlying current lifestyle-related health issues, often related to adverse childhood experiences that necessitate a trauma-informed approach to care. Conversely, health and wellness coaches take a present and future focus to support patients in leveraging personal strengths and insights to devise action steps and accountability toward healthy lifestyle change. Importantly, coaches receive training as to how and when patients should be referred to licensed mental health professionals given that health and wellness coaching may provide a pathway into needed behavioral health services for some patients who may have fears or misperceptions stemming from the stigma historically associated with psychotherapy.[32]

To better clarify the scope of practice of health and wellness coaches, since 2017 the National Board for Health & Wellness Coaching (NBHWC) in partnership with the National Board of Medical Examiners (NBME) has provided national board certification for health and wellness coaches in addition to establishing and maintaining education and training standards. NBHWC maintains a directory of national board-certified health and wellness coaches (NBC-HWCs), enabling physicians to easily identify, collaborate with, and refer to qualified coaches who can provide additional support to patients on the behavior change journey. These advancements have helped to better position NBC-HWCs as collaborative members of the patient-centered care team while also ensuring more consistent and quality care. However, given the significant proportion of patients in primary care with mental health conditions, national standards in mental health literacy for health and wellness coaches would be beneficial to further enhance the coaches' role within the multidisciplinary care team.

CONCLUSION

Behavior change is the foundation for effective lifestyle prescriptions. As such, it is vital for family physicians to develop basic coaching skills that foster positive and productive partnerships with patients. Extending beyond prescribing and educating patients on what to do, the coach approach empowers patients to become more motivated and confident in developing and sustaining health behaviors. Given that every patient's behavior change journey is an individualized and nonlinear experience influenced by a myriad of factors, physicians have an opportunity to improve patient outcomes by learning and integrating the coach approach as well as collaborating with other clinicians such as registered dietitians, licensed mental health professionals, and board-certified health and wellness coaches to provide a patient-centered, multidisciplinary approach to health behavior change. ●

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A Lifestyle Medicine Approach to Medication Deprescribing: An Introduction

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doi: 10.12788/jfp.0259

DEFINITIONS

Medication deprescribing is an important concept and clinical skill in lifestyle medicine (LM) practice. While variation in definitions for the term "deprescribing" exist, one definition that can be found in the literature is "a process of medication withdrawal, supervised by a healthcare professional, with the goal of managing polypharmacy and improving outcomes."[1] This definition appears narrowly focused on medication deprescribing in terms of polypharmacy only. The definition that will be used for the purpose of this article is "the planned process of reducing or stopping medications that are no longer of benefit and may be causing harm. The goal is to reduce medication burden or harm while improving quality of life."[2] Similarly, there is no standard definition for "polypharmacy"; however, the regular use of 5 or more medications without regard to appropriateness of medications is often considered to be polypharmacy.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

Need for Deprescribing in LM Practice

Conventional pharmacologic medicine is generally focused on when and how to initiate medication therapy, with less focus on when and how to appropriately remove medications when the need no longer exists. The practice of LM has a particular and specific need for deprescribing practices. With intensive, therapeutic lifestyle change interventions, the goal is much more specifically to avoid harm as positive lifestyle changes arrest and reverse disease. In cases where LM removes the underlying cause of the need for medication, the medication must be reduced or stopped to address potential safety concerns from overdosing.

Safety Concerns Specific to Lifestyle Treatment

Aggressive de-escalation of medications is frequently needed with intensive therapeutic lifestyle changes (LM treatments) to prevent adverse effects. With insulin-dependent type 2 diabetes, for example, intensive LM treatment can cause dangerous hypoglycemia unless the insulin dosing is aggressively reduced. A similar effect can occur with secretagogues (sulfonylureas and meglitinides). When beta blockers are being used to treat hypertension, intensive LM treatment can cause dangerous hypotension, leading to syncope, falls, and broken bones. Similar but lesser effects can also occur with diuretics.

The intensity, as well as type (nutritional, physical activity, stress management, etc) of planned lifestyle treatment(s) must be considered when establishing the deprescribing plan. Each type of lifestyle treatment or modification has its own weighted effect(s) on specific diseases. In addition, the intensity of LM treatment a patient might choose to incorporate into their daily routine has its own weighted impact. Treatment intensity for LM can be compared with intensity of treatment with medication. If the type of lifestyle change is the "drug," then the inten-

sity of the change is the "dose, frequency, and duration." A patient who agrees to eliminate fast food just 1 meal per week (low intensity, or low "dose") will have different needs for medication changes compared to a patient who agrees to try a whole-food, plant-based diet for the next 30 days (high intensity, or high "dose"). The urgency and rate of medication deprescribing and follow-up with patients is determined by the intensity of the intervention.

LM practitioners report observing dramatic changes in need for medications among patients who are adherent to lifestyle interventions, necessitating early discussions about medication deprescribing. One example is a male patient who suddenly adopted a whole-food, plant-based diet on his own, before his first appointment with a dietitian, and without medical oversight of his blood glucose or medications. When he came into the appointment with the dietitian 1 week later, he had to be treated for hypoglycemia as his blood sugar was <40 mg/dL with glucometer testing in office. In this case, medication deprescribing efforts were a reactive response, rather than an established plan.

This example illustrates what may also happen if a patient with type 2 diabetes is adherent to dramatic dietary and lifestyle change and continues taking glucose-lowering medications at the same doses prescribed prior to the change. Many physicians who perform intensive LM treatments for patients taking medications with potentially dangerous overdosing effects routinely stop or greatly reduce the dosing as they begin therapeutic LM interventions to prevent those effects.

ADDITIONAL REASONS TO CONSIDER DEPRESCRIBING

Other examples of medication-induced negative consequences with reference to lifestyle changes include interfering with adherence to lifestyle treatments. Medications with gastrointestinal adverse effects could inhibit nutritional change (eg, reduction of appetite or increased nausea with glucagon-like peptide-1 receptor agonists). Medications causing hypoglycemia, hypotension, dizziness, myalgia, or fatigue could inhibit an increase in physical activity. A variety of medications have been implicated in sleep impairment; some examples include selective serotonin reuptake inhibitors, corticosteroids, and antihypertensives (eg, diuretics, beta blockers, and clonidine).[3] Certain medications can also inhibit weight loss,[4,5] cause weight gain, or worsen stress management efforts.[6] Some patients may experience such adverse effects when deprescribing is inadequate, discouraging them from adopting healthy lifestyle behaviors.

Other scenarios that may lead to the need for medication deprescribing include ineffectiveness of the medication to achieve the desired outcome, interaction with other medications or diagnosed conditions, medication duplications, unsafe use of the medication, and remission or resolution of the condition or symptom(s) being treated.

Existing Recommendations and Guidelines

It is increasingly well recognized that *de*prescribing is an essential part of *pre*scribing.[7] Polypharmacy is widespread in patients >60 years of age, with nearly half of these patients taking 5 or more medications. The process of discontinuing medications that are no longer needed or appropriate, or in some cases are harmful and/or contributing to new problems, has been described in multiple clinical publications.[7,8] The process for resolving polypharmacy is a deliberate, measured, 4-step approach[8] (see "4-Step Deprescribing Process," page eS102). Similarly, when patients of any age with lifestyle-related chronic disease make intensive lifestyle changes to address and remove the underlying causes of their disease (eg, adopting a healthy diet, getting regular exercise, replacing ultra-processed foods with unprocessed whole foods), the need for aggressive reductions in medications used to reduce serum glucose and blood pressure is typically quite urgent and must be part of the lifestyle change process.[9,10]

A significant barrier to deprescribing is the lack of evidence and guidelines for the deprescribing of many medications.[11-13] The majority of pharmaceutical research focuses on the benefits of medication addition, in contrast to the paucity of guidance outlining how and when medications should be stopped. Most research relevant to deprescribing is observational or retrospective; there is a lack of more rigorous randomized controlled trials. The lack is even greater when considering medication deprescribing in relation to LM treatment. Typically, deprescribing studies have been conducted in relation to polypharmacy, adverse drug reactions, or the advanced age of patients.[7] There is a need for more research in this field, particularly addressing the effects of therapeutic lifestyle interventions on specific medications. The American College of Lifestyle Medicine has identified this need and is encouraging and supporting research in this area.

Expert guidelines within traditional medicine may recommend a cross taper when switching from one medication to another (as with specific antidepressants, for example[9,10]), to avoid adverse or withdrawal events. A cross taper means that there would be a gradual reduction of the medication planned to be discontinued with a simultaneous gradual initiation of the new medication. With LM treatment, it may be necessary to utilize a treatment cross taper by replacing a medication with a lifestyle intervention, not another medication, to avoid overdosing effects as described above.

Most, if not all, providers have experienced scenarios that led to medication deprescribing, such as development

of an allergy, adverse effect, or patient-specific intolerance. Decisions to deprescribe for these types of events are typically encountered as a reactive response to the occurrence. Although this would be deemed appropriate and timely medical care, a proactive decision-making approach to care would be superior to a reactive response.

Considerations for Successful Deprescribing

The following approaches used by the authors and their colleagues have resulted in the best possible patient outcomes.

1. Schedule a visit specifically for medication review. This visit should involve a joint patient-provider discussion of what each medication is for and what lifestyle changes could be made to allow the patient to potentially reduce medication dosing.

