

POPULATION HEALTH AND BIG DATA

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- No financial disclosures

OBJECTIVES

- Define Population Health
- Triple/Quadruple Aim (IHI)
- Meaningful Measurements/Quality Measurements
- Successful Population Health Needs Big Data

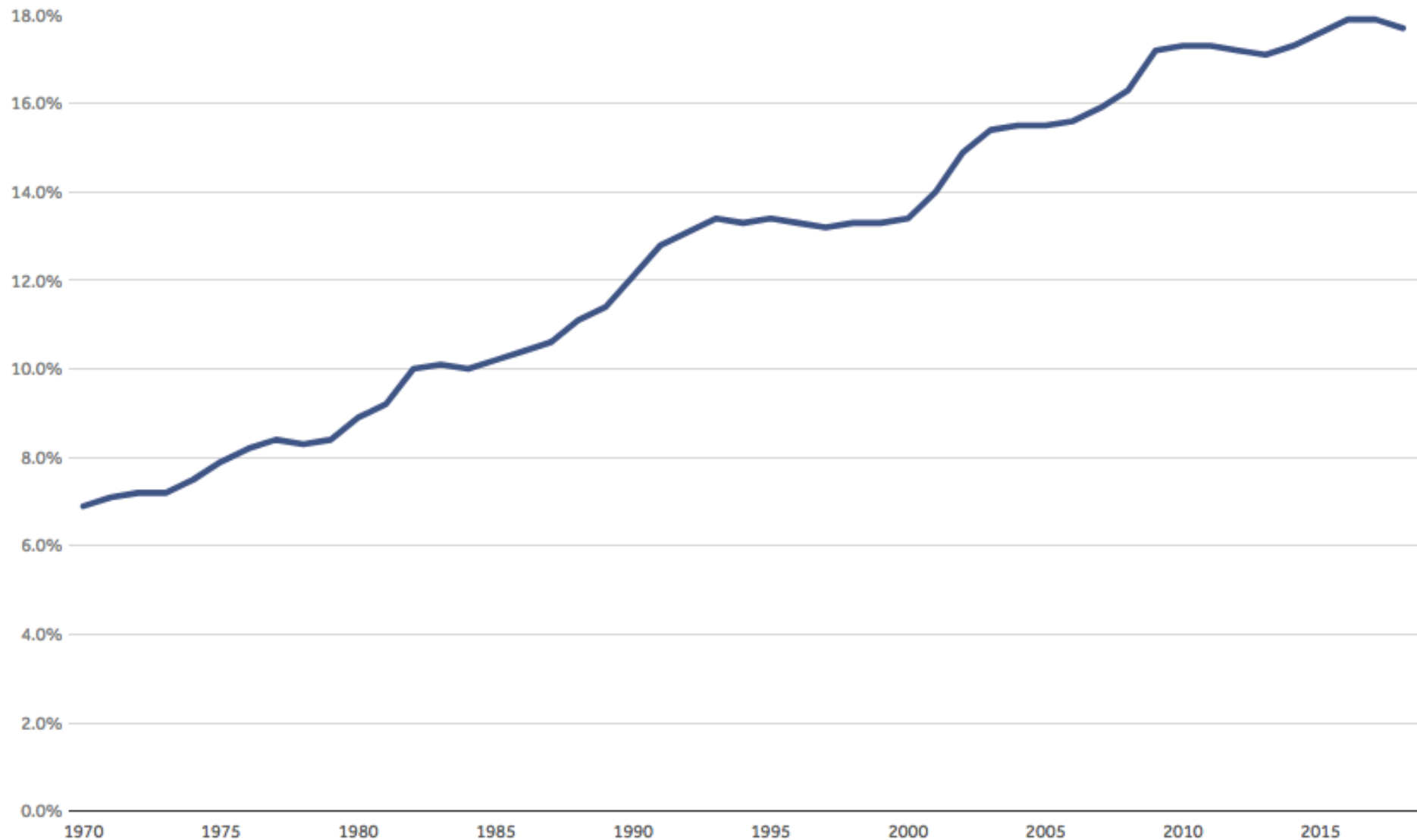
POPULATION HEALTH

WHY POPULATION HEALTH?

- Cost of Healthcare
 - public, private, individual
- Quality of Healthcare
 - Are we healthier as a whole community?
- Patient Experience with Healthcare
 - Physician experience, too

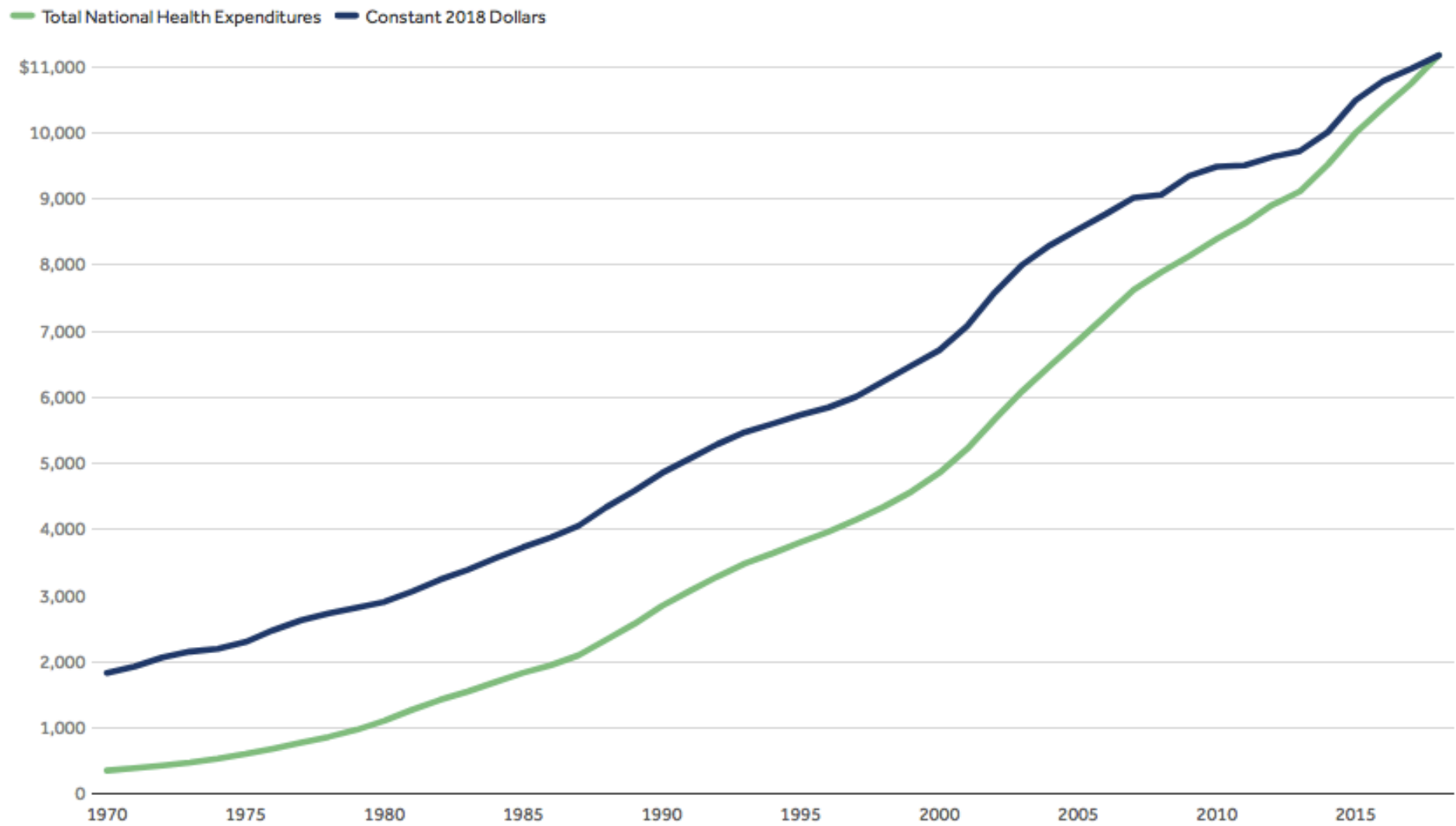
Health spending growth has outpaced growth of the U.S. economy

