e-Health:
Technology's impact on today's physician

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9/9/2016

Disclosures

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ରେ None

Learning objectives

Ↄↄ Explain how e-Health is impacting physicians

Ↄↄ Evaluate the use and spread of Telehealth

Ↄↄ Illustrate how Web-Based marketing alters patient engagement

Ↄↄ Recognize the basic concepts of Health Information Exchange (HIE)

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What is e-Health

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- e-health is an emerging field in the intersection of **medical informatics**, **public health** and **business**, referring to health services and information delivered or **enhanced through the Internet** and related technologies. [1]

- A study in 2005 found 51 unique definitions[2]

1.J Med Internet Res. 2001 Apr-Jun; 3(2): e20
2. J Med Internet Res 2005;7(1):e1

The Smartphone Impact

ⅭⱫ

ⅭⱫAltering how the brain functions due to "constant external data source"
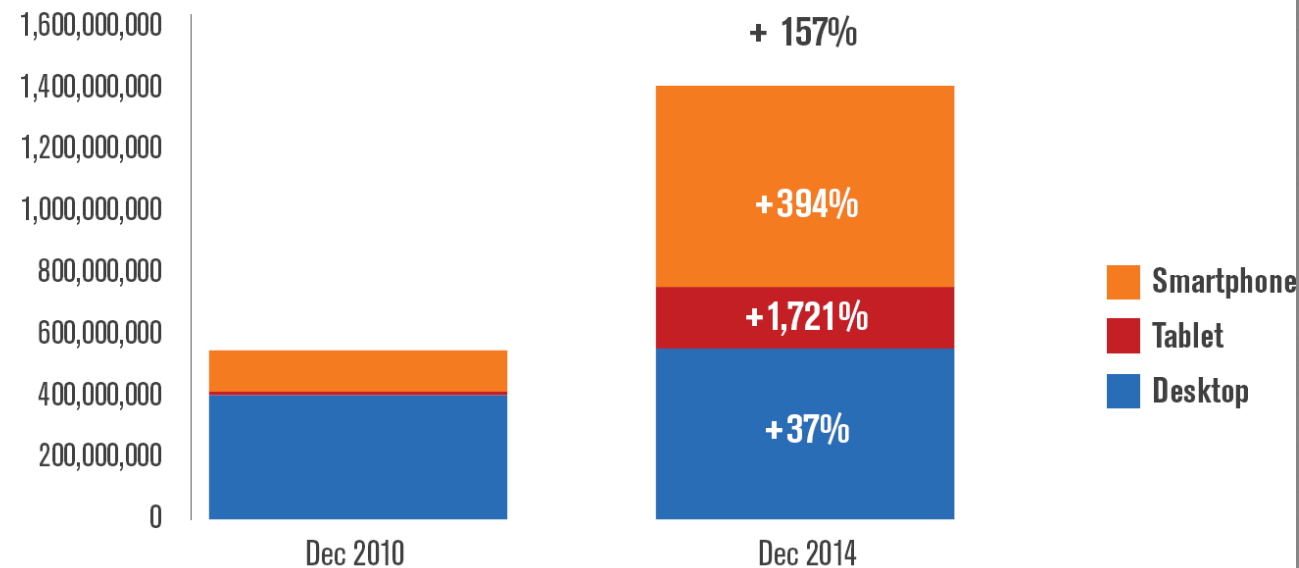
Digital Media Access Platforms

