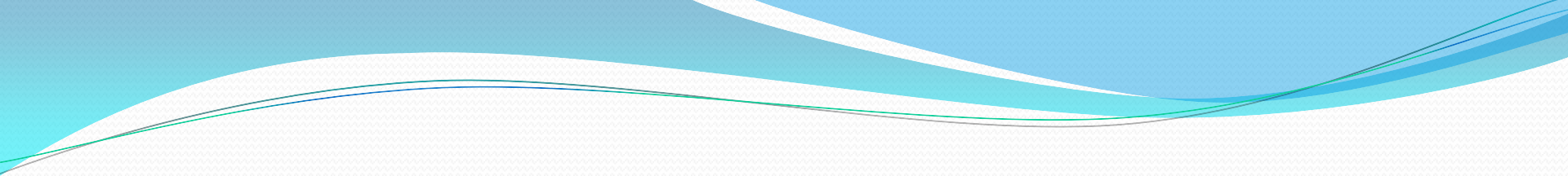


Future Directions in Prevention and Population Health Care Modeling



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A Model Is...

“A simplified representation of a real- world situation used to help answer a specific question.”

What Reality TV Can Teach Us About Preventing Heart Attacks....



Parallels Between Reality TV and Clinical Drugs Trials

- The ostensible goal
 - Reality TV: Identify the most talented recording artist or most compatible couple.
 - Drug trials: Help a hyperactive first grader grow into a productive, job-holding adult
- The real goal
 - Reality TV: Win ad dollars and television viewers
 - Drug trials: Find a drug that leads to improved ADHD symptom check list scores

A Helpful Motto

- “Every system is perfectly designed to get the results it gets.” -- Paul Bataldan, who co-founded the Institute for Healthcare Improvement

Surrogate Endpoints (1)

- Clinical Questions
 - Does the middle-aged man avoids a heart attack after a few decades?
 - Does the hyperactive first-grader holds down a good job someday?
 - Does the peri-menopausal woman remains free from a hip fracture when she's elderly?

Surrogate Endpoints (2)

- Clinical Questions

- Does the middle-aged man avoids a heart attack after a few decades?
 - Surrogate: Cholesterol levels
- Does the hyperactive first-grader holds down a good job someday?
 - Surrogate: Symptoms checklist
- Does the peri-menopausal woman remains free from a hip fracture when she's elderly?
 - Surrogate: DEXA scans

Surrogate Endpoints (3)

- When are surrogate endpoints a problem?
 - Their relation to the actual outcome of interest may be weak or nonexistent
 - Impressing Donald Trump may fail to predict later business success
 - Corollary: A different surrogate endpoints may have much stronger predictive relationship
 - The intervention can improve the surrogate outcome but have bad side effects
 - Nonstop fancy dates that titillate viewers later lead to the couple's inevitable romantic disappointment

What is the REAL goal of preventive cardiology?

- Prevent major CV problems
 - Myocardial infarctions
 - Stroke, peripheral arterial disease
 - Kidney failure
 - Death
- What are the risk factors?
 - Hypertension, diabetes, smoking, hypercholesterolemia, family history (“Framingham 5”)
 - Triglycerides, obesity

Misadventures in Cholesterol Lowering Drugs

- 1970s: Clofibrate
 - World Health Organization trial found it increased heart attacks.
- 2002: Hormone replacement
 - Women's Health Initiative trial showed hormone replacement caused blood clots and increased heart attacks by 29 percent, though it also made cholesterol levels better.
- 2006: Torcetrapib
 - Pfizer sunk \$1 billion to develop and it had great effects on cholesterol levels—but also caused more heart attacks.

Estimator

Clinicians

Patients

About

ASCVD Risk Estimator*

10-Year ASCVD Risk

59.9% calculated risk

7.8% risk with optimal risk factors**

Lifetime ASCVD Risk



Lifetime Risk Calculator only provides lifetime risk estimates for individuals 20 to 59 years of age.

