



HOW DISRUPTIVE INNOVATION IMPROVES HEALTHCARE

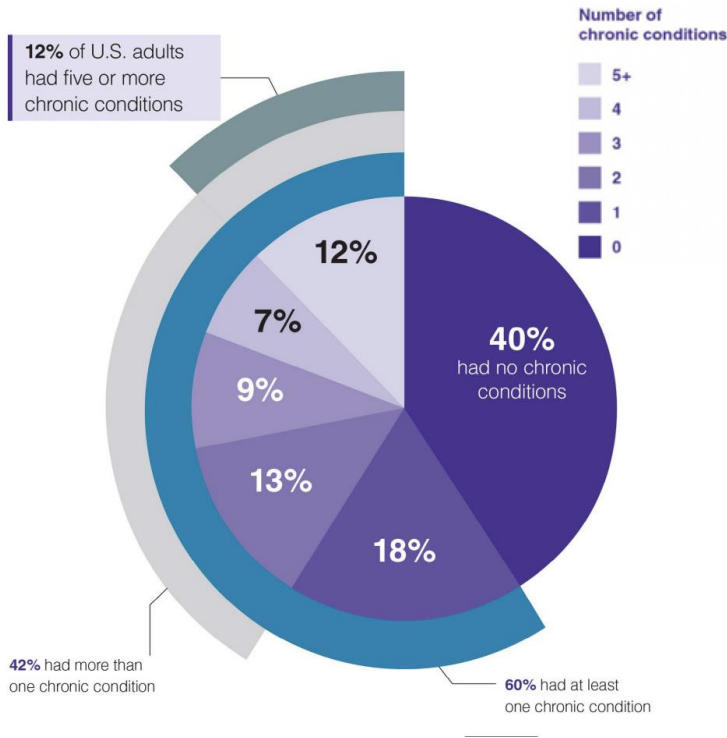
DAVID BARONE

February 27, 2019

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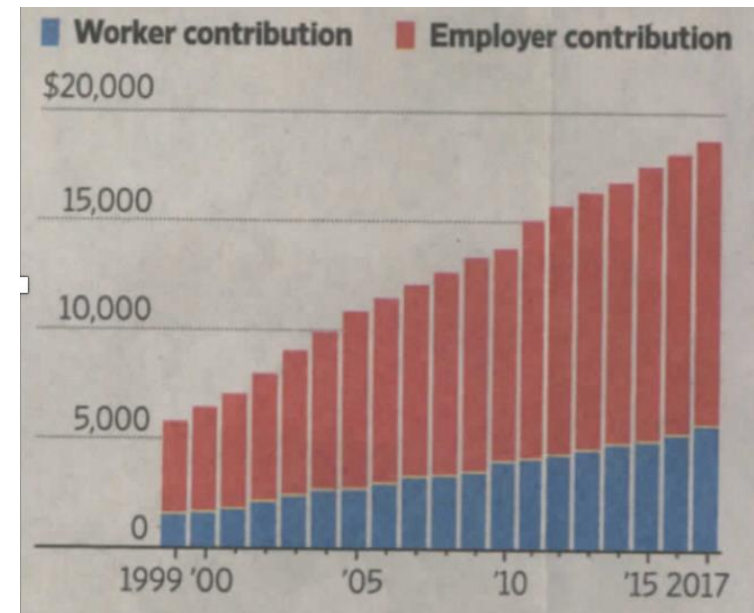
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Healthcare Costs and Premiums Continue to Increase



