

# Advancing Lifestyle Medicine in New York City's Public Health Care System

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## Abstract

Chronic diseases are the leading cause of death and disability in the United States, and much of this burden can be attributed to lifestyle and behavioral risk factors. Lifestyle medicine is an approach to preventing and treating lifestyle-related chronic disease using evidence-based lifestyle modification as a primary modality. NYC Health + Hospitals, the largest municipal public health care system in the United States, is a national pioneer in incorporating lifestyle medicine systemwide. In 2019, a pilot lifestyle medicine program was launched at NYC Health + Hospitals/Bellevue to improve cardiometabolic health in high-risk patients through intensive support for evidence-based lifestyle changes. Analyses of program data collected from January 29, 2019 to February 26, 2020 demonstrated feasibility, high demand for services, high patient satisfaction, and clinically and statistically significant improvements in cardiometabolic risk factors. This pilot is being expanded to 6 new NYC Health + Hospitals sites spanning all 5 NYC boroughs. As part of the expansion, many changes have been implemented to enhance the original pilot model, scale services effectively, and generate more interest and incentives in lifestyle medicine for staff and patients across the health care system, including a plant-based default meal program for inpatients. This narrative review describes the pilot model and outcomes, the expansion process, and lessons learned to serve as a guide for other health systems.

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In the United States, chronic disease is the leading cause of death and disability and accounts for 85% of all health care costs.<sup>1</sup> Although an aging population and social and environmental conditions are contributing to the rise in chronic diseases such as cardiovascular disease (CVD), type 2 diabetes mellitus (T2DM), and hypertension, lifestyle and behavioral risk factors also play a key role.<sup>2</sup> In fact, 80% of premature deaths are attributable to 3 behavioral risk factors—tobacco use, poor-quality diets, and lack of physical activity.<sup>3,4</sup> Moreover, studies demonstrate that individuals who have a healthy diet, exercise regularly, maintain a healthy body weight, and avoid tobacco experience a 78% reduction in the risk of chronic disease

compared with individuals who have none of these factors.<sup>5</sup>

Lifestyle medicine (LM) is an approach to preventing and treating lifestyle-related chronic diseases using evidence-based lifestyle modification as a primary treatment modality.<sup>6</sup> The American College of Lifestyle Medicine (ACLM), the leading professional society in this field, encourages changes across 6 pillars: a whole-food, predominantly plant-based eating pattern; physical activity; stress management; restorative sleep; positive social connections; and avoidance of substance use. A strong body of evidence supports the benefits of LM in preventing and treating CVD, hypertension, T2DM, and other lifestyle-related chronic conditions.<sup>7,8</sup> When an individualized

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## ARTICLE HIGHLIGHTS

- Dedicated community health worker positions have been created for each lifestyle medicine (LM) program to address health determinants, including food insecurity, transportation issues, and technology issues, which can make meaningful change difficult if unaddressed.
- Group visits via shared medical appointments (SMAs) reinforce concepts shared in individual appointments, capitalize on peer teaching and learning, and improve revenue capture.
- We aimed to identify and disseminate best practices in the implementation of replicable and scalable LM programs and to contribute to the science of the efficacy of LM interventions.
- The nutrition and LM teams are promoting interest in healthy eating and positive lifestyle change among the approximately 45,000 systemwide staff; in doing so, this may also reverberate into benefits for patients.
- In addition to being health promoting and well-received by patients, the entrees that feature plant-based protein have been shown to cost \$0.59 less per meal compared with the animal-based protein dishes.

LM program is combined with tools to address social needs and other upstream causes of illness, whole populations may benefit—particularly underserved communities that already face a disproportionate burden of chronic disease.

NYC Health + Hospitals, the largest municipal public health care system in the United States, serves more than 1 million patients annually across the 5 boroughs of New York City (NYC), regardless of immigration status or ability to pay. Approximately 35% of patients have Medicaid and 28% are uninsured; more than 40% are born outside of the United States. In alignment with its commitment to reducing health disparities and providing equitable, high-quality care, NYC Health + Hospitals is a national pioneer in incorporating LM systemwide. In this article, we offer a narrative review of the LM initiatives of NYC Health + Hospitals, from pilot programs to a citywide expansion, in the hopes of providing a blueprint that other health systems can leverage in designing their own LM services.

## NYC HEALTH + HOSPITALS' PILOT LM PROGRAM

**Background**

In 2019, a pilot LM program was launched at NYC Health + Hospitals/Bellevue, one of the system's 11 acute-care facilities. The Bellevue Plant-Based Lifestyle Medicine (PBLM) program aimed to improve cardiometabolic health in high-risk patients through intensive support for evidence-based lifestyle changes, including a healthful plant-predominant eating pattern, physical activity, sleep, stress reduction, social connection, and the avoidance of substance use.<sup>9-11</sup> The primary goals of the pilot were to determine the feasibility of such a program and the demand for its services. Plant-based nutrition was emphasized as the dietary strategy given the wealth of evidence supporting this approach; a related goal was to increase awareness of the benefits of plant-based nutrition among providers and other staff throughout the health system.<sup>12-16</sup> Advocacy from the Brooklyn Borough President's Office was key to establishing the PBLM program.<sup>11</sup>

**Initial Program Structure**

The PBLM program was set within Bellevue's Adult Primary Care Center. LM providers' role was to address patients' lifestyle-related chronic conditions along with patients' primary care providers, but with a clear focus on behavior change. Eligibility criteria included T2DM, prediabetes, heart disease, high blood pressure, high cholesterol, and/or excess weight (body mass index  $\geq 25$  kg/m<sup>2</sup>). NYC residents were encouraged to self-refer through a dedicated program contact center, which screened for clinical eligibility. NYC Health + Hospitals providers could also refer their patients. Eligible participants were enrolled on a first-come, first-served basis.

