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Participation Rates, Process Monitoring, and Quality Improvement Among United States Cardiac Rehabilitation Programs: A National Survey

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Abstract

Purpose—Although strategies exist for improving cardiac rehabilitation (CR) participation rates, it is unclear how frequently these strategies are utilized and what efforts are being made by CR programs to improve participation rates.

Methods—We surveyed all CR program directors in the American Association of Cardiovascular and Pulmonary Rehabilitation's database. We assessed program characteristics, use of specific referral and recruitment strategies, and self-reported program participation rates.

Results—Between 2007 and 2012, 49% of programs measured hospital referral, 21% measured office/clinic referral, 71% measured program enrollment, and 74% measured program completion rates. Program-reported participation rates [interquartile range] were 68 [32 to 90]% for hospital referral, 35 [15 to 60]% for office/clinic referral, 70 [46 to 80]% for enrollment, and 75 [62 to 82]% for completion. The majority of programs utilize a hospital-based systematic referral, liaison facilitated referral, or inpatient CR program (64%, 68%, and 60% of the time, respectively). Early appointments (< 2 weeks) were utilized by 35% and consistent phone call appointment reminders were utilized by 50% of programs. Quality improvement (QI) projects were performed by about half of CR programs. Measurement of participation rates was highly correlated with performing QI projects ($p < 0.0001$.)

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Conclusions—Although programs are aware of participation rate gaps, the monitoring of participation rates is suboptimal, quality improvement initiatives are infrequent, and proven strategies for increasing patient participation are inconsistently utilized. These issues likely contribute to the national CR participation gap and may prove to be useful targets for national QI initiatives.

Keywords

Cardiac Rehabilitation; Quality Improvement; Participation; Referral

Introduction

Cardiac Rehabilitation (CR) reduces mortality rates for patients with cardiac disease and referral to CR is given the strongest level of recommendation by the American Heart Association/American College of Cardiology in practice guidelines.^{1, 2} In addition, CR is has also been endorsed by the National Quality Forum as a performance measure.³ Despite this, CR is highly under-utilized with as few as 20-30% of patients participating nationally.^{4, 5} Although there are many reasons why patients do not participate,⁶ multiple studies demonstrate that providers and hospital systems play a key role⁷ in encouraging patient participation with some programs reporting participation rates >70%.⁸ Consequently, the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) have called upon hospitals, providers, CR programs, and CR program Medical Directors to improve patient participation.⁹⁻¹¹

Several key strategies have been previously described for increasing patient participation. These include strong physician recommendations for participation;¹² an early appointment to CR;¹³ a reminder phone call in the 2-3 days prior to the enrollment appointment;¹⁴ use of a hospital-based liaison who provides program information, encouragement, and otherwise facilitates outpatient referral;¹⁵ and an automatic/systematic referral which does not rely on physician initiative or memory.¹⁵ Each of these key techniques improves participation significantly and if uniformly applied across the United States would significantly improve CR participation rates and reduce the burden of heart disease and numbers of recurrent events.

Although these techniques have been demonstrated to increase patient participation, it is unclear how broadly these strategies are applied across the United States. In addition, it is unknown how often participation rates are being monitored, how often quality improvement projects are being carried out by CR programs, and what impact those quality improvement projects are having on patient outcomes.

To address these gaps in knowledge and to help identify methods for improving CR participation, we assessed the characteristics of a national sample of CR programs in the US with a particular focus on the use of evidence-based strategies to improve CR referral and enrollment. We hypothesized that the majority of programs do not monitor participation and completion rates, utilize evidence-based quality CR participation strategies, or regularly perform quality improvement initiatives.

Methods

In November 2012, we conducted a national survey of program directors registered in the AACVPR national database. We excluded programs with only pulmonary rehabilitation, only inpatient CR services, or programs located outside the United States. Surveys were administered by the AACVPR, were anonymous, voluntary, and responses were collected through the use of the online survey website, www.surveymonkey.com. Program directors were given one survey reminder 2 weeks after the original survey distribution. Participants were entered into an incentive drawing among which 15 participants won a heart health related book worth approximately \$20.

