Screening Children and Adolescents to Identify Familial Hypercholesterolemia

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Disclosures

- **Current/recent funding**: Patient Centered Research Institute, Pediatric Heart Network, New England Congenital Cardiology Research Fund
- **Royalties**: UpToDate pediatric lipid and screening topics
Agenda

• Why screen children for FH?
• Adoption of screening into clinical practice:
  – What’s known about current pediatric screening practices, attitudes and barriers?
• Implementing universal screening in clinical practice
WHY SCREEN CHILDREN FOR FAMILIAL HYPERCHOLESTEROLEMIAS?
Homozygous vs. heterozygous

• Usually no physical findings in childhood
  – Lipid findings are the main pediatric manifestation
Relative risk of coronary heart disease mortality: FH vs. general population

- Neil, 2008
  - Simon Broome
  - Definite + Probable FH
  - Primary + secondary prevention

- Simon Broome, 1999
  - Simon Broome
  - Definite FH
  - Primary + secondary prevention

Relative Risk compared to general population:

- 20-39 yrs: 88.9
- 40-59 yrs: 4.3
- 60-79 yrs: 1.7
- Overall: 3.4
CVD events are lower in adults with FH who are “early adopters” of statins.
Statin Treatment in Children With Familial Hypercholesterolemia
The Younger, the Better

Jessica Rodenburg, MD, PhD; Maud N. Vissers, PhD; Albert Wiegman, MD, PhD; A.S. Paul van Trottenburg, MD, PhD; Anouk van der Graaf, MD; Eric de Groot, MD, PhD; Frits A. Wijburg, MD, PhD; John J.P. Kastelein, MD, PhD; Barbara A. Hutten, PhD

- RCT: 2 year pravastatin vs. placebo
- Pravastatin induced regression of carotid IMT
- Late follow-up suggests delayed IMT progression

Pediatric Lipid Guidelines

- *USPSTF Cholesterol in Childhood* 2007
- *American Academy of Pediatrics* 2008
- *NHLBI Expert Panel Integrated Guidelines for Cardiovascular Risk Reduction in Childhood and Adolescence* 2011
- *AAP Bright Futures* 2012
# Pediatric Lipid Guideline Summary

<table>
<thead>
<tr>
<th>Screening criteria*</th>
<th>AAP 2008</th>
<th>NHLBI/Bright Futures</th>
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<tr>
<td>Family history of heart attack or stroke</td>
<td>✔</td>
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<tr>
<td>Family history of high cholesterol</td>
<td>✔</td>
<td>✔</td>
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<td>Obese (BMI ≥ 95th percentile)</td>
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<tr>
<td>High risk conditions (e.g., hypertension, diabetes)</td>
<td>✔</td>
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<td>Healthy 9-11 &amp; 17-21 year olds</td>
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<tr>
<th>Statin treatment criteria*</th>
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<td>LDL ≥ 190 mg/dL despite 6 months lifestyle therapy</td>
<td>✔</td>
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<tr>
<td>LDL ≥ 160 mg/dL &amp; additional risk factors despite 6 months lifestyle therapy</td>
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* See full statement and Guidelines for full screening and treatment recommendations
Lots of Controversy

Universal Screening and Drug Treatment of Dyslipidemia in Children and Adolescents

Bruce M. Psaty, MD, PhD
Frederick P. Rivara, MD, MPH

Is Universal Pediatric Lipid Screening Justified?

Matthew W. Gillman, MD, SM
Stephen R. Daniels, MD, PhD

In late 2011, an Expert Panel convened by the National Heart...the use of statins and their indications have expanded. By 2005, an estimated 30 million Americans were taking statins, and in 2009, both simvastatin and atorvastatin were...the use of statins and their indications have expanded. By 2005, an estimated 30 million Americans were taking statins, and in 2009, both simvastatin and atorvastatin were

NHLBI Integrated Guidelines on Cardiovascular Disease Risk Reduction: Can We Clarify the Controversy about Cholesterol Screening and Treatment in Childhood?

Moderator: Sarah D. de Ferranti1,2,3*
Experts: Stephen R. Daniels,4,5 Matthew Gillman,6 Louis Vernacchio,7,8 Jorge Plutzky,9,10 and Annette L. Baker11

JAMA 2012, JAMA 2012, Clin Chem 2012,
ARE CLINICIANS SCREENING FOR LIPID DISORDERS DURING CHILDHOOD?
Guideline Adoption Survey - Minnesota

- 2013 e-survey of pediatric providers
  - 77% reported lipid screening
    - 33% did not screen
  - Of those who did screen
    - 50% screened selectively
    - 16% screened universally
  - 83% were uncomfortable managing lipid disorders
  - 57% were opposed to using lipid-lowering medications in children

Guideline Adoption - Cholesterol testing at Health Maintenance Visits

- US National Ambulatory Medical Care Surveys (NAMCS) database
- Repeated cross-sectional surveys of 10,159 visits/survey, 1995 - 2010
- Children 2-21 yrs

Average rate of cholesterol testing 1995-2010: 3.4% of well child visits (p =0.03, trend)

AAP Periodic Survey

- Aim: To understand the practices, attitudes and barriers of practicing AAP members related to screening for and treatment of lipid disorders in children and adolescents
  - Mailed survey
  - Representative of the AAP practicing membership
Random sample of non-retired AAP members
N=1627

Survey respondents
N=705 (43%)

Exclude: Incomplete surveys
N=84 (5%)

Provide direct patient care
N=614 (38%)