2. Plan ahead for medication deprescribing in conjunction with lifestyle treatment to support patient safety (see "Planning for Medication Deprescribing in Lifestyle Medicine"), and communicate clearly to the patient that lifestyle changes must be continued for the reduction or elimination of medication dosing to be sustained.

3. Review the patient's current disease status and symptom levels, as this may affect how quickly to begin medication deprescribing. Medication reductions may not always be needed in conjunction with lifestyle change; consider, for example, a patient with diabetes who is currently uncontrolled with a glycated hemoglobin (A1c) of 10%. Lifestyle treatment may bring such a patient within normal limits. However, in a patient who is well controlled with an A1c of 7% on medication that could produce hypoglycemia, a plan to reduce or stop the medication upon initiation of lifestyle treatment may be needed to prevent hypoglycemia. Intensive lifestyle interventions usually require rapid cessation of medications with potential for hypoglycemia or hypotension.

Assessment of current medication adherence may reveal that there are medications that the patient is no longer taking, medications that the patient is taking differently than prescribed, or medications that the patient is taking that were previously unknown. If nonadherence to a specific medication is identified before initiation of lifestyle treatments, that medication may be discontinued early in treatment. Just as with medication, treatment outcomes differ dramatically based upon adherence vs nonadherence to lifestyle treatments.

4. Develop deprescribing goals that take into account risks and benefits. Goals may include avoidance of adverse events, such as hypotension or hypoglycemia.

5. Take a proactive approach with medication prescribing to assist with medication deprescribing later. Identify and communicate the duration of therapy planned for each medication, the time(s) when effectiveness will be assessed, and reason(s) that a medication may be discontinued before completion of the established duration of therapy.

6. Consider using a medication trial before making a permanent decision regarding indefinite prescribing when new medications are needed during treatment.

7. Be attentive to logistics. Medication formulation and packaging can affect the deprescribing process as well. The patient may be on dosage forms that do not easily allow for individual medication dosage reduction, such as an oral formulation that cannot be cut or split or an injectable formulation that is single-use (without the ability to measure a lower dosage). The only options for such medications may be to reduce dosing frequency or to discontinue the medication if dosage reduction is not possible. Some patients may also be taking a combination medication (2+ medications combined into 1 tablet). In this instance, some LM practitioners transition the patient to the separate medication formulations as individual orders to provide more individualized dosing and allow for the discontinuation of one medication while continuing the other.

8. Monitor patients over the long term to assess for sustained adherence over time (whether it be lifestyle or medication). Providing a clear expectation for follow-up assessment includes addressing why routine assessment and follow-up are necessary, who will be involved from the provider care team with deprescribing support (provider, nurse, or other care team members), how the follow-up will be conducted (face-to-face visit, virtual visit, phone visit, electronic medical

4-STEP DEPRESCRIBING PROCESS[8]

- Review all current medications
- Identify any inappropriate, unnecessary, or harmful medications
- Plan deprescribing with the patient
- Regularly re-review medications

PLANNING FOR MEDICATION DEPRESCRIBING IN LM

- Review all medications and adherence prior to deprescribing
- Consider patient values, goals, and motivating factors
- Review current disease status and symptom control
- Identify intensity of lifestyle intervention planned
- Consider involving a clinical pharmacist for additional support
- Establish expectations for patient self-monitoring
- Communicate expectations for patient follow-up

record messaging, etc), what will be assessed to determine if a medication can be deprescribed, and when follow-up assessments will occur. The frequency of the follow-up assessment plan may be time dependent (daily, weekly, or monthly), self-monitoring dependent (as an example, having fasting blood sugars <100 mg/dL for 1 week), or symptom dependent. The frequency may also be dictated by a patient's cognitive ability to follow instructions for self-management (deprescribing on the basis of an established set of symptoms or monitoring data points in between follow-up touchpoints).

ROLE OF PHARMACISTS

When navigating situations of uncertainty, consider involving a consultant pharmacist for assistance in structuring the medication deprescribing plan. Clinical pharmacists have specific knowledge and training regarding best deprescribing practices on the basis of available medication dosing, pharmacokinetics, and potential interactions affecting concurrent therapy (eg, reduced or enhanced elimination of other medications may occur when an interacting medication is discontinued or a lifestyle behavior is changed). Clinical pharmacists may also be able to help support patient monitoring and implementation of the deprescribing plan. If there is no direct access to a pharmacist through a clinician's hospital or clinic setting, it may be possible to create a partnership with a local community pharmacist.

PATIENT PREFERENCES AND PRIORITIES

When a patient's values, goals, and motivating factors are determinants of treatment adherence, taking these into account when deciding which medications to deprescribe first can be helpful. The focus of deprescribing efforts may vary based on preferences expressed by the patient (**TABLE 1**).

The power of LM treatment can provide renewed hope, as the patient is given some level of control over a dependence on medication, thus improving their quality of life.

PATIENT ENGAGEMENT AND PARTNERSHIP

Patient self-monitoring is critical when deprescribing. Monitoring may include identification of symptoms (eg, dizziness) that may serve as a signal that a medication dose may need to be reduced or stopped. When available, data from self-monitoring devices can be used to guide medication deprescribing. Examples include blood glucose monitors (glucometers or continuous glucose monitors) or blood pressure monitors. Self-monitoring devices not only improve the safety of deprescribing efforts but may also serve as a source of motivation for patients, as the data from these devices can provide direct and timely insights into the impact of lifestyle treatment(s). Patients will need education on both symptom identification and monitoring, as well as on the symptom-triggered action plan.

TABLE 1. **Considerations for commencing deprescribing based on patient preferences**

Patient Experience With Medication	Possible Deprescribing Priority
Low perceived benefit	Medications devalued by patient as a source of motivation
Cost reduction	Most expensive medications first to save money for patient
Daily pill burden feels high	Medication with multiple doses per day to reduce pill burden
Negative side effects	Medications with negative side effects to improve quality of life

Patient engagement is necessary for safe and effective medication deprescribing. Patient communications typically include instructions on how to taper medication, when and what to monitor, what to report to their provider urgently, frequency of follow-up assessment, and what will be assessed. Patients should have the opportunity to ask questions during visits and between encounters. Not only should patients verbalize their understanding, but using techniques such as teach-back, where the patient is asked to repeat the instructions in their own words, is also helpful to verify understanding.

Another valuable technique could be to give patients a symptom or data point (such as a specific blood pressure) included in the deprescribing plan and ask them how they would adjust a medication on the basis of that symptom or data point, if encountered. Testing the ability of patients to follow the instructions may identify the need for modifications or additions to the plan before it is put into action. As part of this process, it is also important to reassure patients that setbacks may occur due to a lesser degree of lifestyle change than was initially planned, but that this should not be viewed as a failure; adjustments to the original plan can be made to meet the patient where they are.

TO LEARN MORE

The American College of Lifestyle Medicine offers resources on this topic and others at https://www.lifestylemedicine.org/. ●

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Reimbursement as a Catalyst for Advancing Lifestyle Medicine Practices

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doi: 10.12788/jfp.0255

Advancing lifestyle medicine into current medical practice is predicated on strategies for reimbursement. Research studies demonstrate that intensive therapeutic lifestyle change interventions are both clinically efficacious and provide an impressive return on investment.[1,2] However, traditional fee-for-service (FFS) healthcare models often do not adequately value lifestyle medicine approaches or provide sustainable reimbursement for the time intensive, longitudinal interaction required for success. Fortunately, the reimbursement landscape continues to evolve—both for private and public payers. With the introduction of alternative payment models, value-based payment systems, and the Centers for Medicare & Medicaid Services (CMS) Innovation Center, many reimbursement programs are moving professional reimbursement away from the traditional FFS model toward population health management.[3] This trend will continue as the United States addresses rising healthcare costs.

Lifestyle medicine practice may be delivered through a variety of implementation strategies. To simplify the illustration of reporting requirements, we provide 2 common practice models: the independent or solo practitioner and the practice team approach.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

THE INDEPENDENT OR SOLO PRACTITIONER

As a solo practitioner or a single lifestyle medicine provider within a larger practice, lifestyle treatment strategies can be provided at each office visit. Preparing a claim for an office visit involves utilizing standard evaluation and management (E/M) codes 99202–99215. For an individual visit, select the code on the basis of time as outlined in the 2021 E/M coding update.[4] This strategy should include the time spent on the day of the visit reviewing the patient's chart, preparing educational materials, documenting the counseling interaction, and subsequent follow-up emails. However, these visits will be subject to deductibles and copays. If you are providing a service rated by the United States Preventive Services Task Force (USPSTF) as an A or B recommendation, include the modifier 33. The modifier identifies the service as preventive care according to the USPSTF guidelines and, therefore, the service is not subject to deductibles or copays.

Screenings and specific counseling are included as A or B recommendations by the USPSTF.[5] For example, colorectal screening may be differentiated from a diagnostic test by using modifier 33. Counseling for cardiovascular risk reduction as specified by the USPSTF may also be designated using modifier 33 along with an E/M code.

Modifier 33 is not appropriate to use with codes specifically designated as preventive care, such as tobacco use cessation counseling (ie, 99407), or preventive care counseling (99401–99404). It is important to be aware that the relative value units (RVU) and reimbursement rate for preventive care counseling codes are significantly smaller than the E/M codes. However, these preventive codes may be advantageous to use when billing these services as "incident to" where another member of the staff provides the service (eg, a health coach or other clinical staff).

