

The Montana Cardiac Rehabilitation Regional Outcomes Project

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- **PURPOSE:** Outcomes evaluation is a critical component in early outpatient cardiac rehabilitation (CR). The goal of this project was to develop a regional CR outcomes program to help facilitate quality improvement.
- **METHODS:** The Montana Outcomes Project initiated data collection on a uniform set of outcomes indicators. Each participating program submitted de-identified data for analysis on a quarterly basis. Results were sent back to each program with its individual program data plotted against the regional mean.
- **RESULTS:** Year 1 data collection included outcomes information from 22 facilities and 850 patients. Mean age was 68 years, 96% were white, 68% were men, and the mean number of CR visits was 24. The mean resting blood pressure at program completion was 118/68 mm Hg, with 90% of patients meeting criteria for blood pressure control (<140/90 or <130/80 mm Hg for patients at high risk). Mean low-density lipoprotein was 87 mg/dL; 94% were on lipid-lowering medications; and 73% achieved low-density lipoprotein values of less than 100 mg/dL. Upon program completion, significant improvements ($P < .001$) were noted in prescore versus postscore for functional capacity measured by the Duke Activity Status Index (5.5 metabolic equivalents vs 7.3 metabolic equivalents), Medical Outcomes Study SF-36 Health Status Questionnaire physical (36.9 vs 45.8) and mental (47.2 vs 52.2) composite scores, Dartmouth Primary Care Cooperative questionnaire (22 vs 15.9), and fat intake measured by the Block Dietary Fat Screener (19.6 vs 14.7).
- **CONCLUSION:** Our findings suggest that the development of a regional CR outcomes project is feasible and could aid in the development of quality improvement projects.

K E Y W O R D S

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Cardiac rehabilitation (CR) has been in existence for more than 30 years and is recognized as a critical component in the recovery from cardiac events and in the prevention of future adverse events.^{1,2} Overall, participation in CR has demonstrated significant benefits in reducing cardiovascular risk factors and improving functional capacity and quality of life.²⁻⁴ In 1 long-term study, there was a striking 56% improvement in survival postmyocardial infarction and a 28% reduction in recurrent events associated with CR participation.⁵ In addition, the study reported that 3 years

postevent, 95% of the patients who completed CR were still alive compared with only 64% of the patients who did not attend CR.⁵

Cardiac rehabilitation has evolved from programs simply geared to the physical rehabilitation of patients postcoronary artery bypass grafting or myocardial infarction to comprehensive, multidisciplinary programs addressing secondary prevention strategies and the psychosocial needs of patients recovering from a variety of cardiac diseases.⁶ Because of the well-established benefits of CR, Medicare benefits for CR services now extend

Table 1 • OUTCOMES INDICATORS FOR THE MONTANA REGIONAL OUTCOMES PROJECT, 2006–2007

Domain	
Health	
Quality of life	SF-36 or Dartmouth COOP Percentage change pre-CR vs post-CR
Clinical	
Blood pressure at goal	<140/90 mm Hg <130/80 mm Hg in patients with diabetes Average of last 3 preexercise readings
Low-density lipoprotein at goal	<100 mg/dL
Lipid-lowering medication	Yes/no
Contraindication documented	Yes/no
Duke Activity Status Index	Percentage change pre-CR vs post-CR
Hemoglobin A _{1c} in patients with diabetes	Yes/no Measured within last 6 mo
Behavioral	
Smoking	Status 1 mo prior to event vs status post-CR
Dietary fat screen	Percentage change pre-CR vs post-CR
Service	
Patient satisfaction	
Program completion rate	>11 sessions = CR completion
Abbreviations: CR, cardiac rehabilitation; Dartmouth COOP, Dartmouth Primary Care Cooperative questionnaire; SF36, Medical Outcomes Study SF-36 Health Status Questionnaire.	

beyond the traditional diagnosis of coronary artery bypass graft, myocardial infarction, and stable angina to include patients who have undergone percutaneous coronary interventions, valve replacement/repair, and heart/heart-lung transplant.

An important component of CR programming is outcomes evaluation, and much time and effort have been dedicated to this in recent years. In 2004, the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) updated recommendations for outcomes measures.⁷ In 2007, selected outcome measures were included into broad-based recommendations from the American Heart Association (AHA), American College of Cardiology (ACC), and AACVPR on performance measures in CR.¹ Measuring outcomes has become critical because these data highlight what programs are doing well but, more important, reveal areas that need to be improved. Quality improvement (QI) activities based on outcomes data can lead to the ultimate goal of improved patient care. Unfortunately, most outcomes indicators in use by many programs lack readily accessible benchmark information for comparison purposes, making it difficult for programs to determine whether their performance is adequate or how they compare to other programs similar in size and scope.

