The (Post-COVID) Future of Cardiovascular Disease Prevention

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About the Presenter

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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.
(Post-COVID) Future of CVD Prevention

• Past
• Present
• The Future
(Post-COVID) Future of CVD Prevention

• Past – BC (Before COVID)
• Present
• The Future
Father of CV Prevention: Paul Dudley White

- Advocate for prevention of heart disease
- Major impetus behind Framingham HS
- Helped oversee creation of NHLBI & AHA
- Eisenhower’s physician following 1955 MI
- “Exercise more. Eat healthy. Learn your family’s medical Hx”
Paul Dudley White’s last fellow at MGH

- J. Willis Hurst
- Chair Emory’s DOM 35 yrs
- Hurst’s The Heart, 14th Ed.
- AHA President
- Lyndon Johnson’s physician, MI April 9, 1972
- Encouraged start of Prev Card at Emory
- 2011 (90 yo)
“In 1961 with just two words, Bill (Kannel) helped to change our understanding of the underlying causes of heart disease and stroke, and with two words, the entire field of preventive cardiology was born.”

Daniel Levy
Current Framingham Heart Study Director

Wong N., Sperling L., Baum S. The ASPC: Our 30 Year Legacy, Clinical Cardiology, 2016
Concept of cardiovascular “risk factors”

Factors of Risk in the Development of Coronary Heart Disease—Six-Year Follow-up Experience

The Framingham Study


Framingham, Massachusetts

Age, sex, hypertension, hyperlipidemia, smoking, diabetes, (family history), (obesity)

FIGURE 1. Risk of CHD according to elevated blood pressure (BP), elevated cholesterol, and left ventricular hypertrophy: Framingham cohort 6-year follow-up. Elevated BP = ≥160/95; elevated cholesterol = ≥260 mg/dl.

Framingham Heart Study: Kannel et al., 1961
“We cannot be a strong nation unless we are a healthy nation…”

Franklin D. Roosevelt

Dedication of NIH Campus

Bethesda, MD

October, 1940
Morris Wilner (My Grandfather)
“CVD is the biggest epidemic (pandemic) ever known to mankind- We need strategies to address epidemics…”

Salim Yusuf
President WHF
Europrevent 2013, Rome

“Secondary Prevention is urgent….“

Valentin Fuster
WCC 2016, CDMX
Epidemics / Pandemics

CORPORATION OF THE CITY OF KELOWNA

PUBLIC NOTICE

Notice is hereby given that, in order to prevent the spread of Spanish Influenza, all Schools, public and private, Churches, Theatres, Moving Picture Halls, Pool Rooms and other places of amusement, and Lodge meetings, are to be closed until further notice.

All public gatherings consisting of ten or more are prohibited.

Kelowna, B.C.,
19th October, 1918.

D. W. SUTHERLAND,
Mayor.
Our World Has Changed Since January 2020……
(Post-COVID) Future of CVD Prevention

- Past
- Present
- The Future
COVID-19
Impact of COVID on CV System

1. Intense Acute Inflammatory response
2. Thrombus formation in coronary circulation
3. Exacerbated by preexisting CVD
4. 1. Plaque rupture
5. 2. Endothelial dysfunction increasing procoagulant activity
6. Acquired antiphospholipid antibody

Disease Progression:
- Virus–membrane interaction
- Virus replication
- Virus dissemination
- Endothelial dysfunction
- Platelet activation
- Neutrophil–platelet aggregate formation
- Neutrophil migration
- Fibrin thrombus formation
- Diffuse alveolar damage
- Platelet consumption
- Coagulation factor depletion
- Disseminated intravascular coagulation
- Diffuse alveolar hemorrhage

Complications:
- VTE with DVT’s and PE
- Myocardial infarction
- Thrombosis of canulae and dialysis catheters
- Strokes due to large vessel occlusion
- Acute kidney injury
CMR in Patients Recovering from COVID-19

- 100 pts Frankfurt, Germany
- Median 71 days from COVID
- Cardiac involvement 78%
- Active myocardial inflammation 60%
- hs-TnT detectable 71%
- Independent of preexisting conditions, severity
- Bx with severe findings - acute lymphocytic infiltration

