Prevention in Youth: Are We There Yet?

Laura L. Hayman, PhD, RN, FAAN, FAHA

College of Nursing and Health Sciences, University of Massachusetts Boston
and
Division of Preventive & Behavioral Medicine, Department of Population & Quantitative Health Sciences, UMass Medical School

2019 FH Global Summit
FH: A Prototype For Precision Public Health
Atlanta, Georgia, USA
October 21, 2019
Presentation/Major Themes

- Importance of primordial & primary prevention in optimizing cardiovascular health for all children/youth
- The critically important role of schools as venues for population-based cardiovascular health promotion
- Evidence-based approaches for promoting cardiovascular health in schools
- Recommendations for optimizing the potential of schools as venues for preventive cardiovascular care
Value of Primordial and Primary Prevention for Cardiovascular Disease

A Policy Statement From the American Heart Association

William S. Weintraub, MD, FAHA, Chair; Stephen R. Daniels, MD, PhD, FAHA, Co-Chair;
Lora E. Burke, PhD, MPH, FAHA; Barry A. Franklin, PhD, FAHA;
David C. Goff, Jr, MD, PhD, FAHA; Laura L. Hayman, PhD, RN, FAHA;
Donald Lloyd-Jones, MD, ScM, FAHA; Dilip K. Pandey, MBBS, PhD;
Eduardo J. Sanchez, MD, MPH; Andrea Parsons Schram, DNP, CRNP; Laurie P. Whitsel, PhD;
on behalf of the American Heart Association Advocacy Coordinating Committee, Council on Cardiovascular Disease in the Young, Council on the Kidney in Cardiovascular Disease, Council on Epidemiology and Prevention, Council on Cardiovascular Nursing, Council on Arteriosclerosis, Thrombosis and Vascular Biology, Council on Clinical Cardiology, and Stroke Council

Abstract—The process of atherosclerosis may begin in youth and continue for decades, leading to both nonfatal and fatal cardiovascular events, including myocardial infarction, stroke, and sudden death. With primordial and primary prevention, cardiovascular disease is largely preventable. Clinical trial evidence has shown convincingly that pharmacological treatment of risk factors can prevent events. The data are less definitive but also highly suggestive that appropriate public policy and lifestyle interventions aimed at eliminating tobacco use, limiting salt consumption, encouraging physical exercise, and improving diet can prevent events. There has been concern about whether efforts aimed at primordial and primary prevention provide value (ie, whether such interventions are worth what we pay for them). Although questions about the value of therapeutics for acute disease may be addressed by cost-effectiveness analysis, the long time frames involved in evaluating preventive interventions make cost-effectiveness analysis difficult and necessarily flawed. Nonetheless, cost-effectiveness analyses reviewed in this policy statement largely suggest that public policy, community efforts, and pharmacological intervention are all likely to be cost-effective and often cost saving compared with common benchmarks. The high direct medical care and indirect costs of cardiovascular disease—approaching $450 billion a year in 2010 and projected to rise to over $1 trillion a year by 2030—make this a critical medical and societal issue. Prevention of cardiovascular disease will also provide great value in developing a healthier, more productive society. (Circulation. 2011;124:00-00.)

Key Words: AHA Scientific Statements ■ cardiovascular diseases ■ prevention
Healthy Lifestyle Behaviors and Therapeutic Lifestyle Change

- Cornerstone of Primordial and Primary Prevention of Cardiovascular Disease

- For individuals with FH, patterns of health behaviors are viewed as important to cardiovascular health across the life course and “add incremental health benefit to pharmacologic treatment” *

Kavey et al., Circ., 2003; Williams et al., Circ., 2002; Daniels et al., Circ., 2005; Daniels et al., Pediatr., 2008; McCrindle et al., Circ., 2007; Kavey et al., Circ., 2006; Hayman et al., Circ., 2007; Graham et al, European Heart Journal, 2007; Barlow et al., Pediatr., 2007; Daniels et al., Pediatr., 2011; Gidding et al., Circ., 2015; Flynn et al., Pediatr., 2017; deFerranti et al., Circ., 2018; Grundy et al., JACC, 2019; Arnett et al., JACC, 2019; Jansen et al., Curr Opin Lipidol., 2002; Torvik et al., Atherosclerosis, 2016; Watts, et al., Intern J of Cardiology, 2014; Gidding, Curr Opin Clin Nutr Metab Care, 2019*
Health Behaviors Central to Cardiovascular Health

- Health behaviors impact cardiovascular health across the life course

- Patterns of health behaviors (physical activity & dietary intake) develop early in life

- Track from childhood to adulthood

- Influenced by multi-level contexts/systems including family, school, community, media, policies

Ecological Systems Theory Model: Contexts for CV Health Promotion

Adapted from: Preventing Childhood Obesity; IOM publication; National Academies Press, 2004,
The Role of Schools in Primordial Prevention of CVD
AHA Scientific Statement
Circulation, 2004;110:2266-2275

Cardiovascular Health Promotion in the Schools
A Statement for Health and Education Professionals and Child Health Advocates From the Committee on Atherosclerosis, Hypertension, and Obesity in Youth (AHOY) of the Council on Cardiovascular Disease in the Young, American Heart Association

Laura L. Hayman, PhD, RN, Cochair; Christine L. Williams, MD, MPH, Cochair;
Stephen R. Daniels, MD, PhD; Julia Steinberger, MD, MS; Steve Paridon, MD;
Barbara A. Dennison, MD; Brian W. McCrindle, MD, MPH
Population Approaches to Improve Diet, Physical Activity, and Smoking Habits

A Scientific Statement From the American Heart Association

Dariush Mozaffarian, MD, DrPH, FAHA, Chair; Ashkan Afshin, MD, MPH; Neal L. Benowitz, MD; Vera Bittner, MD, MSPH, FAHA; Stephen R. Daniels, MD, PhD, FAHA; Harold A. Franch, MD, FAHA; David R. Jacobs, Jr, PhD, FAHA; William E. Kraus, MD, FAHA; Penny M. Kris-Etherton, PhD, RD, FAHA; Debra A. Krummel, PhD, RD; Barry M. Popkin, PhD; Laurie P. Whitsel, PhD; Neil A. Zakai, MD, MSc; on behalf of the American Heart Association Council on Epidemiology and Prevention, Council on Nutrition, Physical Activity and Metabolism, Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young, Council on the Kidney in Cardiovascular Disease, Council on Peripheral Vascular Disease, and the Advocacy Coordinating Committee

Background—Poor lifestyle behaviors, including suboptimal diet, physical inactivity, and tobacco use, are leading causes of preventable diseases globally. Although even modest population shifts in risk substantially alter health outcomes, the optimal population-level approaches to improve lifestyle are not well established.

Methods and Results—For this American Heart Association scientific statement, the writing group systematically reviewed and graded the current scientific evidence for effective population approaches to improve dietary habits, increase physical activity, and reduce tobacco use. Strategies were considered in 6 broad domains: (1) Media and educational campaigns; (2) labeling and consumer information; (3) taxation, subsidies, and other economic incentives; (4) school and workplace approaches; (5) local environmental changes; and (6) direct restrictions and mandates. The writing group also reviewed the potential contributions of healthcare systems and surveillance systems to behavior change efforts. Several specific population interventions that achieved a Class I or IIa recommendation with grade A or B evidence were identified, providing a set of specific evidence-based strategies that deserve close attention and prioritization for wider implementation. Effective interventions included specific approaches in all 6 domains evaluated for improving diet, increasing activity, and reducing tobacco use. The writing group also identified several specific interventions in each of these domains for which current evidence was less robust, as well as other inconsistencies and evidence gaps, informing the need for further rigorous and interdisciplinary approaches to evaluate population programs and policies.

