

Balanced Menus: **A Pilot Evaluation of Implementation in Four San Francisco Bay Area Hospitals**

Developed for San Francisco Physicians for Social Responsibility and
Health Care without Harm

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Executive Summary

Balanced Menu is a voluntary program that seeks to improve nutrition and benefit the environment by reducing meat purchasing among participating hospitals by 20 percent within 12 months. The program also promotes shifting towards serving more sustainably produced meat. Developed and piloted by San Francisco Physicians for Social Responsibility, Balanced Menu was first implemented in 2008 in four San Francisco Bay Area hospitals. In September 2009, Health Care Without Harm launched the program nationally. At the time of this report, 32 hospitals have taken the “Balanced Menu Challenge”.

This report describes a pilot evaluation of Balanced Menu program implementation in four San Francisco Bay Area hospitals: Santa Rosa Memorial Hospital, the San Francisco VA Medical Center, the John Muir Health Medical Center, and one anonymous hospital. The hospitals vary in size as well as medical and food services provided, representing a broad range of possibilities for the program.

Meat Nutritional and Environmental Health Impacts

The U.S. produces about 8.7 ounces of red meat and chicken per person per day, while federal dietary guidelines recommend consuming 5.5 ounces of protein each day, including a diverse array of meat, poultry, nuts, beans, and eggs as part of a 2,000-calorie diet. High levels of meat consumption and production have significant implications for nutritional and environmental public health. In terms of nutrition, animal products are the primary source of saturated fat and cholesterol, both of which are shown to negatively impact health if consumed in excessive quantities. Overconsumption of meat has been demonstrated to increase risks for a range of negative health outcomes, including the development of cardiovascular disease, obesity, Type II diabetes, and certain cancers.

Eating meat is also inextricably linked to environmental health. Most food animals in the U.S. are raised in confined and densely populated facilities utilizing industrial methods. Industrial food animal production (IFAP) is associated with significant water and air contamination and high use of resources including water and fossil fuels. The heavy use of antibiotics at non-therapeutic levels in animal feeds is documented to contribute to the epidemic of antimicrobial-resistant infections affecting humans and threatening the effectiveness of our antibiotic supply – a significant concern in hospitals. Livestock production is a key contributor to global climate change, generating an estimated 18 percent of global greenhouse gases, and half the U.S. food-related greenhouse gases. Different meats have different GHG profiles, with beef and other red meats having the highest emissions, followed by pork, then poultry.

Hospitals: A Key Intervention Target

Changes to hospital menus can make a significant impact on these environmental and potentially also nutritional health impacts, due to the significant buying power of the hospital foodservice sector. Further, as health institutions, hospitals have the opportunity to reflect the primary prevention messages delivered through their health services in the food they provide. Hospitals may also be in a key position to communicate health education messages and promote healthful behavior change, both because they are viewed as respected sources of health information, and because they may see patients and visitors at a time when they may be especially open to such health behavior change messages. Hospital staff members, aware of

the high burden of chronic disease, may also be a receptive audience for health messages. Further, through increased demand for sustainably and locally produced meats, hospitals could drive increased availability of such products in the marketplace.

Balanced Menus was initially adopted by members of the Hospital Leadership Team (HLT), an active group of food service administrators in the Bay Area who seek to increase institutional procurement of healthy and sustainable foods.

Evaluation Aims and Methods

This pilot program evaluation employed both quantitative and qualitative methods to demonstrate impact of the program in these four hospitals during the initial period, as well as the feasibility of and fidelity to the implementation plan. Quantitative methods focused on demonstrating the environmental and institutional impact of Balanced Menus. Based on hospital-reported data, we calculated change in purchased quantities and dollars spent by protein item (beef, pork, poultry, lunchmeats, vegetarian proteins) during the pilot study period. We were able to assess changes in meat purchasing, but in this pilot analysis we did not have adequate data to assess replacement foods and net changes in spending. Further, in this pilot study, there was some variation in the data provided and time periods covered. Carbon footprint impacts were calculated using three different carbon footprint calculator tools for comparison. Interviews were conducted following data collection to assess the process by which the program was implemented and identified barriers to areas for improvement as the program expands to other hospitals.

Results

Purchasing

If purchasing remained constant across time, the three hospitals that provided relevant data would have purchased in total an estimated 109,000 lbs of beef, 70,000 lbs of pork, 237,000 lbs of poultry, and 261,000 lbs of vegetarian protein sources (including in some cases, milk) annually and spent a total of approximately \$1.519 million per year on these food items, based on reported data. In the follow-up period, the four hospitals had reduced meat purchasing by an average of 28 percent. Assuming the hospitals continued purchasing at the new level for a year, they would save a total of \$402,000 on meat purchases in a year. There were inconsistent data collection methods used by the various sites so calculating replacement costs and net savings was not possible.

Carbon Footprint Impacts

We examined the potential greenhouse gas emissions impacts of the purchasing changes, using three calculators that use different methods to arrive at their results. Despite the different methods and the challenges in estimating food-related greenhouse gas emissions, the calculators yielded similar estimates, strengthening confidence in the findings. For the three hospitals that provided relevant data, the included meat and vegetable proteins at baseline would have accounted for 2,627 tons of CO₂-equivalent GHG emissions annually if purchasing was constant through the year. Through participation in Balanced Menus, the hospitals reduced meat-related GHGs to a total of 1,648 tons annually (if the new purchasing quantities were maintained for a year). Adding in the fourth hospital, there would be a 1,004 ton/year reduction,

the equivalent of CO₂ emissions from burning 102,454 gallons of gasoline or sequestering carbon by growing 23,354 tree seedlings over 10 years. Over 85% of the observed emissions reductions came from beef, reflecting beef's exceptionally large carbon footprint. We emphasize that these calculator tools are simply a way to get a general sense for GHG emissions and that the numbers should not be taken literally.

All of the hospitals described the program as an ongoing effort, and expressed that they hoped to further reduce meat purchasing and further increase purchasing of sustainably produced animal products, meaning that in the future, reductions and savings could be even greater.

Interview Summary

The four pilot hospitals set a variety of benchmarks and goals to try to accomplish the Balanced Menus aims. For example, one focused on adding fish and “combination dishes” to the menu, while another did not set a specific target but aimed to use saved money to increase purchasing of sustainably produced meats. The food service staff responsible for the Balanced Menus program felt for the most part that supportive administrative climates facilitated their work. A key challenge was developing menus that would satisfy taste preferences for patients and cafeteria customers, while, in the case of patients, meeting complex dietary needs and restrictions. They reported anecdotally that Balanced Menus was being well received, however at this point, there were no focused formal evaluations completed. (One hospital reported a steady rise in patient satisfaction ratings for meals following Balanced Menus implementation, rising 24 percentage points over several months.) Their three top recommendations for those considering implementing Balanced Menus were: 1) ensure management support, 2) involve clinicians early in the process of menu development, and 3) ease into the program by making small menu changes that could be expanded over time.

Conclusions

This pilot investigation shows that the Balanced Menus program implementation across these four hospitals yielded substantial savings in costs and greenhouse gas emissions that exceeded the initial 20 percent reduction goal. Continued evaluation of Balanced Menus implementation is needed to understand the program's impact in a larger sample of hospitals and with a longer time horizon.

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Report Introduction and Overview

Balanced Menu is a voluntary hospital program that aims to benefit the environment and human health by reducing meat purchasing by 20 percent within 12 months. The program also promotes a shift towards serving more sustainably produced meat. The program was developed and piloted by San Francisco Physicians for Social Responsibility, and was first implemented in 2008 in four San Francisco Bay Area hospitals. In September 2009, Health Care Without Harm launched the program nationally. At the time of this report, 32 hospitals have taken the “Balanced Menu Challenge.”

This report describes a pilot evaluation of program implementation in four Bay Area hospitals. The hospitals have proceeded at different rates with implementation, and each has developed the initiative in a different way. One of the four implemented the program for patient menu options, two primarily for café/cafeteria services, and one for both services.