Recommendation Based On Calcul... >

HDL - Cholesterol
(mg/dL)

46

Systolic Blood Pressure

150

Treatment for Hypertension

Y

N

Diabetes

Y

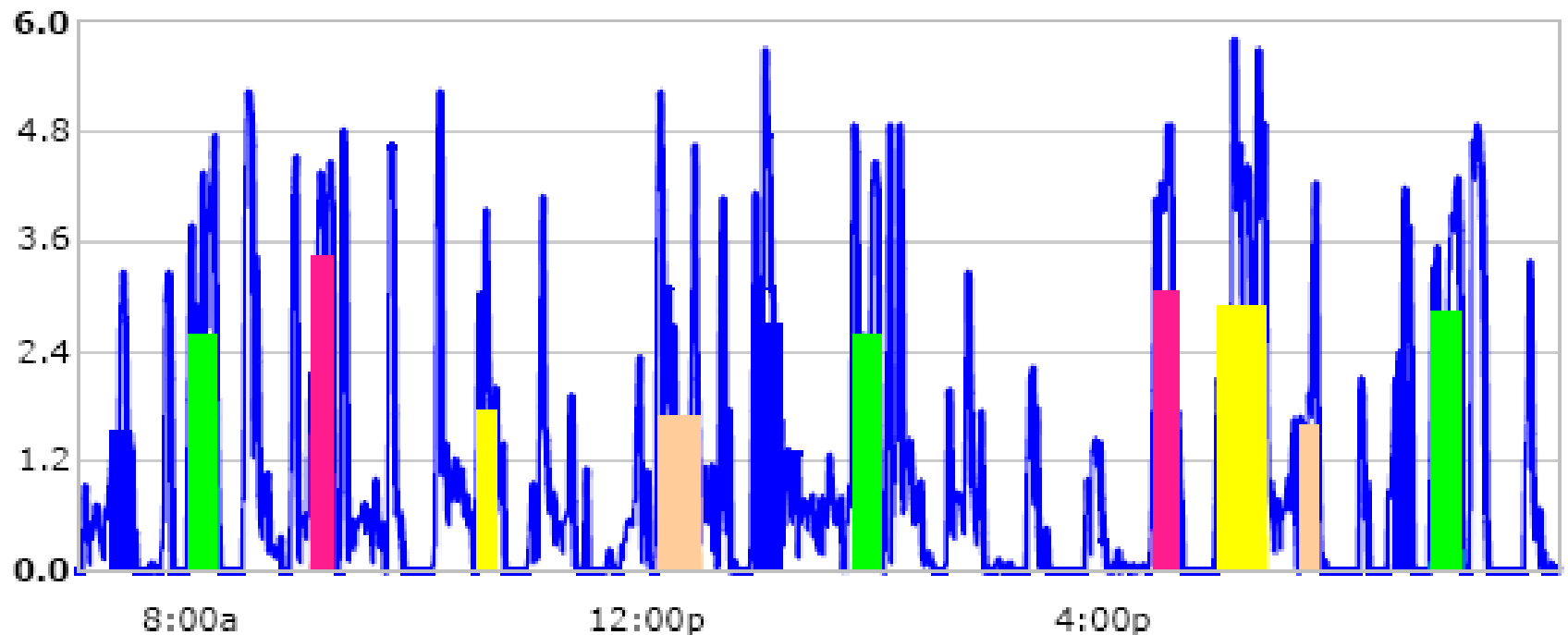
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The number one risk factor for
coronary artery disease risk is...