Participants met individually with providers who had expertise in plant-based nutrition and LM, including a physician, registered dietitian (RD), and health coach (HC), to set goals and monitor progress. Group classes, named the Lifestyle Starter Series (LSS), were added to the program a few months after program launch to increase engagement and supplement 1-on-1 visits. The LSS provided education on the pillars of LM and encouraged skills-building and peer-to-peer support. The RD

and HC led 2 classes per week, teaching an 8-session rolling curriculum, covering the basics of plant-based nutrition, meal preparation, recipe conversions, navigating social situations, mindfulness, stress reduction, sleep health, and improving social connections. In addition, an exercise trainer led 4 classes focused on aerobic and strength training. Resources available to participants included resistance bands, plant-based cookbook(s), a plant-based diet starter guide written by program providers, coupons for fresh fruits and vegetables at NYC farmer's markets, and a discount card for grocery store savings on fresh produce. The frequency and length of program engagement were jointly determined by the PBLM provider team and each participant based on whether they had met their behavior change and/or health goals.

### Outcomes

The PBLM program successfully demonstrated feasibility as well as a high demand for services, which exceeded capacity during the pilot phase; at one point, more than 850 people joined the waiting list for the program.<sup>17</sup> As part of a formal program evaluation, patients reported being highly satisfied with the program, with 98.6% reporting that the "information [they] were given about plant-based eating patterns was easy to understand" and "the program content will be useful to [them] in [their] life."<sup>17,18</sup> Clinically and statistically significant benefits were seen across the board for weight, hemoglobin (Hb) A1c, and diastolic blood pressure. Patients with prediabetes, overweight, or obesity experienced significant improvements in weight and those with T2DM had significant improvements in weight and HbA1c.<sup>19</sup> These cardiometabolic improvements were seen among patients who were on stable or reduced medication regimens, indicating that the favorable outcomes were attributable to behavior change rather than an increase in medications.<sup>19</sup> Indeed, patient-reported outcomes included statistically significant improvements in dietary behaviors, physical activity, and sleep quality.<sup>18</sup>

### Lessons Learned

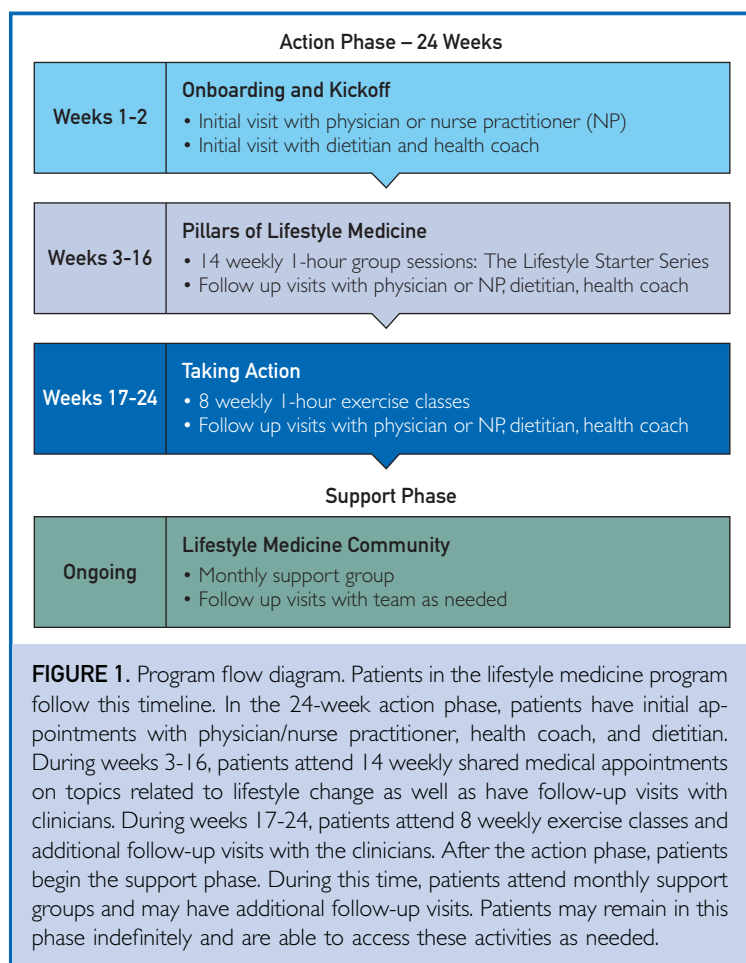
Since its launch in 2019, the Bellevue PBLM program has made several key adaptations. Initially, the program was overwhelmed with

self-referrals from the broader NYC community. Many of these patients had commercial insurance and heard about the program from news, social media, and word of mouth.<sup>17</sup> This limited access for patients typically cared for in a public health care system. To ensure equitable access to services, an electronic referral system was established to prioritize referrals from within the health care system.<sup>17</sup> In addition, the eligibility criteria were adjusted to exclude body mass index of 25-29 kg/m<sup>2</sup>, allowing limited resources to be focused on patients with health concerns related to obesity.

