
A Population-Based Perspective

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Background: Elevated serum cholesterol levels are associated with increased risk for acute myocardial infarction (AMI) and adverse patient outcomes. It is unclear what proportion of patients have their serum cholesterol levels measured during hospitalization for AMI and are given hypolipidemic therapy.

Objective: To examine decade-long trends in measurement of serum cholesterol levels during hospitalization for AMI and use of hypolipidemic therapy.


Results: Increases in the measurement of serum cholesterol levels during hospitalization for AMI were observed between 1986 and 1991, followed by a progressive decrease; only 24% of patients with AMI in 1997 underwent cholesterol level testing. Younger age, male sex, and absence of a history of cardiovascular disease were associated with an increased likelihood measurement of serum cholesterol levels. Although the relative use of hypolipidemic therapy increased significantly over time (0.4% in 1986 vs 10.7% in 1997), the absolute rate of use remained low. In patients with elevated serum cholesterol levels (≥6.2 mmol/L [≥240 mg/dL]), 1.9% received hypolipidemic therapy in 1986 and 36.6% in 1997.

Conclusions: These findings suggest recent declines in the assessment of total cholesterol levels in patients hospitalized with AMI. Although the use of hypolipidemic therapy during hospitalization for AMI has increased over time, considerable room for improvement remains.

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ONE OF THE MOST important risk factors for coronary heart disease (CHD) is an elevated total blood cholesterol level. Elevated serum cholesterol levels are associated with progression of coronary artery disease in patients with angiographically confirmed disease and with an increased risk for recurrent coronary events and all-cause mortality in patients with acute myocardial infarction (AMI). The results of a large number of clinical trials have provided convincing evidence that intervention with hypolipidemic drugs is associated with a reduced risk for CHD events, mortality, and use of health care services. Based on these and additional findings, guidelines and indications for the treatment of patients with elevated total and low-density lipoprotein (LDL) cholesterol levels have been published.

Despite the development and dissemination of these guidelines and calls for more widespread application of dietary and hypolipidemic therapy in high-risk patients and those with confirmed CHD, multiple studies suggest that these therapeutic approaches remain underused. Accordingly, a number of health care organizations have identified the measurement and subsequent treatment of elevated serum cholesterol levels, specifically LDL cholesterol, as a benchmark of quality health care in patients with recent AMI. The National Committee for Quality Assurance has recently implemented a performance measure that reflects the effectiveness of cholesterol level management in patients with CHD. Managed care organizations currently looking for accreditation from the National Committee for Quality Assurance must act in accord with the latest measure of the Health Plan Employer and Data Information Set. This measure mandates the assessment and report of the proportion of patients with major CHD events in whom LDL cholesterol levels of less than 3.4 mmol/L (<130 mg/dL) have been achieved within 2 months to 1 year after hospital discharge.
MATERIALS AND METHODS

The population under study consisted of metropolitan Worcester residents hospitalized with validated AMI in 16 university-affiliated and community hospitals in the Worcester metropolitan area during 1986, 1988, 1990, 1991, 1993, 1995, and 1997. Fewer hospitals were included in recent years because of hospital closures or their conversion to chronic care or rehabilitation facilities. The methods of sample identification and diagnostic criteria used in this study have been described in detail previously.30-32 In brief, to be considered for study inclusion, patients had to be residents of the Worcester metropolitan area (1990 census estimate, 437,000) and have at least 2 of 5 predefined criteria consistent with AMI. Determination of eligibility was based on the review of medical records of patients hospitalized with a primary or secondary discharge diagnosis of AMI (International Classification of Diseases, Ninth Revision [ICD-9] code 410) and other possible discharge diagnoses in which AMI may have been misclassified (ICD-9 codes 411-414 and 786.5) at all Worcester metropolitan area hospitals. These criteria included a typical history of prolonged chest pain (ie, lasting >20 minutes) not relieved by rest and/or use of nitrates, peak serum enzyme level elevations above normal hospital values, and serial electrocardiographic tracings during hospitalization showing evolutionary changes in the ST segment and/or Q waves typical of AMI.30-32

