Effect of a Community Intervention on Patient Delay and Emergency Medical Service Use in Acute Coronary Heart Disease

The Rapid Early Action for Coronary Treatment (REACT) Trial

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Context
Delayed access to medical care in patients with acute myocardial infarction (AMI) is common and increases myocardial damage and mortality.

Objective
To evaluate a community intervention to reduce patient delay from symptom onset to hospital presentation and increase emergency medical service (EMS) use.

Design and Setting
The Rapid Early Action for Coronary Treatment Trial, a randomized trial conducted from 1995 to 1997 in 20 US cities (10 matched pairs; population range, 55,777-238,912) in 10 states.

Participants
A total of 59,944 adults aged 30 years or older presenting to hospital emergency departments (EDs) with chest pain, of whom 20,364 met the primary population criteria of suspected acute coronary heart disease on admission and were discharged with a coronary heart disease–related diagnosis.

Intervention
One city in each pair was randomly assigned to an 18-month intervention that targeted mass media, community organizations, and professional, public, and patient education to increase appropriate patient actions for AMI symptoms (primary population, n=10,563). The other city in each pair was randomly assigned to reference status (primary population, n=9,801).

Main Outcome Measures
Time from symptom onset to ED arrival and EMS use, compared between intervention and reference city pairs.

Results
General population surveys provided evidence of increased public awareness and knowledge of program messages. Patient delay from symptom onset to hospital arrival at baseline (median, 140 minutes) was identical in the intervention and reference communities. Delay time decreased in intervention communities by 4.7% per year (95% confidence interval [CI], −8.6% to −0.6%), but the change did not differ significantly from that observed in reference communities (−6.8% per year; 95% CI, −14.5% to 1.6%; P=0.54). EMS use by the primary study population increased significantly in intervention communities compared with reference communities, with a net effect of 20% (95% CI, 7%-34%; P<0.005). Total numbers of ED presentations for chest pain and patients with chest pain discharged from the ED, as well as EMS use among patients with chest pain released from the ED, did not change significantly.

Conclusions
In this study, despite an 18-month intervention, time from symptom onset to hospital presentation is to be decreased further in patients with suspected AMI.

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mains a major problem. The majority of time lost is the period from the onset of symptoms to presentation in a medical facility, sometimes referred to as patient delay. Even when the decision is made to seek medical care, most patients in the United States avoid ambulance services, preferring self-transport. These delays, which average several hours, prevent the early application of life-saving procedures and contribute substantially to a diminished effectiveness of treatment.

The magnitude and nature of this problem suggest the need for effective community-wide interventions. A focus on patients with known cardiovascular disease alone will not be effective because many patients experience their first AMI without a prior coronary heart disease (CHD) diagnosis. Additionally, bystanders (eg, friends, relatives, and coworkers) can be crucial in obtaining appropriate care. Community-wide interventions for health applications have been applied successfully in many settings. These methods should be tested to determine if they can improve awareness of symptoms of acute cardiac ischemia and knowledge of the appropriate actions to take.

The Rapid Early Action for Coronary Treatment (REACT) trial was a randomized study of community intervention to improve AMI treatment by reducing patient delay to access the health care system. In this article, we report the main results of this community trial.

METHODS

Study Design

The REACT trial was a 4-year study of 20 communities (10 matched pairs) in 5 geographic areas of the United States. Community recruitment, development of a data-collection instrument, development of educational materials, and staff training occurred during the first year. A 4-month baseline data collection phase (December 1995 to March 1996) was followed by 18 months of intervention and concurrent evaluation (April 1996 to August 1997). After the initiation of baseline measures, 1 city in each pair was randomized to the community intervention and the other to reference status.

Criteria for selecting communities included: proximity within 250 miles of a study field center; clear geographic boundaries; population of more than 50000; 911 emergency telephone service; willingness of the medical community and hospitals to participate; nonoverlapping media and hospital use with other study communities; and similarity in demographics, medical services, and media characteristics within each community pair. Because randomization occurred after baseline data collection began, community medical leaders were asked to participate prior to random assignment.

The study consisted of 5 field centers at the Universities of Alabama (Birmingham), Massachusetts (Worcester), Minnesota (Minneapolis-St Paul), and Texas (Houston) and a combined unit at the University of Washington (Seattle) and Oregon Health Sciences University (Portland) with the coordinating center at the New England Research Institutes (Watertown, Mass), and the federal project office at the National Heart, Lung, and Blood Institute.