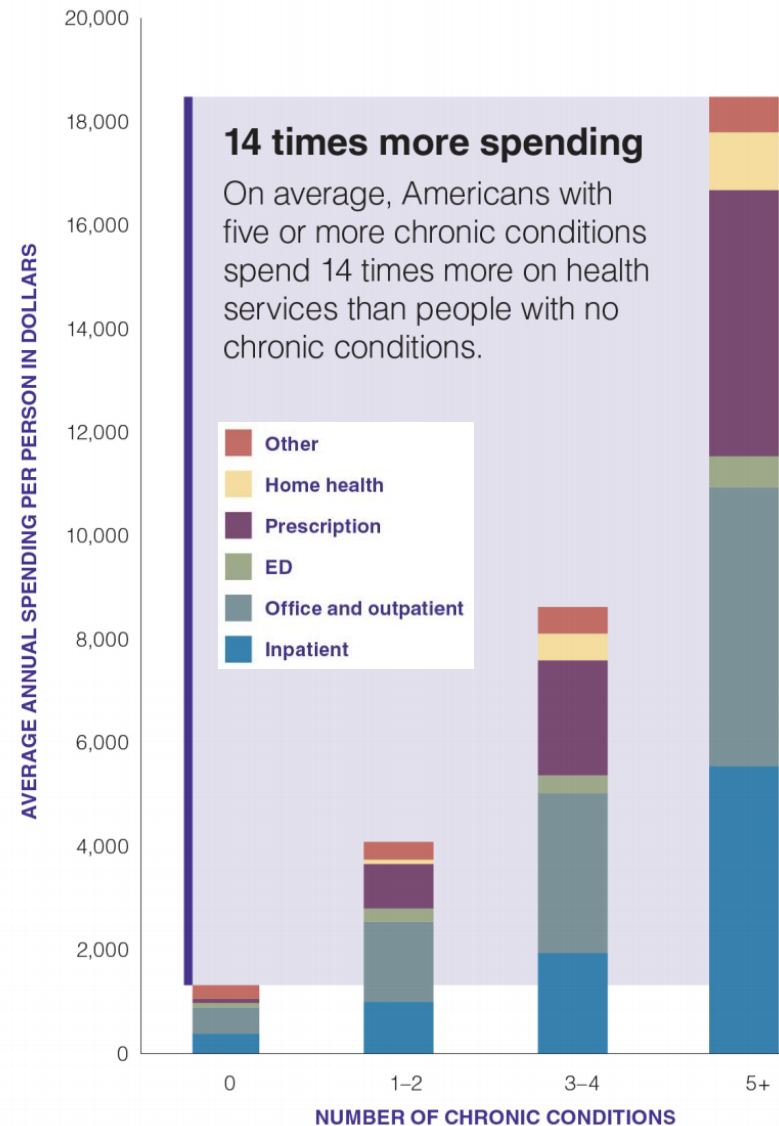
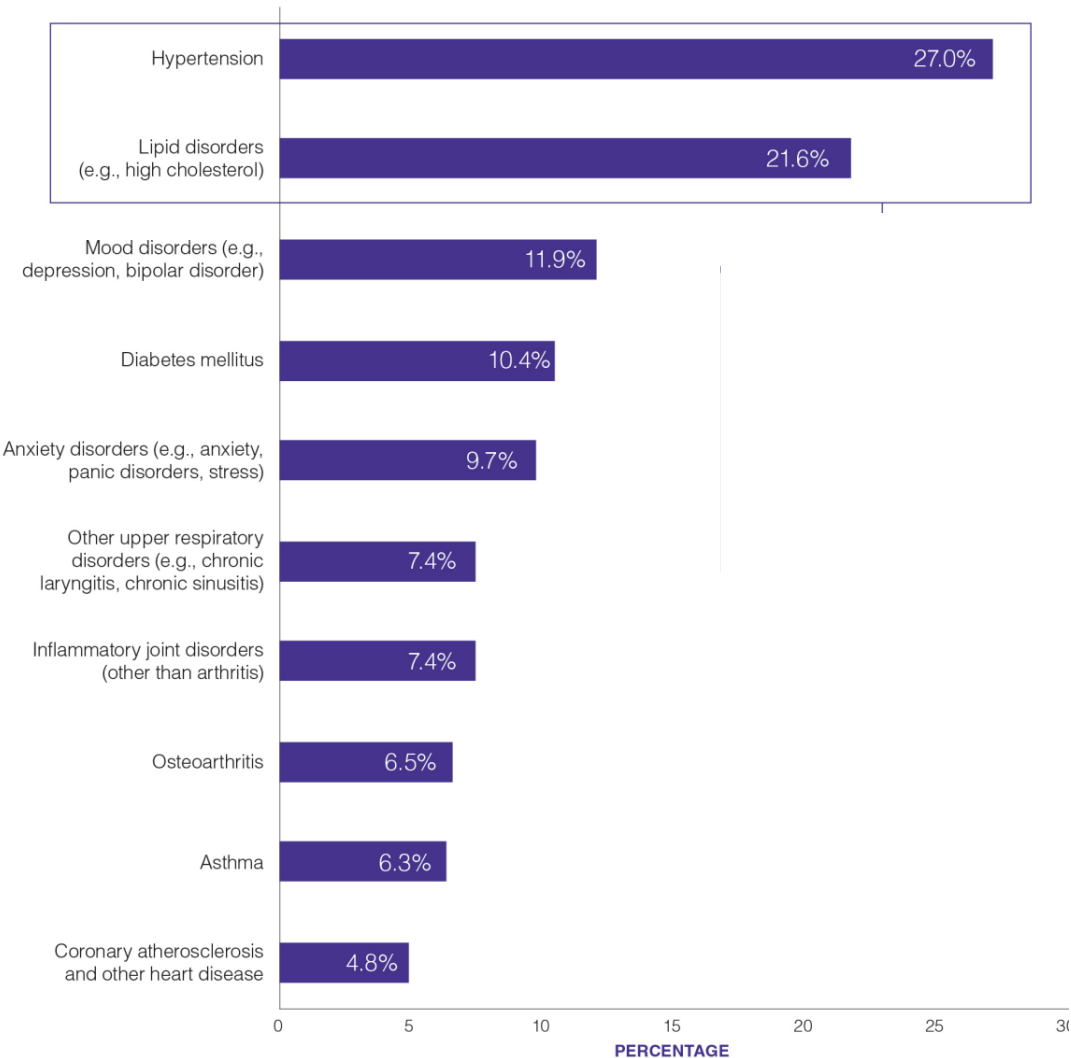
- 60% of adults have at least one chronic condition
- 42% - 2+conditions
- 65+ years - 80%