In 2005, the Montana Cardiovascular Health (CVH) program within the Department of Public Health and Human Services collaborated with the Montana Association of Cardiovascular and Pulmonary

Rehabilitation (MACVPR) to develop a regional outcomes project. The goal of the project was to identify a comprehensive, standardized set of CR outcomes indicators that could be utilized by both small and large CR programs (Table 1). In addition, a major component of the project was to provide data management support, which included providing individual facility and aggregate data analysis and feedback. The feedback allowed programs to compare their data to the regionwide mean (Figure 1). The comparison data then formed the basis for program specific and regional QI projects.

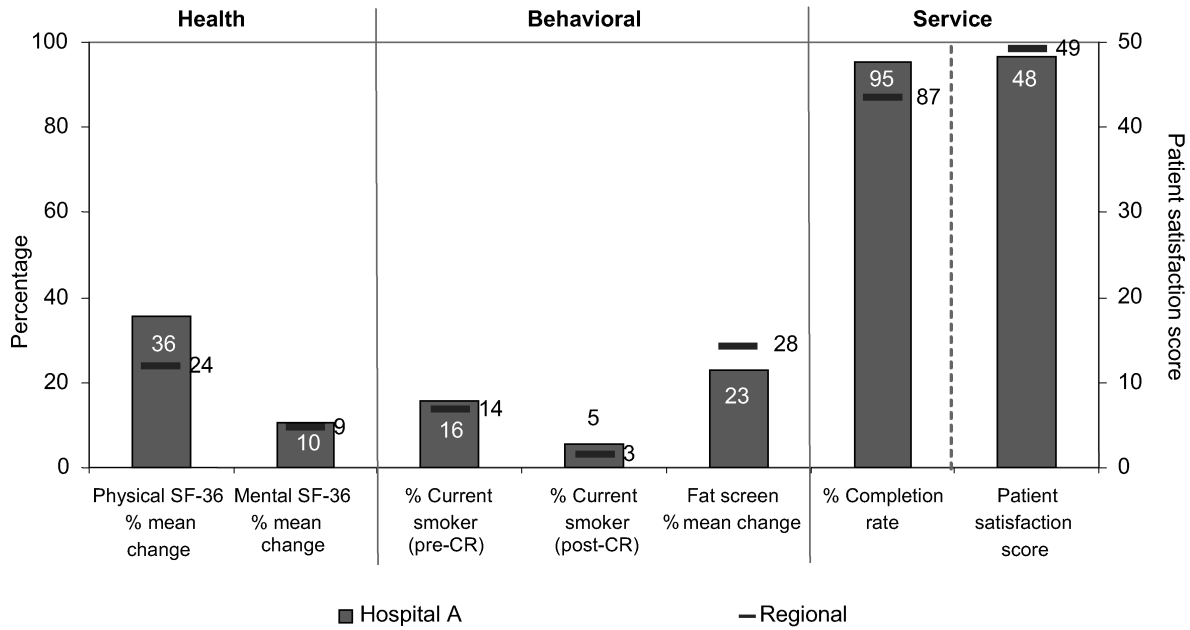
METHODS

Programs participating in the outcomes project provide CR services in Montana and northern Wyoming. Programs in northern Wyoming were included in the project because they are active members of the MACVPR and patients from this area are often transferred to tertiary care facilities in southern Montana.

Program Assessment

In 2005, the Montana CVH program in partnership with the MACVPR developed a 29-question survey to assess CR services in Montana and northern Wyoming. Institutional review board approval for this workforce assessment survey was not required by the

CR indicators from the **health, behavioral, and service** domains for facilities participating in the Regional Outcomes Project, January–March 2007



CR indicators from the **clinical** domain for facilities participating in the Regional Outcomes Project, January–March 2007

