

# Improving Quality of Care for Acute Myocardial Infarction

## The Guidelines Applied in Practice (GAP) Initiative

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**D**ESPITE CONSIDERABLE INVESTMENT in the development and dissemination of national guidelines for the management of acute myocardial infarction (AMI),<sup>1</sup> the Center for Medicare and Medicaid Services' (CMS) Cooperative Cardiovascular Project recently re-

**Context** Quality of care of patients with acute myocardial infarction (AMI) has received intense attention. However, it is unknown if a structured initiative for improving care of patients with AMI can be effectively implemented at a wide variety of hospitals.

**Objective** To measure the effects of a quality improvement project on adherence to evidence-based therapies for patients with AMI.

**Design and Setting** The Guidelines Applied in Practice (GAP) quality improvement project, which consisted of baseline measurement, implementation of improvement strategies, and remeasurement, in 10 acute-care hospitals in southeast Michigan.

**Patients** A random sample of Medicare and non-Medicare patients at baseline (July 1998–June 1999; n=735) and following intervention (September 1–December 15, 2000; n=914) admitted at the 10 study centers for treatment of confirmed AMI. A random sample of Medicare patients at baseline (January–December 1998; n=513) and at re-measurement (March–August 2001; n=388) admitted to 11 hospitals that volunteered, but were not selected, served as a control group.

**Intervention** The GAP project consisted of a kickoff presentation; creation of customized, guideline-oriented tools designed to facilitate adherence to key quality indicators; identification and assignment of local physician and nurse opinion leaders; grand rounds site visits; and premeasurement and postmeasurement of quality indicators.

**Main Outcome Measures** Differences in adherence to quality indicators (use of aspirin,  $\beta$ -blockers, and angiotensin-converting enzyme [ACE] inhibitors at discharge; time to reperfusion; smoking cessation and diet counseling; and cholesterol assessment and treatment) in ideal patients, compared between baseline and postintervention samples and among Medicare patients in GAP hospitals and the control group.

**Results** Increases in adherence to key treatments were seen in the administration of aspirin (81% vs 87%;  $P=.02$ ) and  $\beta$ -blockers (65% vs 74%;  $P=.04$ ) on admission and use of aspirin (84% vs 92%;  $P=.002$ ) and smoking cessation counseling (53% vs 65%;  $P=.02$ ) at discharge. For most of the other indicators, nonsignificant but favorable trends toward improvement in adherence to treatment goals were observed. Compared with the control group, Medicare patients in GAP hospitals showed a significant increase in the use of aspirin at discharge (5% vs 10%;  $P<.001$ ). Use of aspirin on admission, ACE inhibitors at discharge, and documentation of smoking cessation also showed a trend for greater improvement among GAP hospitals compared with control hospitals, although none of these were statistically significant. Evidence of tool use noted during chart review was associated with a very high level of adherence to most quality indicators.

**Conclusions** Implementation of guideline-based tools for AMI may facilitate quality improvement among a variety of institutions, patients, and caregivers. This initial project provides a foundation for future initiatives aimed at quality improvement.

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**For editorial comment see p 1321.**

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**Table 1.** Hospital Characteristics in the GAP Project\*

Hospital Characteristics	GAP Hospitals (n = 10)	Control Hospitals (Volunteered But Not Selected)† (n = 11)
Teaching hospital		
Yes	8	7
No	2	4
Volume‡		
Large	3	2
Moderate	2	2
Small	5	7
Facility for cardiac catheterization and CABG surgery		
Yes	5	4
No	5	7
Predominantly osteopathic	2	3
Hospitals with >10% minority patients with AMI discharged per year	5	5

\*GAP indicates Guidelines Applied in Practice; CABG, coronary artery bypass graft; and AMI, acute myocardial infarction.

†The 1 other hospital that volunteered for the GAP project but was not part of the Southeast Michigan Hospital Profiling Project (SEMHP) was a nonteaching, small-volume hospital with no cardiac catheterization facility.

