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Health Coaching for Chronic Disease Management: A Program Evaluation Conducted at Denver Health Managed Care

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HEALTH COACHING FOR CHRONIC DISEASE MANAGEMENT: A PROGRAM EVALUATION CONDUCTED AT DENVER HEALTH MANAGED CARE

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Abstract

The purpose of this study is to evaluate health coaching at Denver Health Managed Care Center. We evaluated patients with diabetes and obesity who received a telephonic, motivational-interviewing intervention. Our hypothesis was that patients who received health coaching would have improved health outcomes compared to patients who received standard medical care alone. This research benefits this specific program in clarifying effectiveness (i.e. improvement in health and efficiency, indicated by length of treatment). Health coaching is a growing area of study. This research also adds to a broader conversation about what professionals best serve in the role of health coaches, what theoretical approach can be most effective, and how patients of lower socioeconomic status respond to this type of program. Health coaching participants had significantly improved A1c from baseline (M = 8.16; SD = 2.33) to follow up (M = 7.80, SD = 1.91), $t(76) = 2.062$, $p < .05$, but no improvements in other health outcomes . Conclusions and directions for future research are discussed.

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Literature Review

Chronic diseases are a major public health problem in the United States. Two of the most prevalent and concerning chronic health conditions are obesity and diabetes. Obesity rates worldwide increased from 28.8% to 36.9% between 1980 and 2013 (Ng, 2014). Diabetes has become the fifth leading cause of death in the U.S. and is expected to affect up to one-third of the U.S. population by 2050 (Hogan, Dall, & Nikolov, 2003). The costs associated with each of these health issues, whether measured in lost productivity, increased burden on the healthcare system, or reduced quality of life, are considerable (Grosse, 2008). Furthermore, uncontrolled diabetes and obesity increase risks for other more severe health conditions, such as cancer (Guhl, Zhang, Bansback, Amarsil, & Birmingham, 2009).

Past improvements in treatments for chronic health conditions have resulted increased healthcare costs, but only modest gains in health benefits (Hogan et al., 2003). Limitations in treating chronic health conditions can be linked to the difference between acute medical conditions and chronic health conditions. Acute medical conditions are brief in nature and can be solved under the supervision of a medical professional (by putting a cast around a broken arm). In contrast, most chronic health conditions originate from lifestyle choices that occur entirely outside a medical professional's care (e. g., daily behaviors around exercise and diet). Furthermore, the most beneficial treatment for chronic conditions is improving lifestyle choices, which happen without the supervision of a medical professional (Woolf, 2007; Hoerger, Hicks, & Sorensen, 2007). Unfortunately, patient adherence to physician suggested health-related lifestyle changes is below 50% (Myers & Midence, 1998). This may be because physicians often opt for education and advice-giving rather than targeted behavioral interventions (Lindner,

Menzies, Kelly, Taylor, & Shearer, 2003). Research on providers without proper behavior change training suggests that medical providers may assume authoritarian and confrontational attitudes that are associated with further negative clinical outcomes, including frustration for both patients and providers (Moyers, 2006; Anderson & Funnell, 2000). In contrast, interventions targeting treatment adherence and self-management improve patient health and reduce healthcare costs (Massanari, 2000).

Health Coaching

Health coaching programs are a relatively recent development in chronic disease management. Health coaching is typically offered in-person or by telephone with sessions lasting between 10 and 30 minutes (Hettema, Steele, & Miller, 2005). There is evidence suggesting that only a few sessions are needed to improve health outcomes (Hettema et al., 2005); however, many studies have examined models of longer duration that include as many as 10 or 15 sessions (Margolius et al., 2012; Welch, Rose, & Ernst, 2006, Wolever et al., 2011). Given the pressure in modern medicine to treat patients efficiently, it will be important to clarify whether shorter models are sufficiently effective.

The theoretical basis for many behavior change programs is grounded in motivational interviewing (MI; Hettema et al., 2005). MI was developed to counter limitations with informational and fear-based methods previously used in to addiction counseling (Rosenstock, 1988). MI harnesses ambivalence about behavior change to facilitate change talk, which leads to a higher likelihood of actual behavior change (Hettema et al., 2005). Goal-setting is another important aspect of MI (Olsen & Nesbitt, 2010). Health coaching programs have used a variety of interventions, including traditional advice-giving (Rubak, Sandbaek, & Lauritzen, 2005).;

however, MI has been shown to be the most effective and reliable health coaching approach to improve health behavior (Butterworth, Linden, & McClay, 2007).