Exclude: Do not provide health supervision
N=178 (11%)

Provide health supervision
N=443 (27%)

Provide health supervision to 9-11 AND 17-21 year olds
N=398 (24%)
Guideline Knowledge

- Not very knowledgeable: 11%
- Somewhat knowledgeable: 10%
- Moderately knowledgeable: 37%
- Very knowledgeable: 43%

AAP (2008) Guidelines*

- Not very knowledgeable: 21%
- Somewhat knowledgeable: 37%
- Moderately knowledgeable: 37%

NHLBI (2011) Guidelines*

*Note: AAP and NHLBI guidelines refer to American Academy of Pediatrics and National Heart, Lung, and Blood Institute guidelines.
## Screening Practice by Indications

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<th>9-11 year olds</th>
<th>17-21 year olds</th>
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<tbody>
<tr>
<td><strong>Respondents, n(%)</strong></td>
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<tr>
<td><strong>AAP and NHLBI</strong></td>
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<tr>
<td>Family history of heart attack or stroke</td>
<td>156 (39%)</td>
<td>101 (26%)</td>
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<tr>
<td>Family history of high cholesterol</td>
<td>125 (31%)</td>
<td>78 (20%)</td>
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<tr>
<td>Obesity</td>
<td>74 (19%)</td>
<td>37 (9%)</td>
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<tr>
<td>High risk conditions</td>
<td>90 (23%)</td>
<td>70 (18%)</td>
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<tr>
<td><strong>NHLBI</strong></td>
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<tr>
<td>Healthy</td>
<td>277 (70%)</td>
<td>227 (58%)</td>
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*Screening practices differed by age group for all indications p ≤ 0.001*
Attitudes: selective vs. universal screening

• Selective screening based on family history is not enough
  – 70% felt family history was insufficient to identify familial hyperlipidemias

• Universal screening is not highly endorsed
  – Only 55% agreed all children should have cholesterol screening prior to puberty and in late adolescence
Barriers to screening

- Obtaining an accurate family history
- Interpreting pediatric cholesterol profile
- Patients not returning for fasting test

- Not a Barrier
- Minor Barrier
- Major Barrier
Screening healthy children usually/most of time/always was associated with:

• **Patient factors:**
  – Older patient age

• **Practice factors**
  – Spending more time in general pediatrics
  – Practicing in an urban environment
  – Having more patients with private insurance

• **Knowledge and attitudes**
  – Being knowledgeable about the NHLBI guidelines
  – Disagreeing that cholesterol screening is a low priority
  – Agreeing that all children should get screened prior to puberty and in late adolescence

\[ p < 0.05 \]
IMPLEMENTING UNIVERSAL SCREENING IN PRIMARY CARE
QI initiative to implement Lipid screening in primary care: PCP Lipid SCAMP

Provides guidance on screening and initial management of patients with elevated lipid profiles and records outcomes

• Included:
  • Children ages 9-11 and 17-21 years seen in a primary care practice without prior lipid screening in the last 3 years
  • Children ages 2-21 seen in a primary care practice with high risk family history, risk conditions or risk factors without prior lipid screening in the last 3 years
Well Child Visit e.g., Lipid Screening Encounter

Non-Fasting Non-HDL Levels

- Normal <120 mg/dl
- Abnormal 120-279 mg/dl
- Significantly Abnormal >280 mg/dl

Response

- Normal
  - Reenter at next screening interval
- Abnormal
  - 6 months of lifestyle counseling + Fasting lipids
  - Subspecialty Lipid Care

Follow-up

- Normal
  - Re-test 1 year
- Abnormal (non HDL>120 mg/dL)
  - Refer to Subspecialty Lipid care
Urban primary care practice in an academic medical center

- Over 14,000 children, ages 0-21 years
- Low-income neighborhoods of
  - Medicaid insures 65%
- Ethnically and racially diverse
  - 45% African American
  - 45% Hispanic
  - 15% non-English speaking
- High patient disease burden:
  - asthma (15%), obesity (45%), mental health problems (15%), chronic multisystem disease (7%)
- Many changing providers:
  - residents, part time pediatricians, academics, advanced practice
Provider adherence to cholesterol screening recommendations was high

SCAMP recommended testing: 1284

Provider recommended testing: 1223 (94%)

Provider did not recommend testing: 76 (6%)
Although cholesterol testing was usually recommended…it was not always obtained

Provider recommended testing: 1223

- Testing obtained: 934 (76%)
- Testing not obtained: 289 (24%)

Family refused: 106 (37%)

Just didn’t happen: 183 (63%)

“Tested” vs. “Not tested” were similar with regard to patient characteristics
Screening results by indication

All patients: 24.4% abnormal
Key findings from PCP Lipid SCAMP

• Providers followed the screening guidelines
  • PCPs recommended testing 95% of the time
 • Yet 24% of patients did not complete recommended testing

• Rates of abnormal lipids were high (~24%), but not as high as one might have expected given patient population (obesity/overweight, low SES)
  – Most abnormalities were mild
  – 1 patient with a non-HDL 226 mg/dL had a family history of early heart disease

• Patients screened for “age only” (universal screening) had low rates of abnormal findings
SUMMARY AND TAKE HOME MESSAGES
Summary

• FH is associated with significant CV morbidity and mortality that can be modified by early treatment, if identified

• Despite existing pediatric guidelines, providers have not heartily adopted lipid screening

• Quality improvement efforts such as the PCP Lipid SCAMP can promote screening, but gaps remain in diagnosing and treating FH in childhood