HE PAST DECADE HAS WITNESSED THE EMERGENCE OF CONCLUSIVE EVIDENCE THAT LOWERING SERUM CHOLESTEROL LEVELS CAN MARKEDLY AND SAFELY REDUCE THE RISK FOR CORONARY HEART DISEASE (CHD) EVENTS, INCLUDING CARDIAC DEATH, MYOCARDIAL INFARCTION, UNSTABLE ANGINA, AND STROKE. THIS EVIDENCE IS THE CULMINATION OF DECADES OF RESEARCH ON THE RELATION BETWEEN SERUM CHOLESTEROL LEVELS AND ATHEROSCLEROSIS, CAPPED BY 2 RELATIVELY RECENT MAJOR ADVANCES. THE FIRST WAS THE DISCOVERY OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE INHIBITORS (STATINS); THESE DRUGS ARE HIGHLY EFFECTIVE FOR REDUCING SERUM CHOLESTEROL LEVELS. THE SECOND WAS A SERIES OF CLINICAL TRIALS WITH STATIN THERAPY DOCUMENTING THE EFFICACY AND SAFETY OF CHOLESTEROL LOWERING FOR DECREASING THE MORBIDITY AND MORTALITY FROM CHD. THE NATIONAL CHOLESTEROL EDUCATION PROGRAM (NCEP) RECOMMENDS REDUCTION OF LOW-DENSITY LIPOPROTEIN CHOLESTEROL (LDL-C) TO 100 mg/dL (2.59 mmol/L) OR LESS IN PATIENTS WITH ESTABLISHED CORONARY HEART DISEASE (CHD). HOWEVER, THE NATIONAL COMMITTEE FOR QUALITY ASSURANCE (NCQA) IS IMPLEMENTING A NEW PERFORMANCE MEASURE AS PART OF THE HEALTH PLAN EMPLOYER AND DATA INFORMATION SET (HEDIS) THAT APPEARS TO ENDORSE A DIFFERENT TARGET. THE NEW HEDIS MEASURE WILL REQUIRE MANAGED CARE ORGANIZATIONS SEEKING NCQA ACCREDITATION TO MEASURE AND REPORT THE PERCENTAGE OF PATIENTS WHO HAVE HAD MAJOR CHD EVENTS WHO ACHIEVE LDL-C LEVELS LESS THAN 130 mg/dL (3.36 mmol/L) BETWEEN 60 AND 365 DAYS AFTER DISCHARGE. THESE DIFFERENT LDL-C THRESHOLDS EMPHASIZE THE DIFFERENCE BETWEEN A CLINICAL GOAL FOR THE MANAGEMENT OF INDIVIDUAL PATIENTS (<100 mg/dL) AND A PERFORMANCE MEASURE USED TO EVALUATE THE CARE OF A POPULATION OF PATIENTS (<130 mg/dL). THIS ARTICLE DISCUSSES THE RATIONALE FOR EACH THRESHOLD AND EXPLAINS THE USE OF 2 DIFFERENT THRESHOLDS FOR THESE 2 PURPOSES. BOTH THE NCQA AND NCEP EXPECT THAT THE NEW HEDIS MEASURE WILL ENCOURAGE MANAGED CARE ORGANIZATIONS TO DEVELOP SYSTEMS THAT IMPROVE SECONDARY PREVENTION OF CHD.

Guidelines from the National Cholesterol Education Program (NCEP) recommend reduction of low-density lipoprotein cholesterol (LDL-C) to 100 mg/dL (2.59 mmol/L) or less in patients with established coronary heart disease (CHD). However, the National Committee for Quality Assurance (NCQA) is implementing a new performance measure as part of the Health Plan Employer and Data Information Set (HEDIS) that appears to endorse a different target. The new HEDIS measure will require managed care organizations seeking NCQA accreditation to measure and report the percentage of patients who have had major CHD events who achieve LDL-C levels less than 130 mg/dL (3.36 mmol/L) between 60 and 365 days after discharge. These different LDL-C thresholds emphasize the difference between a clinical goal for the management of individual patients (<100 mg/dL) and a performance measure used to evaluate the care of a population of patients (<130 mg/dL). This article discusses the rationale for each threshold and explains the use of 2 different thresholds for these 2 purposes. Both the NCQA and NCEP expect that the new HEDIS measure will encourage managed care organizations to develop systems that improve secondary prevention of CHD.