A major challenge during the pilot phase was a relative lack of administrative support. In response, a coordinator was hired to serve as a liaison between program providers and patients, managing all aspects of scheduling and communication. This greatly facilitated program function and patients' participation. A key part of the coordinator's role was to connect with all patients before enrollment to explain the program structure and expected time commitment. This allowed patients to realistically plan for their participation. It also allowed the coordinator to identify and mitigate barriers to participation, including scheduling issues, whenever possible. Moreover, the coordinator tracked patients' visits in the program, ensuring that they see each provider for at least 2-3 visits, attend group classes, and meet program milestones.

The COVID-19 pandemic changed many aspects of health care delivery, including increasing the use of telemedicine.<sup>20</sup> The PBLM program was no exception; LSS classes were converted from in-person to virtual. The online-only format increased program capacity because the PBLM team was able to offer more classes per week without the need for a physical meeting space. The virtual model also offered critical opportunities for social connection, reduced commute time, and allowed for greater ease of participation. The coordinator assisted patients with the technology required for the group classes. For patients who continued to face difficulties using technology and/or whose primary language was neither English nor Spanish, individual visits with the physician, RD, and HC were substituted instead of virtual classes.

Although many patients entered the program with the goal of discontinuing 1 or



multiple medications, program providers recognized the value of setting realistic expectations up front. Although many patients were able to reduce their medication use in proportion to the intensity of lifestyle changes, LM providers followed national practice guidelines to maximally reduce cardiometabolic risk, recommending medications when indicated. For example, patients with a history of CVD were strongly encouraged to start or continue statin therapy, according to current guidelines.<sup>21</sup> After the pilot, elevated cholesterol was removed from the eligibility criteria to discourage participation of individuals looking to LM as the sole treatment for familial hyperlipidemia.

Finally, the program faced challenges related to billing and reimbursement; specifically, insurance coverage for RD services was highly variable among different commercial

plans, leading to unexpected bills for some patients.<sup>17</sup> To proactively address this, the program staff worked with the hospital's finance department to develop workflows for assessing covered benefits before enrollment.

### EXPANSION OF LM SERVICES

In February 2022, NYC Mayor Eric Adams and NYC Health + Hospitals announced the expansion of LM services to 6 new sites across all 5 NYC boroughs, representing the most comprehensive expansion of LM programming in the United States.<sup>22</sup> These sites include Jacobi, Lincoln, Elmhurst, Woodhull, and Kings County hospitals, as well as Gotham Health, Vanderbilt—a federally qualified health center site. The original Bellevue program and the new sites are united under the umbrella of “NYC Health + Hospitals Lifestyle Medicine Programs.” As part of the expansion, many changes have been implemented to enhance the original PBLM program and to scale its services effectively across the system. In addition, nutrition and LM opportunities have been created for staff and patients systemwide, outside of the dedicated LM programs.

### Expanded Program Structure

As in the original model, patients can enter any of the system's LM programs through self-referrals or clinician-initiated referrals from within NYC Health + Hospitals. These internal referrals, in particular, primarily include Medicaid and uninsured populations. Each patient is screened for clinical eligibility (prediabetes, T2DM, hypertension, atherosclerotic CVD, and/or health concerns related to obesity) and then enrolled, following the pathway shown in Figure 1.<sup>17</sup> During the initial appointment, the patient and physician or nurse practitioner (NP) mutually determine the appropriate start date and its associated timeline; the patient then has individual appointments with the RD and HC. This is followed by the LSS, being expanded from 8 to 14 weekly classes, allowing more time for discussion and skills-based learning, such as practicing mindfulness, creating action plans, and finding community (Figure 2). The exercise classes were also increased from 4 to 8 weekly classes in response to participant feedback. Teaching and discussion points within

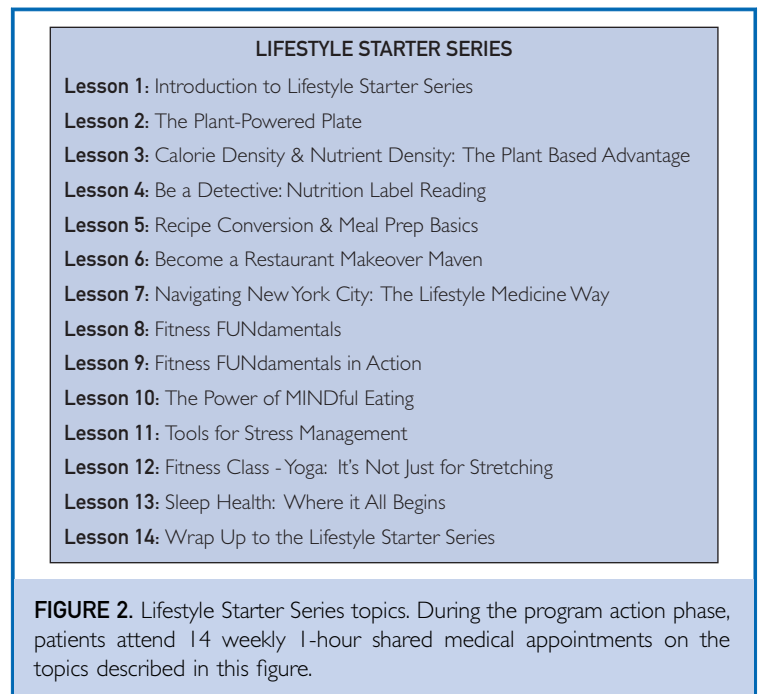
the LSS have been developed in response to our patients' needs. Particular attention has been placed on ensuring that the curriculum is relevant for patients from diverse backgrounds and experiences. For example, the Spanish-language curriculum reflects cultural adaptations, not simply a translation of the English-language version.