Average premium for family



Deductibles: >\$1,200 per person

The Challenge: Chronic Conditions



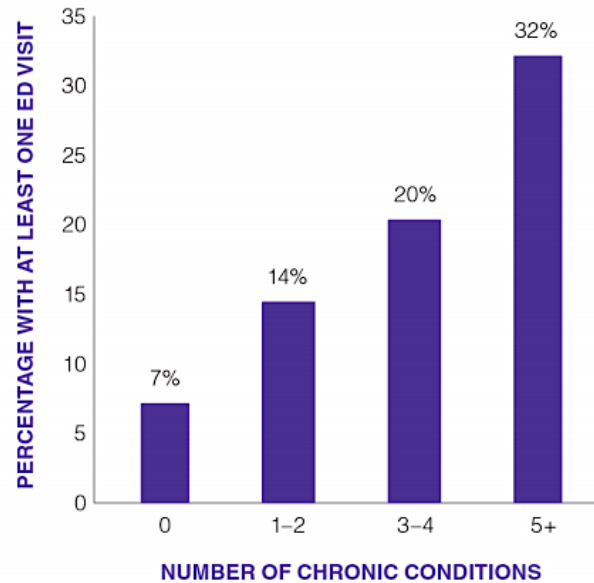
Source: Rand Corp., 2017

People with chronic conditions are responsible for 85% of total healthcare expenditures.

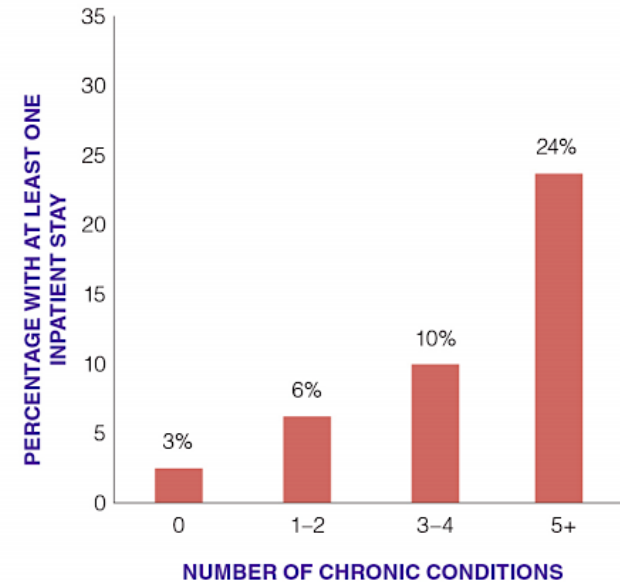
Americans with 5+ chronic conditions, which make up 12% of the population, account for 41% of total healthcare spending.

