



# Healthcare in the 20s: What To Expect?

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**WASHINGTON, DC**  
**12 MARCH, 20120**

# Look into the Future. . .



# 2036-A Healthcare Odyssey: The View from 1986?

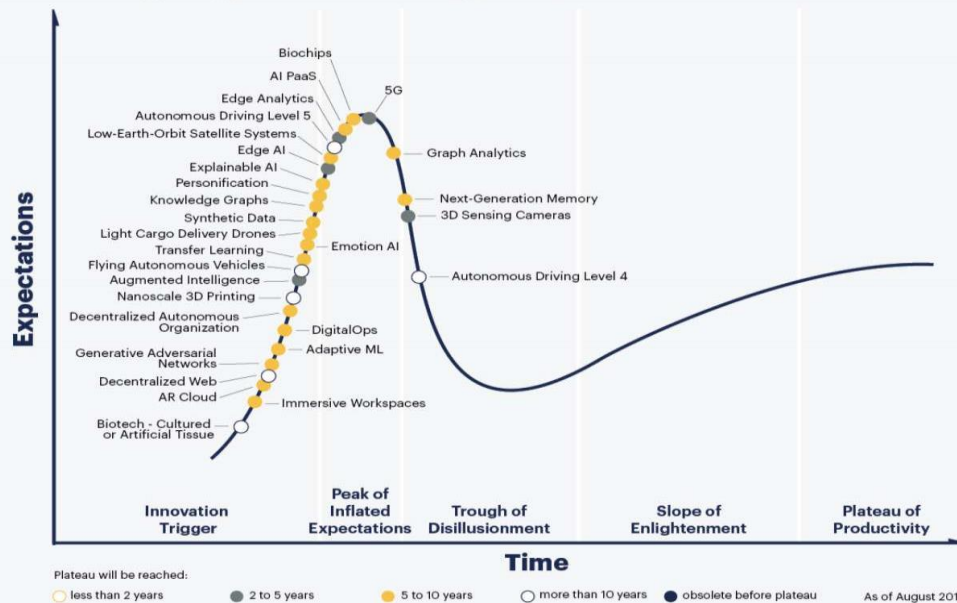
- ▶ **“... Patients of the 21<sup>st</sup> century will be connected to their physicians or hospitals by webs of telemetry similar to those used in cellular communications, monitored by computer systems that could trigger responses in advance of crises”**
- ▶ **“‘Intelligent’ clinical information systems will become the hospital’s operating core. ... Will monitor the patient’s condition realtime ... comparing patient responses against profiles gleaned from vast clinical data bases and assisting the patient care team in planning care”**

# “Where are the Flying Cars??”



# The Gartner Hype Cycle

## Gartner Hype Cycle for Emerging Technologies, 2019



# Seven Predictions for the 2020s

- 1. Two Big Patient Safety Threats for Hospitals**
- 2. AI Surfaces in Interesting Places**
- 3. Major Advances in Critical Care**
- 4. Major Progress Against Schizophrenia**
- 5. Boomers Check Out Early**
- 6. UnitedHealth Group Reaches 10% of US Health Spending**
- 7. Hospitals Hold Share But . . .**

# People Underestimate the Prevalence of Drug Resistant Infections

## The Threat of Antibiotic Resistance in the United States

Antibiotic resistance—when germs (bacteria, fungi) develop the ability to defeat the antibiotics designed to kill them—is one of the greatest global health challenges of modern time.

### New National Estimate\*

Each year, antibiotic-resistant bacteria and fungi cause at least an estimated:



**2,868,700**  
infections



**35,900** deaths



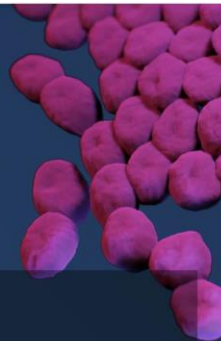
*Clostridioides difficile* is related to antibiotic use and antibiotic resistance:



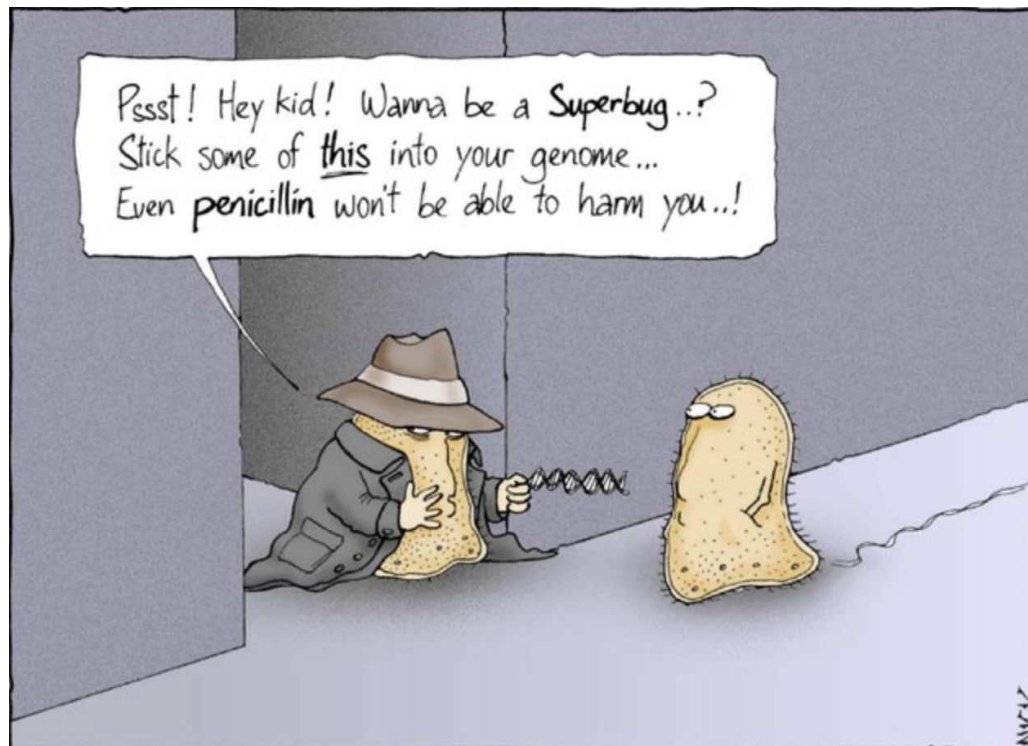
**223,900**  
cases



**12,800** deaths



# Emerging Pathogens Outstrip Antibiotics

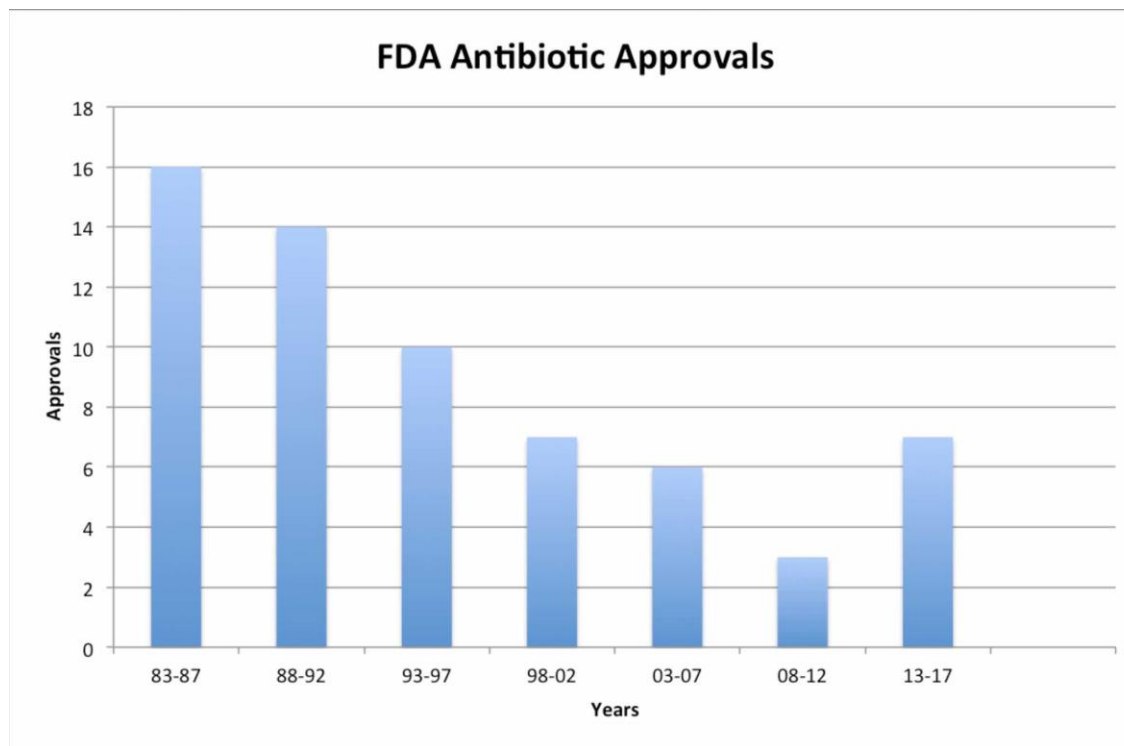




# WHO on Antibiotic Development 2019

- ▶ “. . . the current clinical pipeline is still insufficient to mitigate the threat of antimicrobial resistance.”
- ▶ Only 3 of the 25 Leading Pharma Firms are Working on Antibiotics!
- ▶ Only 2 New Classes of Antibiotics Introduced in Last 20 Years

# New Antibiotics Cleared for Use



# HACs Decline: An Uncelebrated Success!

## DECLINES IN HOSPITAL-ACQUIRED CONDITIONS

National efforts to reduce hospital-acquired conditions such as adverse drug events and injuries from falls helped prevent 20,500 deaths and saved \$7.7 billion between 2014 and 2017.

### ADVERSE DRUG EVENTS



### CAUTI



### CLABSI



\*CAUTI – Catheter-Associated Urinary Tract Infections

\*CLABSI – Central Line-Associated Bloodstream Infections

\*\*The percent change numbers are compared to the 2014 measured baseline for HACs.

