Montana Cardiovascular Health Program
Chronic Disease Prevention & Health Promotion Bureau

MONTANA DPHHS
Healthy People. Healthy Communities.
Department of Public Health & Human Services

Progress and Ongoing Challenges in Coordinating Care for Acute Coronary Syndrome in Montana and Northern Wyoming

2009 and 2012

INTRODUCTION

Heart disease is one of the leading causes of death in Montana with almost 2000 deaths in 2011.[1] Ischemic heart disease including acute myocardial infarction (AMI) accounts for almost 60% of heart disease deaths. AMI continues to be a major public health concern in Montana. Timely revascularization can be lifesaving but presents a challenge in the Rocky Mountain West where cardiac interventional facilities are separated by long distances from many rural areas and inclement winter weather can make rapid transportation impossible. Despite the calls for a national system to improve timely access to revascularization, no national system exists.[2] Cities, states and regions have undertaken their own efforts with encouragement from the American Heart Association (AHA) and the American College of Cardiology (ACC).[3-5] The Montana Department of Public Health and Human Services Cardiovascular Health (CVH) Program organized a statewide Cardiac Workgroup to address the challenges of treating AMI in a geographically large rural state. In 2009, the workgroup surveyed all non-interventional hospitals in Montana and northern Wyoming to assess these challenges, and the results have guided actions of the Cardiac Workgroup.[6] Key activities included providing education and web-based resources, such as model acute coronary syndrome (ACS) standing order sets, that were made available to Critical Access Hospitals (CAHs) in a "cardiac toolkit" (URL: http://cardiac.mt.gov). In 2012, the Cardiac Workgroup initiated the Cardiac Recognition program. The program recognizes CAHs for organizing their own community-specific system to facilitate recognition and treatment of ACS including timely revascularization with fibrinolytic therapy for ST-elevation myocardial infarction (STEMI) or immediate transfer to an interventional hospital in the region. A follow-up survey was conducted in 2012 to evaluate the efforts of the Cardiac Workgroup's activities. This report compares the findings from both surveys documenting regional progress and a continuing opportunity for improvement through interventions and activities identified by the Cardiac Workgroup.

METHODS

In 2012, the Montana CVH Program obtained a list of 50 Montana non-interventional hospitals from the Montana Hospital Association website and a list of the 11 hospitals in northern Wyoming from the Wyoming Department of Health Chronic Disease Epidemiologist. Hospitals in northern Wyoming were included due to the fact that cardiac patients from these hospitals are often referred to cardiac interventional facilities in south-central Montana. Hospitals on the list of non-interventional hospitals used for the 2009 baseline assessment were the same as these for the 2012 follow-up assessment. A cardiac interventional hospital was defined as a hospital that offered invasive cardiac procedures (e.g., coronary artery bypass grafting [CABG] and/or percutaneous intervention [PCI]). All nine cardiac interventional hospitals (all located in Montana) were excluded from both the 2009 and 2012 assessments.

Both the 2009 baseline and 2012 follow-up assessment tools included the same 42 questions. The questions covered the continuum of cardiac care - from the pre-hospital setting to the Emergency Department (ED) and then the referral to cardiac interventional facilities. The assessment was mailed to all non-interventional hospitals in the region along with a cover letter to the Chief Executive Officer (CEO) and to the ED Director or Nursing Director. The assessments were disseminated in November 2008 and August 2012. The cover letters explained the purpose of the assessment and stated that a web link for a summary of the follow-up STEMI assessment would be available to participating respondents and their CEO/Administrator. The letter to the CEO requested that they encourage their ED Director or Nursing Director to complete the assessment while the letter to the ED/Nursing Director emphasized the importance of completing the survey and included a self-addressed envelope. A fax number and e-mail address were also included on the survey tool for those respondents who were interested to fax or e-mail their responses. To increase the response rate, fax reminders were sent to the ED/Nursing Directors who did not return a completed assessment within two weeks following the initial mailing.