‡Large volume indicates hospitals with more than 400 Medicare patients with AMI discharged per year; moderate volume, between 250 and 400 such patients; and small volume, fewer than 250 such patients.

ported that quality of care for Medicare beneficiaries with AMI was far from optimal.<sup>2</sup> Many subsequent studies have shown similar disappointing adherence to the therapies recommended in published guidelines.<sup>3-6</sup> Furthermore, quality of care of patients with AMI varies with age, sex, race, geographic location, physician specialty, and hospital teaching status.<sup>2,3,7-16</sup> This variation in care is likely linked to outcomes.<sup>11,13,17</sup> Although recent analyses of care patterns over time have suggested steady improvement in the use of key therapies in patients with AMI,<sup>18,19</sup> there remain important opportunities to improve adherence to evidence-based therapies.<sup>18-20</sup>

In this report, we describe the initial impact of the Guidelines Applied in Practice (GAP) initiative of the American College of Cardiology (ACC) in southeast Michigan. Conceptually, the program sought to incorporate national guidelines into care processes, focused on both caregivers (physicians and nurses) and patients, in part by creating tools and systems that reinforce adherence to key evidence-based therapies.

**METHODS**

**The GAP Project**

The GAP Steering Committee of the ACC developed the project’s purpose,

timeline, clinical topic, site partner, interventions, and project design. The Southeast Michigan Heart Consortium was selected for the pilot GAP project on the basis of its commitment to quality improvement and excellence in practice. The consortium consists of 31 hospitals with a diverse patient population from which a representative sample of hospitals could be selected.

**Partnership and Site Selection**

The ACC collaborated with the Michigan Peer Review Organization (MPRO) and the Southeast Michigan Quality Forum for Cardiovascular Care (under the auspices of the Greater Detroit Area Health Council). The ACC provided professional credibility, clinical expertise, and resources (research grant). The MPRO provided quality improvement expertise, an established network of quality improvement projects, and provided baseline and follow-up data management and analysis. The Greater Detroit Area Health Council facilitated industry and insurance company support and helped identify local physician and nurse leaders who developed templates for tool kit components and worked directly with hospitals and providers. A Project Oversight Team, responsible for the design, coordina-

tion, and implementation of the GAP Project, comprised individuals representing each of these 3 organizations. A core team, consisting of physician leaders from each of the 6 hospital systems participating in the Southeast Michigan Quality Forum, and nurse leaders from the forum and the MPRO, was established to assist the Project Oversight Team with planning and implementation. The core team had several responsibilities, including identifying other physician and nurse opinion leaders, selecting hospitals to participate, creating templates for GAP tool kit components, and establishing clinically meaningful performance targets. Of the 31 hospitals in the consortium, 22 showed interest in participating in the initiative. Of these, 10 hospitals were selected based on their location, patient population, and teaching status so as to provide diversity of hospital type and of patient characteristics such as elderly, women, and minority patients (TABLE 1).

**The Interventions, Tool Kit, and Project Implementation**

The GAP Project was a multifaceted intervention that consisted of a project kickoff presentation, creation and implementation of a customized tool kit based on ACC/AHA (American Heart Association) national guidelines, identification and assignment of local physician and nurse opinion leaders, “grand rounds” site visits, and premeasurement and postmeasurement of quality indicators. The indicators used to assess quality are shown in TABLE 2. The project was characterized by an extremely rapid timeline, and the entire project was implemented in a single calendar year (FIGURE 1). The data were analyzed in January and February 2001, and the results presented in March.

The GAP tool kit (created based on national guidelines) consisted of 7 critical components: (1) AMI standard orders, (2) clinical pathway, (3) pocket guide/pocket card, (4) patient information form, (5) patient discharge form, (6) chart stickers, and (7) hospital performance charts. Versions of

these tools had already been used successfully at several southeast Michigan hospitals<sup>21,22</sup> (the GAP tool kits are available at: <http://www.acc.org>). Each GAP hospital was assigned one physician and one nurse leader from outside the hospital system from the Southeast Michigan Quality Forum to serve as opinion leaders. They assisted in the development of quality improvement plans, tool kit customization, and project implementation. The project was initiated at each hospital with a grand rounds that introduced the project protocol, and presented the hospital's baseline quality indicator performance as compared with the state average and the aggregate of other GAP hospitals. Mechanisms for disseminating the tools, evaluating processes of care, and data collection and analysis were also discussed.

