Universal Cholesterol Screening in Childhood: A Systematic Review

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ABSTRACT

BACKGROUND: In 2011, a US expert panel recommended universal cholesterol screening for children ages 9 to 11 years. Controversy exists over this recommendation, especially because the most recent systematic review on universal childhood screening was inconclusive.

OBJECTIVES: To conduct an updated systematic review on universal cholesterol screening in childhood and effect on health outcomes, clinical management, screening acceptability, and healthcare costs.

DATA SOURCES: We searched MedLine, EMBASE, Psychinfo, and the Cochrane Registry of Controlled Trials from October 2005 to January 2016. We added new studies identified to those from the previous systematic review (1966–September 2005).

STUDY ELIGIBILITY, PARTICIPANTS, AND INTERVENTIONS: We included controlled trials, pre-post, cohort, survey, and qualitative studies of universal cholesterol screening in children ages 0 to 18 years.

STUDY APPRAISAL AND SYNTHESIS METHODS: Two independent reviewers assessed abstracts and full-text studies, extracted data, and ranked quality. Cost data were inflation-adjusted to 2015 dollars.

RESULTS: Nine new studies met inclusion criteria, taking the total number of relevant studies to 21. Screening was associated with no change in cholesterol in 1 of 1 study on health outcomes. A positive screen for dyslipidemia was associated with diet and/or exercise changes in 29% to 92% of families in 4 of 4 studies. Adherence with new guidelines for universal screening was low (16%–18%) in 3 of 3 studies. Costs per case of familial hypercholesterolemia detected were $12,500 to $20,300.

LIMITATIONS: Included studies were heterogeneous in outcomes.

CONCLUSIONS AND IMPLICATIONS OF KEY FINDINGS: Universal cholesterol screening might have small, positive effects on lifestyle change, but the effect on health remains understudied.

KEYWORDS: cardiovascular diseases; dyslipidemias; health care costs; health services research; hypercholesterolemia; mass screening; patient acceptance of health care; pediatrics; primary health care

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WHAT THIS SYSTEMATIC REVIEW ADDS

- Update and re-evaluate evidence on universal cholesterol screening and its effect on health outcomes, clinical management, acceptability, and health care costs.
- New evidence for small, positive effects on lifestyle change after screening.
- Identification of research gaps on universal cholesterol screening.

HOW TO USE THIS SYSTEMATIC REVIEW

- Become familiar with the state of the evidence on universal cholesterol screening.
- Consider ways to maximize compliance with follow-up testing and efficacy of lifestyle interventions for children with dyslipidemia.

IN 2011, AN Expert Panel of the National Heart, Lung, and Blood Institute (NHLBI) recommended universal cholesterol screening for children as part of a broad attempt to address cardiovascular disease (CVD) risk factors at an early age.[1] In 2014, the American Academy of Pediatrics (AAP) integrated the Expert Panel's recommendation for universal screening into the Bright Futures/AAP recommendations for well-child visits.[2] Figure 1 shows the screening algorithm recommended by the Expert Panel. With the new recommendation, up to 20 million children could be screened for dyslipidemia from 2016 to 2020.[3]

In contrast to the NHLBI Expert Panel, the US Preventive Services Task Force (USPSTF) "concluded that the evidence is insufficient to recommend for or against routine screening for lipid disorders in infants, children,

