A Call to ACTION (Acute Coronary Treatment and Intervention Outcomes Network): A National Effort to Promote Timely Clinical Feedback and Support Continuous Quality Improvement for Acute Myocardial Infarction

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Methods Papers

A Call to ACTION (Acute Coronary Treatment and Intervention Outcomes Network)

A National Effort to Promote Timely Clinical Feedback and Support Continuous Quality Improvement for Acute Myocardial Infarction

Eric D. Peterson, MD, MPH; Matthew T. Roe, MD, MHS; John S. Rumsfeld, MD, PhD; Richard E. Shaw, PhD; Ralph G. Brindis, MD, MPH; Gregg C. Fonarow, MD; Christopher P. Cannon, MD

Background—There is a recognized need for a national unified registry to track presenting features, care, and outcomes for patients with acute myocardial infarction. To address this need, the American Heart Association’s Get With the Guidelines–Coronary Artery Disease program joined the Acute Coronary Treatment and Intervention Outcomes Network (ACTION) Registry to create the National Cardiovascular Data Registry ACTION–Get With the Guidelines (AR-G) in June of 2008. This article outlines the objectives, operational structure, patient population, data elements, data collection methodology, and reporting components of this landmark registry.

Methods and Results—The AR-G was launched in January of 2007. The registry is led by a team of volunteers from the American Heart Association and the American College of Cardiology, and its data coordinating center resides at the Duke Clinical Research Institute. As of December 2008, 344 US hospitals already contributed detailed clinical information on 103,890 myocardial infarction patients (inclusive of 39% ST-segment myocardial infarction and 61% non–ST-segment myocardial infarction patients). Overall data quality has been excellent, with <5% clinical fields missing. Site quality improvement efforts are supported via detailed quarterly feedback reports, routine web educational programs, and sharing of “best practice” clinical support tools.

Conclusions—The AR-G represents a unified, national, acute myocardial infarction registry and supports a robust quality improvement effort designed to encourage evidence-based acute myocardial infarction care and, ultimately, improve patient outcomes. (Circ Cardiovasc Qual Outcomes. 2009;2:491-499.)

Key Words: myocardial infarction ■ patients ■ registries

Cardiovascular disease (CVD) remains the number one killer in the United States.1 Yet deaths from CVD have declined a remarkable 33% over the past two decades, due in part to better care for patients with acute myocardial infarction (AMI).2 Although these gains are impressive, there are still many AMI patients in the United States who fail to receive effective, safe, and timely evidence-based AMI treatments, particularly among certain vulnerable patient populations.3-9 These gaps serve as tangible reminders that AMI care still has room for improvement.

Moving forward, clinical registries and the associated quality improvement (QI) initiatives can facilitate more consistent care and quicker adoption of therapeutic advances. This belief is supported by several prior efforts that have demonstrated the potential for clinical feedback to improve care performance.10-13 To date, there have been several large US voluntary AMI registry programs including: the National Registry of Myocardial Infarction (NRMI), “Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes with Early Implementation of the ACC/AHA [American College of Cardiology/American Heart Association] Guidelines” (the CRUSADE quality-improvement initiative), and the AHA’s Get With The Guidelines (GWTG) Program. Although each of these registries had success in garnering hospital participation, generating new knowledge, and facilitating quality improvement, they were competitive, resulting in considerable confusion among providers regarding which registry in which to participate. For these and other reasons, there arose a distinct need for the creation of a single unified national AMI registry.

To address this need, the ACC’s National Cardiovascular Data Registry (NCDR) facilitated a merger between NRMI and CRUSADE to form the Acute Coronary Treatment and Intervention Outcomes Network (ACTION) Registry in January of

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WHAT THE STUDY ADDS

- The Acute Coronary Treatment and Intervention Outcomes Network—Get With the Guidelines (AR-G) represents a unique effort to create a single, unified, national acute myocardial infarction registry.
- This article describes the objectives, operational structure, patient population, data elements, data collection methodology, reporting components, and progress to date of the AR-G.
- This article is designed to educate practicing clinicians about the AR-G as a tool to assist them in measuring and supporting best care practices so that their patients will ultimately experience improved outcomes.