Total Digital Media Time Spent by Platform

Source: **comScore Media Metrix Multi-Platform** & **Mobile Metrix**, U.S., Dec 2014 / Dec 2010
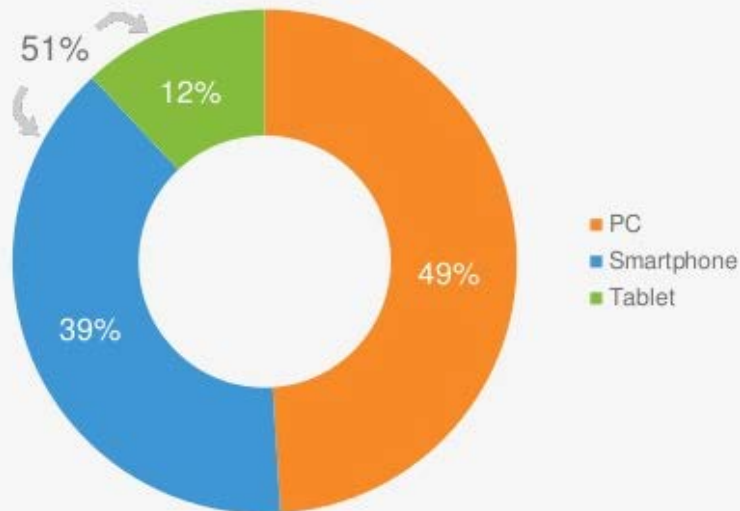
Online time by platform
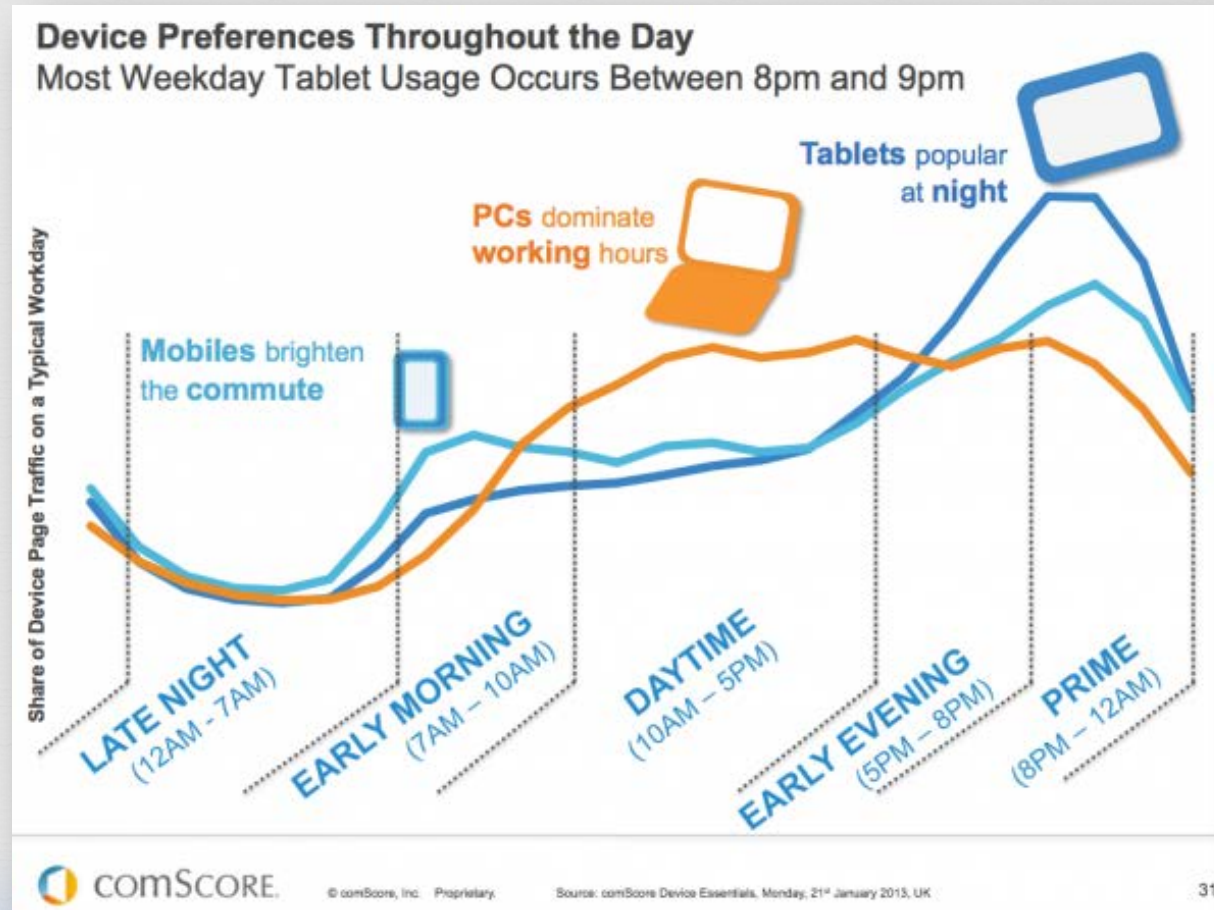