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mg/dL (2.59 mmol/L) or less. These guidelines have been endorsed by the American Heart Association and the American College of Cardiology.6

Because of the strong evidence in support of cholesterol-lowering therapy for secondary prevention, in December 1998, the National Committee for Quality Assurance (NCQA) gave final approval to a performance measure for the effectiveness of cholesterol management in patients with established CHD. The new measure was an optional component of the Health Plan Employer and Data Information Set (HEDIS) in 1999 and will be mandatory in 2000 for managed care organizations seeking NCQA accreditation. Also required in 1999 was a process measure that evaluates how often LDL-C levels are measured in CHD patients.

This performance measure represents a new approach compared with previous HEDIS measures because it goes beyond asking the relatively simple question of whether a test was performed. Instead, managed care organizations that participate in HEDIS will have to identify and follow up patients who have had major CHD events, including acute myocardial infarction (AMI), coronary artery bypass graft (CABG) surgery, or percutaneous transluminal coronary angioplasty.

The new criteria will require managed care organizations to measure and report the percentage of patients who have achieved the LDL-C level specified in the performance measure between 60 and 365 days after hospital discharge for a CHD event. This qualitative change in the nature of HEDIS measures will impose new burdens on managed care organizations at a time when many are under financial stress. However, the NCQA (which includes several representatives from managed care organizations) considered these burdens warranted because of the potential benefits for patients with CHD.

The LDL-C level selected by NCQA for the performance measure is a value less than 130 mg/dL (3.36 mmol/L). This level differs from the NCEP’s LDL-C goal of 100 mg/dL or less for patients with CHD. The purpose of this article is to address this apparent discrepancy and to point out that, properly understood, the clinical goal of an LDL-C level of 100 mg/dL or less and the performance measure of an LDL-C level less than 130 mg/dL are consistent with each other.

The key to this understanding lies in the difference between a clinical goal and a performance measure. This article aims to provide insight into the difference between a clinical goal for the treatment of individual patients and a performance measure for the care of populations. This distinction is important to avoid confusion and the appearance of mixed messages from the NCEP and NCQA.

**NCEP GUIDELINES**

According to NCEP guidelines,2 LDL-C-lowering therapy should be initiated in most patients with CHD if the LDL-C level is more than 100 mg/dL. These guidelines indicate that a reasonable goal of therapy is to reduce LDL-C to 100 mg/dL or less. As defined by NCEP, therapy always means dietary therapy and may or may not include drug therapy. Maximal dietary therapy should always be used for patients whose LDL-C level is more than 100 mg/dL. If the LDL-C level at baseline is 130 mg/dL, drug therapy generally should be started. According to the NCEP, if the LDL-C level is 100 to 129 mg/dL (2.59-3.34 mmol/L), dietary therapy and other life habit modifications, especially physical activity and weight control, should be used; whether to use drug treatment is a decision for the physician to make based on clinical judgment. The rationale for an LDL-C goal of 100 mg/dL or less in secondary prevention is based on evidence including data from epidemiological, angiographic, and clinical endpoint studies.

**Epidemiological Evidence**

Epidemiological data provide the largest body of evidence for the relationship between serum cholesterol levels and CHD risk. Growing evidence suggests that results from epidemiological studies and clinical trials are highly congruent.7 Whereas early prospective studies in high-risk populations suggested a threshold relation between serum cholesterol concentrations and CHD incidence (with an apparently flat relation below 200 mg/dL [5.17 mmol/L]), larger studies revealed the limitations of these earlier, smaller studies. For example, follow-up of 350,000 patients screened for the Multiple Risk Factor Intervention Trial (MRFIT) showed that CHD rates decreased with declining cholesterol levels down to a total cholesterol level of 150 mg/dL (3.88 mmol/L), corresponding to an LDL-C level of about 100 mg/dL.8 This finding is consistent with low rates of CHD in populations in which average total cholesterol concentrations are less than 150 mg/dL.7,8 Data from the Framingham Heart Study demonstrate that about 20% to 25% of AMIs occur in people with a total cholesterol level less than 200 mg/dL, corresponding to an LDL-C level less than 130 mg/dL.9 However, as in the MRFIT results,8 AMI is rare in the person whose total cholesterol concentration is less than 150 mg/dL.9

Epidemiological studies also provide useful information about the shape of the relationship between cholesterol levels and CHD incidence. Larger prospective studies consistently reveal a curvilinear relationship. To be more precise, the relationship is log-linear. This pattern of correlation was shown in the large MRFIT follow-up,8 but as reviewed by Law et al,2 the same log-linear relationship is observed in numerous prospective studies in different populations throughout the world. The NCEP views this large body of consistent evidence as strong support for a continuous but log-linear relationship between serum cholesterol levels and CHD risk.