During the initial 24-week action phase of the program, patients have 2-3 visits for individualized support with the physician or NP, RD, and HC. After the action phase, patients transit into the support phase, which includes monthly support group visits and follow-up visits as needed, no matter how long it has been since they completed the action phase.

To increase patient access and build financial sustainability, NPs were hired to conduct individual breakout sessions with each patient during the LSS—thus allowing the LSS group sessions to become billable shared medical appointments (SMAs). While the RD and HC facilitate discussion, the NP briefly engages each patient to discuss action plans, goals, and other medical concerns. SMAs are billed using evaluation and management codes, similar to traditional individual visits.<sup>23,24</sup>

Although LM seeks to address behaviors related to the 6 pillars, health determinants further upstream from behavior can make meaningful change difficult if unaddressed.<sup>25</sup> To that end, dedicated community health worker (CHW) positions were added to each LM program to address social needs, including food insecurity, transportation issues, and technology issues (eg, logging on to the patient portal or accessing online group classes).<sup>26</sup> By engaging with participants in their homes, CHWs connect directly into participants' lives, building trust, and improving the health care experience.<sup>25,26</sup> In addition, CHWs help eligible patients access resources for healthy plant-based foods, such as NYC's "Groceries to Go" program, or assist in applications to the Supplemental Nutrition Assistance Program (SNAP).<sup>27</sup>

Furthermore, because some mental health conditions can inhibit meaningful behavior change, the programs will partner with behavioral health. Specifically, a licensed psychologist position has been created for each LM program to provide evaluation and therapy for disordered eating, previous trauma, and mood



disorders that may affect the patient's ability to successfully make lifestyle changes. The psychologists will also help patients build skills for coping with stress, improving relationships, and strengthening patient support systems.<sup>28</sup>

In connection with community affairs teams at each site, the nutrition and LM leadership team is engaging community-based organizations (CBOs) to collaborate with each program. These bidirectional partnerships strengthen the programs' connection to the communities they serve, inform the design of the curriculum and materials at each site, and complement the valuable services already offered by the CBOs.<sup>29</sup>

### Nutrition Incentives

Each LM program receives \$4000 annually for Health Bucks, \$2 coupons that can be used to purchase fresh fruits and vegetables at NYC farmers markets.<sup>30,31</sup> Health Bucks can be combined with SNAP benefits: for every \$2 spent at farmers markets using SNAP, shoppers can get \$2 back in Health Bucks, up to \$10 per day.<sup>30,31</sup> The program RD distributes Health Bucks to interested patients according to household size. RDs also educate patients on incorporating fruits and vegetables across culinary traditions and skill levels. Five of

the 7 LM program facilities have farmers' markets onsite, enhancing patients' ability to use Health Bucks. Moreover, each LM program has an annual stipend to purchase plant-based cookbooks and food models.

The LM programs will also feature monthly deliveries of seasonal fresh produce to interested participants during the 6-month action phase of the program. RDs will assess patients' capacity to use the produce (eg, access to a kitchen, available kitchen tools, and culinary literacy) and will help bridge cultural gaps with education about unfamiliar produce. Program RDs have created and adapted delicious and healthy recipes for each delivery. Produce boxes will be customizable and delivered directly to patients, with the majority of produce items sourced locally and regionally by the vendor. The produce deliveries are not intended to address food insecurity but rather to promote more intake of fruits and vegetables, including those potentially unfamiliar to the patient.<sup>32</sup>

### Culinary Skills Resources

NYC Health + Hospitals is partnering with an online culinary school to create video content for patients and staff systemwide. Staff will receive access to culinary medicine videos featuring skills training on cooking tofu, tempeh, whole grains, and legumes: a demonstration of ways to put together delicious plant-based meals using a variety of cooking methods and commonly available kitchen tools (eg, microwaves, air fryers, and electric pressure cookers) and evidence-based information on the health benefits of plant-based eating patterns. Individual short videos will be created for patients on topics such as plant-powered meal preparation, cooking with tofu and tempeh, using spices, meals for under \$10, plant-based meals for the family, cooking legumes, preparing healthy dressings and sauces, and nutritious breakfast ideas. The patient-facing videos will incorporate various culinary traditions including Caribbean, South American, Central American, and South Asian and will be translated into Spanish, Mandarin, Bengali, and Haitian Creole. Providers across the health system will be able to share videos with patients during or after visits, using QR codes and links that can be sent through the patient portal.

### Staff Recruitment

Expansion of the LM program to 6 new sites required a major increase in staffing—nearly 70 new positions beyond the original Bellevue staffing model. Moreover, a 7-person nutrition and LM leadership team was created, including an executive director, senior director, exercise trainer, and directors of operations, education and training, health coaching, and program evaluation. The leadership team partnered with AmeriCorps, whose members are integral to engaging with CBOs, assisting in the recruitment and onboarding of new staff, and planning for launch events.