Source: Rand Corp., 2017

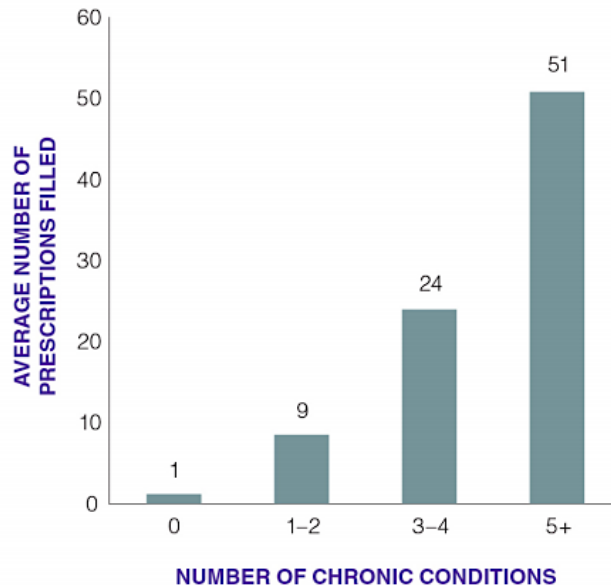
EMERGENCY DEPARTMENT VISITS



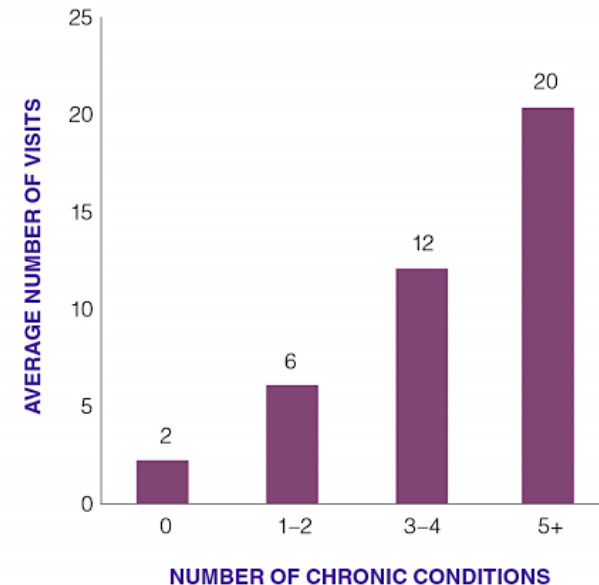
INPATIENT STAYS



PRESCRIPTIONS



OUTPATIENT VISITS



CMS' Vision (Seema Verma, CMS Administrator, 2018)



“We are moving to a system that rewards value over volume.”

“Start paying for value will foster innovation,
as providers look for ways to compete for patients by providing the highest quality care at the lowest cost.”

“Telehealth is changing the very face of healthcare.”

“Telehealth innovations could help usher in a new world of healthcare - embraced by both patients and providers, that identifies new avenues of care delivery, and improves the value of care by increasing its quality while lowering its cost.”

What Constitute Value?

“Value is measured by patient health outcomes per dollar spent.”

Quality improvements - examples:

- Prevention of illness
- Early detection
- Right diagnosis
- Right treatment to the right patient
- Rapid cycle time of diagnosis and treatment
- Start treatment earlier in the chain of disease
- Less invasive treatments
- Fewer complications
- Fewer mistakes and repeat treatments
- Faster and more complete recovery
- Less need for long term care
- Fewer recurrences
- Reduced need for ER visits
- Slower disease progression
- Less care induces illness

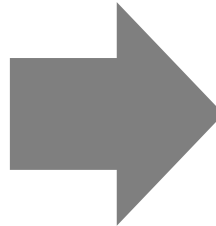
Shifting From 'Volume' to 'Value'

"Better health is inherently less expensive than poor health"

Michael Porter, Harvard Business School

Volume-Driven System

- Payments are based on fee-for-service
- Providers have incentives to increase payment rates, specialization, intensity and volume
- Providers assume limited financial risk
- Limited focus on outcomes and information sharing



Value-Driven System

- Focus on maximizing value (lower cost and higher quality) of health care
- Alignment of financial incentives and management of risk among providers
- Managing population health
- Care coordination / information sharing
- Investment in technologies supporting clinical integration, cost reduction and revenue enhancements

Implications of Shifting to 'Value'

- If a new payment pathway is required, it may take years to be secured.
- Data is the new currency.
- To consider a coverage change, payers want to see convincing data from randomized controlled clinical studies, including sufficient number of patients to be meaningful.
 - Relevant comparisons to standard practice
 - Improvements in care
 - Cost-efficient improvements

Medical technology companies waiting to think about reimbursement options until the product launch find themselves behind.