Half of All Time Spent Online is On Mobile Devices

Devices used throughout the day

Impact on Health IT

ↈ Mobile applications for most EHR's

ↈ MOC changes for ABIM

ↈ Mobile Sensors

ↈ Telemedicine boom

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Telehealth

Telehealth

—— ❧ ——

 AKA Telemedicine, Tele____(insert specialty)

 Simple definition
 "Use of telecommunication technology to enhance healthcare"

 Three trends
 Access and convenience
 Began with acute care, but growing in chronic care management
 Migration from hospital and satellite clinics to the home

Policy Recommendations to Guide the Use of Telemedicine in Primary Care Settings: An American College of Physicians Position Paper

Hilar... American College of Physicians*

Type of Telemedicine	
Asynchronous	...n wrist are sent off site to an orthopedist for ...t needs surgery
Synchronous	...ight for e-visits in which patients can ...a Webcam and be "seen" for acute health ...e physicians connects patients at a ...2-way video with physicians at a remote
Remote patient monitoring	...edication and uses a monitoring device ...ourse of a week. The information is ...who determines whether the patient ...up
Mobile health care services	...es to confirm appointments with

Table. Types of...

* "Store and forward."

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Michael E. DeBakey VA Medical Center - Houston, Texas

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"Health Buddy" Technology Prods Veterans to Live a Healthier Lifestyle

February 23, 2009

Care Coordinators Crystal Tabangay, R.N., B.S.N. (left) and Omana Simon, F.N.P.-B.C. discuss the benefits of the Health Buddy with Marine Veteran Alonzo Pouncy. Veterans with chronic conditions such as diabetes, high blood pressure, chronic obstructive pulmonary disease, and heart failure can be monitored at home using special telehealth technologies provided to them by the Michael E. DeBakey VA Medical Center. Photo by Fran Burke, Public Affairs Specialist

Tele-stroke Services

- Logistical solutions--Empower EMS with mobile devices to calculate a RACE or NIHSS prior to arrival.
- STEMI services
- Specialists on Call
  - In just 15 years, telestroke became mainstream, and the largest care provider for patients with stroke in the country is now not a major medical center but a telemedicine company (n engl j med 375;2 nejm.org July 14, 2016)
  - Provide 24/7 PRN neurology input for TPA recommendations
  - Also provide Telepsychiatry and Teleintensivist services

pulsara

Specialists On Call

- Largest provider of specialty telemedicine care since 2007
- First telemedicine provider to achieve TJC accreditation
- Over 350 hospital clients
- 200,000 neurology consultations
- 250 tPA cases per month for acute ischemic stroke

SPECIALISTS ON CALL
Stronger Hospitals – Better Lives

IS TELENEUROLOGY REPLACING THE NEUROLOGIST?

BY ORLY AVITZUR, MD

ARTICLE IN BRIEF

Neurologists are concerned that telemedicine — originally conceived to provide better access to stroke services in rural and inaccessible locales — may be used to cut costs and neurologists' jobs.

