



# Achieving the Promise of Digital Health

## Are We There Yet? If Not, When... and How?

Robert M. Wachter, MD

Professor and Chair, Department of Medicine  
Holly Smith Professor in Science & Medicine  
Benioff Endowed Chair in Hospital Medicine  
University of California, San Francisco

@Bob\_Wachter

*Management of the Hospitalized Patient CME 2018*

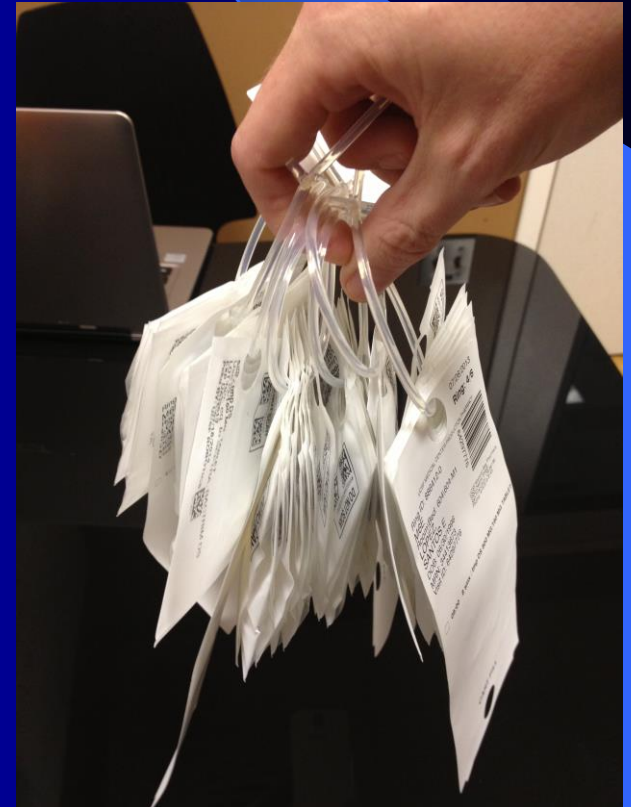
# Disclosures

- Royalties for writing/editing several books from Lippincott Williams & Wilkins and McGraw-Hill
- Stock options for serving on the board of Accuity Medical Management Systems (medical billing) and advisory boards of Amino.com (hospital quality website), PatientSafe Solutions (digital tool for nurses), EarlySense (patient monitoring), and Forward (primary care start-up)
- Stipend for serving on the board of The Doctors Company (medical malpractice insurer) and consulting for Commure (digital start-up)