Given the complexity of identifying new staff across more than 8 different disciplines and 7 different program sites, the nutrition and LM leadership team worked closely with NYC Health + Hospitals human resources teams, both centrally and at each site. To maximize recruitment, many new positions were cross-posted at relevant employment listings, including the ACLM, the American College of Sports Medicine, the Vegetarian Nutrition Dietetic Practice Group, and the National Board of Health and Wellness Coaches. The nutrition and LM team reviewed resumes for all positions, but the site teams were responsible for interviewing and selecting candidates. Most of the physicians and some of the NPs were identified internally from existing staff, with funding allocated to the site to “buy out” their time or pay sessional rates. [Table 1](#) summarizes the staffing model table for each site with full-time equivalents for each provider.

### Staff Training

With new staff members recruited, robust LM training plans were created ([Table 2](#)). Although there are specific training requirements for each role, all positions include live attendance in the LSS (the same curriculum used in group visits) with reflective questions for each session. New staff shadow Bellevue LM program staff to see LM counseling and education in practice. There are weekly check-ins with the nutrition and LM leadership team.

New RD and HC team members receive more extensive training because they are responsible for co-facilitating LSS SMAs. This process includes preparation and

TABLE 1. Staffing Model for Each Lifestyle Medicine Program Site

Role	No. of Staff and FTEs	Responsibilities
Medical Director	1 @ 0.2	Clinical lead and individual visits
Staff Providers (MD/DO/NP)	3 @ 0.1 each	Individual visits
Nurse Practitioner	1 @ 0.5	Individual visits (2 sessions) + billing provider for SMAs (3 sessions)
Registered Dietitian	1 @ 1.0	Individual visits + SMAs
Health Coach	1 @ 1.0	Individual visits + SMAs
Program Coordinator	1 @ 1.0	Program coordination, scheduling, logistics
Psychologist	1 @ 0.6	Behavioral health therapy
Community Health Workers	2 @ 1.0 each	Support for behavior change and social needs
Patient Care Associates (Medical Assistants)	Total 0.4	Vital signs and screenings for patient care sessions
Exercise Instructor	1 @ 1.0 (shared between 7 sites)	Group exercise instruction and design

FTE, full-time equivalent; SMA, shared medical appointment.

mentoring sessions, culminating in co-facilitating classes with the Bellevue program RD and HC and their RD or HC site team member.

In addition, staff receive training to enhance practical applications of working as part of an LM program. These sessions include group facilitator training, coaching for coaches, introduction to meditation, action planning, and

discipline-specific sessions on plant-based nutrition.

Under the mentorship of the leadership team, each site team creates educational materials and curricular elements suited to the site's community. Some examples include cookbooks and patient handouts (eg, lists of restaurants with healthful plant-based options in the area and physical activity resources).

TABLE 2. Lifestyle Medicine (LM) Program Training Pathways

Role	Board Review <sup>a</sup>	LM for Coaches <sup>b</sup>	LM Essentials Course <sup>c</sup>	Observe Lifestyle Starter Series	Shadow LM Practitioners
Medical Director	X		X	X	X
Staff Providers (MD/DO/NP)	X		X	X	X
Nurse Practitioner	X		X	X	X
Registered Dietitian	X		X	X	X
Health Coach		X	X	X	X
Program Coordinator			X	X	X
Psychologist	X		X	X	X
Community Health Workers		X	X	X	X
Patient Care Associates (Medical Assistants)			X		
Exercise Instructor		X	X	X	X

<sup>a</sup>Foundations of Lifestyle Medicine Board Review, American College of Lifestyle Medicine (30 hours); preparatory course for Lifestyle Medicine Board Certification.

<sup>b</sup>Lifestyle Medicine for Coaches, Wellcoaches (21.5 hours).

<sup>c</sup>Lifestyle Medicine & Food as Medicine Essentials Course Bundle, American College of Lifestyle Medicine (5.5 hours).

### Electronic Health Record Changes

In order to better manage clinical data, scheduling/registration, and program progress, the nutrition and LM leadership team worked with the information technology team of NYC Health + Hospitals to implement new tools in Epic, the electronic health record (EHR). Namely, program-specific additions were added under Compass Rose, an Epic module used by health care organizations to manage patient enrollment, goals, and status. This module's tools will increase care coordination, improve appointment tracking, and organize group cohorts. Furthermore, the data from this module increase the ability to evaluate program key performance indicators (KPIs). Additional changes to the informatics infrastructure were implemented to improve tracking of referrals, visits, revenue, and other LM metrics.

### Evaluation Plan

While developing and scaling the LM program, the need was anticipated for regular reporting to stakeholders, monitoring of operational data, and measurement of the program's impact.<sup>17</sup> We created a list of KPIs for process and outcome measures.<sup>33</sup>

For example, process measures included the number of program referrals, participants engaged in the program, visits completed, attendance in specific curricular activities (eg, individual visits, SMAs, exercise classes, and support groups), attrition rate and curricular time point, and program clinical revenue. These can be examined in aggregate, at the site level, and in specified time frames.

Outcome measures were tied to overall clinical programmatic goals and the LM pillars. For example, relevant clinical data are captured at enrollment and after the action phase for patients with known chronic cardiometabolic conditions. These measures include blood pressure, HbA1c, lipid panel, and weight.<sup>19</sup> Patients' 10-year atherosclerotic CVD risk scores are calculated to estimate the summative effect of the intervention on cardiovascular disease risk.<sup>34</sup> Further, measures of behavioral modification in areas such as sleep, stress, diet, physical activity, substance use, and anxiety were identified. For each area, representative questions from well-established questionnaires such as the

Pittsburgh Sleep Quality Index, Starting the Conversation (diet), and Physical Activity Vital Signs were selected. Finally, patient-reported health and quality-of-life ratings were measured.<sup>35-39</sup>

Because the intent of the program is to promote equitable access to LM, measures can be examined by location and demographic characteristics (eg, age, sex, self-reported race/ethnicity, preferred language, and payor). To track these items and ensure their capture, mechanisms were devised to generate structured data around the measures. Default EHR administrative data sources were used including the number of referrals and laboratory results. We used EHR tools to create a distinction for referrals and other visit tabulations specific to the LM programs.