- **Section I** presents a program overview and describes the program’s motivation—the health and environmental consequences of high-meat diets.
- **Section II** presents capsule descriptions of program implementation in each of the four selected hospitals.
- **Section III** describes methods.
- **Section IV** presents results, including before-and-after implementation differences in meat purchasing volumes and costs, and modeled greenhouse gas (GHG) emissions. As another way of understanding broader potential impacts of the Balanced Menu program, this section also models impacts based on an exact 20 percent reduction in purchasing each type of meat (with the strong caveat that this finding is based on only a small number of data points.) The results section also presents qualitative data from interviews with program staff at each hospital, regarding the process and experience of implementation.
- **Section V** presents discussion and conclusions.

It is hoped that this pilot investigation will yield insights valuable to hospitals around the country as they develop their own approaches to maximizing Balanced Menu program success.

Section I: Balanced Menus Program Overview and Purpose

In the Balanced Menus program, participating hospitals commit to reduce meat procurement by 20% and to substitute a portion of their meat purchases (including beef, pork, and poultry) with sustainably produced products. The program was developed with the aims of mitigating climate change and other environmental impacts of industrially produced meat, improving nutritional health, and bringing sustainably-produced meats (such as grass-fed beef) into healthcare settings. This program can be seen as part of the primary prevention mission of health care, including educating about the health and environmental impacts of high-meat diets, and providing patients and cafeteria/café patrons with lower meat options to support these healthier choices. The program may also offer significant cost savings to participating hospitals. Meat and poultry purchases often make up the largest expenses in the food service budget outside of labor.

Balanced Menus was developed and initially piloted by the San Francisco Bay Area chapter of the Physicians for Social Responsibility (SF PSR) under the Healthy Food in Health Care initiative (<http://www.sfbaypsr.org/balancedmenus.html>). At the program level, implementation has involved providing information and support as well as tools such as posters and table tents, conducting local research to identify local and sustainable food sources, and providing the opportunity for participants to share information among themselves. The goals of Balanced Menus reflect the larger mission of SF PSR and its parent organization, Physicians for Social Responsibility, to promote public policies that protect public health. SF PSR developed and piloted Balanced Menus in conjunction with its Hospital Leadership Team (HLT), an active networking group of hospital food service administrators who aim to increase institutional procurement of healthy and sustainable foods. Through monthly meetings, HLT members share information and ideas about menu development and sourcing sustainable and local foods, and strategize about ways to pool purchasing power to improve access to quality foods in the area health care system.

The program's national implementation is being coordinated by Health Care without Harm (HCWH) in collaboration with SF PSR. HCWH is an international coalition of hospitals, medical professionals, community groups, labor unions, environmental health organizations, and related constituents. The mission of HCWH is to "implement ecologically sound and healthy alternatives to health care practices that harm the environment and contribute to disease." Reflected by the goals of Balanced Menus, a key focus of HCWH is on reducing the ecological impact of institutional healthcare facilities and practices. HCWH has developed a Balanced Menus website, providing tools and information that can be used by participating hospitals (http://www.noharm.org/us_canada/issues/food/menus.php).

Why focus on meat?

Nutrition

Meat consumption in the U.S. exceeds nutritional recommendations. While U.S. dietary guidelines recommend consuming 5.5 ounces of meat, poultry, nuts, beans, and eggs per day as part of a 2,000-calorie diet, there are 8.7 oz per capita per day of red meat and chicken in the U.S. food supply.¹ Animal products are the primary source of saturated fat and cholesterol, both linked to health risks. As a result, overconsumption of these foods increases disease risk.² High

meat diets are associated with increased risks for multiple health outcomes, including cardiovascular disease,³ obesity,⁴ diabetes and metabolic syndrome,⁵ and certain forms of cancer.⁶⁻⁸ By contrast, diets comprised mainly of fruits, vegetables, and legumes have been shown to be protective against a range of diseases, including heart disease, obesity, and diabetes.⁹⁻¹⁰ This is particularly important in the United States, where these diseases are prevalent. Cardiovascular disease is the leading cause of death among U.S. adults, and is responsible for more than a quarter of U.S. deaths.¹¹ Obesity and diabetes, both risk factors for heart disease, also affect a significant proportion of the U.S. population. Among adults, 67% are either overweight or obese¹² and 37% are diabetic.¹³ Diet is a key factor underlying this high burden of chronic disease.

Environment

Eating meat is also inextricably linked to environmental health. The vast majority of meat, dairy and eggs in the U.S. are produced in industrial settings in which large numbers of animals are raised in close confinement and fed grains that use large amounts of water, pesticides, fertilizers and petroleum to grow and transport. The primary emphasis is on producing the greatest quantity of product for the least amount of direct financial cost. Industrial food animal production (IFAP) is associated with significant water and air contamination, and with high use of resources including water and fossil fuels. IFAP facilities produce an estimated 1.37 billion tons of animal waste produced annually in the U.S, a figure 100 times more than the amount of human sewage sludge processed in US municipal wastewater plants.¹⁴ Significant environmental and health risks are posed by the fact that this manure is applied to land without treatment, in quantities greater than the land can absorb, leading to runoff and water contamination. Another environmental health concern is the high use of antibiotics in IFAP. An estimated 70 percent of all antibiotics used in the U.S. are used in animal feeds at non-therapeutic doses with the aim of growth promotion rather than disease treatment.¹⁵ This practice has been associated with the epidemic of antimicrobial-resistant infections affecting humans and threatening the effectiveness of much of our antibiotic arsenal—a major concern in hospitals.

In addition to other environmental risks, livestock production is a key contributor to global climate change, generating large quantities of greenhouse gases (GHG) including carbon dioxide, and methane and nitrous oxide. According to the United Nations, food animals account for 18% of global GHG emissions, more emissions than are released by all vehicles involved in the transit sector.¹⁶ The U.S. percentage is lower than 18% due to the many other large domestic emissions sources, such as transportation and industry. Still, after accounting for the fact that the U.S is one of the highest GHG emitters in the world, the large impact of these emissions associated with U.S food animal production is clear. By one estimate, food may account for roughly 15 percent of U.S. greenhouse gas emissions, and half of those derive from meat and dairy.¹⁷ The two most important contributors to this footprint are: large-scale industrial feed grain production, which results in lost opportunity for soil to sequester (store) carbon; and the methane (a more potent greenhouse gas than carbon dioxide) released by cattle as they digest food.¹⁸ Different meats have different GHG profiles; among common meats, beef and other red meats have the highest emissions, followed by pork, then poultry.

A recent analysis by McMichael et al (2007) suggests that given expected rises in population and meat demand globally, it would be necessary to reduce U.S. meat consumption to 3.2 ounces per capita daily, including only 1.8 ounces of red meat – just to *stabilize* GHG emissions at 2005 levels by 2050 (not reduce emissions).¹⁹ As noted above, the food supply provides

more than double that, at 8.7 ounces per person per day.¹ Even further reduction may be necessary to contribute to the overall 80% reduction in GHG that scientists estimate industrialized countries such as the U.S must achieve by 2050, in order to mitigate the worst effects of climate change.²⁰

Is sustainable meat procurement better?

There is no singular definition of sustainable food animal production. Farmers that practice sustainable food animal production frequently raise a variety of animals on pasture, giving them access to the grasses, seeds, and insects that comprise their natural diet; these farms also often raise food crops. Sustainable and organic farming is becoming one of the fastest growing sectors in U.S. agriculture.²¹

Environment

Sustainable food animal production methods can minimize many of the ecological harms of industrial food animal production, particularly in the sense that pasture feeding animals builds healthy and more resilient soils, views manure as a natural fertilizer instead of a waste problem, relies on antibiotics only to treat sick animals, and uses far less pesticides, synthetic fertilizers, water and energy than industrial production. That said, we note that in the case of GHG emissions, studies are mixed; more research is needed. Switching to sustainably produced meats may ultimately be shown to reduce GHG emissions when all aspects of the animals' lifecycles and the foregone uses of the resources needed to raise them are fully accounted for (this seems likely to the authors). However, it also seems likely that the GHG savings from switching from grain-based IFAP beef to sustainably produced grass-fed beef will be small compared to the GHG savings from switching from beef to poultry, and from reducing meat consumption overall. Still, the switch to sustainably produced meat remains justified on other grounds.