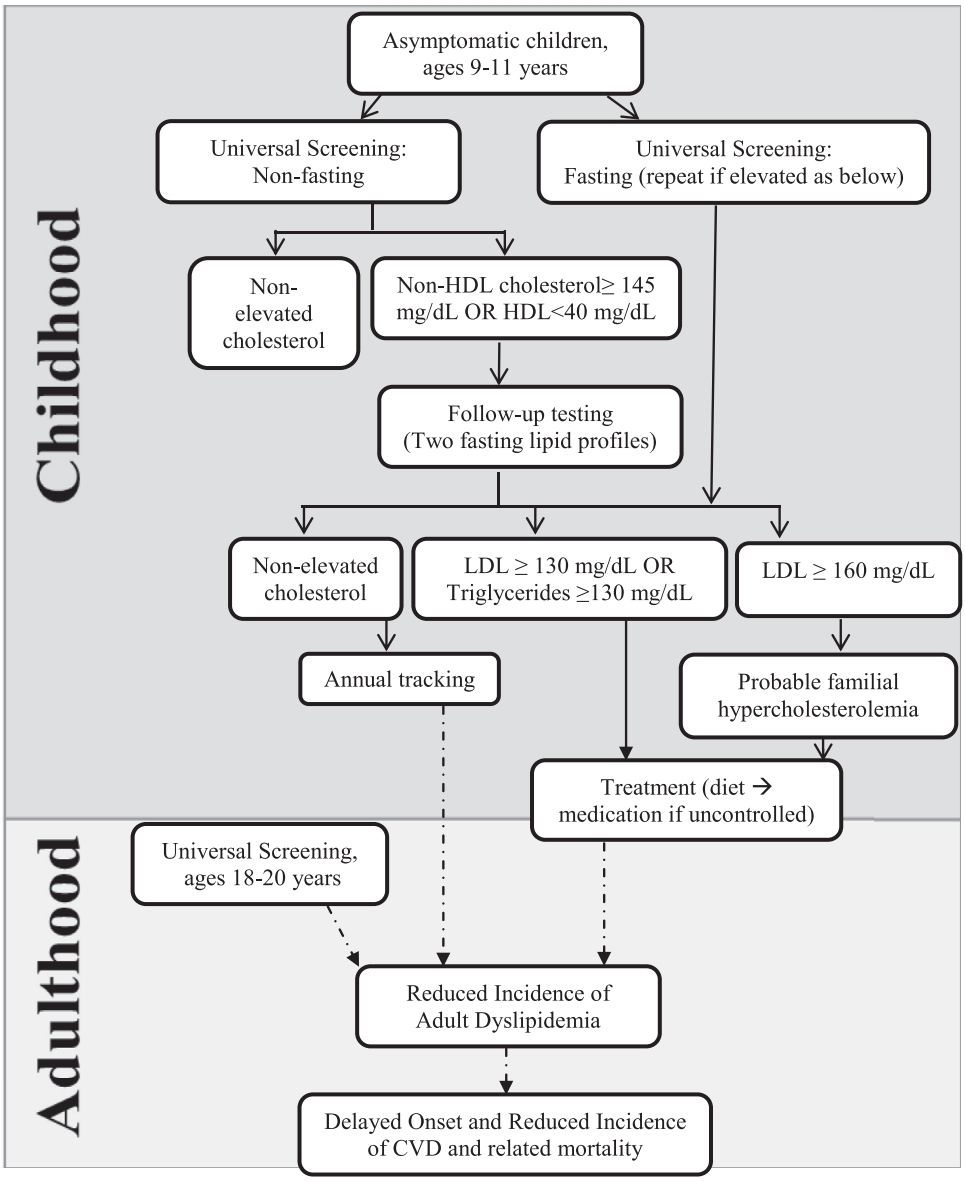

Figure 1. *Framework for universal cholesterol screening in children (developed from National Heart, Lung, and Blood Institute Expert Panel Guidelines and Bright Futures/AAP Recommendations).[1,2] HDL indicates high-density lipoprotein; LDL, low-density lipoprotein cholesterol; and CVD, cardiovascular disease.*

adolescents, or young adults (up to age 20)" in 2007.[4] Previous recommendations limited cholesterol screening to children with established clinical risk factors for CVD (eg, body mass index >85th percentile, diabetes) or family history of dyslipidemia and/or early CVD. Universal screening might identify children with multifactorial dyslipidemia for whom the natural history of dyslipidemia and efficacy of early intervention is not well established.[5,6] This discordance between the USPSTF and NHLBI Expert Panel recommendations for childhood cholesterol screening might lead to confusion in clinical practice.[7–9] Because of the policy attention to universal cholesterol screening, we anticipate additional evidence might have been generated since the USPSTF review to support universal screening. However, to our knowledge, no updated reviews have been published.

Universal screening in childhood has the potential to improve health in the short- and long-term.[10,11] Early identification could help families make informed decisions about dietary cholesterol reduction, possible medication, and later screening intensity.[12] Of known CVD risk factors, dyslipidemia is one of the more established risks in adulthood and is prevalent in children.[13] In the United States, 20% of children have elevated low-density lipoprotein (LDL) cholesterol, elevated triglycerides, and/or low high-density cholesterol.[14] Nonuniversal screening of children, such as screening on the basis of family history of premature CVD or hypercholesterolemia, might miss 30% to 60% of children with dyslipidemia.[1]

To update and re-evaluate the evidence on universal cholesterol screening, we conducted a systematic review of universal childhood cholesterol screening and its effect on child and adult health outcomes, clinical management (follow-up testing and treatment), acceptability of screening, and health care costs.