Conclusions—This systematic review identified and graded the evidence for a range of population-based strategies to promote lifestyle change. The findings provide a framework for policy makers, advocacy groups, researchers, clinicians, communities, and other stakeholders to understand and implement the most effective approaches. New strategic initiatives and partnerships are needed to translate this evidence into action. (Circulation. 2012;126:1514-1563.)

Key Words: AHA Scientific Statements ■ diet ■ nutrition ■ obesity ■ overweight ■ physical activity ■ prevention ■ public policy ■ smoking
Classification of Recommendations and Level of Evidence for Population-Level Interventions

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>There is evidence for and/or general agreement that the intervention is beneficial, useful, and effective. The intervention should be performed.</td>
</tr>
<tr>
<td>Class II</td>
<td>There is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the intervention.</td>
</tr>
<tr>
<td>Class IIa</td>
<td>Weight of evidence/opinion is in favor of usefulness/efficacy. It is reasonable to perform the intervention.</td>
</tr>
<tr>
<td>Class IIb</td>
<td>Usefulness/efficacy is less well established by evidence/opinion. The intervention may be considered.</td>
</tr>
<tr>
<td>Class III</td>
<td>There is evidence and/or general agreement that the intervention is not useful/effective and in some cases may be harmful.</td>
</tr>
</tbody>
</table>

In addition, the weight of evidence in support of the recommendation is classified as follows:

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Evidence A</td>
<td>Data derived from multiple randomized clinical trials or, given the nature of population interventions, from well-designed quasi-experimental studies combined with supportive evidence from several other types of studies.</td>
</tr>
<tr>
<td>Level of Evidence B</td>
<td>Data derived from a single randomized trial or nonrandomized studies.</td>
</tr>
<tr>
<td>Level of Evidence C</td>
<td>Only consensus opinion of experts, case studies, or standard of care.</td>
</tr>
</tbody>
</table>

* Strength and consistency of the evidence were key considerations for setting the recommendation class, including across different types of study designs, permutations of the intervention strategy and related strategies, implementation settings, and outcomes, including behavioral, risk factor, and clinical end points.

Mozaffarian et al. *Circulation*. 2012; 126:1519
School-Based Approaches to Improve Diet & Physical Activity*

Multicomponent interventions** focused on improving both diet and physical activity:
* educational curricula taught by trained teachers
* supportive school policies
* a formal Physical Education program
* serving of healthy food and beverage options in school cafeterias and vending machines
* a parental or family component

Creating Supportive School Nutrition Environments

Supporting Quality Physical Education and Physical Activity in Schools

The Role of Schools in Primary Prevention of CVD
The CARDIAC Project: School-based Cardiovascular Risk Detection Screening Program*

- Initiated in 1998 in rural Appalachian, West Virginia
- Target population: 5th graders in 3 counties
- Purposes (at outset):
  - Determine prevalence of overweight/obesity & co-morbidities
  - Develop/implement referral mechanisms for children at-risk for developing chronic conditions
  - Establish a sustainable statewide health education program to improve children’s health-related knowledge & behaviors

The Coronary Artery Risk Detection in Appalachian Communities (CARDIAC) Project: 18 Year Review *

- Expanded to surveillance, intervention, & research targeting CVD, diabetes
- Lipid Profile Assessment (1998-2015); n=60,404 5th graders:
  - LDL > 160mg/dL; n=637 (1.1%)
  - LDL > 175mg/dL; n=248 (0.4%)
  - LDL > 190mg/dL; n=122 (0.2%)
- Collective results: Selective screening based on family history of premature CVD excluded > 33% of children with “genetically high cholesterol.”
- Support recommendations for universal screening

*Elliott et al., *Curr Pediatr Rev.*, 2017
The Coronary Artery Risk Detection in Appalachian Communities (CARDIAC) Project: 18 Year Review *

- Interventions: Multilevel and Multidisciplinary!
- Micro-Level: Focus on Individual Child & Family: Evidence-based Strategies
  - For children identified with “possible or probable FH” (LDL >/= 160 mg/dL)
    - Contact with parents; educational materials on FH, cascade screening options, f/u with Lipid Clinics in WV
- Meso-Level: Community-based interventions with major stakeholders
- Macro-Level: School-related policies & systems change

*Elliott et al., Curr Pediatr Rev., 2017
Comprehensive School Health: Globally

“Comprehensive school health (CSH) is an internationally recognized framework for supporting improvements in students’ educational outcomes while addressing school health in a planned, integrated and holistic way” (Canada)¹

Health-Promoting Schools: Europe and Australia ²

Coordinated School Health (United States)³

¹ Veugelers & Schwartz, Canadian J of Public Health, 2010;101 (suppl 2).
² Young, St. Leger & Blanchard, Global Health Promotion, 2013;20 (suppl 4).
³ Centers for Disease Control & Prevention (CDC), http://www.cdc.gov/healthyschools/
CDC’s Whole School, Whole Community, Whole Child
Essential Components of Comprehensive School Health Programs

- Health Education: K-12; Planned learning experiences that provide both information and skills necessary to make quality health decisions; trained teachers/prevention specialists
- Integration of FH Education in curricula

- Veugelers & Schwartz, Canadian J of Public Health, 2010;101 (suppl 2).
- Young, St. Leger & Blanchard, Global Health Promotion, 2013;20 (suppl 4).
- Centers for Disease Control & Prevention (CDC), http://www.cdc.gov/healthyschools/.
- Hunt et al., J Sch Health, 2015;85;802-809
Essential Components of Comprehensive School Health Programs

- **Health Services**: Provide emergency care, assessment & management of chronic conditions.
- Wellness promotion, preventive services; services designed to ensure access and/or referrals to the medical home or private healthcare provider.
- **Provision of Services**: Qualified professionals: school nurses, nurse practitioners, dentists, health educators, Prevention specialists, physicians.

- Centers for Disease Control & Prevention (CDC), [https://www.cdc.gov/healthyschools/](https://www.cdc.gov/healthyschools/)
- Hunt et al., *J Sch Health*, 2015;85;802-809
Optimizing Potential of Schools As Population-Based venues for Primordial & Primary Prevention*

- Incorporate & adapt Integrated Guidelines for Cardiovascular Health & Risk Reduction**:
  - Enable schools to function as part of integrated systems of preventive cardiovascular care
  - Advocate for availability of (and collaboration between) school-based health centers (SBHC) & professional nurses or prevention specialists
  - Potential to enhance primary prevention by enabling identification of children & adolescents at risk & providing a mechanism for referral and management.

---


Primordial & primary prevention delivered effectively & universally in schools has potential to reduce unequal risk & burden of CVD.

Allocation of resources at federal, state, & local levels is essential for realizing this vision.

Summary

- Evidence supports the promise and potential of schools as venues for population-based CVD prevention
- School-based research has guided & informed evidence-based programs designed to promote adoption of heart healthy behaviors & enable school environments conducive to heart health
- Multilevel policies (including resources central to implementation) that promote health as well as academic competencies of children & adolescents are required.
- Future Research to evaluate both process & outcomes of school-based heart health programs and multilevel policies are required to optimize schools as venues for population-based preventive cardiovascular care.
OUR GOAL

Optimal Cardiovascular Health for ALL
Thank YOU!