**Study Sample**

The baseline sample was identified using claims with the *International Classification of Diseases, Ninth Revision, Clinical Modification* principal discharge diagnosis code for AMI between July 1, 1998, and June 30, 1999. Data were abstracted from 2 groups: cases with Medicare as their primary insurance (Medicare group) and patients not having Medicare as their primary insurance (non-Medicare group). The sample size was calculated following the determination of a target level of improvement by the project's physician leaders for each quality indicator (Table 2). Medicare baseline cases were identified from filed CMS beneficiary claims data while non-Medicare baseline patients were identified from individual hospitals. A 21% random sample and a 40-case minimum of baseline Medicare cases were selected from each hospital. The non-Medicare sample consisted of an 11.5% random sample and a minimum of 25 cases per hospital. Of 2588 Medicare and 1872 non-Medicare cases, 537 and 254 cases were abstracted at baseline, respectively. Patients without a confirmed AMI and those with codes that designated a subsequent episode of care were excluded

from the study sample, leaving 735 patients to constitute the baseline sample. Additional indicator-specific inclusion and exclusion criteria were applied so that only "ideal" patients (ie, those without any absolute or relative contraindication for that specific indicator) remained in the denominators.<sup>2,19</sup>

Cases discharged between September 1 and December 15, 2000, with the same inclusion and exclusion criteria were eligible for remeasurement. Cases for both Medicare and non-Medicare groups were identified from individual hospitals. All Medicare cases discharged from the hospital with a valid beneficiary claim during the remeasurement period were sampled. For non-Medicare cases, a 57.5% sample was selected with 25 minimum cases per hospital. For remeasurement, 771 Medicare and 313 non-Medicare charts were abstracted, and after exclusions as noted above 914 patients remained in the postintervention sample. As in the baseline, additional inclusion and exclusion criteria were applied at the indicator level.<sup>2,19</sup>

**Control Group**

Thirty of the 31 hospitals in southeast Michigan were originally participants in the Southeast Michigan Hospital Profiling Project (SEMHPP), a cooperative quality improvement initiative with the MPRO. This included 10 hospitals selected for GAP and 11 of 12 hospitals that volunteered for GAP but were

not selected (non-GAP hospitals). The impetus for the SEMHPP was hospitals' need for performance data to be used for public profiling by the Southeast Michigan Employer and Purchaser Consortium. After receiving baseline reports (1/1/98-12/31/98), hospitals were asked to submit improvement plans including details of indicators to be addressed and planned actions to change processes of care. Hospitals were encouraged to implement or up-

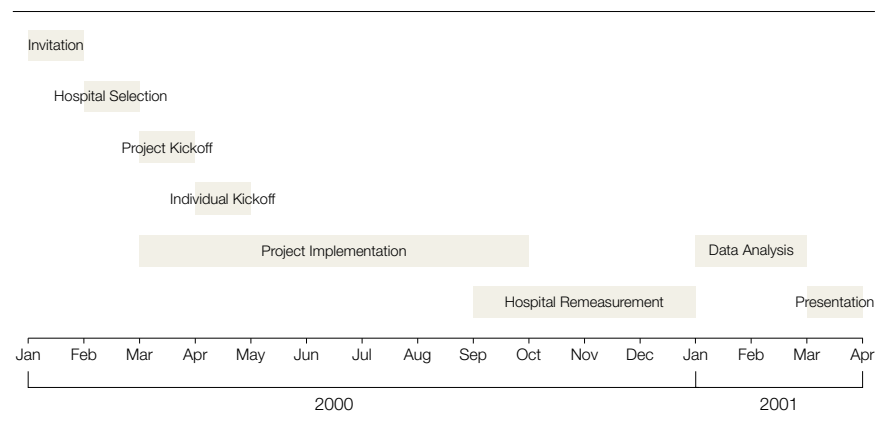
**Table 2.** Quality Indicators for AMI and Their Targeted Improvement Levels\*

Quality Indicator	Targeted Improvement Level
<b>Early indicators</b>	
Aspirin within 24 h, %	95
β-Blocker within 24 h, %	78
Time to thrombolysis, median, min	30
Time to PTCA, median, min	60-120
LDL cholesterol measurement within 24 h	NA†
<b>Late indicators</b>	
Aspirin at discharge, %	95
β-Blocker at discharge, %	87
ACE inhibitor at discharge, %	78
Smoking cessation counseling, %	75
Cholesterol-lowering therapy at discharge	NA†
Dietary counseling	NA†

\*Only "ideal" patients were considered for each of the measures. AMI indicates acute myocardial infarction; early indicators, those instituted with 24 hours of admission; PTCA, percutaneous transluminal coronary angioplasty; ACE, angiotensin-converting enzyme; LDL, low-density lipoprotein; and late indicators, those instituted at discharge or after.