Nutrition

Studies show that grain-fed meat differs in some nutritional qualities from more sustainably raised meats. According to a widely cited report by Clancy (2008), meat and dairy products from grain-fed cows have been found to contain more cholesterol, saturated fat, and calories than those from grazed cows. Pasture-raised cows, swine, and chickens yield meat and eggs higher in vitamin E and beta carotene than those from confined animals.²² Further, animals raised industrially are higher in Omega-6 fatty acids, a compound linked with risk for cancer, diabetes, obesity, and immune disorders, while grass-fed animals are higher in the health-promoting Omega-3 fatty acids, which are protective against these health risks.²³ While further research documenting nutritional differences between industrial and sustainably-raised meat, eggs, and dairy is still needed, claims of health benefits, including lower total fat content and higher Omega-3, may be made with some certainty for grass-fed beef.²²

Why target hospitals?

As health institutions, hospitals have the opportunity—and some would even say obligation—to present a consistent primary prevention message across the health services and non-health services they provide. Hospitals may be in a special position to influence behavior change and communicate health education messages, both because they are viewed as respected sources of health information, and because they see patients and visitors at a time when they may be especially open to health behavior change messages. Hospital staff members, seeing the

burden of chronic disease, could also potentially be a receptive audience for health messages. Beyond those who may change behavior as a result of hospital menu shifts, there are also many patients, visitors and staff who are already eating healthily and who would welcome menus that offer appealing and healthy low-meat options.

Health care food service is a \$12 billion market in the U.S. (Personal communication regarding unpublished study; Marci Wilson, Executive Director of the Association for Healthcare Foodservice. April 14, 2010). Due to the quantities of meats they purchase, hospitals have the opportunity to influence local markets and distribution networks. In the case of Balanced Menus, the hospital market could drive increased availability of sustainably produced meat, dairy and eggs. Potentially, if participant numbers grew large enough, Balanced Menus and programs like it could even contribute to expanded offerings through large distributors such as U.S. Foods and SYSCO, thus making vegetarian options and meats that are sustainably and/or locally produced even more widely available. Leaders in the hospital sector are increasingly recognizing the benefits of shifting their menus to include healthier and more sustainably produced options, as indicated by the success of Healthcare Without Harm's Healthy Food in Healthcare Pledge. Outside the hospital sector, other programs exist seeking to reduce GHGs from institutional food procurement, including a new food emissions measurement tool in development by Clean Air Cool Planet, a nonprofit which provides greenhouse gas emissions calculation tools to over 1000 colleges and universities to help them reduce their carbon footprints.²⁴

Section II: Profiles of Participating Hospitals

Balanced Menu was initially adopted by members of the Hospital Leadership Team (HLT), an active group of food service administrators in the San Francisco Bay Area who aim to increase institutional procurement of healthy and sustainable foods. This study examines data collected by HLT members from four San Francisco Bay Area hospitals: Santa Rosa Memorial Hospital, the San Francisco VA Medical Center, the John Muir Health Medical Center, and one anonymous hospital.

Santa Rosa Memorial Hospital:



Santa Rosa Memorial Hospital is part of the St. Joseph Health System based in Orange, California. The hospital is located 55 miles north of San Francisco in Santa Rosa. With 238 staffed beds, Santa Rosa Memorial offers a wide range of ambulatory and acute-care services, including trauma designation, cardiovascular, pediatrics, obstetrics, physical and occupational therapy, neurology and oncology.

The food service operations at Santa Rosa Memorial Hospital include a cafeteria, coffee cart, vending machines, catering, and patient meal service. Balanced Menu was explicitly run in both the cafeteria and patient meal services. While catering was not directly included under the purview of the program, the meals offered on the catering menu were made healthier prior to adoption of Balanced Menu as part of their commitment to the Healthy Food in Health Care Pledge.

San Francisco Veterans Affairs (VA) Medical Center:



The San Francisco VA Medical Center provides services to more than 35,000 veterans living in an 8-county area of Northern California. The main facility in San Francisco houses 124 beds. Services at this hospital are supported by five community-based outpatient clinics located in Northern California.

The Balanced Menu project was implemented by the Nutrition Service at the VA Medical Center, limited to the inpatient menu and meal services. The program also included limited food sales to hospital staff and guests on weekends and holidays from the patient menus. Cafeteria services were not included because they are provided by a contract food service operation.

Hospital C:

Hospital C is the largest participating facility, with over 600 beds. This hospital ran Balanced Menus in its café/cafeteria services. Due to the diverse and complex dietary needs among patients, changes to patient menus were limited.

John Muir Health:



Formed in 1997, John Muir Health is comprised of two medical centers, with one campus in Walnut Creek and another in Concord. The Walnut Creek Campus medical center offers a 321-bed full-service acute care facility, specializing in a wide range of clinical services including neuroscience,

orthopedics, oncology, cardiovascular services, and obstetrics. The John Muir Concord Campus is a 250-bed, acute care facility that specializes in cardiac care and cancer care. Through the combination of services offered on these two campuses, John Muir Health offers a wide range of inpatient and clinical health services.

Balanced Menus was run on both campuses in the café/cafeterias, focusing on a reduction in meat entrees and an increase in vegetarian options. Several options on the patient menu were also changed or added as part of Balanced Menus. The hospital is gradually incorporating Balanced Menus into the catering program by gradually increasing the quantity of hormone free, sustainably produced meat sourced for high level catering functions.

Section III: Methods

Purchasing Tracking and Analysis

Using their own procurement records, a food service administrator from each of the four participating hospitals provided purchasing data. Purchasing information was collected regarding the quantity (in pounds), cut (if applicable), and cost (in dollars/pound) of beef, pork, poultry, lunchmeats, fish/shellfish, and vegetarian proteins for each of the hospitals. Due to recordkeeping differences, not all hospitals were able to provide detailed cost information. Information regarding the brand and distributor for each entry was also recorded. The hospital contacts were asked to report purchase of sustainable and industrial meat, seafood, and vegetarian proteins separately. For sustainable items, any relevant certifications (e.g. USDA Certified Organic) and labels (e.g. rGBH) were noted in addition to data regarding quantity, variety, cost, and brand.

As described in Table 1 below, hospitals provided baseline data and data reflecting current Balanced Menus implementation. There was some variation in the nature of the data provided for this evaluation due to differences in the methods used by the hospitals to track their purchases. It became clear that based on existing record keeping, gathering the data was labor intensive; we did not request further data to improve consistency in this pilot analysis. To increase comparability across hospitals, we opted to ignore season of the year for the purposes of this analysis, and to focus simply on the changes from baseline. All participating hospital representatives stated that they felt the seasonal variation in their meat purchasing was small enough to justify this decision. Similarly, one hospital provided data for 3-month chunks rather than single months, and with their consent we disaggregated these months equally.

Table 1: Data provided by participating hospitals

Hospital	Size	Balanced Menus Implementation	Data Range	Data Provided
Hospital A (Santa Rosa)	278 beds	Cafeteria and patient meal services	July-September 2008; July-September 2009	For both time points: <ul style="list-style-type: none"> Quantity and cost of industrial meat and poultry purchases For 2009 data: <ul style="list-style-type: none"> Quantity and cost of sustainable meat and poultry purchases
Hospital B (SFVA)	240	Patient menus	Jul-September 2008; April-June 2009	For both time points: <ul style="list-style-type: none"> Quantity and cost of industrial meat, poultry, vegetarian, and fish/shellfish purchases
Hospital C	Over 600 beds	Café/cafeteria menus	January 2009; May 2009	For both time points: <ul style="list-style-type: none"> Quantity of industrial meat, poultry, and vegetarian purchases Aggregated cost per purchase category
Hospital D (John Muir)	321 beds; 250 beds	Primarily cafeteria, both campuses. Some patient menu changes.	2008	<ul style="list-style-type: none"> Reductions in cost per pound for select meats, per 6-week cycle, weekdays only

All data were collected and analyzed using Microsoft Excel. Summary statistics were calculated to determine the average baseline quantity and cost for each of the protein categories by hospital. “Before vs. after” implementation calculations were performed. Data were compared across sites, where possible. For the sites that provided detailed cost information, the shifts in the relative proportions of the budget spent on the various protein sources were also explored. Based on the Balanced Menus goal of reducing meat purchasing by 20%, we also modeled what purchasing could be expected if the hospitals reduced purchasing by 20% equally across meat categories.