DR. LEONARD DASILVA: "We're contracted by the hospitals because they don't have neurologists on staff, or because their neurologists have not agreed to take call, or because they weren't responding in a timely manner, and the hospital was unable to achieve stroke center status or maximize potential tPA patients."
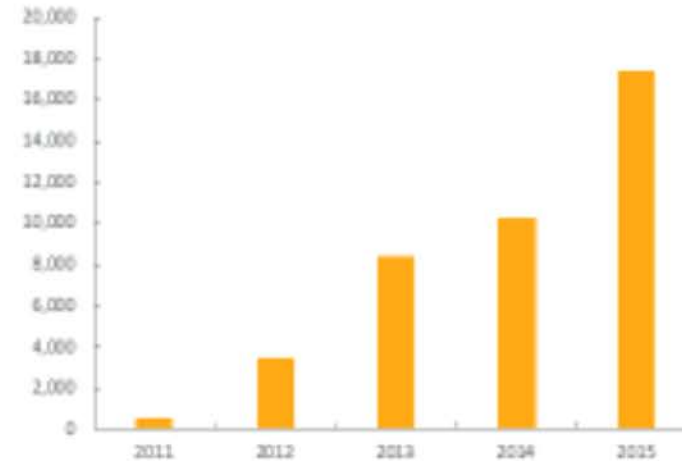
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A Decade of Clinical Excellence

Neurology: 200,200 Consults To-Date
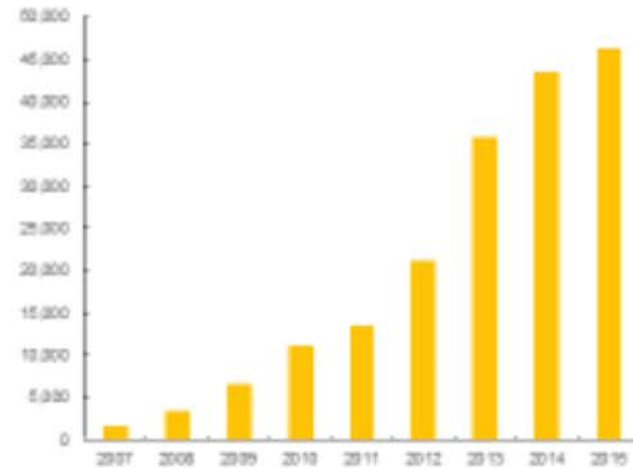
Psychiatry: 50,000 Consults To-Date

<2% Bleed Rate for tPA Stroke Cases

>2,000 Cumulative Years of Clinical Experience

IVC Reversal Rate >40% Across the SOC System

SPECIALISTS ON CALL
Stronger Hospitals – Better Lives

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Virtual Visits

Florida House of Representatives

CS/SB 1646 - Telemedicine

General Bill by Communications, Energy, and Public Utilities and Health Policy

Telemedicine: Creating the "Florida Telemedicine Act"; requiring specified practitioners providing telemedicine services to patients in this state to be licensed in this state; authorizing nonFlorida licensed physicians to meet alternative requirements; providing standards and prohibitions for the provision of telemedicine services; authorizing the use of telemedicine services in the diagnosis and treatment of the human eye; prohibiting a managed care plan under Medicaid from using telemedicine providers that are not physicians, etc.
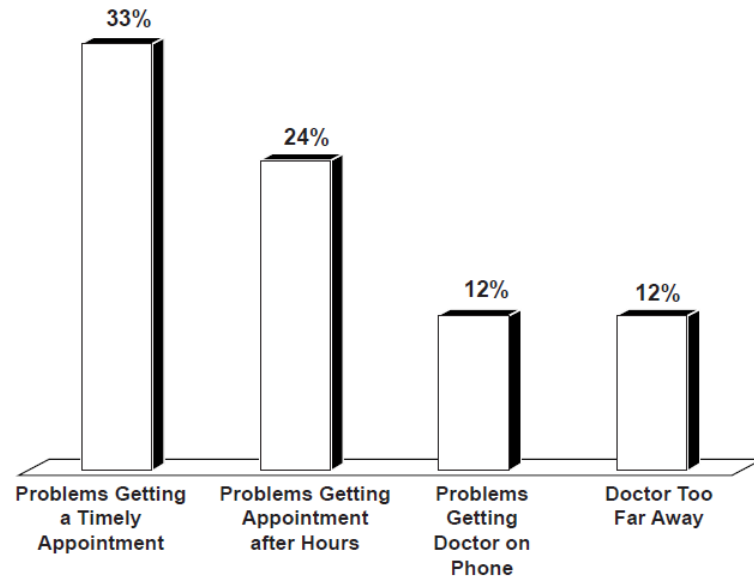
Effective Date: 10/01/2014

Last Event: 05/02/14 S Died in Appropriations on Friday, May 02, 2014 10:39 PM

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Why Telemedicine?