Finally, standardized text templates with trackable elements were created to enable the recording of data in clinical documentation. EHR data for process measures are sent to a data warehouse and referenced through a dashboard using the Tableau data visualization platform.<sup>40</sup> This allows continuous monitoring of program operations and easier reporting of KPIs to stakeholders. For clinical measures, we plan to have periodic data analyses for assessing clinical impact both for patients before and after the LM program at different time points and using quasiexperimental methods to compare outcomes between patients with target chronic diseases who did and did not participate in the LM program. Using our data, we aim to identify and disseminate best practices in the implementation of replicable and scalable LM programs and to contribute to the science of the efficacy of LM interventions.

### Collaboration with Finance Teams

Since the inception of the LM program pilot in 2019, LM program leadership has worked closely with finance, patient accounts, and revenue teams of NYC Health + Hospitals to establish workflows for effective preregistration processes, clear communication with patients, and maximal patient access to the program.

Most services within the LM programs are billable, including individual visits with physicians, NPs/certified nurse midwives, RDs, and psychologists, as well as SMAs. Exercise



classes, HC visits, and support groups are nonbillable. The City's Office of Management and Budget provides support for this expansion and related LM initiatives, covering any gap between program revenue and expenses.

Before joining the program, patients are contacted for a review of their insurance coverage, copayment requirements, and covered services. Patients without health insurance are referred to a financial counselor for evaluation for fee-scaling and enrollment in NYC Care, a health care access program that guarantees low-cost and no-cost services to New Yorkers who do not qualify for or cannot afford health insurance.<sup>41</sup> In addition, patients who meet specific financial criteria are billed for only one monthly copayment for lifestyle program services, regardless of the number of visits.

Individual visits with physicians and NPs are billed using E&M codes according to visit duration and level of medical complexity. For patients with social needs, such as housing instability or food insecurity, Z codes for social determinants of health are included.<sup>42</sup> RD and psychologist visits are billed using standard billing codes.

### SYSTEMWIDE INITIATIVES FOR NYC HEALTH + HOSPITALS STAFF

In keeping with the mission of the LM programs, the nutrition and LM teams have promoted interest in healthy eating and positive lifestyle change among the approximately 45,000 staff; in doing so, this may also reverberate into benefits for patients.<sup>43</sup> In partnership with a local nonprofit, Plant Powered Metro New York, the nutrition and LM leadership team offers 21-day "jumpstarts" to support staff in eating more plant-based diets.<sup>44</sup> The October 2023 jumpstart received more than 900 applications. Representing diverse roles in the health system, participants have expressed great enthusiasm for the program, particularly the dedicated mentorship component.

As an additional way to promote culinary literacy and interest in healthy cooking, our health system will partner with Plant Powered Metro New York to offer plant-based cooking demonstrations to staff systemwide. Available through livestream and on-demand recordings, the cooking demonstrations will celebrate diverse culinary traditions and emphasize accessible and affordable ingredients.

Another initiative is the Power of Your Plate, a 4-week annual webinar series during National Nutrition Month, revolving around the Academy of Nutrition and Dietetics theme. The series includes expert speakers as well as cooking demonstrations featuring quick and easy plant-based recipes. Speakers have covered topics ranging from fiber, protein, and pediatric nutrition, to sports performance nutrition, intuitive eating, and the potential environmental impact of our meals.

Finally, in conjunction with ACLM, the Office of the Mayor of NYC made available 5.5 hours of free continuing education on nutrition and LM to 200,000 health professionals in NYC including NYC Health + Hospitals clinical staff.<sup>22</sup> The LM Essentials Bundle includes content on food as medicine, nutrition for prevention and longevity, and nutrition for treatment and risk reduction.<sup>45</sup>

### THE PLANT-BASED PATIENT MEAL PROGRAM

Mirroring the emphasis on plant-based nutrition in its LM programs and staff initiatives, NYC Health + Hospitals serves plant-based dishes as the "Chef's Recommendation," seen in Table 3 as the default option at lunch and dinner each day for hospitalized patients, with the option to opt into animal-based meals. The goal of the Healthy Eating Plant-Based Initiative is to introduce patients to healthful, delicious plant-based meals and illustrate that nourishing food is part of the recovery process.

The initiative started in 2019 with Meatless Monday, during which a plant-based meal was made available for lunch and dinner on Mondays.<sup>46</sup> Although patients had the option to request a meat-based dish, the plant-based meals proved extremely popular, with an average of 97% of patients choosing to eat plant-based meals on Mondays.