For increased efficiency and effectiveness, the individual practitioner may choose to schedule multiple patients at the same time. This is called a shared medical appointment (SMA).

TABLE 1. **Commonly used billing codes in primary care lifestyle medicine**

Service	CPT/HCPCS	Insurance	Details
Office visit	99202-99215	All	This is the core activity of most lifestyle medicine practices. Use modifier 33 for preventive services
Chronic care management (CCM)	G0506, 99490	Medicare FFS	
Annual wellness visit (AWV)	G0438, G0439	Medicare	
Electrocardiogram	G0403	Medicare	
Depression screening	G0444	Medicare	
Alcohol screening and counseling	G0442, G0443	Medicare	
Tobacco screening and counseling	1000F, 99406, or 99407	All	
Lung cancer screening	G0296	Medicare	
Annual advance care planning	99497, 99498	All	Part of AWV; Z71.89
Remote physiologic monitoring (RPM)	99453, 99454, 99457, 99458	Medicare FFS	Also called remote patient monitoring

CPT, Current Procedure Code; HCPSC, Healthcare Common Procedure Coding System.

An SMA is a clinical encounter in which multiple patients receive education and counseling, physical examination, and clinical support in a group setting (see **Considerations and Requirements for Shared Medical Appointments**).[6,7] SMAs are especially advantageous when seeing patients with the same condition, allowing the practitioner to provide more in-depth education and spend substantially more time with patients than is practical in an individual encounter. SMAs may also be useful for family physicians who do not have the additional resources commonly found in a team-based practice. Standard E/M codes are utilized for reimbursement of the appointment for each individual patient.

Direct primary care (DPC) is an alternative to the FFS practice where the patient pays regular monthly, quarterly, or annual membership fees for all or most primary care services.[8] The DPC model creates more flexibility in treating patients and allows more communication options outside the office visit such as phone, text, email, and telehealth. This may be more conducive to providing lifestyle medicine interventions with a larger proportion of patients.

THE OFFICE TEAM PRACTICE

When lifestyle medicine becomes the driving force for a group practice, everyone has a role in delivering services that promote beneficial lifestyle modification. The team may comprise multiple other professionals in addition to the primary care providers (MD, DO, PA, or NP). Nurses, medical assistants, dietitians, occupational therapists, physical therapists, certified health coaches, health educators, and others can all help the practice achieve healthy lifestyle change for its patients.

The patient-centered medical home (PCMH) is a team-based practice model with the goal of lowering cost and improving patient outcomes. The PCMH may be an effective practice model for lifestyle medicine because it treats the patient holistically, provides patients extended access to providers, effectively coordinates care with other providers, and engages patients in their own care.[9]

A lifestyle medicine practice employs primarily the same types of visits and billing codes as a traditional practice, summarized in **TABLE 1**, including billing based on time spent as outlined in the 2021 E/M coding update. The annual wellness visit provides the opportunity to collect appropriate data to prepare a patient care plan for the year. Medicare allows patients with 2 or more chronic conditions and a chronic care plan (G0506) to be followed by a care manager (99490 for 20 minutes, 99439 for each additional 20 minutes up to 60 minutes total) each month throughout the year, tracking patient progress on the basis of the care plan (see **Chronic Care Management**). Certified medical assistants or certified health education specialists are well suited for this role.

Any Medicare patient may be enrolled in remote physiologic monitoring (RPM) irrespective of chronic conditions. RPM supports the regular use of devices to monitor patient biometrics each month such as weight, blood pressure, heart rhythm, or self-management of blood glucose. Appropriate codes include 99453, 99454, and 99457.

One tool that lifestyle medicine providers commonly employ is the group intensive therapeutic lifestyle change (ITLC) program. An ITLC program is evidenced-based, multimodal, and provides multiple sessions (usually 8 to 20) for

at least 60 minutes per session with a duration of 10 days or longer. Specific outcome metrics are measured, and consistent results are obtained, accounting for variation in populations, adherence, and engagement.[10] Such programs can be a powerful way to deliver education, counseling, and coaching of multiple patients at one time, thereby encouraging the adoption of healthy behaviors. Such programs offer the advantage of efficiency, adequate reimbursement, and the powerful group dynamic for patients to support one another. Several types of professionals may contribute to this effort. For example, a registered dietitian nutritionist (RDN) may provide an ITLC program as medical nutrition therapy (MNT, 97804). These programs may be a combination of individual and group visits offered throughout the year.

Frequently, it is most efficient for the primary care provider (PCP) to enlist help implementing an ITLC program from one or more assistants, including dietitians, behavioral therapists, nurses, or other health professionals. The PCP may report the encounter as an SMA with the other provider types providing the bulk of the content as "incident to" using regular E/M codes or as preventive care counseling.

Throughout the year, the PCP may extend an office visit with a one-hour extender code (99354) to have the patient spend an hour with a physical therapist, occupational therapist, or a behaviorist on the same day. Of course, there is also the option to refer patients for additional lifestyle support to appropriate provider types (eg, RDN, behavioral therapist) who are able to code for their own services.

DISCUSSION

The COVID-19 pandemic has highlighted the worsening health outcomes for individuals with underlying chronic medical conditions including obesity, hypertension, diabetes, heart failure, and chronic kidney disease.[11] There may be a silver lining emerging from this tragedy, as the disruption caused by the pandemic has also forced a re-evaluation of what services are reimbursed, with telehealth as a prime example. During the public health emergency, providing telehealth services expanded the reach of the family physician to their homebound patients. Telehealth reimbursement also expanded access to different components of lifestyle medicine through MNT, diet behavioral counseling, and preventive care counseling. As an evidence-based practice focusing on preventing and reversing many chronic conditions, lifestyle medicine is uniquely positioned to rise to the crest of the oncoming wave of change in healthcare, helping to cultivate resilience in patients for future health challenges.

Understanding organizational arrangements and reimbursement models available to practitioners is key to the ability to engage and grow lifestyle medicine practices. Though

CONSIDERATIONS AND REQUIREMENTS FOR SHARED MEDICAL APPOINTMENTS[12]

Social isolation and loneliness are major contributors to mental and physical illness and death.[13,14] SMAs offer an effective clinical answer to these problems. They can help deliver important lifestyle information en masse and in a psychologically safe and supportive setting. They can be a powerful way to support patients to make healthy behavior changes that would otherwise be difficult to make. When implementing SMAs, these considerations may be helpful:

- Get leadership support for implementation of SMAs
- Determine target audience and size of group (helps with theme of SMA)
- Design a strategy for your SMA to solve a need that patients feel
- Outline a curriculum tailored to the target audience and needs
- Consider making SMA groups permanent as this creates more psychological safety at the prospect of a longer-term relationship
- Prepare participation and privacy consent forms and processes
- Find a space to deliver SMAs. Generally, a physical space must be an existing medical facility with an NPI number
- Consider running your group virtually; however, note that this has multiple advantages (eg, lower cost, expandable) and disadvantages (eg, lack of face-to-face interaction)
- Market the SMAs to target audiences (eg, recruit patients), and encourage participants to recruit their friends
- Collect appropriate clinical data before and after the start of the group
- The most important metric to collect is attendance and retention. If participation drops off, you may not be engaging your audience
- Create a welcoming environment, keeping details (eg, location, time, facilitators) as consistent as possible
- Allow patients to do most of the talking, guiding the discussion as needed back to the curriculum
- Offer educational tools/resources
- Engage an assistant to help write a clinical note for every patient at each SMA
- Bill and code correctly. This is provider and intervention specific, but, generally, it is appropriate for providers to bill for a low- to moderately-complex medical visit (99213)

physician reimbursement is still largely on a FFS or salary basis, alternative payment model arrangements continue to increase. Newer reimbursement models are designed to measure and reimburse the assumption of risk and outcomes. Lifestyle medicine offers practitioners a new and effective approach to address the prevention and treatment of chronic disease while moving into new reimbursement models and improving population health.[15] Retainer-based care, newer capitation arrangements, PCMHs, and the use of group visits are models most closely aligned with the physician competencies of lifestyle medicine. The alignment of pay for performance, accountable care organizations, and shared savings models with the competencies of lifestyle medicine largely depend on how the measures and plan are structured. Conversely, early capitation arrangements (in which physicians assume 100% of risk for all care), and episode-based bundled payments do not substantially align with the PCP competencies of lifestyle medicine.

It is worth noting that value-based reimbursement continues to grow, including alternative payment models such as DPC and PCMH. As these new models for reimbursement become more ubiquitous, incentives may shift to prioritize and reward quality of care rather than quantity of care. This change in focus could drive the use of evidenced-based ITLC programs, allowing practitioners to provide increased time for patient education and goal setting while also allowing patients to support each other in managing chronic conditions.