Intervention

The intervention program, described in detail elsewhere, was a multicomponent strategy based on social cognitive theory, self-regulatory theory, diffusion theory, social marketing, and community organization principles. Meetings of focus groups, including AMI patients, relatives of AMI patients, and health care professionals, resulted in finding 2 central themes: symptom recognition and the need to act fast by calling 911, the local emergency telephone number. Public messages emphasized chest pain or discomfort along with other AMI symptoms including shortness of breath, radiating pain, sweating, nausea, or weakness. The advice given instructed patients to call 911 for ambulance transport to the hospital if any of these symptoms persisted for 15 minutes or longer.

The 4 intervention strategies included: (1) community organization, in which health professionals and leaders of other relevant organizations in each community constituted a local advisory group; (2) public education, which targeted all residents of the intervention communities, with an 18-month program that included the 6 themes of general awareness of AMI symptoms and appropriate action; MI survival plan; women and MI; MI symptom recognition; bystander response to MI; and importance of contacting emergency medical service (EMS) (911 telephone service); (3) professional education, which included physicians, nurses, rehabilitation staff, emergency department (ED) staff, and ambulance staff who were involved in continuing education meetings, special seminars, and academic detailing; and (4) patient education for those with a history of CHD or CHD risk factors who were taught at clinics by physicians. The intervention program was coordinated in each community by a local office that included up to 2 paid staff members with specific goals for type and quantity of education activities.

Outcomes Evaluation

All adults who presented to a hospital ED with a chief complaint of chest pain were included. Characteristics of the primary population for the study included age of 30 years and older, admission for evaluation of suspected acute CHD, and discharge with a CHD-related diagnosis (International Classification of Diseases, Ninth Revision, Clinical Modification codes 410 [acute MI], 411 [ischemic heart disease], 412-414 [prior MI, angina pectoris, and other forms of chronic ischemic heart disease], 427-429 and 440 [cardiac dysrhythmias, heart failure, ill-defined descriptions, and complications of heart disease and atherosclerosis], and 786.5 [chest pain]). Institutionalized individuals, those transferred from hospitals outside of the study areas, and those presenting with other causes of chest pain were not included.

Sample size was based on a projected difference between the intervention and
group randomized design of relatively few matched community units, end points measured in individuals, and a continuous data collection schedule. The target sample size was 750 patients per community (15,000 patients total), assumed to be distributed uniformly during the 4-month baseline and 18-month intervention periods. The study had an 80% power to detect a net end-of-trial difference of 30 minutes between median delay times in intervention and reference communities, using a 2-sided 5% type I error rate.

Delay times were log-transformed to make the distribution more nearly gaussian. Truncating the distribution of delay time by month, which was the primary trial end point. Delay time was defined as the time from self-reported acute symptom onset to arrival at the ED as recorded in the medical chart.

A 2-stage process was used to ascertain cases and collect these data. First, ED staff in study hospitals were trained in standardized questioning of patients regarding the nature and time of onset of acute symptoms. Follow-up training reinforced these practices. Study staff monitored ED logs to ensure that all presenting patients were considered and identified those that satisfied the inclusion criteria. Second, trained abstractors reviewed the hospital records of patients who were admitted with suspected acute CHD and collected demographic data, mode of transportation, procedures, clinical outcomes, and discharge diagnoses. Data collection protocols were reviewed and approved by the institutional review boards of each academic institution and hospital.

The coordinating center conducted random digit dial telephone surveys of 30 to 60 adults aged 21 years and older in each study community at 4 time points at baseline, early, mid, and late in the study to obtain measures of knowledge, attitudes, and behaviors relevant to seeking care for AMI symptoms.