RESULTS

Figure 1 illustrates the locations of interventional and non-interventional hospitals in Montana and northern Wyoming (Figure 1). The response rates for baseline and follow-up assessments were 67% in 2009 and 79% in 2012. Over 90% of the respondents classified their facility as a CAH and had an average of 20 inpatient beds for both the 2009 and 2012 assessments (Table 1). In both years, some form of cardiac enzyme testing was reported to be available in the vast majority of respondents. Laboratory services were available 24 hours a day, seven days a week at all responding hospitals. The average ED patient volume, in the past 12 months, varied slightly from 3,600 in 2009 to 4,300 in 2012. However, when asked how many of these patients were considered "emergent," less than 800 were reported in 2009 and less than 1,000 were reported in 2012.

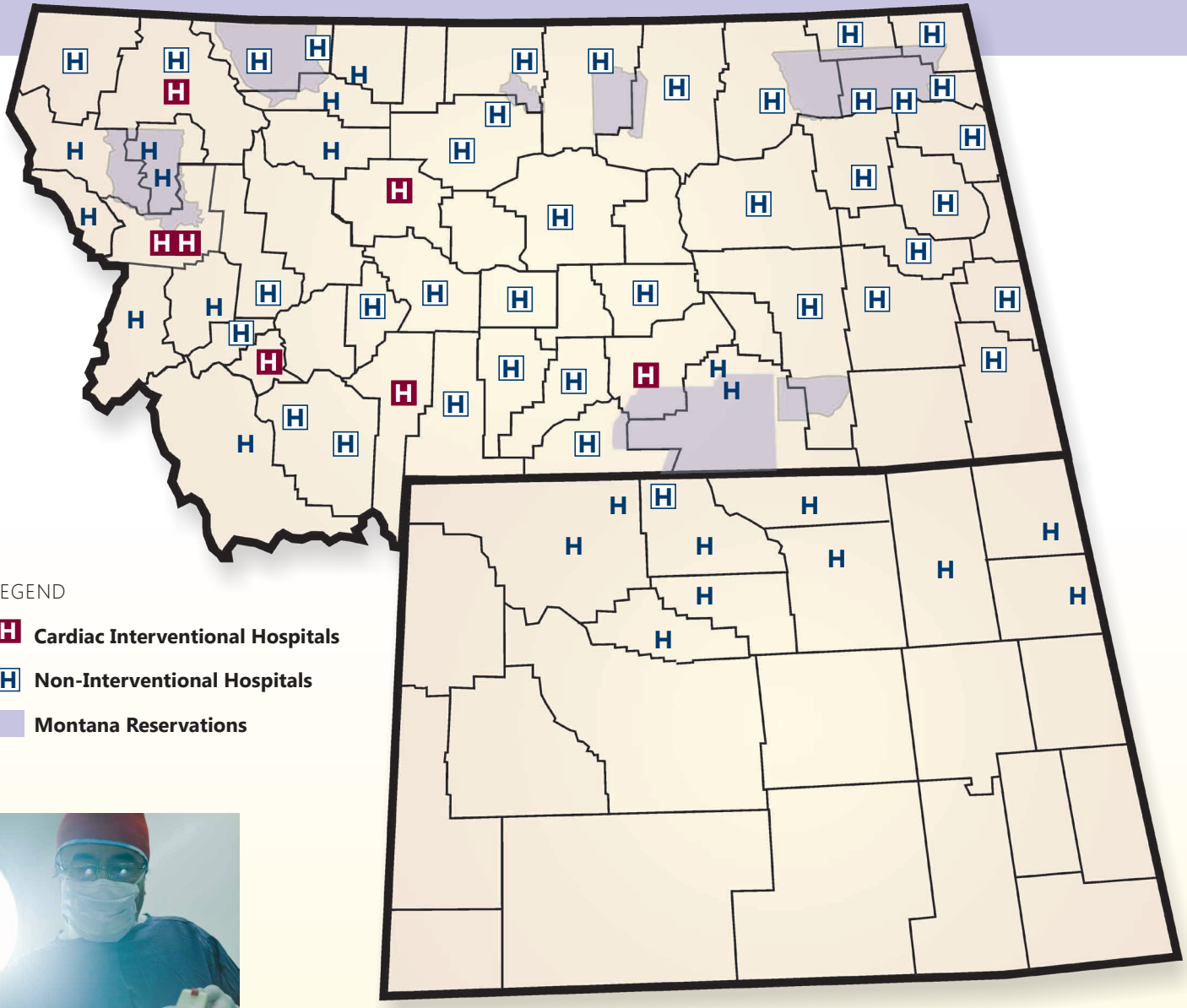


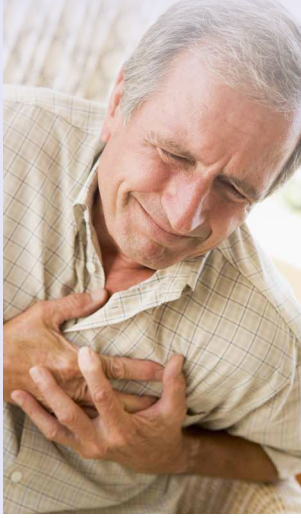
Figure 1.
Location of Cardiac Interventional Hospitals and Non-Interventional Hospitals in Montana and northern Wyoming, 2013.

Table 1. *Hospital characteristics of non-interventional hospitals in Montana and northern Wyoming, 2009 and 2012.*

	2009 N = 41	2012 N = 48
	% (n)	% (n)
CAH	95 (39)	94 (45)
	Mean (SD)	Mean (SD)
Number of inpatient beds	19.9 (8.9)	20.8 (13.2)
	Mean (Min.-Max.)	Mean (Min.-Max.)
Number of patients seen in the ED*	3603 (100-18,000)	4258 (40-28,000)
Number considered emergent	786 (38-3,000)	996 (5-3,600)
	% (n)	% (n)
Laboratory services available 24/7	100 (41)	100 (48)
Perform cardiac enzyme testing	100 (41)	98 (47)
Troponin	100 (41)	98 (46)
Total creatine kinase (CK)	90 (37)	96 (45)
Total CK-myoglobin (MB)	88 (36)	87 (41)
MB	10 (4)	7 (3)
B-type Natriuretic Peptide (BNP)	3 (1)	0
Cardiac enzyme tests available 24/7	100 (41)	100 (47)