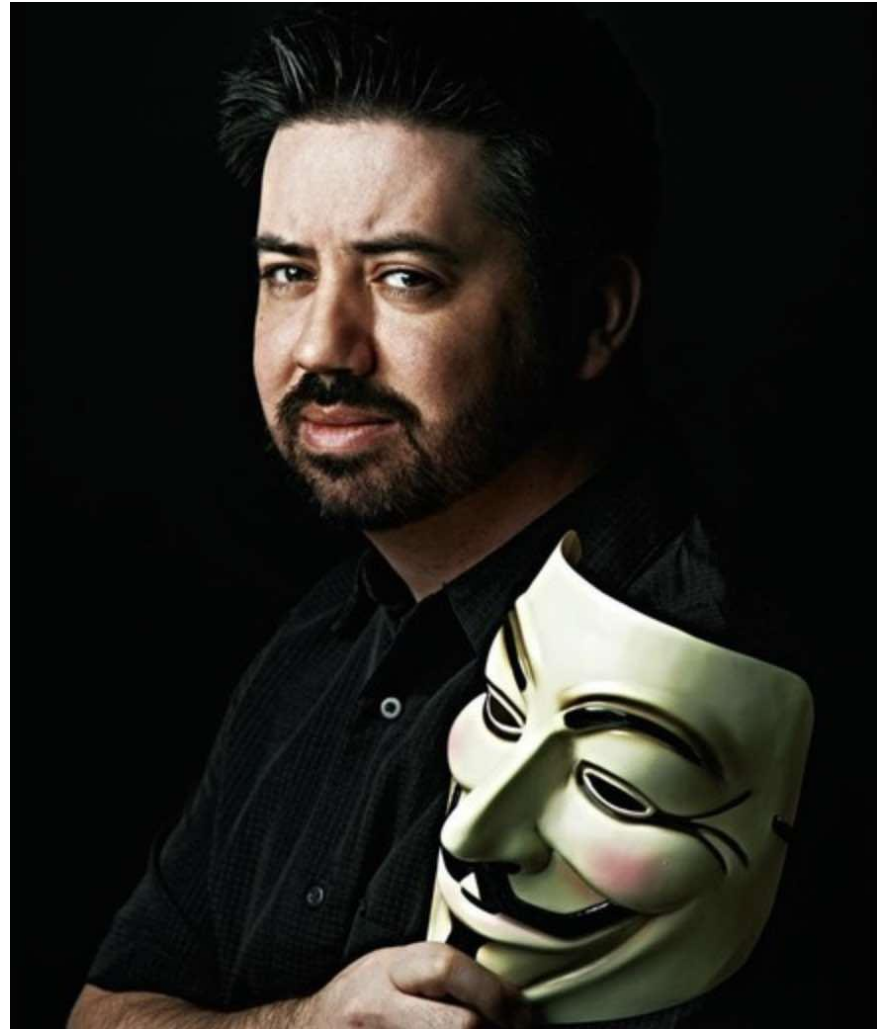
# Implications for Hospitals

- ▶ **Will Need to Double Down on Infection Control**
- ▶ **And Work with Physicians to Minimize Futile or Unproductive Antibiotic Prescribing**
- ▶ **And be Prepared to Advocate for a Government Led Investment and Development Policy for Antibiotics.**

# Bigger Threat: CyberTerrorism



**Josh Corman-**  
**I am the**  
**Cavalry**

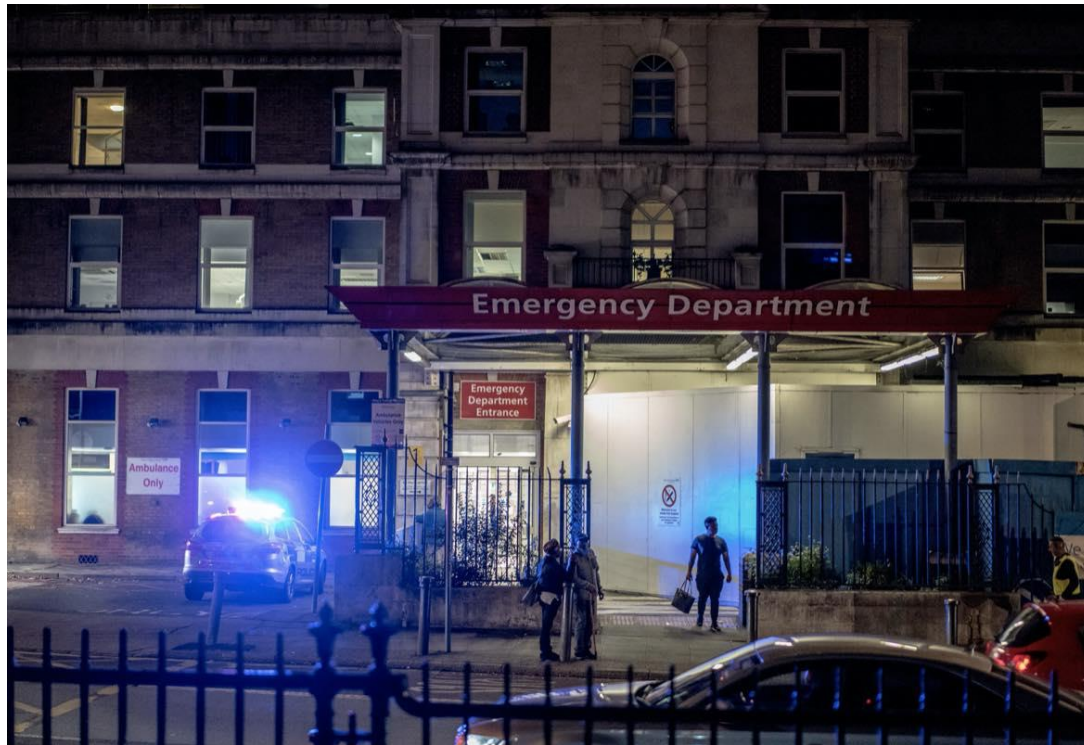


# Hollywood Presbyterian Feb 2016- First Blood



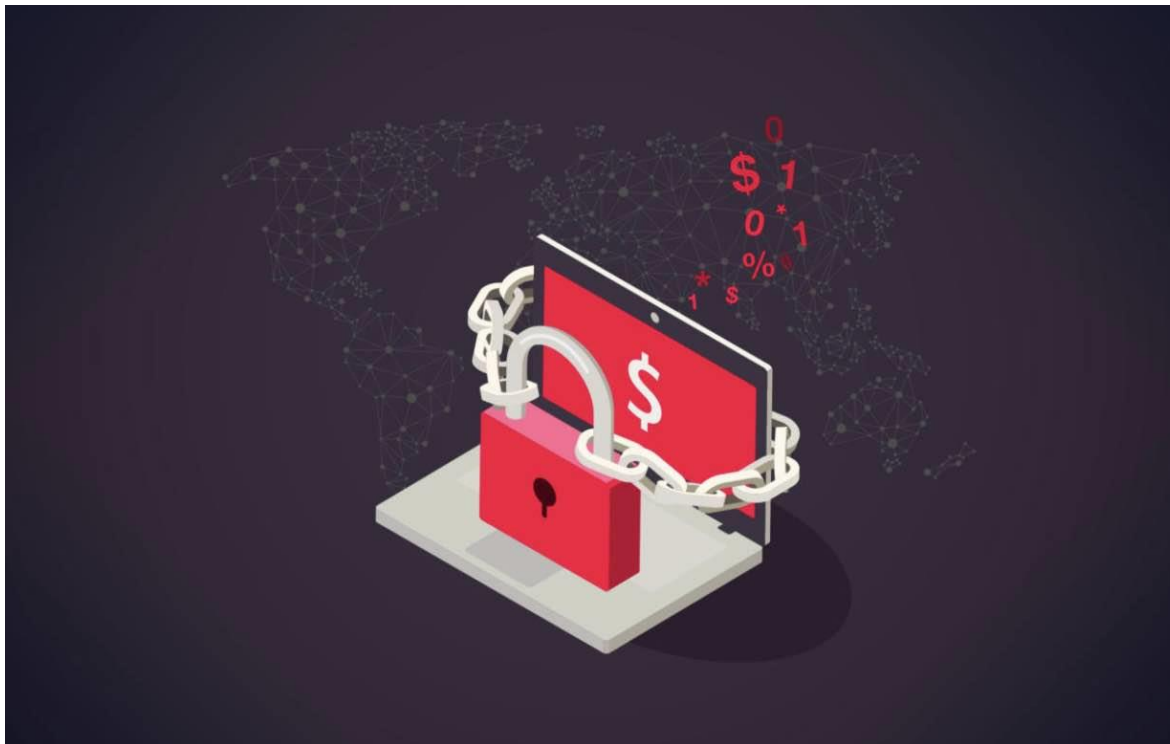


# British NHS “Wanna Cry” Attack Cost Nearly \$120 million in May 2017!





# But Ransomware Attacks Not the Biggest Hospital Risk



# 5G Enabled Internet of Things (IoT) Connects *Literally Everything* in the Hospital to the Internet



# **Mass Casualty Potential! Black Hat Hackers Can . . .**

- ▶ **Shut down Air Conditioning and Elevators**
- ▶ **Shut Down Ventilators and Oxygen Systems**
- ▶ **Reprogram Infusion Pumps**
- ▶ **Take Over CT and MR Scanners thru their Software**
- ▶ **Shut Down Lights and Electricity in Operating Suites and ICUs**
- ▶ **Shut Off Electronic Records and Force People Back onto Paper and Telephone Ordering**

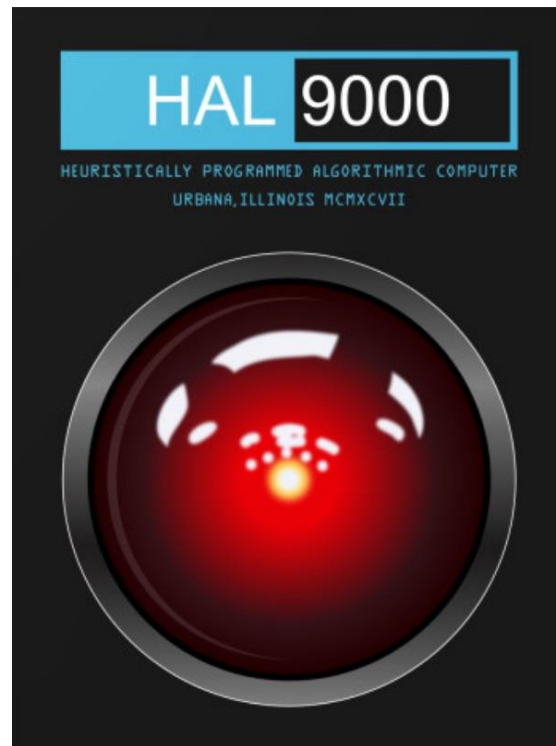
# Syrian Civil War Proved Hospitals No Longer Sacred