A total of 29,982 residents of greater Worcester sustained a validated AMI during the 7 study years. Information about measurement of a more complete serum lipid level profile (eg, triglycerides and high-density lipoprotein [HDL] and low-density lipoprotein [LDL] cholesterol) was available only for patients hospitalized in 1995 and 1997; their characteristics were not examined in this study, as the primary focus of this report was the measurement of total serum cholesterol levels. Patients receiving hypolipidemic medication before the index hospitalization (n=403), those transferred from other hospitals (n=406), and those whose serum cholesterol levels were considered to be elevated due to laboratory measurement error (n=13) were excluded from further consideration. After these exclusions, 5,204 patients constituted the sample of interest. (Some patients met more than 1 of the exclusion criteria.)

DATA COLLECTION

The medical records of hospitalized residents were individually reviewed and validated according to the preestablished diagnostic criteria. Information about demographics, medical history, clinical characteristics, the use of various therapies before and during the acute hospitalization, and therapy prescribed at the time of hospital discharge was abstracted from the medical records of geographically eligible patients satisfying the study inclusion criteria. Prescription of hypolipidemic medications during hospitalization for AMI and/or at the time of hospital discharge was ascertained through the review of notes by physicians and nurses indicating the use of any hypolipidemic medication during the index event. Total serum cholesterol levels were measured in automated clinical chemistry analyzers at the laboratories of participating hospitals.

DATA ANALYSIS

Demographics, medical history, and clinical factors associated with test-ordering practices for cholesterol level measurement and changes over time therein were examined in the study sample. Analysis of variance was used to examine differences between various comparison groups for continuous variables, whereas χ² tests of statistical significance were used for the analysis of differences in discrete variables. All tests of statistical significance were 2-tailed. Multivariable regression analyses were used to examine the association between whether total serum cholesterol levels were measured during hospitalization for AMI and demographic characteristics, medical history, and clinical factors.

RESULTS

SAMPLE CHARACTERISTICS

The mean age of the study sample was 68 years; 59.2% of the subjects were men. A history of angina was present in 24.4%; diabetes, in 26.1%; and hypertension, 52.0%. An initial AMI was present in 68.0% of the sample, and a Q-wave MI developed in 44.6% during the index hospitalization.

OVERALL AND DECADE-LONG TRENDS IN THE MEASUREMENT OF TOTAL SERUM CHOLESTEROL LEVELS

A total of 30,677 (58.9%) patients had their total cholesterol level measured during hospitalization for AMI between 1986 and 1997. Trends in serum cholesterol level measurement during the index hospitalization are shown
Figure 1. Measurement of total cholesterol levels increased markedly from 1986 through 1991, after which time a significant decline occurred such that slightly less than one quarter of patients with AMI hospitalized in 1997 had their serum cholesterol levels measured. Overall, 72.7% of those patients who had their total cholesterol levels measured did so during the first day of hospitalization (76.0% in 1986 vs 40.8% in 1997). In 1995, 9.1% of patients had a complete lipid-level profile performed (triglycerides and HDL and LDL cholesterol), whereas 15.0% of patients had a complete profile performed in 1997.

CHARACTERISTICS OF PATIENTS ASSOCIATED WITH ORDERING PRACTICES FOR TOTAL CHOLESTEROL LEVELS

The demographic characteristics, medical history, and clinical characteristics of patients with AMI according to whether a total serum cholesterol level measurement was performed are shown in Table 1. These data are presented for the total study sample and stratified according to several aggregated periods to make trends over time more interpretable. During the combined periods, total cholesterol level was significantly more likely to be measured during the acute hospitalization in younger patients, men, and patients without selected comorbidities. Patients with an initial Q-wave AMI were also significantly more likely to have assays of cholesterol levels performed than patients with a previous or non-Q-wave MI.

Trends in the relationship of these demographic and clinical factors to the measurement of serum cholesterol levels in the 3 aggregated periods under study are also shown (Table 1). Despite differences over time in the absolute number and proportion of patients having their serum cholesterol level measured, the association of selected factors with the measurement of serum cholesterol level was relatively similar during the periods under study.