All questions were developed by the primary author (QP) and reviewed for content, clarity, and face validity by all other authors. The full survey is found in the appendix. There were 30 survey questions which assessed program size, characteristics, programming, and location relative to referring hospitals and clinics (questions 3-9.) We also assessed measured and estimated program participation rates as well as referral, enrollment, and retention strategies (questions 11-14 and 20-29.) We previously published part of the survey which assessed response bias, program capacity, and growth potential (questions 13-19.) In this article, we report our findings regarding the utilization of specific patient recruitment strategies in both hospital and outpatient clinic settings. Details regarding our survey response rate and response-bias analysis have been previously described.¹⁶ The survey was reviewed and approved by AACVPR leadership and the Mayo Clinic institutional review board.

Measures

Our primary outcome was the measurement of participation rates at least once in the past 5 years (question 26.) Any respondent who answered this question was considered to have completed the survey for the purpose of calculating the survey response rate because measurement of a participation rate is a key first step in quality improvement. Although we also assessed program-reported participation rates, we felt these data would be less reliable, susceptible to social desirability bias, and as such were exploratory outcomes. To speed survey response, we employed skip logic when possible. We required participants to answer basic identifying questions, skip-logic questions, and our primary outcome (questions 1, 2, 18, 23, and 26.) All other questions were voluntary and could be skipped or answered incompletely.

Several important terms required definition. Specific wording used in the survey can be found in the online appendix. A liaison-facilitated referral was defined to occur when a specific staff member discusses outpatient CR, encourages attendance, and facilitates referral for all eligible patients. An automatic referral was defined to occur as part of an order set that does not depend on physician initiative or memory. Referral rate was defined as the percentage of eligible patients in a hospital or clinic who were referred to cardiac rehabilitation. Enrollment rate was defined as the percentage of referred patients who attended >1 exercise session of CR. Completion rate was defined as the percentage of enrolled patients who completed the program, as defined by each individual program. Cumulatively, these four rates (hospital referral, clinic referral, enrollment, and completion)

were collectively referred to as “participation rates” when speaking about the combined group.

Analysis

All data were entered into a database. Except when reported separately, we collapsed all negative, unknown, or uncertain answers into one “null” category. Descriptive statistics were applied. Categorical data are reported as a percent of respondents and continuous data with mean with standard deviation or median with interquartile range as appropriate for normally distributed or skewed data, respectively. We tested continuous data associations with Spearman’s correlation coefficient and categorical associations with Chi-squared. All analyses were performed with JMP 9.0.1 (SAS institute, Cary, NC.)

We estimated the percentage of 100 hypothetical eligible patients who complete CR using reported participation rates by combining referral, enrollment and completion rates. We utilized the percentage of patient referred from the hospital (vs. clinic) to estimate the starting ratio of patients referred from the clinic or the hospital. To test for the potential impact of QI initiatives on patient participation rates, we also stratified programs according to the presence of QI initiatives and compared rates using a t-test.

Results

Out of 812 program directors, 334 (41%) answered at least one question, and 290 (36%) completed the full survey. The number of respondents on each question is shown in table columns labeled N, and varied from question to question due to incomplete responses, survey drop out, and the use of skip logic to speed survey response by skipping unrelated questions. We demonstrated previously in a non-response bias analysis that survey respondents were generally representative of AACVPR programs found in the database.¹⁶

Program characteristics and enrollment strategies are found in Table 1. Findings included that most patient started CR between 3-4 weeks after discharge, and that 50% of programs routinely provided telephone reminders of upcoming enrollment appointments.

Of 314 program directors, 281 (89%) reported having “specific knowledge” of their primary hospital’s referral process and 75% (234/311) reported having specific knowledge of their primary clinic’s referral process. Conversely, only 7.2% (21/289), 14.4% (41/285), 0.7% (2/290), and 0.3% (1/290) of program directors reported being unable to measure hospital referral, office/clinic referral, enrollment, and completion rates, respectively.