Resources

- thefhfoundation.org
- pcna.net
- aap.org
- americanheart.org
- cdc.gov/healthyschools
- actionforhealthykids.org
- napnap.org
- sbm.org

Contact information: laura.hayman@umb.edu
Familial hypercholesterolemia (FH) is an autosomal dominant genetic disease present in all racial and ethnic groups and has long been recognized as a cause of premature atherosclerotic coronary heart disease. Heterozygous FH has the highest prevalence of genetic defects that cause significant preterm mortality (~1:200 to 1:500 or higher in founder populations). The genetic basis of the disorder, impaired functioning of the low-density lipoprotein (LDL) receptor, was first recognized by Goldstein and Brown in their Nobel Prize-winning work. Studies of LDL receptor function have identified additional mechanisms for the pathogenesis of FH (defects in apolipoprotein [apo] B imprinting with the LDL receptor and gain-of-function mutations in proprotein convertase subtilisin/ kexin type 9 [PCSK9] that enhance LDL receptor degradation). Complementing these cell biology discoveries has been drug discovery that has linked enhanced expression of LDL receptor function to LDL-C lowering and successful prevention of ischemic heart disease, with statins and now with newer drugs that affect LDL receptor function in either way, including those that impair PCSK9 regulation of LDL receptor recycling. The natural history of FH, the natural history of genetic diseases that lead to lifelong low LDL-C, and the dramatic improvement in life expectancy created by effective cholesterol lowering provide the biologic underpinning of the cholesterol hypothesis with regard to atherosclerotic vascular disease. Despite these scientific advances, FH remains underdiagnosed and undertreated worldwide. Most patients receive treatment in primary care settings without recognition of the

The Agenda for Familial Hypercholesterolemia
A Scientific Statement From the American Heart Association

Samuel S. Gidding, MD, FAHA, Chair; Mary Ann Champagne, RN, MSN, FAHA; Sarah D. de Ferranti, MD, MPH; Joep Depesch, PhD; Matthew K. Ito, PharmD; Joshua W. Knowles, MD, PhD, FAHA; Brian McCrindle, MD, MPH, FAHA; Frederick Ruud, MD, PhD; Daniel Rader, MD, FAHA; Raul D. Santos, MD, PhD; Maria Lopes-Virella, MD, PhD, FAHA; Gerald F. Watts, DSc, MD, PhD; Anthony S. Wierschick, MD, PhD, FAHA; on behalf of the American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology, and Council on Lifestyle and Cardiovascular and Metabolic Health

Familial hypercholesterolemia (FH) is an autosomal domi-
nant genetic disease present in all racial and ethnic groups and has long been recognized as a cause of premature atherosclerotic coronary heart disease. Heterozygous FH has the highest prevalence of genetic defects that cause significant preterm mortality (~1:200 to 1:500 or higher in founder populations). The genetic basis of the disorder, impaired functioning of the low-density lipoprotein (LDL) receptor, was first recognized by Goldstein and Brown in their Nobel Prize-winning work. Studies of LDL receptor function have identified additional mechanisms for the pathogenesis of FH (defects in apolipoprotein [apo] B imprinting with the LDL receptor and gain-of-function mutations in proprotein convertase subtilisin/kexin type 9 [PCSK9] that enhance LDL receptor degradation). FH leads to high LDL concentrations, with levels in heterozygous FH patients in the normal adults (~<190 mg/dL, LDL cholesterol levels of 3.0 mmol/L (115 mg/dL) and its的危害更多儿童和青少年的健康。 Until recently, there was no definitive clinical distinction of FH based on LDL-C levels and family history, genetic testing identifies mutations in more than one and a large proportion of adults.

Complementing these cell biology discoveries has been drug discovery that has linked enhanced expression of LDL receptor function to LDL-C lowering and successful prevention of ischemic heart disease, with statins and now with newer drugs that affect LDL receptor function in either way, including those that impair PCSK9 regulation of LDL receptor recycling. The natural history of FH, the natural history of genetic diseases that lead to lifelong low LDL-C, and the dramatic improvement in life expectancy created by effective cholesterol lowering provide the biologic underpinning of the cholesterol hypothesis with regard to atherosclerotic vascular disease. Despite these scientific advances, FH remains underdiagnosed and undertreated worldwide. Most patients receive treatment in primary care settings without recognition of the

The American Heart Association makes every effort to avoid any error or controversy in the material it presents to its readers. Specifically, all members of the writing group were required to complete a Disclosure questionnaire listing all relationships that might be perceived to conflict with the information presented. To view the Disclosure form, please visit the AHA Web site (www.americanheart.org). The American Heart Association requests that this document be cited as: Gidding SS, Champagne MA, and Ferranti SD. Depesch J, and McCrindle BW, and Ruud F, and Santos RD, and Lopes-Virella MF, and Watts GF, and Wierschick AS, on behalf of the American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology, and Council on Lifestyle and Cardiovascular and Metabolic Health. The American Heart Association. Familial hypercholesterolemia: a scientific statement from the American Heart Association. Circulation. 2011;123:2920–2932.

Excerpt: prep. review of AHA Scientific Statement is conducted by the USDA, Office of Disease Prevention. For more on AHA and policies and guidelines development, visit www.americanheart.org/presenter.jhtml and select "Policy and Development" link. Permissions: Multiple copies, modification, adaptation, education, distribution, or redistribution of this document are on express permission of the American Heart Association. Information for reprint permission is located at: www.americanheart.org/GlobalCopyrightPermissionGuidelines/ULCC_2010.html. See "A link to "Copyright Permission Request Form" appears on the right-side of the page. (Circulation. 2011;125(8):908. doi: 10.1161/CIRCULATIONAHA.109.998327) © 2011 American Heart Association, Inc. Circulation is available at www.aahjournals.org. Copyright © 2011 American Heart Association, Inc.
Essential Components of Comprehensive School Health Programs

- **Health Education**: K-12; Planned learning experiences that provide both information and skills necessary to make quality health decisions; trained teachers/prevention specialists

- **Nutrition Environment & Services**: Provide meals that meet federal nutrition standards (National School Lunch & Breakfast Programs); competitive foods meet Smart Snacks in School nutrition standards; role modeling of healthy eating behaviors by members of school community

- **Employee Wellness**: Worksite wellness programs for school personnel that foster physical & mental health; Partnerships between school districts & health insurance provider

- **Social & Emotional School Climate**

- **Physical Environment**: Maintaining a healthy & safe school environment

- Centers for Disease Control & Prevention (CDC), [http://www.cdc.gov/healthyschools/](http://www.cdc.gov/healthyschools/)
- Hunt et al., *J Sch Health*, 2015;85:802-809
Essential Components of Comprehensive School Health Programs

- **Counseling, Psychological & Social Services:** Prevention & intervention services supporting mental, behavioral & social-emotional health of students
- **Community Involvement:** Partnerships with community groups, organizations & local businesses to support learning, development and health-related activities
- **Family Engagement:** Collaborative activities to promote learning, development & health of students, K-12.
- **Physical Education & Physical Activity:** Implement a comprehensive school activity program (CSAP): PE, PA during & before & after school, staff involvement & family & community engagement; Certified teachers.
- **Health Services**
  - Veugelers & Schwartz, Canadian J of Public Health, 2010;101 (suppl 2).
  - Young, St. Leger & Blanchard, Global Health Promotion, 2013;20 (suppl 4).
  - Centers for Disease Control & Prevention (CDC), [http://www.cdc.gov/healthyschools/](http://www.cdc.gov/healthyschools/)
  - Hunt et al., J Sch Health, 2015;85;802-809
Statin Adherence and its Consequences

Fatima Rodriguez, MD, MPH
Assistant Professor, Cardiovascular Medicine
Stanford University