# Hospital Readiness?

- ▶ **85% of Hospitals do not have a Cybersecurity Officer!**
- ▶ **How Many Medical Devices Run Windows 95 or Windows XP?**
- ▶ **How Many Hospitals Inventory the Passwords for their Devices and Building Systems?**
- ▶ **How Many of Those Passwords are Hardwired and Discoverable?**
- ▶ **How Many Young Clinicians Can Manage Patient Care based on Paper Backup Records and Telephone Ordering?**
- ▶ **What Percentage Have Disaster Plans in Place to Protect Patients from a Cyberattack?**
- ▶ **How Many Boards Have Discussed How to Respond to a Ransomware Attack?**

# AI: At Gartner's Peak of Inflated Expectations



# Vinod Khosla in 2012 on the Disruption of Medicine



MEDICINE IS “AKIN TO  
WITCHCRAFT”, DRIVEN  
BY TRADITION, NOT BY  
DATA



DIAGNOSIS IS AN  
ALGORITHMIC  
CHALLENGE



80% OF PHYSICIANS ARE  
“UNNECESSARY”



MEDICAL DIAGNOSIS IS  
“EASIER THAN THE SELF  
DRIVING CAR”

# The Self Driving Car: Piece of Cake!





Feature | Biomedical | Diagnostics

02 Apr 2019 | 15:00 GMT

## How IBM Watson Overpromised and Underdelivered on AI Health Care

After its triumph on *Jeopardy!*, IBM's AI seemed poised to revolutionize medicine. Doctors are still waiting

By Eliza Strickland

In 2014, **IBM** opened swanky new headquarters for its artificial intelligence division, known as **IBM Watson**. Inside the glassy tower in lower Manhattan, IBMers can bring prospective clients and visiting journalists into the “immersion room,” which resembles a miniature planetarium. There, in the darkened space, visitors sit on swiveling stools while fancy graphics flash around the curved screens covering the walls. It’s



# IBM Watson Debacle in Oncology

# AI in the 2020s: Venues to Watch

- ▶ Healthcare Claims Management/Revenue Cycle- “The War of the Robots”
- ▶ Radiology and Pathology Image Interpretation
- ▶ “AI Will Not Replace Radiologists, but Radiologists who Use AI will Replace Radiologists Who Don’t”

# mHealth: Also at Peak of Inflated Expectations





Eric Topol in  
2014: You  
Can Diagnose  
**YOURSELF**  
with Your  
Cell Phone!

# Amazing what You Can Attach to an iPhone!

- ▶ **High Def Camera for Skin Lesions/Wounds**
- ▶ **Ultrasound Transducer**
- ▶ **Blood Test Modules**
- ▶ **Multi-lead EKG**
- ▶ **Otoscope**
- ▶ **Spirometer**
- ▶ **Scanner for Counterfeit Drugs**
- ▶ **AT LEAST 325 Thousand Health Related Apps!!**

**Now All We Need is a Business Model!**



# Regina Herzlinger's Crucial Point: Cool Technology Isn't Enough!

- ▶ You ALSO need a Business Model to Sustain and Grow the Disruption!
- ▶ Put Differently, There needs to be a Return on Capital invested in the Disruptive Technology in a Definable Time Frame.
- ▶ “That’s a Really Cool Idea: Is It a Business?”

# REAL TIME DISEASE MANAGEMENT (OnStar™ for People)

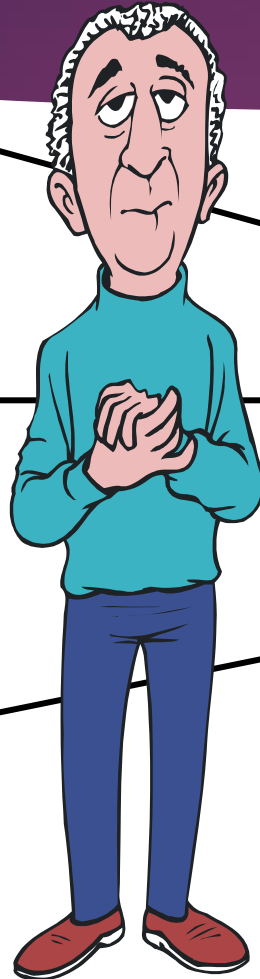
## MODALITIES

Wearable  
• Clothing  
• Wristband  
• Smart Phone

Smart  
House

Implantable  
Devices  
• Defibrillator  
• Insulin Pump  
• Glucose  
Monitor  
• GPS  
Locator/ID

## PERSON



## INTEGRATION/ CONNECTIVITY

Computer  
Decision  
Support

Human  
Monitoring

## INTERESTED PARTIES

Home Security

Family

Ambulance

Hospital

Personal M.D.

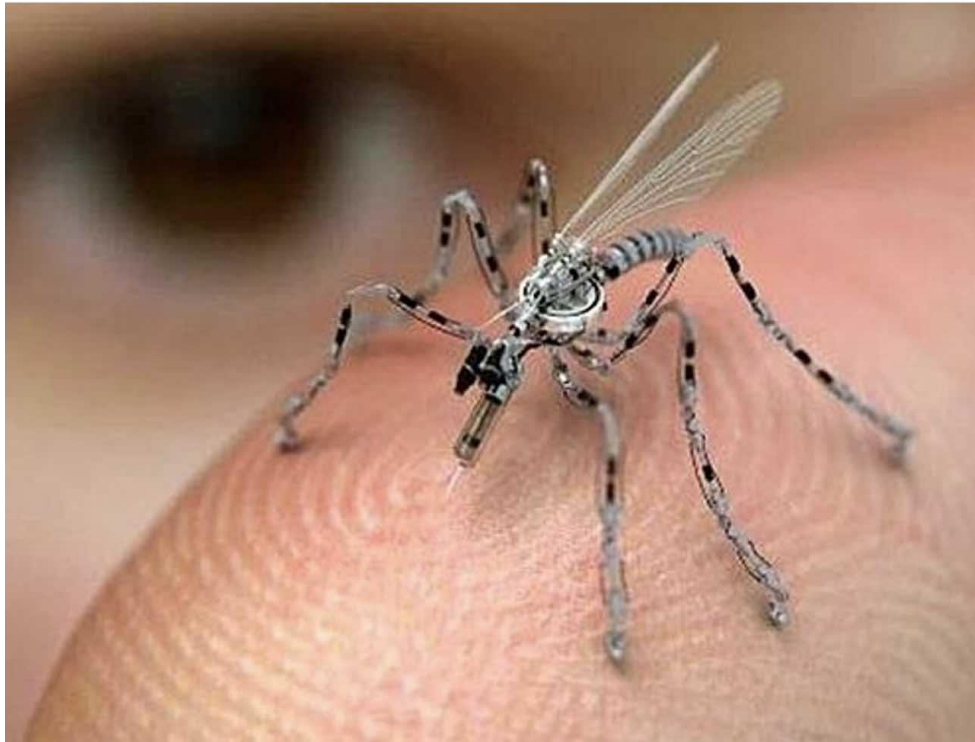
Care Manager



# Advances in Critical Care

- ▶ Artificial Spleen for Sepsis
- ▶ Induced Hibernation for Trauma Patients
- ▶ Both Funded by DARPA

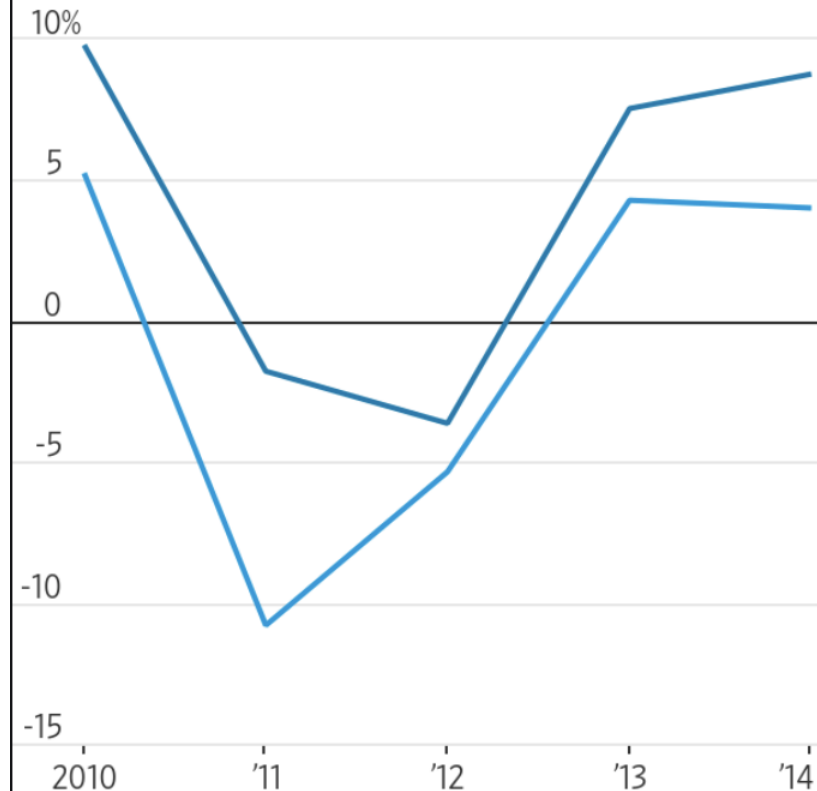
# DARPA- Pushing the Innovation Envelope