Specific referral strategies and referral materials are found in Table 2 for both clinic and hospital settings as reported by program directors with a “specific knowledge” of referral techniques. Utilization of inpatient systematic referrals, liaison-facilitated referrals, and a Phase I CR program were each reported by about 2/3rds of programs. However, only 29% (67/231) used all three of these techniques and 4.7% (11/231) reported using no inpatient referral techniques.

Table 3 shows the frequency of CR participation rate monitoring. We observed a strong association between the measurement of participation rates and quality improvement projects ($p < 0.001$ for all.)

Table 4 demonstrates program-reported CR program participation rates and Figure 1 highlights these findings. Although few programs reported measured rates for the year 2012, measured vs. estimated rates did not differ significantly between programs except for a 12% higher hospital referral rate among programs reporting measured rates ($p = 0.02$). Figure 2 demonstrates that only 30 patients out of a hypothetical 100 eligible patients succeed in moving from eligibility all the way to CR completion using current systems of referral, recruitment, and retention in the United States.

We found only weak correlation between the presence of QI projects and program-reported program participation rates (data not shown in tables.) When comparing programs reporting without QI projects to programs performing such projects, QI projects were not associated with significantly improved hospital referral (+4%, from 57 to 61%, $p = 0.30$), office/clinic referral (+7%, from 38% to 45%, $p = 0.06$), enrollment (-5%, from 65 to 60%, $p = 0.06$), or completion rates (+ 0.5%, from 71 to 71.5%, $p = 0.90$).

Discussion

In this national survey of 290 AACVPR-registered program directors, we found that, although programs are aware of substantial participation rate gaps, monitoring of participation rates is suboptimal, quality improvement initiatives are infrequent, and proven strategies for increasing patient participation are inconsistently utilized. The outpatient/clinic setting has the lowest reported referral rates, lowest monitoring of rates, and lowest utilization of systematic referral. However, inpatient referral and monitoring is still far from ideal. We found that many programs are not utilizing either a phase I program, a systematic referral or a liaison as part of their hospital referral strategy; all of which are key factors known to increase CR referral. For the most part, this was not because of lack of control or awareness of referral strategies. Rather, 90% and 70% of programs could answer detailed questions about inpatient and outpatient referral techniques, respectively, with only about ~10% of programs reporting being unable to measure their participation rates. As a result, while programs are aware of participation gaps, appear able to monitor rates, and can probably institute process changes, substantial gaps remain between current and ideal CR program participation rates in both the inpatient and outpatient settings.

Taken together, these findings suggest that there is a large opportunity for CR programs to improve the care of patients in need of CR and that CR programs could be doing more to recruit and retain patients. Furthermore, our results suggest that if every CR program nationally implemented known effective strategies for patient recruitment, the national CR participation gap would shrink significantly. Such an achievement would likely produce substantial gains in the cardiovascular health and wellness of the nation. Given the known cost-effectiveness of CR,¹⁷ efforts at improving participation rates would also likely be a wise investment of time and resources for hospitals, medical systems, and accountable care organizations. Such efforts would also help organizations meet performance measures and

national guidelines.¹⁻³ Given the central importance of improving CR participation rates, AACVPR leadership may want to consider the performance of QI projects as part of the program certification process.

Although there appears to be a large opportunity for quality improvement in CR, one potential reason that programs may not be utilizing effective strategies or performing QI projects is program capacity restraints.¹⁶ Without enough staffing and physical resources necessary to accommodate an increased number of patients, program directors may have little motivation to perform QI projects with the goal to increase patient participation because they are already running at or near capacity. Consequently, although we did not assess this specifically, it seems possible that underutilization of effective recruitment strategies seen in our survey may be a consequence of program capacity restraints.

To the best of our knowledge, this is the first time a national survey of the utilization of evidence-based CR referral and recruitment strategies has been performed in the United States. Although several national surveys have recently been performed, none of these has focused on the prevalence and opportunities for improvement in CR participation rates. For example, Zullo et al, surveyed CR programs in Ohio and found substantial between-program variations in AACVPR recommended core CR components.¹⁸ Similarly, Kaminsky et al.¹⁹ surveyed 137 United States CR program and asked about basic program features and patient demographics. Neither study addressed the question of referral and enrollment rates (which is arguably the largest quality problem in CR.) Lastly, Grace et al. surveyed CR providers in Canada, noted low participation rates, and also found that part of the implementation problem was CR staff skepticism towards empirically proven enrollment strategies.²⁰ Although performed in Canada, these findings, in combination with our survey, suggest that additional education of CR programs with an increased focus on evidence-based effective strategies is warranted.