FIGURE I

Patient Barriers to Physician Care

33% — Problems Getting a Timely Appointment
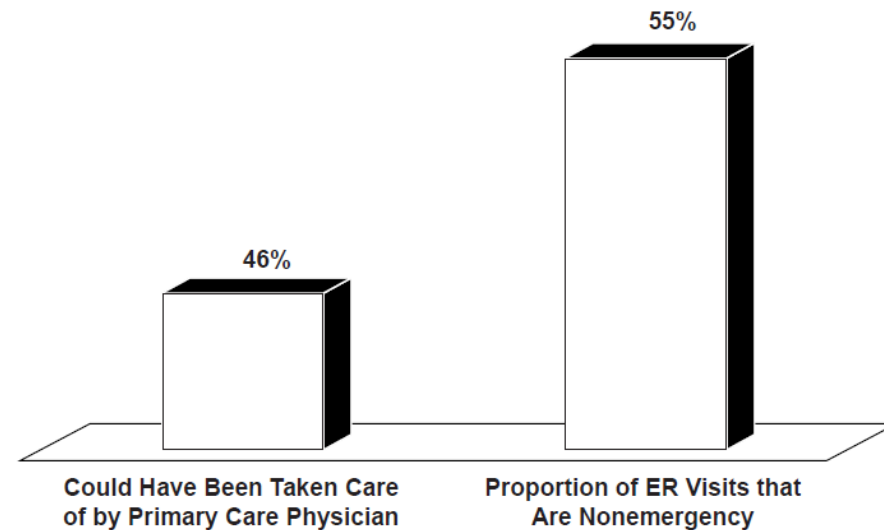24% — Problems Getting Appointment after Hours
12% — Problems Getting Doctor on Phone
12% — Doctor Too Far Away

Source: Bradley C. Strunk, Peter J. Cunningham, "Treading water: Americans' Access to Needed Medical Care, 1997-2001," Center for Studying Health System Change, Tracking Report, Vol. 1, March 2002.

FIGURE IV

Unnecessary ER Visits

46% — Could Have Been Taken Care of by Primary Care Physician
55% — Proportion of ER Visits that Are Nonemergency

Source: "Overuse of Emergency Department among Insured Californians," California HealthCare Foundation, October 2006; and "Addressing the Problem of Low Acuity Non-Emergent ER Visits," Mercer Human Resources Consulting, January 2006.

Telemedicine

- Cost
- e-prescriptions
- 24 hours a day
- Sensors
- Fully licensed and insured

- It takes an average of 20 days to secure a 20-minute appointment with a physician that with travel and wait time consumes 2 hours.

Ray KN, Chari AV, Engberg J, Bertolet M, Mehrotra A. Disparities in time spent seeking medical care in the United States. JAMA Intern Med 2015; 175: 1983-6.