Total national health expenditures as a percent of Gross Domestic Product, 1970-2018



On a per capita basis, health spending has grown substantially

Total national health expenditures, US \$ per capita, 1970-2018

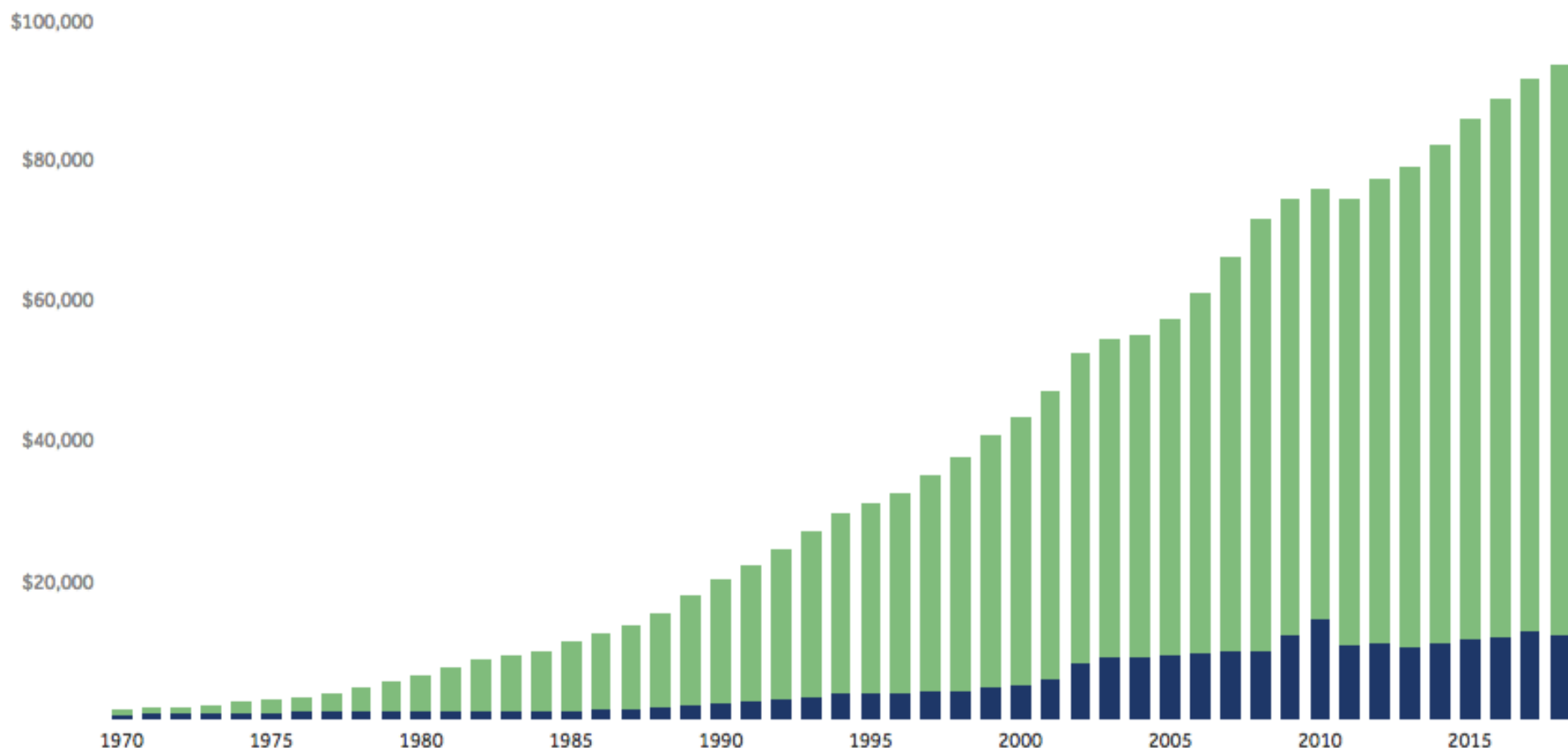


Source: KFF analysis of National Health Expenditure (NHE) data • [Get the data](#) • PNG

Spending on public health has increased, particularly by state and local governments

