

# We are “Fix It” People

- Provide full spectrum care, develop long-term relationships, and make a difference in our patients’ lives; the goals are practical, dilemmas are intellectually stimulating, the procedures include multiple techniques, are anatomically based, aesthetically pleasing, and technically challenging, with many opportunities for innovation.

# Major Trends Affecting Vascular Care

Peter A. Schneider, MD  
Kaiser Foundation Hospital  
Honolulu, Hawaii

PNEC, 2018

Three iPhones are stacked on a grey surface. The top phone is a black iPhone 2G, the middle is a silver iPhone 3G, and the bottom is a black iPhone 3GS. The text is overlaid on the phones.

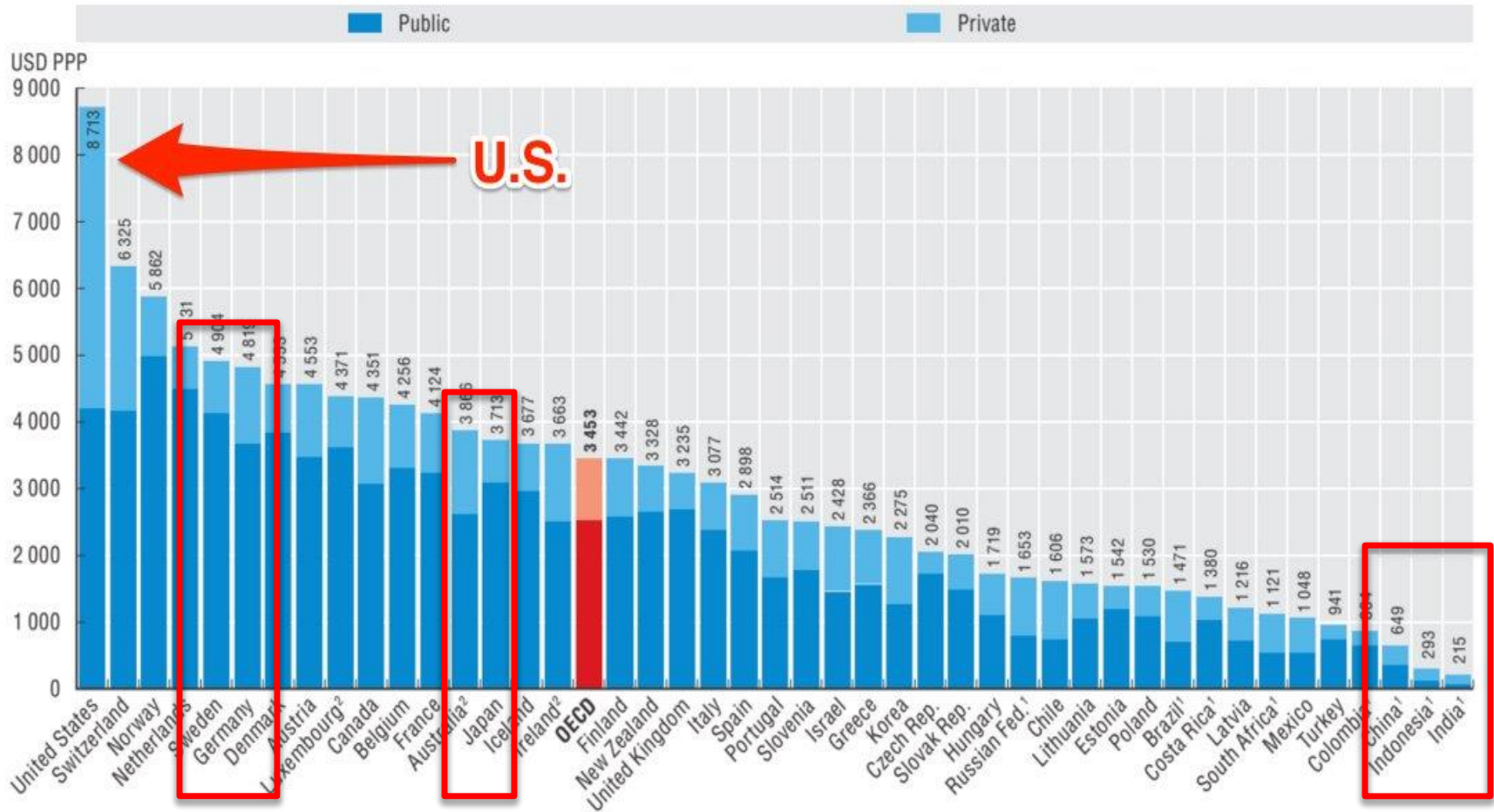
"There's no chance that the iPhone is going to get any significant market share. No chance."

Microsoft CEO Steve Ballmer, 2007

Eventually, we will have one of these.




## 9.1. Health expenditure per capita, 2013 (or nearest year)



Note: Expenditure excludes investments, unless otherwise stated.

1. Includes investments.
2. Data refers to 2012.

Source: OECD Health Statistics 2015, <http://dx.doi.org/10.1787/health-data-en>; WHO Global Health Expenditure Database.

StatLink  <http://dx.doi.org/10.1787/888933281252>

Jamie Orlikoff  
Orlikoff and Associates 2018

## Healthcare mega-mergers dominate 2017

By [Alex Kacik](#) | December 26, 2017

Horizontal, vertical, regional, national, large- and small-scale—2017 marked a year of mergers.

They ranged in all shapes and sizes, from the national hospital system expansions charted by [Catholic Health Initiatives](#) and [Dignity Health](#) to the vertical combination of retail pharmacy giant [CVS Health](#) and insurer [Aetna](#). And they all had one thing in common: trying to achieve scale and turn it into a financial and competitive advantage.

[Five mega-mergers](#) were announced over an eight-day span in early December, starting with CVS Health's [planned purchase of Aetna](#) on Dec. 3.

The next day, Advocate Health Care and Aurora Health Care announced a merger that would create a [\\$10.7 billion cross-state system](#), continuing the trend of providers realigning into regional hubs that give them significant market share. Advocate's [proposal to merge with northern University HealthSystem](#) couldn't overcome antitrust concerns regarding its redundant service areas. So Downers Grove, Ill.-based Advocate turned to the largest health system in Wisconsin in a proposed deal that does not involve any market overlap. On Dec. 6, the [UnitedHealth Group agreed to buy](#) dialysis provider DaVita's medical unit for \$4.9 billion to expand the national insurer's outpatient care services. DaVita Medical Group's physician network provides care to approximately 1.7 million patients annually across six states in 35 urgent-care centers and six outpatient surgery centers.

The following day, Catholic Health Initiatives and Dignity Health [formalized a deal](#) that would have—at the time—created the largest not-for-profit hospital system. The new health system would include 139 hospitals with operations in 28 states with no overlap in hospital service areas, similar to the Advocate-Aurora deal, and combined revenue of \$28.4 billion, eclipsing Ascension's \$22.6 billion. The marriage would test a newly popular co-CEO model that delegates certain roles between Lloyd Dean and Kevin Lofton.

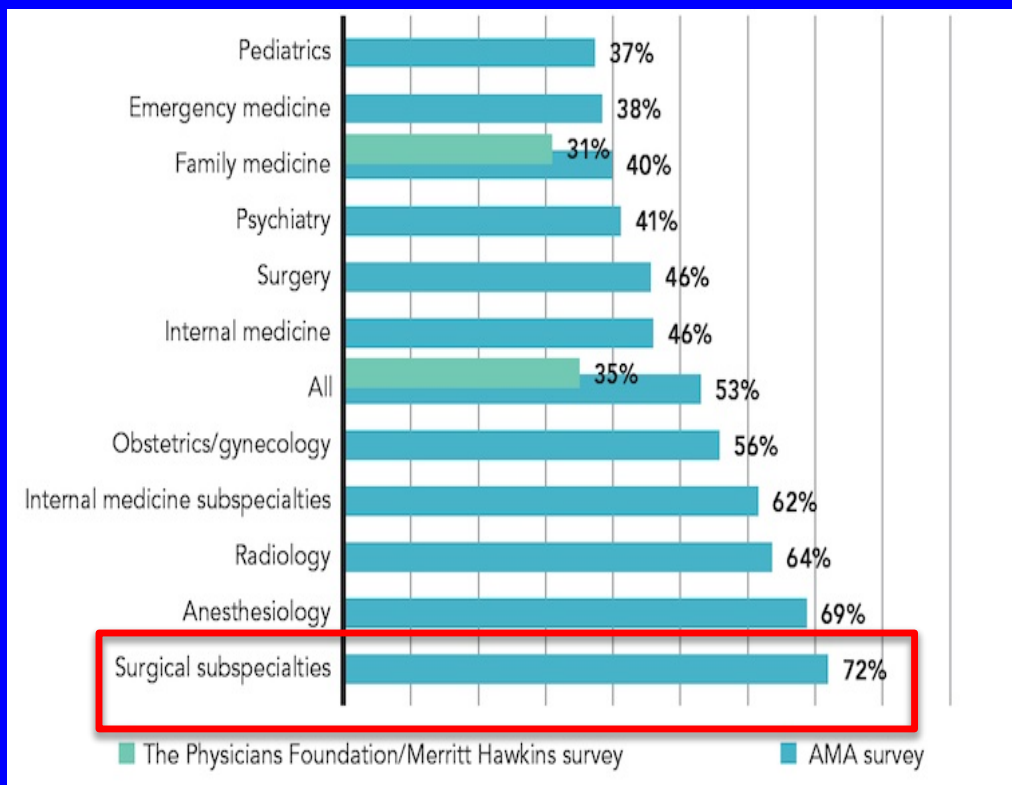
Not to be outdone, on Dec. 10 [plans emerged](#) of an Ascension Health-Providence St. Joseph Health merger, which would create the largest hospital system, as first reported by the [Wall Street Journal](#). It would give the combined not-for-profit entity 191 hospitals in 27 states and annual revenue of \$44.8 billion, ahead of HCA's \$41.5 billion. Providence St. Joseph's experience with taking on risk through its insurance arm would benefit Ascension, said Miki Kapoor, president of Tea Leaves Health, a consulting and software company.