CHRONIC CARE MANAGEMENT

A Centers for Medicare & Medicaid Services provision that reimburses providers for non–face-to-face services provided by any clinical staff member (including medical assistant, nurse, dietitian, and health coach) to patients who have two or more qualifying chronic conditions. The patient must verbally agree, and time spent by the clinical staff working on the patient's behalf must be tracked. A Chronic Care Management (CCM) agreement between a provider and a patient specifies the following:

- CCM involves a charge to Medicare depending on the time spent by providers or clinical staff
- Depending on the health plan, the patient may be responsible for 20% of the cost
- Patients have the right to stop CCM services at any time (effective at the end of the calendar month)

CCM billing algorithm

1. When the provider signs off on a new or revised care plan, bill G0506 (~$64, 1 time only)
2. Review minutes spent on chronic conditions by any clinical staff
   - If >90 minutes AND moderate medical decision making, then
     - Bill 99487 for CCM activity 60 minutes (~$94), and
     - Bill 99489 for each additional 30 minutes (~$47)
   - If < 90 minutes, then
     - Bill 99490 for first 20 minutes of CCM activity (~$42), and
     - Bill 99439 for each additional 20 minutes (billable twice, ~$37)

For more information, see the Medicare Learning Network booklet "Chronic Care Management Services" available at https://www.cms.gov/outreach-and-education/medicare-learning-network-mln/mlnproducts/downloads/chroniccaremanagement.pdf

SUMMARY

Lifestyle medicine aligns with the national movement toward value-based care and population health. As healthcare continues to move beyond FFS models, the value of lifestyle medicine will be recognized for its impact, efficiency, and both patient and provider satisfaction. Value-based care can support lifestyle medicine tools, such as ITLC programs and effective chronic care management processes. Efficient intervention strategies such as the SMA allow providers to offer more in-depth education and behavior change content to empower patients for lifestyle change. As payment and organizational models continue to evolve and healthcare reimbursement moves increasingly away from productivity measures toward value-based payments, lifestyle medicine will be well positioned to employ evidence-based strategies for the prevention, treatment, and reversal of chronic disease. ●

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A Framework for Culture Change in a Metropolitan Medical Community

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doi: 10.12788/jfp.0258

INTRODUCTION

Chronic illness is ubiquitous in the United States. More than 90% of adults aged 65 and over have at least 1 chronic disease, and the prevalence of multimorbidity, or multiple chronic diseases, is on the rise.[1] The pervasiveness of the most common chronic conditions—hypertension, hyperlipidemia, type 2 diabetes, coronary artery disease, obesity, and others—comes at a huge cost to individuals, families, and communities, measured in dollars and quality of life.[2]

It has been estimated that up to 80% of our most common and impactful chronic illnesses could be eliminated through optimizing lifestyle.[3] Poor diet is the leading risk factor for disability-adjusted life-years in this country,[4] and there is a growing body of evidence that a whole-food plant-based (WFPB) diet can halt the progression of, and even reverse, many of our most common chronic diseases.[5-8] A WFPB diet "consists of all minimally processed fruits, vegetables, whole grains, legumes, nuts and seeds, herbs, and spices and excludes all animal products, including red meat, poultry, fish, eggs, and dairy products."[9]

Unfortunately, there are many systems barriers that prevent lifestyle optimization. On the side of clinicians, primary care providers have limited time to spend with patients. The word "doctor" comes from the Latin *docere*—"to teach"—but modern medicine leaves inadequate time to teach patients about these "lifetime diseases" in any detail. Furthermore, nutrition education in medical schools is inadequate, with only 38% providing the minimum 25 hours recommended by the National Academy of Sciences.[10] This leaves physicians and other clinicians poorly equipped to discuss the root causes of illness with their patients and to counsel them appropriately. As a result, clinicians are often frustrated by the progression of chronic illnesses that could improve with lifestyle changes, as they prescribe more pills and procedures while their patients' illnesses progress and health deteriorates.

Patients also face many barriers that prevent optimal lifestyle approaches to reducing chronic disease. Issues of poverty, education, systemic racism, and other social determinants of health affect an individual's capacity for, and interest in, making lifestyle changes that will impact health.[11] Mixed messages from the media about the optimal diet may also leave patients confused and skeptical about the potential for diet to make a difference.

People do not make changes in a vacuum. Clinicians and their patients are social beings, and the changes that they make impact those around them. The work by Christakis and Fowler shows that when a person makes a change, it influences his or her community to 3 degrees of separation.[12] For example, if a person decides to stop smoking, her friends are less likely to smoke, as are her friends' friends, and her friends' friends' friends, even if they have never met. Similarly, medical practice patterns are significantly influenced

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DISCLOSURES

The authors have no conflicts of interest to disclose.

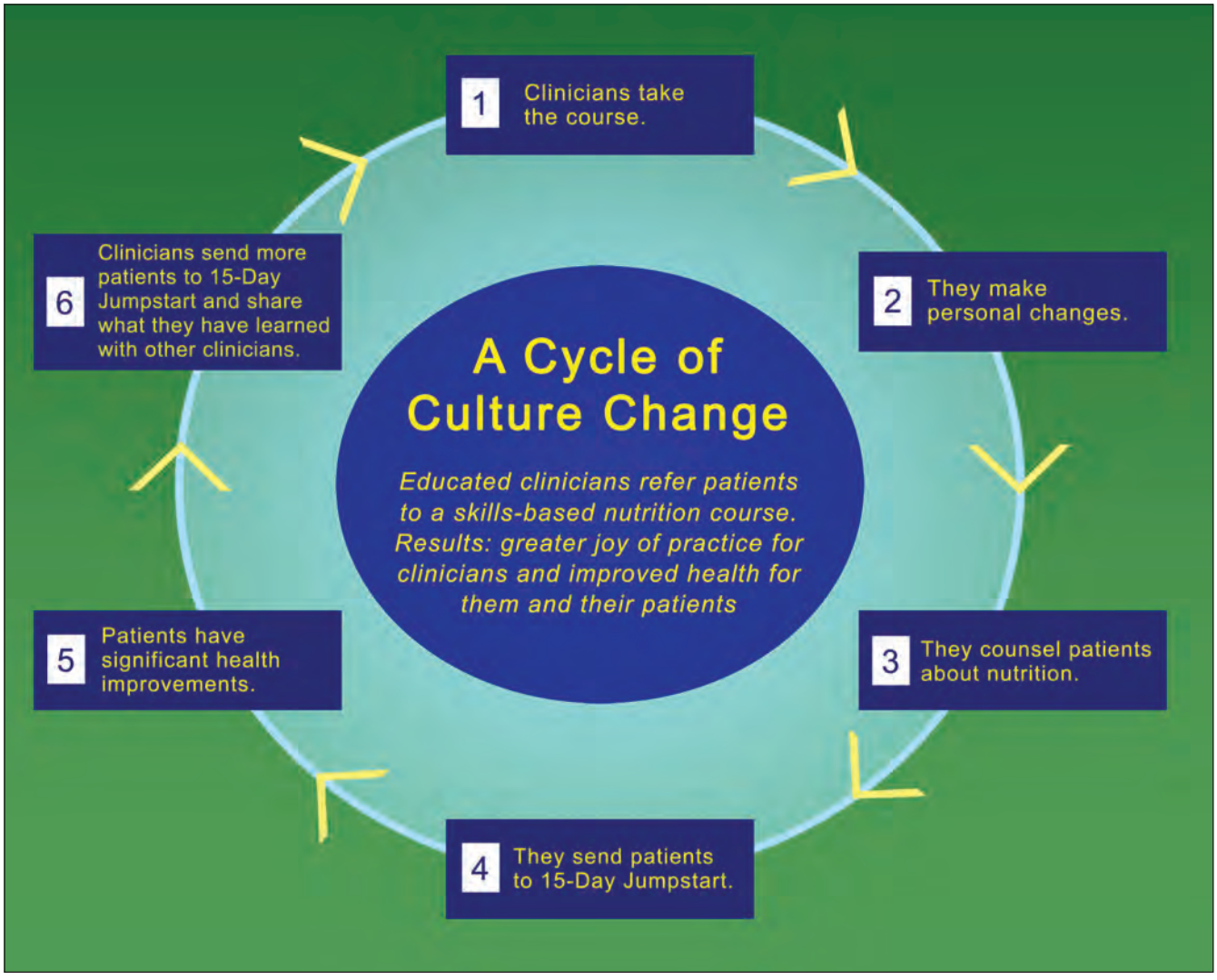
by the community that one practices in. The Dartmouth Atlas demonstrated that there are substantial practice variations around the country for issues as wide-ranging as beta-blocker utilization, treatment of early-stage prostate cancer, and management of diabetes.[13]

With these concepts in mind, we hypothesized that a 2-part program that first educated clinicians in nutrition and then invited them to refer patients to the 15-Day Jumpstart program, which provides similar nutrition education and the skills for moving to a WFPB diet, would (1) increase clinician confidence in their understanding of optimal nutrition for health; (2) increase the likelihood that clinicians would counsel patients about nutrition; (3) improve patient health; and (4) increase joy of practice.

METHODS

In 2019, the Rochester Lifestyle Medicine Institute received a grant from an area accountable care organization. The grant provided funding for participation in 2 previously established programs. Up to 40 clinicians were able to take a 6-week course on the benefits of a WFPB diet, and then each participant was able to enroll 5 of their patients in the 15-Day Jumpstart program. We envisioned that this would create a cycle of culture change, depicted in **FIGURE 1**. In this framework, clinicians would take the course and make personal changes. They would personally experience health benefits, making it more likely that they would counsel their patients about nutrition.[14] They would then refer their patients to the 15-Day Jumpstart program. Based on previously published results

FIGURE 1. **Framework for a cycle of culture change**



of 15-Day Jumpstart outcomes, their patients would be likely to experience rapid benefits in health,[15] which would encourage clinicians to send more patients to the program and to let their colleagues know about the impact of a WFPB diet on health.