Local and federal expenditures on public health, US \$Millions, 1970-2018

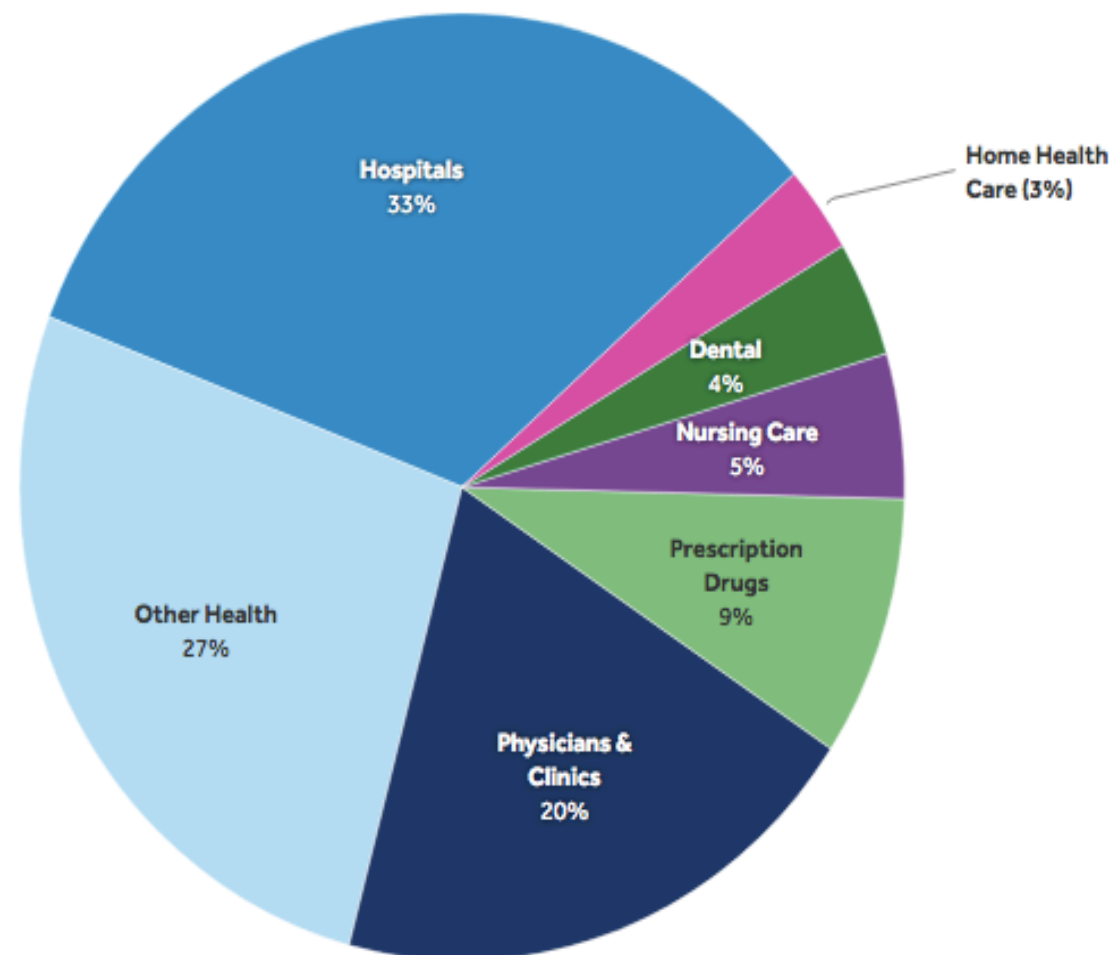
Federal Funds State/Local Funds



Note: Government public health activity includes organizing and delivering publicly provided health services such as epidemiological surveillance, inoculations, immunization/vaccination services, disease prevention programs, the operation of public health laboratories, and other such functions.

Hospital and physician services represent half of total health spending

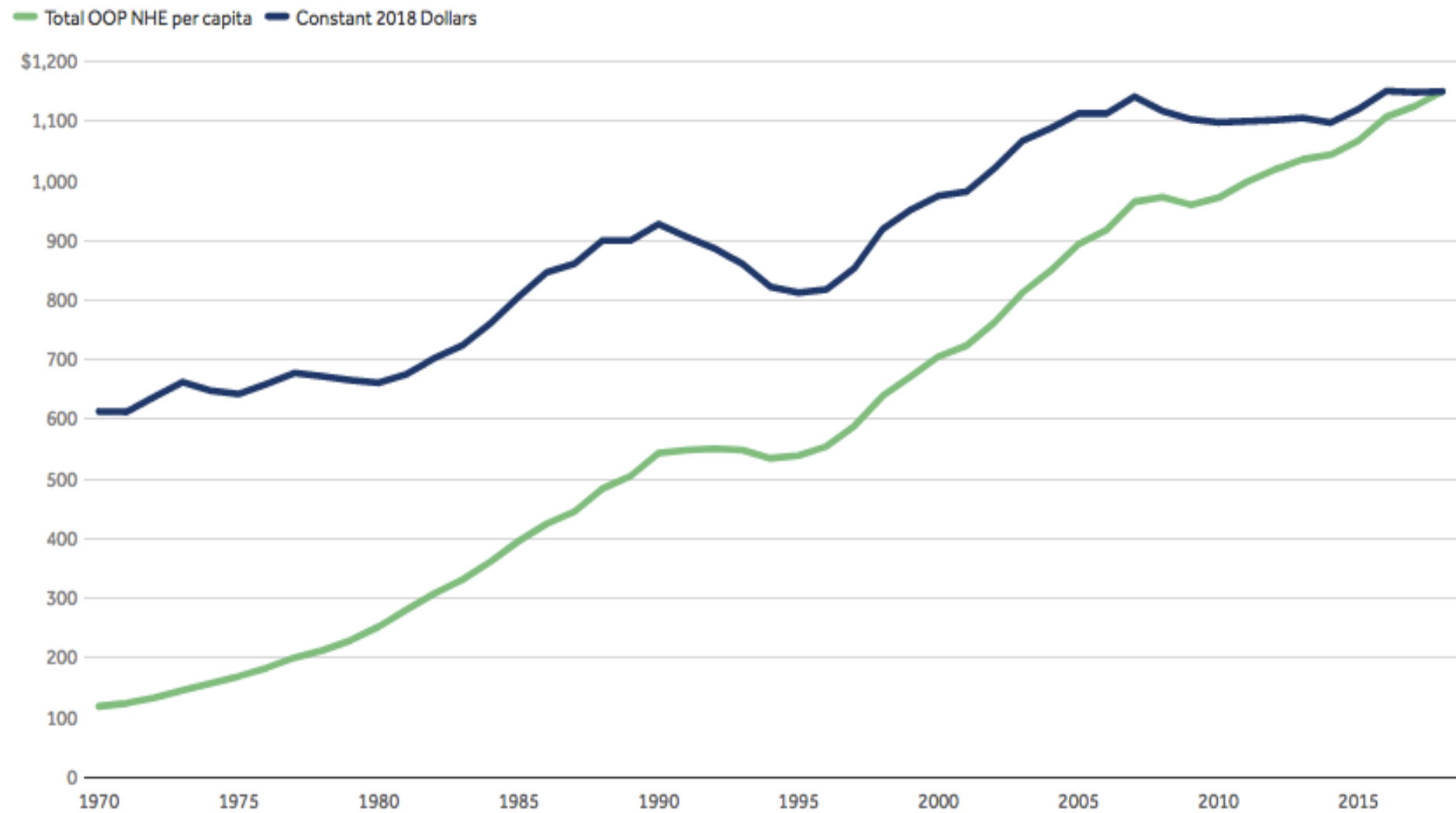
Relative contributions to total national health expenditures, 2018



*Other Health' includes spending on other non-durable products, residential and personal care, administration, and other state and federal expenditures.

Per capita out-of-pocket expenditures have grown since 1970

Per capita out-of-pocket expenditures, 1970-2018



The U.S. has poorer rates of Amenable Mortality, as measured by the Healthcare Access and Quality Index

Healthcare Quality and Access (HAQ) Index Rating, 2016



Source: Kaiser Family Foundation analysis of data from: "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016" The Lancet, 23 May 2018.

