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# Employment Status and Participation in Cardiac Rehabilitation

## DOES ENCOURAGING EARLIER ENROLLMENT IMPROVE ATTENDANCE?

Quinn R. Pack, MD, MSc; Ray W. Squires, PhD; Claudia Valdez-Lowe, ACNP; Mouhamad Mansour, MD; Randal J. Thomas, MD, MS; Steven J. Keteyian, PhD

■ **PURPOSE:** For patients hospitalized for a cardiac event, an earlier appointment to outpatient cardiac rehabilitation (CR) increases participation. However, it is unknown what effect hastening CR enrollment might have among employed patients planning to return to work (RTW).

■ **METHODS:** Using 2 complementary data sets from Henry Ford Hospital (HFH) and Mayo Clinic, we assessed when employed patients eligible for CR anticipated a RTW, the impact of an earlier appointment on CR enrollment, and the effect of employment status on the number of CR sessions attended. Patients at HFH attended CR at either 8 or 42 days (through randomization), whereas Mayo Clinic patients attended 10 days after hospital discharge per standard routines.

■ **RESULTS:** Among 148 patients at HFH, 65 (44%) were employed and planned to RTW. Of these, 67% desired to RTW within 1 to 2 weeks, whereas 28% anticipated an RTW within 1 to 3 days. Home financial strain predicted nonparticipation in CR ( $P < .001$ ) and was associated with an earlier planned RTW. Among 1030 patients at Mayo Clinic, 393 (38%) were employed. Employed (vs nonemployed) patients enrolled in CR 3.3 days sooner ( $P < .001$ ), but attended 1.6 fewer CR sessions ( $P = .04$ ). In employed patients from both health systems, an earlier (vs later) appointment to CR did not result in additional exercise sessions of CR.

■ **CONCLUSIONS:** Employed patients plan to RTW quickly, in part because of home finances. They also enroll earlier into CR than nonemployed patients. Despite these findings, earlier appointments do not seem to favorably impact overall CR participation.

### KEY WORDS

appointment

cardiac rehabilitation

employment

return to work

timing

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Each year, about 650 000 Americans experience a first heart attack and about half of these patients are employed.<sup>1</sup> In addition to the tremendous direct costs of caring for these patients, there are also substantial indirect costs in the form of lost wages, lost productivity, and cardiac disability.<sup>2,3</sup> Return to work (RTW) is associated with improved mood and less emotional distress.<sup>4,5</sup> Consequently, it is important on many levels that patients who were employed before suffering a cardiac-related event eventually return to work and lead productive lives.<sup>6</sup>

However, the need to RTW is often cited by patients as a reason for nonparticipation in cardiac rehabilitation (CR).<sup>7</sup> This is unfortunate because patients who participate in CR gain important long-term mental, physical, and survival benefits.<sup>8</sup> Despite these positive findings, only 30% to 35% of eligible patients ever participate in CR.<sup>9</sup> Consequently, in 2011, the American Heart Association issued both presidential and scientific advisory statements encouraging providers and health systems to improve patient participation rates in CR.<sup>10,11</sup>

National CR guidelines recommend commencing CR within 1 to 3 weeks after hospital discharge<sup>12</sup>; however, the time from hospital discharge to the first CR session (enrollment) often extends beyond 1 month.<sup>13</sup> Recently, several studies have suggested that shortening the number of days from hospital discharge to CR enrollment with an earlier appointment can significantly improve enrollment rates.<sup>14,15</sup> In these studies, there was an approximately 1% loss of CR enrollment for every day of delay. Similarly, a delay in RTW beyond 12 weeks seems to strongly predict failure to RTW.<sup>16</sup> Consequently, an earlier appointment to CR could be a key strategy to enroll and retain employed patients in CR.

Given the potential scheduling conflicts that can occur between an employed patient's need to return to work and attend CR, we examined whether an earlier appointment to CR might improve CR enrollment or the total number of CR sessions among this group. We hypothesized that a need to RTW would be associated with a lower rate of CR participation versus those not employed or needing to RTW, but that an earlier appointment would increase participation. We also assessed when patients desire to RTW and other key employment-related factors that might affect participation in CR.