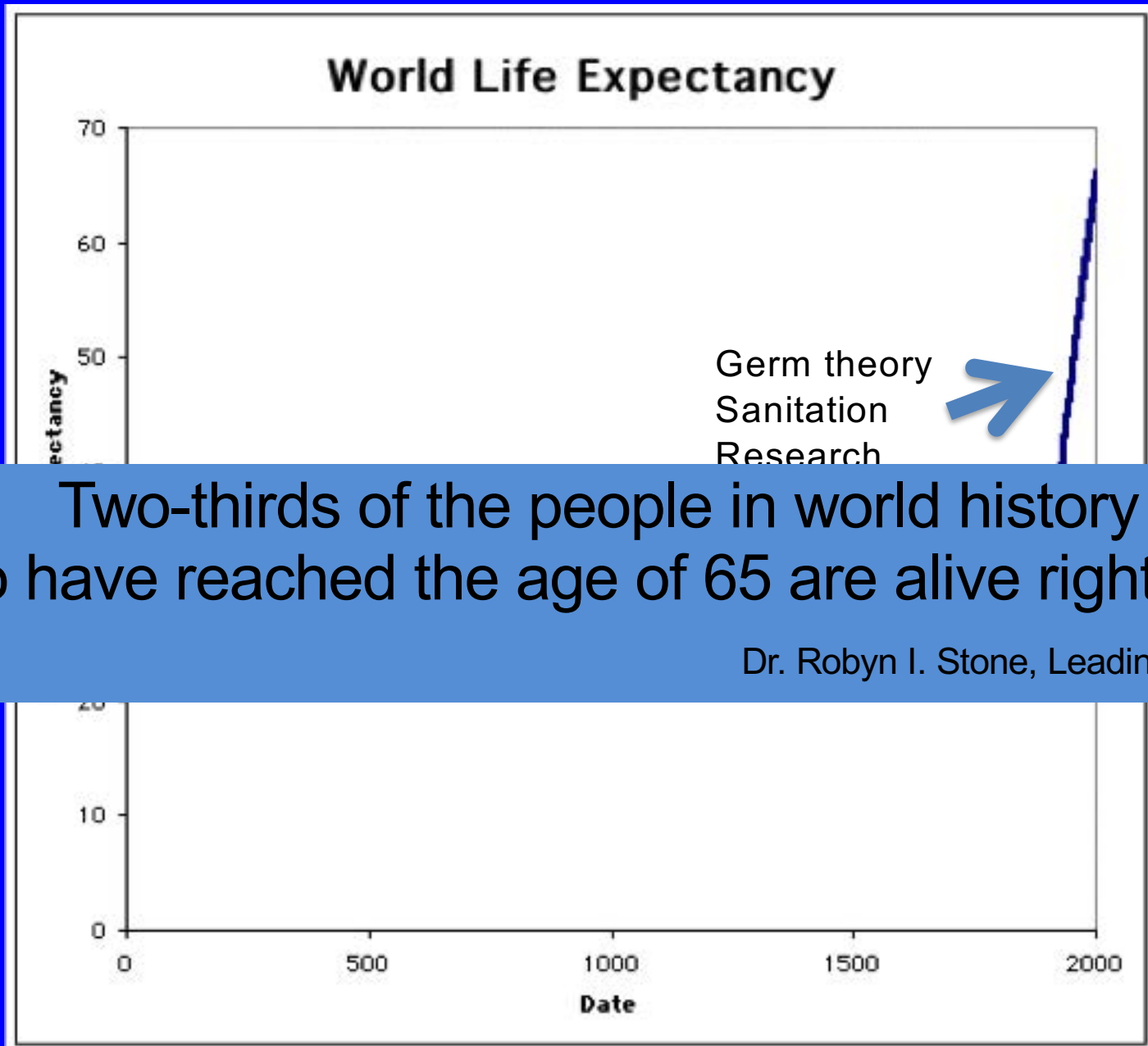
"We are seeing the payers become providers," he said. "They are beginning to own more of the risk and get closer to the patient. These deals are happening because they are finally putting the consumer at the center of healthcare." Negotiating better rates will help offset their losses from taking on more Medicaid beneficiaries as the population ages. But this is a tactic that can also [raise prices for consumers](#).

The healthcare industry saw the start of another shockwave in 2017 as Amazon tiptoed into the healthcare supply chain. The e-commerce behemoth, which has used its logistical prowess and scale to upend many markets, has quietly established a [growing presence in the medical supply sector](#). It has also [received wholesale distribution licenses](#) from several state pharmaceutical boards. The moves have led some companies to forge more mergers and acquisitions.

Imagine when Amazon knows more about your health than you do!

The American Medical Association reported in its 2012 Practice Benchmark Survey that a slight majority (53 percent) of physicians owned their practices, down from 61 percent in 2007/2008; 42 percent of physicians were employees, and 5 percent were independent contractors.<sup>1</sup> The percentage of physicians who identified as practice owners varied widely across specialties.





Two-thirds of the people in world history who have reached the age of 65 are alive right now.

Dr. Robyn I. Stone, Leading Age



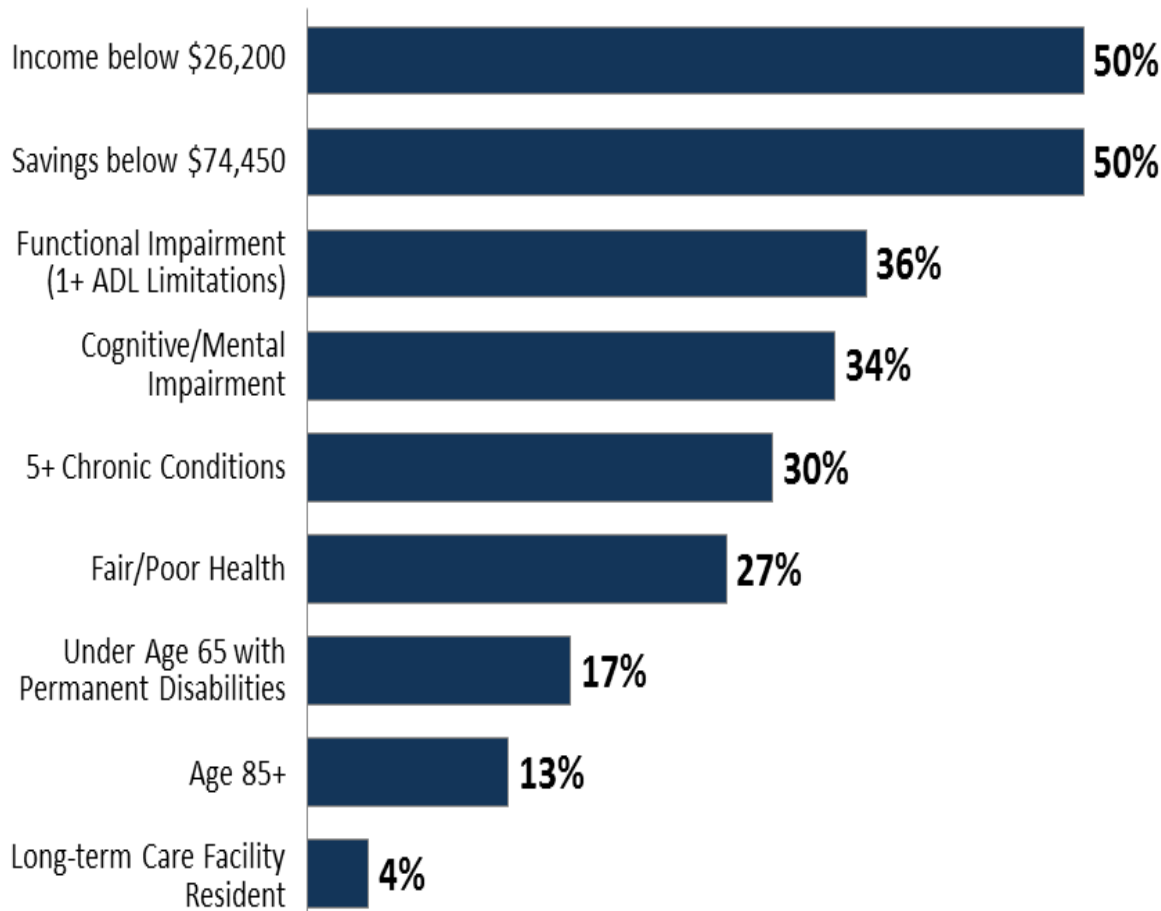
# Characteristics of Medicare Recipients

65 and over age group will grow 28% in next decade.

10,000 baby boomers turn 65 every day, this will continue for next 12 years.

25% of Medicare recipients have five or more chronic conditions, see an average of 13 physicians a year and fill 50 prescriptions per year.