AR-G Objectives

By leveraging the combined resources and expertise of the ACC NCDR and the AHA, the AR-G aims to: (1) serve as a national surveillance system to assess the characteristics, treatments, and outcomes of patients hospitalized with AMI, enrolling consecutive patients with ST-segment myocardial infarction (STEMI) and non-ST-segment myocardial infarction; (2) optimize the outcomes and management of AMI patients through the implementation of evidence-based guideline recommendations into clinical practice; and (3) facilitate efforts to improve the quality and safety of AMI care through novel QI methods. Notably, the AR-G is designed not only to measure, but to improve the quality of care of AMI patients by facilitating QI efforts at participant hospitals. As outlined below, the AR-G uses several strategies to achieve this mission.

Registry Organization, Operations, and Funding

The organizational structure of the AR-G is provided in Figure 1. Although the AR-G is jointly led by the ACC NCDR and the AHA, the registry uses the existing infrastructure of the NCDR. As a result, the AR-G is ultimately accountable to the NCDR Management Board. This Management Board consists of 7 senior volunteer ACC clinician leaders and oversees all NCDR organization, finances, and policies for all the NCDR registries. The Management Board is assisted in its tasks by the NCDR Scientific Oversight Committee (which assures the consistency and scientific integrity of registry-related quality measures, reports, and other aspects among all NCDR registries) and the Data Monitoring Board (which examines data quality and consistency across the registries).

The AR-G Executive Leadership and Steering Committee manage the day-to-day functions of the registry. This group is led by a chair and vice-chair, representing the ACC and AHA, respectively. The group also has representation from other ACC and AHA volunteers, as well as the principle investigator (PI) from the AR-G Analytic Center at the Duke Clinical Research Institute (DCRI). The registry also has two standing subcommittees: the QI Subcommittee (which prioritizes and coordinates QI activities including the site feedback report, QI tools, QI evaluation process, and site recognition programs) and the Research and Publications (R&P) Subcommittee (which prioritizes research proposals in the database, as well as reviews and approves abstracts and manuscripts from the database). These AR-G committees are also staffed by an equal number of clinician volunteers from the ACC and AHA. All physician volunteers and staff are required to formally disclose funding sources, including honoraria and potential conflicts of interest, before commencing work on the AR-G. Furthermore, no volunteer receives personal compensation for their role in the AR-G. A list of AR-G Committee members can be found at www.ncdr.com/webncdr/ACTION.

Routine operations of the AR-G are carried out and managed by the NCDR staff in Washington, DC. The NCDR also has a subcontract with the DCRI in Durham, NC to: (1) update and maintain the AR-G web-based data collection tool; (2) develop and run the quarterly site feedback reports; and (3) execute research analyses as part of its role as the AR-G Data Analytic Center for which Dr Peterson serves as the PI.

There is currently no fee to sites for participating in the AR-G. Rather, the program is funded by a multi-sponsor revenue model. Current pharmaceutical industry supporters of the registry include: Bristol-Myers-Squibb, Sanofi-Aventis Pharmaceutical Partnership, and Schering-Plough. Pharmaceutical partners receive summary information on clinical and process of care data available within the AR-G. Sponsors, however, do not have direct access to the database, nor do they receive individual patient, physician, or hospital information. Furthermore, public use of these data for publication or promotion by the sponsors is monitored and must be approved by the AR-G leadership. Of critical importance, registry operations and publications are completely independent of sponsor involvement or influence.

In the AR-G, a special QI research project is supported by a grant from the Agency for Heath Care Quality Research via the Duke Cardiovascular Center for Effectiveness Research in Therapeutics (CERTs). One aim of the Duke CERTs program is to evaluate the most effective means of adopting effective therapies for AMI patients. As part of this effort, the DCRI is carrying out a randomized, site-level evaluation of targeted site feedback reports, as well as other QI tools (see “Quality Improvement Tools” under the section “Site Education and Data Quality Efforts”), as compared with receiving only the standard QI information and reports.