*Patient volume based on data one year prior the respective surveys (baseline 2007 and follow-up 2011).

Data analyses were completed using SPSS V17.0 software (SPSS Inc., Chicago, IL). Questions that did not have a response were excluded from analysis for that particular question. Some questions required more than one response, and in this case, each response was counted as an individual response.



Pre-hospital care profiles were similar in both years with about 50% of patients with chest pain arriving by Emergency Medical Services (EMS) and most services always notifying the ED in route (Table 2). Only three community hospitals reported that pre-hospital thrombolysis was available in 2009, and the number was unchanged in 2012. In 2012, five hospitals reported that they had destination protocols for patients with AMI, which allowed them to bypass the local facility and transport cardiac patients immediately to an interventional hospital. In the 2009 survey, none of the hospitals reported having destination protocols in place.

Table 2. *Pre-hospital care for patients with chest pain or rule-out myocardial infarction (MI), Montana and northern Wyoming, 2009 and 2012.*

	2009	2012
Percentage of patients with chest pain or rule-out MI arriving by:	Mean (SD)	Mean (SD)
Ambulance or EMS	51.0 (27.5)	47.0 (26.5)
Private vehicle	45.1 (26.7)	46.5 (25.5)
Other	10.2 (8.5)	7.5 (5.8)
	% (n)	% (n)
EMS staff always notifies ED in route	88 (36)	76 (36)
Pre-hospital thrombolysis used in community	7 (3)	6 (3)
Destination protocols bypass facility for AMI patients	0	10 (5)

Challenges and barriers to obtaining, transmitting and interpreting electrocardiogram (ECG) in the pre-hospital setting remain. However, many more facilities in 2012 reported that EMS could perform, transmit, and interpret an electrocardiogram (ECG) in the pre-hospital setting compared to 2009 (Table 3).