October 21, 2019
Disclosures

NovoNordisk event adjudicator, advisor HealthPals and Carta, research funding from Verily Life Sciences and Amgen
Case

- 72yo Spanish-speaking women presents for follow-up after a hospitalization for a myocardial infarction.
- PMHx – HTN, HL, Type 2 DM
- *Discharge* Medications: aspirin 81mg, clopidogrel 75mg, atorvastatin 80mg, lisinopril 20mg
- Labs: TC: 200mg/dL, LDL 120mg/dL, TGs: 175mg/dL; HgA1c 8.3
Social History

• Caretaker to 3 young grandchildren
• Uninsured
• Limited health literacy
• Difficulty in making appointments
• Accompanied by 16-year old granddaughter to the appointment
The Problem of Nonadherence

- Less than 50% of patients with AMI are on statins 1 year following the event
- Registries show 2 year statin “persistence” rates of 30%
- Vulnerable populations
  - Women
  - Minorities
  - The young and elderly

Reasons for Statin Nonadherence

Patient-Related
- Distrust of provider or health system
- Poor health literacy
- Fear of side-effects
- Polypharmacy

Physician-Related
- Failure to prescribe statins
- Not monitoring adherence
- Failure to intensify and reintroduce statins

Health care system-related
- Insufficient time available for adherence
- Limited access to care
- High copayments and insurance coverage
How does statin adherence impact patient outcomes?

- Identified VA patients with ASCVD (n=487,812)
- Defined adherence by Medication Possession Ratios (MPR)
- Compared mortality by adherence level

Statin Adherence and Mortality

Women, minorities, and older/younger adults were least likely to be adherent

Graded relationship between statin adherence and all-cause mortality

### Association Between Adherence and Mortality

<table>
<thead>
<tr>
<th>MPR</th>
<th>Hazard Ratio (95% CI)</th>
<th>Adjusted for Adherence to Cardiac Medications</th>
<th>Fully Adjusted</th>
<th>Additional Adjustment for Follow-up LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted</td>
<td>Adjusted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50%</td>
<td>1.36 (1.34-1.38)</td>
<td>1.25 (1.23-1.26)</td>
<td>1.30 (1.27-1.34)</td>
<td>1.20 (1.17-1.22)</td>
</tr>
<tr>
<td>50%-69%</td>
<td>1.23 (1.21-1.24)</td>
<td>1.15 (1.14-1.16)</td>
<td>1.21 (1.18-1.24)</td>
<td>1.16 (1.13-1.19)</td>
</tr>
<tr>
<td>70%-89%</td>
<td>1.07 (1.06-1.07)</td>
<td>1.03 (1.02-1.04)</td>
<td>1.08 (1.06-1.09)</td>
<td>1.07 (1.05-1.08)</td>
</tr>
</tbody>
</table>

*MPR*: Medication Possession Ratio

---

• Even in a cohort of highly adherent patients on stable statin doses, adherence matters.
• Adjusting for the propensity to adhere to statins (“healthy adherer effect”) did not significantly change the findings.
• Secondary ASCVD prevention needs to focus on adherence.
Other Studies

Relationship Between Adherence to Evidence-Based Pharmacotherapy and Long-term Mortality After Acute Myocardial Infarction

The impact of medication adherence on clinical outcomes of coronary artery disease: A meta-analysis

Liping Du¹, Zhongwei Cheng², Yuxuan Zhang¹, et al.

It’s Not Too Late to Improve Statin Adherence: Association Between Changes in Statin Adherence from Before to After Acute Myocardial Infarction and All-Cause Mortality

Ryan P. Hickson, PharmD, MPH; Jennifer G. Robinson, MD, MPH; Izabela E. Annis, MS; Ley A. Killeya-Jones, PhD; Gang Fang, PharmD, MS, PhD
But patients don’t read peer-reviewed papers...
Understanding reasons for statin nonadherence in minority communities

Qualitative interviews and focus groups

10 minority-serving providers (cardiologists, PCPs, APPs)

27 patients across U.S. sites (Hispanic/Latino, Asian, and African American)
Findings: Provider Interviews

“Patients are not fully convinced about severity until they have an event. That comes down to the relationship and the trust with a patient, definitely.”
Findings: Provider Interviews

“Hypercholesterolemia is not a priority. Patients have been told about the urgency of hypertension. These patients are typically diabetic, so concerns about blindness and amputation make that much more urgent. Hyperlipidemia isn't scary. Diabetes is much scarier - blindness and amputation. Hypercholesterolemia is just another pill for them.”
Findings: Provider interviews
Medication adherence barriers cross cultures and demographics

- Reluctance to take a **lifelong therapy**, especially patients that are already taking many medications
- Access, or a change or loss of **insurance**
- Lower **health literacy** in minority communities; patients do not understand the effect of high cholesterol on cardiovascular disease
- Belief that nutraceuticals or other **natural remedies** can lower cholesterol levels
- Anecdotes about family members that suffered **side effects** such as liver disease, muscle or stomach pain from statin use
Findings: Patient focus groups

“If I knew what cholesterol did, I might pay more attention to it.”
“If you’re taking the same medication for 30 years, your body has become immune and it stops working as well, so your doctor needs to change what you’re on.”
Findings: Patient focus groups

“My doctor in Brazil told me cholesterol was good for my body and I don’t need medication, but I came back to the USA and they told me it was bad. Who should I believe?”
Findings: Patient focus groups

“My Mom has it, I didn’t know until yesterday. I didn’t ask many questions. I didn’t know you could take medication for cholesterol. I didn’t know it was serious. And I know heart issues are in my family.”
Findings: Patient interviews
Medication adherence barriers cross cultures and demographics

- **Confusion** between symptoms, risk, and medications between hypercholesterolemia, hypertension, and diabetes
- Patients believe that **every body is different**, and doctors don’t seem to acknowledge that
- Knew there were different cholesterol numbers, but **unsure** about what each meant
- No sense of **URGENCY**
Master Class next steps

- Expert faculty meeting to review findings and organize results
- Develop online training webinar
- Dissemination of results
### Health System Factors

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited access to medical care</td>
<td>Education/media campaign</td>
</tr>
<tr>
<td>Multiple providers</td>
<td>Coordination of care</td>
</tr>
<tr>
<td>High copayments and insurance coverage</td>
<td>Reduce or eliminate copayments</td>
</tr>
<tr>
<td>High drug costs</td>
<td>Pill burden reduction with fixed dose combination therapy (polypill)</td>
</tr>
<tr>
<td>Clinical inertia</td>
<td>Pharmacy refill tracking/reminders</td>
</tr>
<tr>
<td>Automated pill counters</td>
<td></td>
</tr>
</tbody>
</table>

### Provider Behavior

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to prescribe statin therapy</td>
<td>Provider education</td>
</tr>
<tr>
<td>Failure to maximally intensify statins</td>
<td>Clinical decision support tools (EMR prescribing alerts)</td>
</tr>
<tr>
<td>Failure to reintroduce statins</td>
<td>Adherence to guidelines</td>
</tr>
<tr>
<td>Time constraints</td>
<td>Participation in quality improvement programs</td>
</tr>
<tr>
<td></td>
<td>Team-based approach</td>
</tr>
<tr>
<td></td>
<td>Dosing strategies for patients with presumed statin intolerance</td>
</tr>
<tr>
<td></td>
<td>Re-challenge with statin in patients with a history of myalgia</td>
</tr>
</tbody>
</table>

### Patient Factors

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics, socioeconomic</td>
<td>Discharge counseling</td>
</tr>
<tr>
<td>Lack of patient education</td>
<td>Patient education</td>
</tr>
<tr>
<td>Co-morbid conditions</td>
<td>Smartphone reminder applications</td>
</tr>
<tr>
<td>Depression (particularly post-ACS)</td>
<td>Pill burden reduction with fixed dose combination therapy (polypill)</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>Once-daily medication dosing</td>
</tr>
<tr>
<td>Caregiver involvement</td>
<td>Patient outreach programs</td>
</tr>
<tr>
<td>Adverse reactions and intolerance to statins</td>
<td>Polypharmacy</td>
</tr>
<tr>
<td></td>
<td>Drug-drug interactions</td>
</tr>
<tr>
<td></td>
<td>Caregiver participation</td>
</tr>
<tr>
<td></td>
<td>Cardiac rehabilitation</td>
</tr>
</tbody>
</table>

---

**Optimal Statin Use After Acute Coronary Syndrome**
Implications: Feasibility and efficacy of polypill to improve adherence and CV risk in low-income, real-world U.S. population.
Back to our case...

