ORIGINAL
ResearchRyan P. Sherman, DBH, CHWC, Rebecca Petersen, PhD,
Anthony J. Guarino, PhD, and J. Benjamin Crocker, MDPrimary Care–Based Health
Coaching Intervention for Weight
Loss in Overweight/Obese Adults:
A 2-Year Experience

Abstract: Background: Obesity is a major contributor to medical comorbidity and places a large economic burden on health care. This study examined the effectiveness of primary care–integrated health coaching for weight loss in overweight/obese patients. Participants/Methods: This observational clinical study with a retrospective comparison analysis was performed at an urban academic primary care practice. A total of 271 individuals with a BMI >25 kg/m² were recruited and followed for 2 years. A standardized health coaching intervention was used to promote weight loss. The main outcome measures were weight loss as a percentage of initial body weight and proportion of patients with weight loss $\geq 5\%$ initial body weight, controlling for relevant covariates. An activity-based cost assessment of health coaching for weight loss was also performed. Results: Health coaching was associated with a mean loss of 7.24% initial weight after 12 months (95% CI = 8.68 to 5.90) and 6.77% after 24 months (95% CI = 8.78 to 4.76). Coached patients were more likely to achieve $\geq 5\%$ of initial

weight loss at both 12 and 24 months ($P < .001$). Health coaching costs were \$288.54 per participant over 1 year. Conclusions: Primary care–integrated health coaching was associated with statistically significant weight loss in overweight and obese adults.

Keywords: obesity; health coaching; weight loss; primary care; telephone; telemedicine

tremendous financial burden on the US health care system. Obese adults spend 42% more on direct health care costs than individuals with a healthy BMI, and employers spend \$4.3 billion annually as a result of obesity-related absenteeism.² Because of the medical and financial impacts of obesity, the US health care system is in need of effective and cost-efficient weight loss interventions.

Counseling weight loss interventions provided by allied health professionals within primary care have demonstrated modest weight loss benefits.

Introduction

With nearly 70% of adults affected, clinical overweight and obesity is a medical epidemic with clear links to multiple comorbidities such as cardiovascular disease, diabetes, malignancy, and orthopedic complications.¹ Obesity also places a

American Heart Association guidelines suggest that physicians should consider obesity as a disease and more actively treat patients for weight loss, given that a reduction of 5% in initial body weight has been shown to improve health outcomes.^{3,4} Primary care practices have been identified as appropriate settings for treating obesity.^{5,6} There is little

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evidence, however, that traditional providers can effectively facilitate clinically significant weight loss.⁷⁻⁹

Counseling weight loss interventions provided by allied health professionals within primary care have demonstrated modest weight loss benefits.^{5,10,11} However, the effect on weight loss of a fully integrated and certified health coach within a primary care team has not been described. In 2011, health coaching was introduced into a primary care practice at Massachusetts General Hospital (MGH). We describe this primary care-based weight loss program and report on patient outcomes and estimated program investment.

Methods

Study Setting

We conducted a consecutive sample-based observational clinical study with retrospective comparison analysis at the Ambulatory Practice of the Future (APF), an urban, academic, adult primary care practice at the MGH in Boston, MA. In July 2011, this 1-year-old practice employed 2 part-time (1.75 full-time equivalent [FTE]) primary care physicians (PCPs), 1 half-time (0.5 FTE) nurse practitioner, 1 full-time nurse, and 1 full-time health coach to care for employees and their adult spouses/partners. The Partners Healthcare Institutional Review Board approved this study.