**Sepsis Kills  
270 Thousand  
Americans  
Every Year!**

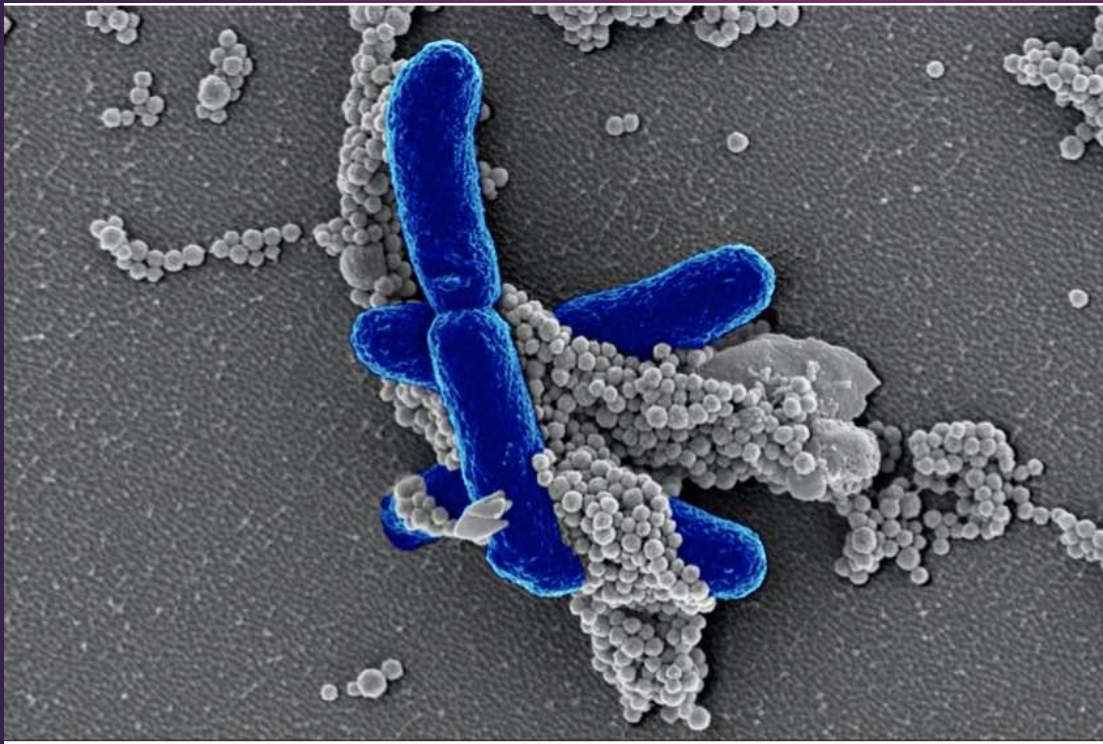
**Change from a year earlier, estimated**

- Adult sepsis hospitalizations
- Adult sepsis deaths



Sources: 2017 paper by Rhee et al in the Journal of the American Medical Association; additional approximate calculations by Dr. Kristina Rudd

Harvard's Wyss  
Institute  
Discovers  
Mechanism for  
Removing  
Pathogens and  
Toxins from  
Septic Blood