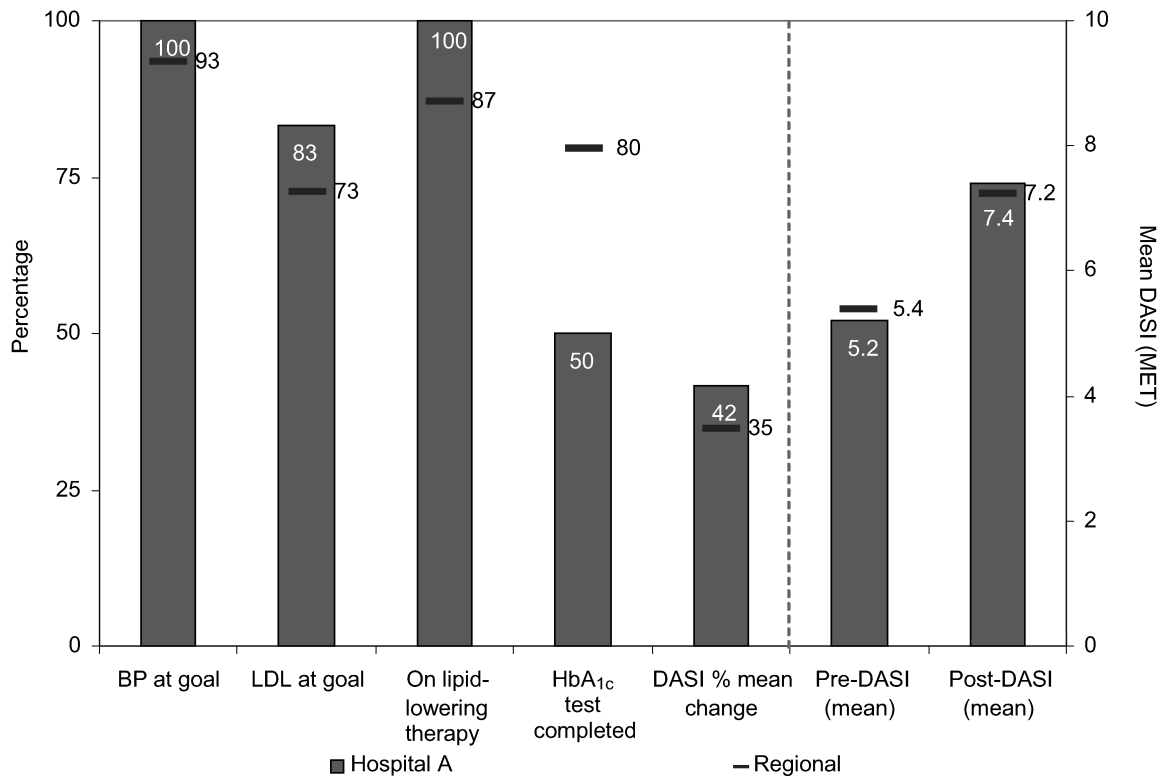


Figure 1. Indicators and example of feedback—Montana Regional Outcomes Project, 2006–2007. CR indicates cardiac rehabilitation; SF-36, Medical Outcomes Study SF-36 Health Status Questionnaire; BP, blood pressure; LDL, low-density lipoprotein; HbA_{1c}, hemoglobin A_{1c}; DASI, Duke Activity Status Index; and MET, metabolic equivalent.

Montana Department of Public Health and Human Services. Participation in the CR assessment was voluntary and confidential and there were no risks associated with participation in the survey. The main focus of the survey was to identify programs interested in participating in a regional outcomes project. The survey consisted of questions related to program description, services and staffing, and outcomes. Cardiac rehabilitation programs in Montana and northern Wyoming were identified from the MACVPR membership database. The MACVPR president sent e-mails to CR program coordinators, notifying them of the upcoming survey and encouraging them to participate in the survey process. Following the e-mails, a letter and the survey were mailed to each program coordinator reiterating the purpose of the survey and asking for their participation. For convenience, a self-addressed stamped envelope was included with the survey. To increase the response rate, telephone reminder calls and follow-up e-mails were sent 2 weeks after the initial mailing to those who had not returned a completed survey. For those who did not complete the survey 4 weeks after the initial mailing, a telephone call was made to the program coordinator and the survey was administered over the phone.

Outcomes Indicators

The CVH program and the MACVPR Outcomes Committee organized a set of outcomes indicators for this project. Indicators were selected and categorized into specific domains on the basis of recommendations taken from the AACVPR guidelines manual to ensure that the project would fulfill criteria for programs seeking certification/recertification (Table 1).⁸ Support materials were organized into a manual that provided detailed instructions on the indicators, administration and scoring procedures, and reporting and feedback procedures. Two orientation calls were held in June 2006 to provide additional information and to address any additional questions or concerns. Data collection began in July 2006, with de-identified data being submitted to the CVH program for analysis on a quarterly basis. The first data submission took place in January 2007 and consisted of patients who started CR between July and September 2006.