A number of other theoretical models are often used along with MI to promote behavior change. Prochaska, Johnson, and Lee's (1998) Transtheoretical Model of Behavior Change arose from "a comparative analysis of... ten major theories of... behavior change," finding that behavior change follows a series of stages: Precontemplation, Contemplation, Preparation, Action, and Maintenance. The core construct behind this theory is a decisional balance whereby patients weigh the pros and cons of changing. Another important part of Prochaska's model is Bandura's (1977) concept of self-efficacy: "the situation specific confidence that people" develop when they can navigate a challenging situation, is a part of Prochaska's model. These theoretical approaches are complementary to, and often integrated with, MI (Welch et al., 2006). For example, Lindner's (2003) review of the coaching literature highlights the importance of health coaching models including the Transtheoretical Model of Behavior Change.

Provider Type and Mode of Delivery

The term "health coach" first appeared in the literature in the 1990s as a way for providers to promote health through patient education (Palmer, 2003). The majority of these providers were nurses (Glasgow, Boles, McKay, Feil, & Barrera 2001); however, there have never been credentialing standards for what types of providers can call themselves health coaches (Butterworth et al., 2007). There is also no standard definition of health coaching services. Butterworth et al. (2007) suggest the following general definition: "a behavioral intervention that facilitates participants in establishing and attaining health-promoting goals in order to change lifestyle-related behaviors, with the intent of reducing health risks, improving self-management of chronic conditions, and increasing health-related quality of life (p. 300)."

Lindner (2003) has called for further investigation of the effects of health coaching as conducted by different types of health professionals. One such group that bears promise is mental health professionals. Social isolation (Alberti, 2001), loneliness (Joseph, Griffin, Hall, & Sullivan, 2001), and high levels of emotional distress (Weinger & Jacobson, 2001) are all common among patients dealing with chronic illnesses, as well as risk factors for depression. As depressed patients have three times the treatment non-compliance rates as non-depressed patients have (DiMatteo, Lepper, & Croghan, 2000), it may be important for health coaches to be able to address depressive symptoms. Furthermore, MI and its related theories (see above) originate in models of psychotherapy and non-directive counseling, again suggesting that they will most effectively be understood and utilized by mental health professionals.

In order to harness the specific expertise of both mental health and medical professions, there has been a growing movement in the last 20 years towards an integration of medical and psychological services (Gallo et al., 2004; Younes et al., 2005). This has been propelled by findings that integrated services lower overall medical costs and improve coordination of overlapping health issues, given the tremendous co-morbidity between psychology and medical problems (Kroenke & Mangelsdorff, 1989; O'Donohue, Cummings, Cucciare, Runyan & Cummings, 2006).

Traditional integration of psychological and medical services involves a psychological provider being in the same physical space as a medical provider, working collaboratively on both treatment planning and intervention. Along with this movement, an increased sensitivity to the needs of rural populations has led to an increase in both telephonic psychological and medical care (Mueller et al., 1999). While the physical distance inherent to the tele-health movements suggests barriers to effective care, this modality has the potential to solve considerable problems

around access to care. Patients in rural areas and patients in metropolitan areas who have difficulty traveling to health care providers could most benefit from this approach. Tele-health has been suggested as "the simplest and most cost-effective strategy to improve adherence behavior" (Haynes, 2001). While there is limited research in this area, early findings suggest that telephonic coaching can be as effective as face-to-face approaches, though more research has been called for in this area (Lindner, 2003).

Many studies conducted on health coaching to this point have had limitations (Lindner, 2003). Some have looked at outcomes in terms of qualitative variables (i.e. patient's perception of self-efficacy; Linden, 2010; Sieber, Newsome, & Lillie, 2012), which *suggest* that patients will have improved health outcomes, but few have actually explored quantitative outcomes of health coaching. Furthermore, most studies to date have also looked at educational or MI-based interventions, whereas reviews have called for studies that integrate the two (Lindner et al., 2003, Welch et al., 2006, Vale, Jelinek, Best, & Santamaria, 2002). Other studies have lacked methodological rigor, such as a small sample size and different baseline characteristics of control and intervention groups (Wolever et al., 2011; Gold, Anderson, & Serxner, 2000). Some of these same limitations exist in the current study, but they have been intentionally minimized to advance the literature on this subject.

Study Introduction

Past research has found a high correlation between risk factors for diabetes and obesity, including body mass index (BMI), blood pressure, and cholesterol (Bener, Zirie, & Al-Rikabi, 2005). In particular, weight loss tends to improve Hemoglobin A1c (Franz, 2013), the recommended indicator of diabetes. A1c is taken by blood draw, but does not require fasting, and measures the average blood glucose of a patient over the last three months (Nowicka, 2011).