# Dialysis-Like Blood Filtration for Sepsis (and possibly Cancer)

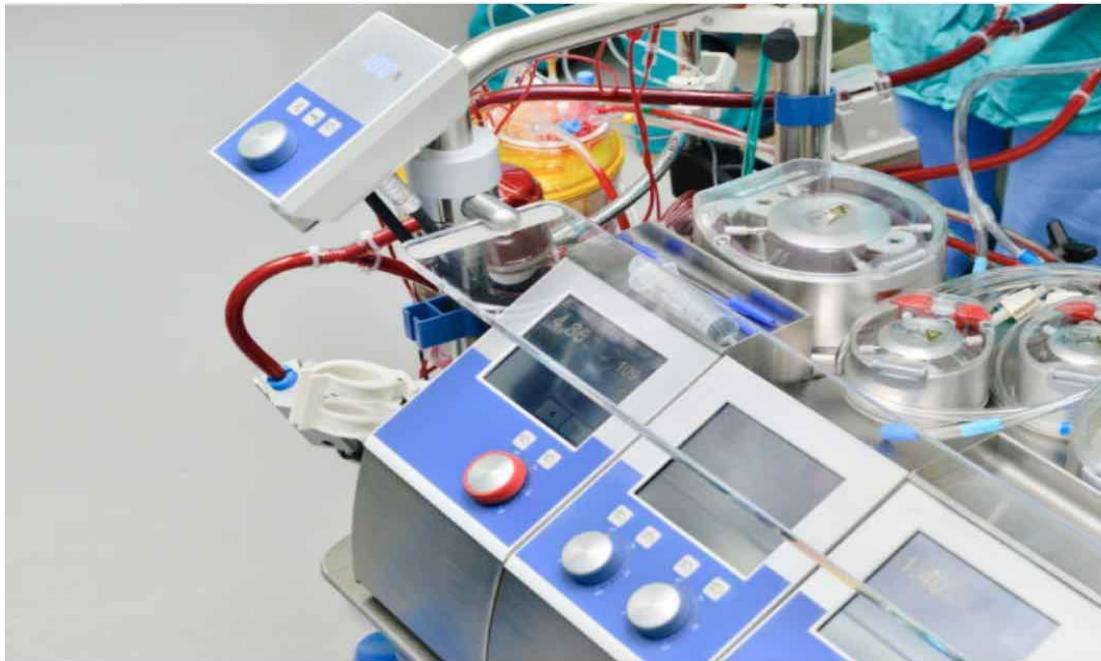


# Human Hibernation: Can We Induce “Time Tolerant Biostasis” Chemically?





# Induced Hypothermia Can Save Trauma Patients (Emergency Preservation and Resuscitation-EPR)

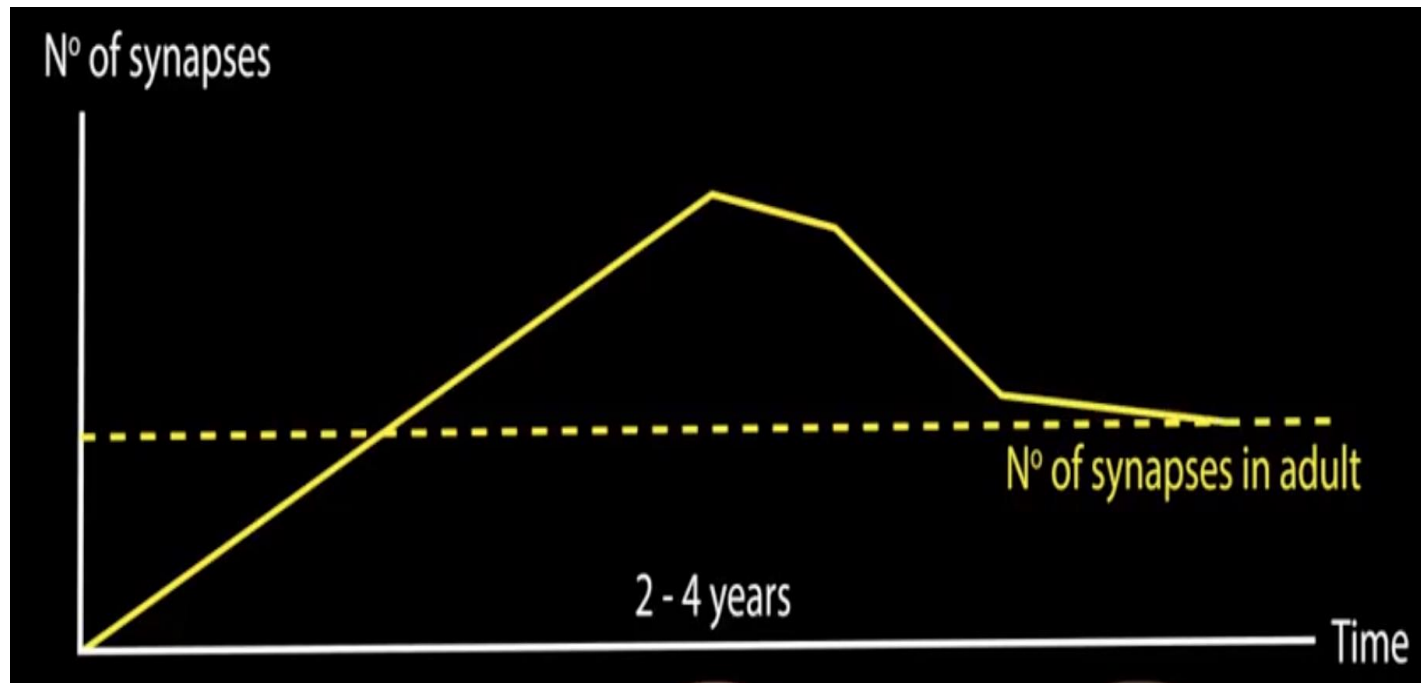


# Schizophrenia: A Terrifying Mental Illness that Affects 2.5 Million Americans

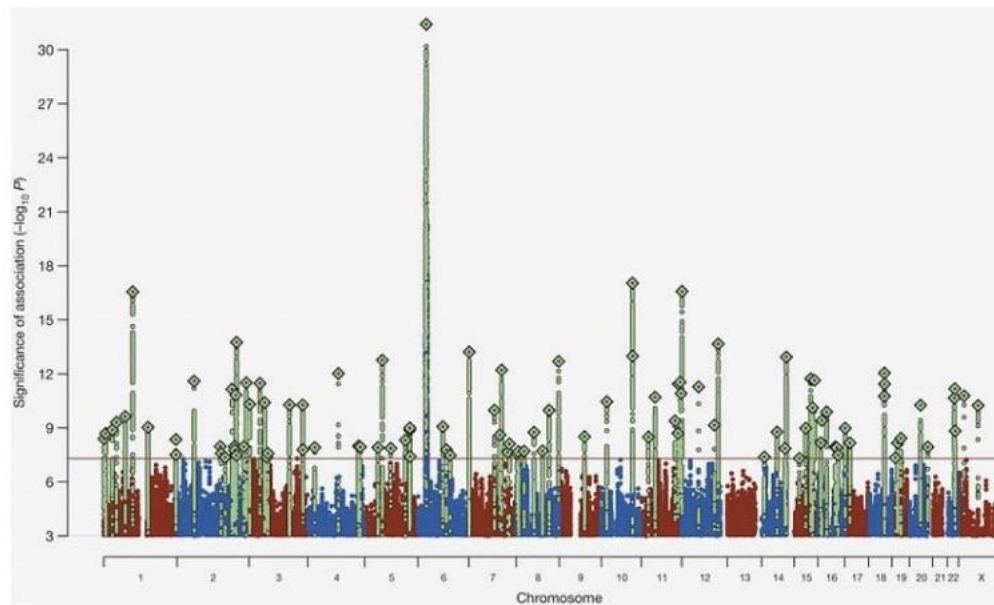




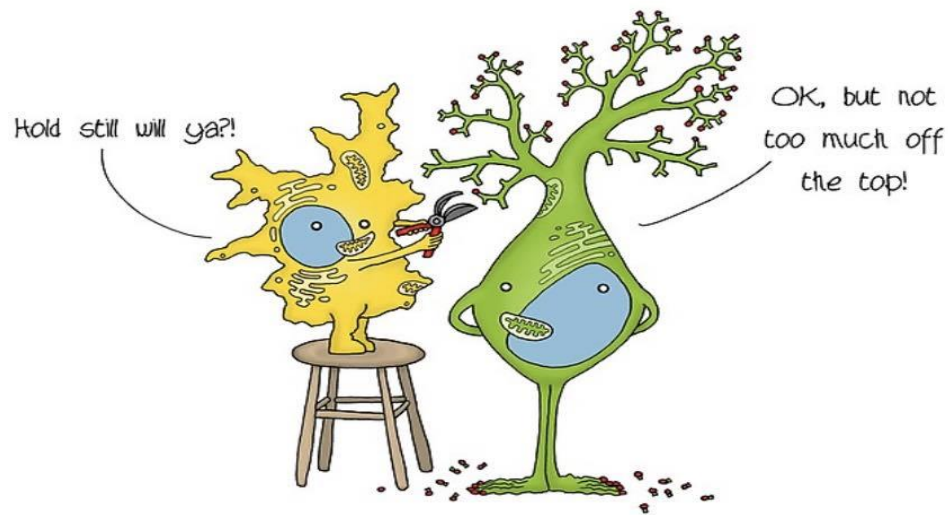
# Synaptic Pruning: Key to a Functional Adult Brain



# The Immune System Plays a Strategic Role in Brain Development

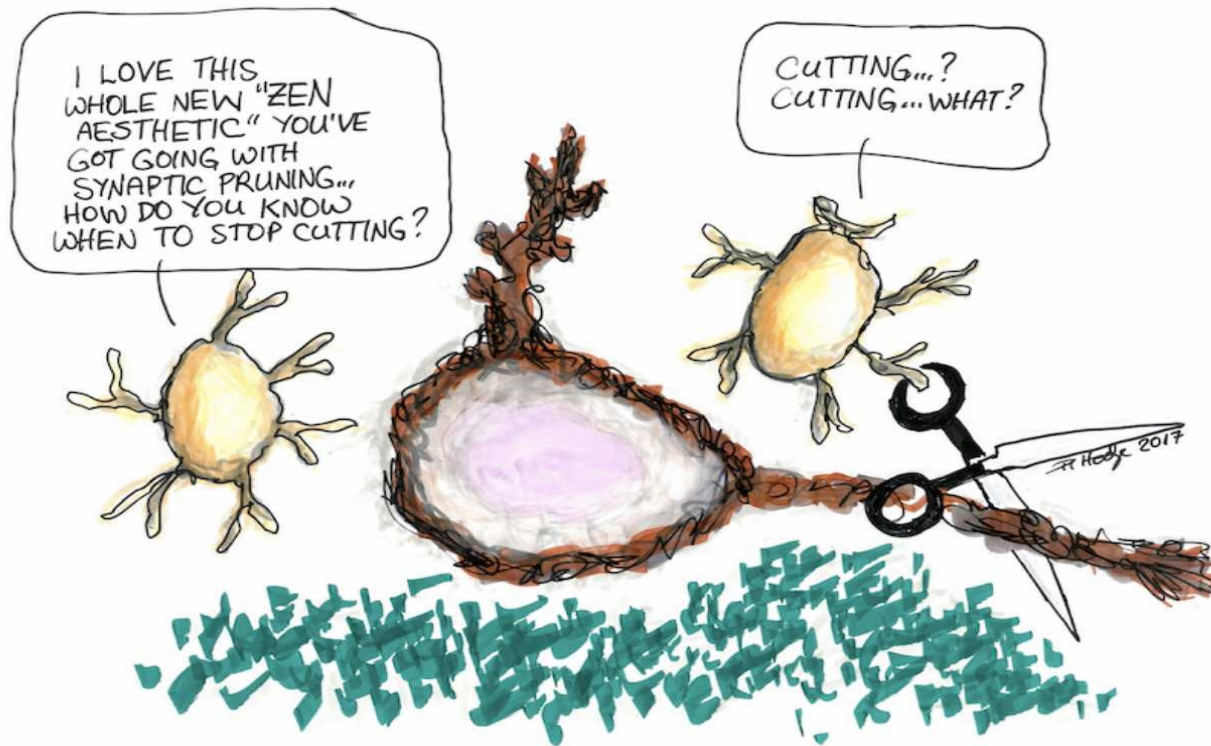


# Synaptic Pruning: How It Works



Synaptic pruning...

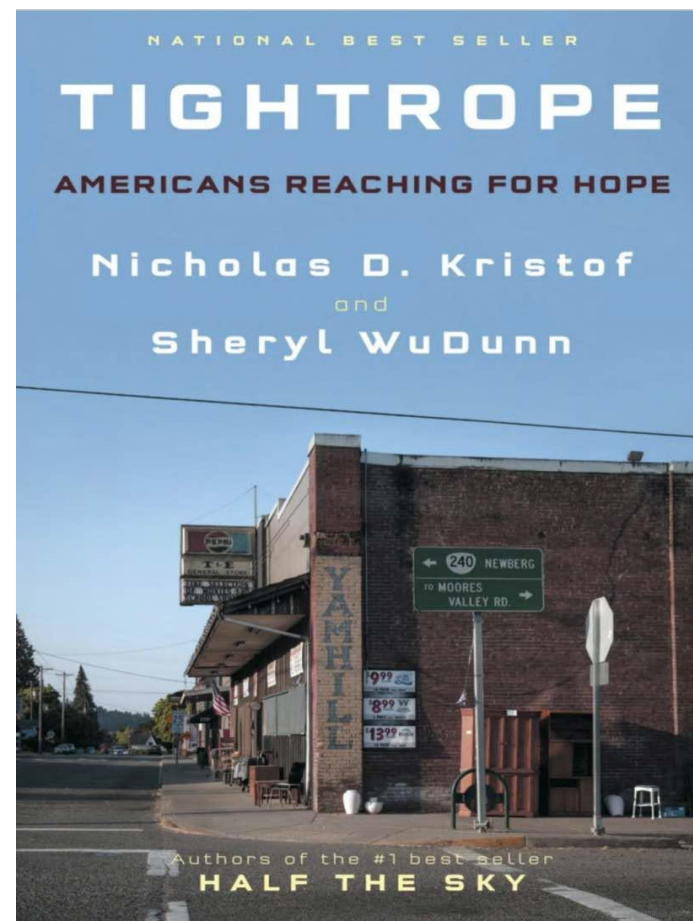
# Is Schizophrenia (or Alzheimers') Caused by Excess Synaptic Pruning?



# Therapeutic Options

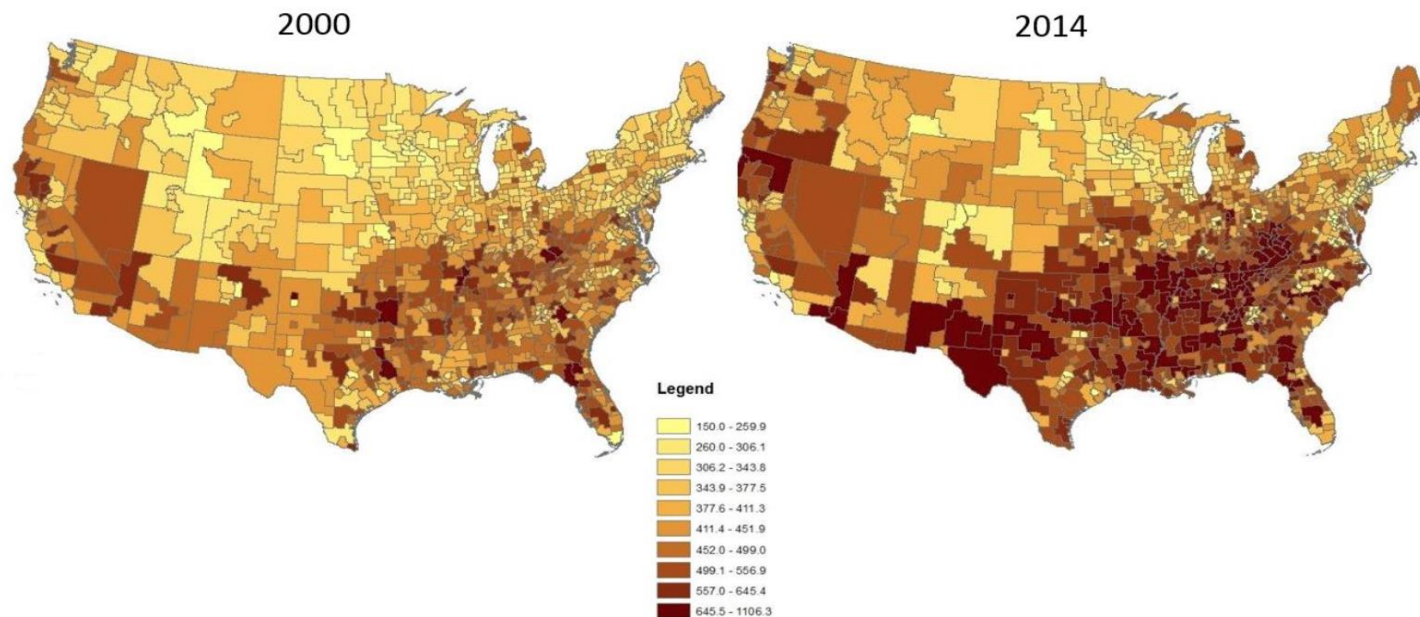
- ▶ **Vaccination of Teens Found with Genetic Risk of Schizophrenia**
- ▶ **Immunotherapy Designed to Reduce Excess Supply of C4A**
- ▶ **Limited Options for Those Who Already Have the Disease**