As we look to the future, there are plans to further diversify funding sources. These may include broader support from federal sources (eg, National Heart Lung and Blood Institute or the Food and Drug Administration) and partnerships with managed care organizations. Despite the funding sources, the AR-G maintains strict rules with its sponsors to protect the privacy of patient data and the confidentiality of site information.

Methods

By leveraging the combined resources and expertise of the ACC NCDR and the AHA, the AR-G aims to: (1) serve as a national surveillance system to assess the characteristics, treatments, and outcomes of patients hospitalized with AMI, enrolling consecutive patients with ST-segment myocardial infarction (STEMI) and non-ST-segment myocardial infarction; (2) optimize the outcomes and management of AMI patients through the implementation of evidence-based guideline recommendations into clinical practice; and (3) facilitate efforts to improve the quality and safety of AMI care through novel QI methods. Notably, the AR-G is designed not only to measure, but to improve the quality of care of AMI patients by facilitating QI efforts at participant hospitals. As outlined below, the AR-G uses several strategies to achieve this mission.

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Patient Population

The AR-G requires participating hospitals to enroll consecutive patients with a primary diagnosis of STEMI or NSTEMI, as defined for registry inclusion by (1) ischemic symptoms at rest, lasting ≥10 minutes, occurring within 24 hours before admission or up to 72 hours for STEMI; (2) ECG changes associated with STEMI (new left bundle-branch block [LBBB] or persistent ST segment elevation ≥1 mm in 2 or more contiguous electrocardiographic leads); or (3) positive cardiac markers associated with NSTEMI (CK-MB or
Table 1. ACTION-GWTG Data Elements

<table>
<thead>
<tr>
<th>Category</th>
<th>Example Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient demographics</strong></td>
<td>Age, sex, race, insurance status</td>
</tr>
<tr>
<td><strong>Medical history and risk factors</strong></td>
<td>Height, weight, hypertension, diabetes mellitus, dyslipidemia, peripheral arterial</td>
</tr>
<tr>
<td></td>
<td>disease, current smoker, prior cardiac history, prior revascularization</td>
</tr>
<tr>
<td><strong>Hospital presentation</strong></td>
<td>Transfer status, date/time of first medical contact, arrival date/time, date/time of first ECG, location of initial evaluation</td>
</tr>
<tr>
<td><strong>Initial cardiac status</strong></td>
<td>ECG findings, heart rate, systolic blood pressure, cardiogenic shock, heart failure</td>
</tr>
<tr>
<td><strong>Medications and associated doses</strong></td>
<td>Antiplatelet agents, warfarin, unfractionated heparin, low molecular weight heparin, bivalirudin, fondaparinux, GP IIb-IIIa inhibitors, β-blockers, ACE inhibitors, angiotensin receptor blockers, aldosterone blocking agents, lipid-lowering agents</td>
</tr>
<tr>
<td><strong>Reperfusion strategy</strong></td>
<td>Thrombolytic date/time, primary PCI date/time, rescue PCI date/time, nonsystems reason for delay in reperfusion</td>
</tr>
<tr>
<td><strong>Procedures</strong></td>
<td>LVEF assessment, diagnostic catheterization, PCI (other than primary), CABG</td>
</tr>
<tr>
<td><strong>Lab values</strong></td>
<td>Cardiac markers, lipid panel, creatinine, hemoglobin, hemoglobin A1C, INR, BNP</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Death, re-MI, bleeding, transfusion, heart failure, cardiogenic shock, stroke</td>
</tr>
</tbody>
</table>

GP indicates glycoprotein; ACE, angiotensin-converting enzyme; PCI, percutaneous coronary intervention; LVEF, left ventricular ejection fraction; CABG, coronary artery bypass graft; INR, international normalized ratio; and BNP, β-type natriuretic peptide.

Troponin I/T > local laboratory upper limit of normal values) within 24 hours after initial presentation.

Patients are ineligible for the AR-G if they develop ischemic symptoms that meet the diagnostic criteria for STEMI and NSTEMI during hospitalization, but were originally admitted for clinical conditions unrelated to STEMI and NSTEMI diagnosis. At most hospitals, patients are identified retrospectively through a review of local administrative or clinical databases.