Puntmann VO, et al. JAMA Cardiol. Online July 27, 2020
Amid the Coronavirus Crisis, Heart and Stroke Patients Go Missing

Emergency physicians are seeing declines in the number of patients arriving with cardiac problems. Some say they were afraid to go to the hospital.


https://www.cdc.gov/mmwr/index.html
Implications of Delay and Disruption of Care During the COVID-19 Pandemic

Recommendations for Patient Visits During COVID-19 Pandemic

- **Don’t defer** patient visits
- **use** telehealth including telephone if at all possible
- **At each visit:**
  - **Ask** about symptoms
  - **Encourage** EMS/ER for acute symptoms
  - **Remind** patients about safety
  - **Ensure** adequate medication refills and access
  - **Inquire** about physical activity and nutrition habits
  - **Use** the full care team to enhance patient care

SMBP- Vital Signs Vital for Telemedicine

Influenza Vaccination for CV Prevention

- AHA/ACC Class I Recommendation for Secondary Prevention (LOE B)
- MI’s 6 X greater within week of influenza
- IV reduces burden of influenza-associated illness including CV events (15-45% - similar RRR as other GDMT)
- Readiness for upcoming influenza season needed
  - Health systems and team-based approaches

[cdf.gov/flu/high risk/ heart disease](https://www.cdc.gov/flu/high risk/ heart disease)
Davis MM, et al. Circulation 2006;114(14)
Kwong JC, et al. NEJM 2018;378(4)
MacIntyre CR, et al. Heart 2016; 102(4)
Cardiovascular Health, Prevention, and CV Care Must Remain a Priority during the Pandemic
Concerning Directional Change
(CDC Vital Statistics)

Changing Direction
The heart disease death rate climbed last year, fueled by the rise in obesity and diabetes.

Age-adjusted mortality rate per 100,000 U.S. residents

- Last jump in heart disease mortality rates: 4.1 between 1992 and 1993
- Heart disease: 168.5 in 2015, 1.5 from 2014
- Cancer: 158.5 in 2015, 2.7 from 2014

Source: Centers for Disease Control and Prevention
Missed Opportunities to Prevent Cardiovascular Events

9.0 M not taking aspirin as recommended
40.1 M with uncontrolled HBP
39.1 M not using statins when indicated
54.1 M combustible tobacco users
+ 70.9 M who are physically inactive

213.1 M missed opportunities

55% of these opportunities are in adults aged 35–64 years

Need to Change the Conversation
Does the News Reflect What we Die From?
Our World Data, Shen et al. (2018)

- CDC’s U.S. causes of death
- Google Trends
- NYT & Guardian database
- 1/3 Heart Disease (2-3% media coverage)
Additional Cause for Concern-Projected U.S. State Level Prevalence of Adult Obesity / Severe Obesity

• 48.9% obese by 2030

• 24% with severe obesity

• “given the difficulty achieving meaningful wt loss, findings highlight importance of prevention”

Ward ZJ, et al. NEJM 2019
Social Determinants of Health: Zip Code vs. Genetic Code?

- Health varies at a very LOCAL level
- Life expectancy in Atlanta
Socio-economic determinants of vascular disease (Food Deserts / Food Insecure)- Presence of “L & MIC” in HIC

Mohamed Kelli, H. et al. ACC 2016; Circ CV Qual Outcomes 2017;10

- Food desert: Locations with low food access and low income (USDA).
- 23.5 million U.S. residents live in food deserts.
- 1421 subjects residing in the Atlanta (MetaHealth, Pred Health studies)

Food deserts in the Atlanta metropolitan area (USDA map)
## Changing Global Burden of Disease in a Global Economy

**1990**
1. Lower respiratory infection
2. Diarrhea
3. Perinatal
4. Major depression
5. Ischemic heart disease
6. Cerebrovascular

**2020**
1. Ischemic heart disease
2. Major depression
3. Road traffic accidents
4. Cerebrovascular
5. COPD

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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
Guideline on the Management of Blood Cholesterol

- Writing committee: cardiologists, internists, interventional cardiologists, NP, pharmacists, PA, pediatrician, nephrologist and lay/patient representative.