*No companies or products mentioned in talk*

# Why I Decided to Explore Health IT

Amoxicillin 4mg po qd

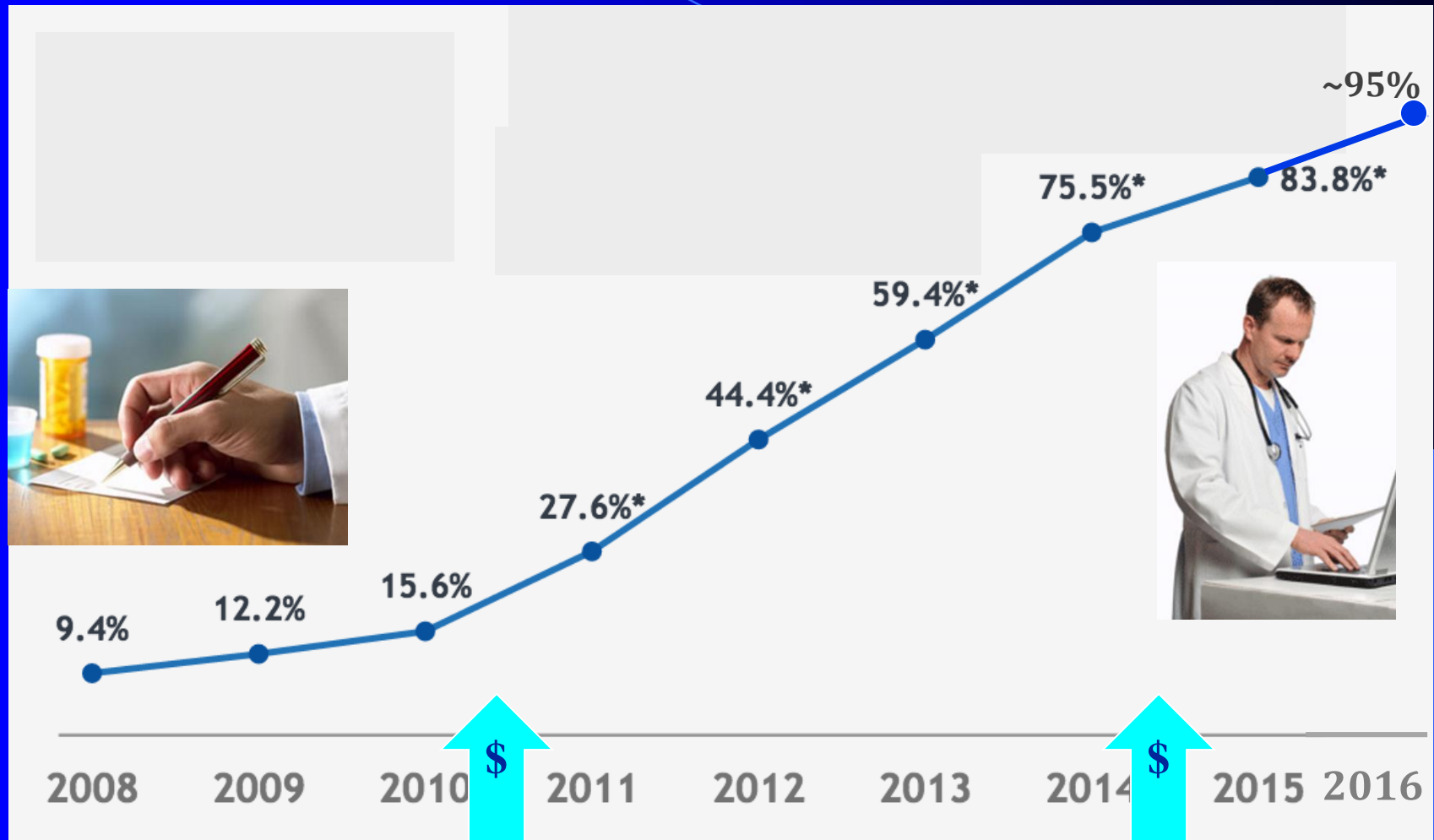




# **“The Challenge That Will Dominate Your Career...”**



# EHRs in US Hospitals, 2008-2016



**\$30 billion in federal incentives**

# **The Big Picture: Two Transformational Trends**

Pressure to  
deliver high-  
value care

*The Dominant Issue  
Today*

The digitization of  
the U.S.  
healthcare system

*Prediction: The Dominant  
Issue in 2025*



**WHAT COULD**

**POSSIBLY GO WRONG?**

MemeCenter.com

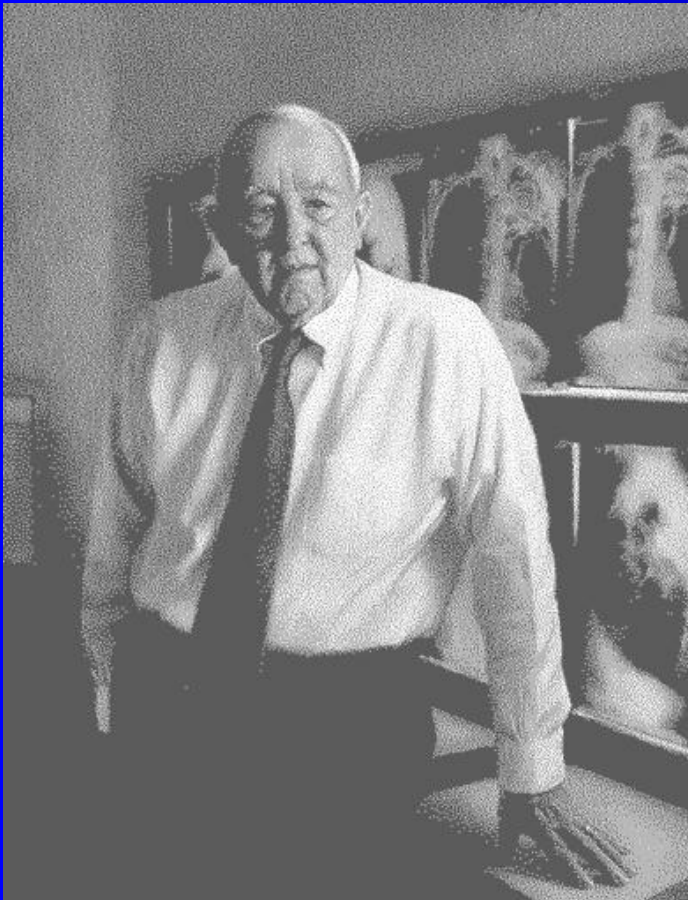


# A 7-year-old Girl's Depiction of her MD Visit





# The Demise of Radiology Rounds



“The man who ruined radiology”  
– Paul Chang’s dad

# Digital Radiology as the Canary in the Coal Mine

- The digitization of the thing creates the opportunity for infinite distribution (at no cost)
- Social relationships and communication patterns that previously depended on gathering around the thing will wither
- Power relationships mediated by who controls the thing will be renegotiated
- Now we're not talking about the film, but rather the entire medical record