†Indicator under development and review in the Center for Medicare and Medicaid Services' Sixth Scope of Work.

**Figure 1.** The Guidelines Applied in Practice (GAP) Timeline



date standing orders, care pathways, and discharge forms to include all components of AMI care with the intent of improving quality of care for patients with AMI. The hospitals responded variably by implementing improvement strategies to improve 1 or more indicators using different hospital-specific strategies.

Remeasurement data for the SEMHPP was collected from these hospitals between March 1 and August 31, 2001. These baseline (n=513) and remeasurement (n=388) SEMHPP data of Medicare patients from the 11 hospitals (Table 1) were used to provide control data.

### Data Collection

Medical records for each sampled hospitalization were forwarded to a clinical data abstraction center. Data were systematically collected for each hospitalization, including patient medical history, symptoms on arrival, electrocardiographic examination, in-hospital treatment and events, and discharge treatment and disposition. The data abstraction tools used for the GAP and the SEMHPP (control group) projects were the same except for modifications made to abstract information about tool use for GAP hospitals. For quality assurance purposes, data were reabstracted for a random sample of both baseline and remeasurement records (4%) by the clinical data abstraction center. There was an overall reliability of 93.2% (original abstracted data vs reabstracted data) and an accuracy rate of 96.5% (both original abstracted data and reabstracted data compared with criterion standard data) for the 289 variables in the abstraction module. Quality of care was assessed by measuring the use of key indicators in "ideal" patients as reported in previous studies (Table 2).<sup>11</sup> Four other test indicators, ie, indicators that are under development and review, were also evaluated (Table 2).

### Statistical Analysis

Data analyses were performed using the same algorithm as the one used for CMS's current national AMI quality indica-

tors.<sup>11</sup> Abstracted data were analyzed to confirm the presence of an AMI based on elevated cardiac biomarker(s) and/or electrocardiographic analyses, and/or presence of chest pain within 48 hours of arrival as reported by earlier studies.<sup>11</sup> Sample comparisons were made using a 2-tailed binomial *z* test for proportions, a  $\chi^2$  test for categorical variables, and a paired *t* test or Wilcoxon rank sum test for continuous variables. Each quality indicator baseline rate was compared to the remeasurement rate for "ideal" cases at the aggregate and individual hospital level. The baseline and remeasurement data for Medicare patients from GAP were compared with data from Medicare patients with AMI in the control group collected as a part of SEMHPP. Additional analyses were performed to examine the effect of the intervention in Medicare and non-Medicare patients, and in different age, sex, and racial groups among the GAP hospitals. Tool-specific analyses also were conducted. The effect of tool use, based on the tool's presence or reference in the chart, was correlated between adherence to the early indicators and the AMI standard orders, and between quality indicators at discharge and the AMI patient discharge forms. All *P* values were 2-tailed with an  $\alpha$  of .05. SAS version 6.12 (SAS Institute Inc, Cary, NC) was used for all statistical analyses.

## RESULTS

### Demographics, Past Medical History, and Clinical Presentations

Overall, 1649 patients were studied, including 735 from the baseline period (pre-GAP interventions) and 914 from the post-GAP period. Most demographics and clinical characteristics of the 2 patient populations were similar (TABLE 3). Also, most of the demographics and clinical characteristics of the baseline and remeasurement for the Medicare patients in the SEMHPP (control group) were similar (Table 3).

### Change in Performance: Impact of GAP

**Overall Change in Quality of Care.** Significant increases in overall adherence

to key treatments were observed in the administration of aspirin and  $\beta$ -blockers at admission and in the administration of aspirin and smoking cessation counseling at discharge (FIGURE 2A and C). For virtually all other quality indicators, nonsignificant but favorable trends toward improvement in adherence to quality indicators were observed (Figure 2A, B, and C). No substantive effect on time to reperfusion in ST-segment-elevation AMI was observed. However, a small sample size precluded meaningful analyses and interpretation of the change in this indicator.