**Data Collection**

The data elements collected were selected by the AR-G Steering Committee. A driving force for data element collection was that these data could be used to support site QI efforts. The core set of variables include the ACC/AHA Performance Measures and Class I Recommendations of the ACC/AHA clinical practice guidelines. These two sets of professional practice standards are used to define the performance and quality metrics presented in the quarterly benchmarked reports (Table 1). Other data elements include patient demographics, presenting features, prehospital therapy, in-hospital therapy, hospital discharge therapy, timing of care delivery, laboratory tests, procedure use, and in-hospital patient outcomes (Table 2). When feasible, the ACC/AHA Task Force on Clinical Data Standards definitions were used. To ensure consistency, the AR-G also attempted to retain data elements that had routinely been collected by sites in the predecessor databases (eg, CRUSADE and NRMII), as well as other clinical registries (eg, GWTG and NCDR CathPCI Registry).

Once they are abstracted via chart review, all data for the AR-G are easily downloaded or exported their data to other systems. There are multiple data display options that allow sites to view their most recent results using standardized figure, tables, or reports. In 2009, NCDR released software specifications so that other software vendors who supported NCDR-based registries could also begin to collect and submit ACTION-specific data. Now, sites will have flexibility in selecting their software vendors, as well as have the advantage of a single data entry platform for patients who are eligible for more than one database (eg, a patient with MI who also undergoes subsequent cardiac catheterization and PCI).

**Site Start-Up**

As a first step to participation, interested sites download and complete materials that are available on the NCDR AR-G web site at: (http://www.ncdr.com/WebNCDR/ACTION/HowToJoin.aspx). There is no direct fee for sites to participate in the AR-G. However, some software vendors may charge hospitals a fee for their services. Hospitals also must devote the personnel resources necessary for collection of these data. Typically, this consists of a half-time data abstraction, though many institutions use the same abstractor to participate in many clinical data registries.

**Site Education and Data Quality Efforts**

As part of site start-up, site personnel receive training on data abstraction, standard data definitions, and data entry procedures. Additional support is also available through periodic web-based training sessions and “on call” AR-G site management personnel. Twice a year, data collection personnel have the opportunity to attend an intensive user group conference. During an interactive forum at these workshops, data definitions are reviewed and case histories are abstracted. Perhaps most importantly, these conferences allow sites to learn the skills necessary to collect high-quality data.

The completeness and accuracy of data submitted to the AR-G is supported by multiple mechanisms. The AR-G data entry systems specify a number of data checks that facilitate point-of-entry data quality. Additionally, hospitals receive specific data quality information as they submit their quarterly data. These reports provide details about records that fail to meet inclusion criteria, contain duplicate patient entries, display missing data elements, or possess out-of-range values. Sites are expected to reconcile these data problems before the final data submission.

The integrity of the database is further supported and validated by several other mechanisms including: (1) evaluation of trends in hospital data submission volumes; (2) critique of observed versus expected mortality rates; and (3) linkage of registry data to claims files to compare admission volumes. In accordance with NCDR data quality standards, each site’s data submissions are measured for...
overall completeness, before their analysis and generation of quarterly outcomes reports. Current rates of missing AR-G data are remarkably low, averaging \(< 5\%\) across all collected data elements. Notably, variables such as age, sex, and race are missing in less than 0.5\% of all cases.

**Performance Feedback**

Each quarter, all records submitted to the AR-G are aggregated and analyzed to create institution-specific performance feedback reports (Figure 2). The content of the reports follows a logical sequence that emphasizes understanding what patients are entered into the registry (eg, patient demographics, patient clinical characteristics, etc); whether these patients received evidence-based care (medical care, including prehospital evaluation, in-hospital and hospital discharge therapies, interventional procedures, etc); and, of course, patient outcomes.

