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Financial Incentives to Promote Cardiac Rehabilitation Participation and Adherence Among Medicaid Patients

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Abstract

Purpose—Cardiac rehabilitation (CR) improves medical outcomes after myocardial infarction or coronary revascularization. Lower socioeconomic status (SES) patients are less likely to participate in and complete CR. The aim of this study was to test whether financial incentives may increase participation and adherence to CR among lower-SES patients.

Methods—Patients eligible to participate in CR with Medicaid insurance coverage were approached for inclusion. Patients were placed on an escalating incentive schedule of financial incentives contingent upon CR attendance. CR participation was compared to a usual care group of 101 Medicaid patients eligible for CR in the 18 months prior to the study. Attendance (participating in one CR sessions) and adherence (sessions completed out of 36) were compared between groups. Study conducted in Vermont, USA, 2013–2015.

Results—Of 13 patients approached to be in the study and receive incentives, 10 (77%) agreed to participate. All 10 patients completed at least one session of CR, significantly greater than the 25/101 (25%) in the control condition ($p < 0.001$). Of patients in both groups who attended at least one session of CR, adherence was higher in the intervention group (average of 31.1 sessions completed vs. 13.6 in the control group, $p < 0.001$). CR completion rates were also higher during the intervention with 8 of 10 (80%) intervention patients completing all 36 sessions compared to only 2 of 25 (8%) control patients ($p < 0.001$).

Conclusions—Financial incentives may be an efficacious strategy for increasing CR participation and adherence among Medicaid patients.

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Keywords

cardiac rehabilitation; financial incentives; participation; attendance; adherence; Medicaid; socioeconomic status; behavioral economics

Introduction

Cardiac rehabilitation (CR) is an individualized, structured, progressive exercise program with interventions for coronary risk factor reduction that is highly effective at reducing morbidity and mortality rates following a myocardial infarction (MI) or coronary revascularization (Lawler et al., 2011; Wenger, 2008). Participation in CR is associated with a 26–36% decrease in cardiac mortality over 2–3 years and a 31% reduction in cardiac re-hospitalizations over 12 months (Lawler et al., 2011; Heran et al., 2011).

Individuals at especially high risk of morbidity and mortality following a cardiac event should be targeted for CR participation. Lower-socioeconomic status (SES) populations are particularly high risk patients with greater rates of smoking, hypertension, diabetes, obesity and physical inactivity (Albert et al., 2006; Alter et al., 2013; Govil et al., 2009; Oberg et al., 2009). Even though this high-risk profile consists of behaviorally modifiable factors, lower-SES patients are more likely to be re-hospitalized and have higher mortality rates following an MI than more affluent patients (Alter et al., 2006; 2013; Bernheim et al., 2007; Kind et al., 2014).

Lower-SES status is also a robust predictor of CR non-participation. While overall, 19% of older adults (≥ 65 years) attended CR as recommended, only 3–5% of those with dual Medicare/Medicaid status (i.e., lower-SES) (Suaya et al., 2007). In a study of 322 CR eligible Medicaid patients in Washington state, only two (< 1%) attended CR within the year following their MI (Oberg et al., 2009). Clearly, interventions are needed to increase CR participation in this high-risk population.

A variety of interventions have been employed to increase uptake of and adherence to CR. A systematic review noted that even in the general population evidence was weak that interventions (e.g. early appointments after discharge, nurse reminder calls) were successful at increasing CR uptake. Additionally, no recommendation could be made for programs that increased adherence (Karmali et al., 2014).

Incentive-based interventions are highly effective at altering health-related behaviors among disadvantaged populations (Higgins et al., 2012; Meredith et al., 2014). Providing financial incentives contingent on objective evidence of behavior change, was developed as a method to encourage cocaine abstinence (reviewed in Higgins et al., 2008). Incentive-based treatments have subsequently been shown to be effective at increasing abstinence from various drugs (Lussier et al., 2006). A meta-analysis of treatments for smoking during pregnancy showed an incentive-based approach was significantly more effective at promoting abstinence than other behavioral or pharmacological therapies (Lumley, et al., 2009). Similar results have been observed when targeting other health-related behaviors in lower-SES populations (Higgins et al., 2012).

The aim of the present study was to examine the feasibility and potential efficacy of financial incentives to increase CR participation and adherence in lower-SES patients.

Methods

Prior to study implementation we examined records of all Medicaid patients over an 18-month period hospitalized for a MI, coronary revascularization, or heart valve surgery who lived in the catchment area for the University of Vermont Medical Center CR program. The catchment area is approximately 1600 km², the vast majority of patients live within a 30 minute drive of the clinic. A total of 113 patients met these criteria. The records were further restricted to those under age 80 to make the historical controls more comparable to the study sample, as no patient over 80 was deemed eligible for the intervention. The final control sample consisted of 101 patients. Basic demographic information on controls (sex, qualifying diagnosis, age) was drawn from clinical records as was number of CR sessions attended (36 possible).