Table 1. Characteristics of Patients With AMI According to Serum Cholesterol Level Measurement Practices and Study Period*

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<tbody>
<tr>
<td>No. of Patients</td>
<td>% With Cholesterol Level Measured</td>
<td>No. of Patients</td>
<td>% With Cholesterol Level Measured</td>
<td>No. of Patients</td>
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<tr>
<td>Age, y</td>
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<tr>
<td>&lt;55†</td>
<td>505</td>
<td>67.1†</td>
<td>131</td>
<td>72.0</td>
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<tr>
<td>55-64</td>
<td>599</td>
<td>63.9†</td>
<td>184</td>
<td>64.1</td>
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<td>65-74</td>
<td>866</td>
<td>58.6†</td>
<td>251</td>
<td>61.5</td>
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<tr>
<td>≥75</td>
<td>1095</td>
<td>53.9†</td>
<td>234</td>
<td>56.0</td>
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</tr>
<tr>
<td>Men</td>
<td>1815</td>
<td>60.7†</td>
<td>491</td>
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<td>Women</td>
<td>1252</td>
<td>56.5</td>
<td>309</td>
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<tr>
<td>Angina present</td>
<td>748</td>
<td>55.3‡</td>
<td>183</td>
<td>53.8‡</td>
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<td>60.2</td>
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<td>800</td>
<td>55.5‡</td>
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<td>1596</td>
<td>56.4‡</td>
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<tr>
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<td>1471</td>
<td>61.9</td>
<td>409</td>
<td>62.5</td>
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<tr>
<td>Stroke present</td>
<td>289</td>
<td>56.9</td>
<td>77</td>
<td>65.3</td>
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<tr>
<td>Stroke absent</td>
<td>2778</td>
<td>59.1</td>
<td>723</td>
<td>61.4</td>
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<tr>
<td>CVD present</td>
<td>2146</td>
<td>57.2‡</td>
<td>553</td>
<td>60.4</td>
</tr>
<tr>
<td>CVD absent</td>
<td>921</td>
<td>63.2‡</td>
<td>247</td>
<td>65.0</td>
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<td>AMI characteristics</td>
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<tr>
<td>Initial</td>
<td>2085</td>
<td>60.5‡</td>
<td>566</td>
<td>64.1†</td>
</tr>
<tr>
<td>Previous</td>
<td>982</td>
<td>55.9</td>
<td>234</td>
<td>56.8</td>
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<td>Q wave</td>
<td>1350</td>
<td>61.5‡</td>
<td>389</td>
<td>61.0</td>
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<tr>
<td>Non−Q wave</td>
<td>1676</td>
<td>56.8</td>
<td>372</td>
<td>62.1</td>
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<tr>
<td>Anterior</td>
<td>1213</td>
<td>57.3</td>
<td>347</td>
<td>56.5‡</td>
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<tr>
<td>Inferior/posterior</td>
<td>1817</td>
<td>59.9</td>
<td>420</td>
<td>66.8</td>
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</table>

* Data were not available for some patients. AMI indicates acute myocardial infarction; CVD, cardiovascular disease (ie, angina, diabetes, and stroke).
†P < .05.
‡P < .005.
Several multivariable regression analyses were performed to examine the association of selected patient characteristics with the measurement of total cholesterol level in patients with AMI overall as well as during the earliest (1986-1988) and most recent (1995-1997) study periods. The independent factors controlled for in these analyses included patient age; sex; medical history of angina, diabetes, hypertension, and stroke; previous MI; non-Q-wave MI; and inferior/posterior MI.