As compared to the SEMHPP (control) patients, the Medicare GAP cohort showed a significant improvement in the use of aspirin at discharge (5% vs 10%,  $P < .001$ ). The improvement in the administration of early aspirin, ACE inhibitor at discharge, and documentation of smoking cessation counseling tended to be higher (albeit nonsignificantly) in the GAP Medicare cohort vs the control group (TABLE 4).

**Change in Quality of Care Among Different Insurance Types, Age Groups, Sex, and Race.** Although both Medicare and non-Medicare patients demonstrated favorable effects of GAP interventions, improvement in various performance measures were more apparent in the Medicare population compared with the non-Medicare population but no statistically significant interaction was found. As a result of the interventions, the baseline gap in the performance measures between the non-Medicare and Medicare population was narrowed in the remeasurement phase.

Similarly, the impact of the intervention tended to be more pronounced in very elderly patients (75 years or older) as opposed to a younger cohort (younger than 75 years). The benefit of improvement in the overall adherence to performance measures was more apparent in women. Furthermore, the intervention was effective in equalizing the adherence to most quality indicators in white and nonwhite patients. However, because of lack of power for subgroup analysis, the trends of improvement in

these different subgroups did not reach statistical significance.

**Tool Use**

Evidence of tool use was identified on chart review in approximately one quarter of abstracted charts in terms of use of AMI-specific standard admission orders

(26.0%), clinical pathways (27.2%), and AMI-specific discharge forms (23.7%). Evidence of the remaining GAP tools (patient information forms, chart stickers) in the charts was identified less frequently than for the 3 tools listed above.

When there was evidence that AMI standard orders were used, a signifi-

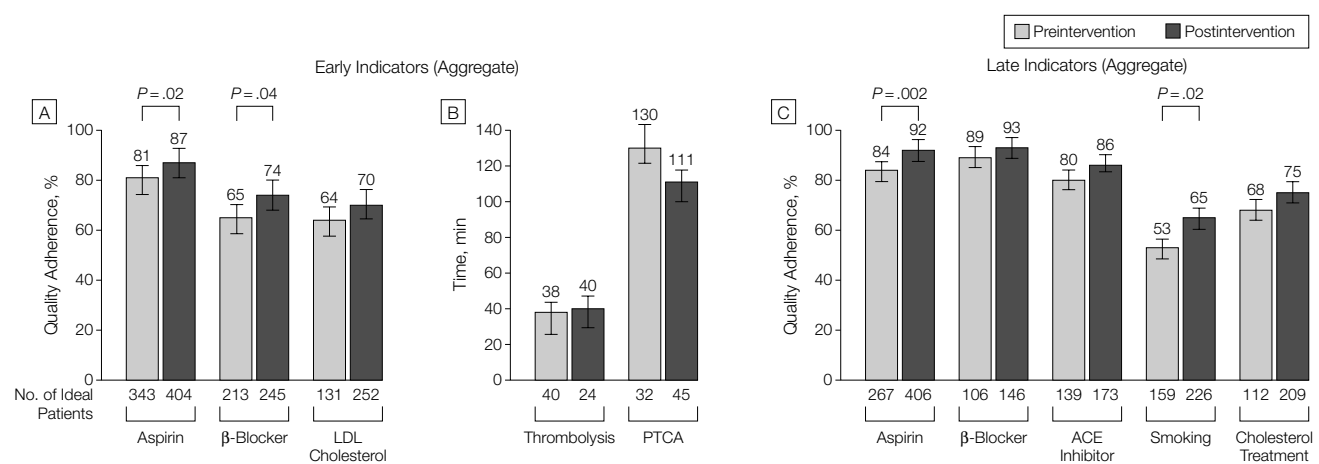
cant improvement in adherence to performance measures was seen in the early administration of aspirin and in the early measurement of low-density lipoprotein cholesterol, and there was a nonsignificant trend for improvement in the early use of  $\beta$ -blockers (FIGURE 3A, Table 4). Similarly, evidence that