It is unclear why program QI projects were only weakly related to program-reported CR participation rates. It is possible that QI projects carried out by our survey respondents did not have an impact on CR participation. However, given that several different QI projects in CR have previously been demonstrated to effectively increase referral, enrollment, and completion,^{13, 21-23} we believe there is not some inherent flaw with QI efforts in CR. Similarly, this finding may reflect an important need among AACVPR programs for increased training in how to effectively perform QI projects. Alternately, this finding may have been due to limitations in our survey technique and the use of program-reported (vs. measured/validated) participation rates. Furthermore, we did not assess the nature, focus, or perceived success of the performed QI projects, nor did we assess short term versus long-term outcomes of the projects. As a result, this is a major limitation to our study. It is possible, for instance, that a specific QI project improved participation but only on a short-term basis. Based upon prior literature, key factors that seem to differentiate successful from unsuccessful QI projects appear to be 1) high levels of goal sharedness, 2) strong administrative support, 3) strong physician leadership, 4) the use of credible data for feedback, and 5) the clear use of improvement initiatives.²⁴ Since none of these factors were assessed in our survey, we are unable to assess the underlying reasons for “success” or “failure” of the QI projects reported by our survey respondents. Given our finding that QI

projects may not be related to CR participation, a significant opportunity exists for future research to explore this issue in greater detail.

Importantly, we were able to survey only AACVPR registered program directors, rather than every CR program in the US (regardless of AACVPR registration). Based on data from 2003, non-AACVPR registered programs represent more than 70% of total US CR programs.²⁵ Although little is known about these programs, they are generally believed to be smaller, have fewer full time employees, fewer full-time managers, and appear less likely to seek AACVPR certification. With decreased program size and dedicated leadership time, it is presumed that these programs are less likely to implement new referral strategies, retention programs, or quality improvement projects. As a result, we believe our survey most likely *overestimates* the actual national quality awareness and improvement projects when considering all CR programs in the US, because we surveyed only large, well established programs that seek AACVPR certification. As a result, this suggests that the true quality gap is even larger than reported here. Furthermore, this idea is substantiated in that program-reported participation rates among our surveyed AACVPR programs (Figure 1) are all higher than those reported in the medical literature.^{4, 5, 26}

Other important limitations of our study include a relatively low survey response rate, although our previous analyses showed that respondents appeared reasonable representative of the AACVPR membership.¹⁶ Additionally, we were unable to validate any program-reported participation rates which limited our confidence in these outcomes.

Conclusions

In summary, our survey highlights current gaps in the use of effective strategies that have been shown to improve delivery of CR, and thereby identifies opportunities for quality improvement by CR programs in the United States. It is likely that at least some of these opportunities are within the reach of most hospitals, clinics, and CR programs. It is equally likely that significant challenges exist that will limit the full implementation of effective CR participation strategies (i.e., competing demands on the time of clinicians and information technology support teams). CR professionals can contribute to efforts to improve CR participation rates and related patient outcomes by working collaboratively with local hospitals and clinics to implement proven, evidence-based CR participation strategies in their communities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
National Cardiac Rehabilitation Participation Rates As Reported by Directors of AACVPR Registered Programs
AACVPR = American Association for Cardiovascular and Pulmonary Rehabilitation
Referral rate was defined as the percentage of eligible patients in a hospital or clinic who were referred to cardiac rehabilitation. Enrollment rate was defined as the percentage of referred patients who attended >1 exercise session of CR. Completion rate was defined as the percentage of enrolled patients who completed the program, as defined by each individual program.

Figure 2.

Hypothetical Overall Participation Rates for 100 Eligible Patients Using Program-Reported Survey Responses. As can be seen, the cumulative effective of the quality gap at each stage (hospital referral, clinic referral, enrollment and completion) results in only 30 out of 100 patients moving from a qualifying diagnosis all the way through cardiac rehabilitation completion. Rates are defined as per Figure 1 and the manuscript text. CR = Cardiac Rehabilitation.