Given these promising results, the food and nutrition team constructed a plan to offer plant-based meals as the default entrée at lunch and dinner every day at all 11 NYC Health + Hospitals acute-care facilities. To obtain buy-in from stakeholders, this groundbreaking concept was showcased at each facility in advance, with a tasting and presentation for administration, clinical leadership, nursing, and support staff. The presentations

TABLE 3. Sample Weekly Menu: Chef's Recommendations for Patients

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Lunch						
Minestrone soup	Black bean soup	Tomato soup	Carrot ginger soup	Green pea soup	Lentil soup	Butternut squash and apple soup
Sancocho with rice	Jackfruit and lentil jambalaya with sunshine rice and broccoli	Chipotle vegetable taco with corn tortilla, yellow rice, black beans, plant-based cheese, and salsa	Falafel with harissa sauce, whole wheat pita, and roasted eggplant	Curried kabocha squash, lima beans, dill and rice	Penne pasta with pea pesto and roasted grape tomatoes	Gandules y Calabaza over sunshine rice
Alternate Lunch						
Zesty 3 bean chili over yellow rice and green beans	Garden Bolognese over rotini with mixed vegetables	Gandules y Calabaza over sunshine rice	Zesty 3 bean chili over yellow rice and green beans	Sancocho with rice	Falafel with harissa sauce, whole wheat pita and roasted eggplant	Orange cauliflower with edamame over brown rice pilaf
Dinner						
Tossed salad	Spring mix salad	Coleslaw	Chick pea salad	Cucumber salad	Tangy slaw	Tossed salad
Garden Bolognese with rotini and spinach	Pad Thai noodle bowl	Moroccan root vegetable tagine with tricolor cous cous	Southern black-eye pea casserole with plant-based corn bread topped with plant-based shredded cheese	Zesty jackfruit burrito bowl with jicama slaw and broccoli and flour tortilla	Spanish vegetable paella with yellow rice	Red curry vegetables with roasted tofu
Alternate Dinner						
Moroccan vegetable tagine with roasted chickpeas with brown rice pilaf	Rigatoni pasta al fomo with plant-based ricotta cheese	Curried kabocha squash with lima beans, dill and white rice	Orange cauliflower with edamame over brown rice pilaf	Garden Bolognese with rotini and mixed vegetables	Fiesta black bean burger on a whole wheat bun with cauliflower	Whole wheat Sicilian pizza with plant-based cheese

highlighted the program's mission and the scientific evidence supporting the benefits of plant-based eating for both human and planetary health.<sup>47</sup>

The rollout of the initiative was a staged process, beginning in March 2022 with plant-based meals as the default at lunch only. Data from this phase reported a remarkable 95% acceptance and 90% satisfaction rate among patients. The culinary team adapted the menus based on continuous patient feedback to ensure that the meals were well-received and reflected diverse cultural traditions. In September 2022, the program was expanded to include plant-based meals as the default at dinner, in conjunction with the launch of a Food Service Associate program. This program provides 1-on-1 communication with patients at multiple points throughout the day, allowing patients to share feedback and preferences.

NYC Health + Hospitals now serves more than 14 tasty, nutritious, and culturally diverse plant-based dishes that patients genuinely enjoy. Greater than 10,000 meals are served daily, with patient acceptance and satisfaction remaining high. In addition to being health-promoting and well-received by patients, the entrees that feature plant-based protein have been shown to cost \$0.59 less per meal compared with the animal-based protein dishes. In 2023, the health system served more than 783,000 plant-based meals. Moreover, plant-based dishes are an excellent way to curb greenhouse gas emissions.<sup>48</sup> Since implementing plant-based dining, NYC Health + Hospitals has decreased carbon dioxide emissions for overall purchases by 36%.

### CLINICAL OUTCOMES FROM THE PILOT PBLM PROGRAM

As mentioned previously, the 2019 pilot phase of the PBLM program at NYC Health + Hospitals/Bellevue was formally evaluated, with a primary goal of assessing feasibility of implementation as well as demand for services. In addition, 6 clinical outcomes were assessed: weight, HbA1c, systolic and diastolic blood pressure, non-high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol (LDL-C).<sup>19</sup> Compared with baseline, there were statistically significant improvements at 6 months in weight, HbA1c, and diastolic blood pressure across

the full sample of 173 patients. Differences in LDL-C trended toward significance. Within subgroups defined by baseline diagnosis, statistically significant changes included reduced weight (95.6 vs 91.7 kg) among those with overweight or obesity; improved HbA1c (7.9% vs 7.2%) and reduced weight (98.2 vs 93.3 kg) among those with T2DM; and improved diastolic blood pressure (79.1 vs 75.0 mm Hg) among those with hypertension. The change in LDL-C approached significance (112.1 vs. 98.0 mg/dL;  $P < .10$ ) among those with diagnosed hyperlipidemia despite the relatively low baseline LDL-C and a high baseline use of statin therapy.<sup>19</sup>

To assess the effects of lifestyle changes alone, additional analyses were conducted among patients with T2DM, hypertension, and hyperlipidemia whose medication regimen was stable or reduced during the 6-month study period. Statistically significant improvements persisted among patients with T2DM (HbA1c, 7.8% vs 7.1%; weight, 97.2 vs 91.9 kg) and hypertension (diastolic blood pressure, 79.8 vs 75.4 mm Hg). Among those with hyperlipidemia, changes in both non-high-density lipoprotein cholesterol and LDL-C approached statistical significance (140.4 vs 124.7 and 112.8 vs 98.6 mg/dL, respectively) despite stable or reduced lipid-lowering medication. These findings support the focus on healthy lifestyle behaviors in the PBLM program for achieving meaningful improvements in blood sugar, body weight, blood pressure, and lipids; positive lifestyle change can synergize with evidence-based pharmacotherapy when indicated, and it may also allow for reduction in medication burden.