Statistical Methods

The statistical design and analytic methods were developed specifically for REACT and tailored to its unique combination of features. Methods included a

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Reference Group</th>
<th>Intervention Group</th>
<th>US Census</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median household income, $</td>
<td>29,896 (18,396-39,264)</td>
<td>27,056 (15,890-32,842)</td>
<td>29,943</td>
</tr>
<tr>
<td>Race/ethnicity, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>76.7 (5.4-97.8)</td>
<td>78.0 (9.2-97.4)</td>
<td>80.3</td>
</tr>
<tr>
<td>Black</td>
<td>8.7 (0.1-41.6)</td>
<td>8.7 (0.2-26.0)</td>
<td>12.0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>11.6 (0.5-93.9)</td>
<td>12.1 (0.4-90.1)</td>
<td>8.9</td>
</tr>
<tr>
<td>Other</td>
<td>4.9 (0.6-16.6)</td>
<td>3.2 (0.5-8.4)</td>
<td>4.6</td>
</tr>
<tr>
<td>Age &gt;55 y, %</td>
<td>19.7 (13-26)</td>
<td>20.2 (15-24)</td>
<td>21.0</td>
</tr>
<tr>
<td>High school graduate, %</td>
<td>76 (46-91)</td>
<td>76 (49-88)</td>
<td>78</td>
</tr>
</tbody>
</table>

*Values are expressed as mean (range) and are representative of the reference and intervention cities’ combined populations of 1,142,993 and 1,126,589, respectively. REACT indicates Rapid Early Action for Coronary Treatment trial. Ellipses indicate data not available.

For reporting, mean log₁₀ delay time (Y) was adjusted for covariates and retransformed to exp₁₀ (Y), assuming that Y is normally distributed. The linear trend in log₁₀ delay time (b) was converted to percentage yearly change in delay time (100% × [exp₁₀ (b) − 1]). The logistic trend in ambulance use (b) was converted to a percentage change in the odds of using an ambulance by 100% × [exp (b) − 1]. Confidence intervals (CIs) for each summary statistic were obtained from the second-stage model with t deviates and appropriate df. SAS statistical software was used for all computations (SAS Institute Inc, Cary, NC).

RESULTS

Demographic characteristics of the study communities are shown in Table 1. The reference and intervention cities had combined populations of 1,142,993 and 1,126,589 (1990 census), respectively. Community population sizes ranged from 55,777 to 238,912. The matched pairs were comparable in age distribution, education level, ethnic distribution, household income, and median delay time. All communities accepted their randomized assignments and participated until the end of the intervention program.

Intervention intensity, as measured by contacts, is shown for the 10 intervention communities (Table 2). These contacts included mass and small media and clinician and patient groups. Much of the audience was reached by mass media approaches, specifically radio, television, and newspaper. Direct mail, brochures, posters, and other educational materials were also used extensively. Direct education through community group presentations exposed many citizens to the study messages. These intervention strategies varied by community, depending on media structure and available organizations over time. Although direct education provided fewer contacts than mass media, the intensity of each direct contact was much greater.

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The random digit dial surveys provide an indication of the intervention effect on the knowledge, attitudes, and beliefs of community residents. A total of 4389 adults were contracted in 4 surveys. Participation rates were approximately 60%. In a group with a mean age of 43.1 years, a progressive increase in unaided recall of the REACT name with 6% (n=643) of respondents in intervention communities providing unaided recall at the last survey compared with 0% (n=541) in the reference communities (P<.001). At the end of the intervention, 44% (n=602) of the surveyed population in the intervention communities recognized the REACT name when it was presented whereas 15.1% (n=561) recognized it in the reference areas (P<.002). The recognition of the REACT name in reference communities was probably related to erroneous recall of other unrelated programs or contamination between communities.

There was a low but increasing level of received messages about MI symptoms (2.7% [n=645] vs 1.8% [n=561]; P<.03) and a higher percentage of correct answers to appropriate action for AMI among persons residing in the intervention communities compared with reference sites (32.6% [n=643] vs 22.8% [n=561]; P<.006). No significant differences in these additional factors were observed between intervention and reference communities. A survey of admitted patients showed similar results (data not shown).

Data were collected on 29398 and 31645 patients presenting to EDs with suspected acute CHD in reference and intervention areas, respectively (Table 3). The disposition of patients (hospitalized or released) presenting to the ED before and after the intervention is shown in Figure 1. During the intervention period, total ED presentations for chest pain and released patients declined in both the reference and intervention communities (Table 3). The decline was greater in the reference areas, but the differences were not significant (reference group, 1684 to 1353 per month; intervention, 1527 to 1504 per month).

Of those hospitalized during the intervention period, 9801 reference and 10563 intervention patients met the primary population criteria of suspected acute CHD on admission and a CHD-related discharge diagnosis (Table 3). Age and sex distributions were similar. Delay time information at baseline was available on 71.7% to 72.8% and did not differ by community assignment. Absence of delay times was primarily the result of a vague patient symptom history or inadequate recording by hospital staff.