Table 1

Prevalence of Cardiac Rehabilitation Program Features and Enrollment Strategies

	N	Category	Prevalence, %
Structural			
Local population	335	<50,000	37
		50,000 – 99,999	20
		100,000 – 249,999	20
		250,000 – 500,999	10
		500,000 – 999,999	7
		1,000,000	6
Inpatient vs. outpatient referral, %	338	0-20	24
		21-40	8
		41-60	9
		61-80	18
		81-100	41
Location relative to hospital	340	Same building	44
		Same campus	20
		5-10 minutes	8
		>10 minutes	28
Location relative to clinic	339	Same building	34
		Same campus	27
		5-10 minutes	21
		>10 minutes	18
Member of CR network	340		26
Member of AACVPR	340		96
Electronic medical record	340		56
Academic medical center	340		19
Ongoing CR research	340		7
Enrollment Strategies			
Time interval from hospital discharge to enrollment	328	1-2 weeks	35
		3-4 weeks	49
		5-6 weeks	15
		7-8 weeks	12
		9 weeks	3
Percentage of time a telephone reminder is made in the 2-3 days prior to initial appointment, %	326	0-20	36
		21-40	5

	N	Category	Prevalence, %
		41-60	5
		61-80	4
		81-100	50
Programmatic features			
Gender-tailored sessions	334	---	2
Age-tailored sessions	334	---	7
Behavioral contracts	334	---	23
Spouse participation	334	---	73
Incentive programs	334	---	33
Evening hours	314	---	16
Days open per week, mean $\pm$ SD	314	---	3.6 $\pm$ 0.9

Abbreviations: AACVPR, American Association of Cardiovascular and Pulmonary Rehabilitation; CR, cardiac rehabilitation.

Table 2**Hospital and Clinic Referral Strategies and Materials.**

	N	Prevalence, %
Hospital		
Referral strategies		
Phase I program	340	60
Systematic referral	279	63
Liaison	277	68
Number of referral strategies utilized		
0	231	5
1	231	22
2	231	44
3	231	29
Timing/trigger for systematic referral		
Admission	206	14
Discharge	206	58
Surgery	206	42
Cardiac catheterization	206	52
Other (stress test/blood test/biomarker)	206	23
Referral materials		
Appointment day/time	279	26
Map/directions	279	32
Flyer/handout	279	73
Contact information	279	82
Clinic		
Systematic referral	234	18
Referral materials		
Appointment day/time	230	20
Map/directions	230	18
Flyer/handout	230	18
Contact information	230	70

Table 3

Program-Reported CR Participation Rate Monitoring and QI Projects

	N	Measured in past 5 years	QI project in past 5 years	χ^2	P value
Hospital referral	289	49%	62%	74.5	<.0001
Office/clinic referral	285	21%	42%	45.9	<.0001
Program enrollment	290	71%	60%	33.3	<.0001
Program completion	290	74%	57%	48.2	<.0001

Abbreviations: CR, cardiac rehabilitation; QI, quality improvement.

Note: Rates were determined per Figure 1 and as described in the text.

Table 4**Program-Reported Cardiac Rehabilitation Participation Rates**

Participation Rate	N	Overall participation rate % (IQR)	% of respondents reporting measured participation rates	Measured participation rate % (IQR)	Estimated participation rate % (IQR)	p-value
Hospital Referral	248	68% (32 to 90)	26%	77.5% (40 to 98)	65% (33 to 85)	0.02
Office/Clinic Referral	235	35% (15 to 60)	8%	35% (19 to 73)	34% (15 to 60)	0.46
Program Enrollment	251	70% (46 to 80)	40%	67.5% (45 to 80)	70% (47 to 80)	0.49
Program Completion	252	75% (62 to 82)	45%	75.5% (67 to 85)	75% (60 to 80)	0.10

IQR = inter quartile range, N = number of survey respondents

Rates are defined as per Figure 1 and the manuscript text