Patient Population

The study population consisted of overweight or obese adults (BMI >25 kg/m²; age ≥18 years) receiving primary care at the APF. Patients already taking or subsequently prescribed weight loss medication and those who transferred their care out of APF, relocated, or who were pregnant were excluded. The study groups were defined as follows: (1) coaching group: eligible patients who received health coaching for weight loss for at least 3 months; (2) comparison group: eligible patients who were identified by having had an office visit and a recorded BMI >25 kg/m² and who did not receive health coaching (based on provider assessment of readiness/

willingness to change or an actual decline in an offer to participate in health coaching for weight loss); (3) drop-out group: patients from the coaching group who did not complete 3 months of coaching for weight loss (these patients were intentionally not included in the coached group to conduct a “per protocol” analysis because their attrition was missing completely at random—that is, unrelated to the treatment); and (4) non-weight coached group: eligible patients who received coaching for any reason other than weight loss (this group served as a means to control for general motivation to change because group assignment could not be randomized).

Coaching Program Description

The APF health coaching model utilizes a fully integrated, professionally certified health coach. A primary care clinician identifies patients at routine practice visits and individually assesses their readiness for coaching. Patients who choose to work on weight loss independently are given usual instruction that consists of the provider's counseling to lose weight, along with available patient education resources on weight loss. Patients who opt for health coaching are offered an appointment with the health coach within 4 weeks. The health coach initiates outreach via a “warm” handoff or email. Patients are required to complete and return a self-assessment, which gathers information on their current lifestyle habits, before their initial appointment. On completion of the self-assessment, an office visit is scheduled for the patient to meet with the health coach. Figure 1 provides a more comprehensive description of the health coaching enrollment and program.

The health coaching techniques used during patient encounters are largely based on a Wellcoaches^{TM} coaching protocol, which integrates several models of engagement and behavioral approaches, including motivational interviewing, appreciative inquiry, self-determination theory, transtheoretical model, positive psychology, and relational flow.¹² The health coach

Figure 1.

Description of health coaching enrollment and program.

* PCP, primary care physician.

** NP, nurse practitioner.

facilitates a dialogue and the creation of a patient-generated action plan. Because no mechanism exists for reimbursement by payers for health coaching, these visits were not billed, and patients did not have to make a co-pay. The health coach used in this study had a master's degree in clinical exercise physiology and was a Wellcoaches^{TM}-certified health and wellness coach.

Outcome Measures

The primary outcome measures were percentage of weight change and the achievement of weight loss of ≥5% from baseline to 12 months, and from baseline to 24 months. A secondary measure was a 12-month health coaching cost assessment (dollars per participant).

Data Acquisition

A chart review of the electronic health record was conducted in July 2015 to identify eligible patients. Patients in the

coached, drop-out, and non-weight coached groups were identified via a review of consecutive coaching visits from January 1, 2012, to December 31, 2013. Chart review for these groups was extended through 2 years (up through December 31, 2015) to collect weight measurements. The comparison group was identified via a search of practice visits from July 2011 to December 2011 for patients who had a BMI >25 kg/m² and were followed in the practice for at least 2 subsequent years. In addition to baseline weight and BMI, we included in the statistical analysis the following demographic and health covariates that could affect weight change: age, gender, race, and presence of comorbid conditions, including psychiatric illness (depression or anxiety), prediabetes or diabetes, hypertension, and hyperlipidemia. Follow-up BMI and weight measurements were collected at 12 and 24 months from the earliest visit (for comparison group) or enrollment in the coaching program (for other groups). The number and length of coaching encounters were collected to obtain a coaching cost assessment.

Data Analysis

This study was designed to have 80% power to detect group differences of 10 pounds in the primary comparisons between the comparison and coached groups, assuming a 2-sided type I error rate of 5%. Mixed-model repeated-measures analyses were conducted to compare the groups' adjusted mean percentage of weight loss at 12 and 24 months. The model included the fixed effects of (1) baseline BMI, (2) age, (3) sex, (4) race/ethnicity, (5) psychiatric disorder, (6) hyperlipidemia, (7) hypertension, (8) prediabetes and diabetes, and (9) group assignment. The random effect (random intercepts) was the participant. To assess the proportion of patients achieving clinical weight loss (ie, attained $\geq 5\%$ weight loss from base-line), a 4 (Group) $\times$ 2 (Attainment) cross-tabulation (χ^2) analysis was conducted at the 12- and 24-month time points. Logistic regression analyses, using the

Figure 2.