# 2014 Advertisement For AZ ER Job

**Arizona General Hospital** will be coming to The Grand Canyon State later this year!! Located in Laveen, Arizona, a suburb of Phoenix, **Arizona General Hospital** is a 40,000 square-foot boutique general hospital.

*Services offered include:*

- Emergency Room
- Radiology Suite inc. CT, X-Ray, and Fluoroscopy
- Two State-Of-The-Art Operating Rooms
- Outpatient Surgery
- 16 Inpatient Rooms
- NO ELECTRONIC MEDICAL RECORD**



**LESSONS**

**LEARNED**

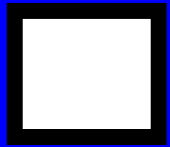




# The Four Stages of Health IT

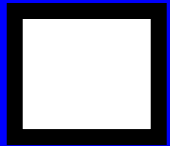


1. Digitizing the record



2. Connecting the parts

- a. PCPs to Hospitals, Hospitals to Hospitals, etc.
- b. Third-party apps to enterprise systems
- c. Patient-facing systems to enterprise systems



3. Gleaning meaningful insights from the data



4. Converting these insights into action that improves value

# The Productivity Paradox of Information Technology: Review and Assessment

**Erik Brynjolfsson**

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Center for Coordination Science  
MIT Sloan School of Management  
Cambridge, Massachusetts



*“You can see the computer age everywhere except in the productivity statistics.”*

-- Nobel Prize winning economist Robert Solow, 1986



# The Two Keys for Unlocking the Productivity Paradox

Improvements  
in the  
technology



Reimagining  
the work  
itself

# Why Health IT May Finally Be Entering a New Phase



- Winners in EHR derby: healthcare-specific companies, good at collecting data & moving it around
  - At the ready when healthcare went digital, 2010-15
  - But *not* expert in consumer IT, user interface, big data, AI, cloud computing, communication, visualization....
- Now: more open architecture, better interoperability, advances in AI, big \$\$ from VCs & digital companies
- Starting to see examples of “re-imagining the work”
  - Three examples: clinical documentation, a modern infection control sleuth story, rethinking subspecialty “consultation”

# The Physicians' Case: A Brief History

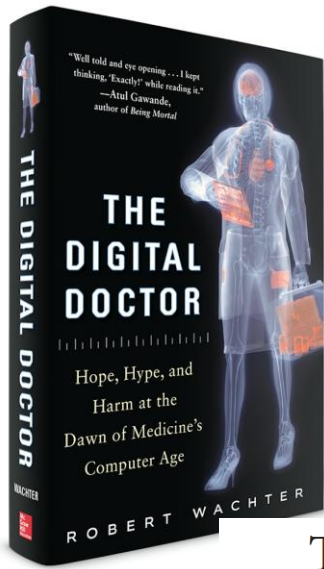
*There were exacerbations of the fever; the bowels passed practically nothing of the food taken; the urine was thin and scanty. No sleep... About the fourteenth day from his coming to bed, after a rigor, he got hot; wildly delirious, shouting, distress, much rambling, followed by the coma came on at this time.*

**LEVEL 1 NOTE**

*Thirty-fourth day. Death.*

Case of Apollonius of Abdera,  
5<sup>th</sup> century BCE, Greece





The combination of all the checkboxes, templates, and copy and paste has led to notes that are so loaded with bilge—much of it of questionable utility and some of it of questionable veracity, as you'll see—that, while the billers may be overjoyed, clinicians cannot do their work. One physician told me about caring for a desperately ill patient in an ICU. Each day's note was brimming with nonsense, most of it cloned from the prior day's note. Lacking MS Word's "Compare Documents" function, he came up with his own ingenious way of figuring out what had happened to the patient in the prior 24 hours: he printed out the current day's note and the prior day's note (each over a dozen pages long), and held one over the other against a bright window in the ICU. This method allowed him to pinpoint the couple of paragraphs in the lengthy document that had changed overnight. It was his only way of seeing what was going on.