Changing the Traditional Landscape

High deductible health plans, intended to make consumers decision-makers in deciding about who to use for healthcare and how much to use expensive services and products.

New forms of collaboration / vertical integration:

- **Drug stores - insurance**
(CVS - Aetna)
- **Hospitals forming a new generic drug company** (Civica Rx)
- **Hospitals - insurance**
(Partners Healthcare - NHP)
- **Employers - insurance company**
(Amazon, Berkshire Hathaway and JP Morgan)

Technology Companies Entering Healthcare

- Digital technologies are adopted for monitoring functions and expanding to diagnosis and even to therapeutics.
- Enabling technologies
 - Telemedicine
 - Real time monitoring
 - Integration and analysis of data, including vital signs from multiple sources
 - Convergence of genomics, sensors and AI
- Examples
 - Warn patients they are getting ill
 - Remind / advise to take medications
 - Send alert to a nearby hospital
 - Use AI and 'deep learning' about someone's illness and normal behavior to pre-empt hospitalization by spotting when something is wrong.
 - Connect to wearable sensors, medical data, voice / stress recognition

- Technology companies - traditional medtech companies (Apple - Zimmer Biomet)
- New technologies are deployed (AI, big-data analytics, voice-based diagnosis...)
- Boundaries between consumer and medical products, and between consumer and medical channels are blurring



NHS vision:

Use Amazon's Alexa as a 'Virtual Medical Coach' to monitor patients with diabetes, asthma or depression in their own homes.

Already using speech recognition software to create 'mental health triage bot' that analyses someone's voice to detect emotion and suicidal ideas.

Digiceuticals - medical devices? (a new territory for the FDA, no established regulatory pathways).

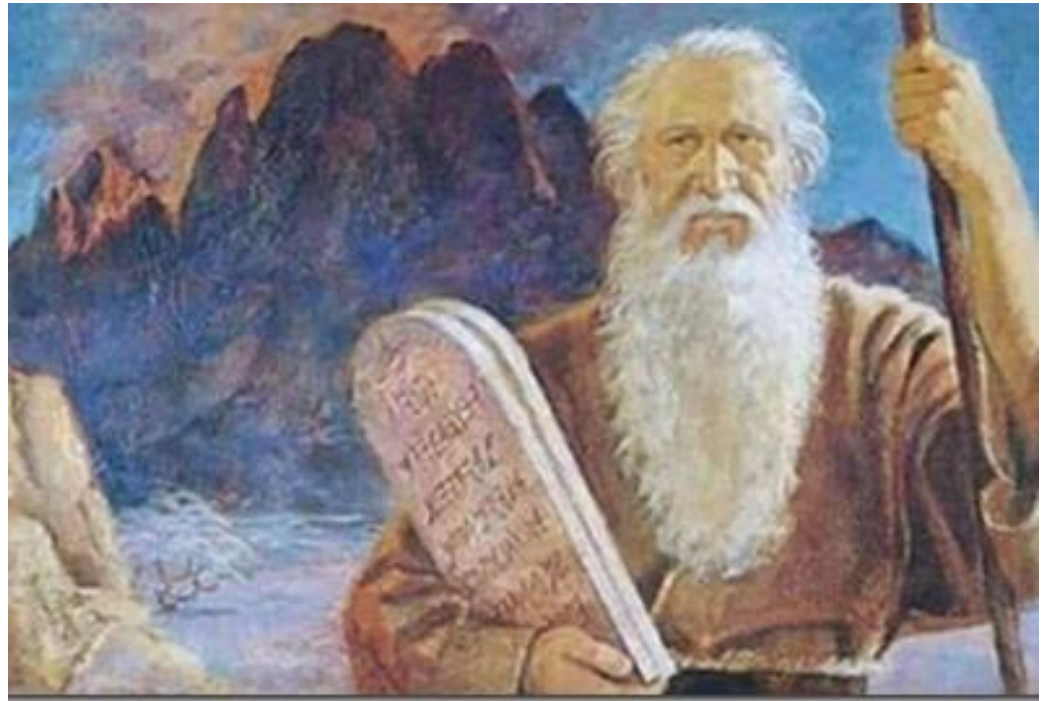
- Pear Therapeutics - software treating opioid abuse, FDA-approved (2018).
- Some digiceuticals will work better alongside conventional drugs.
- Opportunities for alliances between tech and pharma firms.