**Table 3.** Demographics: Medicare (GAP and SEMHPP) and Non-Medicare (GAP) Patients\*

Characteristics	Before, No. (%)			After, No. (%)		
	GAP Non-Medicare (n = 220)	GAP Medicare (n = 515)	SEMHPP Medicare (n = 513)	GAP Non-Medicare (n = 251)	GAP Medicare (n = 663)	SEMHPP Medicare (n = 388)
<b>Demographics</b>						
Women	61 (27.7)	265 (51.5)	272 (53.0)	78 (31.1)	331 (49.9)	210 (54.1)
Nonwhite	36 (16.4)	112 (21.7)	83 (16.2)	37 (14.7)	158 (23.8)	71 (18.3)
Age, mean (SD), y	55.3 (11.6)	76.2 (9.0)	77.5 (10.1)	55 (11.2)	75.6 (10.0)	77 (10.2)
<b>Medical history</b>						
Hypertension	122 (55.5)	368 (71.5)	359 (70.0)	155 (61.8)	517 (78.0)	322 (82.9)
Diabetes	58 (26.4)	177 (34.4)	181 (35.3)	67 (26.7)	238 (35.9)	143 (36.9)
Current smoker	113 (51.4)	95 (18.5)	73 (14.2)	123 (49.0)	137 (20.7)	73 (18.8)
Prior AMI	65 (29.6)	221 (42.9)	189 (36.8)	73 (29.1)	315 (47.5)	201 (51.8)
Prior CHF	29 (13.2)	171 (33.2)	158 (30.8)	24 (9.6)	222 (33.5)	169 (43.6)
Prior CABG	29 (13.2)	97 (18.8)	77 (15.0)	25 (10.0)	131 (19.8)	69 (17.8)
Prior PTCA	39 (17.7)	81 (15.7)	53 (10.3)	43 (17.1)	127 (19.2)	58 (14.9)
Prior stroke	17 (7.7)	97 (18.8)	104 (20.3)	15 (6.0)	126 (19.0)	99 (25.5)
<b>Clinical</b>						
Chest pain	202 (91.8)	380 (73.8)	441 (86.0)	227 (90.4)	494 (74.5)	388 (100)
SBP >160 mm Hg or DBP >100 mm Hg	46 (20.9)	136 (26.4)	159 (30.9)	57 (22.7)	179 (27.0)	138 (35.6)
Heart rate >100/min	36 (16.4)	152 (29.5)	157 (30.6)	46 (18.3)	170 (25.6)	121 (31.2)

\*GAP indicates Guidelines Applied in Practice; SEMHPP, Southeast Michigan Hospital Profiling Project; AMI, acute myocardial infarction; CHF, congestive heart failure; CABG, coronary artery bypass graft; PTCA, percutaneous transluminal coronary angioplasty; SBP, systolic blood pressure; and DBP, diastolic blood pressure.

**Figure 2.** Overall Effects of the Guidelines in Applied Practice (GAP) Intervention on Early (A, B) and Late (C) Quality Indicators



LDL indicates low-density lipoprotein cholesterol measured in hospital; Thrombolysis, time to thrombolytic administration in minutes; PTCA, time to primary percutaneous transluminal coronary angioplasty in minutes; ACE, angiotensin-converting enzyme inhibitor given at discharge; and Smoking, smoking cessation advice documented in chart. Error bars indicate 95% confidence intervals.

the AMI standard discharge form was used was associated with significant improvements in the use of aspirin and/or  $\beta$ -blockers at discharge, and with smoking cessation counseling, dietary counseling, and cholesterol-lowering therapy at discharge (Figure 3B, Table 4).

**COMMENT**

This initial report of the GAP initiative of the ACC illustrates opportunities available to improve care for AMI and provides a framework for similar initiatives targeting other diagnoses. Either trends toward higher adherence to quality indicators or significant improvements were observed for a majority of those measured. In particular, groups identified by prior studies to be more prone to receive suboptimal care, eg, el-

derly persons and women, tended to be more likely to benefit regarding both the early and late indicators.

Perhaps even more interesting was the higher level of adherence observed at remeasurement for early quality indicators when AMI standardized orders were evident in the medical record. Similarly, improved adherence to late indicators was observed when the AMI-specific discharge tool was in the chart. These percentages, in the 80s and 90s, (Figure 3A and B), represent the kinds of levels that we can hope for if we are successful in creating effective standardized delivery systems that involve physicians, nurses, and patients in the quality paradigm and begin at or before admission and continue until discharge.