6-week nutrition course

From 2012 to 2020, one of the authors (TDB) taught a 6-week, 12-hour certified medical education (CME) course entitled "A Plant-Based Diet: Eating for Happiness and Health." The course was an introduction to the medical, environmental, and social basis for adopting a WFPB diet, suitable for the general public but offered for 12 hours of professional credit to physicians and other health professionals. The course outlines the relationship between nutrition and health, reviewing the literature that evaluates the connection of different dietary components with common chronic medical conditions, as well as the evidence for the benefits of a WFPB diet. Another author (CHB) provided recipes and food samples.

15-Day Jumpstart program

A full description of the 15-Day Jumpstart program has previously been published.[15] Briefly, the 15-Day Jumpstart program was designed as a medically supervised, in-person program to give patients knowledge and skills to adopt an Esselstyn-compliant WFPB diet.[16] This is a very low-fat dietary pattern that focuses on vegetables, fruit, whole grains, and legumes, and excludes animal products, high-fat plant foods, and processed foods. Each program enrolled about 24 patients. Patients had biometrics and fasting labs evaluated on days 1 and 15, with 1:1 counseling by a medical provider. They participated in small group, multimodal education on days 1 and 15, with a cooking class on day 2 and a plant-based potluck lunch on day 8. Support was provided throughout the program via daily emails and an option to participate in a closed Facebook group. In April 2020, because of the pandemic, the 15-Day Jumpstart was moved to an online format. Results are reported for the patients who completed the in-person program.

Data collection

Data for both the nutrition course and the 15-Day Jumpstart program were collected as part of a quality improvement program. A protocol to analyze these data for publication was reviewed by the University of Rochester Research Subjects Review Board and determined to be an exempt study. Participating clinicians were surveyed at the end of the course and again at 3 months. 15-Day Jumpstart patients were surveyed on days 1 and 15 of the program, and biometric data (height, weight, vital signs, waist circumference) and point-of-care measurements (fasting glucose and cholesterol profile) were completed on those days as well.

Statistical analysis

Patient characteristics are presented using descriptive statistics. Differences in pre-post values were calculated via paired *t* tests for all continuous variables, using 2-tailed *P* values.

RESULTS

Thirty-seven clinicians participated in the 6-week nutrition course. Twenty-five of the 37 were physicians (67.6%); 8 were nurse practitioners, 3 were physician assistants, and 1 was a registered dietitian. At the end of the program, 25 participants completed a survey. The majority of survey respondents (24/25) stated that they felt confident about the type of eating pattern that was best for health, that they had learned about the role of nutrition in health (25/25), that they were more likely to counsel their patients about eating a WFPB diet (25/25), and that they were likely to talk to patients more about nutrition and chronic disease (24/25) **(TABLE 1)**. Furthermore, 96% of participants made changes to their own diet by the end of the course **(FIGURE 2)**.

The clinicians were surveyed 3 months later. Sixteen responded, and the majority noted that they had discussed nutrition, and particularly a WFPB diet, more with their patients. This, in turn, had led to more rewarding interactions with their patients **(TABLE 1)**. Seventy-three percent responded that they had patients who had experienced significant changes in their health as a result of being talked to and counseled about WFPB nutrition.

Patient characteristics are described in **TABLE 2**, and outcomes for patients are presented in **TABLE 3**. The average age was 56.5 years old, and patients were predominantly white and female, reflecting referrals to the program. Patients had significant weight loss (mean, 7.3 pounds; $P<0.0001$); blood pressure drop (reduction of 7.3 and 3.3 mm Hg in systolic and diastolic blood pressure, with $P=0.0002$ and 0.01, respectively); decrease in abdominal girth (mean, 1.0 inch; $P<0.0001$); drop in total, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) cholesterol (mean decrease of 26.2, 7.5, and 21.6 points, respectively, with $P<0.0001$ for each); and decrease in fasting glucose (mean drop of 8.4 mg/dL; $P=0.008$).

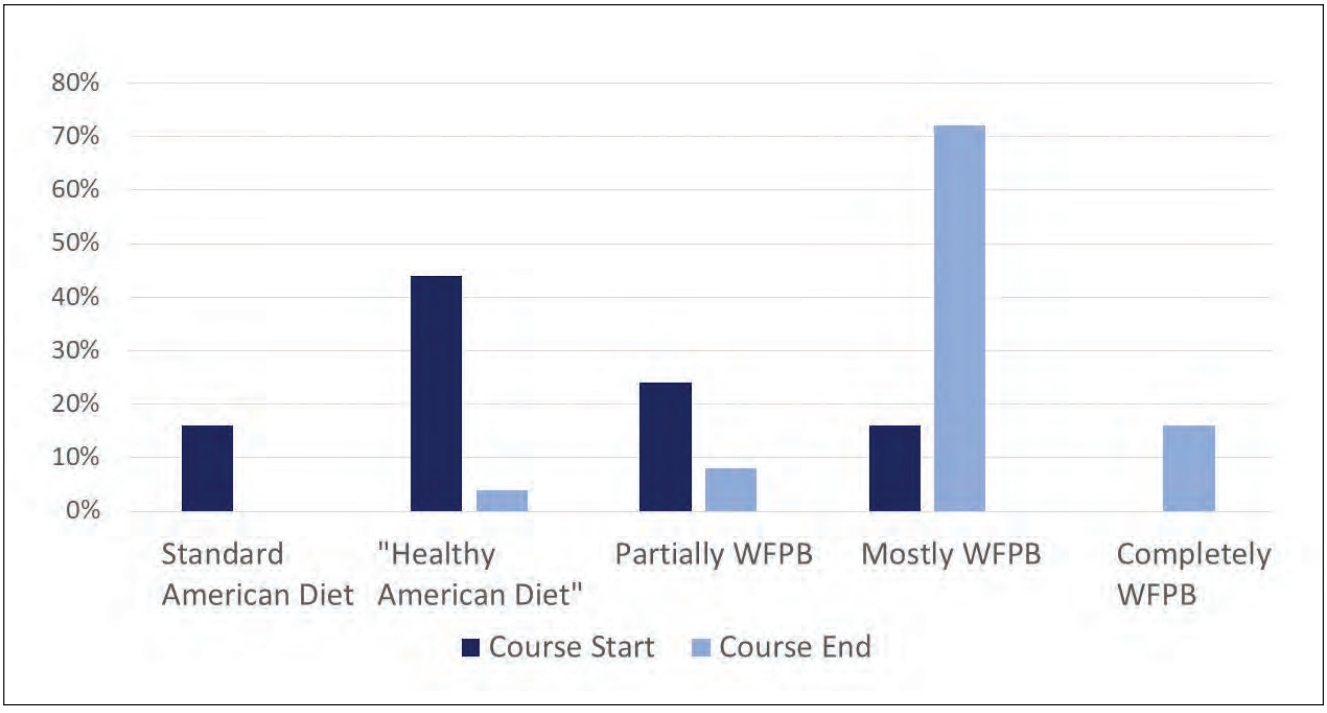
DISCUSSION

This paper presents a framework for fostering culture change in a medium-sized metropolitan area. Combining the education of clinicians with a short clinical intervention for their patients appears to be an effective way to increase awareness

TABLE 1. **Clinician survey responses at the completion of the course and 3 months after completion**

Clinician responses	% Agreeing or strongly agreeing
On completion of the nutrition course (N=25)	
"I learned important information about the role of nutrition in health."	100
"I am confident that I know about the type of eating pattern that is best for my patients' health."	96
"I am more likely to talk to my patients about the role of nutrition in chronic disease as a result of taking this course."	96
"I am more likely to counsel my patients about eating a whole-food, plant-based diet as a result of taking this course."	100
At 3 months (N=16)	
"I talk to my patients more about the role of nutrition in chronic disease as a result of taking Dr. Barnett's course 'Eating for Health and Happiness.'"	100
"I counsel my patients about eating a whole-food, plant-based diet as a result of taking Dr. Barnett's course 'Eating for Health and Happiness.'"	88
"Talking to my patients about the role of nutrition in chronic disease makes my work more rewarding."	88
"Talking to my patients about eating a whole-food, plant-based diet makes my work more rewarding."	81
"Being able to refer my patients to the 15-Day Jumpstart program makes my work more rewarding."	81

FIGURE 2. **Clinician self-reported dietary pattern at the beginning and end of the course[a,b]**



[a]N=25; 96% of clinicians made changes to their diet.

[b]A WFPB diet consists of minimally processed fruits, vegetables, whole grains, legumes, nuts and seeds, herbs, and spices and excludes all animal products, including red meat, poultry, fish, eggs, and dairy products.

TABLE 2. **Patient characteristics (N=74)**

Characteristics	No. (%)
Age, years (mean, 56.5; SD, 12.6)	
10-20	2 (2.7)
21-30	3 (4.1)
31-40	1 (1.4)
41-50	9 (12.2)
51-60	28 (37.8)
61-70	26 (35.1)
71-80	5 (6.8)
Sex	
Women	53 (71.6)
Men	21 (28.4)
Race	
White	50 (67.6)
African American	6 (8.1)
Native American	1 (1.4)
Two or more races	2 (2.7)
Hispanic	1 (1.4)
Did not specify	14 (18.9)
Pre-existing conditions	
Prediabetes	7 (9.5)
Type 1 diabetes	0 (0)
Type 2 diabetes	20 (27.0)
Hypertension	47 (63.5)
Hyperlipidemia	48 (64.9)
Cancer	6 (8.1)
Coronary artery disease	9 (12.2)

SD, standard deviation.

of the impact of nutrition on chronic disease and to create a feedback loop that increases the likelihood that clinicians will discuss plant-based nutrition with their patients. As far as we are aware, this is the first program to combine the education of practitioners with a clinical program for their patients as an approach to changing the culture and practice patterns of a community. The feedback that clinicians get, first from changing their own diet and then from seeing the benefits to their patients, makes it more likely that they will continue to make these recommendations to their patients.