*Percent of total Medicare population:*



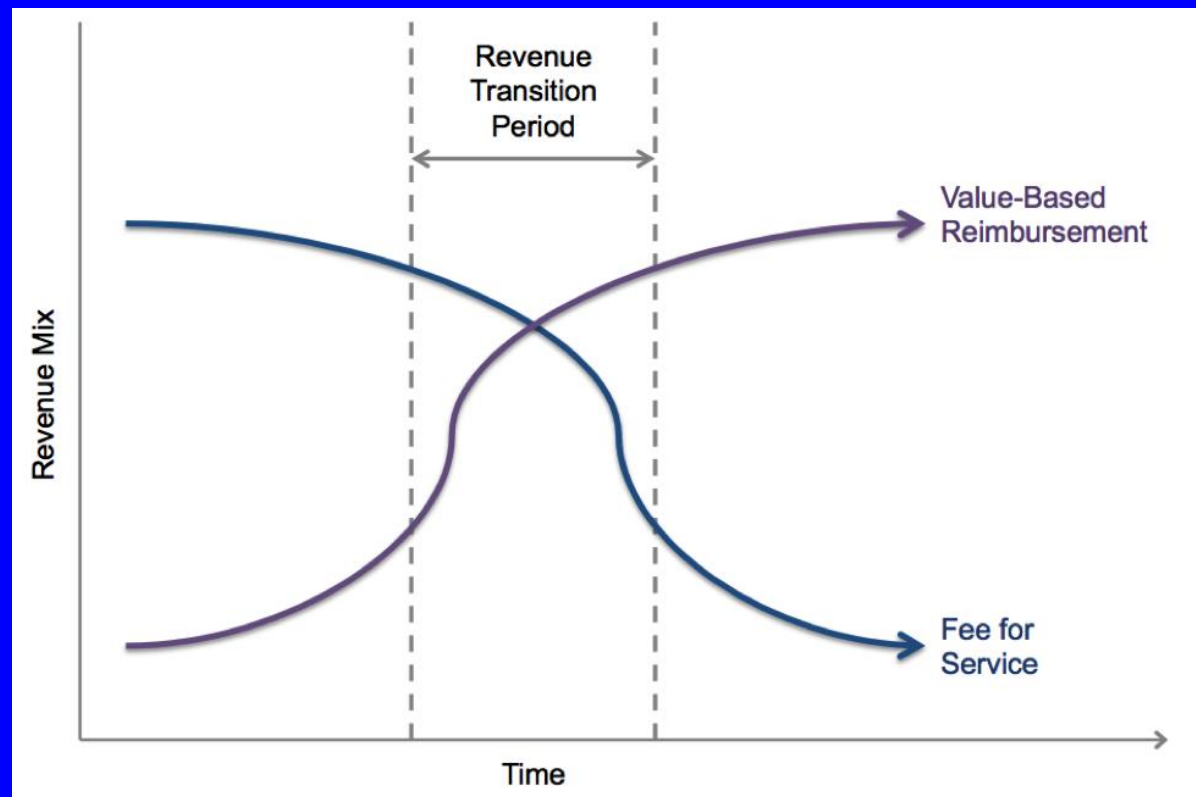
In 1960, 5 workers supported every person over the age of 65.

In 2025, 2 workers will support every person over the age of 65.

The Key to Transitioning from  
Fee-for-Service to  
Value-Based Reimbursement

# How will we deal with these challenges?

## Volume-based to Value-based



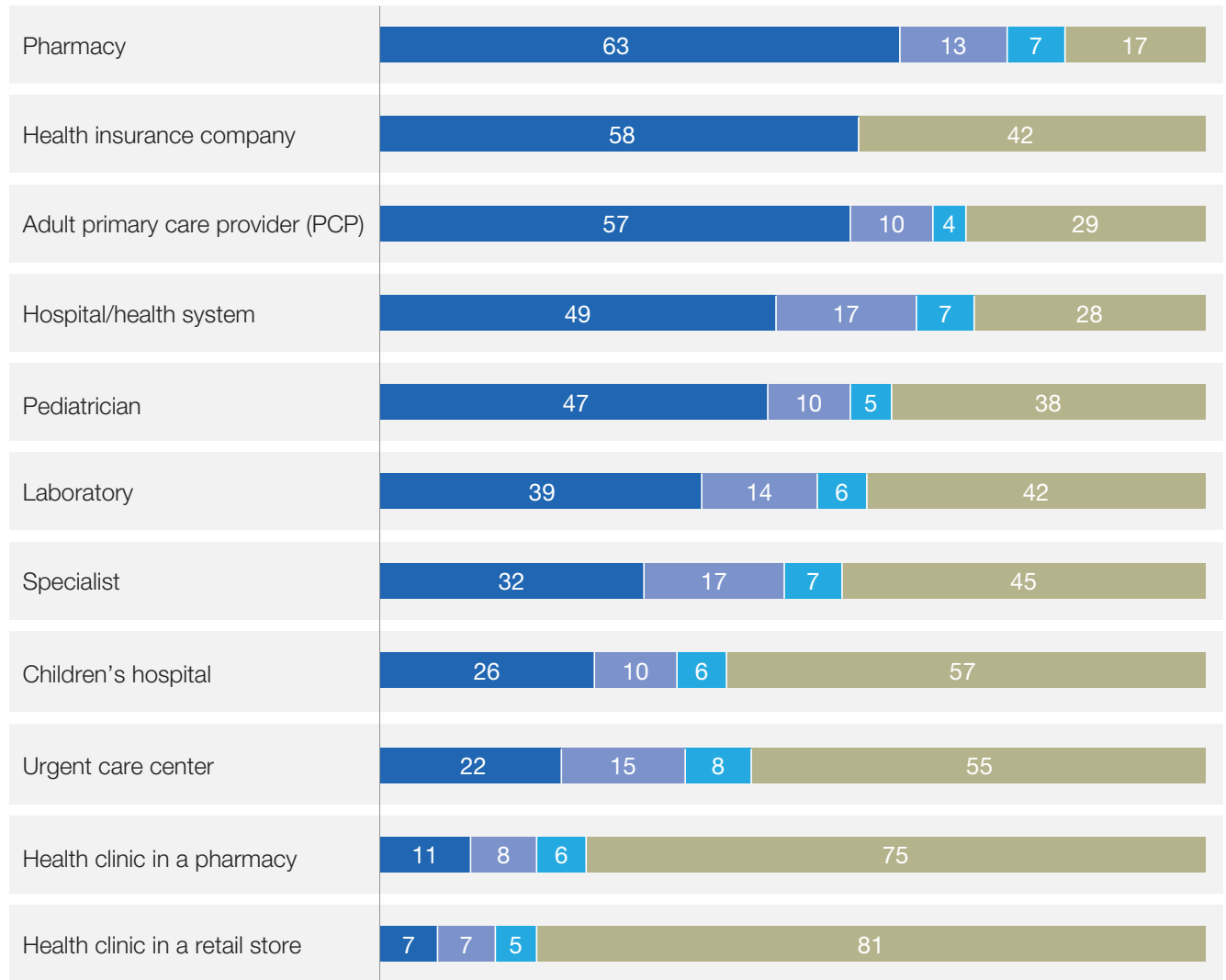
Way bigger than the open versus endo discussion

### EXHIBIT 4 Many consumers have few, if any, preferred healthcare partners

Do you currently have a preferred...?

■ Yes, I have one I use for all care    
 ■ Yes, I have one I use for occasional care    
 ■ Yes, I have one I use for some care    
 ■ No, I don't have one

% of respondents<sup>1</sup>



Healthcare Systems and Services

## Enabling health consumerism

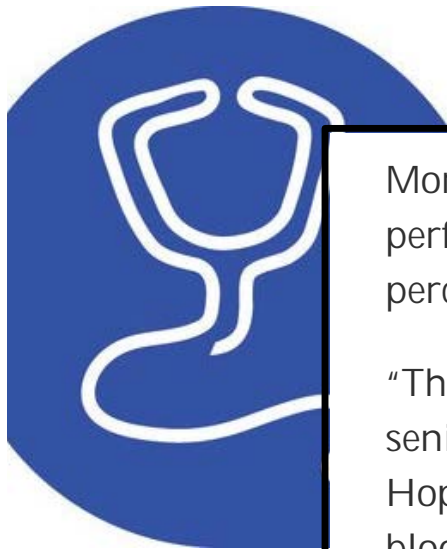
Jenny Cordina, Rohit Kumar, and Eric



# Overtreatment Is Common, Doctors Say

NICHOLAS BAKALAR SEPT. 6, 2017

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More than 70 percent of doctors conceded that physicians are more likely to perform unnecessary procedures when they profit from them, while only 9.2 percent said that their own financial security was a factor.

“This study is essentially the voice of physicians about the problem,” said the senior author, Dr. Martin A. Makary, a professor of surgery at Johns Hopkins. “We’re told that there are too many operations done for narrowed blood vessels in the legs. Spine surgeons say that a quarter of all spine surgery may not be necessary. Half of stents placed may be unnecessary.

Most physicians in the United States believe that overtreatment is harmful, wasteful and common.