**Angiographic Trials**

A series of trials have addressed the question of whether aggressive cholesterol-lowering therapy delays progression or induces regression of coronary plaques, as assessed by angiography. Three trials among others are noteworthy: the Program on Surgical Control
of the Hyperlipidemias (POSCH),\textsuperscript{10} the Familial Atherosclerosis Treatment Study (FATS),\textsuperscript{11} and the Post-CABG trial.\textsuperscript{12} Patients in POSCH and FATS achieved LDL-C levels near 100 mg/dL and showed favorable changes in coronary lesions. The Post-CABG trial was designed to test the efficacy of moderate vs aggressive LDL-C lowering on angiographic end points in a series of patients who had previously undergone CABG surgery. Reduction of LDL-C levels to 95 mg/dL (2.46 mmol/L) led to less progression of atherosclerosis and a trend toward fewer revascularization procedures than did lowering of LDL-C levels to 135 mg/dL (3.49 mmol/L).\textsuperscript{12}

**Clinical Trials**

Each of the recent statin trials revealed a marked reduction (in the range of 30%) of CHD events among patients with known CHD in the drug treatment group compared with those in the placebo group. Of utmost importance, the Scandinavian Simvastatin Survival Study (4S) and Long-Term Intervention with Pravastatin in Ischaemic Disease (LIPID) trial demonstrated a reduction in total mortality with cholesterol-lowering therapy.\textsuperscript{1,3} In the Cholesterol and Recurrent Events (CARE) and LIPID trials, mean LDL-C levels during statin therapy were in the range of 100 mg/dL throughout the study.\textsuperscript{2,3} Taken at face value, these low LDL-C levels during treatment support a target goal of about 100 mg/dL.

Some controversy has been generated by post hoc subgroup analysis of the results of CARE\textsuperscript{13} and LIPID,\textsuperscript{3} in which an apparent threshold of benefit is reached at an LDL-C level of approximately 125 mg/dL (3.23 mmol/L). This finding is similar to the apparent threshold in the same range observed in earlier prospective epidemiological studies. Indeed, subgroup analysis of the 4S trial\textsuperscript{14} revealed a similar log-linear relationship and evidence of benefit from lowering LDL-C levels to 100 mg/dL.

Based on larger prospective studies,\textsuperscript{7,8} many experts believe that when large numbers of patients have been studied, the same log-linear relationship between LDL-C levels and CHD risk will be observed with cholesterol-lowering therapy for secondary prevention.

These multiple lines of evidence support the NCEP’s recommendation for an LDL-C level of 100 mg/dL or less as the clinical goal of therapy for secondary prevention. In addition, many studies demonstrate that the majority of patients with CHD can achieve this goal by a combination of available dietary and drug therapies. On the other hand, the NCEP recognizes that some patients cannot achieve an LDL-C level of 100 mg/dL or less through the combination of dietary therapy and standard dosages of currently available medications. For such patients, the NCEP guidelines are explicitly nondogmatic about the recommended LDL-C goal of 100 mg/dL or less and leave latitude for the physician to exercise clinical judgment. A prime consideration is to weigh the likelihood of benefit against the risk of adverse effects and the cost of drugs.

When LDL-C concentrations remain in the range of 100 to 129 mg/dL for patients receiving maximal dietary therapy and standard drug dosages, the physician has several options: (1) the drug dosage can be increased; (2) another cholesterol-lowering drug can be added; (3) another class of drug can be used to modify other forms of dyslipidemia; or (4) other risk-reducing strategies can be maximized while leaving LDL-C levels in this range. The NCEP’s primary recommendation is to modify therapy in a way to achieve an LDL-C level of 100 mg/dL or less, but the potential benefit of alternative approaches to risk reduction also is recognized. For example, in a recent clinical trial,\textsuperscript{15} gemfibrozil (a fibrate) therapy in CHD patients with mean LDL-C levels between 100 and 129 mg/dL demonstrated a significant reduction in recurrent AMI without further reduction of LDL-C levels.