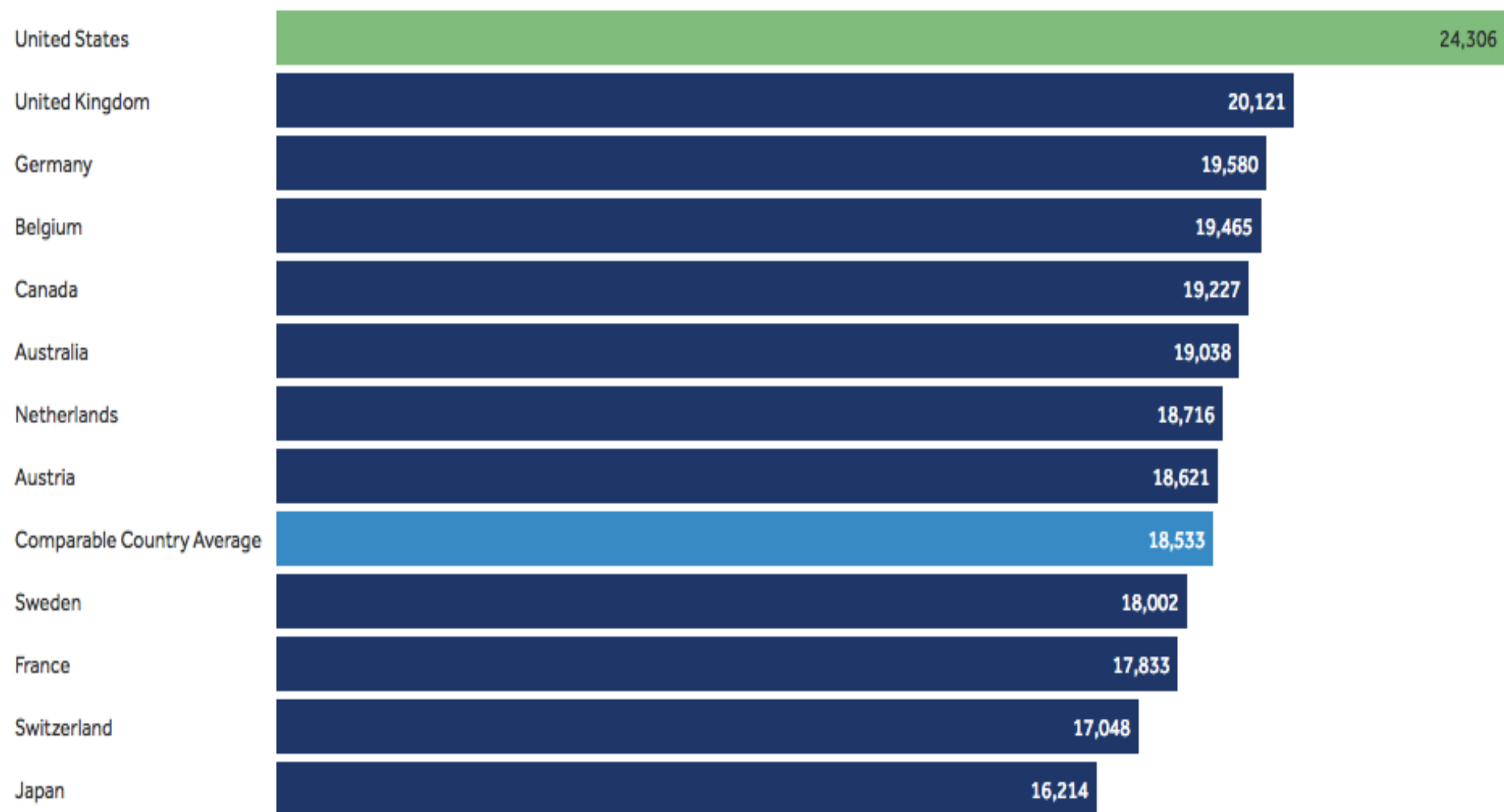
• [Get the data](#) • [PNG](#)

Peterson-KFF

Health System Tracker

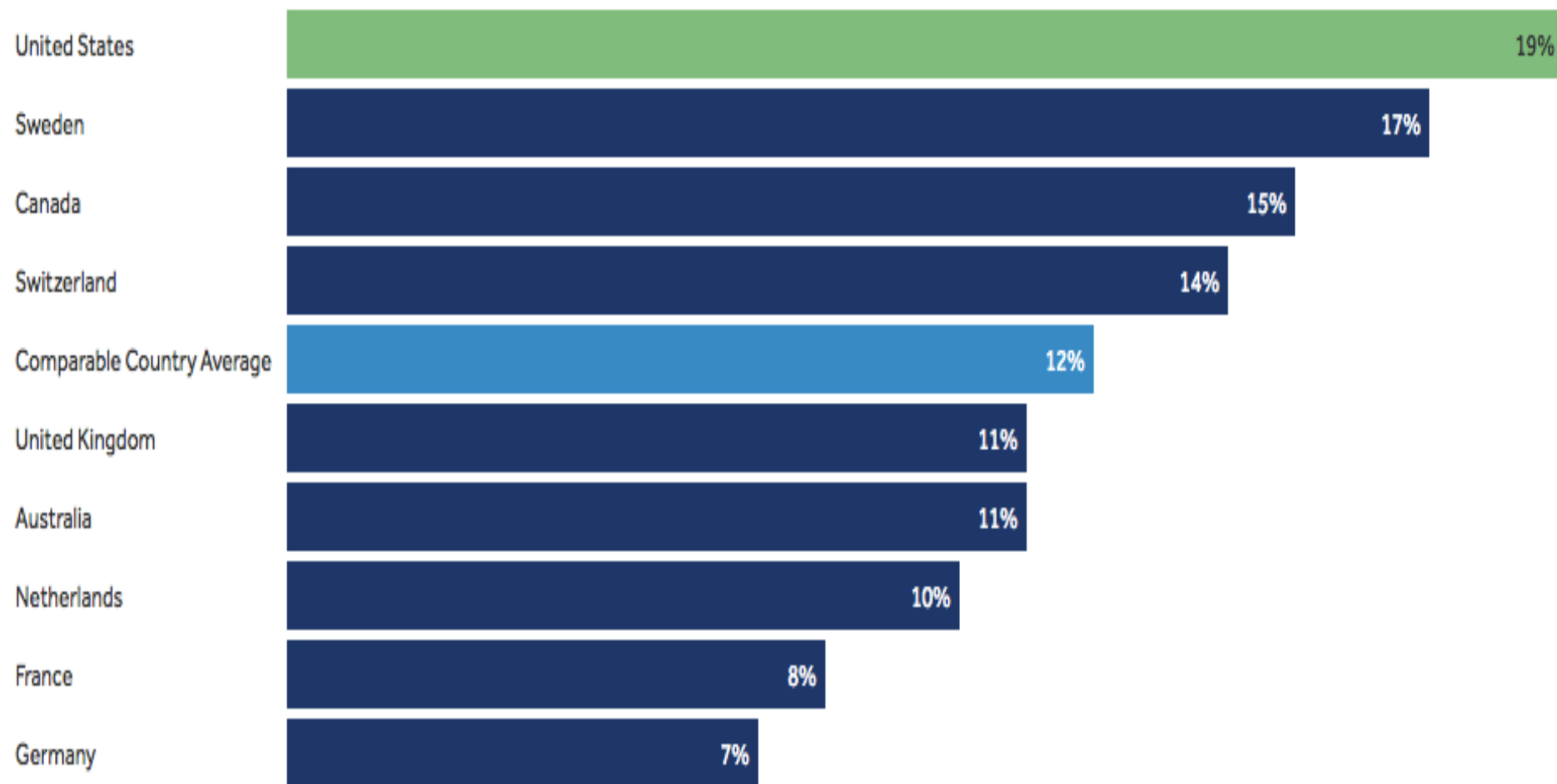
Disease burden is higher in the U.S. than in comparable countries

Age-standardized Disability Adjusted Life Years (DALY) rate per 100,000 population, 2017



The U.S. has higher rates of medical, medication, and lab errors than comparable countries

Percent of adults who have experienced medical, medication, or lab errors or delays in past two years, 2016



Source: [Unpublished data from 2016 Commonwealth Fund International Health Policy Survey](#) • [Get the data](#) • [PNG](#)