# The New York Times

## *A Busy Doctor's Right Hand, Ever Ready to Type*

By KATIE HAFNER JAN. 12, 2014



Dr. Marian Bednar, an emergency room physician in Dallas, left, with Amanda Nieto, 27, her scribe and constant shadow. Mark Graham for The New York Times

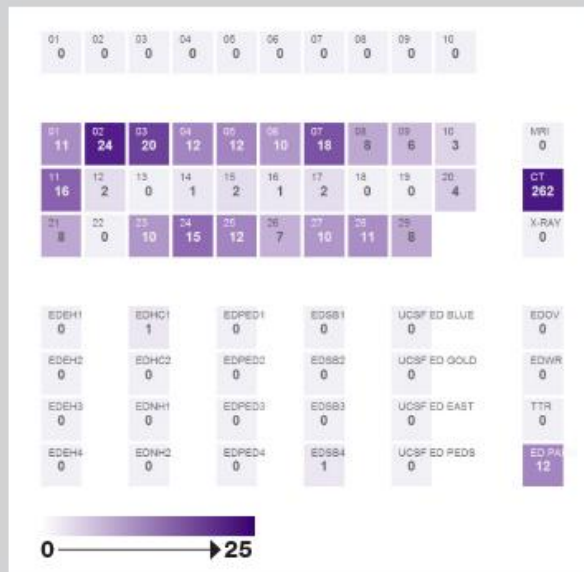
DALLAS — Amid the controlled chaos that defines an average afternoon in an urban emergency department, Dr. Marian Bednar, an emergency room physician at Texas Health Presbyterian Hospital Dallas, entered the exam

# The Note of the Future

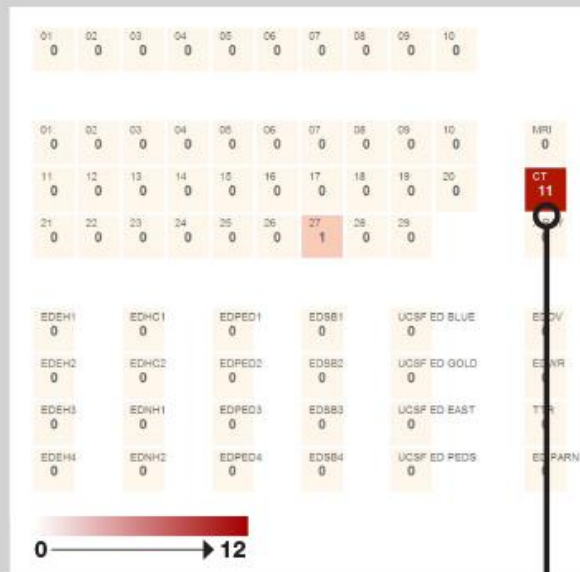
- Created via natural MD-patient conversation, likely via a “digital scribe”
  - Several start-ups, plus tech giants, working on this
- Relevant historical data brought forward
- Part-Facebook Wall, Part-Twitter feed, with Wiki-like elements
- Artificial intelligence comes to medicine
  - Likely dx’s listed, along with suggested care paths and key questions/uncertainties to address
    - “Patients like this turned out to have....”
    - “Your patient should be afebrile by now. Rethink the dx...”



# Mapping of *C. difficile* Transmission



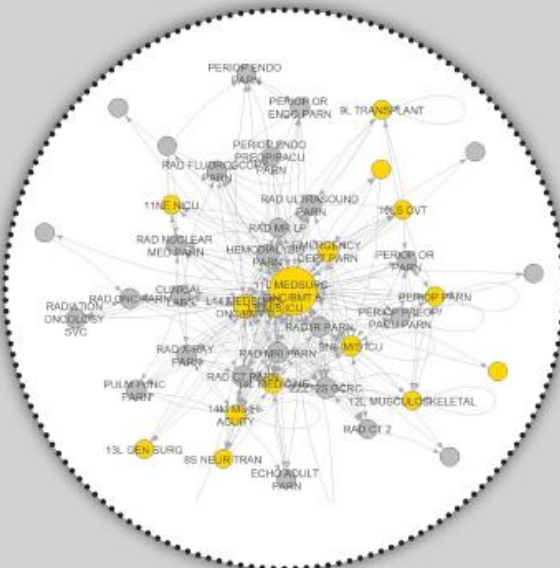
# of patients "EXPOSED" in  
Emergency Department rooms



# of "EXPOSED" patients who develop  
*C. difficile* in the Emergency Department



Where do *C. difficile*  
patients travel within  
the hospital?