## METHODS

This is a secondary analysis of data from 2 previously published studies<sup>15,17</sup> and an original, unpublished

patient survey. These studies originated from Henry Ford Hospital in Detroit, MI, and Mayo Clinic in Rochester, MN. Institutional Review Board approval was obtained from each institution. The Henry Ford study was registered with clinical trials.gov (NCT01596036).

The Henry Ford study focused primarily upon increasing initial CR participation among hospitalized patients, whereas the Mayo Clinic study focused on increasing the number of CR sessions attended among those enrolling in CR. Because of the complementary strengths and limitations of each study, it was determined that utilizing both data sets would more completely and thoroughly address the main aim of this study. However, at no point was data actually combined between studies because of significant differences in populations, methods, and study limitations.

## Henry Ford Population and Patient Survey

The first study was a randomized controlled single-blind trial performed among 148 patients at Henry Ford Hospital and has been described previously.<sup>15</sup> Briefly, between February and November 2011, hospitalized adult patients ( $\geq 18$  years old) with a myocardial infarction (MI), percutaneous coronary intervention, or stable angina with a positive stress test were recruited. Patients were excluded if they refused to consider attending CR, were medically unstable, were currently participating in CR, or had planned followup outside the Henry Ford Health System. All patients gave written informed consent. Qualified patients were then randomized to an early ( $< 10$  days) or standard (5 weeks) appointment to CR. Patients in the early appointment group attended CR at a median of 8.5 days (vs 42 days) after hospital discharge and were subsequently 18% more likely to attend CR orientation (77% vs 59% attendance,  $P = .02$ ).<sup>15</sup>

As part of this study, every patient was asked whether they were currently employed and whether they planned to RTW at any point in the future. If patients answered affirmatively to both questions, they filled out a 12-question 1-page survey. Questions dealt with (1) timing of their anticipated RTW, (2) basic insurance and disability issues, (3) patient illness perceptions, and (4) patient attitudes toward CR. All questions were reviewed by coauthors for face validity and content, but formal survey validation was not undertaken. Exact survey questions are found in the Results section.

Employment status, as self-reported by survey participants, was utilized as the primary predictor for participation in CR. The primary outcome was attendance at CR orientation. The randomization group (early vs standard) was utilized as the primary covariate and

interaction term between employment status and attendance at CR orientation. Secondary endpoints were participation in  $\geq 1$  exercise session of CR (usually occurred on a subsequent day after CR orientation) and the total number of CR exercise sessions attended.

### Mayo Clinic Population

The second study retrospectively analyzed the effects of several quality improvement activities within the Mayo Clinic CR program.<sup>17</sup> Briefly, we included all patients ( $n = 1151$ ) who attended their first session of outpatient CR at Mayo Clinic in Rochester, MI, between May 2009 and January 2012, with participation in CR occurring through May 2012. During this period, we instituted 3 sequential quality improvement projects: (1) a policy of maximizing CR attendance for all patients; (2) an inpatient and outpatient recruiting video about the benefits of CR; and (3) a motivational program in which patients were rewarded with T-shirts, parking passes, and other token items for reaching CR participation milestones. Combined, these projects significantly improved the overall number of CR sessions.<sup>17</sup> Importantly, none of these projects focused on improving CR participation among employed patients, improving RTW rates, or shortening the interval between hospital discharge and CR enrollment and are therefore unlikely to affect the current analyses.

We included all patients from this prior analysis. However, we additionally excluded patients without a recent hospitalization and those with unknown employment status. Patients without a valid consent for medical record chart review had been previously excluded.

During the study period, Mayo Clinic continued its long-standing policy of encouraging early enrollment into CR. Appointments to CR were made by inpatient CR staff at the time of hospital discharge per hospital routines and per their clinical judgment. Although patients participated in this process, most patients were generally encouraged to take the next open appointment, which was usually available within 1 to 2 weeks but sometimes even occurred on the same day as hospital discharge. Unfortunately, patient-level details of this process were not available in the Mayo Clinic database for analysis, but there were no changes to this routine or policy during the study period.