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<tbody>
<tr>
<td>Age, y</td>
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<tr>
<td>55-64</td>
<td>0.92 (0.75-1.13)</td>
<td>0.73 (0.48-1.11)</td>
<td>0.65 (0.45-0.94)</td>
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<tr>
<td>65-74</td>
<td>0.74 (0.65-0.95)</td>
<td>0.74 (0.49-1.11)</td>
<td>0.47 (0.33-0.66)</td>
</tr>
<tr>
<td>≥75</td>
<td>0.65 (0.54-0.76)</td>
<td>0.60 (0.40-0.91)</td>
<td>0.35 (0.25-0.49)</td>
</tr>
<tr>
<td>Women</td>
<td>0.95 (0.85-1.07)</td>
<td>0.80 (0.65-1.03)</td>
<td>1.04 (0.83-1.32)</td>
</tr>
<tr>
<td>Medical history</td>
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<tr>
<td>Angina</td>
<td>0.91 (0.80-1.04)</td>
<td>0.68 (0.51-0.89)</td>
<td>0.83 (0.63-1.10)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.87 (0.77-0.99)</td>
<td>0.95 (0.72-1.25)</td>
<td>0.90 (0.70-1.15)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.87 (0.78-0.98)</td>
<td>1.04 (0.82-1.33)</td>
<td>0.93 (0.74-1.18)</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.05 (0.87-1.27)</td>
<td>1.26 (0.82-1.93)</td>
<td>0.90 (0.61-1.32)</td>
</tr>
<tr>
<td>AMI characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>1.06 (0.93-1.20)</td>
<td>1.20 (0.92-1.57)</td>
<td>1.01 (0.78-1.31)</td>
</tr>
<tr>
<td>Q wave</td>
<td>1.13 (1.01-1.28)</td>
<td>0.83 (0.65-1.06)</td>
<td>0.98 (0.77-1.25)</td>
</tr>
<tr>
<td>Anterior</td>
<td>0.91 (0.81-1.02)</td>
<td>0.66 (0.52-0.84)</td>
<td>1.12 (0.89-1.40)</td>
</tr>
</tbody>
</table>

*AMI indicates acute myocardial infarction. Data are given as adjusted odds ratio (95% confidence interval). Referent categories for odds ratios are age younger than 55 years; male; absence of a medical history of angina, diabetes, hypertension, and stroke; previous MI; non-Q-wave MI; and inferior/posterior AMI.

**Factors Associated With Serum Cholesterol Level Measurement During Hospitalization for AMI**

The results of this population-based study of residents from a geographically defined, representative northeast metropolitan area show a significant decline in the measurement of total serum cholesterol levels in patients hospitalized for AMI between 1986 and 1997. After simultaneously controlling for a number of characteristics, patient age, in particular, emerged as a significant factor influencing whether a serum cholesterol level test was ordered during hospitalization for AMI; with advancing age inversely associated with having a cholesterol test performed.

**Trends in the Prescription of Hypolipidemic Agents**

Overall, 3.3% of patients were prescribed hypolipidemic therapy during hospitalization for AMI. A significant increase was observed in the use of hypolipidemic therapy in hospitalized patients between 1986 (0.4%) and 1997 (10.7%) (P < .001).

Among patients in whom total serum cholesterol level was measured, hypolipidemic drug therapy was initiated during hospitalization for AMI and/or at discharge in a minority of patients (Figure 2). Patients with total cholesterol levels measured in 1997 had a 4-fold increased likelihood of receiving hypolipidemic therapy compared with patients who did not have their lipid levels measured in the most recent period under study.

Overall, hypolipidemic therapy was initiated during hospitalization and/or at the time of hospital discharge in 8.0% of patients with a total cholesterol level of at least 6.2 mmol/L (≥240 mg/dL). In 1986, 1.9% of patients with an elevated serum cholesterol level received hypolipidemic therapy, compared with 36.6% in 1997. In a subgroup analysis of individuals reported to be receiving hypolipidemic medication before the index hospitalization, slightly less than three quarters (72.7%) of these patients were discharged receiving hypolipidemic therapy.

**Comment**

The results of this population-based study of residents from a geographically defined, representative northeast metropolitan area show a significant decline in the measurement of total serum cholesterol levels in patients hospitalized for AMI between 1986 and 1997. After simultaneously controlling for a number of characteristics, patient age, in particular, emerged as a significant factor influencing whether a serum cholesterol level test was ordered during hospitalization for AMI; with advancing age inversely associated with having a cholesterol test performed.