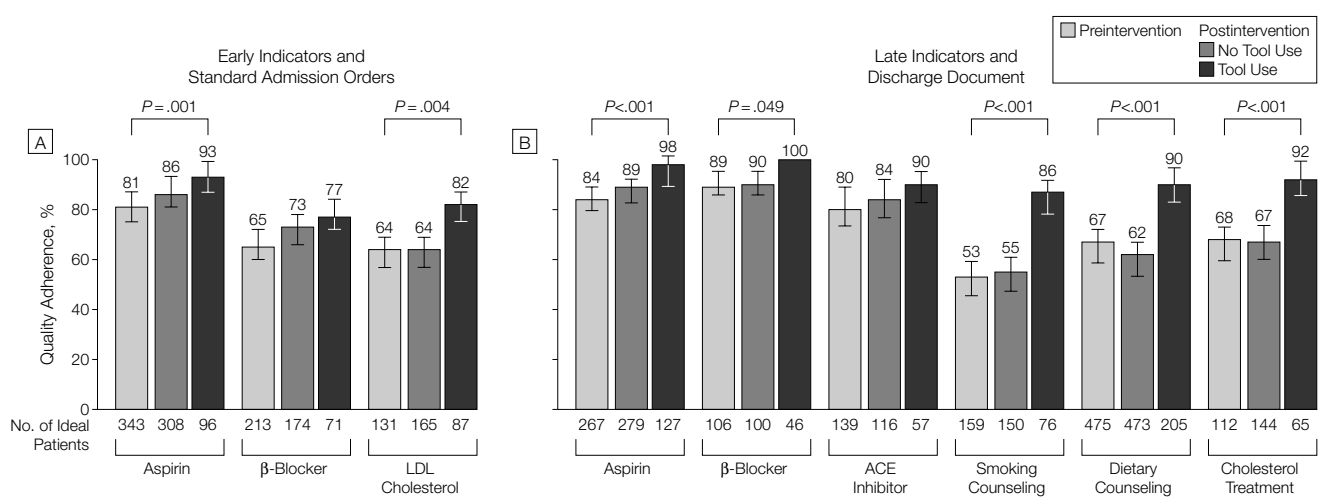
Although there was no designed control group in the GAP project, data for Medicare patients from 11 volunteer hospitals collected as part of the SEMHPP initiative served as a control group. When the improvement in various quality indicators between baseline and remeasurement for GAP Medicare patients was compared with the improvement for these indicators in the control hospitals, a significant improvement was observed in the use of aspirin at discharge, with nonsignificant trends for greater improvement in GAP hospitals for other quality indicators such as early aspirin use, use of ACE inhibitor at discharge, and documentation of smoking cessation counseling. At the time that GAP was implemented, in addition to the growing

**Table 4.** Quality Indicators for Medicare Patients in GAP vs SEMHPP Hospitals\*

Quality Indicators	SEMHPP (Control) Hospitals (n = 11)		GAP Participating Hospitals (n = 10)		P Value (for Follow-up Rates, Controls vs GAP Hospitals)	Follow-up Rates When GAP Tools Used, %	P Value (for Follow-up Rates, Controls vs Hospitals Using GAP Tools)
	Baseline, %	Follow-up, %	Baseline, %	Follow-up, %			
Early aspirin	85.2	81.7	76.5	87.1	.12	92.6	.005
Early $\beta$ -blockers	59.5	76.1	62.5	73.3	.64	77.1	.88
Discharge aspirin	74.6	78.6	82.0	91.7	<.001	98.4	<.001
Discharge $\beta$ -blockers	70.3	86.4	87.3	92.9	.27	100.0	.01
Discharge ACE inhibitors	77.5	75.4	80.0	84.7	.14	89.5	.04
Smoking cessation	36.1	42.6	27.7	50.4	.31	85.5	<.001

\*GAP indicates Guidelines Applied in Practice; SEMHPP, Southeast Michigan Hospital Profiling Project; and ACE, angiotensin-converting enzyme.