The primary predictor was the interval between hospital discharge and CR enrollment. The primary study outcome was the number of CR sessions attended as determined through review of billing records using current procedural codes 93798 and 93797. Self-reported employment status as found in the Mayo Clinic database was utilized as the primary covariate and interaction term.

### Statistical Analysis

For the survey, we tallied all answers, calculated answer frequencies, and assessed whether survey answers predicted CR orientation attendance. When necessary, we grouped survey answers into 2 categories around the median response for the purpose of statistical testing.

For both analyses, patients were grouped by employment status and compared using patient characteristics such as age, sex, and primary diagnosis. Continuous variables were presented as mean  $\pm$  standard deviation, skewed variables as median (interquartile range [IQR]), and count data were presented as proportions. Statistical testing utilized the *t* test for normally distributed continuous data in both data sets; chi-squared test for the Mayo Clinic categorical data because of large numbers; Fischer exact test for Henry Ford categorical data given the small sample sizes; and the Wilcoxon rank sum test for linear regression modeling in the Mayo Clinic data set because of important data skew in the outcome measures. All tests were 2-sided with significance set at  $\alpha < 0.05$ .

Among patients at Henry Ford Hospital, we assessed whether employment status was associated with attendance at CR orientation, exercising  $\geq 1$  session, and total number of CR sessions attended. We tested the role of an early appointment (by randomization group) on attendance at CR orientation by using an interaction term (employment status  $\times$  randomization group). Analyses were performed with SAS 9.2 (SAS Institute, Cary, NC). Due to the limited numbers of patients and statistical power, multivariate modeling was not performed.

Among Mayo Clinic patients, linear regression was utilized to identify if employment status was associated with the time interval between hospital discharge and CR enrollment, and if employment status was associated with the total number of CR sessions. All tests were non-parametric due to skewed distributions in both variables. Interaction terms (employment status \* time interval, and employment status \* total number of CR session) were utilized to test the association between enrollment timing, employment status and the number of CR sessions attended. Analyses were performed with JMP 9.0.1 (SAS Institute, Cary, NC).

## RESULTS

### Patient Populations

In the Henry Ford Hospital study, 203 patients with coronary artery disease were assessed for trial eligibility,

150 patients were randomized, 2 withdrew consent after randomization, and 148 patients comprised the study population. Of these, 65 (44%) were employed before their cardiac event. In the Mayo Clinic study, a total of 1151 patients enrolled in CR during the study period. We excluded 48 patients because of lack of informed consent, 55 patients without a recent hospitalization, and 18 patients with unknown employment status, leaving a total of 1030 patients available for analysis. Of these, 393 (38%) were employed, 502 (49%) were retired, 60 (6%) were unemployed, and 75 (7%) were disabled. Patient characteristics for both groups are found in Table 1. In general, employed patients were younger than nonemployed patients, were more likely to be male, were less likely to have a history of diabetes or hypertension, and were more likely to have insurance coverage for CR. Among the Mayo Clinic cohort, employed patients were more likely to have had MI rather than a coronary artery bypass graft (CABG). The Henry Ford Hospital cohort was predominantly black, whereas the Mayo Clinic population was predominantly white.

### Henry Ford Hospital and Patient Survey

Survey results are shown in Table 2. Among the 57 employed patients answering question 1, "When would you like to return to work?" a total of 38 (67%) desired to RTW within 2 weeks, whereas a subgroup of 16 (28%) hoped to RTW within just 1 to 3 days. Approximately half of the patients reported having disability insurance, paid time off for illnesses, or enough financial reserves to take leave from work for >2 weeks. Patients perceived the physical demands of their work to be mild, their heart condition severity as moderate, and expressed a high value in attending CR. Insurance status and home financial strain predicted attendance at CR orientation, whereas the physical demands of work, heart condition severity, and the perceived value of CR did not (Table 3.) Home financial strain was strongly correlated with a desire for an earlier RTW ( $\chi^2 = 41$ ;  $P = .003$ ).