  Reviewed by 21 official reviewers as well as 27 individual content reviewers.

- Guideline Summary
  ACC Guideline Hub (Guidelines Made Simple)
  121 pages
  72 Recommendations
  Class I 29
  Class II a 26
  Class II b 14
  Class III 3

2 Value Based Recommendations
28-36% of Guideline-Recommended Patients Not on Statins: ACC NCDR PINNACLE Registry (Maddox et al., JACC 2014)

**Figure 2: Lipid-Lowering Therapies, Overall and by Patient Risk Group**

Display of lipid-lowering therapies by patient risk group. Percentages total >100% due to differing contraindication number per group. Refer to the methods section for further details. ASCVD = atherosclerotic cardiovascular disease; CVD = cardiovascular disease; DM = diabetes mellitus; LDL = low-density lipoprotein.
“Drugs Don’t Work in Patients who Don’t Take Them”

C. Everett Koop, MD
U.S. Surgeon General
1985
CV Economics: Pyramid Standing on its Head?

- CV Prevention
- Office-based Care
- CCU / ER Care
- Imaging
- CT Surg
  - ICDs
  - PCI

Select patients

All patients
(Post-COVID) Future of CVD Prevention

- Past
- Present
- Post-Pandemic Future?
March 22, 2020 DocMatter Community

- Cases of COVID-19
  Worldwide: 372,147
  - Deaths 16,310
  U.S. 42,161
  - Deaths 508

Future of Preventive Cardiology
By Raina Garg MBBS, MPH re: ASPC DocMatter Community

The last pandemic in 1918 was followed by the Great Depression. It might be logical to assume that this pandemic will be followed by an economic recession. Where do specialties like "Preventive Cardiology," which have been deemed non-essential services stand in the grand scheme of things?
Cases of COVID-19

Worldwide: Approaching 20M
Deaths 723K
U.S.: Approaching 5M
Deaths 162K

Johns Hopkins Coronavirus Resource Center,
accessed Aug. 8, 2020
Future CV Prevention ?…. 
Sperling LS. Circulation 2020 On My Mind doi.org/ 10.1161.120.047059

Re: Future of Preventive Cardiology

Fantastic that ASPC has provided this forum for discussion. Up until now I have held back from adding comments. Given the posed question I am compelled to respond. When this unprecedented challenge to our country and the world hopefully settles down (we have a long journey ahead one day at a time) what will be clear is that among the many lessons we have been blind to is that the burden of chronic disease (NCDs) has led to a human civilization in great danger. What is clear from the COVID-19 data is that risk for severe manifestations and death are being driven by the interaction of a viral illness with an unwell population. The need to invest more than ever in ESSENTIAL services like cardiovascular prevention, preventive cardiology, population health initiatives, and robust public health programs is painfully crying out every day in China, Iran, Italy, LA, NYC, and in our communities everywhere in the nation.

- Laurence Sperling

The message above is a reply to this discussion started by Dr. Raina Garg:
“risk for COVID-related morbidity driven by interaction of viral illness with unwell population. Need to invest more than ever in ESSENTIAL services like CV prevention, population health initiatives, robust public health programs…”

The (Post-COVID) Future of Cardiovascular Prevention: Unprecedented Times
doi.org/10.1161.120.047059
“cardiovascular and cardiometabolic prevention must be a high level priority in the post-pandemic recovery & the era of COVID-19”

“lessons learned during (pandemic) recovery critical to ensure health of population going forward..”

“In the midst of difficulty lies opportunity…”

Albert Einstein
THE FUTURE OF CARDIOVASCULAR MEDICINE WILL BE ..... FOCUS ON CV HEALTH & PREVENTION
Social Determinants of Health: Challenges & 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
The CardioMetabolic Health Alliance

Working Toward a New Care Model for the Metabolic Syndrome

FIGURE 2 Stages in the Evolution of MetS and Recommended Therapy by Stage

MetS. A greater emphasis on assessing nutritional quality and levels of physical activity, with a focus on filling the gap between public health approaches and implementation in clinical practice, will be needed. Care models will continue to incorporate ACOs, but uncertainty exists as to how the ACA will affect MetS care in the future. It is foreseen that health care will transition to a greater degree from the clinic to the community, improving access to care, and that there will be a broadening of stakeholders to include public health, community, and industry sectors. Screening and performance metrics will enhance implementation of new care models in the future. Finally, the TT affirmed a call to action to encourage ongoing partnerships, funding, and initiatives to improve the lives of people with or at risk for MetS.
Therapeutic Inertia in CVD Prevention