Table 3. *Capabilities of EMS to perform pre-hospital care for patients with chest pain or rule out MI, Montana and northern Wyoming, 2009 and 2012.*

	2009	2012
	% (n)	% (n)
Capacity to perform 12-lead ECG	19 (8)	38 (18)
ECG transmission ability (multiple answers)		
EMS personnel reads ECG and interpretation called (via phone or radio)	12 (5)	25 (12)
ECG read by computer algorithm and called by phone	0	6 (3)
ECG transmitted to hospital (including Blue Tooth)	5 (2)	10 (5)
Unable to transmit ECG	68 (28)	63 (30)
Reasons unable to transmit ECG		
Geographic “dead spots”	25 (7)	33 (10)
Lack technological resources	32 (9)	57 (17)
Other reason*	25 (7)	33 (10)

*Other reason includes: Basic Emergency Medical Technician (EMT) service (3), beyond scope of EMT or EMT skill level (6), equipment/money (3), lack of EMT or physician coverage (2)

The availability and use of protocols specific for AMI increased between 2009 and 2012 while availability and use of chest pain protocols remained unchanged (Figure 2). Evidence-based elements (e.g., documentation of electrocardiogram within 10 minutes of ED arrival and evaluation of cardiac enzymes) were included in most chest pain protocols reported by non-interventional facilities (Table 4). The percentage of non-interventional facilities with AMI protocols that include procedures for STEMI increased from 50% to 70% over the four-year period (Table 5). From 2009 to 2012, more facilities reported that they make the decision to treat eligible STEMI patients with thrombolytics before discussing with a cardiologist. The proportion of facilities for which frequently confirming treatment by a cardiologist was reported decreased from 31% to 20%. The average number of times thrombolytics were used to treat STEMI patients in the past 12 months doubled from 3.6 in 2009 to 7.6 in 2012.

Figure 2. *Availability and use of chest pain and acute myocardial infarction (AMI) protocols, Montana and northern Wyoming, 2009 and 2012.*