Time to enrollment was controlled by random assignment with the early and standard groups attending CR orientation at a median of 8.5 days and 42 days, respectively. Among the 65 employed patients, 49 (75%) attended CR orientation and of the 33 (51%) patients assigned to the early appointment group, 26 (78%) attended CR. Employed (vs nonemployed) patients seemed as equally likely to attend CR orientation (OR = 1.83; 95% CI = 0.89-3.75;  $P = .10$ ) and were marginally more likely to exercise  $\geq 1$  session (OR = 1.81; 95% CI = 0.93-3.49;  $P = .08$ ). An early appointment to CR among employed patients did not predict improved attendance at CR orientation (interaction  $P = .52$ ).

### Mayo Clinic Population

The median (IQR) time to enrollment in CR was 10 (7, 15) days, with 90% of patients attending by day 27, whereas the average time to enrollment was  $14.7 \pm 17.8$  days. Patients attended a median (IQR) of 15 (6, 29) sessions of CR, whereas the average number of CR sessions was  $17.3 \pm 12.1$ . Employed patients enrolled at a median (IQR) of 9 (6, 13) days after hospital discharge, 3.3 days sooner ( $P < .001$ ) than nonemployed patients, but completed 1.6 fewer sessions than nonemployed patients ( $P < .05$ ). Other predictors of an earlier enrollment into CR were younger age, male sex, and a diagnosis of percutaneous coronary intervention. In addition, predictors of increased CR session attendance included increasing age, residence inside Olmsted county, white race, or a qualifying diagnosis of CABG or MI, whereas a qualifying diagnosis of angina predicted attendance at fewer sessions of CR (Table 4).

However, after adjustment for univariate significant baseline predictors of enrollment time, employment status was no longer associated with enrollment time ( $-0.6$  days,  $P = .51$ ). In addition, employment status was only marginally associated with the total number of exercise sessions attended ( $-0.7$  sessions,  $P = .06$ ) after adjustment for other univariate significant baseline predictors of the total number of CR sessions. Furthermore, there was no interaction between employment status, enrollment timing, and the total number of sessions of CR attended ( $P = .19$ ).

## DISCUSSION

The primary finding of this project was that, in 2 diverse patient populations using both interventional and observational study methods, an early appointment to CR among employed patients did not differentially improve CR enrollment or the total number of CR sessions attended when compared with nonemployed patients. This was true although approximately two thirds of the employed patients wanted to RTW within 2 weeks, expected to be given <2 weeks' leave of absence, and placed a high value on CR. Furthermore, in the Mayo Clinic cohort, actual attendance at the first session of CR occurred at a median of 7 to 8 days postdischarge, 3 days earlier than nonemployed patients, yet no added difference was found. Rather, it seems that the primary driver of participation in CR among employed patients is a complicated intertwining of multiple factors such as insurance status and home financial strain. Age, race, and medical diagnosis (angina, CABG, or MI) also seemed to play a more important role in the number of CR sessions attended