The incentive intervention was implemented within a month after collection of the information on controls. Patients were eligible if they were (a) hospitalized for an MI, coronary artery bypass grafting, percutaneous coronary intervention, or heart valve surgery, (b) enrolled in a state-supported insurance plan for low-income individuals (Medicaid), and (c) lived within the CR program catchment area. Patients with dementia, advanced cancer, significant frailty, or other systemic disease that would preclude CR participation were excluded. Sixteen patients were identified as potentially eligible over a 4-month period. Three patients, all over the age of 80, were excluded due to criteria listed above. Thirteen patients were approached with 10 (77%) consenting to participate. Of the 3 patients who declined, 2 cited no interest in CR due to other medical issues and the third declined due to lack of transportation.

The University of Vermont Medical Center CR program is described elsewhere (Savage et al., 2009). Briefly, the program consists of 2 or 3 supervised exercise sessions per week over a 3–4 month period (maximum 36 sessions). The CR program is individualized, based on functional capacity and goals for cardiovascular risk factor reduction. Exercise modalities employed include treadmills; elliptical trainers; seated steppers; and cycling, arm and rowing ergometers. Exercise duration is gradually increased to approximately 45 minutes of aerobic exercise. When appropriate, resistance training is included. Patients are encouraged to attend weekly educational sessions focusing on risk factor control.

Study participants received financial incentives for completing each of the 36 exercise sessions. Participation, verified by CR staff, was defined as attending and completing the scheduled prescribed exercise. Incentives were provided immediately following the completed session in cash or check. Participation in the initial exercise session earned \$20. Subsequent sessions were incentivized on an escalating schedule starting at \$4 and increasing by \$2 for each consecutive session up to a maximum of \$70 per session. Failure to attend a scheduled session, without valid excuse, resulted in a reset of the incentive value. Following a reset, the participant could receive \$4 at the next session attended, \$6 at the second consecutive session attended, and would return to the level of their previous progress

at the third consecutive session attended. This schedule of escalating value incentives combined with a reset contingency has been experimentally demonstrated to be more effective than a fixed schedule at promoting continuous adherence (Roll & Higgins, 2000). Maximum possible incentive earnings were \$1,368.

The same definition for CR attendance and adherence was used in both conditions. Attendance was defined as having attended even one session of CR and adherence as the number of sessions completed (36 possible). Basic demographics and CR attendance and adherence were compared between incentivized and control patients using Fisher's Exact Test and Wilcoxon Rank Sum test. This study was approved by the local institutional review board.

Results

Baseline characteristics are listed in Table 1 (top panel). Mean age was 59 years, most patients were male and qualified for CR as a result of a MI. Age, sex, and qualifying diagnosis did not differ between the study conditions. Within the patients who attended CR (Table 1, bottom panel), the two study conditions did not differ significantly on measured characteristics.

To assess attendance, participation in one or more sessions was compared between all patients approached for the intervention (n=13) and historical controls (n=101). This method minimizes inflation of attendance rates in the study population by accounting for those who declined the study, and would likely not attend CR. Of 13 patients approached, 10 (77%) consented and attended at least one CR session. This 77% attendance rate is significantly greater than the 25% (25/101) in controls ($p < 0.001$).

To examine adherence, number of sessions completed among those who attended at least one CR session was compared between conditions (Figure 1). For patients who attended any CR, incentivized patients completed more sessions than controls (mean sessions completed 31.1 vs. 13.6, $p < 0.001$). Rate of completion also differed significantly with 8 of 10 (80%) incentivized patients completing all 36 sessions, compared to only 2 of 25 (8%) controls ($p < 0.001$). Incentivized patients were also compliant. Of 372 scheduled visits there were only 61 (16%) missed visits and only 9 (2%) were unexcused absences. Incentive earnings averaged $\$878 \pm 179.3$.

Discussion

The present results are encouraging regarding the feasibility and efficacy of financial incentives for increasing CR attendance and adherence in Medicaid-enrolled patients. Seventy-seven percent of patients offered the opportunity to participate in the incentivized intervention accepted, and the intervention resulted in greater levels of participation and adherence compared to controls.

To our knowledge, this is the first study to examine the efficacy of financial incentives for increasing CR attendance and adherence. Previous attempts at improving adherence in CR have been largely ineffective (Karmali et al., 2014); however, some success was garnered in

a quality improvement project that included small, non-financial incentives (Pack et al., 2013). Improving CR participation in lower-SES patients is critical given their high risk factor burden (Albert et al., 2006; Alter et al., 2013; Govil et al., 2009) and poor participation rates (Suaya et al., 2007; Oberg et al., 2009). High risk factor burdens have led to higher rates of re-hospitalization (Alter et al., 2006; 2013; Bernheim et al., 2007; Kind et al., 2014) and mortality with lower-SES populations having a 1-year post-discharge death rate of 5% compared to 2% among higher-SES patients (Alter, et al., 2006). However, increased mortality and hospitalization rates are significantly attenuated by statistically controlling for behaviorally modifiable cardiac risk factors such as diabetes, obesity, and smoking (Alter et al., 2006; Bernheim et al., 2007). This constellation of co-existing conditions makes the lower-SES population high-risk. Accordingly, enhancing CR participation in lower-SES populations has the potential to modify many risk factors possibly reducing re-hospitalization and mortality rates. Importantly, lower-SES patients who attend CR have comparable improvements in risk factors as higher-SES patients (Govil et al., 2009).