Carbon Footprint Calculations

After the purchasing changes were calculated, carbon footprint analysis was performed using the Balanced Menus calculator described below. Other studies have identified challenges in accurately modeling GHG impacts.²⁵ Accordingly, we entered the data into two other calculators that use completely different methods as a sensitivity analysis to see how the results might be dependent on the calculator used.

- a. **Balanced Menus calculator:** This calculator was developed for the Balanced Menus program by San Francisco Physicians for Social Responsibility, based on the analysis in Eshel & Martin, 2006.²⁶ The calculator first converts inputs of food lbs to kcal protein, then converts kcal protein to both tons CO₂ and tons CO₂-eq (methane and nitrous oxide). The CO₂ calculations were based on Pimentel and Pimentel’s (1995) estimates of fossil fuel inputs for foods, followed by U.S. Dept. of Energy (DOE) calculations for converting fossil fuel energy to CO₂ emissions. The methane and nitrous oxide calculations take DOE emissions figures for enteric fermentation (mainly cow belching) and manure management for each food animal and divide this figure by the U.S. population. Next, the quotient is multiplied by the U.S. caloric consumption of each food, as reported by the United Nations Food and Agriculture Organization, to obtain emissions per calorie consumed. (We note that the nitrous oxide calculation does not include emissions from nitrogen fertilizer, biasing results downward.) Finally, the CO₂ and CO₂-eq figures are summed to obtain a total level of CO₂-equivalent emissions per lb of each type of meat. The calculator assumes all meat inputs are for grain-fed meat. We ran the numbers both including and excluding the small quantity of grass-fed beef data provided to us. **Inputs:** *beef; pork; chicken; egg; milk; soy*
- b. **Low Carbon Diet calculator:** This calculator was developed for Bon Appetit Management Company’s Low Carbon Diet program, based on a compiled set of life cycle analysis studies examining all the factors that go into producing, processing and transporting a set of food items. Figures in the calculator reflect the specific foods in that provider’s menus, including their sourcing and preparation. For this analysis, we combined all meats of a single type (e.g., beef) into a single category, averaging the carbon dioxide equivalents, because Low Carbon Diet listed a different set of sub-types of meat than did the hospitals in the survey. Additional calculations were performed to obtain tons CO₂/lb food (available on request). <http://www.eatlowcarbon.org/>. **Inputs:** *beef, pork, poultry, tofu, seafood, egg.*
- c. **Economic Input Output Life Cycle Analysis calculator:** This calculator was developed by Carnegie Mellon University. Economic Input Output Life Cycle Analysis (EIO-LCA) takes a top down rather than a bottom up approach to quantifying GHG emissions, slicing up

the national economy and national GHG emissions by industry sector (e.g., animal slaughtering and processing), and assigning to each sector relevant portions of all the input sectors that go into it (e.g., cattle ranching, power generation & supply, grain farming). To apply it to the data, we combined calculator information with information on per capita food consumption from USDA (more detailed methods available on request). www.eiolca.net **Inputs:** *red meat [beef + pork], chicken/fish/eggs, dairy.*

Qualitative Interviews and Analysis

One food service contact from each hospital took part in a semi-structured telephone interview exploring how their hospital came to adopt Balanced Menus and the process of implementation. The interview guide consisted of 15 prompts covering topics related to the adoption and implementation of Balanced Menus, with particular emphasis on the role of the interviewee in implementing the program, administrative support for the program, the types of challenges the hospital may have faced in operating Balanced Menus, and opportunities for improving the program. The scope and depth of the exploration of any given topic was determined by its relevance to the experience of the interviewee.

Each interview was documented with detailed note taking and recording as backup. Interview notes were coded in Microsoft Word by a single rater according to the themes covered on the interview guide. Of particular interest were commonalities and differences related to the motivations for adopting Balanced Menus, the challenges in implementing the program, the process of goal setting, and strategies for reaching those goals. Additional points of interest were opportunities for improving Balanced Menus and advice to future program adopters.

Section IV: Results

Baseline Purchasing

Tables 2 and 3 present baseline purchasing data for the hospitals engaged in this pilot investigation. The tables reflect the mean quantities of the included items, for three hospitals. (The fourth hospital only provided data on changes in purchasing, and is excluded from many calculations.) The data show that combined, over a year without the Balanced Menus Program, these three hospitals might source over 109,140 lbs of beef, 70,116 lbs of pork, 236,844 lbs of poultry, and 261,360 lbs of vegetarian protein sources (including milk). That purchasing would cost in total over an estimated \$1.519 million for the included protein sources in the participating meal services. Of that, \$293,000 would go to vegetarian proteins, the rest to meat.

Table 2: BASELINE purchasing data – pounds

	Beef	Pork	Poultry	Lunch Meat	Fish	Veg. Protein	TOTAL
Hospital A – monthly	5,202	3,309	9,233	683	0	11,472	29,899
Hospital B – monthly	810	541	890	0	6	81	2,329
Hospital C – monthly	3,083	1,992	9,614	208	0	10,227	25,124
Total – monthly	9,095	5,843	19,737	891	6	21,780	57,352
Average lbs/month	3,032	1,948	6,579	297	2	7,260	19,117
Average lbs/year ^v	36,380	23,370	78,948	3,564	25	87,120	229,407
Total lbs/year	109,140	70,116	236,844	10,692	72	261,360	688,224

TABLE 3: BASELINE purchasing data – \$

	Beef	Pork	Poultry	Lunch Meat	Fish	Veg. Protein	TOTAL
Hospital A – monthly	\$15,429	\$11,426	\$24,674	\$2,068	\$0	\$3,484	\$57,081
Hospital B – monthly	\$2,579	\$1,126	\$1,958		\$216	\$528	\$6,408
Hospital C – monthly	\$7,549	\$6,302	\$28,054	\$810	\$0	\$20,381	\$63,096
Total – monthly	\$25,557	\$18,854	\$54,686	\$2,878	\$216	\$4,112	\$126,585
Average \$/month	\$8,519	\$6,285	\$18,229	\$1,439	\$72	\$8,131	\$35,434
Average \$/year ^{vi}	\$102,228	\$75,417	\$218,744	\$17,268	\$864	\$97,572	\$425,212
Total \$/year	\$306,684	\$226,248	\$656,232	\$34,536	\$2,592	\$292,716	\$1,519,020

We emphasize that we do not know how representative these figures are of hospitals nationally, even within their size categories, and further that the small number of three hospitals can make this finding relatively unstable. It is also not possible to calculate average purchasing per patient, because one hospital provided data for patients and café combined, one only for café, and one only for patient menus, based on how they were implementing Balanced Menus.

Changes in Purchasing

Table 4 shows changes in purchasing for all four hospitals following implementation of the Balanced Menus program. It should be emphasized that all the hospitals considered implementation an ongoing process, and none considered themselves to have reduced meat purchasing or sourced sustainably produced meat to the desired extent. Therefore, these findings do not reflect a true “after” measurement, but rather, document a point in time during implementation. The table shows that on average, the sites had gone beyond the 20% reduction goal. They had reduced meat purchasing by 28 percent and saved in aggregate \$33,514 per month from their meat budgets. If these changes continued for a year at the same level, the savings would be \$402,168 across the hospitals.