**Table 1 • Baseline Characteristics According to Employment Status<sup>a</sup>**

	Henry Ford Hospital			Mayo Clinic		
	Employed (n = 65)	Nonemployed (n = 83)	P Value <sup>b</sup>	Employed (n = 393)	Nonemployed (n = 637)	P Value <sup>b</sup>
Age, y <sup>c</sup>	56 ± 11	63 ± 12	<.001	57 ± 10	69 ± 12	<.001
Male	45 (69%)	37 (45%)	.003	303 (77%)	433 (68%)	.002
Race						
Black	24 (37%)	49 (59%)	.03	–	–	
Non-Hispanic white	–	–	–	357 (91%)	594 (93%)	.16
Body mass index <sup>c</sup>	32 ± 8	33 ± 8	.09	31 ± 6	30 ± 6	.03
Medical history						
CABG	3 (5%)	6 (7%)	.73	–	–	
PCI	11 (17%)	29 (35%)	.02	–	–	
MI	15 (23%)	27 (33%)	.27	–	–	
Risk factors						
Diabetes mellitus	19 (29%)	46 (55%)	.001	103 (27%)	204 (33%)	.03
Hypertension	50 (77%)	76 (92%)	.01	256 (67%)	498 (81%)	<.001
Current smoking	19 (29%)	27 (33%)	.67	43 (11%)	57 (9%)	.47
Hyperlipidemia	47 (72%)	70 (84%)	.07	–	–	
Index event			.90			.001
STEMI	12 (18%)	13 (16%)		–	–	
NSTEMI	31 (48%)	38 (46%)		–	–	
PCI	9 (14%)	15 (18%)		90 (23%)	128 (20%)	
Angina	13 (20%)	17 (20%)		59 (15%)	87 (14%)	
CABG	–	–		54 (14%)	126 (20%)	
Valve	–	–		36 (9%)	74 (12%)	
MI	–	–		121 (31%)	137 (22%)	
Heart transplant	–	–		15 (4%)	46 (7%)	
Other	–	–		18 (5%)	39 (6%)	
Insurance for CR			.03			
Full	28 (43%)	19 (23%)		–	–	
Partial/copays	28 (43%)	52 (63%)		–	–	
None	9 (14%)	12 (14%)		–	–	
Distance to CR, miles	9 ± 7	8 ± 5	.28	–	–	
Olmsted county resident	–	–	–	246 (63%)	388 (61%)	.59

Abbreviations: CR, cardiac rehabilitation; CABG, coronary artery bypass graft; MI, myocardial infarction; NSTEMI, non-ST-segment elevation myocardial infarction; PCI, percutaneous coronary intervention; STEMI, ST-elevation myocardial infarction.

<sup>a</sup>Data reported as number (%) unless noted otherwise.

<sup>b</sup>P values from the Student *t* test (continuous data) or chi-square (categorical data), as appropriate.

<sup>c</sup>Data reported as mean ± SD.

than did employment status. On the basis of these findings, we conclude that although employment status may help predict enrollment and withdrawal from CR (at least using univariate analysis), many additional

and perhaps more important factors are involved in an employed patient's decision to participate in CR.

These findings should help professionals working in CR appreciate the complex interplay between

**Table 2 • Survey Questions and Responses Among Employed Patients at Henry Ford Hospital**

Questions	Responses	n (%)
When would you like to return to work?	1-3 d	16 (28)
	1-2 wks	22 (39)
	3-4 wks	11 (19)
	1-2 mos	4 (7)
	3-4 mos	4 (7)
How much time off from work (leave of absence) do you expect to be given by your employer as part of this hospitalization?	1-3 d	10 (19)
	1-2 wks	24 (44)
	3-4 wks	14 (26)
	1-2 mos	3 (6)
	3-4 mos	3 (6)
How long could you afford to stay away from work before it would negatively affect your financial situation?	1-3 d	7 (12)
	1-2 wks	22 (38)
	3-4 wks	12 (21)
	1-2 mos	2 (3)
	3-4 mos	12 (21)
	≥5 mos	3 (5)
Do you have sick leave or paid time off for illnesses?	Yes	34 (54)
Do you have disability insurance?	Yes	30 (48)
Will this hospitalization be covered by your insurance?	Yes	56 (92)
How physically strenuous is your work?	Very mild	24 (39)
	Mild	12 (20)
	Moderate	19 (31)
	Heavy	3 (5)
	Very heavy and strenuous	3 (5)
How confident are you that you will be able to meet the physical demands of your job?	Not confident at all	2 (3)
	Confident with significant reservations	2 (3)
	Confident with mild reservations	16 (26)
	Confident	7 (11)
	Very confident	35 (56)
From your perspective, how severe is your heart condition?	Very mild	3 (5)
	Mild	10 (16)

(continues)