The site-specific data are compared against a variety of internal and external benchmarks. Internal benchmarks include the sites’ unique own data, trended over time. External benchmarks are intended to provide site leadership with comparison points to other institutions, as well as reasonable national performance thresholds to help identify areas for potential performance improvement. There are three external benchmarks provided: (1) overall national benchmarks; (2) “like hospital” benchmarks (eg, hospitals with similar invasive cardiac procedural facilities); and (3) an achievable benchmark of care\(^{15}\) that describes the composite guideline-recommended treatment provided at top performing hospitals (eg, “Top 10\%”). This Top 10\% benchmark represents patients submitted by those select hospitals that most frequently provided evidence-based care. The site is not only given the performance results from the benchmark institutions, but also information on the type of patients treated at those centers (to assure the sites that they are seeing a comparable patient case mix). These feedback reports also include figures which illustrate quarterly trends in hospital performance (an internal benchmark) to facilitate temporal evaluations of change in local quality of care delivery.

**Quality Improvement Tools**

Data collection and performance reporting are an important and ongoing part of the continuously circumnavigating QI process. Yet hospitals and clinicians must actively implement changes at the local level, to actually improve patient care. To ensure that these changes occur, the AR-G QI Subcommittee works to create practical tools for sites to help improve their adherence to the Guidelines. Examples of these tools include: acute and discharge standing order templates, risk stratification algorithms, dosing pocket cards, drug dosing nomograms, discussion forums, and clinician educational materials available through webinars and slidesets (Figure 3). These materials are posted on the Cardiosource web site (www.cardiosource.com) under “Registry Resources, AR-G.” With an independent Editorial Board, and supported by the ACC, the Cardiosource web site maintains a vast information repository of case studies, research results, news, video discussion, and tools to assist the clinician in performing evidence-based practice.

The AR-G also promotes QI by encouraging sites to share best practices and “lessons learned” from their QI experiences. Annual NCDR user group meetings provide an ideal platform for informal networking among registry participants. During these and other meetings, the AR-G leadership conducts a recognition ceremony for those hospitals with noteworthy performance achievement in AMI care. Structured poster and oral presentations of local QI success stories are displayed during these sessions to recognize hospitals that...
have been particularly successful in QI efforts. These face-to-face meetings, as well as monthly teleconferences, serve as venues through which knowledge can be shared. The AR-G recognizes that there is no singularly “right” way to change practice. Rather, the AR-G offers sites multiple strategies to maximize the likelihood of improving ACS patient care.

AR-G leadership is also driven to better understand how the program can more acutely assist sites in facilitating local QI efforts. For example, members of the DCRI who are part of the AR-G QI committee developed an innovative site feedback report, designed to help sites quickly and easily identify their top three areas of needed improvement, relative to their peers. Using the large AR-G data platform, the impact of this new report on site QI efforts can be evaluated using a randomized site-level rollout design. Within a year, we will be able to test whether this specific format can improve care quality.

Patient Privacy and Informed Consent Issues

As noted previously, the primary purpose for the AR-G is to facilitate QI. Yet registry information can clearly be collected for both QI activities and research. Prior registries have proven that the boundary between QI and research can be indistinct. Such distinctions, however, have important implications for institutional review boards (IRBs), patient privacy boards, and patient informed consent. At the local level, data collection by site can be seen as a QI tool. Many centers consider site data collection exempt from IRB review, as well as exempt from patient informed consent. Notably, informed consent may lead to a sampling bias which can jeopardize the validity and generalizability of the database. By contrast, rules governing informed consent tend to vary by state and are ultimately the privy of local IRBs.

The aggregate AR-G data will be used to support national clinical research. Patient confidentiality will be protected in the following ways: (1) data are stripped of all identifiers before their use for research; and (2) use of data for these purposes is closely overseen by the DCRI analytic center’s IRB.

Progress to Date

Data submission for the AR-G was launched on January 1, 2007. As of December 31, 2008, site interest and enrollment in the AR-G has remained brisk. Figure 4 provides the actual number of participating hospitals in each state. The AR-G intends to maintain and encourage participation among a representative cross section of all acute care hospitals, regardless of size, cardiac facilities, or reimbursement structure. Broad participant configuration is seen as key to better understand hospital and system-level variations in care processes and associated predictors.