Peterson-KFF

Health System Tracker

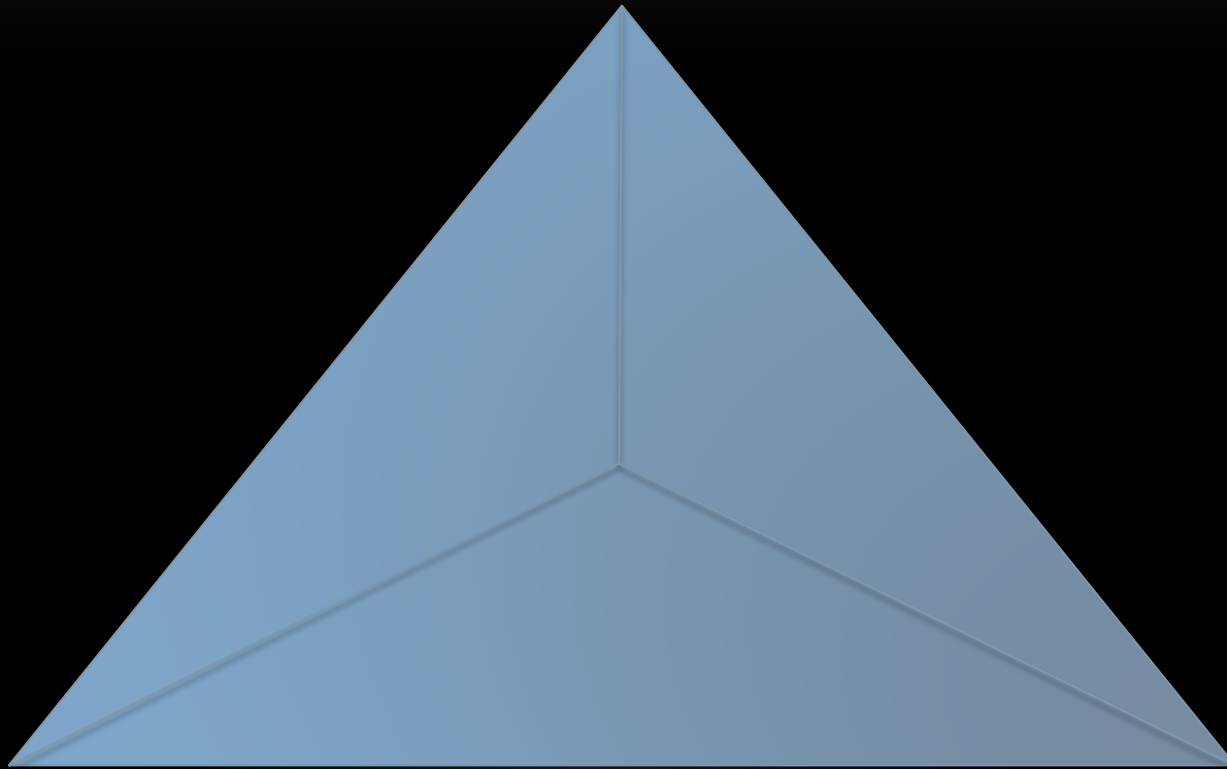
HOW TO ADDRESS COST, QUALITY, AND EXPERIENCE?



Institute for
Healthcare
Improvement

IHI TRIPLE AIM

Population Health



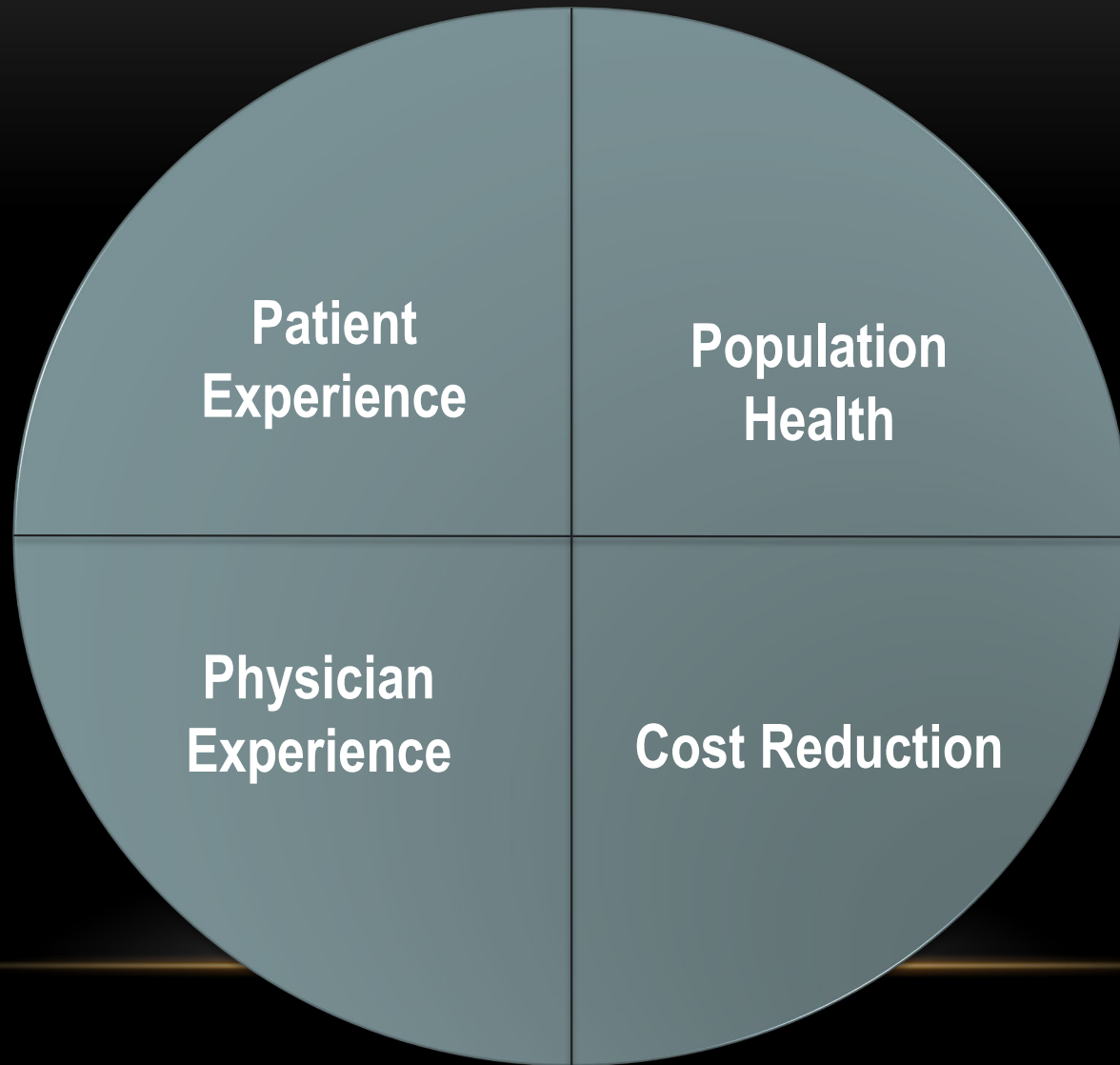
Experience of Care

Per Capita Cost

IHI TRIPLE AIM

- US Healthcare system accounts for nearly 17% of GDP
- Need to get value from healthcare resources
- Aging populations
- Longer life expectancy
- Chronic health problems
 - Medical and Social systems affected