Table 4: Changes in meat purchasing after Balanced Menus

	Total	Beef	Pork	Poultry	Lunch meat ^{vii}
Total change in lbs/month (across 4 hospitals)	-14,272	-4,402	-2,080	-7,210	-580
Average change in lbs/month	-3,568	-1101	-520	-1802	-193
Avg. % change in lbs/month ^{viii}	-28%	-35%	-27%	-26%	-51%
Total change in lbs/year ^{ix}	-171,264	-52,824	-24,960	-86,520	-6,960
Total change in \$/month	-33,514	-10,117	-8,663	-12,794	-1,802
Average change in \$/month	-8,379	-2,529	-2166	-3,199	-601
Avg. % change in \$/month	-21%	-28%	-30%	-16%	-51%
Total change in \$/year ^x	-\$402,168	-\$121,404	-\$103,956	-\$153,528	-\$21,624

Table 5: Full data on baseline and changes in meat purchasing, MONTHLY

		TOTAL	Beef	Pork	Poultry	Fish ^{xi}	Lunch Meat	Veg. Protein
SANTA ROSA	Baseline lbs	29,899	5,202	3,309	9,233	0	683	11,472
COMBINED	Change lbs.	-10,632	-3,096	-1,643	-7,391	2,340	-528	-313
conv. & sust.	%	-36%	-60%	-50%	-80%	na	-77%	-2.7%
	Baseline \$	\$57,081	\$15,429	\$11,426	\$24,674	\$0	\$2,068	\$3,484
	Change \$	-\$24,385	-\$7,797	-\$7,472	-\$19,483	\$10,909	-\$1,613	\$1,072
	%	-43%	-51%	-65%	-79%	na	-78%	31%
SFVA	Baseline lbs	2,329	810	541	890	6	0	81
	Change lbs.	211	-60	-87	-17	327	0	48
	%	9%	-7%	-16%	-2%	na	na	59%
	Baseline \$	\$6,408	\$2,579	\$1,126	\$1,958	\$216	\$0	\$528
	Change \$	\$873	-\$351	-\$97	\$110	\$1,233	\$0	-\$23
	%	14%	-14%	-9%	6%	na	na	-4%
Hospital C	Baseline lbs	25,124	3,083	1,992	9,614	0	208	10,227
	Change lbs.	-917	-1,133	-330	465	0	-52	133
	%	-4%	-37%	-17%	5%	na	-25%	1%
	Baseline \$	\$63,096	\$7,549	\$6,302	\$28,054	\$0	\$810	\$20,381
	Change \$	\$3,606	-\$1,486	-\$1,008	\$6,792	\$0	-\$189	-\$503
	%	6%	-20%	-16%	24%	na	-23%	-2%
John Muir	Baseline lbs	na	na	na	na	na	na	na
	Change lbs.	-600	-170	-30	-400	na	na	na
	Baseline \$	na	na	na	na	na	na	na
	Change \$	-\$1,174	-\$725	-\$129	-\$320	na	na	na
Total	Total Baseline lbs	57,352	9,095	5,843	19,737	6	891	21,780
	Total Change lbs	-11,938	-4,459	-2,090	-7,343	2,667	-580	-132
	Overall % change lbs	-21%	-49%	-36%	-37%	na	-65%	-1%
	Avg % change lbs	-10%	-35%	-27%	-26%	na	-51%	19%
	Total Baseline \$	\$126,584	\$25,557	\$18,854	\$54,686	\$216	\$2,878	\$24,393
	Total Change \$	-\$21,080	\$10,358	-\$8,706	-\$12,902	\$12,142	-\$1,802	\$546
	Overall % change \$	-17%	-41%	-46%	-24%	na	-63%	2%
	Avg % change \$	-8%	-28%	-30%	-16%	na	-51%	8%

Table 5 (previous pg.) takes a more in-depth look at the above-described purchasing changes, breaking down the data by individual hospital and also adding in data on fish, vegetarian protein and 'other.' This table demonstrates fairly wide diversity in how the hospitals approached Balanced Menus, as described below.

Hospital A made the deepest cuts in purchasing, and was the only hospital to provide data on sustainable meat procurement. The hospital administrator indicated in the interview that they had used some of the cost savings from meat reduction to support the shift to sustainable meat procurement. They also noted that they did not reduce meat offerings, but rather, expanded vegetarian options, which consumers chose. This hospital's menu changes resulted in reductions in every category of meat procurement, but most substantially beef, reducing 59.5 percent of beef purchasing even when combining industrial and sustainable products together. The hospital also made dramatic cuts to poultry purchasing, despite poultry's relatively low carbon footprint. The hospital's data chart gives the impression that they also cut back on vegetarian protein; this reflects primarily a reduction in dairy. Overall, the hospital spent \$24,385 less monthly on meat following implementation than they had spent prior to the program start. Over a year, the savings could come to \$292,620, not counting replacement items. Hospital staff note that the reduction was partly due to a decline in patient census and staffing due to the year's economic challenges.

Hospital B made significant changes to its meat procurement, cutting beef by 7.5 percent and pork by 16.1 percent. At the same time, the hospital dramatically increased purchasing of vegetarian proteins (17% increase) and of fish. Accordingly, overall, based on the data provided, this program ended up costing an extra \$873 during the pilot time period. However, for this extra cost, the hospital was able to invest in providing what was most likely a healthier and more ecologically sound mix of foods to patients.

Hospital C: Hospital C started out with the second-highest baseline vegetarian protein, at 10,727 lbs. The program made small increases in vegetarian proteins and poultry, and reduced its other meat purchasing, especially beef (36.7% drop.) Reported spending on included items at this hospital did increase by \$3,606 during the project period, apparently due to the increase in poultry purchasing.

Hospital D: Hospital D provided only data on the change in pounds purchased per 6-week period, so it is not possible to reach detailed conclusions about program impacts. Overall, the hospital sourced 427 lbs less meat per month in the later period than it did in the baseline. The major part of this reduction, at 267 lbs, was poultry, followed by beef (113 lb reduction). Overall, they saved \$920/month in meat costs. Over 1 year, that would be equivalent to \$11,040.

Hospital A provided data to show the impacts of its sustainable meat purchasing efforts, presented in Table 6. In particular, the hospital added 435 lbs of grass-fed beef in the 'after' month compared to the baseline. The vegetarian proteins include sustainably produced dairy and eggs.

Table 6: Hospital A, Sustainable and industrially produced proteins

	TOTAL	Beef	Pork	Lunch Meat	Poultry	Fish	Vegetarian Protein
SUSTAINABLY PRODUCED							
Baseline lbs	11,527	0	0	0	55	0	11,472
Change lbs.	295	435	0	0	174	0	-313
% change lbs	3%	4%	0%	0%	2%	0%	-3%
Baseline \$	3,663	0	0	0	179	0	3,484
Change \$	4,017	1,869	0	0	1,076	0	1,072
% change \$	110%	51%	0%	0%	29%	0%	29%
INDUSTRIALLY PRODUCED							
Baseline lbs	18,372	5,202	3,309	683	9,178	0	0
Change lbs.	-3,828	-3,568	-1,643	-528	-7,565	2,340	0
% change lbs	-21%	-19%	-9%	-3%	-41%	13%	
Baseline \$	\$53,418	\$15,429	\$11,426	\$2,068	\$24,495	0	
Change \$	-\$28,402	-\$9,666	-\$7,472	-\$1,613	-\$20,560	\$10,909	0
% change \$	-53%	-18%	-14%	-3%	-38%	20%	

Greenhouse Gas Emissions Modeling

The changes in purchasing may have multiple environmental impacts. To model just one of these, we entered the above data into three GHG emissions calculators (described above in Methods). **We emphasize that these calculators are simply a way to get a general sense for GHG emissions and that the numbers should not be taken literally.** It is virtually impossible to develop a fully accurate food GHG calculator with broad applicability—numerous variables combine to shape the carbon footprint of any one item, including: where, when and how the item and its inputs were produced; which cut of meat; how it was transported; how it was stored; how it was prepared; etc. Further, different calculators take quite different approaches to calculating GHG emissions and allow different data to be entered into the calculations. Surprisingly, however, the results from all three calculators were quite close, as demonstrated in Figure 1. The figure examines data by hospital and calculator, demonstrating that values for each grouping of results (e.g., all blues for “GHG before”) were reasonably similar. Furthermore, in terms of the ordering of results, the Balanced Menus calculator nearly consistently presented the most conservative results of the three analyses, and Low Carbon Diet calculator nearly consistently provided found the highest results for greenhouse gas emissions.

Figure 1: Modeled GHG emissions reductions by calculator and hospital.