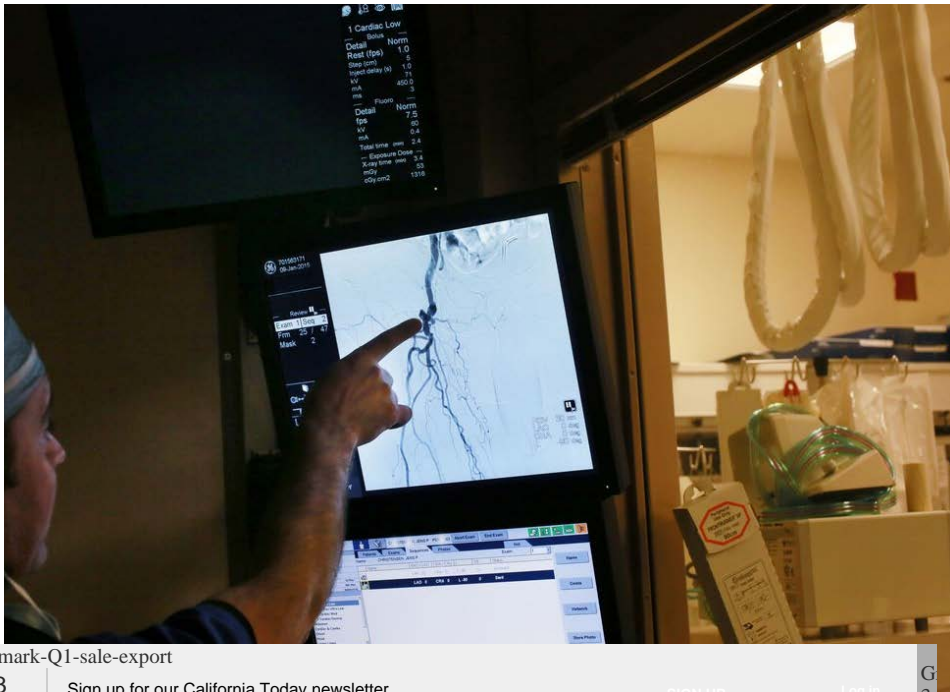
Researchers surveyed 2,106 physicians in various specialties regarding their beliefs about unnecessary medical care. On average, the doctors believed that 20.6 percent of all medical care was unnecessary, including 22 percent of prescriptions, 24.9 percent of tests and 11.1 percent of procedures. The

New York Times Sept 6, 2017

# Medicare Payments Surge for Stents to Unblock Blood Vessels in Limbs

JLIE CRESWELL and REED ABELSON JAN. 29, 2015

330



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://www.nytimes.com/2015/01/30/business/medicare-payments-surge-for-stents-to-unblock-blood-vessels-in-limbs.html[4/2/2018 4:22:18 PM]

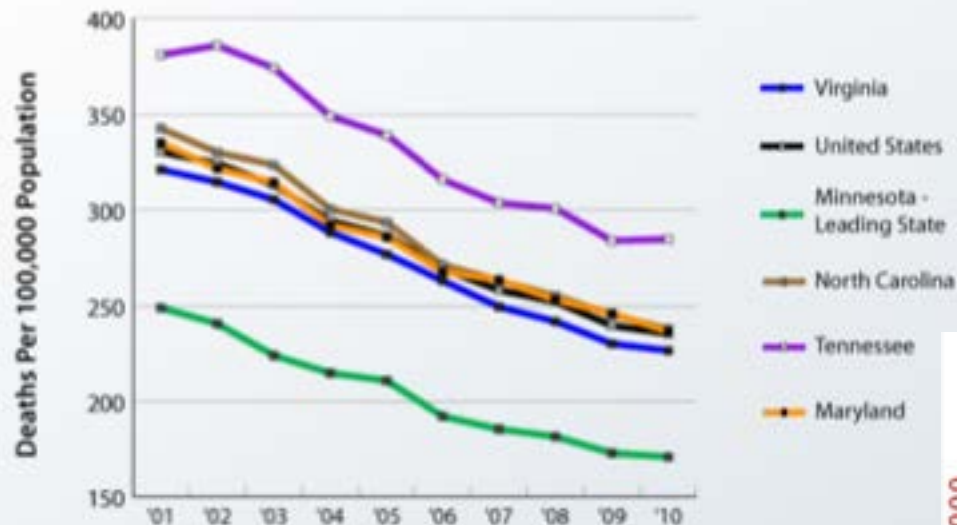
Procedures done in office  
Loose guidelines  
Decreasing coronary volume  
Competition between specialties  
Medicare billing outliers

Mixed up arterial and venous procedures  
Ignored the rise of CLI

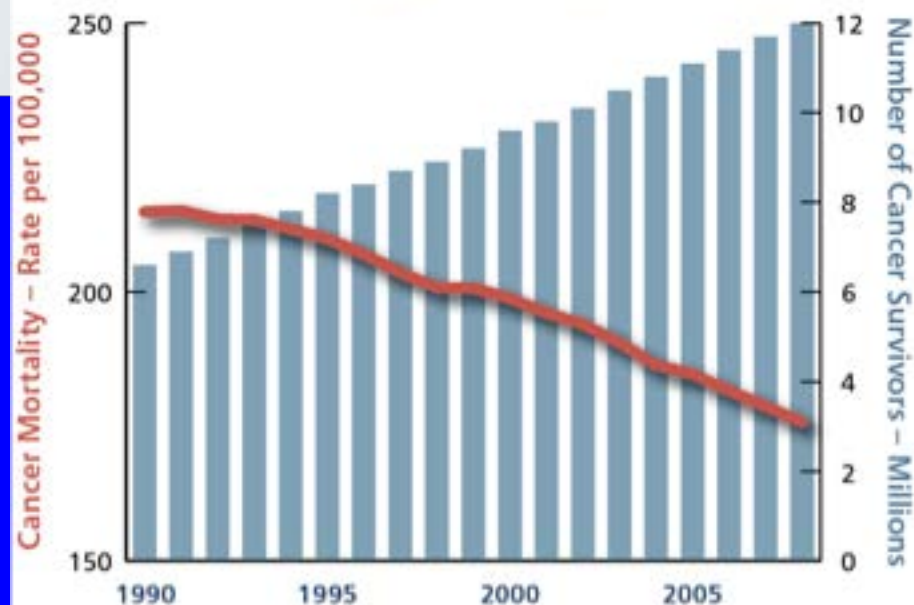
New York Times, January 29, 2015

# The Major Killers: Cancer and Heart Disease

Age-adjusted Cardiovascular Death Rate, By State

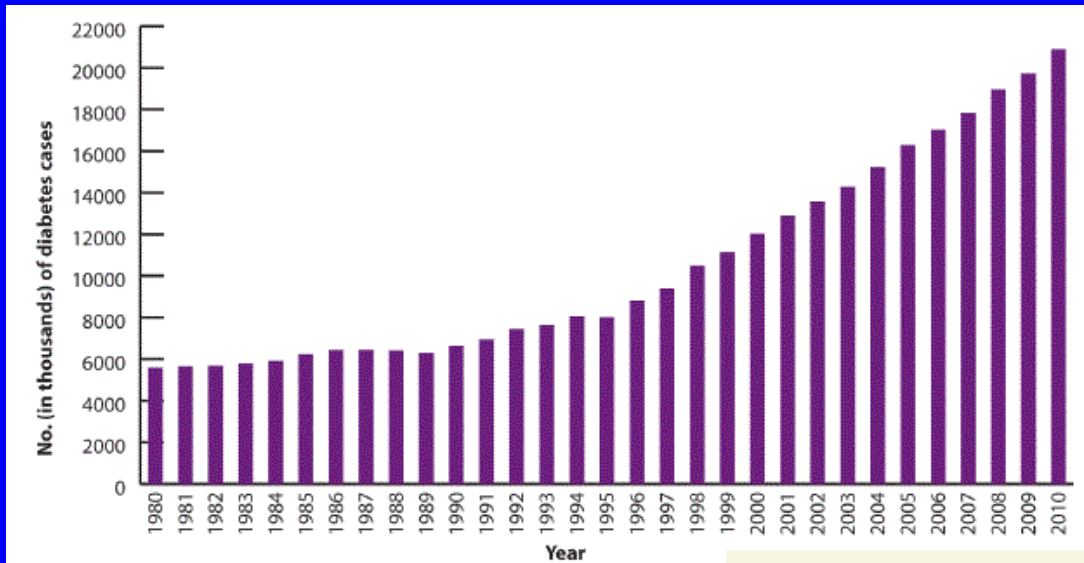


Cancer in the United States, 1990-2008: Survival Rising, Mortality Decreasing

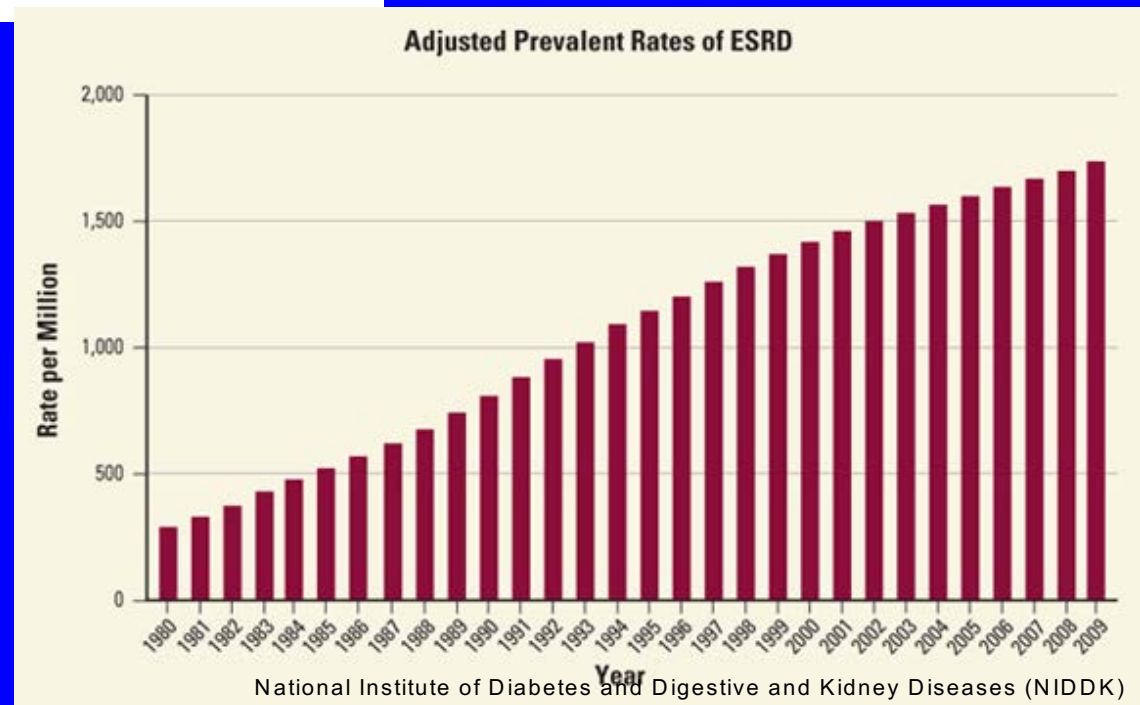


Data from the National Cancer Institute on estimated number of cancer survivors and age-adjusted cancer deaths per 100,000 people