Patient group assignment.

Abbreviation: BMI, body mass index.

previously mentioned covariates, were conducted to examine which variables significantly contributed to $\geq 5\%$ weight loss at 12 and 24 months. All statistical tests were conducted using IBM SPSS version 23 (Chicago, IL). Time-driven activity-based costing was used to assess the mean investment required for health coaching over 12 months (in dollars invested per coached participant as well as dollars invested per participant achieving $\geq 5\%$ baseline weight loss) using methods from Kaplan and Anderson's model.¹³

Results

Patient Enrollment

Figure 2 delineates the assignment of 271 patients into the 4 previously described groups. Per data acquisition (record analysis) methods, all participants in the drop-out group were patients who had originally accepted the coaching intervention (ie, none of the participants in the drop-out group originated from the comparison group).

Patient Characteristics

Baseline descriptive information for the 4 groups is presented in Table 1, with the following differences detected: (1)

BMI: (dropouts $>$ comparison), (2) age (comparison older than coached and non-weight coached), (3) sex (coached and comparison had fewer female participants than dropouts and non-weight coached), (4) hypertension (comparison $>$ other groups), and (5) diabetes/prediabetes (comparison $>$ coached). There was no difference in rates of depression or anxiety in any group. The drop-out group had significantly more patients with diabetes than the coached group.

Patient Outcomes

Percentage Weight Change at 12 Months ($n = 271$). Groups differed significantly in adjusted mean percentage of weight change at 12 months ($P < .001$). Post hoc analyses identified that the adjusted mean percentage of -7.24% weight change for the coached group was significantly greater than that for the other groups. There were no differences among the other 3 groups (see Table 2 and Figure 3).

Percentage Weight Change at 24 Months ($n = 242$). Groups also differed significantly in adjusted mean percentage of weight change at 24 months ($P < .001$). Post hoc analyses

Table 1. Baseline Descriptive Information by Group, With Overall Group Differences and Specific Group Differences.^a

	Group	n	Mean	SD	P Value
BMI (kg/m ²)	Comparison ^p	123	30.2	5.0	.02
	Coached	98	31.8	5.0	
	Dropout ^q	21	34.0	5.2	
	Non-weight coached	29	32.0	9.3	
	Total	271	31.3	5.7	
Weight (pounds)	Comparison		202.2	43.6	.67
	Coached		203.0	37.9	
	Dropout		212.6	46.0	
	Non-weight coached		196.9	61.4	
	Total		202.7	44.0	
Age (years)	Comparison ^p		54.9	15.1	<.001
	Coached ^q		46.0	12.1	
	Dropout ^{p,q}		46.8	12.4	
	Non-weight coached ^q		44.5	12.4	
	Total		49.9	14.3	
Race, white (%)	Comparison		85.4	35.5	.05
	Coached		86.7	34.1	
	Dropout		81.0	40.2	
	Non-weight coached		65.5	48.4	
	Total		83.4	37.3	
Sex, male (%)	Comparison ^p		61.0	49.0	<.001
	Coached ^p		48.0	50.2	
	Dropout ^q		19.1	40.2	
	Non-weight coached ^q		24.1	43.5	
	Total		49.1	50.1	
Psychiatric	Comparison		20.3	40.4	.07
	Coached		35.7	48.2	
	Dropout		28.6	46.3	
	Non-weight coached		34.5	48.4	
	Total		28.0	45.0	
Hyperlipidemia	Comparison		40.7	49.3	.62
	Coached		38.8	49.0	
	Dropout		28.6	46.3	
	Non-weight coached		31.0	47.1	
	Total		38.0	48.6	
Hypertension	Comparison ^p		50.4	50.2	.01
	Coached ^q		30.6	46.3	
	Dropout		33.3	48.3	
	Non-weight coached		27.6	45.5	
	Total		39.5	49.0	
Diabetes/Prediabetes	Comparison ^p		25.2	43.6	.01
	Coached ^q		11.2	31.7	
	Dropout		33.3	48.3	
	Non-weight coached		10.3	31.0	
	Total		19.2	39.5	