**RESULTS:**  
Improvements in cleaning  
practices were rapidly  
implemented



Sara Murray

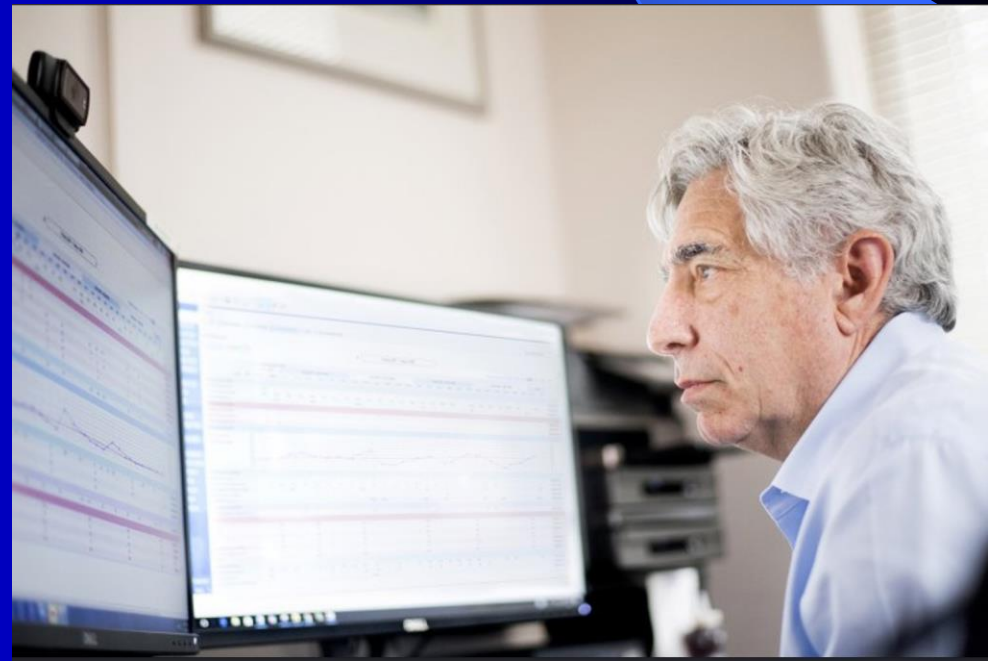
Murray S. *JAMA*  
*Internal Medicine*,  
Dec 2017

# Scaling the Knowledge of Specialists Using Digital Tools

- In the old days, generalists caring for patients obtained specialty consults if needed for additional knowledge/insight
  - Underground economy in “curbside consults”
- One bit of reimaging: at UCSF, eConsults obviated ~20% of outpatient consults
  - Higher satisfaction for all, better access
  - None of the heavy lifting was technical
  - Didn’t come out of the box from Epic

# More Scaling of Expertise: An Inpatient Glucose Mgmt Service

- At 6am every day, sitting in his home, diabetologist Rob Rushakoff reviews data for every UCSF Medical Center inpatient meeting certain criteria:
  - Type 1 diabetes
  - Insulin pump
  - 2 or more glucoses above 225
  - Any glucose  $< 60$







**“I got Rushakoffed!”**



## Association Between a Virtual Glucose Management Service and Glycemic Control in Hospitalized Adult Patients: An Observational Study

Robert J. Rushakoff, MD; Mary M. Sullivan, DNP; Heidemarie Windham MacMaster, PharmD; Arti D. Shah, MD; Alvin Rajkomar, MD; David V. Glidden, PhD; Michael A. Kohn, MD, MPP

**Results:** The proportion of hyperglycemic patients decreased by 39%, from 6.6 per 100 patient-days in the pre-vGMS period to 4.0 per 100 patient-days in the vGMS period (difference, -2.5 [95% CI, -2.7 to -2.4]). The hypoglycemic proportion in the vGMS period was 36% lower than in the pre-vGMS period (difference, -0.28 [CI, -0.35 to -0.22]). Forty severe hypoglycemic events (<2.2 mmol/L [ $<40$  mg/dL]) occurred during the pre-vGMS period compared with 15 during the vGMS period.



In the time it used to take him to do *one* endocrine consult, Rushakoff is improving care of diabetics (& education about diabetes care) for the entire inpatient population