# More Diabetics and Renal Failure

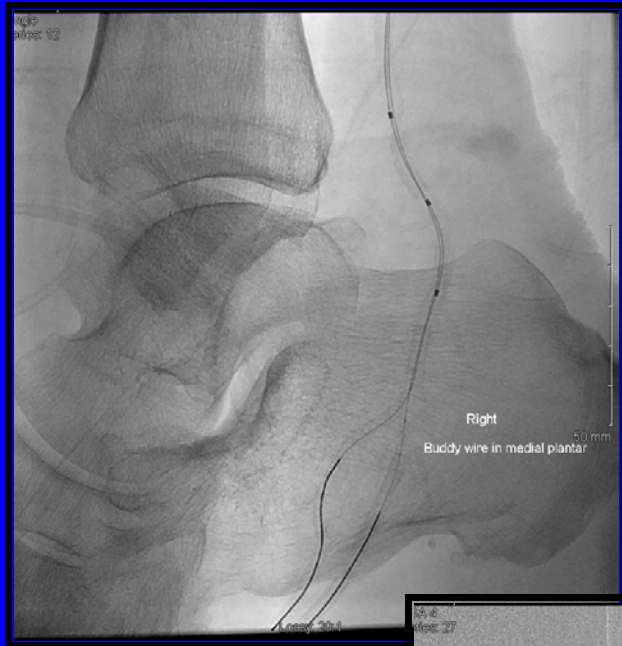


CDC: Diabetes Report Card 2012



National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

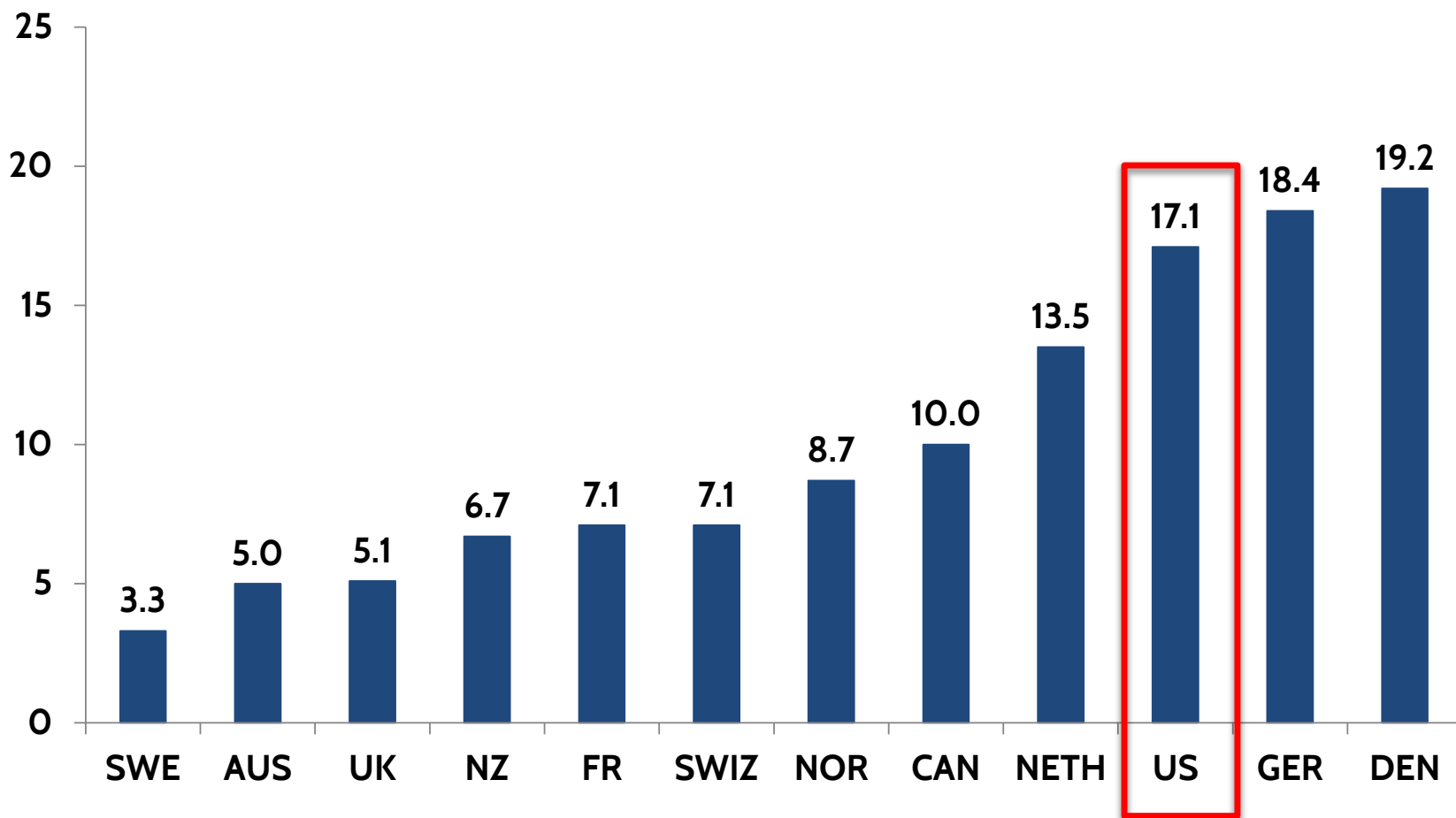
# Disease and treatment moving into distal vascular beds.





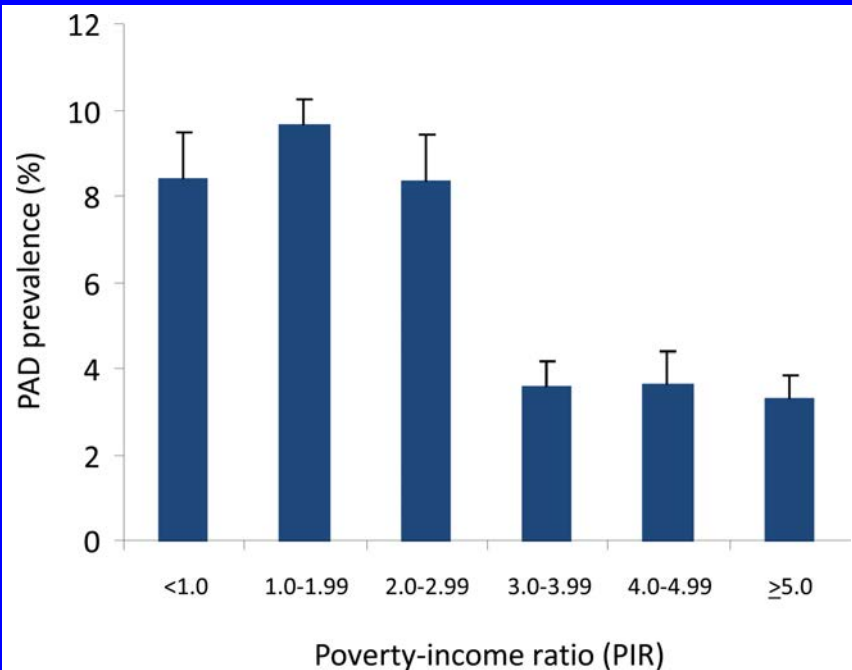
## Exhibit 12. Lower Extremity Amputations as a Result of Diabetes, 2011

Amputations per 100,000 population

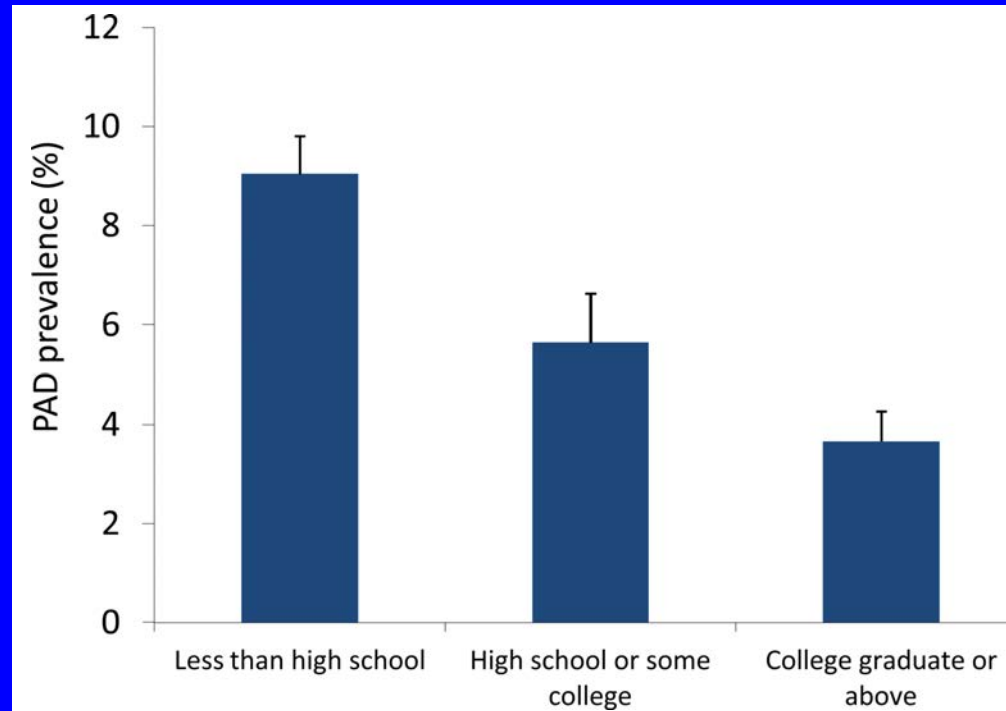


\* Data from 2010 for the Netherlands, Switzerland, and the U.S.; and 2009 for Denmark.  
Source: OECD Health Data 2015.