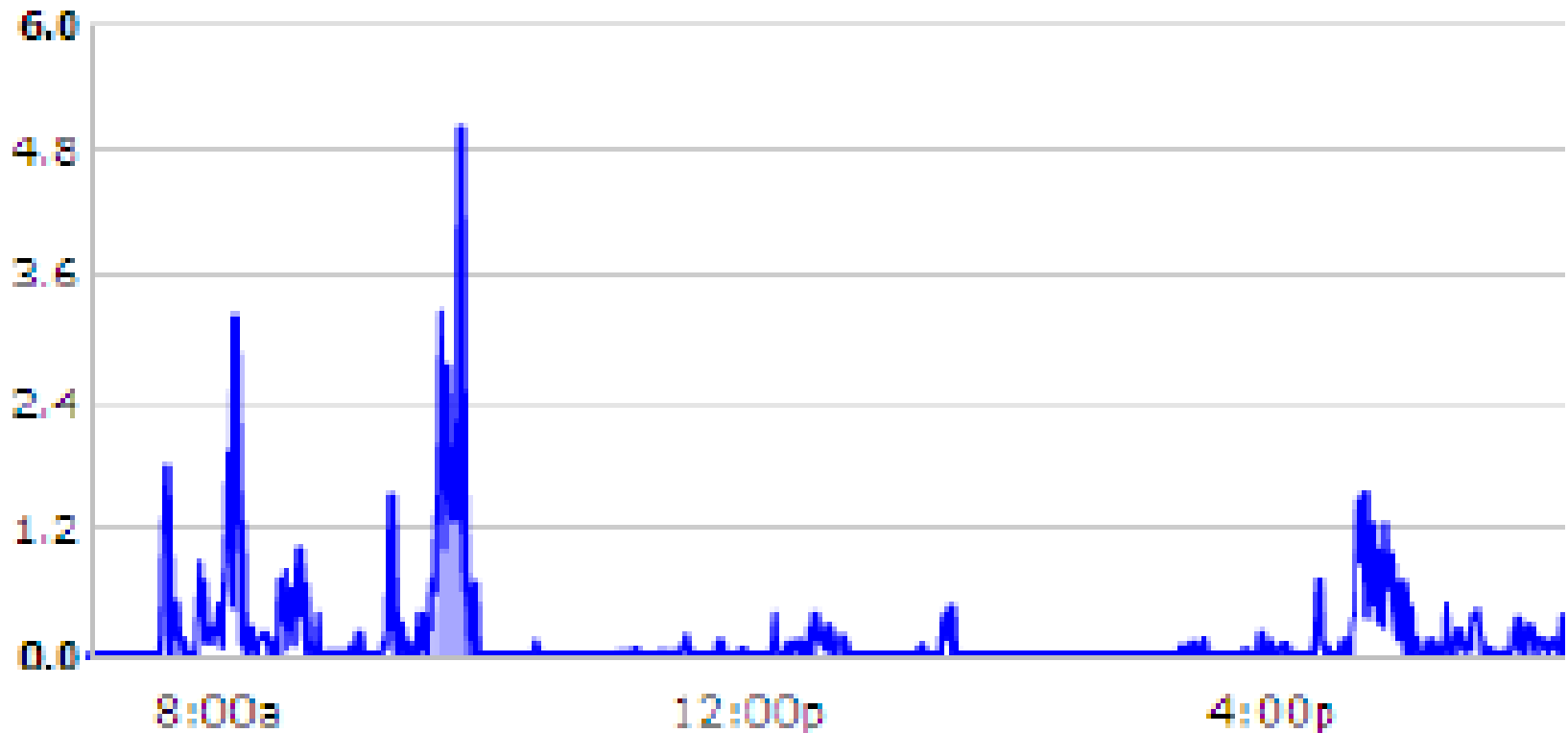


Pediatric Obesity (con't)



Jake Sanghavi at DisneyWorld. 30,137 steps

Pediatric Obesity (con't)