Overall, the pilot program evaluation demonstrated clinically meaningful improvements across at least half, if not the majority, of patients with overweight or obesity, T2DM, prediabetes, hypertension, and hyperlipidemia. These findings hold promise for the expansion of LM services at NYC Health + Hospitals to play a key role in improving cardiometabolic health in the broader patient population.

### DISCUSSION

The experience of NYC Health + Hospitals in piloting and expanding LM initiatives

systemwide may provide valuable lessons for other health systems. First, our experience revealed that there is a substantial interest among the general public for LM services and nutrition-focused care. Given the burden of chronic disease, LM offers health systems a vital opportunity to reduce health disparities and improve outcomes related to T2DM, hypertension, and other chronic diseases while attracting new patients to their systems, as was seen in the Bellevue PBLM program.<sup>19</sup> In addition, some studies suggest the potential for cost savings and return on investment with LM, especially through value-based care models.<sup>49-51</sup> There may also be an opportunity to enhance professional satisfaction and reduce burnout among health care providers.<sup>52</sup>

Second, our use of a multidisciplinary team has been crucial to fostering meaningful behavior change. Group visits through SMAs reinforce concepts shared in individual appointments, capitalize on peer teaching and learning, and improve revenue capture.<sup>23,24</sup> SMAs also increase the number of touchpoints throughout the program, giving patients opportunities to learn about LM from different perspectives and helping patients feel accountable. Finally, virtual visits appear to be highly convenient and more flexible for patients than in-person visits, but in-person visits are important for patients with technology challenges; thus, a hybrid model may be most inclusive.

Institutional support is a critical component for developing a successful LM program. The programs of NYC Health + Hospitals have been supported by visionary leadership at the city, system, and program levels. Presently, the Mayor's Office has established the expansion of LM services citywide as a high priority.<sup>22</sup> Staff education and identification of local LM "champions" also play important roles. Systemwide webinars, jumpstart programs, and continuing education activities on the benefits of nutrition and LM foster staff buy-in, helping staff themselves adopt healthy lifestyle habits and promote LM concepts with patients. Data collection on patient satisfaction and health outcomes are essential for building trust and demonstrating benefit to stakeholders and the medical community. Finally, leveraging the assistance of interested volunteers can introduce new ideas and

augment the program's outreach and effectiveness while filling in gaps.

## CONCLUSION

Our experience with the pilot and expansion of the LM programs at NYC Health + Hospitals demonstrates the feasibility and effectiveness of a comprehensive, multidisciplinary LM approach to addressing chronic disease in a safety net system. As a microcosm of the world, NYC and its diverse communities highlight the need for innovative solutions that address chronic diseases at some of their key root causes. Our initiative has shown promising results with significantly reduced cardiometabolic risk factors and improved health behaviors, and we believe this is only the beginning.<sup>19</sup>

As we look forward, our focus is on the expansion of LM services and initiatives within the health system and the broader NYC health care ecosystem. By incorporating staff initiatives such as jumpstarts, capitalizing on receptive political leadership, and broadening offerings to health care workers across the entire city, we aim to make a substantial change in the conversation about chronic disease treatment and prevention.

## POTENTIAL COMPETING INTERESTS

Mr Babich has received consulting fees for Epic electronic medical record projects from Tegria Healthcare Consulting & Technology Services. Dr McMacken has received payment for educational content for the American College of Lifestyle Medicine (ACLM) and travel reimbursement for speaking at ACLM's Lifestyle Medicine 2022 conference. Ms Correa has received honoraria for speaking at the International Conference on Nutrition in Medicine and has participated in the Universal Meals Advisory Board and Food + Planet Advisory Board. Mr Adams receives royalties for his book, *Healthy at Last*, from Hay House and McMillan UK. Ms Morgenstern has received honoraria for speaking at the International Conference on Nutrition in Medicine. Dr Katz has received travel reimbursement for speaking at ACLM's Lifestyle Medicine 2022 conference. Dr Joshi has received royalties from Wolters Kluwer; consulting fees from Planted Forward, Otsuka, and Med Learning Group; and honoraria and/or travel

support from the National Kidney Foundation, PatientsLikeMe, Academy of Nutrition and Dietetics, Temple University, Michigan Osteopathic Association, NephCure, Michigan Council of Renal Nutrition, Northwest Renal Dietitians, University of Missouri, Brown University, International Plant-Based Nutrition Healthcare Conference, and the Canadian Association of Nephrology and Dietitians. Dr Joshi also serves as an unpaid member on 2 boards for the National Kidney Foundation. Dr Shah has received honorarium from Plant Powered Metro New York. K.P.-M., K.C., T.G.L., A.B.W., and R.B. report no financial disclosures.

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**Abbreviations and Acronyms:** **ACLM**, American College of Lifestyle Medicine; **CBO**, community-based organization; **CHW**, community health worker; **CVD**, cardiovascular disease; **EHR**, electronic health record; **Hb**, hemoglobin; **HC**, health coach; **KPI**, key performance indicator; **LM**, lifestyle medicine; **LSS**, Lifestyle Starter Series; **NP**, nurse practitioner; **PBLM**, plant-based lifestyle medicine; **RD**, registered dietitian; **SMA**, shared medical appointment; **SNAP**, Supplemental Nutrition Assistance Program; **T2DM**, type 2 diabetes mellitus

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