Dixon DL, Sharma G, Mensah GA, Sperling LS, Deedwania, PC, Virani SS
JACC 2019;74(13)

**FIGURE 1** Strategies to Reduce Therapeutic Inertia

**Clinician and Patient Education**
- Clinician-patient discussion of net clinical benefit and medical misinformation
- Support educational outreach visits
- Provide decision support at point-of-care
- Improve guideline formats & tools for dissemination

**Team-Based Care**
- Place the patient at the center of the care team
- Inform and empower patients through shared-decision making
- Guideline-based, algorithmic approach to treatment

**Systems Approaches**
- Real-time audit and feedback
- System-wide quality improvement
- Use of implementation science principles

Therapeutic inertia is a complex problem that will require a broad holistic approach to address it.
BARI 2D Trial: Primary Endpoint

- 5-year death rate
- N= 2368
- difference did not reach statistical significance.

Death (\%)  

\[
\begin{array}{c|c|c|c|c|c|c}
0\% & 5\% & 10\% & 15\% & 20\% \\
\hline
\text{Revasc.} & 13.2\% & n =155 & & & \\
\text{OMT} & 13.5\% & n =161 & & & \\
\hline
\end{array}
\]

p = 0.97

BARI 2D Study Group, NEJM 2009
Risk Factor Goals

- Smoking Status: No smoking*
- LDL-C: <100 mg/dL*
- Non-HDL-C: <130 mg/dL*
- TG: <150 mg/dL**
- SBP: <130 mmHg*
- DBP: <80 mmHg*
- Hemoglobin A1C: <7%*

Additional studies are needed to define optimal target levels for systolic BP and A1C for patients with T2DM.
• **Extension of Paradigm- CV Risk Reduction**

• **Focus on Rx with Evidence for Event Reduction**

• **Clinicians MUST be actively involved in new approaches to comprehensive care**

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ASCVD is defined as a history of an acute coronary syndrome or MI, stable or unstable angina, coronary heart disease with or without revascularization, other arterial revascularization, stroke, or peripheral artery disease assumed to be atherosclerotic in origin.

DKD is a clinical diagnosis marked by reduced eGFR, the presence of albuminuria, or both.

Consider an SGLT2 inhibitor when your patient has established ASCVD, HF, DKD or is at high risk for ASCVD. Consider a GLP-1RA when your patient has established ASCVD or is at high risk for ASCVD.

Patients at high risk for ASCVD include those with and organ damage such as left ventricular hypertrophy or retinopathy or with multiple CV risk factors (e.g., age, hypertension, smoking, dyslipidemia, obesity).

Most patients enrolled in the relevant trials were on metformin at baseline as a glucose-lowering therapy.

ASCVD = atherosclerotic cardiovascular disease; CV = cardiovascular; DKD = diabetic kidney disease; eGFR = estimated glomerular filtration rate; GLP-1RA = glucagon-like peptide-1 receptor agonist; HF = heart failure; MI = myocardial infarction; SGLT2 = sodium-glucose cotransporter-2; T2D = type 2 diabetes.
Primary Outcome: CV Death, MI, hospitalization for UA, HF or resuscitated cardiac arrest

Adjusted Hazard Ratio = 0.93 (0.80, 1.08)
P-value = 0.34

Absolute Difference INV vs. CON

6 months:
Δ = 1.9% (0.8%, 3.0%)

4 years:
Δ = -2.2% (-4.4%, 0.0%)

Maron DJ, et al. NEJM 2020; 382: 1395-1407
Cardiac Rehabilitation and Risk Reduction: Time to “Rebrand and Reinvigorate”
doi:10.1016/j.jacc.2014.10.059
Benefits of CR