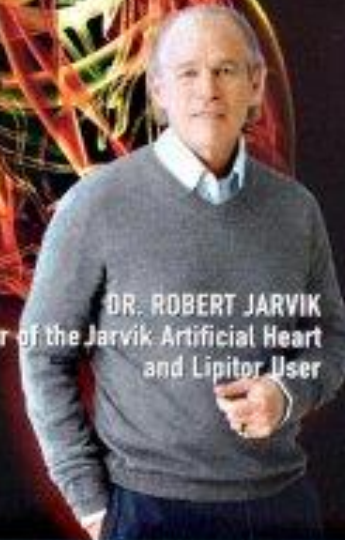
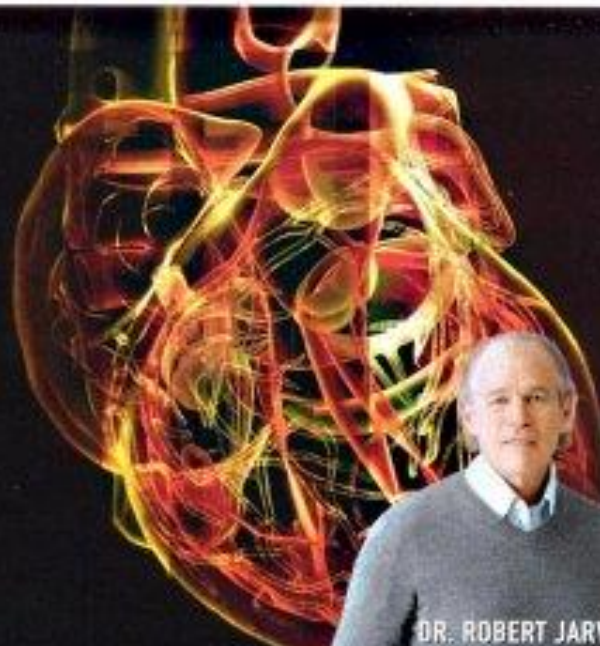


Jake Sanghavi at daycare. 4,873 steps

In patients with multiple risk factors for heart disease,

Lipitor
reduces risk *of*
heart attack
by **36%***

If you have risk factors such as family history, high blood pressure, age, low HDL ('good' cholesterol) or smoking,



DR. ROBERT JARVIK
~Inventor of the Jarvik Artificial Heart
and Lipitor User

*That means in a large clinical study, 3% of patients taking a sugar pill or placebo had a heart attack compared to 2% of patients taking Lipitor.



LIPITOR®
atorvastatin calcium
tablets

Find results of study.



Find the rate in the control group.



Find the rate in the treatment group.



Subtract the treatment group rate from the control group rate (ignore a minus sign, if present), and divide the result into 100.

Example

In a trial of cholesterol lowering over five years, 8 percent of patients died in the treatment group, and 12 percent died in the control group.



Control group rate: 12 percent



Treatment group rate: 8 percent



Difference: 4 percent

$$\text{NNT} = 100/4 = 25$$

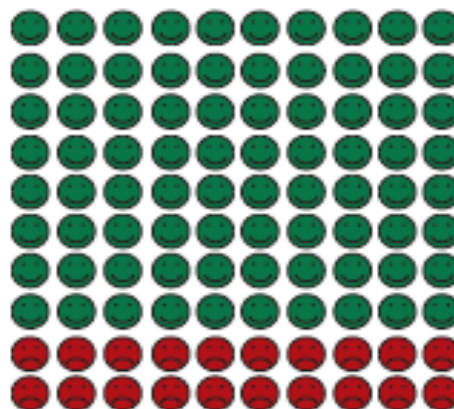
1 What is my risk of having a heart attack in the next 10 years?

NO STATIN

80 people **DO NOT** have a heart attack (green)

20 people **DO** have a heart attack (red)

The risk for 100 people like you who **DO NOT** take statins.