Data analyses were completed using the SPSS V14.0 software (SPSS, Inc., Chicago, Illinois). Paired *t* tests were used to assess differences in Duke Activity Status Index (DASI), quality of life (Medical Outcomes Study SF-36 Health Status Questionnaire [SF-36]), or Dartmouth Primary Care Cooperative questionnaire [COOP]), and the Block Dietary Fat Screener scores at baseline and at CR program completion.⁹⁻¹²

RESULTS

All 33 (100%) CR programs in Montana and northern Wyoming completed the assessment survey. Approximately one-fourth of programs were associated with hospitals that offered cardiac interventional services (percutaneous coronary intervention or coronary artery bypass grafting). Nearly all (88%) programs were hospital based, whereas the remaining programs (12%) were freestanding or satellite facilities. Program staff for all programs consisted primarily of nurses and exercise physiologists, with a limited number of physical therapists, respiratory therapists, technical personnel, and aides. The average number of full-time equivalents in the programs associated with interventional hospitals was significantly greater than the full-time equivalents in the other programs (2.4 vs 1.0). Inpatient (phase I) programs associated with interventional hospitals reported an average of 28 patients per month compared with just 1 patient per month in the smaller programs. Similar trends were noted in both early outpatient (phase II) and long-term or maintenance (phase III/IV) programs (phase II: 17 vs 5 and phase III/IV: 47 vs 8). More than 60% of programs were tracking outcomes in some format before participating in this project. Of the remaining 13 (39%) programs not tracking outcomes, more than two-thirds expressed interest in starting an outcomes program. Twenty-five (82%) CR programs expressed interest in participating in a regional outcomes project. Twenty-two of the 25 interested facilities began and continued participation in the outcomes project.

Outcomes From Year 1

January 2008 represented 1 complete year of data collection and included patients who entered CR between July 2006 and June 2007. Outcomes information was reported from 22 facilities and included 850 patients. Mean age was 68 years, 96% were white, 68% were male, mean number of visits was 24, and program completion rate (≥ 12 visits) was 84%. Mean resting blood pressure (BP), derived from an average of the last 3 preexercise BP measurements, at program completion was 118/68 mm Hg, with 90% of patients meeting criteria for BP control ($< 140/90$ or $< 130/80$ mm Hg for high-risk patients).¹³ Mean low-density lipoprotein (LDL) was 87 mg/dL according to the most current laboratory values available to the CR staff, 94% were on lipid-lowering medications, and 73% achieved LDL values of less than 100 mg/dL. Upon program completion, significant improvements ($P < .001$) were noted in prescore versus postscore in functional capacity measured by the DASI

(5.5 metabolic equivalents vs 7.3 metabolic equivalents),⁹ SF-36 physical (36.9 vs 45.8) and mental (47.2 vs 52.2) composite scores,¹⁰ Dartmouth COOP (22 vs 15.9),¹¹ and fat intake measured by the Block Dietary Fat Screener (19.6 vs 14.7).¹² Smoking rates decreased from 13% at the beginning of CR to 4% post-CR. Patient satisfaction was 48.9 of a possible 50 on a set of nonstandardized questions.

DISCUSSION

Findings suggest that there is significant interest among CR facilities to participate in regional outcomes projects. We also found that it was feasible to establish a regional collaboration among facilities, AACVPR state affiliates, and a state health department. Participating programs embraced the project and were able to utilize the quarterly feedback to facilitate improvements in the quality of care for their patients.

Year 1 aggregate outcomes data were similar to those reported by others involved with state or regional outcomes projects, including the high percentage of male participants (67%–72% men) and whites (90%–98%).^{4,14–16} Vitcenda¹⁴ reported that 88% of the participants involved with the Wisconsin Web-Based Outcomes Project (W²eBOP) met goal criteria for BP control (<140/90 or <135/80 mm Hg for high-risk patients) compared with 90% meeting slightly stricter control criteria in Montana and northern Wyoming (<140/90 or <130/80 mm Hg for high-risk patients). The percentage of patients on lipid-lowering medications was considerably higher in Montana and northern Wyoming (94%) than in Wisconsin (72%), as was the percentage meeting goal criteria for LDL control (LDL <100 mg/dL) (73% vs 45%).¹⁴ Functional capacity improvement, as measured by pre- to postchanges in the DASI, in Montana and northern Wyoming improved to 34%, which was similar to the 28% improvement reported by Gulanick et al¹⁵ in the Illinois outcomes project. The outcomes projects in Indiana and Illinois demonstrated improvements in quality of life using the SF-36 after CR participation, which was again consistent with our results.^{15,16}