**Table 2 • Survey Questions and Responses Among Employed Patients at Henry Ford Hospital (Continued)**

Questions	Responses	n (%)
	Moderate	32 (52)
	Severe	10 (16)
	Very severe	6 (10)
How important do you think cardiac rehabilitation is for treating your heart condition?	Not important at all	0 (0)
	Possibly important	1 (2)
	Moderately important	11 (17)
	Very important	16 (25)
	Essential to my full recovery	35 (56)
How important do you think cardiac rehabilitation will be for helping prevent future heart problems?	Not important at all	0 (0)
	Possibly important	2 (3)
	Moderately important	6 (10)
	Very important	19 (30)
	Essential to my full recovery	36 (57)
From your perspective, how helpful will cardiac rehabilitation be at helping you prepare to return to work?	Not helpful at all	4 (6)
	Mildly helpful	5 (8)
	Moderately helpful	14 (22)
	Very helpful	22 (35)
	Essential—could not go back to work without cardiac rehabilitation	18 (29)

cardiac disease, the desire to RTW, and CR attendance. Although it is often assumed that employed patients uniformly are not interested in, do not attend, and quickly drop out from CR, these associations do not seem to hold up under closer scrutiny. In particular, when an employed patient does not participate in CR, it seems necessary to inquire beyond “employment status” for other reasons for nonparticipation. Furthermore, it seems that we should shift our focus from employment status *per se* to better understanding and addressing the actual underlying issues that may be preventing greater participation in CR.

Although we did not find that employed patients were particularly helped by an early appointment, it should be emphasized that an earlier appointment was still an effective tool for increasing patient



**Table 3 • Univariate Predictors of Attendance at Cardiac Rehabilitation Orientation Among Employed Patients At Henry Ford Hospital**

Characteristic (Survey Answer Category)	Missing Survey Response (N)	Attended CR (n = 49)	Did Not Attend CR (n = 16)	P Value
Desire to RTW, <2 wks	8	31/45 (69%)	7/12 (58%)	.51
Time off work, <2 wks	11	26/42 (62%)	8/12 (67%)	1.00
Home financial strain, <2 wks	7	17/45 (38%)	12/13 (92%)	<.001
Sick leave policy, yes	2	26/47 (55%)	8/16 (50%)	.78
Disability insurance, yes	3	25/47 (53%)	5/15 (33%)	.24
Hospitalization covered by insurance, yes	4	45/46 (98%)	11/15 (73%)	.01
Physically strenuous work, very mild or mild	4	18/45 (40%)	6/16 (38%)	1.00
Able to meet physical demands of job, very confident	3	26/46 (57%)	9/16 (56%)	1.00
Perceived severity of heart condition, severe to very severe	5	10/45 (22%)	6/15 (40%)	.19
Importance of CR for treating heart condition, essential to full recovery	2	26/48 (54%)	9/15 (60%)	.77
Importance of CR for preventing future heart problems, essential to full recovery	2	30/48 (63%)	6/15 (40%)	.15
CR as helpful for returning to work, essential for returning to work	2	14/48 (29%)	4/15 (27%)	1.00

Abbreviations: CR, Cardiac Rehabilitation; RTW, return to work.

**Table 4 • Patient Characteristics and Predicted Enrollment Time and Session Attendance at Mayo Clinic**

	Time $\Delta$ to Enrollment, Days	P Value <sup>a</sup>	Difference in Attendance, Sessions	P Value <sup>a</sup>
Employed	-3.3	<.001	-1.6	.04
Age, per 10 y	+1.6	<.001	+1.0	<.001
Female sex	+2.6	.03	-0.7	.43
Olmsted county	-0.4	.77	+5.4	<.001
Non-Hispanic white	-1.7	.42	+4.5	.001
Diabetes mellitus	-1.4	.92	0.0	.97
Hypertension	+2.0	.13	+0.8	.65
BMI, per 5 kg/m <sup>2</sup>	+0.2	.63	+0.5	.15
Qualifying diagnosis				
Angina	+2.8	.60	-5.0	<.001
Valve surgery	+2.0	.11	-0.7	.43
CABG	+0.3	.84	+4.3	<.001
Heart transplant/LVAD	+0.9	.054	-1.3	.87
MI	-3.2	.07	+1.9	.009
PCI	-1.4	.01	-0.6	.31
Other	+4.1	.95	-2.4	.15
Time to enrollment, per 10 d	-	-	0.0	.95

Abbreviations: BMI, body mass index; CABG, coronary artery bypass graft; LVAD, left ventricular assist device; MI, myocardial infarction; PCI, percutaneous coronary intervention; time  $\Delta$ , time difference.