YES STATIN

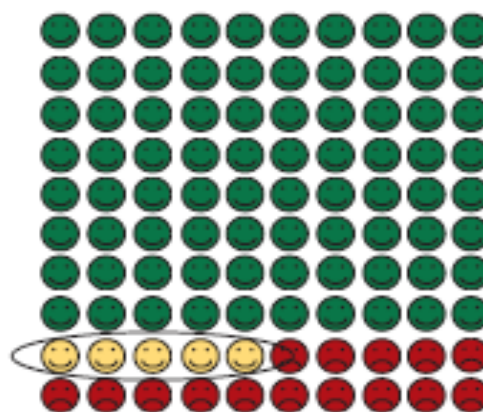
80 people still **DO NOT** have a heart attack (green)

5 people **AVOIDED** a heart attack (yellow)

15 people still **DO** have a heart attack (red)

95 people experienced **NO BENEFIT** from taking statins

The risk for 100 people like you who **DO** take statins.



 had a heart attack

 avoided a heart attack

 didn't have a heart attack

VIEWPOINT

Accountable Health Communities Getting There From Here

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Editorial page 2099

Almost 40 years after Hiatt¹ called on physicians to become stewards of the scarce resources devoted to health care, physicians have taken on key leadership roles at multiple levels. The Choosing Wisely Campaign is a physician-led initiative that focuses on individual physician decision making as an opportunity to improve care and lower costs by avoiding unnecessary and often harmful treatments.² Physicians are also taking on prominent leadership roles in new health care delivery and payment models, most notably accountable care organizations (ACOs), that encourage and reward achievement of better outcomes while managing the total costs of care.³

There is an important opportunity for physicians to bring their clinical knowledge, professional values, and wisdom to a third level of activity: the initiatives unfolding in communities and regions across the country that are aimed at investing health resources more wisely. In this Viewpoint, we discuss approaches

viewed approaches to managing complex social problems, including cross-jurisdictional challenges such as metropolitan policing or problems with commons, such as regional fisheries. She found that polycentric governance structures that acknowledge the multiple levels (eg, national, state, and local) at which action is needed while engaging all of the stakeholders (public and private) who need to work together outperformed simpler governance approaches. Her work also points to the importance of governments granting some degree of local autonomy to regional stakeholder groups and to the need for such groups to build trust, develop effective means of supporting collaboration, manage conflicts, and build long-term commitments to stewardship of community resources, which in this case are the physical, human, and financial resources that influence health.

A second framework offers particular promise once the goals of a local stewardship initiative are

Select a Plague Type

Bacteria



Most common cause of Plague.
Unlimited potential

Virus



A rapidly mutating pathogen
which is extremely hard to
control

Fungus



Fungal spores struggle to travel
long distances without special
effort

Parasite



Parasitic lifestyle prevents DNA
alteration from every day
infection

Prion



Nano-Virus



control, microscopic
a built in kill switch

Bio-Weapon



Exceptionally lethal pathogen
that kills everything it touches

MASTER 12 DISEASE TYPES

Special

re research

27-1



BRAZIL BEGINS TO BREAK DOWN

Normal life in Brazil is beginning to break down due to Kindness V1. Cure research is starting to slow

OK

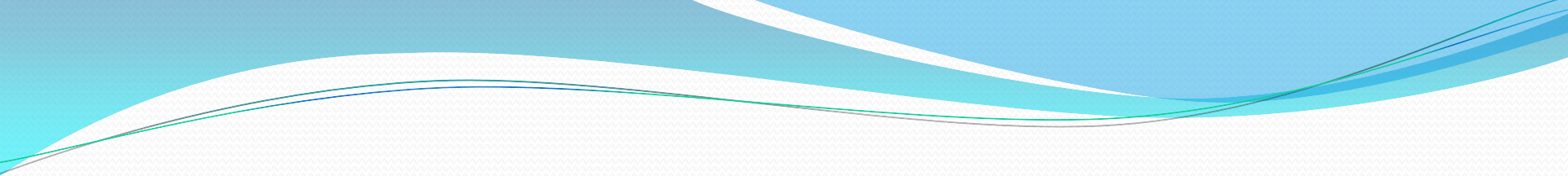
Finland

INFECTED
#2,198,447

DEAD
#11,189

100

WORLD



<http://torchresearch.org/pages/eastafrica/>