• Never picked up discharge medications
• Had not started her statin – didn’t realize it was important
• Med reconciliation inadequate
• After taking the prescribed atorvastatin 80mg – LDL-C decreased to 50 mg/dL
Not everyone has the same opportunity to be healthy

Visit CountyHealthRankings.org
Implementation science research agendas

Adherence as a “vital sign”

Multi-dimensional interventions

Focus on vulnerable populations

Future Directions
Acknowledgments
Thank you for your attention!

frodrigu@stanford.edu
2019 FH Summit:
Disparities in Care

Laurence S. Sperling, M.D., FACC, FACP, FAHA, FASPC
Katz Professor in Preventive Cardiology
Professor of Global Health
Emory University
Executive Director, Million Hearts
CDC / NCCDPHP / DHDSP/CMS
Past President, American Society for Preventive Cardiology
About the Presenter

Laurence S. Sperling, MD

DISCLOSURES

No potential conflicts related to this presentation

• Opinions expressed do not necessarily reflect the opinions of the US Dept of HHS, the Public Health Service, the Centers for Disease Control and Prevention, or the presenters affiliated institutions. Use of trade names is for identification only and does not imply endorsement by any of the groups named above.
FH: Disparities in Care

- Disparities in Health & Healthcare
- Disparities related to FH
FH: Disparities in Care

- Disparities in Health & Healthcare
- Disparities related to FH
Disparities in Care

“Of all the forms of inequality, injustice in health is the most shocking and inhumane”

Dr. ML King
2nd Convention of the Medical Committee for Human Rights
Chicago
March 25, 1966
Disparities in Health & Healthcare

• 1986- Dept. HHS Report of Secretary’s Task Force (Heckler Report)
  – Highlighted marked health disparities in blacks and minorities

• Disparities in HC: differences in quality not due to access-related factors, clinical needs, preferences, appropriateness of intervention

• Disparities also exist according to socioeconomic status and sex / gender

Mensah GA. JACC 2019;74(9):1264-1268
Health vs. Healthcare: The Health/Disease Continuum

Status of CV Health Across America

• 2009 BRFSS, > 350K, self report

• 3.3% with ideal CV health (A);
  – 1.2% Oklahoma
  – 6.9% DC

• 9.9% with poor CV health (B: 0-2 metrics)

• Large disparities by age, gender, education, ethnicity

Fang J, et al. J Am Heart Assoc 2012;DOI.1161
Social Determinants of Health & CV Outcomes: Challenges and Interventions


Low SES
- Poor access to care and healthy foods
- Psychosocial factors
- Behavioral factors
- Environmental factors

Traditional CVD Risk Factors
- Hypertension
- Dyslipidemia
- Diabetes
- Smoking
- Obesity
- Poor diet
- Physical inactivity

Interventions
- Behavioral counseling (physical activity, smoking, alcohol)
- Community-based programs
- Health education
- Local and federal health policy

Interventions
- Guideline-based care
- Lifestyle modification
- Task shifting
Social Determinants of Health: Zip Code vs. Genetic Code?

• Health varies at a very LOCAL level

• Life expectancy in Atlanta
Leveraging Implementation Science to Address Health Disparities in Genomic Medicine

- Implementation of genomic applications in high-risk populations suboptimal; rates even lower among underserved
- Disparities in uptake of evidence-based GLs
- Barriers include poor awareness, knowledge, stigma, cost concerns, medical mistrust, limited access
- Collaborative multi-stakeholder approaches needed

FH: Disparities in Care

- Disparities in Health & Healthcare
- Disparities related to FH
Focus on
Familial Hypercholesterolemia (FH) & Disparities

Hidden in plain sight...........
Health Disparities Among Individuals with FH

- Disparities among those with FH likely impactful given FH affects all races /ethnicities
- Women with FH at much higher risk of premature ASCVD
- Most understudied FH subpopulation is blacks
- CASCADE-FH includes fewer blacks and Hispanics than expected by U.S. census data
- Unlikely that prevalence of FH lower in minority groups

Disparities Among Adults with Phenotypic FH: CASCADE-FH Registry

- Data from 3167 adults enrolled in CASCADE-FH registry /adjusted logistic regression to evaluate disparities in LDL-C and statin use

Health Disparities Among Adults with Phenotypic FH: CASCADE-FH Registry

• Women
  – Dx 4 years later in life
  – 40% less likely to be on any statin or high-intensity statin
  – 32% less likely to achieve LDL-C< 100; 21% less likely to achieve 50% LDL reduction

• Blacks Dx at older ages

• Asians and blacks
  – 50% less likely to achieve LDL-C< 100; 30% less likely to achieve 50% LDL reduction

Racial and ethnic disparities in LDL achievement remain

<table>
<thead>
<tr>
<th>Race</th>
<th>Enrollment</th>
<th>Most Recent Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>Enrollment</td>
<td>189 (n = 121)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>136 (n = 121)</td>
</tr>
<tr>
<td>Asian</td>
<td>Enrollment</td>
<td>173 (n = 70)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>119 (n = 70)</td>
</tr>
<tr>
<td>Nat American/Alaskan</td>
<td>Enrollment</td>
<td>244 (n = 6)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>151 (n = 6)</td>
</tr>
<tr>
<td>Nat Hawaiian/Pac Islander</td>
<td>Enrollment</td>
<td>95 (n = 1)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>113 (n = 1)</td>
</tr>
<tr>
<td>White</td>
<td>Enrollment</td>
<td>147 (n = 2,199)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>111 (n = 2,199)</td>
</tr>
<tr>
<td>Mixed/Other</td>
<td>Enrollment</td>
<td>165 (n = 133)</td>
</tr>
<tr>
<td></td>
<td>most recent follow-up</td>
<td>128 (n = 133)</td>
</tr>
</tbody>
</table>

LDL-C values were collected for these patients at enrollment into the CASCADE FH Registry and at the patients’ most recent follow-up. These values were then averaged for each race at enrollment and most recent follow-up. Analysis of variance of the data shows racial disparities in average LDL-C values between the African American and White patient populations at enrollment ($p<.001$) and at most recent follow-up ($p=.005$). A racial disparity in average LDL-C between the Asian and White patient populations at enrollment ($p=.003$) was also noted. No disparities were found between the African American and Asian patient populations at enrollment ($p=.25$) and most recent follow-up ($p=.99$), or between the Asian and White patient populations at most recent follow-up ($p=.32$).
Prevalence & Predictors of Health Literacy in FH