QUADRUPLE AIM



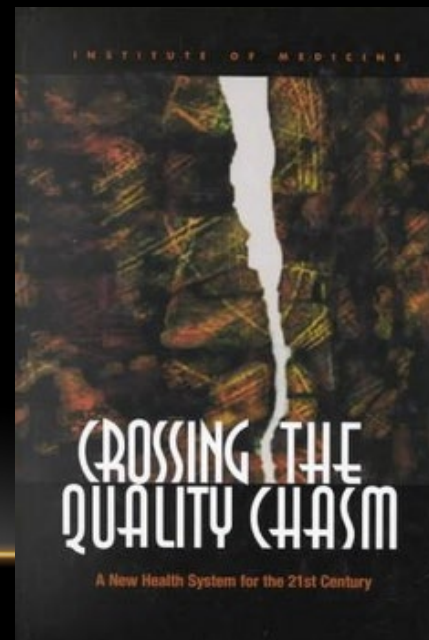
POPULATION HEALTH

- Foundational principles
 - Optimizing health for patient and population
 - Focus on the Quadruple Aim
 - Measure Quality (not outcomes)
 - Importance of therapeutic relationships

MEANINGFUL MEASURES

CMS QUALITY MEASURES

- Tools to measure healthcare processes, outcomes, patient perceptions, and organizational structure and/or systems
- Goal: Focus activities on high-quality health care
 - Effective
 - Safe
 - Efficient
 - Patient-centered
 - Equitable
 - Timely



Meaningful Measures Image_April2018



CMS MEANINGFUL MEASURES

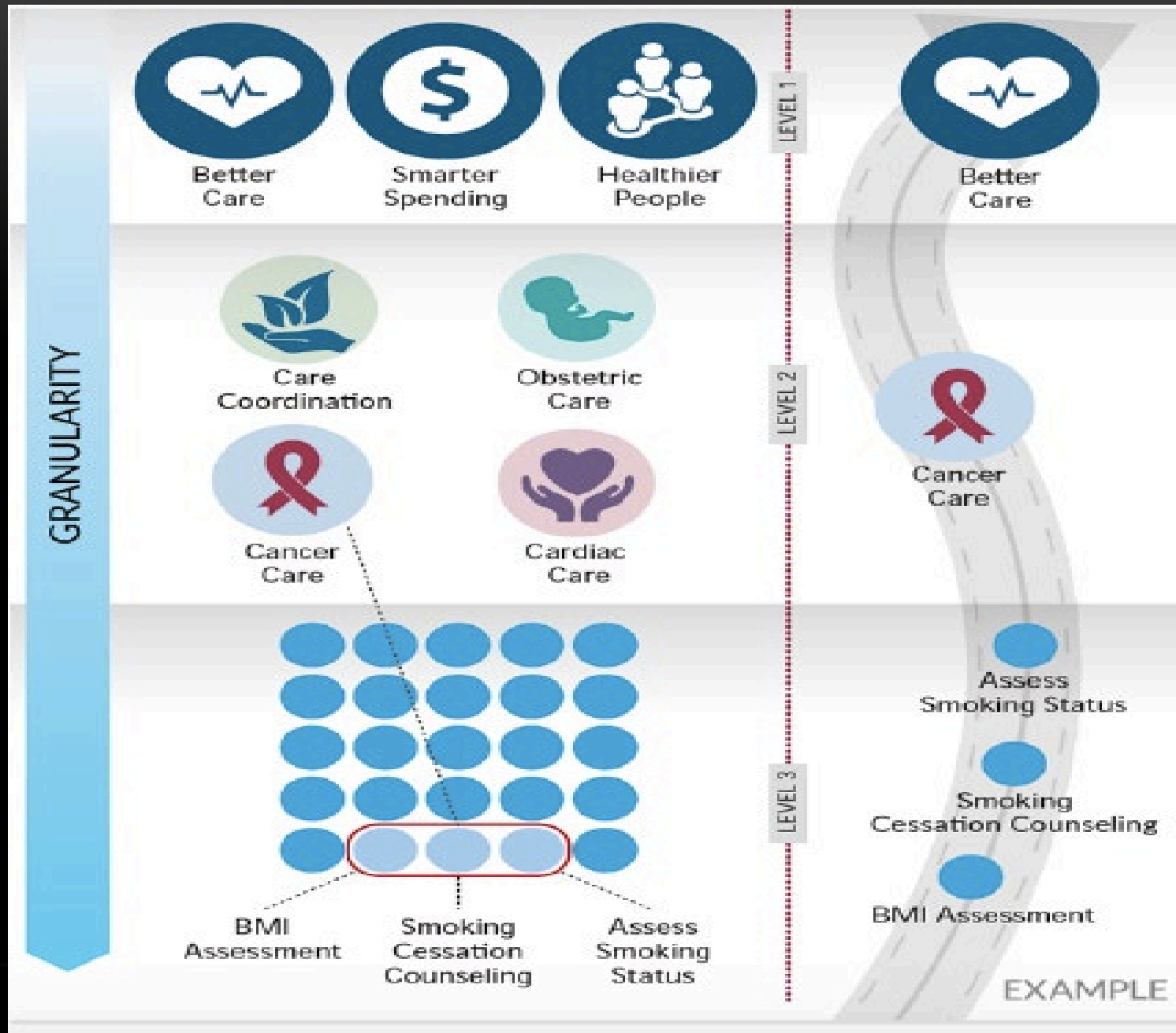
- Promote Effective Communication and Coordination of Care
 - Medication management
 - Hospital admissions/re-admissions
 - Transfer of PHI and Interoperability
- Promote Effective Prevention & Treatment of Chronic Disease
 - Preventative care
 - Management of chronic conditions
 - Mental health prevention/treatment/management
 - Opioid and substance abuse disorders
 - Risk-adjusted mortality

CMS MEANINGFUL MEASURES

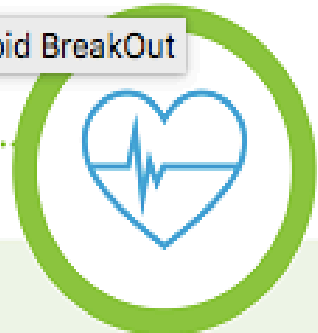
- Work with Communities to Promote Best Practices of Healthy Living
 - Equity of care
 - Community engagement
- Make Care Affordable
 - Appropriate use of healthcare
 - Patient-focused episode of care
 - Risk-adjusted total cost of care

CMS MEANINGFUL MEASURES

- Make Care Safer by Reducing Harm Caused in Delivery of Care
 - Healthcare-associated infections
 - Preventative healthcare harm
- Strengthen Person/Family Engagement as Partners in Care
 - Personalized care aligned with patient's goals
 - End of life care based on preference
 - Patient's experience of care
 - Patient reported functional outcomes



Meaningful Measures Framework Opioid BreakOut



Preventive Care

Management of Chronic Conditions

Prevention, Treatment, and Management of Mental Health

Prevention and Treatment of Opioid and Substance Use Disorders

Risk Adjusted Mortality

Meaningful Measure Areas

Measures

Influenza Immunization Received for Current Flu Season
HH QRP

Timeliness of Prenatal Care (PPC)
Medicaid & CHIP

Well-Child Visits in the First 15 Months of Life (6 or More Visits)
Medicaid & CHIP

Osteoporosis Management in Women Who Had a Fracture
QPP

Hemoglobin A1c Test for Pediatric Patients (eCGM)
Medicaid & CHIP

Follow-up after Hospitalization for Mental Illness
IPFQR

Alcohol Use Screening
IPFQR

Use of Opioids at High Dosage
Medicaid & CHIP

Hospital 30-Day, All Cause, Risk-Standardized Mortality Rate (RSMR) Following Heart Failure (HF) Hospitalization
HVBPP