# Boomers Check Out Early



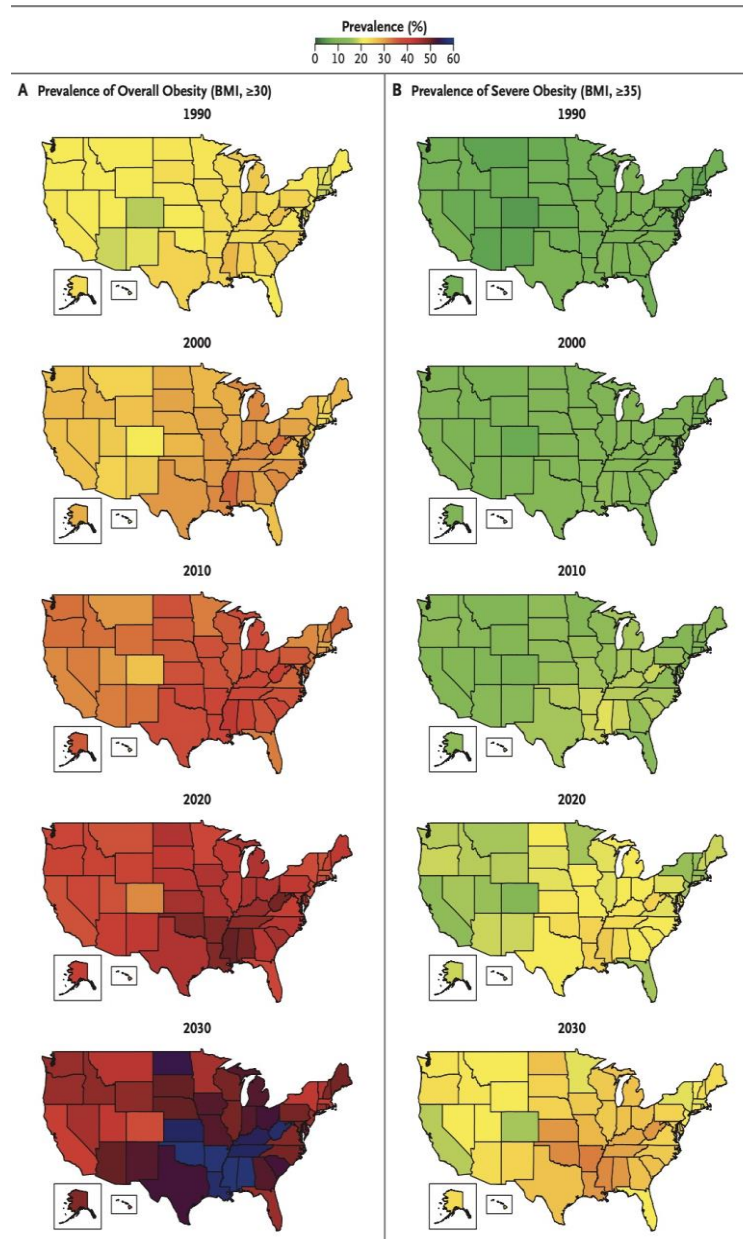
# Deaths in MidLife: A Rising Tide

Figure 1.9 All-cause mortality, white non-Hispanics, ages 45-54



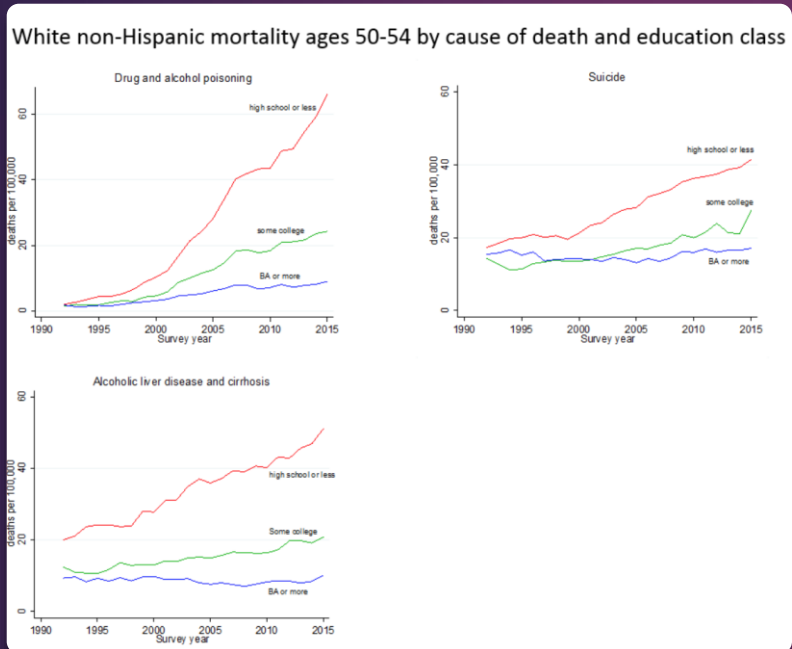


# Obesity is the Main Driver





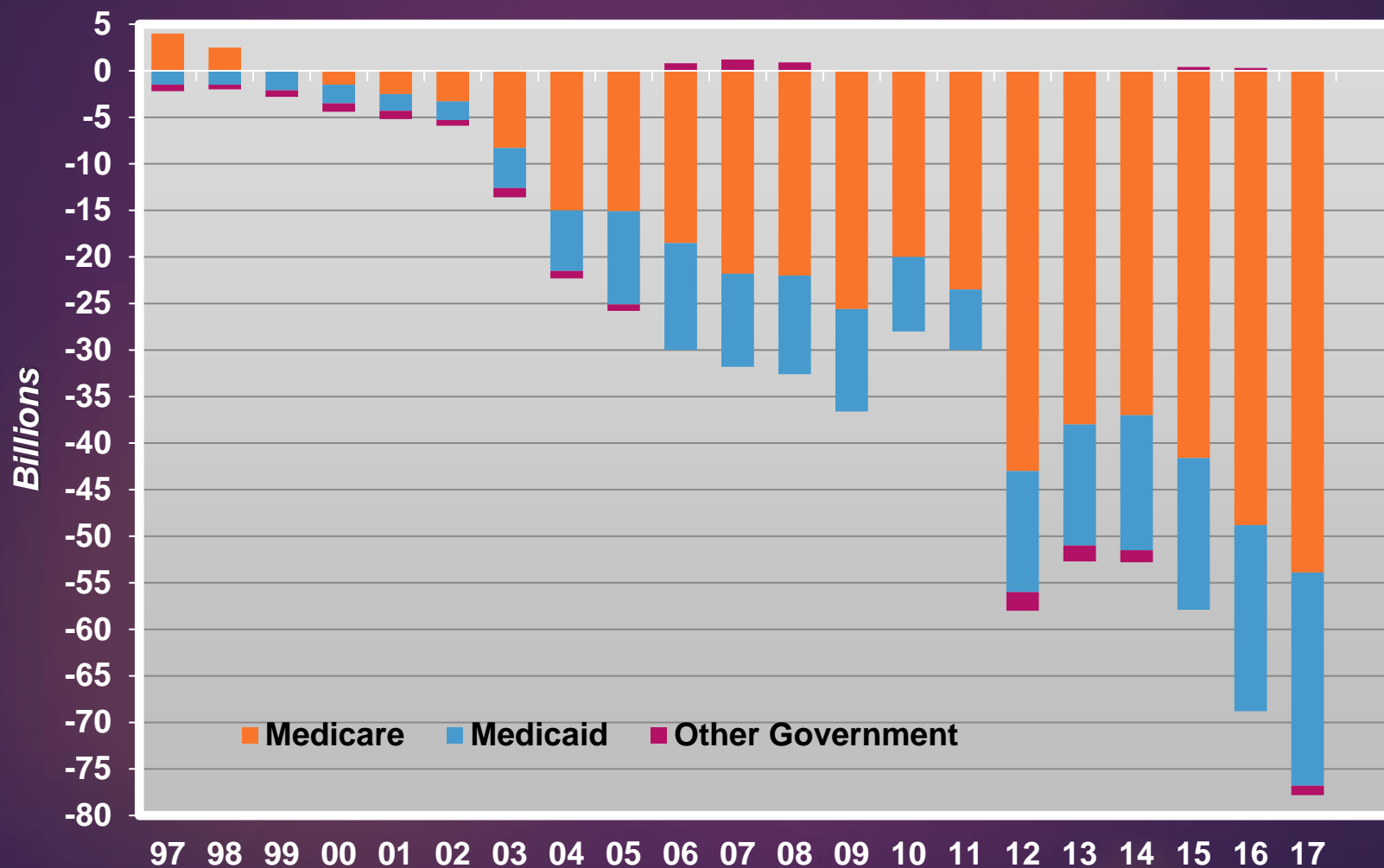
But "Diseases of Despair" are Also Driving Mortality in 45-64s



# **Implications: Lots of Self-Inflicted Morbidity Leads to Rise in Hospital Use**

- ▶ **Metabolic Syndrome Leads to Rising Prevalence of Heart Disease, Stroke and Diabetes**
- ▶ **Resulting in: Rising Mortality from MI and Stroke**
- ▶ **Meaning More Medicare Patients in Your Emergency Room, ORs, ICUs, Imaging Suites, etc.**
- ▶ **Medicare Operating Losses Have Almost TRIPIED since 2010**
- ▶ **Only Half of Boomers are Yet on Medicare in 2020**