Despite the benefits of CR, promoting participation among lower-SES patients is challenging. Reviews of barriers to CR in the general population describe a variety of challenges including transportation, family obligations, and co-occurring illness (Neubeck et al., 2012; Daly et al., 2002). One oft-cited challenge is costs. However, reducing financial barriers alone does not ensure participation. As was seen in the control condition for this study, although patients had Medicaid, and no co-pays, patients rarely attended. In another study, even when offering reimbursement of all out-of-pocket costs, college graduates were still 71% more likely to participate in CR than high school graduates (Harlan et al., 1995). More intensive and innovative interventions appear to be necessary.

One advantage of incentive-based interventions is that they provide an immediate, positive consequence following the target behavior. This positive consequence can help overcome some potential negative consequences of beginning CR (e.g. pain, discomfort or embarrassment). Additionally, the continued receipt of incentives can help bridge the temporal gap between the proximal CR demands and more distal positive health benefits of successful participation (e.g. improved endurance or mobility) (Higgins et al., 2012). Sensitivity to delay to benefits, sometimes described as delay discounting, varies within a population and aversion to delays has been associated both with lower-SES status and with suboptimal health behaviors (e.g. Daugherty and Brase, 2010). For those with a pronounced aversion to delayed rewards, distant and probabilistic outcomes may have little influence over current behavior. Financial incentives can be a useful way to overcome that bias.

Considering the high-risk profile of this population, incentivizing CR participation could prove cost-effective through several mechanisms. Increased attendance results in more clinical contact and provides time for prompts from medical staff to improve health-related behaviors such as medication adherence and smoking cessation. Improvements in health-related behaviors could decrease re-hospitalizations (e.g. Kind et al., 2014). Indeed, the use of incentives to improve health behaviors has been gaining mainstream recognition as companies work to contain healthcare costs (Mattke et al., 2013).

Given the apparent success of the use of incentives, an important consideration would be how to implement program into CR. Studies have discussed some potential legal considerations of implementing these programs into clinical care (e.g. Pack et al., 2013). Future studies should be conducted to test the efficacy and optimal parameters of incentivizing participation and adherence within CR as well as determine how to best implement a program into general practice. Importantly, the potential for financial incentives to facilitate primary and secondary preventive services was integrated into the Affordable Care Act. Section 4108 of the Affordable Care Act mandated Centers for Medicare and Medicaid Services to allocate 100 million dollars to investigate the use of financial incentives to promote health-related behavior change among Medicaid beneficiaries (CMS, 2015).

This study has limitations. Participants were not randomly assigned to study conditions and there may have been undetected differences in patient characteristics across conditions as less information was available for those in the control compared to intervention conditions. The study population was also relatively small and consisted mostly of men. The number of racial/ethnic minorities was limited, however the 12–20% minorities included is greater than is seen in the local population (7.8%). Referral practices may have differed between the two conditions. While participants in the intervention condition were approached in person and told about CR, we cannot be sure that patients in the control condition were similarly referred. Additionally, participants in the intervention condition may have benefited from increased staff interaction, although no methods other than providing the incentives were used to promote attendance. Limitations notwithstanding, this trial provides encouraging evidence supporting the potential utility of financial incentives for improving CR attendance and adherence in lower-SES patients. These encouraging results appear to warrant follow-up with a fully randomized controlled clinical trial.

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Figure 1.
Number of exercise sessions completed by patients in the control and intervention groups who enrolled in the cardiac rehabilitation program. Vermont, USA, 2013–2015.

Table 1

Characteristics of intervention and control patients.

Cardiac Rehabilitation Eligible	Intervention (n = 13)	Control (n = 101)	p
Age (years $\pm$ SD)	58.5 $\pm$ 9.6	58.9 $\pm$ 11.6	0.562
Gender (% Male)	69.2%	59.4%	0.561
Qualifying Diagnosis (%MI)	69.2%	55.5%	0.383
Attended CR (% attended)	76.9%	24.8%	<0.001
Attended Cardiac Rehabilitation	Intervention (n = 10)	Control (n = 25)	p
Age (Years)	59.8	60.4	0.912
Gender (%Male)	80%	72%	1.000
Race			
White	80%	88%	0.610
Black or Mixed Race	20%	12%	
Smoking status			
Current	30%	32%	1.000
Former/Never	70%	68%	
BMI	32.4	32.4	1.000
Waist (cm)	109.7	102.23	0.650
Education (Years, range)	12.1 (7–16)	n/a	n/a
Number of Sessions completed	31.1	13.6	<.001

Vermont, USA, 2013–2015.