The proportion of patients who were hospitalized and subsequently discharged with a noncardiac diagnosis did not differ significantly between reference and intervention communities during the intervention (P=.61; Figure 1). The proportion of patients admitted with suspected CHD increased in both the intervention and reference communities from baseline to intervention, but the differences were not significant (P=.13; Figure 1).

Table 2. Contacts in the Intervention Communities*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease news stories</td>
<td>A total of 1459 TV and newspaper stories about heart disease</td>
</tr>
<tr>
<td>REACT news stories</td>
<td>A total of 235 TV and newspaper stories about the project or its message</td>
</tr>
<tr>
<td>REACT news story</td>
<td>TV and newspaper circulation and viewership estimate of 7 792 834; impressions uncontrolled for duplication</td>
</tr>
<tr>
<td>REACT newspaper insert</td>
<td>A circulation of 1 220 650 for special newspaper inserts</td>
</tr>
<tr>
<td>REACT TV public service announcements</td>
<td>A total of 4657 public service announcements and paid advertisements played on commercial TV broadcast outlets in 10-, 20-, 30-, and 60-second formats</td>
</tr>
<tr>
<td>REACT cable public service announcements</td>
<td>A total of 2932 public service announcements and paid advertisements played on cable TV channels</td>
</tr>
<tr>
<td>REACT radio public service announcements</td>
<td>A total of 385 public service announcements and paid advertisements played on commercial radio broadcast outlets</td>
</tr>
<tr>
<td>Direct mail (circulation)</td>
<td>A total of 1 175 676 pieces of direct mail targeted at general public and Medicare-eligible persons</td>
</tr>
<tr>
<td>Point-of-purchase displays</td>
<td>A total of 607 REACT displays with brochures for use mainly at pharmacy prescription and check-out counters</td>
</tr>
<tr>
<td>Billboards</td>
<td>A total of 210 REACT billboards appeared for at least 30 days at a time in high-traffic public areas</td>
</tr>
<tr>
<td>Posters</td>
<td>A total of 3094 REACT posters were distributed in clinics, worksites, and other public places</td>
</tr>
<tr>
<td>Brochures, newsletters</td>
<td>A total of 1 340 704 REACT brochures and newsletters for general public or target distribution audiences</td>
</tr>
<tr>
<td>Movie-screen public service announcements</td>
<td>Presentation of REACT messages on slides preceding movies in 6 communities</td>
</tr>
<tr>
<td>Other material inserts</td>
<td>A circulation of 140 938 for all other printed materials and inserts</td>
</tr>
<tr>
<td>Presentations to high-risk patients</td>
<td>Presentations to a combined total of 361 cardiac rehabilitation groups, risk factor patient management classes, and other in-person presentations or brief counseling sessions of high-risk patients; more than 36 179 individuals were reached</td>
</tr>
<tr>
<td>Other activities with high-risk patients</td>
<td>Distribution of 468 printed and video materials to high-risk patients and their families</td>
</tr>
<tr>
<td>Community presentations</td>
<td>Presentations to a combined total of 915 senior and civic organizations, worksites, and social service agencies; 155 491 individuals were reached</td>
</tr>
<tr>
<td>Magnet events</td>
<td>A total of 145 visible public events, such as health fairs or brief presentations of the REACT message as part of some other public event</td>
</tr>
</tbody>
</table>

*REACT indicates Rapid Early Action for Coronary Treatment trial; TV, television.
Patient delay from symptom onset to ED presentation is shown in Figure 2 for the primary population. The estimated median delay time at baseline was 140 minutes in both intervention (range, 119.3–177.1 minutes) and reference communities (range, 120.7–167.6 minutes) (Table 4). The mean delay time trend in intervention communities declined significantly (−4.7% per year, 95% CI, −8.6% to −0.6%) but did not differ significantly from the trend in reference communities (−6.8% per year, 95% CI, −14.5% to 1.6%). The delay times and slopes in community pairs are shown in Table 4. Eight intervention communities had negative slopes indicating decreasing delay times, and 6 reference areas had decreasing delay times. The net effect was a nonsignificant overall difference between intervention and reference communities.

