Pediatric Lipid Screening Rates in the US Are Low: What Can Labs Do to Help?

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Prevention of atherosclerosis should begin in childhood, since several studies have demonstrated that dyslipidemia in childhood is associated with severity of atherosclerotic lesions later in life. Pediatric lipid screening aims to identify children and adolescents with dyslipidemia, including those with more severe, genetic cases and those with mild to moderate lipid increase due to secondary causes. A variety of recommendations related to pediatric lipid screening have been published in the past 25 years, most advocating a targeted approach to screening in those with pertinent family history or risk factors, such as increased body mass index. An expert panel sponsored by the National Heart, Lung, and Blood Institute (NHLBI) issued a report in 2011, detailing guidelines for cardiovascular health and risk reduction in children and adolescents. The report included recommendations for targeted screening in children age 2 and older with a positive or unknown family history of dyslipidemia-related cardiovascular disease or other major risk factors. The expert panel recognized the past failure of targeted screening to identify many at-risk youth and, therefore, also included recommendations for universal screening in those aged 9–11 years and again between 17 and 21 years (1). Despite its endorsement by the American Academy of Pediatrics, the universal screening recommendation was met with controversy.

Two recent reports have shown pediatric lipid screening rates before the universal screening guidelines to be low in children, including obese children for whom lipid screening has been a consistent recommendation (2, 3). Vinci et al. used National Ambulatory Medical Care Survey data to examine rates and correlates of lipid testing in 2- to 21-year-olds seeing primary care providers for well visits from 1995 to 2010 (2). During this 16-year period that included 10 159 visits, the screening rate was 3.4%, with a slight increase observed over time (2.5% in 1995; 3.2% in 2010). Higher-risk groups, including those with increased body mass index, were more likely to be screened. However, overall rates were low, based on census estimates, indicating that approximately 35% would have been eligible per the NHLBI recommendations (1). In another study, data from 301 080 children and adolescents aged 3–19 years were evaluated by Margolis et al. to determine the frequency and results of lipid testing across 3 large US health systems in 2007–2010 (3). Results showed that the overall screening rate during that time was 9.8%. Individuals who were overweight or obese were more likely to be tested than normal-weight children, and screening rates were lower in 9- to 11-year-olds than in 17- to 21-year-olds. This data will serve as the benchmark for assessing changes in practice patterns as new pediatric lipid screening recommendations are implemented. Whether considering universal or targeted lipid screening, there is a large discrepancy between expected and observed rates of screening, likely because of a number of challenges that impede implementation rates.

What Are the Barriers to Pediatric Lipid Screening, and What Can Laboratories Do to Facilitate Screening?

Pediatric lipid screening is typically performed in a primary care setting, yet many pediatric care providers are unsure about key facets of screening recommendations. Dixon et al. recently described these gaps through an online survey conducted in 2012–2013 of primary pediatric providers in Minnesota (4). The multiple-choice questionnaire was designed to discern providers’ knowledge, screening, and management attitudes regarding pediatric lipid guidelines. A majority of providers (74%, 406/548) reportedly believed that lipid screening and treatment would reduce future cardiovascular risk, although 34% performed no screening, 50% screened selectively, and only 16% performed universal screening in children. The top perceived barriers to lipid screening indicated a need for improved guidance on identification of whom to screen and which tests to order (including the use of fasting vs nonfasting samples for testing). Gaps in knowledge existed about the interpretation of abnormal results related to appropriate interventions and follow-up plans. Costs to implement screening and the impact on busy practice work flows must be considered and may pose additional challenges for primary care providers. As

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2 Nonstandard abbreviations: NHLBI, National Heart, Lung, and Blood Institute; HDL-C, HDL cholesterol; POC, point of care.
providers work to incorporate current screening recommendations into their practice, laboratories can help mitigate some of the associated barriers.