# Vascular Disease Reflects Socioeconomic Status



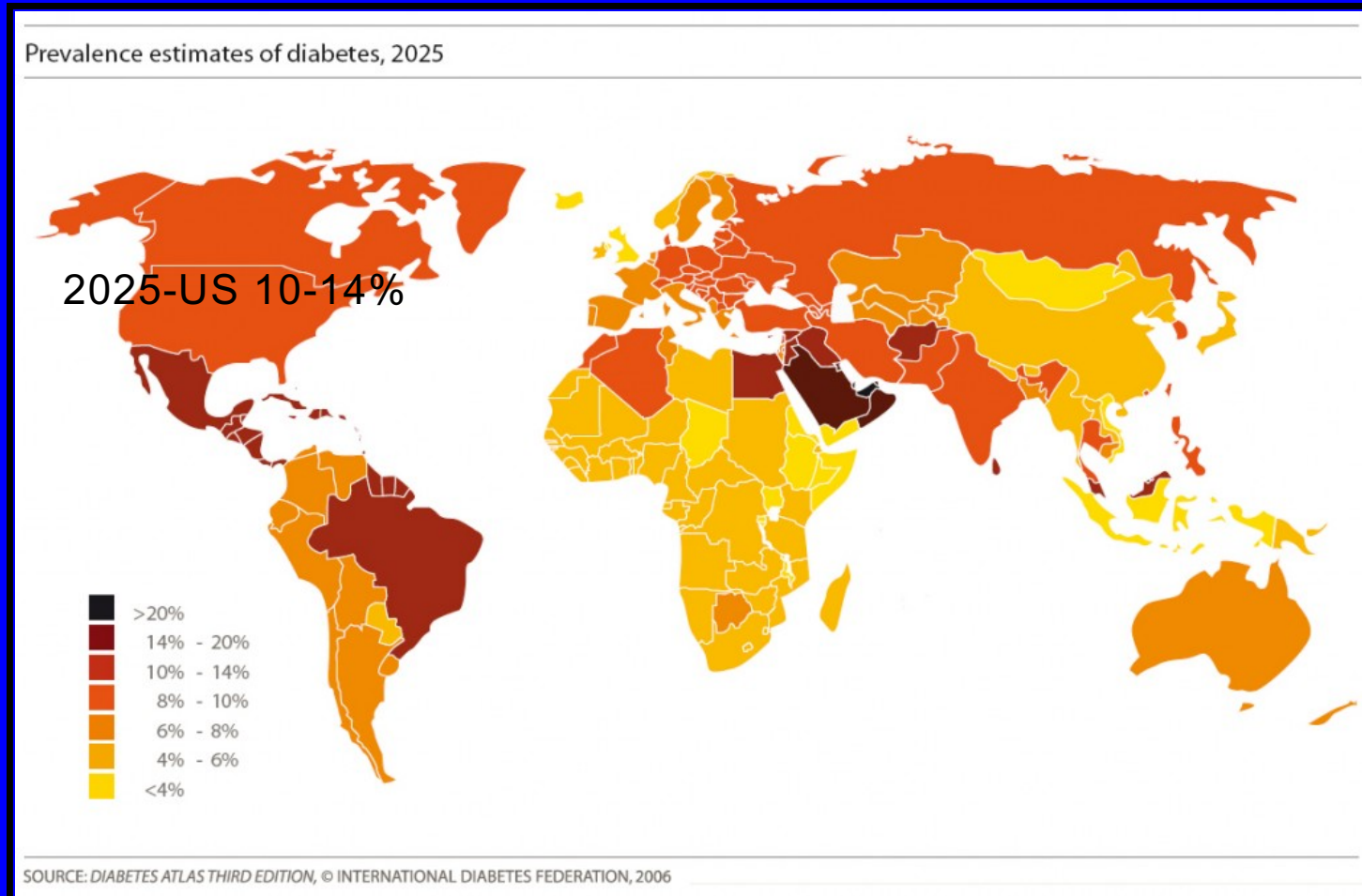
**Figure 1.** Prevalence of PAD by poverty-income ratio (PIR) category. PIR is a ratio of self-reported household income relative to a family's poverty threshold. A PIR value < 1.0 indicates family income below the poverty threshold. PIR was categorized as < 1.0, 1.0-1.99, 2.0-2.99, 3.0-3.99, 4.0-4.99, and ≥5.0.



**Figure 2.** Prevalence of PAD according to highest attained education level.

Pande et al. Circ Cardiovasc Qual Outcomes 2014;7:532

# Diabetes: Global Epidemic



Global Sherpa: Globalization, Sustainable Development and Social Impact in World Rankings, Countries and Cities

# Vascular Disease-Now an International Problem

**TABLE 2. ESTIMATED PREVALENCE AND NUMBER OF PEOPLE WITH DIABETES (ADULTS 18+ YEARS)**

WHO Region	Prevalence (%)		Number (millions)	
	1980	2014	1980	2014
African Region	3.1%	7.1%	4	25
Region of the Americas	5%	8.3%	18	62
Eastern Mediterranean Region	5.9%	13.7%	6	43
European Region	5.3%	7.3%	33	64
South-East Asia Region	4.1%	8.6%	17	96
Western Pacific Region	4.4%	8.4%	29	131
<b>Total<sup>a</sup></b>	<b>4.7%</b>	<b>8.5%</b>	<b>108</b>	<b>422</b>

World Health Organization  
Diabetes Report 2016

# Vascular Disease in Mummies

20 of 52 mummies from Ancient Egypt. Circa 1500-2000 BC



# Advanced Imaging



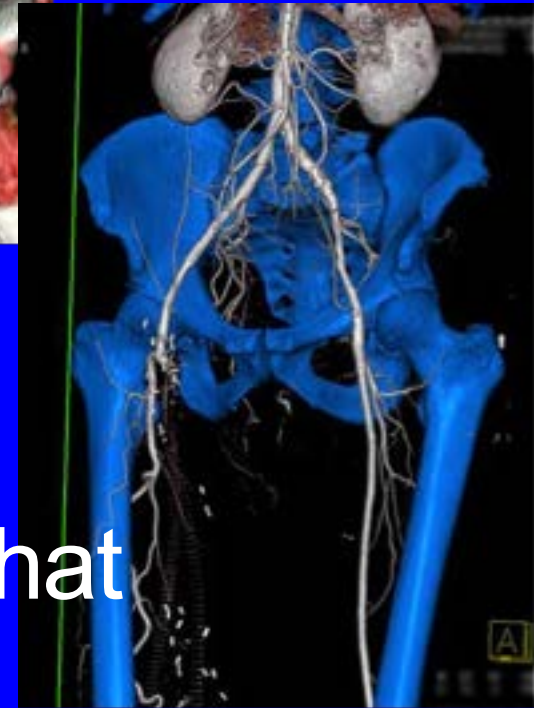
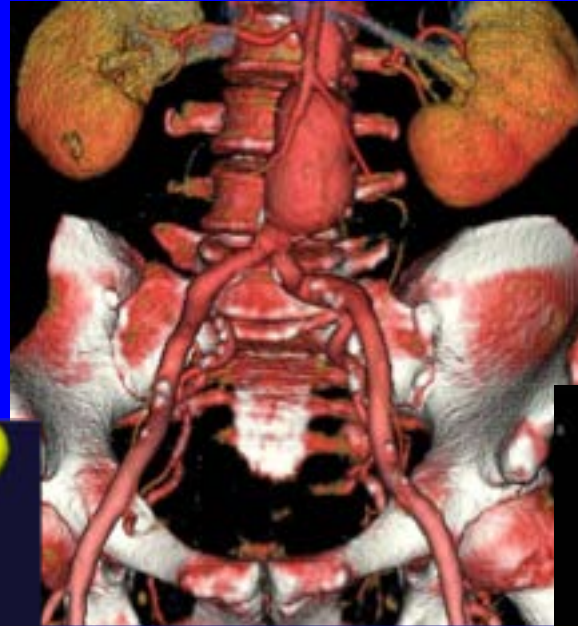
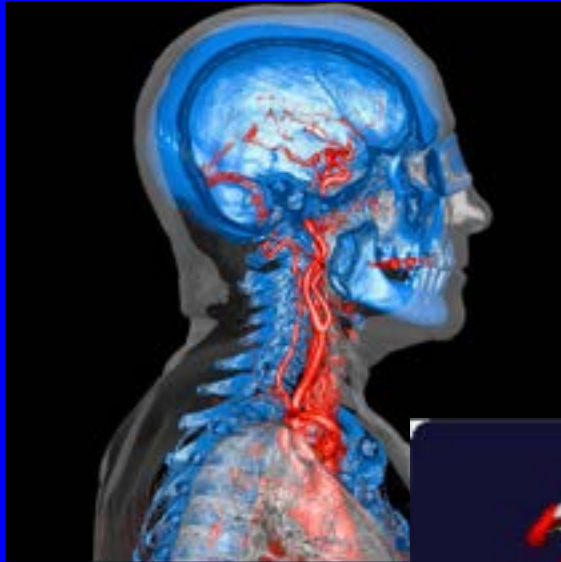
"X-rays will pro

100 years later

Lord Kelvin, President of



# Anatomical Digitization of the Patient



20 years after that

# Radiation Exposure

Occupational radiation exposure linked to left-sided brain tumors

[Roquin A. \*Am J Cardiol.\*](#)

[2013:doi:10.1016/j.amicard.2012.12.060.](#)

- Generational issue for practitioners
- Self-experimentation
- Increased cancer risk?
- New tools
- Guided therapy-combination of advanced imaging and interactive computer guided treatment.