The education of clinicians increases their confidence and makes them more likely to counsel patients. It can also increase their joy of practice—an important outcome at a time when clinician burnout is at a dangerously high level.[17] This finding is not surprising, given the principles of the self-determination theory of motivation and personality, which were incorporated into the 6-week nutrition course and were also used to develop the 15-Day Jumpstart program. Self-determination theory is built on the idea that 3 basic psychological needs have to be fulfilled in order to grow and to thrive: autonomy, competence, and relatedness.[18]

Autonomy is the urge to act volitionally in accord with one's own values and sense of self. Competence is the desire to be effective in dealing with one's surroundings. Relatedness is the desire to be connected to others and to experience caring. Clinicians decide to take this program and to counsel their patients using what they have learned; this fosters autonomy. Competence increases by understanding the literature and the rationale for plant-based nutrition and then experiencing improved patient outcomes as a result of counseling them based on this knowledge. Access to laboratory data to assess rapid changes from the start to the completion of the program increases a sense of com-

TABLE 3. **Patient clinical outcomes**

Measures (average)	n	Day 1	Day 15	Mean change	*P* value
Weight, lb	63	213.3	206.0	–7.3	<0.0001
Systolic blood pressure, mm Hg	63	131.7	124.5	–7.3	0.0002
Diastolic blood pressure, mm Hg	62	83.5	80.2	–3.3	0.01
Abdominal girth, in	61	44.5	43.4	–1.0	<0.0001
Total cholesterol, mg/dL	62	176.8	150.6	–26.2	<0.0001
Triglycerides, mg/dL	62	132.9	134.4	1.5	0.81
HDL cholesterol, mg/dL	61	54.8	47.3	–7.5	<0.0001
LDL cholesterol, mg/dL (calculated)	53	103.9	82.3	–21.6	<0.0001
Fasting glucose, mg/dL	62	114.1	105.7	–8.4	0.008

petence for both clinician and patient. And, finally, relatedness increases in working with patients to improve their chronic conditions.

It has been demonstrated that clinicians who practice a health habit are more likely to counsel their patients about that habit.[14,19] Ninety-six percent of clinicians who took the plant-based nutrition course and completed the survey made changes in their own diet.

Limitations

This study has some limitations. First, this is a small study based on a quality improvement database. Not all participants responded to survey requests, limiting generalizability. However, the responses to the surveys were overwhelmingly positive, so that even if participants with less favorable responses did not provide data, thereby leading to an overestimate of benefit, it is clear that the impact of this program was substantial.

Second, this program was completed in 1 midsized community. It is possible that in smaller communities—where there are fewer clinicians to share experience or reduced population density—there might be less of an impact. Similarly, larger communities might require a larger core group in order to make an impact. It will be important to replicate this approach in other communities to assess whether there is a similar impact.

Third, the onset of the COVID-19 pandemic necessitated a change in the format of the 15-Day Jumpstart program. With converting to a virtual format, many participants did not get complete pre- and post-data, and we, therefore, reported on the in-person participants only. Although the in-person program has been shown to be impactful,[15] further work needs to be done to evaluate the impact of the online version of the program and its outcomes relative to the in-person model.

Finally, participants in this program were self-selecting. It is likely that clinicians who were more interested in nutrition to begin with were more likely to take the course and were also more likely to engage their patients in discussions of nutrition. However, even if clinicians started off receptive to this program, they appear to have had room for growth. They made changes to their own eating patterns and experienced improvements to clinical practice. We expect these benefits to proliferate, as clinicians are likely to discuss both personal and patient successes with their colleagues and to influence their behavior as well.

Some clinicians and communities may be less receptive. The Dartmouth Atlas has demonstrated that there is significant variability in practice patterns in the United States.[13] Studies of social networks and personal connections give a rationale as to why that may be.[12] It is unclear how effective this program would be in less receptive communities. However, clinicians have colleagues across the country and the world, and interactions with them are easier than ever in our new era of online forums.

Additionally, the cost of the 15-Day Jumpstart program is not covered by medical insurance at this time. Grant funding has been obtained so that members of underserved communities can take the program free of charge, but those who are not supported by grant funding must pay for the program out of pocket. Although efforts have been made to minimize the cost of the Jumpstart program (currently $0 to $149, depending on grant coverage), it may still be unaffordable to many, in turn limiting the uptake, accessibility, and generalizability of this approach.

Further evaluation is needed to determine the duration of impact of the 15-Day Jumpstart program on patient health, and whether participants remain adherent to dietary pattern.

In summary, a program that uses the 2-part approach of educating clinicians and providing an opportunity for patients to experience rapid health changes through changing their diet may provide a template for encouraging culture change by creating a feedback loop with multiple benefits. These benefits include improved patient health and higher job satisfaction for clinicians. ●

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An Approach to Nutritional Counseling for Family Physicians: Focusing on Food Choice, Eating Structure, and Food Volume

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doi: 10.12788/jfp.0272

INTRODUCTION

Incorporation of nutritional counseling as part of routine medical treatment is more urgent than ever. While the prevalence of obesity[1] and other lifestyle-related disease[2-6] in the United States is increasing, dietary risk factors for children and adults continue to worsen. More than one-third of American children and adolescents (ages 2 to 19 years) consume fast food on any given day, and more than 11% consume more than 45% of their total daily calories from fast food.[7] Ninety-five percent of Americans older than the age of 2 years exceed the recommended intake of solid fats and added sugars.[8] Sedentary behaviors are pervasive, and time spent sitting every day is increasing.[9] Despite our best efforts to diagnose illness early, prescribe medications, and provide appropriate procedures, almost all patients with lifestyle-related conditions like diabetes, obesity, and cardiovascular risk factors and diseases experience worsening illness, which over time leads to functional decline, disability, and premature death. As 1 of 6 lifestyle medicine domains (the others being physical activity, stress management, restorative sleep, avoidance of risky substances, and positive social connections), healthy nutrition is a key area for intervention and is relevant to many patient-provider conversations in primary care.

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DISCLOSURES

The author receives royalties from general interest books about nutrition. He receives research funding from the Highland Hospital Foundation, which has received philanthropic donations from nonprofit organizations, including the T. Colin Campbell Center for Nutrition Studies, and various individuals.

Evidence suggests that changing diet and lifestyle can be a powerful intervention. For example, observational studies show that a combination of healthy lifestyle factors is associated with an 80% reduced risk of coronary events,[10,11] a 50% reduced risk of stroke,[11,12] and a 90% reduced risk of type 2 diabetes.[11] Stringent lifestyle intervention programs have demonstrated weight loss,[13] regression of atherosclerotic lesions,[14-16] and successful treatment of type 2 diabetes.[17,18]

And yet, for physicians and advanced practice providers, there appears to be little in the way of a consensus framework for counseling patients on the application of optimal nutrition. Approaches to adopting improved nutrition vary dramatically. Some emphasize continuous daily calorie monitoring and restriction via portion control, without significant restriction on the types of foods that can be consumed. Others focus on timing of eating, including various intermittent fasting regimens. And still others are exemplified by dietary strategies that focus on limiting or avoiding consumption of entire food groups. Examples include the ketogenic diet[19] and a low-fat, vegan diet.[20]

The purpose of this paper is to propose a simple and practical, unified framework that combines core nutritional behaviors underlying these disparate approaches and applies them to counseling individual patients for beneficial outcomes. The common dieting approaches mentioned previously, in their simplest form, are interesting but are often singularly focused on one aspect of healthy nutrition to the exclusion of others (**TABLE 1**).[21,22]

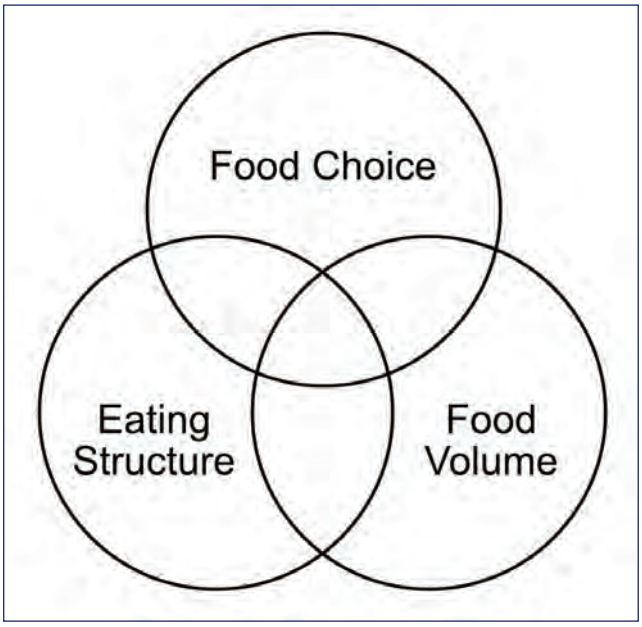
A UNIFIED FRAMEWORK

A unified framework of nutrition application includes 3 distinct, but interrelated, approaches: (1) food choice, (2) eating structure, and (3) food volume (see **FIGURE 1**). Many popular diet approaches focus entirely on 1 component, in part

TABLE 1. **Typical nutritional approaches and common limitations**[21,22]

Dietary pattern/diet advice	Limitation
Continuous calorie counting/portion control	Paired with message that no food is "off-limits"; permission given to eat any type of food in the name of "moderation"[21]
Intermittent fasting	No nutritional advice beyond calorie restriction during certain periods of time[22]
Dietary patterns with food restrictions (keto, vegan)	Lack guidance around changing time of eating or portion sizes

FIGURE 1. **The 3 components of optimal nutritional counseling**



because following those plans appears to be easier to would-be dieters. In the author's and colleagues' clinical experience, though, optimal outcomes require addressing all 3 components. Questions to quickly assess each of these components in a patient evaluation are suggested in **TABLE 2**. By better assessing behaviors and identifying targets for nutritional changes, family physicians can better counsel patients, particularly when paired with aspects of motivational interviewing and the establishment of SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals.