Use of the EMS system is shown (Figure 2) for the primary study population. At baseline, the average rate of EMS use was 33% in both intervention and reference communities for the primary patient population. The odds of EMS use increased steadily and significantly in intervention communities (16% per year, 95% CI, 2%-32%), while the mean trend in EMS use in reference communities did not change (−3% per year; 95% CI, −13% to 7%). The net effect was a 20% increase in EMS use in intervention compared with reference communities (odds ratio, 1.20; 95% CI, 1.07–1.34; P < .005). Ambulance use among patients who were admitted but discharged with a noncardiac diagnosis increased nonsignificantly (P = .70) in the intervention areas compared with reference areas (Fig-

**Table 3. REACT Population Size and Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Reference Group</th>
<th>Intervention Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline 18 Months</td>
<td>Baseline 18 Months</td>
</tr>
<tr>
<td>Total presenting to the emergency department</td>
<td>5051 (1684) 24347 (1353)</td>
<td>4582 (1527) 27063 (1504)</td>
</tr>
<tr>
<td>Released from the emergency department</td>
<td>3520 (1172) 15749 (764)</td>
<td>2809 (936) 15668 (872)</td>
</tr>
<tr>
<td>Hospitalized with noncardiac diagnosis</td>
<td>183 (46) 719 (44)</td>
<td>289 (67) 813 (45)</td>
</tr>
<tr>
<td>Hospitalized with cardiac diagnosis† (primary population)</td>
<td>2175 (544) 9801 (545)</td>
<td>2876 (719) 10563 (587)</td>
</tr>
</tbody>
</table>

*REACT indicates Rapid Early Action for Coronary Treatment trial; MI, myocardial infarction. The numbers in parentheses are the average number of patients per month. Numbers released from the ED in first baseline month were excluded because of lapses in collection. Numbers for all categories are inflated by subsampling fractions, which were applied throughout REACT to reduce the burden of data collection and adjusted approximately monthly to reflect current load in each community. Overall sampling fraction was 94% for admitted patients, 29% for released patients. The patients released from the emergency department within the first baseline month were excluded because of lapses in collection. Data for baseline released represent 3 months.

†Patients were admitted for evaluation of acute coronary heart disease and discharged with a coronary heart disease–related diagnosis. Diagnoses based on definition from International Classification of Diseases, Ninth Revision, Clinical Modification.
ure 1). Patients discharged from the ED were least likely to use EMSs, and usage increased in reference communities but remained unchanged in intervention communities (Figure 1). The differences were not significant ($P = .13$).

Although this study was not adequately powered to evaluate mortality, case fatality among the primary population was recorded. Compared with baseline, the case fatality rates of the intervention communities decreased from 3.23% to 2.43%, and in the reference communities decreased from 2.66% to 1.78%. These decreases were not significantly different.

**COMMENT**

Lack of timely contact with the health care system leading to out-of-hospital death or delayed presentation remains a major obstacle to more effective management of patients with AMI. The majority of CHD patients who die from cardiac arrest die outside the hospital without receiving medical attention.7 For those who experience AMI, delay in treatment is the major factor limiting the effectiveness of contemporary management approaches.3,26 Delay in seeking care is commonly divided into 3 major components: prehospital patient delay (time from symptom onset to seeking medical care); transportation delay; and delay in hospital evaluation and diagnosis prior to treatment.1,2,20,27,31 Data from 12 US and European studies published from 1969-1987 found median prehospital patient delay times ranged from 150 to 420 minutes.32 Cooper et al described a 300-minute median delay time for blacks with AMI in 1983 and 1984. Ho et al described a 144-minute median delay in King County, Washington, during 1986-1987. In the Worcester Heart Attack Study, median delay times of around 120 minutes in 1986, 1988, and 1990 were observed for patients discharged with AMI.33 Goldberg et al found a median delay time of 130 minutes for AMI cases presenting in 1991 to Minnesota hospitals. The Physician’s Health Study demonstrated a median delay time of 114 minutes for physicians experienc-
Public education campaigns to reduceprehospital delay and increase EMS use for patients with AMI have shown mixed results. A study in Gothenburg, Sweden, demonstrated that a 1-year education campaign was associated with a significant reduction in median delay time from 180 to 138 minutes among patients with confirmed AMI. Use of EMS was unchanged. A public campaign in Geneva, Switzerland, was associated with a similar reduction of median delay time for patients with confirmed AMI from 196 to 144 minutes. A study in King County found median delays of 144 minutes at baseline and 138 minutes following a media campaign. These differences were not significant, and EMS use was not changed.