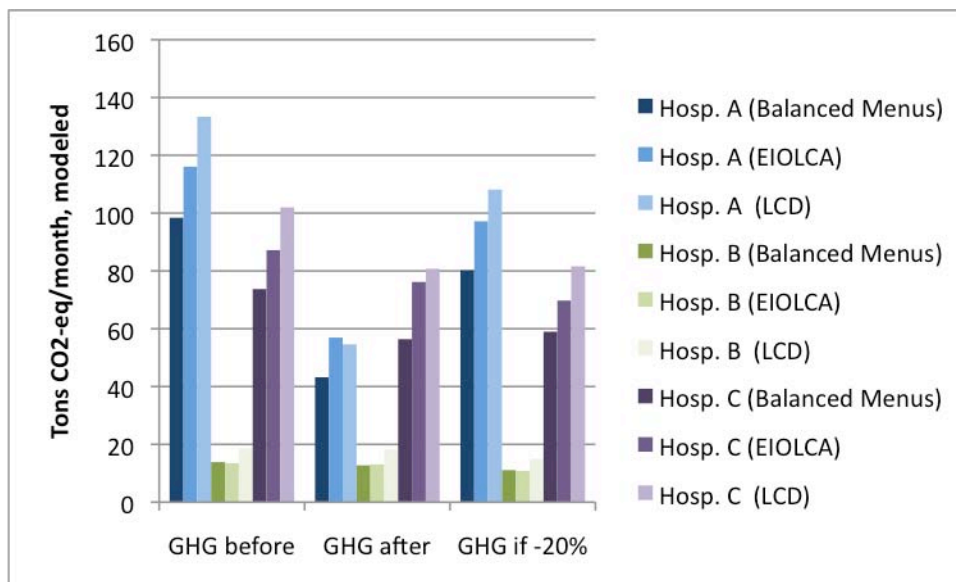


Table 7 presents the modeled GHG emissions changes based on changes in meat purchasing. **As with the analysis of changes in costs, we emphasize that this GHG analysis does not fully or adequately take into account what the meats were replaced with. Nonetheless, given that meats, especially beef, have exceptionally high impacts, it is expected that total GHG reductions may be significant even after accounting for replacement foods.** Detailed tables by food type are available on request.

We found that in all the calculators, most of the observed emissions reductions (over 85% on average) came from beef, primarily due to its large carbon footprint. Hospitals did make significant reductions in beef purchasing but percentage-wise and pound-wise, it was only the top-reduced item for one hospital (C). Indeed, two hospitals made greater reductions in poultry than beef despite the GHG implications.

TABLE 7: Greenhouse gas emissions changes based on changes in meat purchasing—modeled^{xii}

	Tons CO ₂ -eq before	Tons CO ₂ -eq after	Change in tons	% Change ^{xiii}	Tons CO ₂ -eq if -20% ^{xiv}
Average per month	73.0	45.8	-20.9	-26%	59.2
Average per year	875.6	549.4	-251.0		710.2
Total across hospitals per month	218.9	137.3	-83.7		177.5
Total across hospitals/ year	2,626.7	1,648.2	-1,004.0		2,130.5

The table shows that in sum, the included hospital food for the three hospitals at baseline accounted for 2,626.7 tons of CO₂-equivalent GHG emissions annually, assuming purchasing did not vary by season. Through the Balanced Menus program, hospitals were modeled to reduce meat-related GHGs by an average of 26 percent monthly per hospital. Including the additional hospital that provided only “change” data, this reduction would calculate to 1,004

tons/year across all four hospitals. Based on the Balanced Menu goal of reducing meat purchasing by 20 percent, we also modeled the potential impacts if each hospital reduced sourcing of each type of meat by exactly 20 percent. Under that scenario, the hospitals would have reduced emissions in aggregate by 596.2 tons/year to 2,130.5 tons—a smaller reduction than is estimated to have occurred.

To give some context, the 2,626.7 tons CO₂-eq / year for the three hospitals at baseline is equivalent to the CO₂ emissions from burning 268,043 gallons of gasoline. Alternately, this figure is comparable to the carbon sequestered by 61,100 tree seedlings grown over 10 years. The estimated summed reduction in GHGs for all the hospitals, 1,004 tons CO₂-eq/year, is equivalent to the CO₂ emissions from 102,454 gallons of gasoline. Alternately, the figure can be compared to the carbon sequestered by 23,354 tree seedlings grown over 10 years. (Based on comparability data provided at the following EPA website: <http://www.epa.gov/cleanrgy/energy-resources/calculator.html>.)

Findings From Interviews with Food Service Managers

Interviews were conducted with the food service managers from each of the four participating hospitals. Interviewees were asked to describe the process of implementing Balanced Menu in their food service operations. Of specific interest were facilitators and barriers to implementation, including strategies for addressing barriers. In the course of this discussion, the interviewees talked about how well received the program was both by management and by their customers. Each interview closed with a discussion of how to improve Balanced Menu and recommendations for future program adopters.

Goal Setting

The four pilot hospitals set a variety of benchmarks and goals in order to try to accomplish the specific aims set out by Balanced Menu. Hospital A, for instance, aimed to increase vegetarian options in their menus. Hospital B sought to limit the amount of red meat served to no more than five meals per week. As part of their strategy to meet this goal, the food services staff sought to add fish to the menu three to four times per week and add more “combination dishes” like pastas and stews. In contrast, the food service manager at Hospital D did not set a specific goal. Instead, she sought to reduce the amount of meat purchased, with no specific target. In keeping with the aims of the program, the interviewee suggested that she hoped to use the money saved by reducing purchase of meat overall to buy more sustainably produced meats instead. Some of the hospitals promoted Balanced Menu as part of larger efforts focused on healthy diet and/or eating locally.

Each of the four interviewees reported dissatisfaction with their progress in accomplishing these goals, citing lack of time or staff support as a key barrier. However, the representative from Hospital A was pleased to report a 30 percent increase in the portions of vegetables served and, on the patient menus, a 20 percent increase in sustainable options.

Facilitating Factor: Administrative Support

All four interviewees reported that their managers were supportive of Balanced Menu. While none had hospital administrators who directly championed the program, interviewees reported that they were given the freedom to use their judgment in running their operations, including Balanced Menu. The interviewees were further requested to explain how they went about

“selling” the program to their administrators. Most cited use of the Balanced Menus programming brochures and other marketing materials as a way to inform the management about the goals and process of the program. This approach proved sufficient, in their cases, without need for additional “selling points” or materials.

Facilitating Factor: Supportive Social Climate

In addition, several of the interviewees mentioned other existing activities taking place at their hospitals to promote sustainability and other “green” initiatives, demonstrating management support for the mission and goals of Balanced Menus. Each interviewee, for example, was a member of the Hospital Leadership Team, a group of Bay Area food service professionals interested in improving the sustainability and nutritional content of foods offered at hospitals in the region. Two interviewees described other programs taking place at their hospitals, such as a “Green Team” or the “Green Environment Management Strategies” program, focusing on reducing the overall carbon footprint of their particular hospitals. Another interviewee discussed her hospital’s “farm to fork” program, which was designed to increase local procurement of meats and produce. In fact, each of the interviewees cited an interest in expanding the locally grown menu options offered through their food service programs, partially as a result of participation in the Hospital Leadership Team. Balanced Menus was seen as a framework through which to accomplish this goal.

Challenge: Patient Needs and Customer Preferences

Patients’ complex dietary needs and restrictions were identified by each of the interviewees as one of the key challenges in implementing Balanced Menus. As one interviewee explained, “It is very complicated to change the patient menu. All recipes have to be painstakingly analyzed and then we have to figure out different modifications for different diets.” For this reason, the food services manager at Hospital C decided not to include Balanced Menus in its complete form as part of the patient meal operations. Instead, this hospital made substitutions in its patient menus aimed at limiting certain meats, such as pork, while maintaining the necessary nutritional profile. Another interviewee cited the clinical staff as being a “harder sell,” compared to the leadership. Several of the interviewees reported pushback from the clinical staff, who were concerned that changing the menus would disrupt the nutritional balance of the offerings. Of particular concern was maintaining protein levels in accordance with state regulations. The food service manager from Hospital A reported particular concern over vegan options: “When the dieticians started analyzing the [Balanced Menus] recipes, especially the vegan options, they couldn’t get protein up to where they felt comfortable.” Adjusting the recipes to achieve the proper nutritional composition, while reflecting the goals of Balanced Menus, then required increased cooperation between the food services and clinical staff. One hospital reported that they ultimately did find a way to successfully include vegetarian items as the main patient entrée while maintaining nutrition balance, by modifying other menu items to increase the overall protein level of the meal and/or day. For example, with a (popular) vegetarian meal of lentils and spinach over rice, they added a custard with berries for dessert, thus keeping protein content high.