**Figure 2.** Trends in prescribing hypolipidemic therapy according to whether cholesterol level measurements were obtained during hospitalization for acute myocardial infarction in the Worcester, Mass, Heart Attack Study.
age, patients were much less likely to have their choles-
terol levels checked. This trend remained prominent even
in the most recently hospitalized cohort. In contrast to
decreases in the measurement of serum cholesterol level
over time, there was a significant increase in the initia-
tion of hypolipidemic therapy during hospitalization for
AMI, although the absolute rate of use remained low even
in the mid to late 1990s.

MEASUREMENT OF SERUM CHOLESTEROL
LEVELS DURING HOSPITALIZATION FOR AMI

The importance of the identification and appropriate treat-
ment of hypercholesterolemia in patients with coronary
artery disease through lifestyle interventions and/or phar-
maceutical approaches is undisputed. Several large,
well-designed, randomized controlled clinical trials have
demonstrated significant reductions in subsequent mor-
bidity and/or mortality in patients with coronary artery
disease and hypercholesterolemia who were given hy-
polipidemic therapy. Accordingly, the NCEP ATP II has
recommended that a complete blood lipid-level pro-
file be performed in all patients with established CHD.

Despite these recommendations and the develop-
ment and clinical availability of increasingly effective hy-
polipidemic agents, there is substantial evidence to sug-
gest that coronary artery disease and hyperlipidemia
remain underdiagnosed and untreated. Analysis of data
from the Behavioral Risk Factor Surveillance study sug-
gests that fewer than one third of patients who needed
management, particularly in high-risk cardiac patients,
and engaging patients at windows of opportunity such as
hospitalization for AMI, Roberts examined the reasons why
cardiologists might have limited interest in cholesterol
management. Confusion about rapidly changing recommenda-
tions from lipid experts, inadequate knowledge about
nutrition and implementation of appropriate dietary
changes, perception of hypolipidemic agents as expen-
sive and fraught with adverse effects, and lack of finan-
cial compensation for time spent in this endeavor were ma-
jor reasons cited for physicians' lack of attention to
cholesterol level management.

We suspect that confusion about the validity of cho-
lesterol level measurements ascertained within the first few
hours after AMI may play a role in the observed trends of
decreasing testing of serum cholesterol levels. Data from
the Framingham Heart Study suggest that cholesterol level
measurements in the first 24 hours after AMI are valid,
reflect baseline values, and can be used for the institution
of dietary or therapeutic intervention programs. On the
other hand, data from limited studies have suggested that
lipid values fall significantly after the first few days of hos-
pitalization and can take up to several weeks to months
to return to baseline. However, there are several prob-
lems with a “wait-and-see” approach to the measurement
of serum cholesterol levels after AMI. As previously noted,
the index hospitalization represents an opportune time to
initiate secondary prevention efforts. Delays in diagnosis
and treatment may result in significant undertreatment of
an important and modifiable risk factor for CHD.

One could argue that in the setting of an AMI, phys-
sicians have too many issues to deal with in the first few
days of hospitalization to consider the institution of proper
management of lipid levels. Ironically, data from our study
suggest otherwise. Physicians were not only checking se-
rum lipid levels more often in the past, but they were also
more likely to check them in the first 24 hours after AMI,
when these measurements may be more likely to reflect
basal levels.

The outpatient approach to lipid level measure-
ment after AMI also presumes that a high number of
lipid-level profiles will be falsely low and result in pa-

patients and physicians being falsely reassured or necessi-
tating the cost of an additional test at 6 to 8 weeks after hospitalization for AMI. In fact, it has been shown that in patients hospitalized for AMI, most have baseline LDL levels of greater than 2.6 mmol/L (>100 mg/dL) and/or fail to achieve LDL levels of less than 2.6 mmol/L (<100 mg/dL) after 3 months of lifestyle changes. In the present study, 20% of lipid level measurements performed after the initial hospital day demonstrated levels that were elevated at greater than 6.2 mmol/L (>240 mg/dL). Indeed, the NCEP ATP II recommendations suggest that a preliminary cholesterol level measurement during the acute phase of MI provides an approximation that, if elevated, can assist with initial management decisions. In addition, the NCEP ATP II in 1997 recommended the immediate assessment of a lipoprotein-level profile on admission for AMI. A more complete serum lipid-level profile, which requires physicians to be more proactive in their test-ordering practices, was infrequently ordered in our study in the late 1990s. Although having data available about the profile of other serum lipoprotein levels may provide additional insights to patients' risk and need for more targeted therapies, this testing remains underused in most hospitalized patients with AMI.