"What really amazed me as a healthcare technologist is just how easy it is to develop new skills (apps) for Alexa, and what the impact of this new app technology could be on healthcare as a whole. To say it's revolutionary is truly an understatement."



Novartis and Pear Therapeutics to develop digital therapeutics for patients with schizophrenia and multiple sclerosis

Moses, the first to download files from the cloud using a tablet.



- Investments in digital health (2017) - \$12B
- Large technology companies are increasing their involvement in healthcare deals
 - 2012: \$275M
 - 2017: ~\$3B

- The strategy of pushing a minimum viable product to market and then iterate improvements - which works well for technology apps - is generally ill-suited in healthcare, as incremental iterations strategy is much more difficult in healthcare.
- Digital health products - like all products targeting healthcare space - need to appeal to a complicated landscape of stakeholders who may have a say in whether a new technology is adopted.
 - Must be **scientifically proven**
 - Must be **medically relevant**
 - The innovation must be **commercially viable**
- Majority of companies starting as B2C had to pivot to B2B, selling to insurance companies, hospitals, employers or other healthcare providers.

Remote Physiologic Monitoring (RPM) Gaining Recognition

Over the last few years -

Providers have started to adopt RPM solutions, generally, on a small scale

- Lack of confidence in the quality of the data.
- Challenges integrating the data into established clinical workflow.
- Not clear as to how to act upon receiving the data.
- Limited reimbursement.

More recently -

The rapid development of technology is outpacing the capacity to implement novel RPM interventions

- Evidence demonstrating improved health outcomes with RPM interventions is still limited.
- Required up-front capital or manpower resources often delay purchase decisions.
- Designing new processes and training staff can take months.
- Few studies have demonstrated cost benefits.

Going forward -

RPM is gaining momentum

- Advent of clinical-grade technology
- Positive results from studies using wearables.
- More interest in reimbursing providers who use RPM technology.

2019 - New Coverage for Chronic Care RPM

CPT code 99453. Remote monitoring of physiologic parameter(s) (e.g., weight, blood pressure, pulse oximetry, respiratory flow rate); **set-up and patient education on use of equipment.**

CPT code 99454. Remote monitoring of physiologic parameter(s); device(s) supply with daily recording(s) or programmed alert(s) transmission, **each 30 days.**

CPT code 99457. Remote physiologic monitoring treatment management services, 20 minutes or more of **clinical staff/physician/other qualified healthcare professional time** in a calendar month requiring interactive communication with the patient/caregiver during the month.

With the new CPT codes, use of RPM is expected to realize significant growth over the coming years.

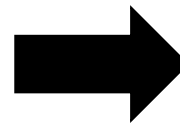
Hospitals and healthcare providers will use RPM and non- face-to-face technologies to develop new services.



Use of technologies to deliver medical services:

- Data storing / forwarding
- Two-way interactive video /e-consults
- Remote patient monitoring (RPM)