Customer preferences also proved a challenge to the complete phase-in of the Balanced Menus program. This concern was particularly noted by Hospital B, which serves an “old school, meat and potatoes crowd,” as described in the interview. Balanced Menus offerings at Hospital B were adjusted so that they would not appear “exotic” compared to other menu options. Several of the interviewees explained that patients’ families are also resistant to change in the menus. In order to cope with the emotional distress of caring for or visiting a loved one in the hospital,

patients' families may seek comfort foods in hospital cafeterias. As the food service manager from Hospital C explained, "there are two groups that come in, employees who want something new, different, and exciting, and patients' family members and friends who want something comforting that they don't have to worry about like hamburgers or 'mac and cheese.'" Anecdotal evidence cited by the interviewees suggested that the family members did not initially find the Balanced Menu options to be particularly comforting. In response, several of the interviewees reported having revised their vegetable-based offerings to accommodate these preferences. Hospital A reported that when they increased their vegetarian offerings, customers did take advantage of them.

Customer Satisfaction

Despite some challenges in accommodating the dietary needs and taste preferences of their clients, each of the food service managers reported having received anecdotal evidence of positive customer response to Balanced Menu. In Hospital A, it was noted, "leadership got very positive comments [about the new menus] from staff and other clients. The program was perceived as a success." Driving the positive comments was the increase in vegetarian options and the more apparent use of fresh vegetables across the selections. This sentiment was echoed by patrons and patients dining in Hospital D. Emails and customer comments were one indicator of satisfaction. "I've received emails from employees. People are happy with the vegetables and seasonal fruit rotation. Some people have gone out of their way to say positive things."

Customer satisfaction was a particularly important consideration in the adoption of Balanced Menu. Each of the interviewees cited this, along with financial impact, as a primary concern among the hospital leadership. Each of the interviewees discussed their procedures for tracking general customer satisfaction, which largely involved the use of standard hospital customer satisfaction questionnaires administered annually. Hospital A reported a substantial and steady rise in patient satisfaction ratings for meals following Balanced Menu implementation, as measured in the Avatar survey, rising 24 percentage points over several months. None of the hospitals have yet added additional evaluation methods to capture consumer response to Balanced Menu specifically, but several expressed intent to do this in the future.

Recommendations for Future Program Adopters

At the close of the interview, the food service managers were asked to reflect on the challenges and successes they experienced in implementing the program, and offer recommendations for future adopters of Balanced Menu. The key recommendations included assuring management support, involving clinicians early in the process of menu development, and easing into the program by making small changes to the menu that could be expanded over time. These recommendations reflect "lessons learned" from the interviewees' own experiences.

Prior to implementing Balanced Menu, one interviewee explained, it is important to have administrative support. Leadership support was seen as providing a certain level of "freedom" to adjust the menu in accordance with the program goals. In addition, management buy-in to the program was thought to be a key selling point in negotiations with clinical staff. Indeed, many of the interviewees stressed the need to "get the nutrition staff on board early," as the

representative from Hospital A phrased it. This interviewee “wished [she had] had more formal meetings with the clinical dieticians” in light of the challenges posed by needing to accommodate the diverse and complex dietary needs of their patient population while striving to achieve the Balanced Menus goals.

Each of the interviewees also suggested “starting small” by changing a few options or sections of the menu. One interviewee suggested pre-testing Balanced Menus options with clients prior to introducing them to the larger menu. That way, food services may adjust the flavor and texture profile of the dishes prior to “going live.” Several others suggested making small substitutions in the “combination dishes,” such as switching to turkey for the meatloaf and lasagna options or substituting a vegetarian dish for one of these options. One interviewee offered this as advice: “Remember not to try to push too hard. Know that it’s a process. Take baby steps.” Another suggested “doing it slowly to make sure you come up with popular, good-tasting recipes for substitutes.”

Summary

In summary, each of the interviewees expressed satisfaction overall with Balanced Menus and planned to continue with implementation. Over the course of the interview, each of the food service managers expressed intent to adjust their implementation strategies according to lessons learned during the pilot period. Some of these adjustments will include more taste testing with clients, wider marketing of the program, and assessment of customer satisfaction with the new menu items. They were each willing to share their menus with future program adopters, hoping that Balanced Menus will have a wider reach and greater impact through a combined effort.

Section V: Discussion and Conclusion

Overall, in this pilot evaluation, the four participating hospitals documented significant forward movement in achieving Balanced Menus goals. If purchasing remained constant across the year, the three hospitals that provided relevant data would have purchased in total an estimated 109,000 lbs of beef, 70,000 lbs of pork, 237,000 lbs of poultry, and 261,000 lbs of vegetarian protein sources (including in some cases, milk) annually. For these products, they would have spent a total of approximately \$1.519 million per year, based on reported data. When follow-up data were collected, on average the hospitals reduced meat purchasing by 28 percent. If they continued purchasing at the new level for a year, they would save in sum \$402,000 on meat purchases in a year. We did not receive adequate data on replacement proteins to enable calculation of the net savings.

We examined the potential greenhouse gas emissions impacts of the observed changes, inputting the data into three calculators that use different methods to arrive at their greenhouse gas emissions estimates. Despite the different methods, all three calculators yielded similar estimates, providing some level of confidence to the findings. For the three hospitals that provided relevant data, the included meat and vegetable proteins at baseline would have accounted for 2,627 tons of CO₂-equivalent GHG emissions annually if purchasing was constant through the year. Through participation in Balanced Menus, the hospitals reduced meat-related GHGs to a total of 1,648 tons annually (if the new purchasing quantities were maintained for a year). Adding in the fourth hospital, there would be a 1,004 ton/year reduction, the equivalent of CO₂ emissions from burning 102,454 gallons of gasoline or sequestering carbon by growing 23,354 tree seedlings over 10 years. Over 85 percent of the observed emissions reductions came from beef, reflecting beef's exceptionally large carbon footprint. We emphasize that these calculator tools are simply a way to get a general sense for GHG emissions and that the numbers should not be taken literally.

All of the hospitals described the program as an ongoing effort, and expressed that they hoped to further reduce meat purchasing and further increase purchasing of sustainably produced animal products, meaning that in the future, reductions and savings could be even greater.

The four pilot hospitals set a variety of benchmarks and goals in order to try to accomplish the specific aims set out by Balanced Menus. For example, one focused on adding fish and "combination dishes" to the menu, while another did not set a specific target but aimed to use saved money to increase purchasing of sustainably produced meats.

In interviews, food service staff responsible for the Balanced Menus program described key facilitating factors and challenges. For these staff, convincing their management to allow Balanced Menus generally involved describing the program and sharing the marketing materials. All were in hospitals that had previously indicated support for environmental sustainability initiatives. The food service managers felt that a bigger challenge for them was developing menus that would meet patients' complex dietary needs and restrictions, and that would satisfy their preferences. They also worked to develop effective cafeteria menus. They reported anecdotally that Balanced Menus was being well received, and one and experienced a 24 percentage point increase in Avatar patient satisfaction ratings for meals during

implementation. However, none had directly evaluated patient or customer satisfaction with Balanced Menus. Some were interested in doing so.

The food service managers had three top recommendations for those considering implementing Balanced Menus: assure management support, involve clinicians early in the process of menu development, and ease into the program by making small menu changes that could be expanded over time.

In the future, it will be valuable to conduct ongoing evaluation of Balanced Menus implementation to help hospitals make the case for the program to their administrators and others. It will be critical to develop an easy-to-use data collection tool matched to the categories of top institutional food providers, and for hospitals to collect data on an ongoing basis rather than having to go backwards through records.

Limitations

The findings from this evaluation must be considered within the context of its limitations. First, as Balanced Menus is a new program, neither the implementation plan nor the data collection methods are yet standardized; participating hospitals each provided slightly different data, due to differences in the methods they used to track their purchases as well as differences in their program implementation. In some cases, to facilitate analysis we had to combine categories or make assumptions about what the data meant. We hope to make specific recommendations for a future data collection tool, in order to make it easier for hospitals to collect data and to improve comparability.

Second, the pilot study included only four hospitals (and one of these was omitted from many of the cross-site comparisons because of limited data provided.) It is not possible to know how reflective these results would be of other hospitals in the U.S., even within their same size categories. Further, the sample hospitals were in the San Francisco Bay Area, which differs culturally and in terms of seasonal/local food production capacity from many other areas of the country. Accordingly, hospital administrators, patients and café users may have been more receptive to the program, and the food service providers may have had more options for locally grown substitute foods than elsewhere.