In the current study, a telephonic health coaching intervention targeting health behaviors was provided by MI-trained masters or doctorate-level mental health providers. We examined health indicators associated with diabetes and obesity, including BMI, hemoglobin A1c, blood pressure, and cholesterol. We hypothesized that less sessions of health coaching would be as effective at reducing health variables as more sessions. Findings from this study should help clarify directions for future research surrounding telephonic health coaching, further explorations of credentialing and standards for health coaches, and the efficacy of shorter vs. longer term coaching models.

Methods

Overview

Denver Health Managed Care (DHMC) patients who were diagnosed with diabetes, obesity, or both and received health coaching (intervention group) were compared with DHMC patients who were diagnosed with diabetes, obesity or both who were eligible for but did not elect to receive any health coaching (control group). The measured outcomes were change in A1c, BMI, blood pressure, and cholesterol within an approximately three-month time-frame. The study was exempt from institutional-review board protocol because it was a program evaluation being conducted retroactively on health data without any identifiable patient information.

Setting and Population

Denver Health is a safety-net hospital primarily serving low-income and minority patients from the Denver, Colorado area. DHMC is an insurer for many Denver Health patients. Included in the DHMC services was a telephonic health coaching program.

Eligibility

Patients were eligible to enroll in health coaching if they had a significant chronic illness and elected to enroll in the program. Patients age18 or older were included in the intervention group for this study if they participated in at least one health coaching session for diabetes or obesity between September 2013 and December 2014. Adult patients who did not participate in health coaching were included in the control group if their medical record indicated diabetes or obesity as their primary medical condition.

Health Coaches and Intervention

Ten health coaches provided services during this period. They included non-clinical master's level practitioners, mental health-related graduate school trainees, and licensed psychologists. Each carried different caseloads depending on the expectations of their position (range = 3-38 cases). All health coaches received training and ongoing supervision with a clinical health psychologist.

Health coaches focused on building trusting relationships with their patients, using weekly or twice-monthly phone calls of approximately 20 minutes to assess stage of change, to foster "change talk", and to help patients set "SMART" (specific, measurable, attainable, realistic, and timely) goals for reducing the severity of either obesity or diabetes. Goal selection was facilitated by the health coach, but ultimately self-determined by patients. Typical goals included establishing healthier dietary habits and increasing physical activity.

Data Gathering and Measures

Data were collected with the assistance of the Quality Improvement department at Denver Health Managed Care based on electronic medical records. We tracked the number of sessions that each patient received.

We then measured health outcomes including A1c, BMI, systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol (LDL), and high-density lipoprotein cholesterol (HDL). For the intervention group, we defined baseline health indicators as the closest measure available within 3 months of the first health coaching session (pre-lab value) and 3 months of the final health coaching session (post-lab value). This resulted in a range of April, 1 2013 to December, 1 2014 and average length of health coaching (M = 59.18 days; SD = 60.28).

For the control group, pre- and post- lab values were selected to closely match the intervention group. Control group pre-lab values were recorded at the value closest to the mid-point of the above dates. Control group post-lab values were then collected at the closest date to the average length of health coaching from that first date. For example, if a control group patient's pre-lab values were recorded from February 1, 2014 then the post-lab values were recorded at the closest date to 59 days later, or April 1, 2014.

Statistical Analysis

We began the analysis by conducting descriptive statistics. We then used logistic regression to determine if any of the data were systematically missing at random. We then used dependent samples *t*-tests to compare the pre- to post- scores for the intervention and control groups. We then used independent samples *t*-tests to compare the difference scores to determine if there was a significant difference between lab value changes of the intervention versus the control group (i.e. did the intervention group improve more than the control group). Analysis of covariance (ANCOVA) was then conducted to determine if the number of health coaching sessions predicted improvements in the intervention group.

Results

Our overall sample included 2,446 patients with 2,223 in the control group and 223 in the intervention group. Ages in the control group (M = 51.53; SD = 16.38) did not significantly differ from ages in the intervention group (M = 51.55; SD = 14.76), $t(2452) = -.016$, $p = .987$). Intervention group participants received between 1 and 16 health coaching calls (M = 4.7; SD = 2.9).