- Reduction in total (13%) & CVD mortality (26%)
- Dose-dependent reduction in mortality
- Reduction in hospitalization, angina, depression
- Class I recommendation / QOC metric
- **Future**
  - Home-based
  - E-health / m-health
  - Hybrid models

Sandesara PB, Eapen DJ, Sperling L. ACCSAP 9, 2016, Chpt 5 (Module 8)
“CR of the future must be patient-centered, comprehensive... delivered through variety of easily accessible care models that emphasize value... in healthcare outcomes & cost effectiveness”
Preventive Cardiology as a Subspecialty of CV Medicine
Shapiro MD, Maron DJ, Sperling LS, Bhatt DL, Fazio S
JACC 2019;75(15)

CENTRAL ILLUSTRATION: The Necessary Competencies for Preventive Cardiology

Preventive Cardiology
- Diabetes
- Hypertension
- Cardiovascular imaging and stress testing
- Biomarkers and genetics
- Obesity and nutrition

Endocrinology
Cardiology
Internal Medicine

The Future

- Preventive Cardiologists
- CV Prevention Specialists
- Cardiometabolic and Diabetes Care Specialists
- Population-focused Public health-oriented CV Prevention Specialists
The Post-COVID Future?

- Acceleration of New Care Models
  - Telehealth / telemedicine
- Decreased use of Ineffective, low-value care
- Volume to value transformation
- Rapid movement to further healthcare integration / consolidation
Need for Comprehensive & Complementary Prevention Programs
(Focus on where we are born, live & work, learn & play)

• Traditional HC……
• Public / Global Health
• Industry / workplace
• Schools / churches / families / communities
• Media
• Environmental engineering/architecture
• Government
Success Stories

• Be There San Diego
  – Univ. of Best Practices / Right Care Initiative
• Nashville Health
• Kaiser N. California HTN Control
• South Carolina Collaborative
• Minneapolis focus on comprehensive CV risk factors

PRECISION MEDICINE ?
POPULATION HEALTH ?
Precision Public Health

• **Precision Medicine**
  – Providing right treatment to right patient at right time

• **Precision Public Health**
  – Providing right intervention to right population at right time

Million Hearts® 2022
Aim: Prevent 1 Million Heart Attacks and Strokes in 5 Years

Keeping People Healthy

Optimizing Care

COMMUNITY

Priority Populations
# Million Hearts® 2022
## Priorities

### Keeping People Healthy
- Reduce Sodium Intake
- Decrease Tobacco Use
- Increase Physical Activity

### Optimizing Care
- Improve ABCS*
- Increase Use of Cardiac Rehab
- Engage Patients in Heart-Healthy Behaviors

### Improving Outcomes for Priority Populations
- Blacks/African Americans with hypertension
- 35- to 64-year-olds
- People who have had a heart attack or stroke
- People with mental and/or substance use disorders

*Aspirin use when appropriate, Blood pressure control, Cholesterol management, Smoking cessation
• **Public Health Priorities**
  – Where CDC & partners can make significant progress in relatively short time

• Antibiotic Resistance
• HIV Elimination
• Million Hearts
• Opioid Overdose
• Vaccine Preventable Disease
• Viral Hepatitis
The Future?


THE 3 BUCKETS OF PREVENTION

Traditional Clinical Prevention

1. Increase the use of clinical preventive services

Innovative Clinical Prevention

2. Provide services that extend care outside the clinical setting

Community-Wide Prevention

3. Implement interventions that reach whole populations

201http://journals.lww.com/jphmp/Citation/publishahead/The_3_Buckets_of_Prevention_99695.aspx
Approach to Cardiovascular & Cardiometabolic Epidemics / Pandemics?

- Identify vectors / complex causes
- Identify barriers / roadblocks / factors that propagate
- Goals:
  - Control
  - Elimination
  - Eradication
Post- COVID Future of CVD Prevention

• COVID impacts CV system, CV care, and outcomes
• CV Health & Prevention remain a priority in the midst of pandemic
• Future- greater need for integration of healthcare and public health at level of community
Cardiovascular Prevention Dashboard Command Center?

- Population-based
- Greater focus on those out of range or at increased risk, i.e. in the “red zone”
The Future ??

“It’s tough to make predictions, especially about the future”

Yogi Berra
thanks