FOOD CHOICE

Food choice is, very simply, the food that someone chooses to consume. This is the most powerful, and perhaps also the least marketable, component to change, which may be why many popular weight loss programs do not explicitly say to strictly avoid foods, and instead promote messages embracing "everything in moderation."

Specific health goals (eg, weight loss vs treating atherosclerotic heart disease) may involve slight differences in the emphasis on which foods or dietary patterns may be employed. However, overall dietary recommendations are more similar than different. The American College of Lifestyle Medicine recommends an "eating plan based predominantly on a variety of minimally processed vegetables, fruits, whole grains, legumes, nuts and seeds" for treatment and potential reversal of related illness.[23] This is similar to the recommendations of the American Institute for Cancer Research, which advises eating "a diet rich in whole grains, vegetables, fruits, and beans" with "at least" two-thirds of dietary intake being from plant foods to prevent cancer and maintain a healthier life,[24] as well as other professional guidance emphasizing unrefined plant foods.[25-29]

Consistent with these recommendations, but with a focus on weight loss, the concept of energy density, or caloric density, provides a useful structure to optimize food choice. Energy density simply refers to the amount of energy, or calories, in a standard weight or volume of food. **FIGURE 2** shows rough approximations of calorie content for various groupings of foods.[30]

In weight-loss approaches focused on calorie restriction, arguably the greatest barrier to long-term success is increased appetite due to hunger,[31] which reflects an increase in ghrelin production as weight is lost.[32] The biological drive to consume more calories is ultimately too strong to resist for all but a small proportion of people who are trying to lose weight. This is supported by the finding that patients with obesity who use programs principally targeting calorie restriction regain more than 30% of their lost weight at 1 year and 75% of their lost weight within 5 years, on average.[33] Although this finding does not clearly attribute the weight regain to any specific physiologic factor of their weight loss approach, one obvious hypothesis is that a calorie-restriction plan that leads to any degree of chronic hunger is intolerable.[34-36] Thus, whatever plan people put into place must minimize long-term hunger.

Choosing foods lower in energy density and higher in bulk, fiber, and water may reduce hunger by blunting an increase in ghrelin. In a single-meal study, a high-carbohy-

TABLE 2. **Examples of assessing behaviors and targeting nutritional changes for a patient likely to be consuming excess calories**

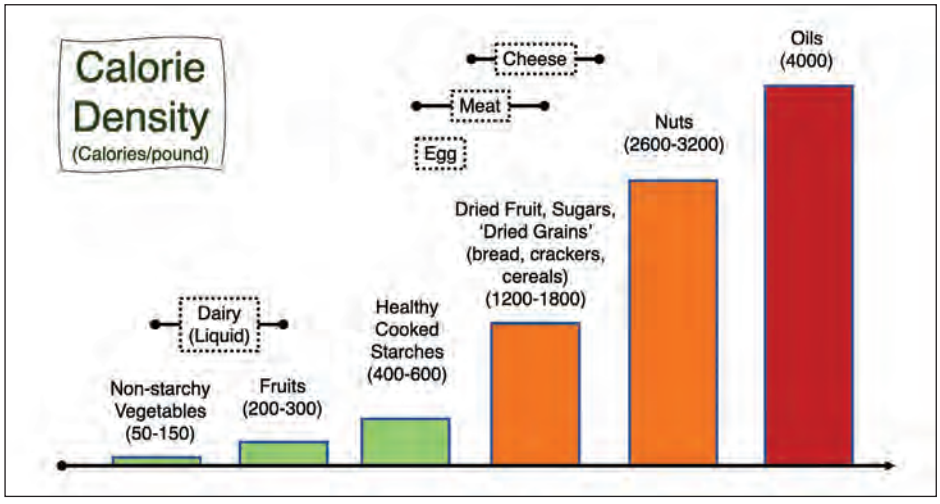
Questions	Rationale	Possible behavioral targets (discussed with motivational interviewing style)
Food choice		
24-hour food recall: What did you eat for dinner, lunch, and breakfast yesterday?	A food recall provides a more realistic picture than having a patient volunteer what they "usually" eat, which may be colored as much by intentions as by actual choices.	Target misinformation about what foods to avoid and what foods to enjoy, using calorie density framework. (For example, a patient may think that brown rice is problematic but that cheeseburgers are fine.) Explore ways a patient may want to change food choice.
Eating structure		
Did you have any snacks in the afternoon before dinner?	Understand if the patient consumes excess calories from snacking.	Discuss approaches to having regular meals and minimizing snacking on unhealthy foods.
Did you eat any food after dinner last night?	Understand timing of food choices to understand contributing factors (eg, emotional influence, work schedule).	Explore what would need to change to address barriers relating to schedule.
Do you eat with other people in your house?	Understand influence of others living with the patient.	Discuss conversations about health goals and dietary changes with significant others.
Food volume		
Do you ever eat what would be commonly recognized as an excessive amount of food in a short period of time? Do you eat past fullness? Do you ever feel like you lose control of eating during these times, and then feel ashamed or guilty? Have you ever counted calories, and if so, do you know how many calories you are eating? Are there times of day you are regularly hungry?	Identify binge eating behaviors. Since many people struggling with weight have done weight-loss plans involving counting calories, some people have some understanding of their average calorie intake. Understand whether some meals may be too large and others may be too small, if they are routinely hungry at certain parts of the day.	Consider referral to therapy involving a professional experienced in treating disordered eating and related emotional concerns. Consider tracking intake with a popular program (eg, MyFitnessPal, LoseIt, FatSecret, Chronometer). Problem-solve ways to eat more food if regular hunger is present (which is unsustainable and leads to poor food choices).

drate meal blunted ghrelin rise compared with a high-fat meal.[34] In a 12-week study, a low-fat dietary pattern resulted in no increase in ghrelin or appetite despite an average 5% body weight loss.[35] And in a 1-year cohort study, maintenance of weight loss and avoidance of weight regain was found to be greater in subjects with lower rises in ghrelin, and subjects with lower rises in ghrelin were eating more low-energy-density foods.[36] In a study of successful dieters in the National Weight Control Registry, those who started consuming more energy from fat, the most energy-dense food available, were the individuals who had weight regain.[37] And in one randomized controlled study of a low-fat vegan dietary program, which focused on choosing foods that are lower in energy density, weight loss peaked at month 6, but, remarkably, participants maintained 100% of their weight loss at 1 year.[13] In short, these studies demonstrate that lowering the energy density of dietary intake allows for individuals to consume a higher volume of food while still consuming reduced calories. The subjective experience of hunger is blunted, and it becomes easier to maintain satiation with lower calorie intake.

Not all studies find improved success with a lower-fat approach, but a focus on fat alone may not reflect dietary patterns that are lower in calorie density overall if processed, low-fat food is emphasized. Additionally, findings may be more related to the effectiveness of intervention implemen-

tation and compliance, rather than the efficacy of the nutritional plan applied strictly.[38] Another challenge of the calorie-density model is the success of the very low-carbohydrate approach, which emphasizes consuming foods that are high to very high in energy density (fats and meats).[39] However, although the success of programs at the extreme of carbohydrate restriction is at odds with the calorie density approach, general population observations are supportive of the benefit and value of the calorie-density framework. Populations consuming high-energy-density diets tend to have more nutrition-related problems, including overweight and obesity.[40-43] And even at the extreme, a strictly applied ketogenic diet has been found to lead to higher calorie intake than a low-fat, plant-based diet that is lower in calorie density.[19] It is also inadvisable to overlook evidence from high-quality, prospective epidemiologic observations of negative effects on morbidity and mortality associated with higher intake of animal protein.[44-46]

FIGURE 2. **Calorie density of various food groups**[30]



Calorie amounts based on sampling of various foods in the US Department of Agriculture FoodData Central.

Changing food choice is difficult, as it often involves challenging lifelong taste preferences. The change usually means consuming food that one does not find to be as enjoyable as the richer food that may have helped to create poor health in the first place. And one cannot continue to routinely rationalize consumption of certain rich foods in times of excitement, celebration, anxiety, boredom, stress, depression, or any other emotional state. "Comfort" food consumed during these times is high in caloric density and rich in added sugar, salt, and/or fat. People do not suffer a stressful day and feel the urge to relax in the evening with a bowl of steamed broccoli. In this way, the effort to change food choice could be described as challenging not only taste preferences, but one's "relationship" with food.