Logistic regression results indicated that a significant portion of A1c (-2 Log Likelihood = 374.017, Cox & Snell R Square = .005), HDL (-2 Log Likelihood = 1979.058, Cox & Snell R Square = .010), LDL (-2 Log Likelihood = 249.531, Cox & Snell R Square = .050) and BMI scores (-2 Log Likelihood = 151.196, Cox & Snell R Square = .012) were missing at random, but not completely at random. This means that whether or not a data point was missing is not related to other missing data, but to observable values of some other data. As the effect size (range = .988 – 1.489) for these results were very small, though, this was not determined to be a barrier to proceeding to analyze data without adjustments (Osborne, 2012). Furthermore, it is logical that these three variables would be missing together: if a patient goes to the doctor they will always have their weight taken (BMI) and blood pressure measured, but will only have A1c, LDL, and HDL collected if blood is drawn. It is unclear why BMI would be missing at random, but not completely at random.

Table 1

A1c Change Scores of Control vs. Intervention Group

Group	Mean	Standard Deviation
Control	-.329	.040
Intervention	.357	.173

Health coaching participants had significantly improved A1c from baseline (M = 8.16; SD = 2.33) to follow up (M = 7.80; SD = 1.91), $t(76) = 2.062$, $p < .05$. Similarly, A1c change scores were significantly greater in the intervention group (A1c mean change = -0.36) as compared to the control group (A1c mean change = 0.33), $t(1284) = -4.183$, $p < .001$). The direction of this change shows that intervention group A1c scores improved, while control group A1c scores worsened.

ANCOVA results showed that the number of health coaching sessions was not a significant predictor of A1c difference scores in the intervention group, $F(1, 3) = 4.39$, $p = .734$. No significance was found between intervention and control groups for either of the above t-tests on BMI, $t(2227) = -.209$, $p = .242$, systolic blood pressure, $t(2283) = -.054$, $p = .957$, diastolic blood pressure, $t(2283) = .087$, $p = .931$, or high-density lipoprotein cholesterol, $t(301) = -.883$, $p = .378$, or low-density lipoprotein, $t(271) = -.858$, $p = .392$.

Discussion

This study showed that health coaching helped patients reduce their hemoglobin A1c, the primary lab value used to assess diabetes. A1c may have shown improvement while BMI, blood pressure, and cholesterol did not for a number of possible reasons. Research has shown that despite the common conception, BMI may be highly resistant to change as a result of improvements in healthy eating and regular exercise (Ochner, Tsai, Kushner, & Wadden, 2015). This research suggests that, like the findings in the current study, reducing BMI may be most effective when lifestyle changes are combined with medical interventions like medication and surgery. There does not appear to be a plausible explanation, however, for why blood pressure and cholesterol did not improve as a result of health coaching.

The number of coaching sessions was not significantly related to improvements in A1c. This suggests that number of coaching sessions may not be important, though this would be inconsistent with past literature. Alternatively, it may suggest that 10 or fewer sessions are not sufficient to show a meaningful difference in number of sessions and that future studies should examine longer coaching models that have a larger range in possible coaching sessions. Finally, the current finding may be a result of the specific intervention completed at DHMC or methodological limitations in studying number of sessions (i.e., low sample size at various session totals).

A major limitation to this study is self-selection of participants into the intervention or control group. As such, patients in the intervention group may have begun the study with more motivation than those in the control group. Furthermore, while examining historical data reduced the cost and difficulty of the data collection process, a more standardized approach to recruitment, intervention, and outcome measuring could have been completed if this had been a more robust, randomly assigned study of health coaching. In the current data set there were also large amounts of missing data that, despite statistical analysis to clarify its impact, may have changed the results. Again, a more robust study protocol may have decreased the amount of missing data confounding the results.

Another limitation is that, unlike in other studies, there was not a standard training protocol or degree of experience amongst different health coaches. This complicates interpreting the results. DHMC has software to assesses a coach's adherence to MI in the intervention, both to increase standardization and as a training method, but this is not a standard of practice at the site. Requiring such software would have been one option to clarify the meaning of these results. Finally, patients were selected from those identified as having *either* diabetes or obesity in an

effort to create a more robust sample size. While there is tremendous co-morbidity of risk factors and suggested treatment between these two illnesses, this combining of groups may have limited the specificity of findings to either group.

Future research should focus on the question of what number of sessions is most efficient to achieve the desired health outcomes. This may be further understood by examining the impact of varying session length and time between sessions. Future studies may also want to clarify whether and how some health coaches are more effective than others at facilitating positive outcomes in their patients. This type of research may clarify which types of health professionals and what level of training will result in the most effective health coach.

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