Prevention and Treatment of Chronic Disease

Programs Using Illustrative Measures

- Quality Payment Program (QPP)
- Home Health Quality Reporting Program (HH QRP)
- Medicaid and CHIP (Medicaid & CHIP)
- Inpatient Psychiatric Facility Quality Reporting (IPFQR) Program
- Hospital Value-Based Purchasing (HVBPP) Program

OUTPATIENT QUALITY MEASUREMENTS AND REPORTING/DATA COLLECTION

HEALTHCARE EFFECTIVENESS DATA AND INFORMATION SET (HEDIS®)

- Tool used by >90% of America's health plans
- Measures performance on important dimensions of care and service
- Standardized performance measures for ease of comparison
- HEDIS® Measures on public health issues
 - cancer, heart disease, smoking, asthma, and diabetes
- Identify opportunities for improvement
- Monitor success of quality improvement initiatives
- Track improvement

HEDIS®

- Over 90 HEDIS® measures, divided into six "domains of care":
 - Effectiveness of Care
 - Access/Availability of Care
 - Experience of Care
 - Utilization and Risk Adjusted Utilization
 - Health Plan Descriptive Information
 - Measures Collected Using Electronic Clinical Data Systems

HEDIS® 2019 MEASUREMENT AREAS

- Colorectal Cancer Screening
- Care for Older Adults
- Use of Spirometry Testing in the Assessment and Diagnosis of COPD
- Pharmacotherapy Management of COPD Exacerbation
- Controlling High Blood Pressure
- Persistence of Beta-Blocker Treatment After a Heart Attack
- Annual Monitoring for Patients on Persistent Medications
- Medication Reconciliation Post-Discharge
- Potentially Harmful Drug-Disease Interactions in the Elderly
- Use of High-Risk Medications in the Elderly
- Osteoporosis Management in Women Who Had a Fracture
- Antidepressant Medication Management
- Follow-Up After Hospitalization for Mental Illness
- Board Certification
- Plan All-Cause Readmissions

- HEDIS® Measures address cost and health care improvement
- CAHPS is the patient experience tool

CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS (CAHPS)

- CMS developed patient experience survey
- Rating health care providers and plans
 - hospitals, home health care agencies, doctors, and health and drug plans
- CMS publicly reports the results of its patient experience surveys
- Some surveys affect payments to CMS providers

<https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/CAHPS/index.html>

CAHPS

- Experience is not the same as satisfaction
- Patient experience surveys focus on how patients experienced or perceived key aspects of their care, not how satisfied they were with their care
 - how often they experienced critical aspects of health care
 - communication with their doctors
 - understanding their medication instructions
 - coordination of their healthcare needs

<https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/CAHPS/index.html>

8. Wait time includes time spent in the waiting room and exam room. In the last 6 months, how often did you see the person you came to see within 15 minutes of your appointment time?

- Never
- Sometimes
- Usually
- Always

9. Using any number from 0 to 10, where 0 is the worst health care possible and 10 is the best health care possible, what number would you use to rate all your health care in the last 6 months?

- 0 Worst health care possible
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 Best health care possible

10. In the last 6 months, how often was it easy to get the care, tests or treatment you needed?

- Never
- Sometimes
- Usually
- Always

Your Personal Doctor

11. A personal doctor is the one you would see if you need a check-up, want advice about a health problem, or get sick or hurt. Do you have a personal doctor?

- Yes
- No →If No, Go to Question 27

12. In the last 6 months, how many times did you visit your personal doctor to get care for yourself?

- None →If None, Go to Question 27
- 1 time
- 2
- 3
- 4
- 5 to 9
- 10 or more times

13. In the last 6 months, how often did your personal doctor explain things in a way that was easy to understand?

- Never
- Sometimes
- Usually
- Always

14. In the last 6 months, how often did your personal doctor listen carefully to you?

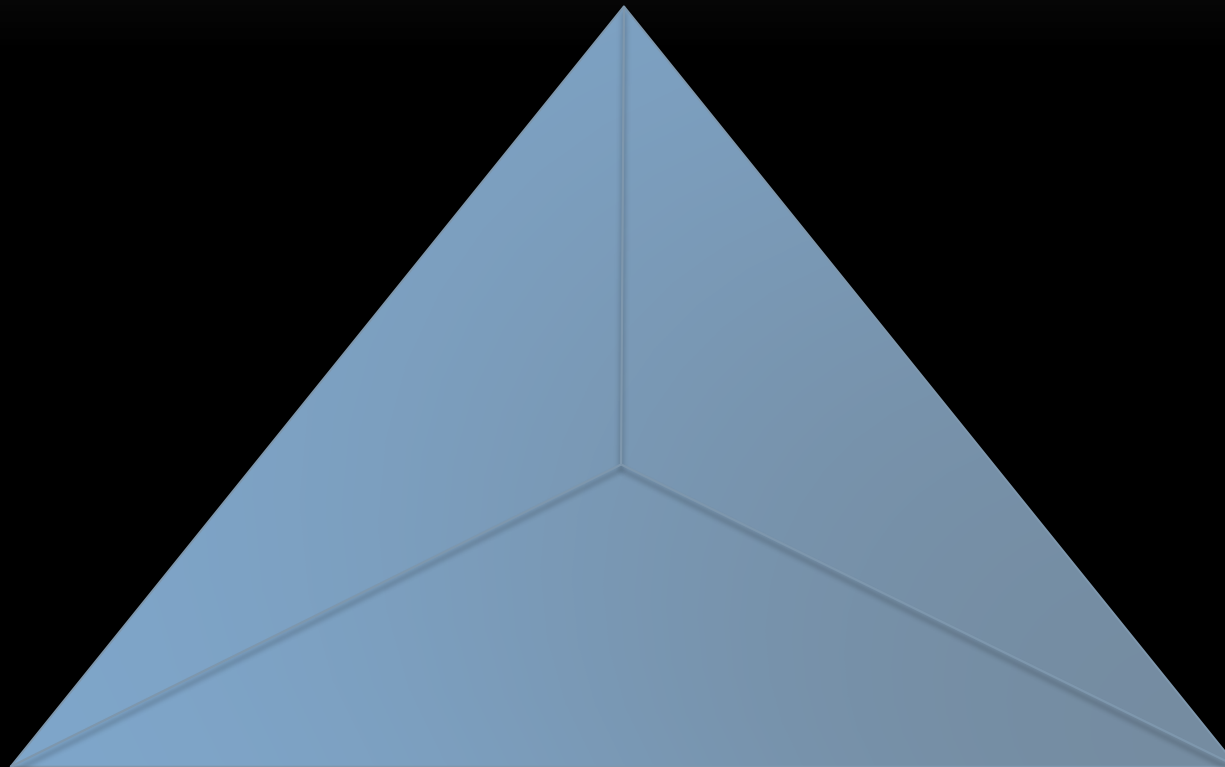
- Never
- Sometimes
- Usually
- Always



Institute for
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Improvement

IHI TRIPLE AIM

Population Health



Experience of Care

Per Capita Cost



Institute for
Healthcare
Improvement

IHI TRIPLE AIM

Population Health
(preventative)



Experience of Care

Per Capita Cost

- Experience of Care = once you are sick
- Population Health = prevention
 - Preventing chronic disease/illness/injury
 - Understanding health/wellness is a function of environment and social factors
 - Support at-risk populations (rural, lower income, limited education) who don't individually have resources for prevention – requires resources of the community/population
- = Reduced Cost of Care

How to accomplish the Triple Aim

BIG DATA

BIG DATA

- “Healthcare big data refers to collecting, analyzing and leveraging consumer, patient, physical, and clinical data that is too vast or complex to be understood by traditional means of data processing.”