^aTo assess equivalency among the groups on baseline information, a series of 1-way ANOVAs were conducted for continuous variables and χ^2 tests for categorical variables. *P* values are based on ANOVA results to assess overall group differences. Same superscripts p and q indicate groups are not significantly different; different superscripts indicate that groups are significantly different. To control for inflated type I error in the post hoc comparisons, the Bonferroni correction was used.

Table 2. Adjusted Mean Weight (lbs) at Baseline and Mean (*M*) Adjusted Percentage Change at 12 and 24 Months.

	n	Baseline Weight		12-Month Weight		Percentage Change	
		<i>M</i>	SD	<i>M</i>	SD	<i>M</i>	SD
Comparison	123	203.0	3.5	201.2	3.4	−0.9	0.5
Coached	98	200.5	3.8	185.0	3.7	−7.2	0.6
Dropout	21	211.4	8.2	213.2	8.1	0.9	1.3
Non-weight coached	29	202.9	7.0	206.0	6.9	2.0	1.1
$F(3, 259) = 32.89, P < .001, \eta^2 = .28$							
	n	Baseline Weight		24-Month Weight		Percentage Change	
		<i>M</i>	SD	<i>M</i>	SD	<i>M</i>	SD
Comparison	123	200.4	3.3	196.8	3.4	−2.6	0.8
Coached	70	190.0	4.3	185.6	4.4	−6.8	1.0
Dropout	21	210.9	7.9	209.5	8.0	−0.5	1.9
Non-weight coached	28	205.0	6.8	206.6	7.0	2.5	1.6
$F(3, 230) = 9.15, P < .001, \eta^2 = .11$							

identified that the coached group lost a significantly larger percentage of their baseline weight (−6.77%) than the other 3 groups. Additionally, the comparison group lost significantly more weight compared with the non-weight coached group (see Table 2 and Figure 3).

Clinically Significant Weight Loss at 12 Months (n = 271). A total of 60% of patients in the coached group lost ≥5% of baseline weight by 12 months. The χ^2 analysis indicated that significantly more coached patients achieved weight loss of ≥5% of baseline weight at 12 months than did comparison, drop-out, or non-weight coached patients (see Table 3). Binary logistic regression analyses indicated that none of the demographic or comorbid medical conditions was significantly associated with achieving clinically significant weight loss.

Clinically Significant Weight Loss at 24 Months (n = 242). Weight loss of ≥5%

baseline weight was observed in 34.7% of the 98 initial patients in the coached group at 24 months. The χ^2 analysis indicated that significantly more coached patients achieved weight loss of ≥5% of baseline weight at 24 months than did comparison, drop-out, or non-weight coached patients (see Table 3). Binary logistic regression analyses indicated that none of the demographic or comorbid medical conditions was significantly associated with achieving clinically significant weight loss.

Coaching Cost Assessment

Patients in the coached group attended a mean number of 11 visits over the course of the first year. The mean length of each visit was 31 minutes. Using activity-based costing methods, and assuming a \$60 000 annual (48 wk/year) salary with 30% indirect employment costs and 80% theoretical capacity, we calculated that the mean investment in health coaching for all patients (independent of weight loss) was

\$288.54 per participant at 1 year. Mean coaching costs for participants achieving ≥5% baseline weight loss at 1 year was \$479.16 per participant. Costs carried out to 2 years would have been substantially less given that most patients were not actively coached beyond their first year.

Discussion

This retrospective observational study suggests that fully integrated health coaching in overweight and obese patients in a primary care practice is associated with meaningful weight loss. Team-based primary care with a certified health coach resulted in an average loss of 7.24% initial body weight at 12 months, with a majority (60%) of patients losing ≥5% of their initial body weight, and nearly 35% of patients having ≥5% lower weight than their initial body weight at 24 months.