Necessity rather than a luxury

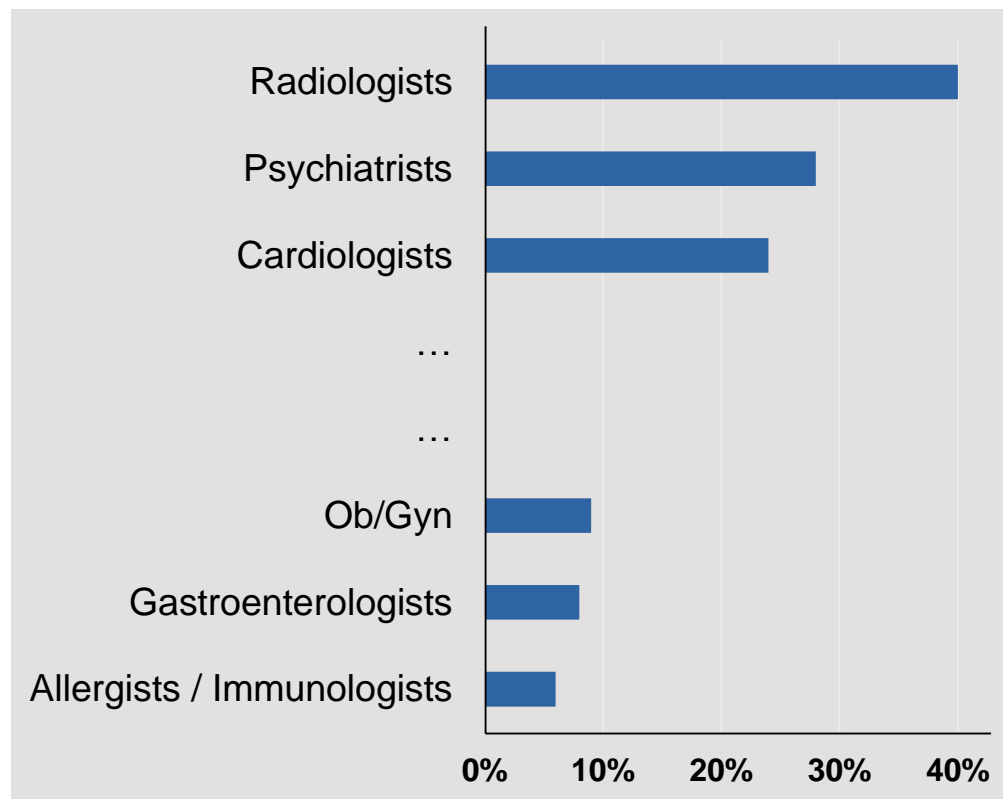


Drivers

- Skyrocketing costs
- Patients demand for better access
- Aging population
- Chronic conditions requiring around-the-clock care

Use of Telemedicine / Virtual Reality by Specialists (US)

- 15% of all practices already use telemedicine to interact with patients
- 11% of all practices use telemedicine to interact with other healthcare professionals
- Due to cost of implementation, use of telemedicine is less common in smaller and physician-owned practices



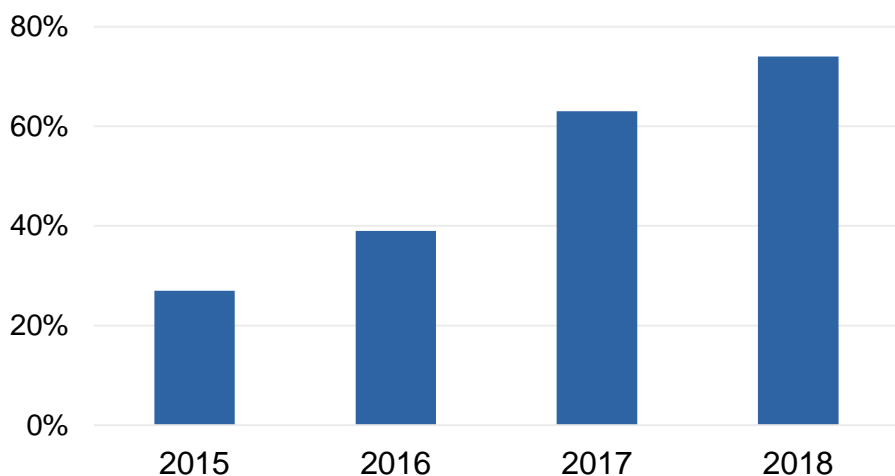
Data storing /forwarding:
radiologists

Videoconferencing:
emergency medicine, psychiatrists

RPM users:
cardiologists, nephrologists

Virtual Care is Already Beyond Early Adopters

~75% of large firms offer telemedicine as an employee health benefit



Source: Business Insider Intelligence

>90% of health systems plan to expand virtual care offering during 2019

Utilization by patients

- 2017: 0.7% of commercially insured
- 2019 (proj.) >10%
- ~50% mental health (no physical assessment is required)

Drivers

- Growing demand
- Efforts to reduce costs
- Removing restrictions (e.g., location of physician / patient)
- Shift care closer to patient's home
- Time saving

It's Time to Fire Your Doctor



INSIDE VIEW

By Andy Kessler

Barack Obama famously and falsely said, "If you like your doctor, you will be able to keep your doctor, period." But... what if you don't like your doctor?

Let's say you, like me, are one of the 20 million Americans who work for themselves—no boss, but also no corporate-tax deduction for health insurance. The smart move is to get a high-deductible insurance plan. Now it suddenly matters what doctors charge: \$500 to take your blood pressure and bang your knee with a rubber hammer, \$1,200 for a blood test that uses pennies worth of chemicals to tell you your hemoglobin levels are fine. Plus four months to get an appointment, and then the doctor asks you to fax an authorization. What? It's 2019. It's time to fire your doctor.