Although these challenges can be overcome in a process not unlike the way a smoker stops smoking or a high-caffeine consumer cuts back on caffeine, they present uncommon difficulties for patients. This is likely to be why changing food choice is only obliquely recommended in most popular diet programs. It's not an approach that seems as easy or appealing as eating whatever you want in a "moderate" way, even for people motivated to lose weight. Family physicians need to be prepared to enter a conversation with patients about these challenges head-on. It can be of use to share the following with patients:

- Taste preferences are strongly affected by previous consumption patterns and change over time. With continued effort, healthy food can start to "taste good."[47,48]
- Focusing on changing the food environment (food in the home or at work) is crucial. Make the healthy choice the much more obvious, convenient choice, and less willpower is required to stick to behavioral goals.[49]
- Avoiding excessive hunger can help stave off cravings and feelings of loss of control.[50]

EATING STRUCTURE

Eating structure encompasses characteristics of intake, such as when and where people eat, how often they eat, and how they structure their meals and snacks throughout the day. Eating structure has been studied extensively. For example, about 20% of Americans regularly skip breakfast,[51] and skipping breakfast has been associated with increased risk of cardiovascular disease and death from any cause.[52] Similarly, late-night eating has been associated with increased risk of poor metabolic health.[53] It is possible that both behaviors co-occur in the same people, because if one underconsumes calories early in the day, one may be predisposed to overcompensate with excess calorie consumption late in the day or evening.

Eating structure appears to be important in childhood and adolescence as well. Having more frequent structured family mealtimes is associated with improved health in children and adolescents.[54] Snacking has become more common among both adults and kids, with snacks contributing 27% of calories in children's diets.[55,56] The effect of snacking on

weight is mixed and may be determined by the types of foods chosen as snacks.[56] Unfortunately, most snack calories that children consume come from obviously unhealthy food such as desserts, sweets, and salty snacks.[57]

Because day-to-day eating structure may affect health, intentional interventions targeting eating structure have become increasingly popular. Intermittent fasting can refer to a wide variety of protocols and has been increasingly studied in relation to weight loss and metabolic health. Results suggest that episodic restriction of calorie intake can lead to weight loss and other metabolic improvements,[22,58] but it may not be more effective than programs that continuously restrict calorie intake.[59-61] Subject dropout from these studies of intermittent fasting can be as high as 38%, suggesting that this approach may not be as easy to adhere to as is commonly touted.[61]

In summary, unhealthy eating structures (eg, skipping breakfast, late-night eating, less frequent family mealtimes, snacking on energy-dense foods) have been associated with poorer health outcomes. But protocols focused on eating structure alone, as in various intermittent fasting studies, are not the easy-to-comply-with panacea they are sometimes portrayed to be.

For individuals who have an eating structure characterized by eating at unplanned, irregular intervals, not eating regular meals, or snacking mindlessly, it is likely to be critical that they address this aspect of their eating habits, regardless of food choice or food amount. But focusing on this alone is unlikely to be sufficient to achieve optimal results.

FOOD VOLUME

Restricting food volume, embodied by portion control or calorie counting, has been the most employed weight loss strategy over time. One marketing approach of focusing on a principal strategy of calorie restriction may make it more appealing—namely that people can continue to eat anything they want, including their favorite, rich foods, but that by employing the appealing concept of "moderation" they can still achieve their health goals. An article on the website of one popular weight loss program states, "What's your favorite 'forbidden food'? Chocolate? Cheese? Chicken parm? Whatever you love, love, LOVE … the flexibility of [our program] means that you don't have to banish them from your life."[62]

The appeal of this approach is further reinforced by the fact that some people can be successful, at least in the short run. Many individuals in intensive, structured weight loss programs, some of which use meal replacement products, can lose a large amount of weight with calorie restriction approaches. Unfortunately, they often regain most of their lost weight within a few years.[33,63,64]

Regardless of the appealing marketing message, however, it is difficult to restrict calories by continuing to eat the same energy-dense foods but just "eating less" of them. Small portions of energy-dense food are less satiating than larger portions of less energy-dense food. In a single-day study,[65] a breakfast high in fat and low in weight and volume resulted in less satiation than a bulkier, high-fiber, high-carbohydrate breakfast even though both breakfasts contained the same number of calories. Subjects enjoyed the taste of the smaller, high-fat breakfast, but because it was less satiating, they went on to consume more calories during the rest of the day than subjects consuming the larger, high-fiber, high-carbohydrate breakfast.

Not only are calories from foods high in energy density likely to be less satiating, given that these foods come in smaller weights and volumes, but evidence suggests that they may have addictive characteristics that, in turn, may encourage overconsumption.[66-69] The combined qualities of these foods being less filling and more addictive are likely to make it extraordinarily difficult over a long time frame to reduce food volume without a serious effort to significantly reduce, or even avoid, certain energy-dense foods.

Although a singular focus on food volume may be suboptimal, food volume clearly is important to consider in nutritional counseling. For many, merely changing their food choice or eating structure may not be sufficient to achieve the most dramatic outcomes. Even if a patient is choosing foods that are lower in energy density, it is still possible to regularly overeat, thus limiting the benefit of an effort at dietary change. Binge eating disorder is the most common eating disorder, with a lifetime prevalence estimated to be 2.8% of Americans.[70] There are likely many more people who may not meet the full criteria for the eating disorder but tend to struggle with similar behaviors. It is possible that those who are habituated to the feeling of consuming excess calories at most meals, on most days, for most decades of their life may need to explore what it feels like to be "comfortably" full rather than overfull.

It may be useful to use calorie monitoring for patients with a history of high-volume eating for a period as they work to understand what they need to be comfortably full. The revised Harris-Benedict equation and the Mifflin-St. Jeor formula are examples of standard formulas to estimate resting metabolic rate,[71] and are embedded in many common metabolic rate calculators found on the Internet. These equations may provide a rough estimation of calorie requirements. Of course, there are a variety of individual variables that might lead any one patient to have a significantly different metabolic rate than what an equation might predict.

By monitoring calorie intake for short periods of time

along with sensations of hunger and fullness and subsequent weight changes, individuals may come to understand where they may struggle with eating larger-than-necessary volumes, or mindless eating independent of any hunger. This may be particularly useful for individuals who have benefited from changing their food choices but have reached a plateau and are looking to further maximize their benefits. Physicians can suggest apps or other resources to help patients evaluate their potential overconsumption. Popular smartphone apps to track calorie intake are widely available and include MyFitnessPal, LoseIt, FatSecret, and Chronometer, among others.

IMPLICATIONS FOR RESEARCH AND FAMILY MEDICINE PRACTICE

Ultimately, changing one's dietary choices and behaviors is difficult. And although many people believe they know how to define a healthy diet, many people don't use evidence-based strategies to target specific changes in their diet. The ideas presented in this commentary might be described as common sense that is intuitively easy to understand, but one does not need to look very far in the marketplace to see a variety of contrasting ideas at odds with the strategies outlined here. The wide variety of approaches, ranging from vegan to ketogenic, to low-calorie meal replacement, to intermittent fasting, perpetuates confusion. When assessing a patient's current behaviors and then offering advice, the framework of food choice, food volume, and eating structure can provide a systematic, comprehensive approach to identifying areas that might benefit from adjustments. Food choice is the most important area to optimize based on evidence related to satiation and calorie consumption as it relates to energy density.

The approach described here, of course, is limited to changing dietary intake. Any individual patient will have interrelated non-nutrition factors that also heavily influence their dietary behaviors. Exercise, sleep, stress management and mental health, relationships, medical conditions and medications, food insecurity, socioeconomic factors, as well as other substance use are obvious examples of non-food health behaviors that may influence eating behaviors. Incorporating an understanding of these influences is critical to offering a holistic approach to dietary counseling.

Ultimately, the American food environment strongly promotes unhealthy choices and behaviors. Americans have been consuming larger portions and significantly more calories during the past several decades.[64,72] Because of health complications resulting from these trends, it remains an important and worthwhile effort for any individual to improve their diet and lifestyle. For those struggling with excess weight, losing as little as 5% of total body weight is associated with improvements in blood sugar, cholesterol, blood pressure, healthcare costs, mobility, knee pain, menstrual irregularities, and fertility, among other outcomes.[73]

For the family physician, it is encouraging that individual patients *are* interested in improving their diet and lifestyle. On any given day, more than 17% of Americans are on a special diet, with the majority of these diets related to weight loss.[74] To effectively treat our patients suffering from any one of a variety of common lifestyle-related conditions, and to effectively address their interests and concerns, it is critical that all healthcare providers, not just dietitians, have some familiarity with diet and lifestyle coaching. And although dieting may be derided due to the common occurrence of weight regain, it's also clear that a substantial proportion of dieters maintain clinically significant diet and lifestyle changes over a long-term time frame. In the National Weight Control Registry analysis of almost 3000 successful dieters, 87% of them were still maintaining a 10% weight loss at years 5 and 10.[37] Family physicians are on the front line of nutrition education for an audience that may or may not have previously demonstrated interest. Sustainable, long-term lifestyle change with strategic improvements in food choice, food volume, and eating structure offers a more comprehensive toolkit than most fad diets or dieting programs today and can be incorporated as part of routine medical care. ●

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