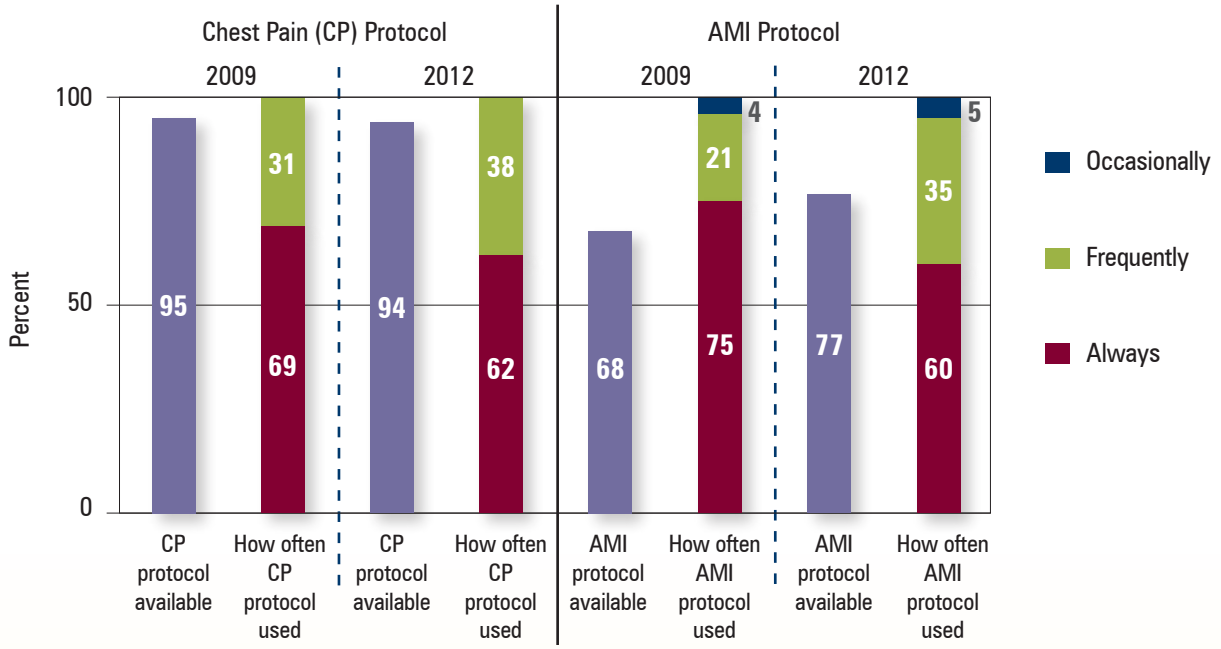


Table 4. *Elements contained in chest pain protocol, Montana and northern Wyoming, 2009 and 2012.*

	2009	2012
Chest pain protocol elements include:	N = 39	N = 45
	% (n)	% (n)
History of symptom onset	92 (36)	89 (40)
ECG within 10 minutes of ED arrival	95 (37)	98 (44)
Morphine, oxygen, nitroglycerin, aspirin (MONA)	95 (37)	84 (38)
STEMI checklist & thrombolysis eligibility	77 (30)	73 (33)
Adjunctive therapeutic interventions	69 (27)	76 (34)
Troponin and other cardiac enzymes	97 (38)	98 (44)
Cardiac Risk Score	13 (5)	13 (6)

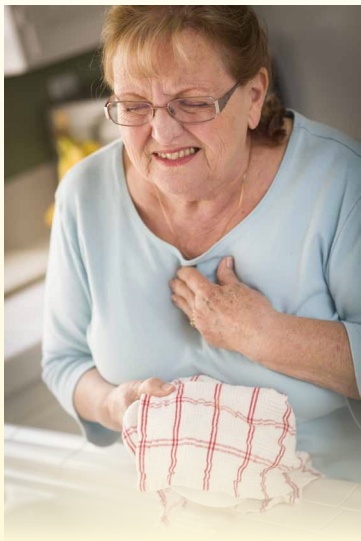
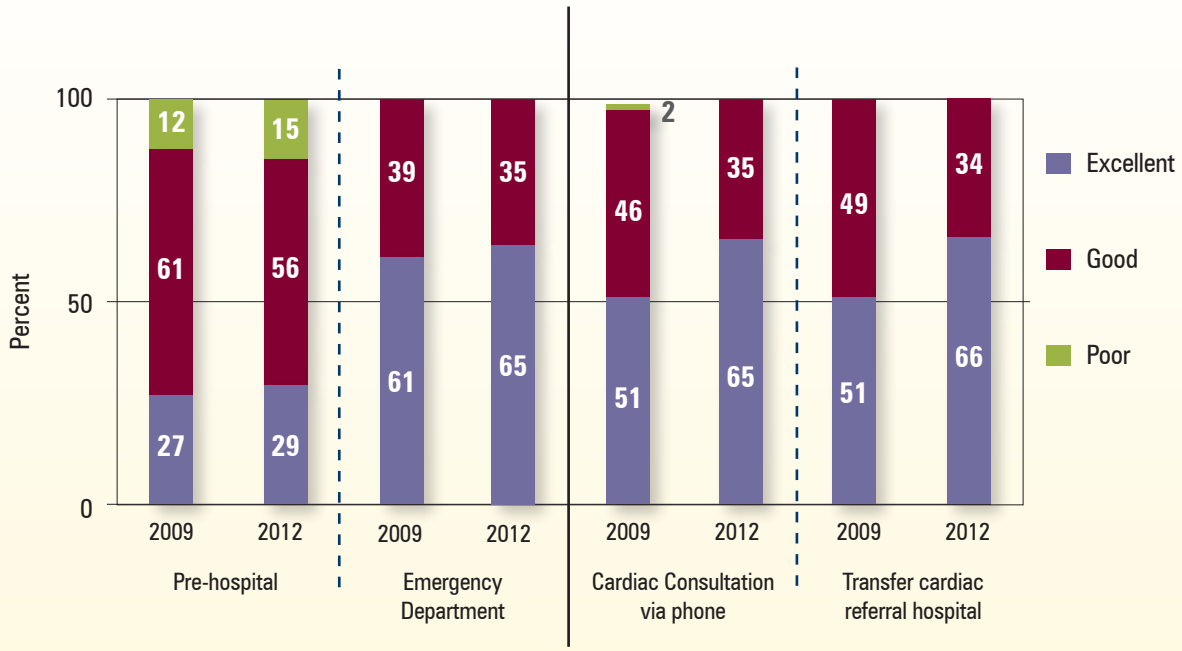