• HL measured in 7 countries using HLSQ scale
• 762 – AUS, Brazil, China, Hong Kong, Malaysia, Taiwan, UK
• > 20% with inadequate HL
• Inadequate HL greatest in Malaysia / Brazil / China (37%)
• Income independent predictor of HL as index of health disparities

Helping Individuals with FH and their Families
CASCADE FH™ Registry Sites

- 37 Sites Enrolling
- 2 Sites In Progress
FIND FH National Heat Map
3 Digit Zip Code
Number of Probable FH Individuals
Estimated

FIND FH Georgia HeatMap

The FH Foundation's FIND FH® Heat Map
Number of Probable Individuals with FH by 3-Digit Zip Code
- 2,010 to 19,540
- 990 to 2,010
- 470 to 990
- 190 to 470
- 0 to 190
FIND FH
In Disadvantaged Communities
(Example of Precision Public Health?)
Million Hearts® 2022
Aim: Prevent 1 Million Heart Attacks and Strokes in 5 Years
MH and FH Foundation / Summit

- Synergistic missions
- Important partnership
- 1:250 living with FH
  > 1 Million Hearts
FH: Disparities in Care

• Significant disparities in health & healthcare
• Similar disparities likely in identification & care of FH
• Further investigation needed to better understand impact of disparities in outcomes of those with FH
• Approaches to addressing traditional RFs should be coupled with interventions to confront health inequities
Disparities in Care

“Human progress is neither automatic nor inevitable…. But will require tireless exertions and passionate concern of dedicated individuals”

Dr. ML King
Future of Integration Speech, NYU
Feb. 10, 1961
thanks
Together Everyone Achieves More:

Identifying FH through Pediatric Cholesterol Screening

Amy Peterson, MD
Director, Pediatric Preventive Cardiology Clinics
Associate Professor of Pediatrics
University of Wisconsin School of Medicine and Public Health

October 21, 2019
Children are screened if you:

- Educate health care providers about pediatric cholesterol
- Develop strategies to implement pediatric cholesterol screening
Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents

0-2 years old: no screening

2-8 years old: Fasting lipid panel for at-risk children

9-11 years old: Nonfasting lipid screen for all children

12-16 years old: Fasting lipid panel for at-risk children

17-21 years old: Nonfasting lipid screen for all patients
Strategies to Screen Pediatric Populations:

1. Educate health care providers and patient families about the purpose of lipid screening
2. Remove barriers to screening

Teach, and then MAKE IT EASY
Teach, and then MAKE IT EASY…

Pediatric Preventive Cardiology Clinic

Cholesterol Screening in Children

UW Health’s American Family Children’s Hospital is pleased to provide the following guidelines for cholesterol screening in children. If you have any questions about this information or would like to speak with a provider in the Pediatric Preventive Cardiology Clinic, please call us at (608) 263-3680.

WHEN/WHOM TO SCREEN

<table>
<thead>
<tr>
<th>Age</th>
<th>Test</th>
<th>FLP (fasting lipid panel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 yrs</td>
<td>No screening</td>
<td>FLP &amp; FLP risk factors</td>
</tr>
<tr>
<td>2-8 yrs</td>
<td>FLP &amp; FLP risk factors</td>
<td>FLP &amp; FLP risk factors</td>
</tr>
<tr>
<td>9-11 yrs</td>
<td>Everyone</td>
<td>Non-fasting lipid panel</td>
</tr>
<tr>
<td>12-15 yrs</td>
<td>Everyone</td>
<td>Non-fasting lipid panel</td>
</tr>
<tr>
<td>16-17 yrs</td>
<td>Everyone</td>
<td>Non-fasting lipid panel</td>
</tr>
</tbody>
</table>

NORMAL VALUES

- Non-fasting: Non-HDL Chol < 145 or HDL > 40
- Non-fasting lipid panel includes total cholesterol and HDL cholesterol
- Non-HDL cholesterol = TC (total cholesterol) minus HDL cholesterol
- Fried: Children and Adolescents
  - Total Cholesterol: < 170
  - LDL: < 110
  - HDL: > 45
  - Triglycerides: < 150

RISK FACTORS

- Positive family history
- MI, CAD, sudden cardiac death, < 55 yrs males, < 65 yrs females
- Hypertension
- Obesity
- Tobacco use
- HDL < 40 mg/dl
- Type 1 & 2 diabetes
- Kidney disease
- Heart transplant
- Kawasaki disease
- Chronic inflammatory disease
- HIV

RECOMMENDED REFERRAL GUIDELINES

- The Pediatric Preventive Cardiology Clinic will see any patient with abnormal fasting lab results. If non-fasting lab results are abnormal, have the child do a fasting lipid panel.
- Urgent Referral Recommended: LDL > 190, TG > 500

APPOINTMENTS AND QUESTIONS

Providers:
Amy Peterson MD, Ann Dodge NP, Erin Marriott NP
Appointments: (608) 263-9400
To reach a provider: (608) 263-3680

Pediatric Heart Program
UNIVERSITY OF WISCONSIN-MADISON
Teach, and then MAKE IT EASY…
to order
- Ensure your laboratories are using appropriate pediatric reference ranges.
- Have automatic calculation of non-HDL-C from total and HDL-C.

To screen, teach, and then MAKE IT EASY... to interpret.
However beautiful the strategy, you should occasionally look at the results.

Winston Churchill
Pediatric Cholesterol Screening in Action

Updated from Desantes et al. J Pediatr 2017;188:87-90
Persistence Pays Off

By 8 years of care, 95% of children have had ≥1 cholesterol screen ordered.
The oldest are most likely to be screened...

...but the youngest are most likely to come!
So What Happened?

178 children with non-HDL-C ≥ 190 mg/dL

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familial hypercholesterolemia</td>
<td>43 (24)</td>
</tr>
<tr>
<td>Mixed Dyslipidemia</td>
<td>38 (22)</td>
</tr>
<tr>
<td>Dyslipidemia due to medication/medical condition</td>
<td>29 (17)</td>
</tr>
<tr>
<td>Polygenic hypercholesterolemia</td>
<td>7 (4)</td>
</tr>
<tr>
<td>Elevated LDL-C, not FH</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Atherogenic dyslipidemia</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Normal lipid panel when repeated</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Unknown diagnosis/no follow-up</td>
<td>50 (28)</td>
</tr>
</tbody>
</table>

Why were they screened?

- Universal screening: 48%
- Fam hx high cholesterol: 24%
- High-risk condition: 21%
- Fam hx ASCVD: 17%
- Obese child: 16%
- Parent request: 4%
- No reason given: 6%

Among those with universal screening, it was the only indication in 75%.
Conclusions

• Universal cholesterol screening should be utilized as a primary strategy for detection of pediatric FH.

• A multifaceted approach to improving cholesterol screening rates can be effective.

• “Screening fatigue” and conflicting guidelines can result in lower screening rates.