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Growth and popularity

Telehealth in growth mode worldwide
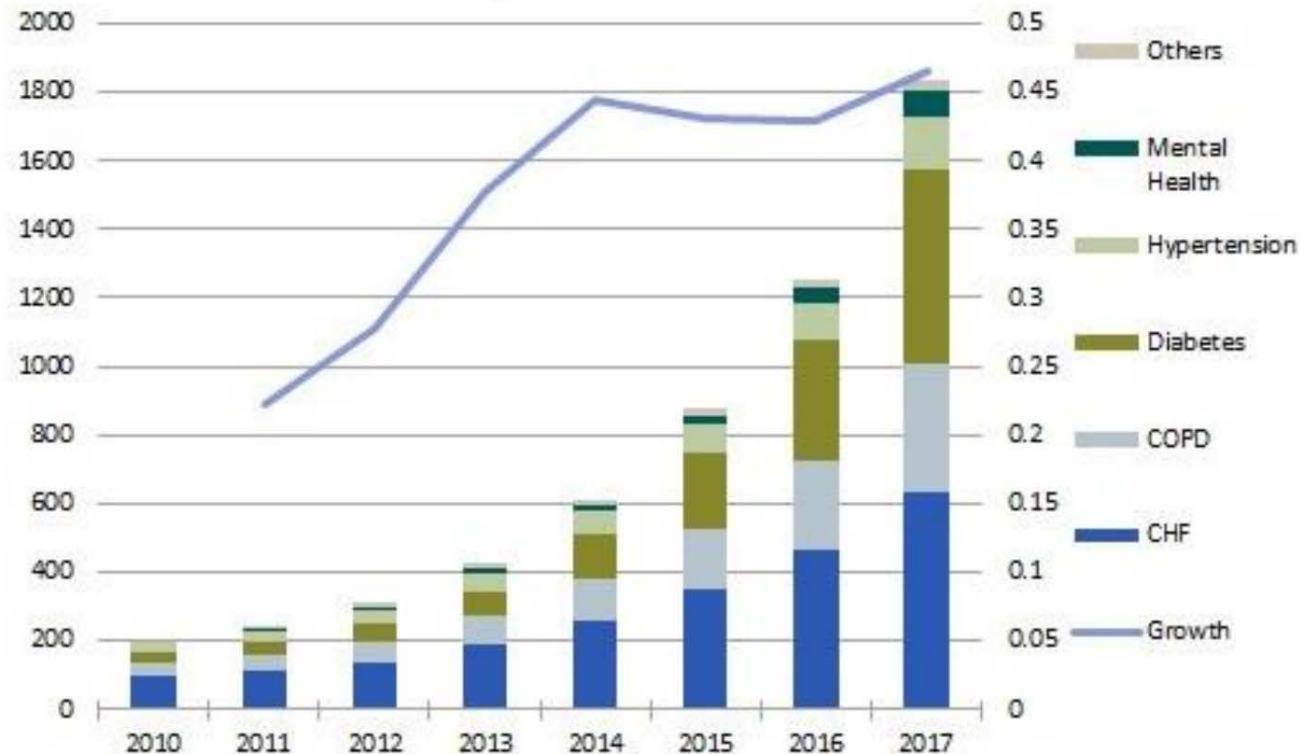
The World Market for Telehealth – An Analysis of Demand Dynamics – 2012,

TeleICU/Teleintesivists

❧

 ❧ The ICU environment full of distractions, alarms, and interruptions that produce alarm fatigue and the potential increased error rates

 ❧ Video and audio devices connected to each ICU patient room

 ❧ ePhysician and eRN overseeing the care and making recommendations to intensivists/hospitalists and nurses

 ❧ Typically a checklist of items, but available for consultation

 ❧ Full EHR access

Tele-ICU Enhancements

A Second Set of Eyes: An Introduction to Tele-ICU

Susan F. Goran, RN, MSN

Figure 1 High-resolution cameras with zoom and pan ability are mounted in each room in the intensive care unit, enabling the tele-ICU staff to assess patients and/or communicate directly with the bedside team.

Figure 2 VISICU eLERT button allows staff in the intensive care unit to request the on-camera presence of the tele-ICU team. Both 1-way and 2-way audio/video communications are available for tele-ICU use.