**Figure 3.** Adherence to Early Quality Indicators in Patients With and Without Evidence of Use of Standardized Admission Orders and Adherence to Late Indicators in Patients With and Without Evidence of Use of Discharge Form



See Figure 2 legend for expansions of terms. P values are for comparisons between preintervention (baseline) quality adherence levels and postintervention quality adherence levels in medical records with evidence of tool use. Error bars indicate 95% confidence intervals.

awareness of the optimal care of patients with AMI supported by widely disseminated nationally published best-practice guidelines,<sup>1 2</sup> other regional initiatives were ongoing. One was SEMHPP as outlined earlier, and the other was a project sponsored by BlueCross BlueShield that targeted area hospitals to improve the use of  $\beta$ -blockers and aspirin at discharge for all patients with AMI who participated in their health maintenance organization. Thus, all volunteer hospitals were involved in quality improvement efforts on their own. Furthermore, GAP generated increased awareness of quality of care for AMI patients among the nonparticipating volunteer hospitals that served as a control group. The fact that there was only a modest improvement in the quality-of-care indicators in GAP hospitals compared with the control hospitals may have been the result of these ongoing efforts that were targeting quality improvement in AMI care among all hospitals in the region, with a second reason being only variable tool use during the project.

The initial GAP experience builds on the results of prior quality improvement projects. These projects have suggested that a systematic approach, particularly targeting use of quality improvement tools and involving both caregivers and patients, may be successful in improving adherence to performance measures.<sup>21-24</sup> Yet, unlike prior single-institution experiences or regional initiatives that targeted 1 or 2 key indicators of care for patients with AMI, GAP, when implemented appropriately through the use of tools, appeared to be successful in improving the overall care among diverse institutions in which physicians with different subspecialty training treat a wide variety of patient populations. The tools were meant not only to provide physicians and nurses with an evidence-based outline to appropriately manage their patients, but also to reinforce these key quality goals by serving as reminders during the care process. These tools were also meant to provide patients with education and empowerment and to

help them better understand their disease and the long-term goals of its treatment, including lifestyle strategies.

We believe the GAP pilot initiative may provide the foundation for future initiatives, and that it is unique in several ways. First, the national guidelines for management of AMI were used as the basis for tools that, when used, reminded physicians, nurses, and patients of the key goals of therapy during the care process itself. Second, both internal and external opinion leaders worked with the hospitals and their staffs to implement the project and assist in identifying barriers to successful implementation, a strategy previously shown to be effective in influencing physician behavior.<sup>23-26</sup> Third, great flexibility was allowed as hospitals customized the tools to suit their own experience and style, allowing them greater “local ownership” and more active involvement in ensuring a favorable adoption of the tools at each hospital.<sup>27</sup> Fourth, the project took advantage of prior quality improvement initiatives and dialogue involving MPRO, the state contractor for CMS’s improvement initiative, and all of the hospitals. The trust and relationships, which had been successfully fueled by a series of initiatives in the 1990s, allowed the initial measurement to be made and were vital to the quick action of the improvement plan.

This study has important limitations. The initial measurement occurred more than a year before the quality improvement intervention. Thus, it is likely that some of the observed improvement represented a natural drift toward higher adherence. However, the modest improvement seen in the quality-of-care indicators among GAP Medicare patients, compared with controls who volunteered for the project but who were not selected and where other quality improvement initiatives were already ongoing, suggests that the GAP initiative did have at least a modest impact on the quality of care. Although the hospitals agreed to use admission and/or discharge tools, these tools were identified during chart review in only a minority of patients. It is possible that the

aggressive timeline of the GAP initiative may not have provided caregivers with an adequate opportunity to become familiar with and to adopt the tools. A longer implementation period, insistence on tool use, continuous monitoring, and attempts to identify and overcome barriers for tool use may result in greater use of the tools and consequently better adherence in future initiatives. Evidence of tool use was associated with the greatest impact on the change in performance measures. This finding argues for a strategy where institutions and caregivers adopt standard tools and processes to optimize quality of care for patients with AMI. Because of the multifaceted intervention approach implemented in GAP, it was not possible to gauge the efficacy of individual components in improving the adherence of the quality indicators. Finally, the cost implications of this quality improvement initiative were not evaluated, and future studies need to address the cost-effectiveness of such programs in communities at large.

In summary, we have shown that the creation and implementation of guideline-based tools surrounding care of AMI may facilitate quality improvement among a wide variety of institutions, patients, and caregivers. This initial GAP project provides a foundation for future initiatives aimed at quality improvement.

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