• Continued educational efforts are needed to maintain high screening rates and ensure appropriate care.
Thank you!
Science, Policy, and Behavior: Necessary Ingredients for Changing FH Care

Information – Education - Advocacy

Nanette K. Wenger, MD, MACC, MACP, FAHA
Professor of Medicine (Cardiology)
Emory University School of Medicine
Consultant, Emory Heart & Vascular Center
Founding Consultant, Emory Women’s Heart Center
Atlanta, Georgia

FH Summit  Atlanta, 2019
<table>
<thead>
<tr>
<th>Name of Commitment</th>
<th>Name of Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Grants/Contracts/Trial</td>
<td>AstraZeneca, Boehringer Ingelheim, Department of Defence (DoD), NHLBI</td>
</tr>
<tr>
<td>Steering Committee/Trial Data</td>
<td></td>
</tr>
<tr>
<td>Safety and Monitoring Board</td>
<td></td>
</tr>
<tr>
<td>Consultantship</td>
<td>Amarin Pharma, Inc., AstraZeneca, Janssen Pharmaceuticals</td>
</tr>
</tbody>
</table>
FH Update 2019

- Individuals with FH at same risk as those with ASCVD
- FH + ASCVD → 5x ↑ risk
- CASCADE FH Registry
  - Disparities in FH care
Disparities in FH Care

- Women, blacks, and Asians undertreated
  - Not prescribed statins comparably to white males
- Blacks and Asians do not reach same LDL-C goals as white males

Myers, Circ Cardiovasc Qual Outcomes 12:3005404, 2019
For Women Only: Pregnancy and FH

- Recommend pre-pregnancy counselling, contraception advice
  - Proper planning → likelihood healthy pregnancy, healthy children

- Healthy lifestyle: low-fat, low-cholesterol diet; routine exercise; no smoking before, during, after pregnancy

- Discontinue statins, ezetimibe, niacin, other lipid-lowering therapy at least 4 weeks prior to discontinuing contraception
  - Bile acid sequestrants can be used during pregnancy
  - Lipoprotein apheresis for very high-risk women

- During pregnancy
  - LDL-C can ↑ up to 66%
  - TG can ↑ up to 200-400%

- ? Resume statins during breastfeeding

- Screen children for FH

Lundberg https://www.acc.org/latest-on-cardiology/articles/2018/05/10/13/51 familial-hypercholesterolemia-and-pregnancy
Background Data

- Heterozygous FH (HeFH) may be as common as 1:250 individuals
  - Likely 90% of FH carriers undiagnosed

- FH present in all races, equally in both genders

De Ferranti, Circulation 133:1067, 2016
Nordestgaard, Eur Heart J 34:3478, 2013
Importance of Shared Decision-making

• Collaborative process whereby clinicians help patients reach a decision that is both informed by evidence and congruent with their personal values and preferences

• Requires education/information for both clinicians and patients

• Clear, accurate, unbiased medical evidence about reasonable alternatives – including no intervention – and benefits of each

Barry, NEJM 366:780, 2012
Your Heart: An Owner’s Manual

- Technical specifications – parts and features
  - Muscular pump – little larger than a clenched fist
  - Weighs less than a pound
  - Beats over 100,000 times daily
    - pumps @ 2000 gallons of blood daily, nearly 5 quarts of blood each minute
  - @ 60,000 miles of arteries, capillaries, veins
- US warranty
  - av. 81.1 years women
  - av. 76.1 years men
  - av. 74.6 years African American
  - av. 78.9 years white American
  - av. 86.5 years Asian American
  - read Owner’s Manual carefully for operating instructions
Concepts for Owner: Care and Maintenance

- Empowering individuals – awareness, education
  - Favorable lifestyle changes can ↓ CV risk factors, prevent CVD/CHD

- Continuum of risk
  - Match intensity of intervention to risk

- Behavioral changes by individuals, reshaping practice patterns by healthcare providers
  - Dramatically ↓ number of persons disabled, killed by CHD annually

- Partnership between individuals and their healthcare providers
Directions for Operation

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Geriatrics Society, the American Society of Preventive Cardiology, and the Preventive Cardiovascular Nurses Association

Arnett, J Am Coll Cardiol DOI: 10.1016/j.jacc.2019.03.010
CVD Risk Assessment

Wenger, Clin Cardiol DOI: 10.1002/CLC.21318
Preventive Approaches: Operating and Maintenance Instructions

- Lifestyle interventions – MAJOR EMPHASIS
- Major risk factor interventions
- Preventive drug interventions
Health Benefits of Smoking Cessation

- People who quit smoking before age 50 have 1/2 the risk of dying over the next 15 years compared with continuing smokers.
- Smoking cessation improves pulmonary function 20% to 30% within 2 to 3 months.
- After 1 year of smoking abstinence, risk of coronary heart disease is reduced by 50%.
- Within 5-15 years of smoking cessation, risk of stroke is similar to nonsmokers risk.

Centers for Disease Control and Prevention, MMWR. 39:2, 1990
Walking Cuts Women’s Heart Disease Risk

- Nurses Health Study: 72,488 women aged 40-65
- Vigorous exercise and brisk walking reduced the risk of heart attack or death from coronary heart disease by 30-40%
- Women who were sedentary but later engaged in moderate walking reduced the risk of heart attack and coronary death by 20-30%
- Walking at slower pace also beneficial

Manson, N Engl J Med. 341:650, 1999
The 250:250 Rule

- Exercise an extra 250 calories per day
- Eat 250 fewer calories per day
- Equals 500 fewer calories per day
- 3500 fewer calories per week = 1 lb weight loss
Lifestyle Changes: They Work!

- Diabetes Prevention Program (DPP)
  - Diet and exercise effectively delayed diabetes in a diverse American population of overweight people with IGT:
    - Physical activity for 30 minutes per day and weight loss of 5-7% of body weight:
      - Reduced risk of getting type 2 diabetes by 58%

**Class III Interventions: Not Useful/Effective and May Be Harmful for CVD Prevention in Women**

**Menopausal hormone therapy**

Hormone therapy and selective estrogen-receptor modulators (SERMs) should not be used for the primary or secondary prevention of CVD (*Class III; Level of Evidence A*).

**Antioxidant Supplements**

Antioxidant vitamin supplements (eg, vitamin E, C, and beta carotene) should not be used for the primary or secondary prevention of CVD (*Class III; Level of Evidence A*).
WHAT TO ASK YOUR PHYSICIAN OR PROVIDER AT YOUR OFFICE VISIT

In addition to traditional cardiovascular risks and your ASCVD risk score, ask about your ASCVD Risk Enhancers:

1. Family history of premature atherosclerotic cardiovascular disease
2. Persistently elevated cholesterol LDL-C over 190 mg/dL
3. Chronic kidney disease
4. Metabolic syndrome
5. Conditions specific to women:
   - Hypertensive disorders of pregnancy, preeclampsia, premature menopause, gestational diabetes
6. Inflammatory diseases, especially rheumatoid arthritis, psoriasis, lupus, and HIV
7. Ethnicity such as South Asian, Hispanic/Latino, African American
8. Elevated triglycerides over 175 mg/dL
9. Elevated hs-CRP over 2.0 mg/L
10. Elevated Lp(a) levels over 50 mg/dL or 125 nmol/L
11. Ankle-brachial index under 0.9
Advocacy Accomplishments

• Advocacy key driver of ↑ awareness

• FH a global public health priority

• Data from cascade screening/registries
  • FH prevalence 1:500→1:250

• Safe, effective Rx with generic statins, ezetimibe
  • Cost-effective

• Advocacy organizations
  • FH community peer support
  • Facilitates family screening
Advocacy Challenges and Opportunities

- Care disparities for women, underserved populations
- Available, affordable access to newer, more potent lipid-lowering therapies
- Limited government programs, registry maintenance, funding, research initiation
- Education patients, healthcare providers, healthcare delivery systems
- Cost-savings from preventive care
  - Years of life without disability, lost productivity
- Privacy, confidentiality
  - Prevent genetic discrimination
- Specialized centers – severe, homozygous FH
Towards more precision in cardiovascular disease prevention

Kirsten Bibbins-Domingo, PhD, MD, MAS
Lee Goldman, MD Endowed Chair in Medicine
Professor and Chair of Epidemiology & Biostatistics
Vice Dean, Population Health & Health Equity
University of California, San Francisco

January 15, 2020
Disclaimer

- I was a member of the US Preventive Services Task Force (USPSTF) from 2010-2017 and lead the USPSTF as vice-chair and chair from 2014-17.