Like roughly half of American adults, I'm borderline: hypertensive, high cholesterol, though only "pre"-diabetic. A streak of misdiagnoses has led me and many others to take doctoring into our own hands. I do an annual blood test for \$199 through WellnessFX and get results on a smartphone app. A Bluetooth-connected cuff from Omron Healthcare tracks my blood pressure and even notes atrial fibrillation or irregular heartbeat. A Fit-

Beautyrest Sleeptracker tells me my REM sleep duration. My Apple Watch charts my resting pulse and does a simple electrocardiogram. The more data, the better.

When you do get sick, you still need to see a doctor—they have that prescription pad. But insurance companies tired of overpaying for five-minute doctor visits have begun setting up alternatives. Sutter Health runs walk-in clinics for \$129 a visit. Online care is cheaper, so Anthem Blue Cross encourages customers to use LiveHealth, a videoconference platform, for \$49. Aetna has a deal with Teladoc, a \$4.5 billion public company, for \$38 consultations. No pain meds, of course, but almost everything else.

Consumer-driven options have already changed nonvital care. After doing in-home teeth impressions, you can order orthodontic aligners for \$80 a month. For acne treatment, you can upload photos of affected areas and receive medicine by mail monthly. Technology is lowering costs and improving care on all fronts.

Technology has moved so fast that several smartphone-based platforms now function like Uber for doctors: Doctor on Demand, PlushCare, Amwell and MeMD are cutting into primary care. These are gig-economy doctors who provide care on demand for, well, gig-economy workers and others without employer insur-

upload my health stats and connect to my platform of choice 24/7, whereas just recently I could barely get a hold of my doctor by phone, let alone email or texts, because he couldn't get paid for that time, stuck in a 20th-century pay scheme.

Taking charge of your health care can be complicated and a bit scary for everyone, but it's doable for most. I'd stick with services that hire doctors from top medical schools. And here's a

Medical tech allows us to monitor health, get advice and seek care remotely and cheaply.

warning for hypochondriacs: Consult a real doctor and don't—*I repeat, do not*—Google your symptoms and convince yourself you have everything from diverticulitis to distomatosis.

If you're really sick you still need to see a specialist: urologist, gynecologist, gastroenterologist, otolaryngologist, pulmonologist, cardiologist. But by then you'll have blown through your high deductible, so that's what insurance is for anyway. And even the specialists will soon realize they can benefit from telemedicine to reduce in-office visits. For now, when you inevitably and repeatedly fill out the prescreening paper-

for the name of your care physician. I call "Dr. Webb."

Doctors don't see the real future of medical diagnosis. They see one patient at a time, a clever piece of clothing used by countless patients, the data that patients is needed for smart intelligence-based care. So why not collect more data from current or emerging technologies that can enable at-home vital sign monitoring and ECGs, easy glucose testing, blood tests to find early before symptoms appear, Alzheimer's screening, thyroid-stimulating hormone tests, even DNA tests that demonstrate a propensity for certain diseases.

Data, data, data—the more the better. As I write this, I have a Fantastic Voyage-like capsule near my stomach transmitting pH levels. How cool is that? As this technology progresses, more tests and more capsules will fill databases with personalized information.

The goal of these measurements isn't always to give a black-and-white diagnosis saying you have some disease or you don't, but to build data that can be analyzed over time. As more data is recorded, machine learning will allow programs to detect patterns of known disease progression, and flag them early when treatment is cheap and effective. The revolution is coming. But not from your



WSJ 2/11/2019

Going Forward - Continuing Adoption of Telehealth in 2019 and Beyond

- **The line between physical and virtual care will continue to blur**
 - Addressing the full spectrum from acute to post-acute to chronic and better life style
 - Expanding patient populations - behavioral health, cancer, home dialysis, substance abuse...
- **Growing body of evidence confirming the value of telehealth**
 - ROI, reduced cost, patient satisfaction, quality
- **AI as a viable and a valuable tool**
- **New players expanding to the telehealth market**
 - Retail (e.g., Best Buy acquisition of GreatCall)
 - Technology (e.g., Apple...)
- **Legislation supporting expansion of telehealth services**
 - Budget Act 2018 (Feb 2018) - telehealth payments for Medicare Advantage, ACOs, home dialysis, acute stroke
 - Patients and Community Act (Oct 2018)
 - State policies
 - CMS payments for RPM

Source: HealthLeaders, Dec 2018