# Guided Therapy: Linking Device Development and Usage with Advanced Imaging

1 billion transistors in the I-phone.  
I am using catheters, guided by 2-D fluoroscopy.  
The same as I was at the beginning of my career.



Hansen Medical's Magellan Robotic System for Vascular Interventions Gets FDA Nod

The FDA has given Hansen Medical (Mountain View, CA) the green light to bring the Magellan Robotic System domestically for peripheral vascular interventional procedures-510(k).

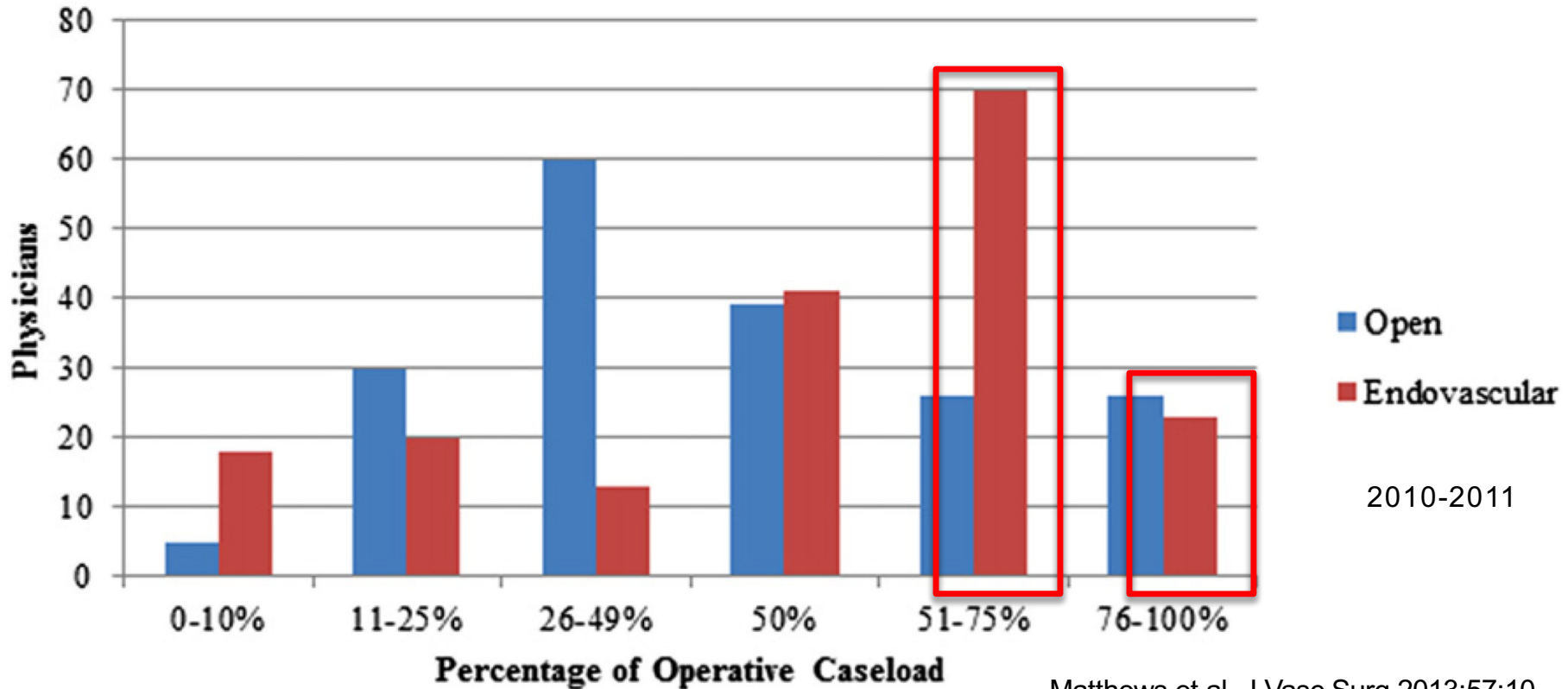
It received European approval about a year ago and is already being used by clinicians.

# Open Surgery

- We are “fix it” people.
- Open surgery will mostly go away in next 20 years.
- Trajectory of the last 20.
- Where next:
  - Femoral, most diffuse disease (TASC F),  
endo failures, hybrid procedures, emergencies
- Particular challenge for vascular surgeons
  - Our identity

# Trends in a changing vascular practice environment for members of the Society for Vascular Surgery

## Open vs Endovascular



Matthews et al. J Vasc Surg 2013;57:10

70% of those surveyed performed endovascular in  $\frac{1}{2}$  to  $\frac{3}{4}$  of their cases. Another 22% performed endovascular in  $\frac{3}{4}$  to all of their cases.

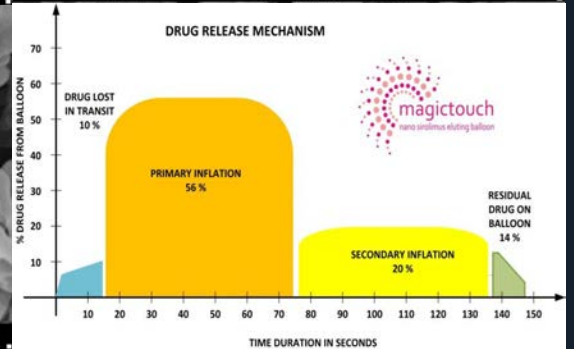
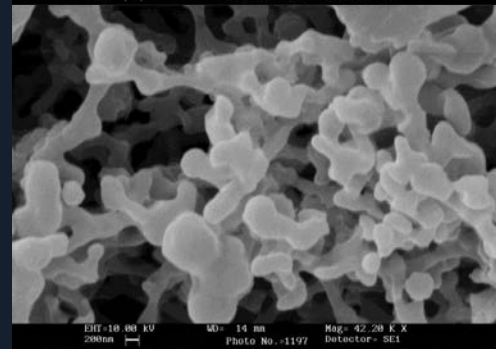
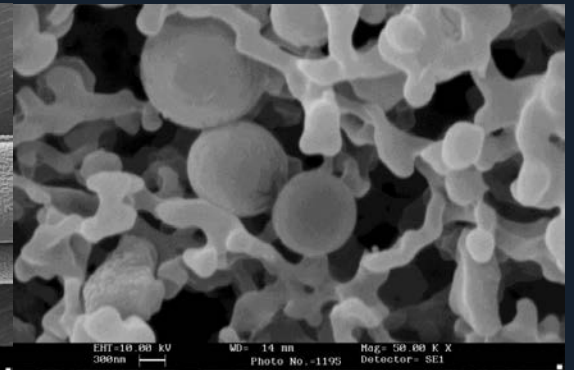
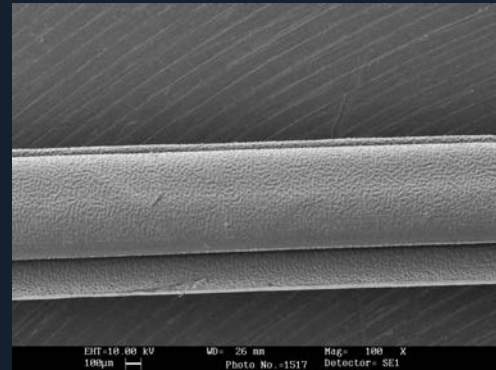
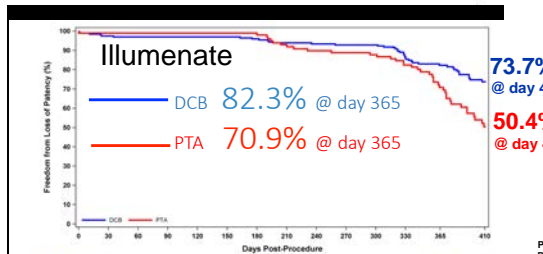
# Occlusive Disease-Era of Drug Delivery