BIG DATA

- Analyzes huge amounts of clinical data fast while noting patterns that may help improve patient care
- Advanced analytics and real-time data allow for more efficient and timely diagnoses



IBM Watson

- IBM —developed the Watson technology
- Machine learning – autonomously learning
- 2010



MACHINE LEARNING IN HEALTHCARE

- Better information at the point of patient care
 - Real-time information on possible outcomes and cost for each option
- Process huge datasets beyond the scope of human capability (advanced analytics)
- Takes analysis of data and translate into clinical information
 - Leads to better outcomes
 - Lower costs of care
 - Increased patient satisfaction

BLOOD PRESSURE EXAMPLE

- Review today's blood pressure in EMR
- Compare to prior blood pressure by graph or table format
- Adjust medication accordingly
- Return visit in 3-6 months

BLOOD PRESSURE IN ADVANCED ANALYTICS (AA)

- Review today's blood pressure in EMR
- AA compares BP to 50 prior blood pressure measurements for patterns
- AA pulls data from lab test results, demographic data (ethnicity, gender, socioeconomic status), family history, recent clinical trial information
- Based on data, AA provides stroke risk, CAD risk, renal failure risk in real time

News > Health

Google computers trained to detect cancer

New approach achieved 89 percent accuracy, compared to 73 percent for doctors



By LISA M. KRIEGER | lkrieger@bayareanewsgroup.com | Bay Area News Group

PUBLISHED: March 3, 2017 at 8:58 am | UPDATED: March 6, 2017 at 11:35 am

- Use of machine learning
- Predictive analytics
- Pattern recognition
- Pathologist with unlimited time to view slides with more than 10 gigapixels at 40x magnification

MACHINE LEARNING IN CANCER DETECTION

- “deep learning”
- Computational methods using an algorithm to program itself
- Learns from a large set of examples (billions of images)
- The Google team found that the system can autonomously learn what pathology looks like

JANUARY 25, 2017

Deep learning algorithm does as well as dermatologists in identifying skin cancer

In hopes of creating better access to medical care, Stanford researchers have trained an algorithm to diagnose skin cancer.



BY TAYLOR KUBOTA

- Goal of universal access to health care
- Database of nearly 130,000 skin disease images
- Trained algorithm to visually diagnose potential cancer

[HTTPS://NEWS.STANFORD.EDU/2017/01/25/ARTIFICIAL-INTELLIGENCE-USED-IDENTIFY-SKIN-CANCER/](https://news.stanford.edu/2017/01/25/artificial-intelligence-used-identify-skin-cancer/)

WHEN BIG DATA GOES WRONG

USE OF BIG DATA IN PUBLIC HEALTH...

- GFT

DAVID LAZER AND RYAN KENNEDY OPINION 10.01.15 07:00 AM

SHARE



WHAT WE CAN LEARN FROM THE EPIC FAILURE OF GOOGLE FLU TRENDS

- Big Data
- Use in Epidemiology and Health Trends
 - Are Data Owners** responsible to use it for public best interest?
- Google Flu Trends (GFT)
 - Google search data for influenza signs and symptoms could accurately estimate flu prevalence two weeks earlier than CDC
 - Until.... 2013
 - Missed peak of flu season by 140%

<https://www.wired.com/2015/10/can-learn-epic-failure-google-flu-trends/>

Google's 'Project Nightingale' Gathers Personal Health Data on Millions of Americans

Search giant is amassing health records from Ascension facilities in 21 states; patients not yet informed



Tech giants like Amazon and Apple are expanding their businesses to include electronic health records -- which contain data on diagnoses, prescriptions and other medical information. That's creating both opportunities and spurring privacy concerns. Here's what to know. Photo Composite: Heather Seidel/ The Wall Street Journal

By *Rob Copeland*

Updated Nov. 11, 2019 4:27 pm ET

RECOMMENDED VIDEOS

1. Trump Imposes Additional Sanctions on Iran



2. Ukrainian Boeing 737 Crashes in Iran, Killing All on Board



3. Puerto Rico Struck by Deadly Earthquake



4. Dozens Killed in Soleimani Funeral Stampede



5. How the Quds Force Extended Iran's Influence in the Region



MOST POPULAR ARTICLES

1. Opinion: Be Prepared for President Sanders



2. Iran Fires Missiles at U.S. Forces in Iraq



PERSONAL HEALTH INFORMATION IN DEMAND VIDEO

- <https://www.wsj.com/video/why-big-tech-wants-access-to-your-medical-records/F9C51DC8-5238-4D0C-B8BD-73F0FAC92048.html>

You may be one of the 25 million active Fitbit users around the world (as of January 2018).

You may use it to help monitor your exercise, sleep patterns and ensure you do your 10,000 steps. Or maybe it just looks cool and it's quite interesting to see what your resting heart rate is.

Like joining the gym in January and only going once, many people buy a Fitbit, Jawbone Up or Nike Fuelband to help achieve their health and fitness goals, but find themselves no more motivated to exercise &band leaving them no healthier than before. Studies have revealed how wearables can only help the most motivated users, that 10,000 steps won't make you healthy and even how heart-reading inaccuracies have led to weight gain!

But the next generation of health and wellness wearables is already tackling these problems. They are part of a holistic revolution in health care that focuses on more than just your heart rate or step count — and, this time, employers are the early adopters.

Wellness, wearables and work

<https://www.aetnainternational.com/en/about-us/explore/international-health-insurance/employers-turning-to-professional-wearable-tech.html>

QUANTIFIED SELF (QS) OR PERSONAL INFORMATICS (CHEAP AND CONVENIENT DATA COLLECTION)

- Data collection from daily life
 - Inputs - food consumed, quality of surrounding air, sleep, number of cigarettes, step count
 - Medication compliance, glucose trends, BP trends
 - States - mood, arousal, fertility cycles, oxygen levels
 - Performance - mental/physical, movement at work, endurance training

BENEFITS OF BIG DATA IN HEALTHCARE

- Predicts how one patient will respond to a specific treatment
 - Identify at-risk patients before issue arises
- Identify variations among patients and treatments that influence health outcomes
 - More precise treatment plans for individuals
- Genomic data to more accurately predict how illnesses will progress

www.softwareadvice.com/resources/what-is-big-data-in-healthcare-and-whos-already-doing-it/

BENEFITS OF BIG DATA IN HEALTHCARE

- Data from revenue cycle software and billing systems can aggregate cost-related data
 - Identify areas for reduction in spending
- HITECH Act, focus on interoperability of EMR
- Interoperability key for Medicare reimbursement qualification
 - MACRA incentivizes interoperability to use EMR with this capability

www.softwareadvice.com/resources/what-is-big-data-in-healthcare-and-whos-already-doing-it/

SUMMARY

- Population Health can improve quality in health care to help achieve cost savings, better health/less chronic disease, positive experience for the patient and the physician
- Improved Population/Preventative Health leads to better Patient Experience and Lower Cost of healthcare
- Understand what you are being measured against
- Use of Big Data only beginning
- More information and advanced analytics can help care for our patients