LABORATORIES CAN BETTER SUPPORT PEDIATRIC LIPID SCREENING IN THE FOLLOWING WAYS

Develop a dialogue with pediatric providers about lipid screening. Universal lipid screening in children is controversial. However, improved education about current guidelines is needed among both pediatric providers and laboratorians. Laboratorians should evaluate current patterns of lipid test utilization and survey providers to learn whether and how they are implementing screening. Such efforts would lead to a better understanding of providers’ opinions and perceived barriers to lipid screening in children.

Facilitate the use of nonfasting lipid panels and report non-HDL cholesterol. The NHLBI expert panel recommends nonfasting non-HDL cholesterol (non-HDL-C) as the first-tier approach for universal screening [1]. Unlike LDL-C, non-HDL-C can be calculated from nonfasting lipid concentrations since the calculation does not depend on the triglyceride concentration. Despite this, non-HDL-C is likely underutilized in pediatric lipid screening [4]. Hospital laboratories may not offer a nonfasting lipid profile as an orderable test, and many do not routinely calculate non-HDL-C when a lipid profile is performed. Making changes to nonfasting test availability and routinely reporting non-HDL-C may improve screening rates. Facilitating provider adoption of nonfasting screening may decrease missed screening opportunities and eliminate challenges associated with obtaining fasting samples in children.

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Report pediatric lipid test results with age-appropriate, evidence-based cutoffs. Lipid tests in children should be reported with appropriate age-specific cutoffs, per the National Cholesterol Education Program and as described in the NHLBI 2011 guidelines [1]. Lipid target ranges in children differ from those in adults, with the exception of HDL. Adult cutoffs are higher than those for children. Two-thirds of respondents in the study by Dixon et al. indicated that they were not familiar with pediatric normal/abnormal lipid ranges [4]. An audit of lipid reference range information available via online laboratory test catalogs from several laboratories demonstrated that use of adult cutoffs for all ages is a common practice, revealing that significant improvement is needed in this area.

Support implementation of point-of-care lipid testing. Point-of-care (POC) lipid testing is now widely available and may offer several advantages to primary care screening work flows, including decreased cost and operational burden. POC testing may improve care coordination due to the opportunity to convey results, counsel, and devise management plans within a single visit. Many practices are implementing POC lipid testing to improve screening work flows. However, the analytical performance of these devices and their effectiveness in pediatric lipid screening have not been well studied. Studies conducted in adults show that the devices available in the US may not meet National Cholesterol Education Program recommended assay performance criteria for imprecision and bias, but may be suitable for screening purposes [5].

| Table 1. Examples of comments appended to lipid test results in children 2-19 years old.\(^a\) |
|-----------------------------|-----------------------------|
| **Nonfasting lipid tests** | **Fasting lipid tests** |
| Confirmatory fasting lipids are recommended for nonfasting values of total cholesterol ≥200 mg/dL and non-HDL-C ≥145 mg/dL. | If fasting LDL-C >130 mg/dL: provide dietary counseling, assess cardiovascular risks, and manage per NHLBI guidelines. Referral to a pediatric lipid specialist is recommended if the average of 2 fasting lipid profiles (obtained ≥2 weeks, but ≤3 months, apart) shows LDL-C >250 mg/dL or TG\(^b\) >500 mg/dL. Children with cardiovascular risk factors may require pediatric lipid specialist management at concentrations below these cutoffs. |

\(^a\) Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents [1].

\(^b\) TG, triglycerides.
Laboratorians should act as a resource to primary care providers by defining best practices in the evaluation and implementation of POC lipid testing, while creating awareness of the common limitations and sources of error in such measurements.

Pediatric lipid screening rates were low before the 2011 NHLBI expert panel report recommending universal lipid screening for those 9–11 and again at 17–21 years old. Screening rates in children that met targeted screening criteria were higher but still well below that expected. Irrespective of providers’ endorsement of recent universal screening recommendations, published reports show that strategies are needed to improve pediatric lipid screening rates. Barriers to implement lipid screening recommendations include impact on busy practice work flows, limited physician awareness of recommendations, and concern over appropriate interpretation and management of increased numbers of patients with dyslipidemias. Laboratorians should act on this opportunity to help mitigate challenges providers face in implementing pediatric lipid screening recommendations.

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