AGE AND OTHER FACTORS ASSOCIATED WITH CHOLESTEROL LEVEL MEASUREMENT

Of the demographic characteristics, medical history, and AMI characteristics included in our regression analyses, age appeared to have the greatest influence on whether serum cholesterol levels were measured. This was especially true in the most recent hospitalized cohort (1995-1997) in which patients aged 75 years and older were 63% less likely to have their cholesterol levels checked than those aged 55 years and younger. The appropriateness of screening for, and treatment of, hypercholesterolemia in older patients, including those with underlying coronary disease, has generated considerable controversy. However, analyses from 2 of the more recent trials for hypolipidemic agents suggest that older patients may also benefit from the receipt of hypocholesterolemic agents. These and other data suggest that the relative absence of cholesterol level measurements in elderly patients hospitalized with AMI in the present study may result in important failures to diagnose and subsequently modify an easily correctable risk factor in a high-risk patient population. Underuse of effective cardiac therapies in elderly patients with AMI has been noted previously in several other reports from our communitywide registry, including treatment with β-blockers, thrombolytic agents, and aspirin.

Overall, and within each time period, cholesterol levels were more likely to be measured in men than women and in those without than with a specific comorbidity. In subsequent regression analyses, however, including age as a controlling variable, most of these factors were no longer associated with cholesterol level measurement. A history of diabetes or hypertension was weakly, albeit inversely, associated with the measurement of serum cholesterol level in the entire study sample. Patients with a history of some form of cardiovascular disease and in whom an AMI develops may receive less cholesterol level testing because they had a prior assessment of their serum lipid levels and may have previously received drug treatment.

INITIATION OF HYPOLIPIDEMIC THERAPY

Although significant increases in the initiation of hypolipidemic therapy were noted from 1986 through 1997, a remarkable underuse of this therapy remains, even in those with clearly elevated cholesterol levels. Much of this underuse is, no doubt, secondary to failure to check serum cholesterol levels during the index hospitalization. However, of patients in whom serum lipid levels were checked and found to be elevated (>6.2 mmol/L [>240 mg/dL]), only 8.0% started appropriate drug therapy during hospitalization. Although there was a marked improvement during the course of our study in the prescribing of hypolipidemic agents in patients with hypercholesterolemia, the absolute rate of initiation of hypolipidemic therapy remained low, peaking at 36.6% in 1997. The extent of use of low-fat and/or other special diets in these patients is unknown. A perplexing finding was the observation that slightly less than three quarters of patients who reportedly received hypolipidemic therapy before the index hospitalization were discharged receiving these medications. This may be due to poor or inaccurate patient reports of medication use, inadequate documentation of discharge medications, or physician reluctance to continue therapy with these agents for varying reasons.

The reasons for the underuse of hypolipidemic therapy, even in patients with documented undesirable serum cholesterol levels, are unclear. The previously cited findings of Roberts may partially explain physician reluctance to start therapy in these high-risk patients. It is also possible that physicians, while noting the increased cholesterol levels, prefer to wait until after hospital discharge for the initiation of drug therapy and/or discussions about the importance of making dietary changes. Unfortunately, by delaying therapy, a window of opportunity for the initiation of hypolipidemic treatment and other possible secondary prevention measures is lost. Increasing evidence suggests that the presently used agents (eg, statins) exert an important plaque-stabilizing effect in addition to their ability to lower cholesterol levels. It is possible that the early initiation of therapy with these highly effective agents may decrease the occurrence of early recurrent coronary events, especially in patients at high risk (ie, those with unstable angina and non–ST-segment elevation MI). A reasonable quality standard might be that screening for dyslipidemia ought to be performed before hospital discharge in patients who have not undergone screening for hyperlipidemia in the past year. This recommendation is in part based on the rationale that an elevated total cholesterol level in the hospital setting is likely to be even higher in the usual home environment, and that appropriate follow-up with subsequent testing in the outpatient setting should be documented.