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Tele ICU Impact

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- ଔ   Avera Health System, South Dakota: More than 160 patients have been able to stay in their hometown hospital with support from Avera Tele-ICU CARE; air transport costs saved: $1 000 000

- ଔ   Maine Medical Center, Maine: During the 33 months after implementation of tele-ICU, turnover of registered nurses decreased by 56% at a cost savings of $1,090,909 per year

- ଔ   Resurrection Health Care, Illinois: **7% reduction in blood transfusions in 6 months** = $11200 in savings; 38% decrease in ICU length of stay in 6 months = approximately $3,000,000 in savings

- ଔ   Via Christi Health System, Kansas: Tele-ICU/ICU partnership to prevent air embolism; teaching intervention allowed avoidance of an estimated $240,000 in non-reimbursable patient care costs under the new Centers for Medicare and Medicaid Services never event rule.

Tele-wound care

Boca Raton Regional hospital

HipaaSnap Wound Care app
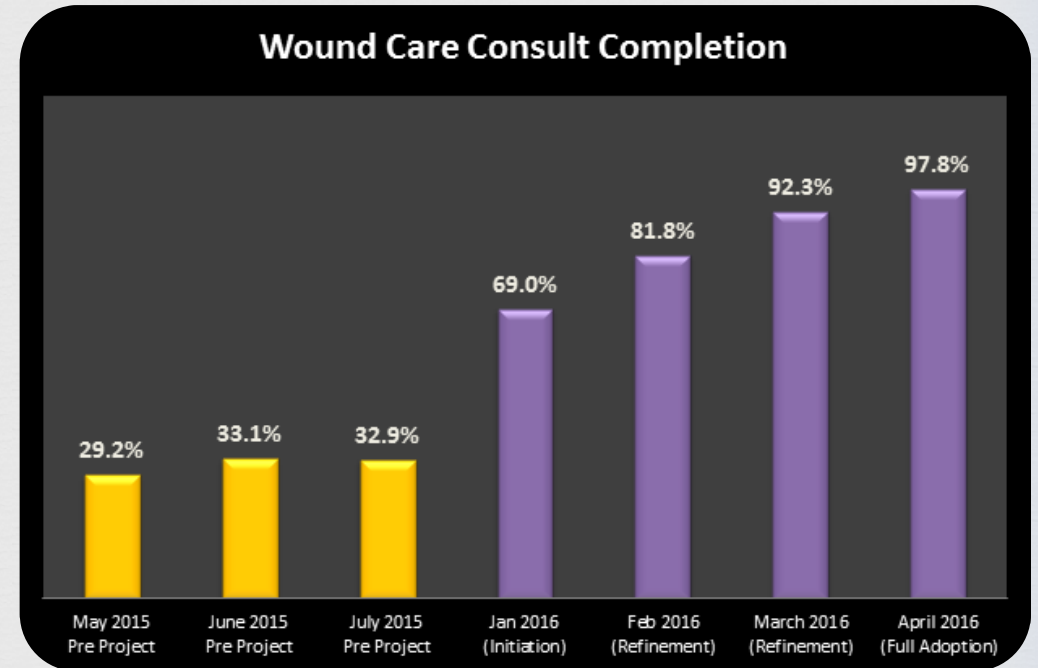
TeleSurgery

- The Lindhberg operation in 2001
  - Performed by Dr. Jacques Marescaux
  - 45 min cholecystectomy on a 68 yo female in Strasbourg Civil Hospital in Eastern France
  - Surgeon was in New York using the ZEUS robotic surgical system

A   B

Medscape   Source: Cancer Control © 2009 H. Lee Moffitt Cancer Center and Research Institute, Inc.

Zeus Robot Arms   Zeus Console

FIGURE 1. Example of evaluation by videoconference in a patient with mandibular fracture (both condyles and symphysis). Generated images (A and B) are remotely viewed on tablet by the plastic surgeon researcher (thumbnail picture). The CT examinations (C and D) are evaluated by visualization of the computer screen captured by the smartphone.

Military Use

Project

Trauma Pod

With SRI as lead integrator, DARPA collaborators demonstrated how a remotely operated trauma pod could deliver emergency first-response treatment in the battlefield to stabilize patients for transport.