Table 5.
Elements contained in AMI protocol, Montana and northern Wyoming, 2009 and 2012.

	2009 N = 28	2012 N = 37
	% (n)	% (n)
Protocol includes procedures for STEMI	50 (14)	70 (26)
Elements specific for STEMI include:		
Assessment for thrombolytics	100 (14)	92 (24)
Contraindications for ECG within 10 minutes of ED arrival	43 (6)	35 (9)
Thrombolytic agent – Alteplase	29 (4)	42 (11)
Thrombolytic agent – Reteplase	29 (4)	8 (2)
Thrombolytic agent – Tenecteplase	43 (6)	42 (11)
Other thrombolytic agents	21 (3)	15 (4)
Observation and transfer to interventional facility	57 (8)	54 (14)

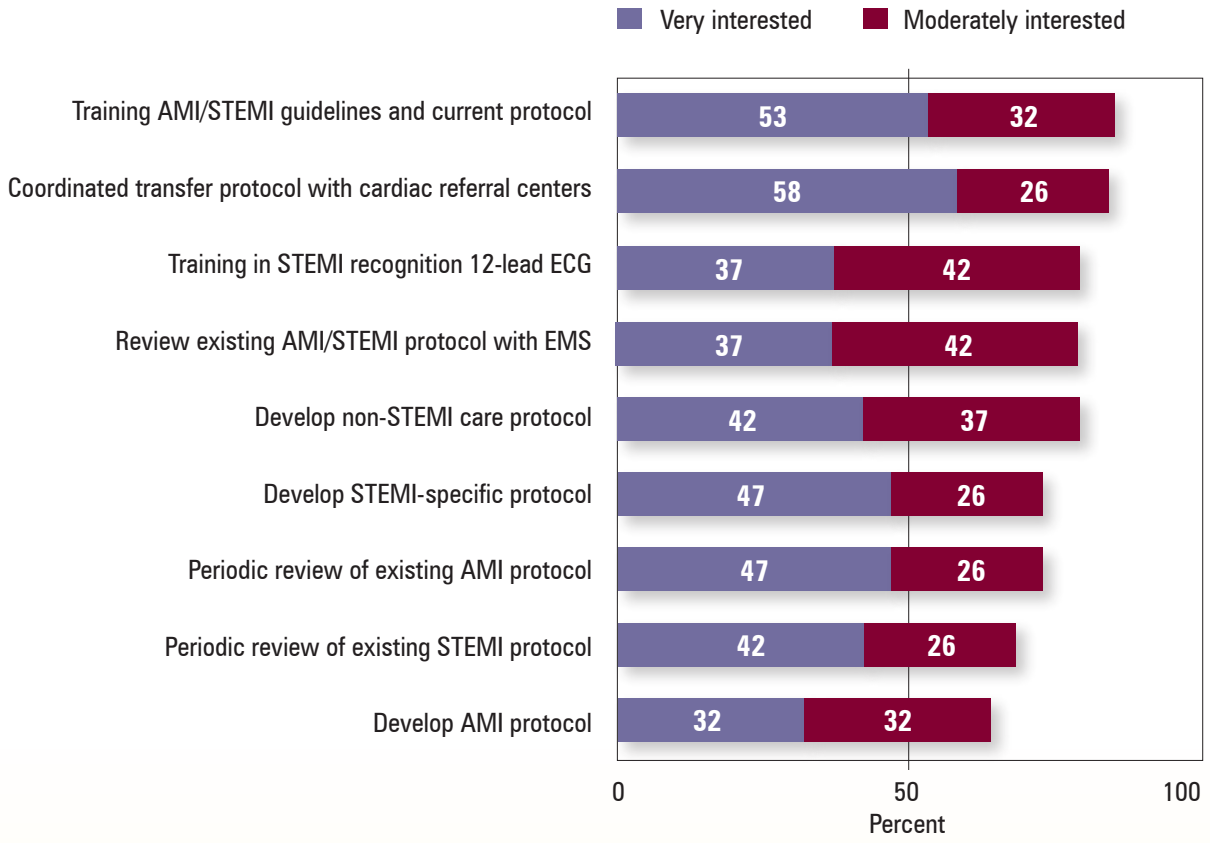
Over this four-year time period, responding non-interventional hospitals reported a one-minute decrease in the average time it takes to speak with a cardiologist from 11.2 to 10.0 minutes. Approximately two-thirds of non-interventional facilities rated their emergency department, cardiac consultation by phone process, and their cardiac referral hospital transfer process as excellent in 2012 (Figure 3). Contacts used to arrange transfers to interventional facilities included a variety of healthcare professionals (e.g., cardiologist, air transport team, the receiving cardiac interventional hospital ED, and receiving hospitalist).