STUDY STRENGTHS AND LIMITATIONS

Although the focus of the present report was on the inpatient measurement of serum lipid levels and the ini-
tiation of hypolipidemic therapy in patients with AMI, a limitation of this descriptive epidemiological study was our inability to describe the measurement of serum cholesterol levels and/or institution of hypolipidemic therapy after discharge from areawide hospitals. It is certainly possible that physicians increasingly opt to check patients’ cholesterol levels after discharge from the hospital during their initial outpatient encounters and more systematically develop a dietary and/or medication plan to more favorably influence their serum lipid- and lipoprotein-level profile. Unfortunately, some data suggest that community physicians do not treat patients adequately with hypolipidemic therapy after a diagnosis of coronary disease.31,42 This will require further explanation and study. We can only comment on the consistently decreasing in-patient measurements of cholesterol levels during the decade-long study and the missed opportunity for the initiation of early secondary prevention modalities that this represents. Furthermore, an outpatient approach to the diagnosis and management of hyperlipidemia does not explain the low rates of use of hypolipidemic therapy in patients documented to have hyperlipidemia.

Similarly, a certain proportion of patients may have had cholesterol levels measured in the preceding year, and repeated testing was therefore deemed unnecessary. However, as target cholesterol levels differ in patients with and without coronary artery disease, and given the rapidity at which serum cholesterol levels can worsen with adverse dietary changes, one could argue that even subjects with previously acceptable serum cholesterol levels should undergo retesting after AMI. As with any observational study, there may have been additional factors that influenced the determination of serum cholesterol levels as well as initiation of hypolipidemic therapy. Other factors that may have influenced physicians’ test-ordering and treatment practices include severity of underlying and acute coronary disease, presence of other comorbidities, sociodemographic status, insurance coverage, and patients’ adherence to lifestyle and/or treatment recommendations. Data were also not available about the number and characteristics of patients who may have already had their cholesterol status known, particularly during a recent period before their AMI, which may have reduced the likelihood of further testing of lipid levels during their index hospitalization. We were similarly unable to assess whether physician specialty or practice type played a significant role in affecting these end points. Although the extent of this situation remains unknown, a number of patients admitted for AMI likely had undergone previous screening for hyperlipidemia. There may have been many reasons why these individuals were not receiving hypolipidemic drugs at the time of hospital admission, including that the patients were not hyperlipidemic at the time of the screening, that hyperlipidemia was managed with changes in diet, or that the patients had been prescribed hypolipidemic drugs but did not take them because of adverse effects, costs, or other reasons. Finally, we did not compare the long-term outcomes among those who did, compared with those who did not, undergo measurement of cholesterol levels. Although these data are available, the nonrandomized nature of this study precludes any meaningful conclusions being derived about the effects (or lack thereof) of current test-ordering practices, given the influence of a variety of potentially confounding factors, only some of which were measured.

The strengths of this study include its ability to reflect accurately hospital cholesterol level measurement practices in a large number of patients with AMI from a predefined geographic area during a prolonged period. We believe that this is the first report presenting data concerning trends in the early assessment and management of cholesterol levels in patients with AMI from the perspective of a multihospital, population-based study. Moreover, the socioeconomic and demographic characteristics of residents of the Worcester metropolitan area have been shown to be similar to those of the rest of the United States, enhancing the potential generalizability of our study findings.

CONCLUSIONS

This study reports a decreasing use of cholesterol level measurement in patients hospitalized for AMI. In addition, an increasing proportion of these tests are being performed at a later time during the index hospitalization than has been shown to be valid, which increases the likelihood of artificially low test results. Although the initiation of hypolipidemic therapy is occurring in increasing proportions of patients with AMI who have documented hyperlipidemia, it still occurs in a minority of eligible subjects. Our analyses suggest that the most important factor negatively influencing test-ordering practices is advancing age. The present results suggest that substantial room remains for improvement in the diagnosis and management of hyperlipidemia in all patients with AMI with the goal of reducing subsequent morbidity and mortality in these patients.

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