We believe that the intervention's success is attributed to the specific use of a fully integrated health coach. Health

Figure 3.

Adjusted mean percentage of weight change at 12 and 24 months.

coaching techniques focus on patient empowerment, as opposed to standardized behavioral prescription and patient education.¹⁴ Eliciting from and supporting patients to leverage their unique strengths empowers them to choose their goals and create their own plan.¹⁵ Monitoring for obstacles to these goals and recognizing and celebrating achievements with patients develops self-awareness and builds self-efficacy.¹⁶ As a result of this behavioral change, health coaching may have a sustained effect on weight loss beyond the limited intensively active relationship with the patient.

Implications

Many primary care providers lack the confidence, skills, or time to enable patients to lose weight and sustain weight loss.^{17,18} Others believe that skilled allied health professionals are better qualified to deliver weight loss interventions.^{19,20} Although primary care clinicians have been shown to be relatively ineffective in administering weight loss interventions,²¹⁻²⁴ advice about weight loss received from a primary care provider can serve as a powerful motivator for patients to attempt to lose weight.²⁵ In our case, the ability of the provider to participate in

ongoing oversight and support of a fully integrated health coach may have assisted patients in commitment to change. Future research should compare this fully integrated approach to outsourced programs.

The treatment protocol in this study met all the elements of the Centers for Medicaid and Medicare Services and obesity guideline minimum requirements with the exception of the modality of treatment contact.^{3,26} Instead of office visits, telephone visits were used for interim assessment and ongoing coaching. The clinical and imputed cost-effectiveness of this study highlights the flexibility and potential scalability of a hybrid visit model of care for weight loss and lends credibility to the relatively small body of literature demonstrating the value of telephone-/remote-based behavioral interventions for weight loss.^{11,27-29}

Programs and policies that improve workforce health and reduce health care costs are of great importance to employers.³⁰ Studies on weight loss or prevention of weight gain in work site settings have demonstrated largely modest short-term weight reduction.³¹ For example, patient-employees at the very same employer site in this study who participated in a 9-month employer-sponsored maintenance intervention immediately following a 10-week work site exercise and nutrition program lost a mean of 3.4 pounds.³² However, there was no difference in weight loss between intervention and nonintervention groups. Our study, which yielded a mean weight loss of 15.4 pounds among coached patients who completed the program, demonstrates the potential value of fully integrated health coaching for weight loss in employer-sponsored primary care clinics. The larger number of women and patients with diabetes/prediabetes in the drop-out group, however, suggests the need for further evaluation and consideration of alternative coaching platforms for these patients. It may be inherently more difficult for patients with diabetes to lose weight.³³ Competing factors such as family responsibilities or shift-based work positions for employees

Table 3. Percent of Patients Achieving Clinical Weight Loss at 12 and 24 Months.^a

Group	n = 271	12 Months, 5% Loss		n = 242	24 Months, 5% Loss	
		Percentage Yes (n)	Percentage No (n)		Percentage Yes (n)	Percentage No (n)
Comparison	123	13.8 (17)	86.2 (106)	123	20.3 (25)	79.7 (98)
Coached	98	60.2 (59)	39.8 (39)	70	48.6 (34)	51.4 (36)
Dropouts	21	19 (4)	81 (17)	21	23.8 (5)	76.2 (16)
Non-weight coached	29	3.4 (1)	96.6 (28)	28	10.7 (3)	89.3 (25)

^aAt 12 months: $\chi^2 = 68.98$, $P < .001$, Cramer's $V = 0.50$; at 24 months: $\chi^2 = 22.76$, $P < .001$, Cramer's $V = 0.31$

might also affect adherence to coaching appointments or make it more difficult to lose weight.³⁴