The REACT trial design differed from these previous efforts in size and scope. REACT used a randomized controlled design involving 20 US cities with an incremental, multifaceted, and community-tailored campaign of 18 months. Evidence for an effect on knowledge and recognition in the general adult population is seen in data from the random digit dial telephone surveys. The achieved levels of knowledge, attitudes, and beliefs, however, were not as high as those seen in programs on other health topics. Furthermore, for some items, this may represent a ceiling effect. For example, at baseline most respondents in both the intervention and reference communities (>90%) recognized chest pain as an indicator of AMI.

A difference in reduction in delay time, the prespecified primary trial end point, was not observed between intervention and reference communities. The lack of effect represents a failure of the intervention to achieve this goal under the conditions of the REACT design. The educational messages may have been flawed, lacked sufficient intensity, duration, or both, or were targeted to the wrong groups. The successful programs in Sweden and Switzerland both occurred in settings of less competitive media environments and in well-organized health care systems based on universal insurance coverage. Although the REACT campaign appeared quite intense, it must be viewed in the context of a constant barrage of information that virtually all citizens in communities throughout the United States receive. It is conceivable that, given this intensity of background information, a longer duration of an even more intense intervention might have been more effective in lowering delay time. Increasing levels of awareness at the end of the study suggest that further effort may have resulted in a measurable effect.

Another explanation for the lack of effect of the REACT trial may be found in the relatively short median delay times observed at baseline and throughout the study. These delay times are similar (140 minutes) to the times observed at the end of the campaign in King County (138 minutes). Both the Swedish and Swiss studies began with much longer median delay times and achieved levels similar to the baseline times observed in REACT. In fact, REACT levels approximated the short times (114 minutes) observed in the Physician Health Study. It may be difficult to reduce median delay to less than 2 hours given the variability of onset and differing symptoms of CHD plus patients’ associated fear, denial, rationalization, and mal attribution of symptoms.

The increased use of the EMS system may have added to the delay times in the intervention communities. A 2-way EMS transport takes added time and the standard EMS practice of patient stabilization, intravenous access, electrocardiogram transmission, and other steps, while appropriate, may delay hospital arrival. The study design does not allow accurate ascertainment of the effect of greater EMS use on prolonging delay. However, modeling of its possible maximum effects indicates that study outcomes would not have changed.

It is also possible that measurement error, random error, and missing data play a role in the REACT observed study outcomes. Despite training of ED staff, 27% to 29% of medical records lacked usable delay times, although this rate is better than that observed in routine medical record review. Missing data may be due to lack of questioning or recording in the ED, the patient’s condition (eg, decreased consciousness), or patient uncertainty about time of symptom onset. This loss of information may have contributed to the absence of findings in delay time. However, the rate of missing data was similar in both intervention and reference sites.

The significant increase in the use of the EMS system by the primary study population in the intervention communities is an important positive result. It is also reassuring that the subgroup of patients released from the ED did not significantly increase their ambulance use. Recognized advantages of bringing skilled paramedic personnel and equipment to the patient include close monitoring, available defibrillation, cardiopulmonary resuscitation, intravenous medication use, and contact with emergency physicians. The differences observed in the REACT study contrast with those found in Seattle and Sweden where EMS use did not significantly increase with media campaigns. It is important to note that the communities in Seattle and Sweden started with EMS use rates of 42% and 61%, respectively, and hence had less opportunity to improve those rates, whereas REACT started with EMS use rates of 33%.

For a typical town with 100 000 residents, the annual cost of the REACT intervention would be $156 000 to $294 000. The cost includes local staff, supplies, and media distribution. Differences between cities were a function of local labor, rent, media, and distribution costs. More information is
available on the REACT Website at http://www.epi.umn.edu/react.

In conclusion, the REACT trial demonstrates that a community-based campaign designed to change patterns of response to symptoms of AMI did not significantly reduce patient delay time compared with reference areas. The REACT program did increase the use of the EMS system by patients admitted with presumed acute CHD and discharged with a CHD diagnosis, leading to more appropriate transport of these patients to the hospital. Although the REACT observations indicate a continued need for programs to bring rapid and effective care to patients with AMI, including sustained and intense public, patient, and clinician education, new strategies are needed if patient delay time for AMI is to be reduced further.

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Additional Information: Further information, as well as materials and methods from REACT, is available at http://www.epi.umn.edu/react.

REFERENCES