Figure 3.
Rating of systems-of-care processes for acute cardiac care, Montana and northern Wyoming, 2009 and 2012.



While the number of non-interventional hospitals interested to work on particular components of STEMI care with their cardiac referral centers (regional or hub-and-spoke) decreased from 29 to 19, interest to participate cooperatively in particular aspects of STEMI care remains high (Figure 4). Almost 50% to 60% of hospitals were very interested in receiving training, developing, and reviewing AMI/STEMI care guidelines and coordinated transfer protocols.

Figure 4.
Interest in particular components of STEMI care by non-interventional facilities, Montana and northern Wyoming, 2012.



DISCUSSION/CONCLUSION

Our findings suggest that the systems of care for AMI including STEMI are improving across the region. Many hospitals have taken the opportunity to update their protocols and procedures including coordinating with pre-hospital providers. Yet challenges remain in obtaining, interpreting, and transmitting ECGs in the pre-hospital setting. Early identification of ACS clearly helps achieve timely revascularization and the use of thrombolytic therapy for STEMI has doubled. The 2012 survey results demonstrate that communication and referral systems for ACS have improved yet opportunities to coordinate persist.

Our findings are subject to several limitations. First, responses were self-reported and were not confirmed by external review. While the intended survey respondent was the Emergency Room Director or the Nursing Director, respondents from administrative positions completed the survey and may have had varying levels of knowledge about their hospital's cardiac capabilities. Therefore, it is possible that some of the improvement identified could be from increased awareness of cardiac-related activities among respondents. Second, the follow-up survey had a slightly higher response rate than the baseline assessment (79% vs. 67%) which may have impacted some of the improvements identified. Third, as statewide baseline and follow-up surveys were used to assess the efforts of the Cardiac Workgroup's activities, there was no separate non-interventional hospital group available for comparison. Finally, Cardiac Workgroup activities focused on improving process to enhance quality cardiac care but cardiac-related outcomes were not assessed.