Among the 295 initial centers that began data collection in 2007, 71% were full-service hospitals with facilities for cardiac catheterization, PCI, and CABG. Approximately 10% of hospitals did not have a cardiac catheterization laboratory and 20% of hospitals were academic centers. The median number of beds per hospital was 297 (25th, 75th percentiles: 203, 451). The majority of participating centers were located in either the Midwest (35%) or the South (33%). The remaining centers were split equally geographically between the West and the Northeast.

Figure 3. STEMI dosing guide.
Patient Characteristics
At the end of December 2008, data submission totaled 103,890 records. Table 3 provides baseline demographic and clinical characteristics of the overall population, which includes 39% STEMI and 61% NSTEMI patients. Currently, racial and ethnic minorities represent 16% of the population. Women represent 36%. Almost 30% (28.3%) of the patients submitted to the registry are 75 years old or older. The reported comorbid illness and prior cardiac history proved characteristic of a high-risk cohort, particularly when compared to those patients enrolled in randomized clinical trials. Notably, 30% of patients had a revascularization procedure before admission, 12% had a prior episode of congestive heart failure, and 8% had a stroke. The use of acute and discharge evidence-based therapies among those without contraindications are displayed in Figures 5 and 6. The high-risk nature of this group is supported by the 5.9% STEMI and 4.3% NSTEMI unadjusted in-hospital mortality rates. Significantly, the completeness of the data has been remarkable, with less than 1% actually missing.

Discussion
The AR-G is a national unified registry and QI program for AMI. This registry provides a unique opportunity to assess and describe the characteristics and care of patients. Specifically, this registry provides opportunities for improvement in adherence to clinical practice guidelines and other performance measures. Through the AR-G, participating hospitals have access to a robust QI framework, including performance feedback reports and QI tools that are critical for facilitating a culture of quality patient care. This registry can also be used as a “test environment” to identify what works best in QI efforts and initiatives. Through these mechanisms, the AR-G will be able to encourage the rapid adoption of new guideline recommendations, thus minimizing the well-documented delays in translation of evidence.

Participation in the AR-G provides comprehensive performance information beyond the mere tracking of the 9 performance measures required by the Centers for Medicare and Medicaid Services (CMS) and the Joint Commission. AR-G performance feedback reports and QI tools enable sites not only to identify opportunities to improve patient care across a broad range of process measures, but to provide specific resources to address these gaps. Innovative quality metrics presented in these reports include the use of anticoagulants, dosing of antithrombotics, and procedural use. Patient subgroups that are presented assist in revealing inequities in treatment—not just by age, sex, and race—but among patients with specific comorbid illnesses. For broad-based improvement to occur on a national level, hospitals need initiatives like the AR-G to push the quality boundaries beyond that which is required by regulatory agencies and payers.

Beyond its potential for QI, the AR-G has vast potential as a scientific resource. First, as a majority of US sites participate in the AR-G, the registry can more completely fulfill its role as a national surveillance system for US MI care and outcomes. As part of this role, the AHA will use the AR-G data to assess the effectiveness of its recently launched Mission Lifeline program, a national campaign to improve STEMI systems of care.18

Second, the AR-G can be used as a platform for tracking new drugs or devices when they become used in routine clinical practice. Such postmarket information is vital to assure that the safety and effectiveness of these therapeutic agents are maintained as they move outside of selected trial populations and settings.
Third, the AR-G can be leveraged to support the need and rationale for future randomized clinical trials. Specifically, observational comparative effectiveness research from the registry can be hypothesis-generating, helping to identify important questions for trial confirmation, as well as providing needed information for trial design. This registry could also potentially serve as a backbone for the conduct of RCTs, linking interested investigators into a research network and limiting the demands of additional data collection.

Fourth, the AR-G may one day be augmented with blood samples that could be mined for various biomarkers or perhaps even genomic data. If supplemented by novel emerging markers, this registry could be a remarkable resource for future scientific discovery, given that it provides a huge sample of well-characterized patients.