## Pharmacology is natural next step

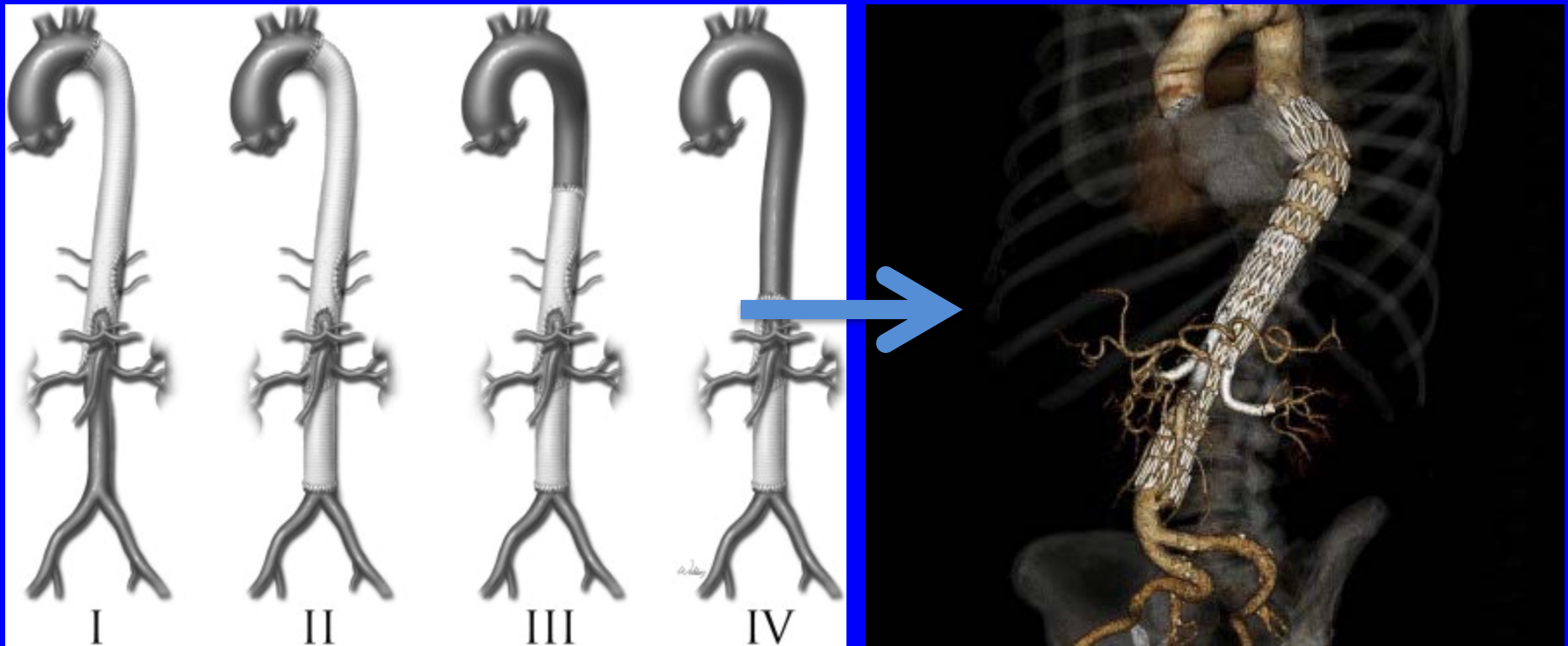
- Mechanical solutions have plateaued.
- Next leap is **Nanoparticle Polymer Free Sirolimus Coated Balloon Delivery Catheter**

### 12 Month Patency RCTs of DCB vs PTA

Lyden, TCT 2016



# Large Vessel-Total Relining for Aneurysm Disease Development of Branches



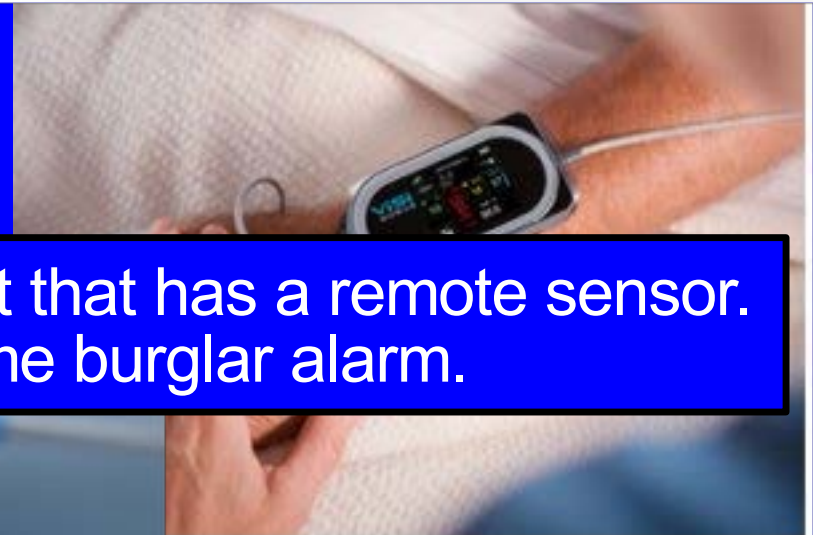
Ascending aorta, spinal cord and endoleaks (and cost) remain unsolved.

# Remote Monitoring

- 2018-CMS reimburses for remote monitoring
- Injectable oxygen sensor
- A watch that monitors heart rate and rhythm



# How to Transfer Existing Technologies to Medicine?



Imaging a bypass graft or stent that has a remote sensor. Monitored like on-star or a home burglar alarm.



## Top 10 Remote Patient Monitoring Companies for Hospitals

The top remote patient monitoring platforms by vendors offer hospitals advanced chronic disease management features and capabilities.

[Thomas Beaton](#)

mHealth Intel

July 07, 2017 - To enhance care delivery and improve patient outcomes for conditions that need constant surveillance, hospitals are increasing their use of remote patient monitoring solutions.

Integrated remote monitoring solutions with messaging and alert systems can let providers know when patients are in stable or critical conditions without the need for hospital room. Remote monitoring can improve the management of chronic diseases by measuring critical risk indicators such as glucose, blood pressure, etc. These devices can also provide patient-generated health data (PGHD) to physicians and keep patients informed on their health goals.

### **Biotronik, Biotronik Home Monitoring**

The cardiac home monitoring tools offered by Biotronik aim to replace unnecessary doctor's visits through early detection of cardiac health risks. Devices are equipped with an antenna and extra storage capacity that connects to a patient device called CardioMessenger. Through CardioMessenger, clinical data (e.g., vitals, health information) is collected, encrypted, and sent to a patient's provider.

### **Boston Scientific, Latitude NXT**

The Latitude NXT in-home patient monitoring system allows a healthcare team to monitor connected devices in-between primary care visits. Devices send data to providers at regularly scheduled times from blood pressure monitors, pacemakers, cardiac monitors, weight scales, and other connected health devices.

### **GE Healthcare, Apex Pro CH**

Apex Pro CH is a telemetry system offered by GE Healthcare that allows hospitals and other healthcare organizations to unify their monitoring systems under a single wireless network. Providers can monitor 438 patients under a coverage area, and allows access from multiple devices.

### **Honeywell, Genesis Touch**

The Genesis Touch device from Honeywell collects biometrics from patients to remotely located providers, and transmits them to a patient management dashboard. The device can host video visits, allow multiple providers access to a patient's vitals, and can be used with an optional 2-gigabyte data plan in lieu of a wireless network. The Genesis Touch also integrates with an oximeter, blood pressure monitor, and precision health scale.

### **Medtronic, Vital Sync**

Through the Vital Sync monitoring platform from Medtronic, providers can integrate physiological information from bedside monitors and wearable devices to a hospital server. Providers are able to set clinical protocols through mobile apps and devices, view patient information remotely, and receive alerts and updates to a mobile device.

### **Nihon Koden, Aware**

Nihon Koden's alarm management system allows hospitals to draw analytics from their monitoring parameters, and see detailed information about the types of patients and when patients experience health risks. Aware is intended to assist providers in identifying which alarms need the most attention.

### **Philips Healthcare, EncorePro 2**

Providers can use the EncorePro 2 to have all a patient's data presented in one convenient dashboard while automating routine sleep and respiratory settings. Changes in a patient's health data or condition are automatically updated on a smartcard that immediately updates a provider on any changes.

### **Spacelabs Healthcare, Xhibit**

The Xhibit remote monitoring platform allows providers to customize monitoring for specific patient needs through connected monitors, wearable health devices, and dashboards. With instant access to patient data, a provider is able to use a clinical suite to make data-informed decisions via monitoring-generated vitals, and determine if new care solutions are needed for said patient.

### **Abbott, Merlin.net**

The Merlin.net patient care network and the Merlin@home transmitter enhances provider communication with remotely monitored patients through follow-ups in care available for home-use and during travel. The transmitter uses the care network to transfer health information to a doctor without a visit can monitor a device daily between visits. St. Jude is also offering 2017 updates in security to the Merlin.net platform to further protect patient health data.



# AI, Big Data, Machine Learning

- Electronic medical record integrated with digitally collected data (EHR meets Google (fountain-of-youth project), Facebook, Amazon, IBM-Watson)
- Population management
- Assessment of seemingly random patterns
- Remote sensors and monitoring: real-time assessment

# Major Trends in Vascular Care

## Conclusion

- There is no conclusion; it's a process.
- Day-to-day seems the same; but the tectonic plates are moving.
- Dramatic new opportunities.

### **We are “Fix It” People**

- Provide full spectrum care, develop long-term relationships, and make a difference in our patients' lives; the goals are practical, dilemmas are intellectually stimulating, the procedures include multiple techniques, are anatomically based, aesthetically pleasing, and technically challenging, with many opportunities for innovation.

"Sapiens tackles the biggest questions of history and of the modern world, and it is written in unforgotably vivid language."

—JARED DIAMOND, *Pulitzer Prize-winning author of Guns, Germs, and Steel*

Yuval Noah Harari



# Sapiens

A Brief  
History of  
Humankind

*NY Times* best-selling author of  
*The 4-Hour Workweek*  
*Toys of Titans*

# TRIBE OF MENTORS

SHORT LIFE ADVICE  
FROM THE BEST IN THE WORLD

TIMOTHY FERRISS