**THE NCQA AND HEDIS PERFORMANCE MEASURES**

The efficacy of interventions demonstrated in randomized trials is usually only partially realized as effectiveness in the general population, in part because patient compliance with the intervention strategy is not reinforced by clinical personnel as in a clinical trial. In theory, managed care organizations have the potential to improve quality of care through development of supportive systems. The NCQA and its HEDIS performance measures therefore have considerable potential to accelerate translation of the last decade’s insights concerning the impact of cholesterol reduction into lower cardiovascular morbidity and mortality.

The NCQA is a nonprofit organization that evaluates the quality of care delivered by managed care organizations. It provides accreditation to organizations that undergo and pass its periodic reviews. In many marketplaces, NCQA accreditation is critical for the competitiveness of managed care organizations. HEDIS measures produced by NCQA thus are likely to influence the care of millions of Americans. Performance of managed care organizations on HEDIS measures is often published in lay publications; hence, older HEDIS measures (eg, mammography and influenza vaccination rates) have become key focuses for managed care organization quality improvement initiatives. In addition, recent changes in NCQA accreditation standards will result in a portion of accreditation decisions being driven directly by HEDIS performance levels.

In the development of more recent HEDIS measures, the NCQA has commissioned a series of measurement advisory panels (MAPs) that include physicians and scientists nominated by leading professional societies and managed care organizations, along with researchers from the Centers for Disease Control and Prevention, the National Institutes of Health, academic settings, and other pertinent research organizations. The LDL-C measure was developed by the Cardiovascular MAP of the NCQA.

In prior versions of HEDIS, the focus has been on process measures—such as the performance of a test or a procedure—as opposed to outcomes...
measures, such as rates of survival of patients with CHD. The reasons for emphasis on process rather than outcomes have included the difficulty of collecting outcomes data and adjusting for other factors that influence risk for poor outcomes. In contrast, process measures can usually be measured from readily available claims data, and, within limits, are considered valid across populations.

The NCQA’s decision to use a specific LDL-C level for a performance measure represents a qualitative departure from prior versions of HEDIS in 2 important ways. Control of LDL-C is an intermediate outcome because reduced LDL-C levels have been convincingly linked to reduced risk for CHD events. In addition, LDL-C and other laboratory data are not currently available to most managed care organizations. Therefore, collection of data for this measure will pose new administrative burdens for managed care organizations.

The consensus of the Cardiovascular MAP was that the potential benefits of an LDL-C performance measure warrant the logistical difficulty and the expense required for managed care organizations to collect these data. Although the age-adjusted death rate from CHD has been declining for the past 30 years, CHD continues to be the single leading cause of death in the United States. This public health problem has been transformed into a public health opportunity during the last several years by the scientific evidence that demonstrates CHD risk can be greatly reduced.

**Development of a New HEDIS Measure**

The selection of cholesterol control after a CHD event as a HEDIS measure was based in part on the efficacy demonstrated in randomized trials. Additional factors included the presence of opportunity for improvement and the potential to demonstrate differences in performance among managed care organizations. These 2 factors help define issues that are ideal for fostering competition among managed care organizations on the basis of quality.

Research performed by the NCQA in cooperation with the Robert Wood Johnson Foundation in 1996 at 2 large health maintenance organizations (HMOs) showed that only 28% of patients at one HMO and 39% at a second HMO had their LDL-C levels measured in the year after a hospitalization for AMI. This research also showed that even when lipid levels were measured, only 32% and 58% of patients at the 2 HMOs achieved an LDL-C level of less than 130 mg/dL within 18 months of hospitalization for AMI (Steven Pearson, MD, and C.G., unpublished data, 1998).

These findings are consistent with data from research outside of managed care settings that suggest comparable room for improvement in the population overall. According to a recent study on adherence to NCEP guidelines, 70% of patients with CHD in primary care practices in the period 1993-1995 did not have documented LDL-C levels of less than 130 mg/dL; patients either had an LDL-C level of 130 mg/dL or more or no LDL-C level documented. Only 14% of patients had attained an LDL-C level of 100 mg/dL or less.