# Hospital's Medicare Losses DWARF Medicaid Losses

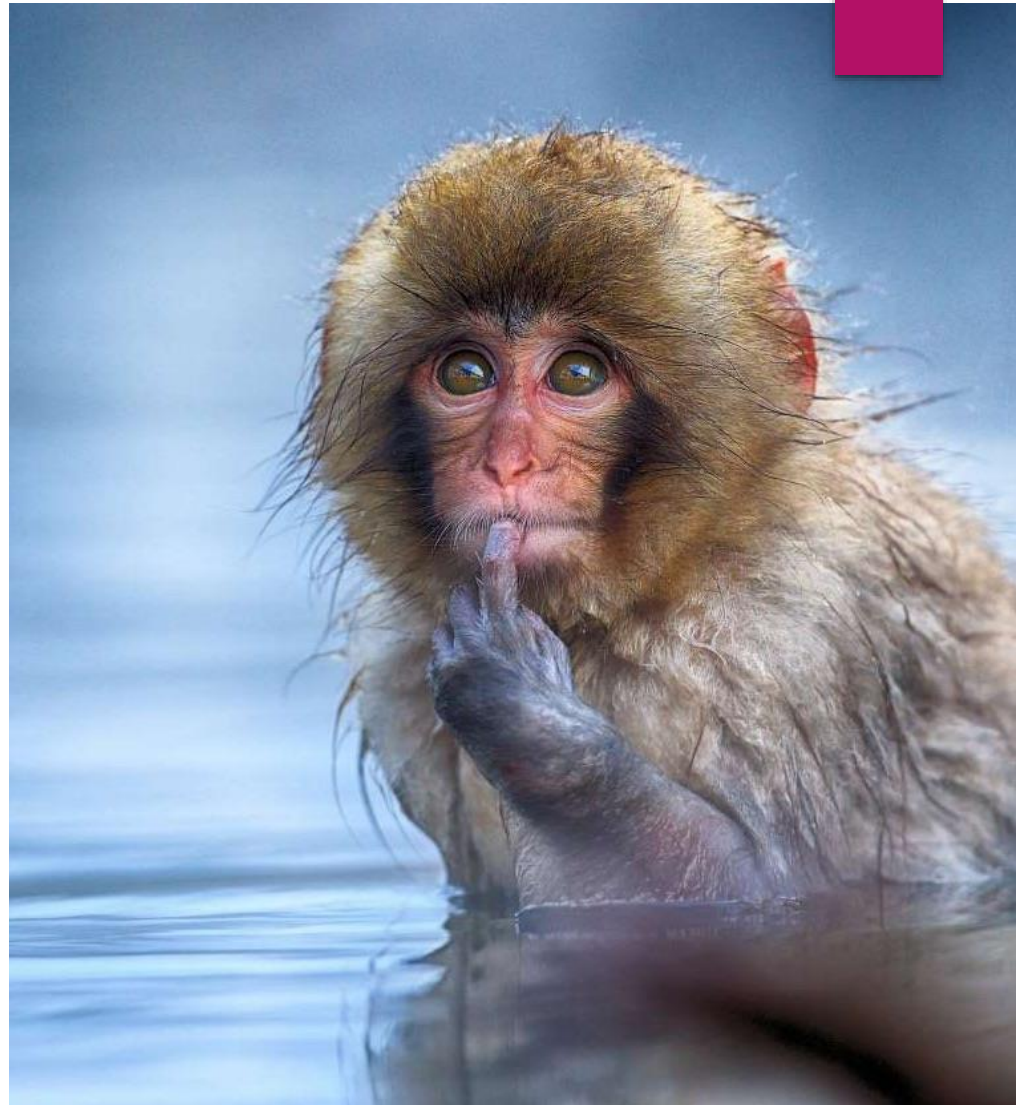




Will A Single  
Health  
Enterprise  
Reach 10%  
of US Health  
System?

# Inquiring Minds Want to Know

- ▶ **WILL IT BE ...**
- ▶ **CVS/Aetna?**
- ▶ **Amazon?**
- ▶ **Amazon/Berkshire/JP Morgan?**
- ▶ **Google?**
- ▶ **Apple?**



# My Nominee: UnitedHealth Group!

- ▶ **UnitedHealth Group: Presently the *Second* Largest Health Enterprise in the World**
- ▶ **UHG had \$242 billion in revs, \$13.5 billion in earnings, \$53 billion in cash and investments, and \$19 billion in cash generated from operations in 2019**
- ▶ **United Healthcare Insurance Plans Enroll 39 million Americans (vs 22 million for Aetna)**
- ▶ **27.4 million commercial, 5.2 MA and 6.4 Medicaid MCO**
- ▶ **However, Growth Rate of Health Insurance Business is 6% per year, less than half the rate of Optum**
- ▶ **2/3 of UnitedHealth Group's Earnings Growth is coming from non-health insurance activities**

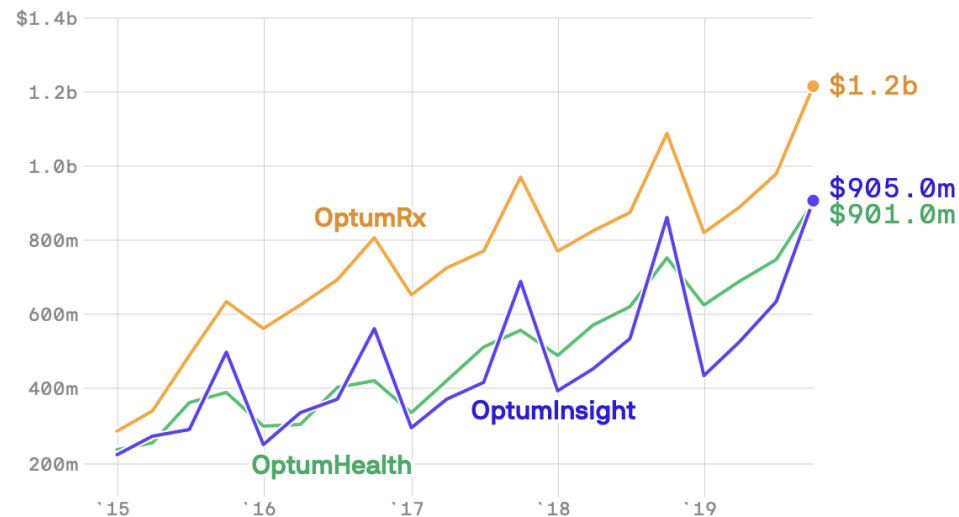
# Optum Rising . . .

- ▶ **Optum has a 2019 \$110 billion run rate, growing at 13% a year. \$12 b in cash flow annually (\$1 billion a month!)**
- ▶ **Three Lines of Business:**
  - ▶ **OptumRx PBM \$73 billion**
  - ▶ **OptumInsight Business Intelligence/Consulting \$9 billion**
  - ▶ **OptumHealth (Care Delivery)- \$28b**
- ▶ **Care Delivery Component Includes Risk Bearing MD Groups, Urgent Care, Ambulatory Surgery, Physician Staffing**
- ▶ **Optum Bought Advisory Board in 2018-Leading into Comprehensive Outsourcing via Optum 360**
- ▶ **Minimal Linkages of these Businesses to One Another or to UHC Insurance business**