Follow-up Efforts of the Cardiac Workgroup

The Montana CVH Program offered Cardiac Recognition awards again in July 2013 and CAHs in Montana were invited to submit their protocols for review and recognition. To obtain Cardiac Recognition, CAHs must meet the following criteria: 1) identify a Coordinator. The Coordinator is responsible for submitting the application information and quality improvement documentation and insuring that the institutional commitment criteria are carried out; 2) provide current up-to-date acute care cardiac policy and procedures; and 3) engage in quality improvement. Recipients will participate in the abstraction and reporting of outpatient AMI measures using the Centers for Medicare and Medicaid Services abstraction and reporting tool (CART). Recipients will annually submit a summary of ACS QI projects identified from data obtained through the CART. Recipients will consent to a data sharing agreement which will enable Mountain-Pacific Quality Health to provide CART data to the CVH Program. The CVH Program will share periodic reports with all cardiac recognition awardees. Each recognized facility will receive a small stipend to help with their quality improvement efforts. Referring cardiologists and cardiac interventional facilities across the state have been encouraged to reach out to outlying communities to help in reviewing and updating policies, procedures and protocols to assure that all Montanans can access timely revascularization appropriately (see www.cardiac.mt.gov under "Resources").

2012
Cardiac Recognition Recipients

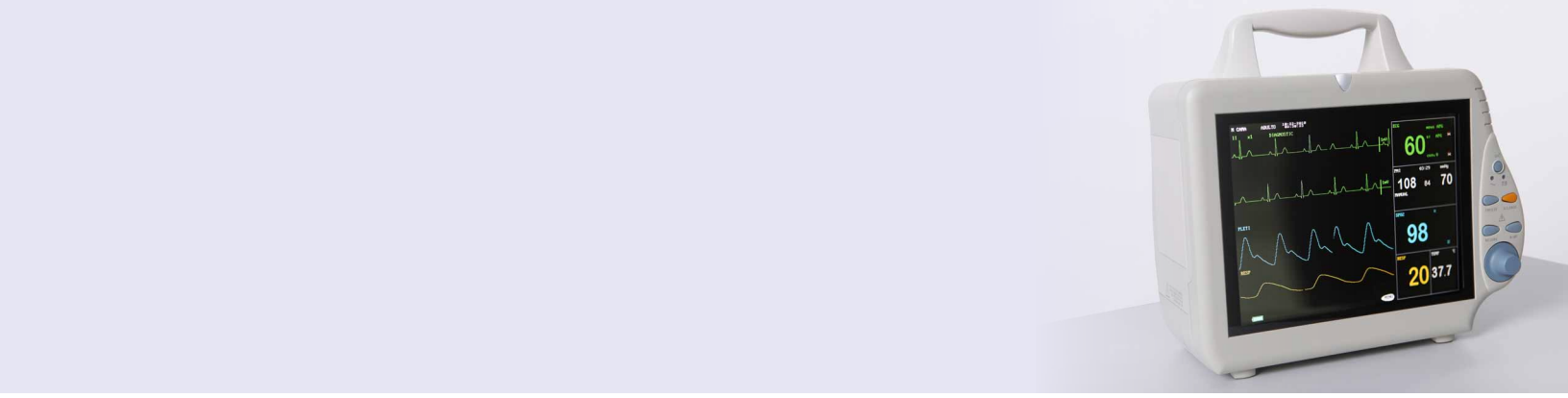
Community Hospital of Anaconda

Missouri River Medical Center

2013
Cardiac Recognition Recipients

Teton Medical Center

Livingston HealthCare



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Acknowledgements

The Montana Cardiovascular Health Program gratefully acknowledges the contributions of the many individuals from the non-interventional hospitals who graciously responded to the assessment. We also thank Sharon Hecker, MD for her time and expertise in reviewing the assessment tool, and Joseph Grandpre, PhD for providing the contact information for the northern Wyoming non-interventional hospitals, as well as Linda Priest from Northwest Resource Consultants and the Montana Cardiac Workgroup for their work on this project. This publication was supported through a cooperative agreement (3U50 DP000736-06W1) with the Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention and through the Montana Department of Public Health and Human Services. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

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This publication was supported through a Cooperative Agreement (3U50DP000736-06S1) with the Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention and through the Montana Department of Public Health and Human Services. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

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