

## Accuracy of Lipid Profiles in the Hospital Setting: Impact on the Initiation of Cholesterol-Lowering Therapy

Based on a presentation by Leonard Keilson, MD, MPH

### *Presentation Summary*

Hospitalization for an acute event, such as myocardial infarction, is an opportune time for screening lipids, counseling patients, and advising them about treatments. Physicians frequently fail to seize these "windows of opportunity" that hospitalization presents. The hospital setting may be the best time to screen a patient's lipid levels and systems can be set up to

accomplish this in a timely fashion. There are certain illnesses, procedures, and conditions under which a patient's lipids may be altered and these should be considered when about to undertake screening. The conventional Freidewald test appears to be as reliable as newer lipid-screening measures. Using this test, nonfasting lipids can reliably predict patients with elevated cholesterol.

**I**n the past, experts recommended counseling a patient as soon as possible after an acute MI, when the patient is most vulnerable and health educational measures can have a strong impact. But now best clinical practice should include screening and counseling patients before they leave the hospital, said Leonard Keilson, MD, MPH. Dr. Keilson is Medical Director at the Center for Lipids and Cardiovascular Health at the Maine Medical Center in Portland.

"Evidence also suggests this might be the best time to begin treatment, now that we have effective interventions," said Dr. Keilson.

Despite the obvious wisdom of screening and counseling at the time of an acute event, most clinicians don't screen patients' lipid levels during these "windows of opportunity" that hospitalization affords. Dr. Keilson cited many of the reasons physicians offer for this lapse:

- They say the patient is too sick.
- They believe lipid measurements should be performed by someone else:
  - cardiologists think it's a primary care problem.
  - surgeons believe it's a medical (nonsurgical) matter.
- They don't want to feel responsible for the patient after screening.
- They say the pressure of managed care organizations force hospital discharge too quickly resulting in not enough time to enter test results on patients' charts.
- They assert that in-hospital testing is done in vain because levels are altered by the acute event.
- They say the patient needs to be fasting, which alters lipid levels.
- They blame it on a desire to keep costs down.
- They say they forgot.

"The last answer is probably the most honest one," Dr. Keilson told listeners. "When the patient comes in under pressure for acute care, it is easy to forget."

### Control Points for Lipid Measurement

Various control points provide timely opportunities for lipid screening in the hospital. These include the emergency room, clinical units (eg, critical care unit, intensive care unit, surgical unit), and the laboratory.

"One opportunity is to do lipid screening when the patient arrives in the emergency room and to set up a standing order that can be done by either computer matrix or by a checklist," said Dr. Keilson.

Emergency room staff involved in lipid screening include emergency physicians, house staff, head nurses, staff nurses, information clerks and coordinators, and computer programmers who alter computer matrix screens for lipid testing. Clinical unit personnel who can expedite lipid screening include head nurses, clinical nurses, nurse specialists, practice nurses, house staff, admissions assistants and secretaries, all of whom deal with the patient's record at a time when ordering a lipid screening is possible. In the laboratory, specimen handlers, laboratory directors, and computer programmers all have their say about whether or not lipid screening can be done appropriately at the right time.

"You may have to make a deal with lab staff that when a patient comes in who needs screening, they will get the tests done in a timely way," Dr. Keilson added. "Also, you have to be sure that the data get back to the patients' charts. Then you have to develop strategies that alter provider behavior," he added.

### Clinical Conditions Can Modify Lipid Levels

There are many conditions under which measuring may be inappropriate. Lipid levels are in fact altered by acute MI, bypass surgery, major surgery, severe burns and infections, active rheu-

matoid arthritis, and acute pancreatitis. Following bypass surgery and 24 hours after hospitalization for acute MI, patients will have dramatic lowering of lipid levels. Acute pancreatitis can cause striking elevations of triglycerides, either as a result of an underlying lipid disorder or as a byproduct of the disease.

"If you time screening inappropriately, you will wind up with arbitrarily low, false negative results," explained Dr. Keilson.

*Various control points provide timely opportunities for lipid screening in the hospital. These include the emergency room, clinical units (eg, critical care unit, intensive care unit, surgical unit), and the laboratory.*

Heparin is probably the most common drug used in the post-MI period to lower triglycerides and modify LDL-C levels. Reduced lipoprotein synthesis can occur as a result of a metabolic insult, caused by either surgery or acute infections. Lipoprotein clearance may increase due to the presence of inflammatory mediators.

During the course of a hospital stay, patients may be put on intravenous nutrition. Thus, it is not appropriate to measure lipids late in the hospital stay. Being immobilized and inactive can affect insulin resistance or glucose tolerance. Release of stress hormones may modify insulin and insulin resistance. Other diseases are associated with hyperlipidemia, such as hypothyroidism and hyperglycemia.

### Which Test Is Best?

Dr. Keilson and colleagues studied patients in the emergency setting with acute MI.<sup>1</sup> At most hospitals, when patients come to the emergency room with an acute MI, creatinine phosphokinase (CPK) levels are obtained first, and if these are elevated, lipid testing can be performed. In the study, patients were

screened in the fasting and nonfasting state using three different methods: ultracentrifugation (the "gold standard," which is somewhat tedious to perform and takes 24 hours to yield results); the Genzyme test (a newer method); and the conventional method (Freidewald). The three studies were found to be similarly useful. Correlation coefficients among the three measurements were extremely high. The conventional Freidewald method had excellent sensitivity and specificity, and could identify patients with abnormal elevated cholesterol.

"The sensitivity of 86% and specificity of 96% with the conventional method compare quite favorably to most of the tests we do in clinical practice," said Dr. Keilson.

The fact that LDL-C levels fall after a meal may seem somewhat counterintuitive. In patients with diabetes, blood sugar goes up after a meal. With lipids, the opposite occurs following a meal, LDL-C falls. In most instances, LDL-C and HDL-C levels can be screened in the nonfasting state. Three hours following a meal, LDL-C levels fall by about 7%. After 5 hours, they fall by roughly 2.5%, a relatively small amount.

"If a patient has an elevated nonfasting LDL-cholesterol level, that person will have an elevated fasting LDL-C on this test," he noted.

## Conclusion

In conclusion, Dr. Keilson emphasized that lipid screening should be done whenever feasible in the hospital, but under the right conditions. Screening is probably most appropriate in the emergency room before bypass surgery or other procedure. If the data are interpreted correctly, screening can be done in nonfasting patients. The conditions of testing are important for interpretation of results. Screening lipids in the hospital setting needs to be systemized, and feedback and follow-up should be part of that system, advised Dr. Keilson.

"It is not rocket science to understand that if you have a hospitalized patient with an LDL-C level of 140 mg/dL in the nonfasting state, this is a hyperlipidemic patient who will probably require pharmacotherapy as time goes on," Dr. Keilson told listeners. "In 1997 I would say that it appears advantageous to screen, counsel, and treat patients as soon as possible after a vascular event at a time when measures may have their greatest impact," he added.

Dr. Keilson is currently planning a clinical trial that will evaluate compliance in patients treated with lipid-lowering drugs at the time of discharge from the hospital.

## ... REFERENCES ...

1. VanDis FJ, Keilson LM, Rundell CA, et al. Direct measurement of serum low-density lipoprotein cholesterol in patients with acute myocardial infarction upon admission to the emergency room. *Am J Cardiol* 1996;77:1232-1234.