The NCQA’s HEDIS measure for LDL-C was developed to improve these statistics by rewarding managed care organizations that are able to develop systems for care of patients with CHD. Such a performance measure may cause cholesterol management in at least some managed care organizations to become superior to that of fee-for-service settings, if these organizations invest in systems that identify and follow up patients with CHD and elevated LDL-C levels.

**Performance Measure for LDL-C**

The decision by the NCQA to establish a performance measure for LDL-C of less than 130 mg/dL was based on the practical consideration of how best to implement NCEP guidelines in managed care settings. The members of the NCQA Cardiovascular MAP endorsed the NCEP LDL-C goal of 100 mg/dL or less for secondary prevention for individual patients, and the NCQA intends to vigorously promote this goal in its educational efforts. However, other considerations led to the development of a performance measure of less than 130 mg/dL for LDL-C levels.

**Gaps in Research.** Prospective epidemiological studies convincingly show that LDL-C levels less than 100 mg/dL are associated with low rates of CHD events. Some clinical trials also support the NCEP’s goal for LDL-C levels in secondary prevention. Thus far, however, large randomized trials have not been completed that specifically address whether lowering LDL-C levels from between 100 and 129 mg/dL to less than 100 mg/dL will yield improved clinical outcomes. Such trials are currently under way and should resolve this issue.

The members of the NCQA Cardiovascular MAP all supported the NCEP LDL-C goal of 100 mg/dL or less for the care of individual patients with CHD. However, there was uncertainty about whether this goal should be used as a HEDIS performance measure before large, randomized controlled trials with clinical end points more clearly define the relations among efficacy, safety, and costs from reducing LDL-C levels to 100 mg/dL or less when high dosages of cholesterol-lowering drugs are required. In part because this new HEDIS measure would require considerable new expense for managed care organizations, the Cardiovascular MAP considered it necessary that there be no controversy about the target LDL-C level used.

**Drug Efficacy.** Since LDL-C concentrations in patients with CHD in the United States generally are higher than in persons without CHD, a greater than average reduction will be required to achieve an LDL-C level of 100 mg/dL or less in many patients with CHD. For example, in the 4S, CARE, and LIPID trials, less than half of patients overall achieved an LDL-C level of 100 mg/dL or less while taking standard dosages of statins. This means that additional therapeutic modifications will be required to achieve the target goal in many patients with CHD.

Although intensification of therapy is possible and most likely is appropriate...
for most patients who fail to achieve the LDL-C target using the initial treatment regimen, the NCQA did not want its performance measure to force physicians to intensify pharmacological therapy for patients whose LDL-C levels are 100 to 129 mg/dL. This position was consistent with NCEP guidelines, which also provide for the physician to use clinical judgment when choosing the best therapeutic approach for patients with LDL-C levels in this range. More powerful statin regimens and more experience with combination therapy are likely to decrease the difficulty of lowering LDL-C levels to 100 mg/dL or less in the future, and should help this target seem more accessible to clinicians.

Realistic Performance Measures. In view of the relatively poor performance found in most studies of achievement of NCEP goals for LDL-C, NCQA reasoned that a stepwise approach is required for reducing LDL-C concentrations in the whole population of patients with CHD. If the initial performance measure was too stringent, the failure rate in the first few years of its application would be unacceptably high, and a meaningful comparison among managed care organizations would not be possible.

Simplicity. One proposal was to use an LDL-C level of 100 mg/dL or less as the performance measure and indicate that the percentage of patients reaching the target was expected to be less than 100%. For example, the NCQA might indicate that the goal for a managed care organization is to have 60% of patients with CHD have LDL-C levels below this point. However, this approach was rejected as being potentially unwieldy and confusing.

Implications of Physician Failure. The NCQA was reluctant to adopt a performance measure for physicians that potentially labels care as substandard for such a large portion of patients with CHD. Particularly troublesome for physicians will be those patients whose LDL-C levels are close to the NCEP goal but who fail to reach the actual LDL-C level of 100 mg/dL or less by taking standard or even higher dosages of drugs. The NCQA believes that imposing a measure of 100 mg/dL or less on physicians would reduce their options for clinical judgment when LDL-C concentrations approach this target level. The NCQA prefers that physicians pursue NCEP guidelines using clinical judgment rather than through mandate.

REFERENCES