Finally, there are efforts underway to expand the AR-G from its current in-hospital focus to one that could provide a longitudinal evaluation of MI patients. Specifically, the AR-G could be linked with other administrative data sources (such as Medicare and private payers), to provide information on downstream clinical events and resource use (including deaths, rehospitalizations, etc). Furthermore, there are efforts underway to include patient identifier information that would allow for direct linking of patients across multiple clinical registries (such as other procedure or ambulatory registries). Each of these possibilities presents incremental patient privacy and sampling bias challenges, yet with a robust methodology, many efficiencies and beneficial cross-collaborations can be gained through such an approach.

Limitations
First and foremost, perhaps the most significant limitation of the AR-G is that it is a voluntary registry. As a result, the

Table 3. Baseline Characteristics of Patients (N=103 890)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=103 890</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y, median (quartile 1, quartile 3)</td>
<td>64 (54, 76)</td>
</tr>
<tr>
<td>% Missing</td>
<td>0.008</td>
</tr>
<tr>
<td>Age ≥75 y</td>
<td>28</td>
</tr>
<tr>
<td>Female sex</td>
<td>36</td>
</tr>
<tr>
<td>% Missing</td>
<td>0.0003</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>White</td>
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ACTON-GWTG data is from January 1, 2007, to December 31, 2008, from 344 centers. HMO indicates health maintenance organization; VAMC, Veterans Affairs Medical Center; and CHF, congestive heart failure.

Figure 5. Acute therapies (n=103 890). Medication contraindications excluded.

Figure 6. Discharge therapies and recommendations (n=103 890). Medication contraindications excluded. Transfer outs and deaths are excluded. *Among patients with ejection fraction <40, congestive heart failure, diabetes, and hypertension.
current participating hospital profile tends to be that of larger, tertiary centers that may have better baseline performance than smaller centers possessing fewer resources. Although site recruitment remains ongoing, we recognize that the AR-G results may not apply to patients who present with AMI in hospitals not participating in this registry. Second, there remains a large opportunity to increase site participation, given that only approximately 344 of the nation’s 4000 acute care hospitals currently are participating. Cited barriers to participation include local privacy restrictions, resource constraints, and a presumed data collection burden. As the registry begins an aggressive site recruitment campaign, educational efforts should highlight feasible solutions to these operational challenges.

Third, data elements in the AR-G are limited to those that are readily documented in the inpatient medical record. Process of care markers, such as serial laboratory values or prehospital treatment by emergency medical services, are purposefully not collected because the data collection burden for hospitals would be too great. Ironically, the data that is collected is directly dependent on the accuracy and completeness of associated clinical documentation. For example, contraindications are recorded in the registry if they are documented in the medical record. Although there are ongoing efforts to improve data completeness and quality, some patients reported to be eligible for treatment may have had contraindications or intolerance that were not documented by the treating clinicians. As a result, the hospital’s performance on these measures may appear lower than they are in actuality.

Finally, the sole inpatient focus of the AR-G is an inherent limitation. The ability to track patients over time is necessary to develop a more thorough understanding of downstream resource utilization, as well as outcomes associated with the use-specific therapies and procedures.

**Conclusions**

The AR-G is uniquely positioned to advance the science of QI by creatively leveraging established alliances with academic thought leaders, professional societies, industries, and payers. This type of consortium will be increasingly important in helping to develop measurement systems and the “next generation” of pay-for-performance initiatives. Specifically, such a consortium will assist in the establishment of meaningful and measurable targets for QI, as well as the tools and techniques necessary to efficiently reach these goals.11

Additionally, the AR-G will be able to advance the QI field by providing a rich set of data for disease surveillance, by following trends in the adoption of new therapies into routine clinical practice, and by observational treatment comparisons.17,20 Dissemination of findings from such studies will be vitally important to patient care, both in the recognition of much needed change, and in the enablement of hospitals to apply these changes to real-life.

The AR-G will also serve as an engine for scientific research and discovery. The registry will provide unique epidemiological data for tracking US MI care and outcomes for years to come and facilitate postmarket safety surveillance and comparative effectiveness studies of agents used in the care of MI patients. Lastly, the AR-G will likely be augmented with other clinical and administrative data sources in the near future, to allow for a longitudinal evaluation of MI patients.

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**References**