Implementing health coach-based weight loss strategies in a primary care setting may impose a number of burdens on the practice, including the need for culture-based training and work flow changes to endorse and integrate the provision of care by a nontraditional member of the primary care team. Considering the currently nonreimbursable nature of health coaching visits by insurance providers, it is important to demonstrate that its implementation has a significant enough benefit to justify the cost of employment and operational support of the health coach. Our cost assessment suggests that health coaching may be competitive with costs for other work site and commercial weight loss interventions.^{31,35} A comprehensive economic assessment of the cost of health coaching, however, including dropouts, missed appointments, and patient-generated expenses was beyond the scope of this particular study. Larger, multicenter randomized trials evaluating the impact of health coaching on weight loss savings are needed to demonstrate this more robustly. Nonetheless, the potential for anticipated savings associated with fewer comorbidities and complications of obesity with sustained weight loss argues for the investigation of visit-based reimbursement policies for health

coaching in primary care. Comprehensive Medicare reimbursement was introduced in 2011 for PCPs to provide patients with intensive behavioral therapy for obesity. Telehealth reimbursement service codes for behavioral counseling for obesity were introduced in 2015.³⁶ These measures, along with the recent call and action toward a nationally recognized certification for professional health and wellness coaches,³⁷ have created a strong impetus for allied health professionals to play a significant role in the administration of such therapy. Under global payment reimbursement structures or other value-based health care systems, any revenue tied to individual coaching visits would be less relevant, especially if projected long-term savings from reduced obesity-related morbidity exceeded the cost of the coaching intervention itself. The potential for long-term savings associated with health coach-based weight loss, if demonstrated with further rigorous investigation, could serve as an incentive for practices and institutions that participate in such risk-sharing contracts.

Limitations

This observational study was performed at a single practice, using a single health coach who was certified via a specific coaching certification program, which may not translate to similarly achievable results for primary care health coaches in general or for those trained via alternative

certification programs. Second, the practice's patients consisted of employees of an urban academic hospital and their partners/spouses, whose sociodemographic information such as median incomes and levels of education (additional factors potentially associated with weight change) could not easily be determined. Third, although race distribution mimicked that of our institution's employee demographics, the study did not have a significant minority representation. These factors significantly limit the generalizability of health coaching to all primary care populations. Fourth, the study design risks the introduction of group selection bias. Different time period and selection criteria used for the selection of comparison (retrospective identification of eligible patients) and coached participants (more consecutive inclusion of eligible coached patients) may raise concerns about the ability to adequately compare outcomes because of different drop-out rates (which, by definition of selection criteria, was absent in the comparison group) or because of inherently different group characteristics or changes in the delivery of care that could be attributed to the dates of study inclusion. Given minimally beneficial effect on weight change observed in the comparison group, we do not believe that a drop-out effect, if measured, would have demonstrated a statistically beneficial or detrimental weight outcome.

We also suspect that there would be negligible differences among group characteristics across this population of employee patients had enrollment entry dates been more synchronous. Furthermore, we believe that because both comparison and coached participants who were simultaneously receiving care are at the practice for the majority of their 2-year follow-up periods, any inherent changes within the practice that could have biased clinical outcomes would have been experienced by the majority of both groups.

Group selection could also reflect differing levels of motivation to lose weight. The use of the non-weight coached group as an additional group allowed us to assess the impact of general motivation to change because patients self-selected into the coaching programs. Although patients were not randomly assigned to groups, the greater weight loss in the coached group compared with patients in the non-weight coached group, along with the outperformance of the comparison group in contrast to the non-weight coached group, suggests that weight loss was related to the dynamic of coaching for weight loss and not to a more general factor of motivation to change.

Conclusion

A weight loss intervention using a fully integrated, certified, health coach was associated with meaningful weight loss in a primary care practice setting. This study adds to the growing body of evidence that health coach-based intervention for overweight and obesity is feasible in the primary care setting.

Authors' Note

RPS and JBC contributed equally to this work. AJG, RPS, and JBC had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. **AJLM**

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