# Optum Earnings Distribution

## Optum subsidiaries' quarterly operating profit

2015-2019

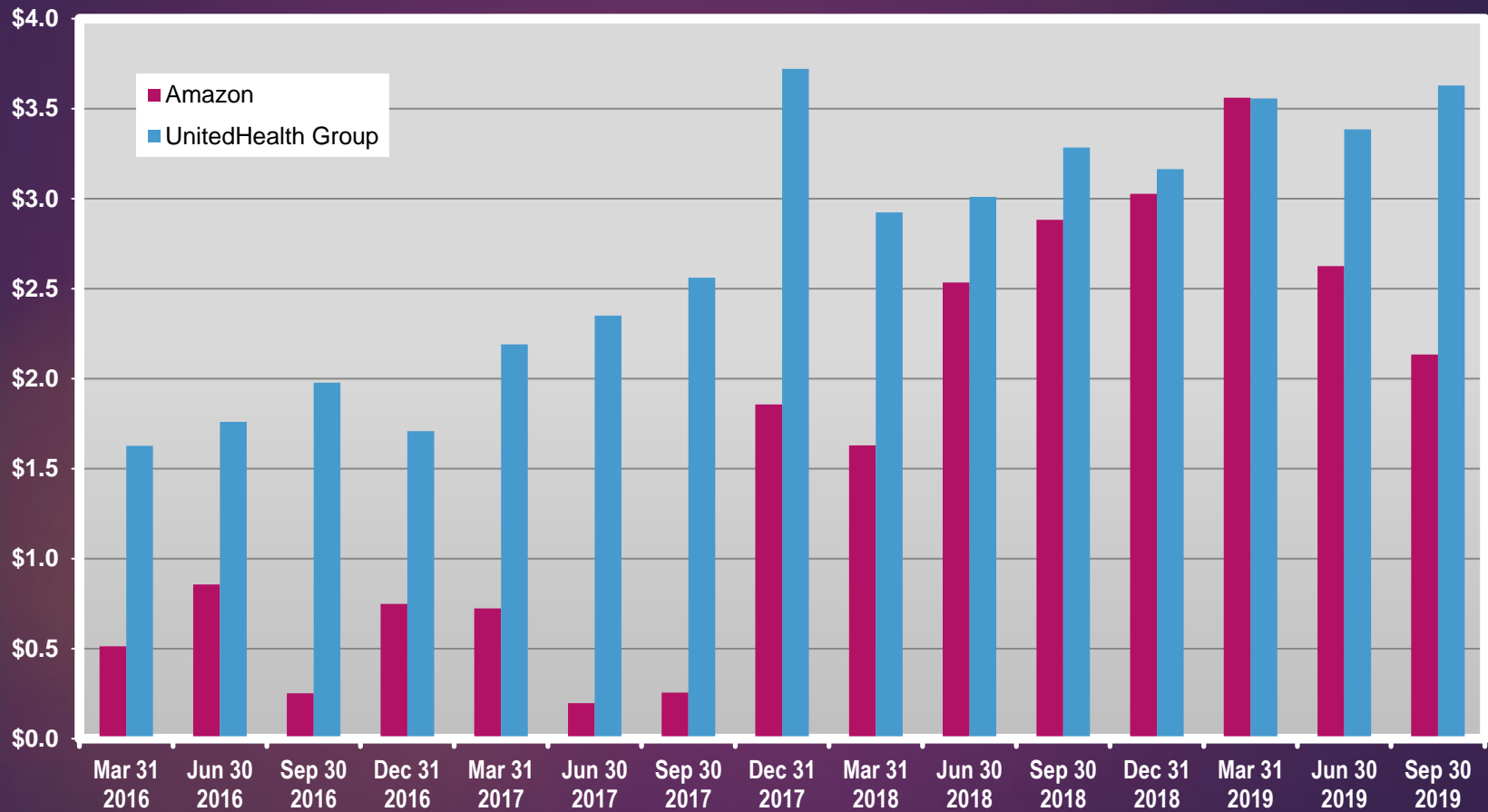


Data: Company documents; Chart: Axios Visuals



# Amazon vs. UnitedHealth Group

## Net Income (in billions)



# What Could Prevent UHG Reaching 10% of US Health Spending

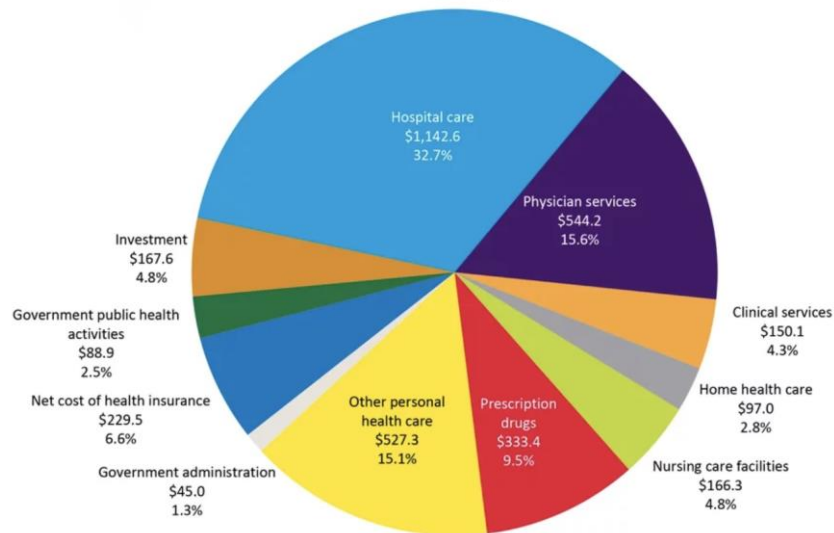
- ▶ Running Out of Accretive Deals to Do
- ▶ Earnings Slowdown at United Health's Insurance Ops, which . . .
- ▶ Could Force Dividend Increase/Share Buy Backs
- ▶ Divestiture of Optum
- ▶ “Medicare for All”

# What Happens to Hospitals in the '20's?



# Hospital Industry Holds Share (at 1/3 of US Health Spending)

The U.S. spent \$3,492.1 billion on health care in 2017  
where did it go?



# Hospitals Not Immune to Disruption

- ▶ **Massive Disruption from Less Invasive Surgery and Imaging**
- ▶ **BUT . . . *No one has Yet Found Substitutes for Acute and Critical Care, which Remain Hospitals' Core Business***
- ▶ **Demand for Core Services Will Grow due to Boomer Crash**
- ▶ **Less Intense Ambulatory Providers will Skim Off Visits BUT**
- ▶ **Hospital Profits Come from Surgery and Imaging.**
- ▶ **(Physician Practices More Vulnerable than ER . . .)**
- ▶ **Hospitals' Biggest Disruption Threats are Economic and Political**

# Biggest Health Industry Risk is a Recession!





# Followed Closely by One Party Government!



# Pray for Gridlock

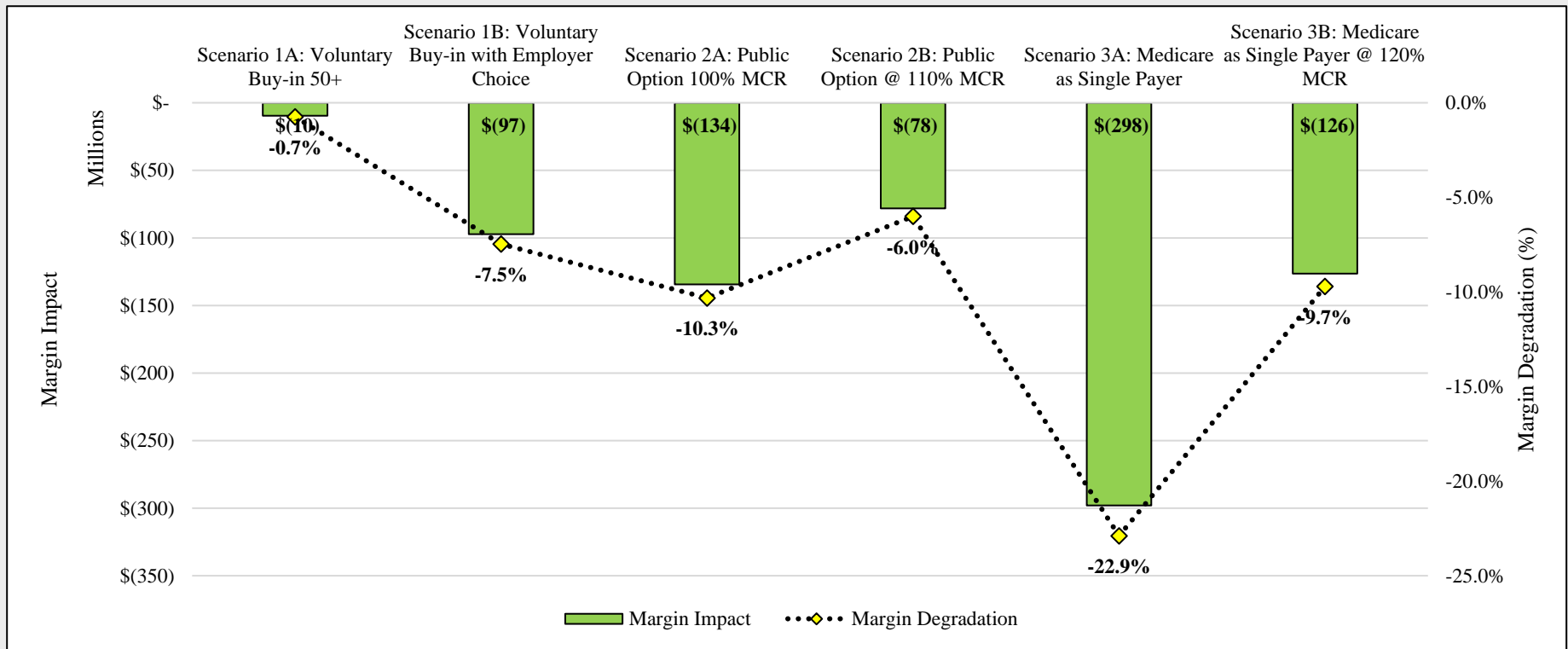
- ▶ **Republicans Came within One Vote (McCain) in 2017 of Eliminating a TRILLION in funding for the Poor and Working Poor**
- ▶ **Democratic "Fallbacks" to M4A- Medicare Buy-In) Badly Damage Hospital Operating Margins by Reducing Commercial Insurance Enrollment**



# Margin Impact and Percent Degradation

## Margin Impact and Percent Degradation

- PMPY for age 50-64 new members of approx. \$7,700
- PMPY for age 0-49 new members of approx. \$2,800
- 55% member mix shift between 0-64 age for all “Choice” scenarios
- All other assumptions found in consolidated assumptions table



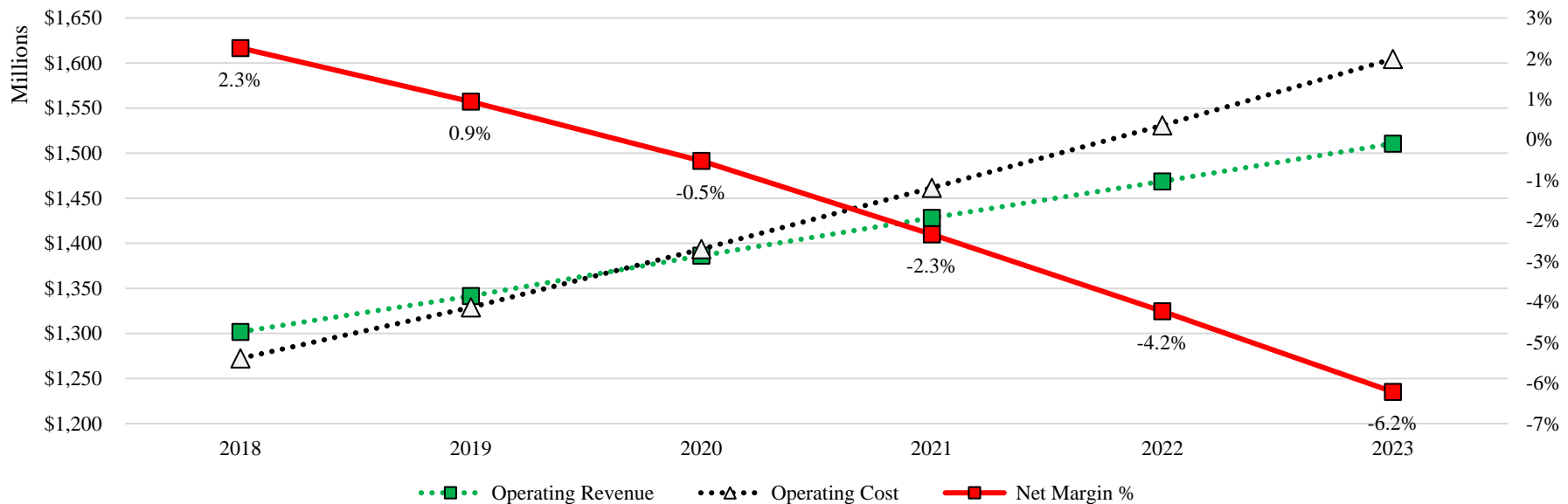
### Sample Hospital Characteristics

- Region: Southeast
- Ownership: Private; Non-profit hospital
- Annual Revenue: \$1.4B
- Bed number: 1,350

# Net Margin Projections with Status Quo Assumptions (Payer Mix & Margin Deterioration)

Significant driver of revenue degradation in status quo is continued growth of Medicare & MA business and stagnation of commercial business

5-Year Status Quo Projections Without Cost Reduction Initiatives



- Customized health system long range financial projections evaluate each revenue and cost driver to better understand a realistic outlook under status-quo insurance marketplace.

## Sample Hospital Characteristics

- Region: Southeast
- Ownership: Private; Non-profit hospital
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# Implications?

- ▶ **Government Payers Will Play a Much Larger Role Even Without Further Coverage Expansion Just From Demographics Alone**
- ▶ **Can We Staunch the Bleeding from Low Government Payment Rates vs/ High Costs?**
- ▶ **Can We Get Actual Productivity Gains Out of the EHR?**
- ▶ **Can We Make Hospitals Safer - - - from SuperBugs and IoT?**
- ▶ **What Happens if We “Cure” Sepsis?**
- ▶ ***Where are the New Products/Services We Need and How Do We Get Them?***