Third, in understanding the program impacts, we did not have clear or consistent information on the substitute foods the hospitals used in place of the meats they reduced. Accordingly, it was not possible to calculate net impacts in terms of price or greenhouse gas emissions.

Finally, these reductions in meat purchasing occurred during a time of economic challenges. As such, if vegetarian options were priced lower by the food services, they might have been more appealing than they would be in other times. In addition, we did not measure the impact of changes in patient census and hospital staffing on overall food purchasing, but it is possible that the economy forced reductions in those numbers, as was reported by Hospital A.

Conclusion

Through this pilot investigation, we have shown that the Balanced Menus program implementation in these four hospitals exceeded the 20 percent meat reduction goal, and yielded substantial savings in costs and greenhouse gas emissions, as well as, potentially,

some improvements in health for those eating reduced quantities of meat. The program's expansion provides an important opportunity to further advance these goals. With a larger sample of hospitals and a longer time-span, future program evaluation work can gain an even clearer perspective on the program's impacts.

References

1. US Department of Agriculture Economic Research Service. Food Availability: Red meat and poultry. Retail weight, 2008. Available at: <http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm#mtpcc>. Accessed March 23 2010.
2. Walker P, Rhubart-Berg P, McKenzie S, Kelling K, Lawrence RS. Public health implications of meat production and consumption. *Public Health Nutrition* 2005;8(4):348-56.
3. Erlinger TP, Appel LJ. The relationship between meat intake and cardiovascular disease. In. Baltimore, MD: Johns Hopkins Center for a Livable Future; 2003.
4. Wang Y, Beydoun MA. Meat consumption is associated with obesity and central obesity among US adults. *International Journal of Obesity* 2009;33(6):621-28.
5. Baxter AJ, Coyne T, McClintock C. Dietary patterns and metabolic syndrome - a review of epidemiologic evidence. *Asia Pacific Journal of Clinical Nutrition* 2006;15(2):134-42.
6. Ma RW, Chapman K. A systematic review of the effect of diet in prostate cancer prevention and treatment. *Journal of Human Nutrition and Diet* 2009;22(3):187-99.
7. Sandhu MS, White IR, McPherson K. Systematic review of the prospective cohort studies on meat consumption and colorectal cancer risk: a meta-analytical approach. *Cancer Epidemiology, Biomarkers, and Prevention* 2001;10:439-446.
8. Taylor VH, Misra M, Mukherjee SD. Is red meat intake a risk factor for breast cancer among premenopausal women? *Breast Cancer Research and Treatment* 2009;117(1):1-8.
9. Barnard N, Scialli A, Turner-McGrievy G, Lonou A, Glass J. The effects of a low-fat, plant-based dietary intervention on body weight, metabolism, and insulin sensitivity. *The American Journal of Medicine* 2005;118(9):991-997.
10. Hu F. Plant-based foods and prevention of cardiovascular disease: an overview. *American Journal of Clinical Nutrition* 2003;78(3):544S-551S.
11. United States Centers for Disease Control and Prevention. Heart Disease Facts. Available at: <http://www.cdc.gov/heartdisease/facts.htm>. Accessed December 20, 2009.
12. United States Centers for Disease Control and Prevention; National Center for Health Statistics. Prevalence of overweight, obesity, and extreme obesity among adults: United States trends, 1960-62 through 2005-2006. In. Atlanta, GA; 2006.
13. United States Centers for Disease Control and Prevention. Prevalence of metabolic syndrome among adults 20 years of age and over, by sex, age, race and ethnicity, and body mass index: United States, 2003-2006. In. Atlanta, GA.; 2006.
14. Gerba C, Smith J. Sources of Pathogenic Microorganisms and Their Fate during Land Application of Wastes. *J Environ Qual* 2005;34:42-48.
15. Mellon M, Benbrook B, Benbrook KL. Hogging It!: Estimates of Antimicrobial Abuse in Livestock (2001). In. Washington, DC: Union of Concerned Scientists; 2001.
16. Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, Haan C. Livestock's Long Shadow: Environmental Issues and Options. In. Rome: FAO; 2006.
17. Weber CL, Matthews HS. Food-Miles and the Relative Climate Impacts of Food Choices in the United States. *Environmental Science & Technology* 2008;42(10):3508-3513.

18. Intergovernmental Panel on Climate Change. Climate Change 2007: Synthesis Report. In. New York, NY; 2007.
19. McMichael AJ, Powles JW, Buler CD, Uauy R. Food, food production, energy, climate change, and health. *Lancet* 2007;370(Series on Energy and Health #5):55-65.
20. Wilkinson P, et, al. A Global Perspective on Energy: Health Effects and Injustices. *Lancet* 2007;370(Series on Energy and Health #1):965 - 978.
21. United States Department of Agriculture. Agricultural Chemicals and Production Technology: Sustainability and Production Systems. In. Washington, D.C.; 2005.
22. Clancy K. Greener Pastures: How grass-fed beef and milk contribute to healthy eating. In. Washington, D.C.: Union of Concerned Scientists; 2006.
23. Rule DC, Broughton KS, Shelliot SM, Maioraon G. Comparison of muscle fatty acid profiles and cholesterol concentrations of bison, beef cattle, elk, and chicken. *Journal of Animal Science* 2002;80(5):1202-11.
24. Kim B, Houser LP, Rosenthal A, Neff RA. Literature Review of Methods and Tools for Quantifying the Indirect Environmental Impacts of Food Procurement: A research report completed for Clean Air-Cool Planet. In: Center for a Livable Future; 2008.
25. Kim B, Neff R. Measurement and communication of greenhouse gas emissions from U.S. food consumption via carbon calculators: A review of scope, methods and communication. *Ecological Economics* 2009;69(1):186-196.
26. Eshel G, Martin P. Diet, Energy, and Global Warming. *Earth Interactions* 2006;2006(10):1-17.

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ⁱ Calculated based on Weber & Matthews' emissions data; Census household data; and EPA emissions data, in Kim, B., Neff, R., Measurement and communication of greenhouse gas emissions from U.S. food consumption via carbon calculators, *Ecological Economics* (2009), doi:[10.1016/j.ecolecon](https://doi.org/10.1016/j.ecolecon).

ⁱⁱ For example, a full lifecycle accounting of beef cattle production would include the production of feed grains and the energy-intensive inputs it takes to produce them, transport, respiration, manure, heat, lights, farm and processing equipment, cooling processes, energy for irrigation, and so on --- and *also* the lost opportunity to sequester carbon on healthy soils not producing feed grains or being deforested for feed production or pasture.

ⁱⁱⁱ Unfortunately, due to inconsistencies in data from hospital to hospital, we were not able to utilize detailed meat-type data in this analysis.

^{iv} As part of reviewing the calculator, we re-gathered this base data from their updated book (2008, p. 70, tables 8.2, 8.3). The book notes that the data were adapted from a 1977 study(!). We removed fish as a category, as the data in that study for different seafood vary by orders of magnitude.

^v Assuming purchasing did not change with seasons

^{vi} Assuming purchasing did not change with seasons

^{vii} Data on lunch meat was not consistently provided by all, but there was enough to enable sharing it here. We are not including data on fish or on sustainably produced meats here because the reporting was less consistent.

^{viii} % change calculated as change/baseline, so if a baseline of 100 was reduced by 20, this would be calculated as 20/100.

Averaged across hospitals, not meat products.

^{ix} Assuming purchasing did not change with seasons

^x Assuming purchasing did not change with seasons

^{xi} Note: the average % changes for fish are left blank because the "after" sourcing was many times as much as the early sourcing, leading to percentage change values in some cases over 1000 percent, which can be confusing

^{xii} Each estimate is based on the results from the 3 calculators averaged for each hospital, and combining all included protein sources – followed by averaging the results across three hospitals. For the "change" column, there were 4 hospitals included in the averaging. Yearly estimates assume there was no seasonality in purchasing.

^{xiii} This percentage represents a weighted figure.

^{xiv} This column shows a scenario in which the hospitals had reduced their meat purchasing by 20%, as suggested in the Balanced Menus Challenge – and had reduced equally from each meat category.