The indicators selected for the outcome measures were selected on the basis of clinical relevance and by recommendations from the AACVPR,⁸ but there are limitations. For example, most CR programs could not order lipid testing directly, making standardization difficult in reporting LDL values. The patient satisfaction survey was developed specifically for this project but was not formally studied for reliability and validity. Nonetheless, most measures included were

similar to those suggested by the AHA/ACC/AACVPR in 2007 and fulfill requirements for AACVPR program certification, laying the groundwork for improving patient care.¹

On the basis of the findings from year 1 of this collaborative project, the CVH program and the MACVPR Outcomes Committee recommended specific QI projects to programs based on their individual program data. Recommendations included improving feedback to referring physicians regarding BP control and appropriate lipid follow-up, including testing and treating with lipid-lowering medications. Regional QI projects focused on 2 areas, fat intake, as measured by the Block Dietary Fat Screener,¹² and functional capacity, as measured by the DASI.⁹ These indicators were chosen because several programs consistently reported scores below the regional mean. Two teleconferences were offered focusing on patient education using the “train the trainer” method. A registered dietitian presented a healthy heart nutrition lecture focusing on reducing dietary fat intake and an exercise physiologist presented an exercise lecture related to home exercise strategies. Both presenters shared their presentations and handouts with CR programs taking part in the teleconference. The intent of the presentations was to provide programs with an out-of-the-box patient education lecture that they, in turn, could present to their own patients.

As the outcomes project moves into the second year, continued monitoring of the targeted indicators will be followed to determine the effectiveness of the QI projects. In addition, programs from Arizona, California, Michigan, Minnesota, North Dakota, Oregon, South Dakota, and Washington are actively participating in the outcomes project.

In summary, our findings suggest that a collaboration is feasible among the MACVPR, the CVH program, and individual CR programs to develop and implement a regional outcomes project. These efforts lay the foundation for both individual and regional QI projects with the overall goal of improving patient care.

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References

1. Thomas RJ, King M, Lui K, et al. AACVPR/ACC/AHA 2007 performance measures on cardiac rehabilitation for referral to and delivery of cardiac rehabilitation/secondary prevention services. *Circulation*. 2007;116:1611–1642.
2. Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systemic review and meta-analysis of randomized controlled trials. *Am J Med*. 2004;116:682–692.
3. Taylor RS, Unal B, Critchley JA, Capewell S. Mortality reductions in patients receiving exercise-based cardiac rehabilitation: how much can be attributed to cardiovascular risk factor improvement? *Eur J Cardiovasc Prev Rehabil*. 2006;13:369–374.
4. Verrill D, Barton C, Beasley W, et al. Quality of life measures and gender comparisons in North Carolina cardiac rehabilitation programs. *J Cardiopulm Rehabil*. 2001;21:37–46.
5. Witt BJ, Jacobsen SJ, Weston SA, et al. Cardiac rehabilitation after myocardial infarction in the community. *J Am Coll Cardiol*. 2004;44:88–96.
6. Balady GL, Ades PA, Comoss P, et al. Core components of cardiac rehabilitation/secondary prevention programs. *Circulation*. 2000;102:1069–1073.
7. Sanderson DK, Southard D, Oldridge N. Outcomes evaluation in cardiac rehabilitation/secondary prevention programs. *J Cardiopulm Rehabil*. 2004;24:68–79.
8. American Association of Cardiovascular and Pulmonary Rehabilitation. *Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs*. 4th ed. Champaign, IL: Human Kinetics; 2004.
9. Hlatky MA, Boineau RE, Higgenbotham MB, et al. A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). *Am J Cardiol*. 1989;64:651–654.
10. Stewart A, Hays R, Ware JE. The MOS short form general health survey: reliability and validity in patient population. *Med Care*. 1988;26:724–735.
11. Wassib J, Keller A, Rubenstin L, et al. Benefits and obstacles of health status assessment in ambulatory settings: the clinician's point of view. *Med Care*. 1992;30:42–49.
12. Block G, Gillespie C, Rosenbaum EH, Jenson C. A rapid food screener to assess fat and fruit and vegetable intake. *Am J Prev Med*. 2000;18:284–288.
13. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint Committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *JAMA*. 2003;289:2560–2572.
14. Vitcenda M. Baseline outcomes of the WISCVPR Web-based outcomes project. *J Cardiopulm Rehabil*. 2003;23:290–298.
15. Gulanick M, Gavic AM, Kramer V, Rey J. Outcomes in cardiac rehabilitation programs across Illinois. *J Cardiopulm Rehabil*. 2002;22:329–333.
16. Jungbauer SJ, Fuller B. Feasibility of a multi-state outcomes program for cardiopulmonary rehabilitation. *J Cardiopulm Rehabil*. 1999;19:352–359.