<sup>a</sup>Statistical analysis using the Wilcoxon-rank sum test in linear regression.

enrollment in CR. In our original trial at Henry Ford Hospital, we noted an overall enrollment rate in CR of 75% among our employed patients, which is much higher than national enrollment rates of 30% to 35%.<sup>9</sup> Also, it has been shown that encouraging a prompt RTW seems to be a key strategy in preventing long-term disability.<sup>16</sup> Thus, it still seems reasonable that all potentially eligible patients (including employed patients) should commence CR as soon as possible.

It is important to note that, although a few vocational rehabilitation programs have successfully increased the rate of RTW,<sup>18,19</sup> CR participation, as currently structured in the United States, does not seem to appreciably improve rates of RTW.<sup>20</sup> Rather, the decision to RTW is complicated by multiple social, economic, mental, and disease-related processes.<sup>21-25</sup> For those who do RTW, however, CR does seem to improve long-term health-related quality of life<sup>26</sup> and should be encouraged.

One additional finding in our study that may be underappreciated by CR programs is that employed patients were somewhat *more* likely to participate in CR, rather than less. This is consistent with prior publications<sup>27-30</sup> and runs counter to the presumptions of many CR staff members. This effect probably occurs because employed patients tend to be younger and more insured, 2 key factors that have previously been shown to be predictors of CR participation.<sup>31,32</sup>

### Study Strengths and Limitations

Notable strengths of this study include the use of 2 very different and ethnically diverse populations in which the main findings were similar. Although our Henry Ford Hospital sample sizes were small, we had detailed survey and referral information. We also directly manipulated appointment timing at Henry Ford Hospital and, as a result, findings from that site are unlikely affected by referral or participation bias. Although the Henry Ford Hospital cohort was limited due to the necessity of inclusion/exclusion criteria, the Mayo Clinic population included all patients (including surgical patients) and better represents the "real world." Also, although the Mayo Clinic study was limited by lack of inpatient referral information, it was large, had better classified employment types, and had sufficient statistical power for multivariate modeling. Thus, by presenting these studies together, we more confidently assessed our aims and drew upon the relative strengths of each study while limiting study weaknesses.

This study has several important limitations. First, because of the small sample size at Henry Ford Hospital, most findings were limited in statistical

power and multivariate modeling could not be performed. Second, it is unknown which patients actually returned to gainful employment. This was not assessed in both studies and limits what conclusions can be drawn, particularly in assessing the relationship between CR participation and actual RTW. Third, we did not have detailed employment descriptions (eg, professional, clerical, and manual labor) in either study, which could play an important role in a patient's decision to attend CR. Fourth, we did not explore the differences in CR participation among the various types of nonemployment statuses (eg, retired, unemployed, and disabled) because we did not have this information in the Henry Ford Hospital data set and the 135 (13%) unemployed and disabled patients at Mayo Clinic was a relatively small number. Fifth, although patients play a part in deciding enrollment time and the extent of participation, CR staff may have also influenced time to enrollment (by accelerating the appointment time for an employed patient) or CR participation (by recommending a shorter course of CR if the patient was doing well and wanted to RTW).

## CONCLUSIONS

Although employed patients expressed a sense of urgency relative to returning to work and valued the role of CR, an early appointment did not seem to preferentially improve attendance at CR orientation or improve the total number of CR sessions attended in this subgroup of patients. Rather, the decision to participate in CR was predicted by a complex interplay of medical, economic, and social factors rather than simply by employment status. CR programs should look beyond employment status and a patient's desire to RTW when assessing and motivating patients to attend CR.

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