- The views presented here are mine and not be official positions of the USPSTF.
Primum non nocere - “First, do no harm”

Clinical Prevention:

What we do in the clinical setting for patients without signs or symptoms of disease, in order to prevent future pain and suffering from disease.

Understand benefits and harms of prevention – ideally the likelihood of benefits and harms for the patient in front of you.
For large segment of population at average risk

1. How effective is the screening test?
2. How effective is the intervention?
3. What’s the balance of benefits and harms?

Evidence: Randomized controlled trials, large observational studies
The U.S. Preventive Services Task Force (USPSTF)

- Independent panel of volunteer, non-federal experts (N=16)

- Makes recommendations on clinical preventive services offered in the primary care setting

- Members with expertise in primary care and in evidence-based medicine/research
  - Family Medicine, Obstetrics and Gynecology, Internal Medicine, Geriatrics, Nursing, Pediatrics, Behavioral Health, Health Systems

- Explicit process of evidence review by Evidence-based Practice Centers (EPCs), with input from sub-specialists with content expertise and public throughout the recommendation development process
The U.S. Preventive Services Task Force

- The USPSTF scope for clinical preventive services includes:
  - screening tests
  - counseling
  - preventive medications

- Services are offered in a primary care setting

- Recommendations apply to adults and children with no signs or symptoms

- The Task Force evaluates benefits and harms of each service

- Costs are not considered in the balance of benefits and harms.
12 recommendations per year

- New topics and updates of existing topics
- Final recommendation and accompanying evidence report published in JAMA
Steps the USPSTF Takes to Solicit Input & make a Recommendation

At each stage –
1) Solicit feedback from content experts, sub-specialists
2) Draft posted for public comment
3) Peer-review of evidence report prior to public posting
The USPSTF analytic framework for approaching the evidence (generic)
Basic USPSTF Methods for Developing Recommendations

Assess the evidence across the analytic framework for:

- The **certainty** of the estimates of the potential benefits and harms

- The **magnitude** of the potential benefits and harms

- The **balance** of the benefits and harms, or the **magnitude of the net benefit** of the preventive service
### Basic USPSTF Methods for Developing Recommendations: The Letter Grades

<table>
<thead>
<tr>
<th>Certainty of Net Benefit</th>
<th>Magnitude of Net Benefit</th>
<th>Substantial</th>
<th>Moderate</th>
<th>Small</th>
<th>Zero/Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I</td>
</tr>
</tbody>
</table>
USPSTF Grades

- **A**: All three grades are recommendations in favor of screening
- **B**: They differ by the level of certainty of the evidence and the magnitude of potential net benefit
- **C**: No net benefit and recommend against screening
- **D**: Not enough evidence to make a recommendation
- **I**: NOT a recommendation against screening – rather it’s a call for more research

**NOT a recommendation against screening**
Private insurers “…shall provide coverage for and shall not impose any cost sharing requirements for evidence-based items or services that have in effect a rating of ‘A’ or ‘B’ in the current recommendations of the USPSTF”

The law also states “…nothing in this subsection shall be construed to prohibit a plan or issuer from providing coverage for services in addition to those recommended by USPSTF or to deny coverage for services that are not recommended by the Task Force”
USPSTF Grades and the Affordable Care Act

- The ACA expands access to evidence-based preventive services, but is the “floor” and not the “ceiling” for coverage.

- USPSTF evaluates science, but does not determine coverage. That role is left to insurers, regulators, and lawmakers.

- As physicians, we value access for our patients, but as a Task Force, we cannot reinterpret the science to arrive at an A or B recommendation.
Cardiovascular Disease: Lipids
# Statin Use for the Primary Prevention of Cardiovascular Disease in Adults: Preventive Medication

**Release Date:** November 2016

## Recommendation Summary

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade (What's This?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults aged 40 to 75 years with no history of CVD, 1 or more CVD risk factors, and a calculated 10-year CVD event risk of 10% or greater</td>
<td>The USPSTF recommends that adults without a history of cardiovascular disease (CVD) (i.e., symptomatic coronary artery disease or ischemic stroke) use a low- to moderate-dose statin for the prevention of CVD events and mortality when all of the following criteria are met: 1) they are aged 40 to 75 years; 2) they have 1 or more CVD risk factors (i.e., dyslipidemia, diabetes, hypertension, or smoking); and 3) they have a calculated 10-year risk of a cardiovascular event of 10% or greater. Identification of dyslipidemia and calculation of 10-year CVD event risk requires universal lipids screening in adults aged 40 to 75 years. See the &quot;Clinical Considerations&quot; section for more information on lipids screening and the assessment of cardiovascular risk.</td>
<td>B</td>
</tr>
<tr>
<td>Adults aged 40 to 75 years with no history of CVD, 1 or more CVD risk factors, and a calculated 10-year CVD event risk of 7.5% to 10%</td>
<td>Although statin use may be beneficial for the primary prevention of CVD events in some adults with a 10-year CVD event risk of less than 10%, the likelihood of benefit is smaller, because of a lower probability of disease and uncertainty in individual risk prediction. Clinicians may choose to offer a low- to moderate-dose statin to certain adults without a history of CVD when all of the following criteria are met: 1) they are aged 40 to 75 years; 2) they have 1 or more CVD risk factors (i.e., dyslipidemia, diabetes, hypertension, or smoking); and 3) they have a calculated 10-year risk of a cardiovascular event of 7.5% to 10%.</td>
<td>C</td>
</tr>
</tbody>
</table>

## Supporting Documents
- Final Research Plan
- Final Evidence Review: Statin Use for the Prevention of Cardiovascular Disease
  - PDF Version
- Final Evidence Review: Screening for Dyslipidemia in Younger Adults
  - PDF Version
- Evidence Summary: Statins for Prevention of Cardiovascular Disease in Adults
  - PDF Version
- Evidence Summary: Screening for Dyslipidemia in Younger Adults
  - PDF Version

## Clinical Summary
Clinical summaries are one-page documents that provide guidance to primary care clinicians for using recommendations in practice.
Lipid Disorders in Children and Adolescents: Screening

Release Date: July 2016

Recommendation Summary

<table>
<thead>
<tr>
<th>Population</th>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children and adolescents 20 years or younger</td>
<td>The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for lipid disorders in children and adolescents 20 years or younger.</td>
<td>I</td>
</tr>
</tbody>
</table>
Challenges

- Evidence not of sufficient quality or quality
- Screening test characteristics problematic
- Intervention effective, but limited longer term evidence of benefits/harms
- Limited evidence on intervention effectiveness for the period proposed for screening
For large segment of population at average risk

Identify variation in risk of the population

Intensity of intervention depends on risk

Climate Prevention: First, do no harm

1. How effective is the screening test?
2. How effective is the intervention?
3. What’s the balance of benefits and harms?

Evidence
Filling the gaps in evidence for FH screening

- More population-based evidence
- Data that informs approaches to screening
- Longer-term follow-up on lipid therapy in children/young adults
- Evidence on modified outcomes during the period of assessment/treatment.
Towards more “precision” in population prevention

- Importance of communication & scientific discourse

- Ongoing discussion of types of evidence that support “precision” screening

- High interest (and $$) in prevention – importance of putting patients first
Primum non nocere - “First, do no harm”