TeleSurgery

— ❦ —

 Now with use of voice recognition to control OR

 Research promising in Unassisted robotic surgery

 Force-feedback and time delay
   How much pressure does it take to hold but not tear an artery?
   Haptic response technology

E- Health and Its Impact on Medical Practice

American College of Physicians
A Position Paper
2008

ACP supports e-Health activities that enhance patient-physician collaborations. Potential benefits from e-Health include:

ACP supports the expanded use of telemedicine for those patients with an established physician relationship, to achieve fully integrated, location-independent care processes supported by care teams that are not necessarily all present at a single location at the time of a patient encounter.

ACP supports the development of a national process to certify for trustworthiness of content for Web sites that offer consumer health information.

ACP recommends the reform of payment policy to appropriately compensate physicians for their investment in and ongoing use of e-Health services, which can positively affect access, care coordination, patient satisfaction, value, and process and clinical outcomes.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Medicare & Medicaid Services

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Telehealth Services

The originating sites authorized by law are:

❖ The offices of physicians or practitioners;
❖ Hospitals;
❖ Critical Access Hospitals (CAHs);
❖ Rural Health Clinics;
❖ Federally Qualified Health Centers;
❖ Hospital-based or CAH-based Renal Dialysis Centers (including satellites);
❖ Skilled Nursing Facilities (SNFs); and
❖ Community Mental Health Centers (CMHCs).

Note: Independent Renal Dialysis Facilities are not eligible originating sites.

TELEHEALTH SERVICES

As a condition of payment, you must use an interactive audio and video telecommunications system that permits real-time communication between you, at the distant site, and the beneficiary, at the originating site.

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Overlay banner: telehealth modifier GT, "via interactive audio and video telecommunications systems"

Partially visible back table:

Service	re Coding System Code
Telehealth	
Follow-up i	
Office or o	
Subseque... visit every	
Subsequ... 1 telehea	
Individua	...21
Individua... minimu... year tra	...109

Front table:

Service	Code
Individual psychotherapy	
Telehealth Pharmacologic Management	CPT codes 90832–90834 and 90836–90838
Psychiatric diagnostic interview examination	HCPCS code G0459
End-Stage Renal Disease (ESRD)-related services included in the monthly capitation payment	CPT codes 90791 and 90792
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients younger than 2 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents (effective for services furnished on and after January 1, 2016)	CPT codes 90951, 90952, 90954, 90955, 90957, 90958, 90960, and 90961
	CPT code 90963
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients 2-11 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents (effecti... after...	CPT code 90964
...for patients 12-19 years of age to include monitoring for the adequacy of nutrition, assessment of growth and development, and counseling of parents (effective for services furnished on and after January 1, 2016)	CPT code 90965
End-Stage Renal Disease (ESRD)-related services for home dialysis per full month, for patients 20 years of age and older (effective for services furnished on and after January 1, 2016)	CPT code 90966
Individual and group medical nutrition therapy	
Neurobehavioral status examination	HCPCS code G0270 and CPT codes 97802–97804
Smoking cessation services	CPT code 96116
Alcohol and/or substance (other than tobacco) abuse structured assessment and intervention services	HCPCS codes G0436 and G0437 and CPT codes 99406 and 99407
Annual alcohol misuse screening, 15 minutes	HCPCS codes G0396 and G0397
Brief face-to-face behavioral counseling for alcohol misuse, 15 minutes	HCPCS code G0442
	HCPCS code G0443

HRSA *Health Resources and Services Administration*
Data Warehouse

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Home > Tools > Analyzers > Medicare Telehealth Payment Eligibility Analyzer

Medicare Telehealth Payment Eligibility Analyzer Results

Input address: 796 Highway 441 North, okeechobee, Florida 34972
Geocoded address: 796 US-441 S, Okeechobee, Florida, 34974

Start Over

Data as of 1/1/2016

✅ **Yes, the address provided is eligible for Medicare telehealth payment.**

The Medicare Telehealth Payment Eligibility Analyzer uses a combination of data from the Rural Health Grants Eligibility Analyzer and Medicare Physician Bonus Payment Eligibility Analyzer tools to determine eligibility for Medicare telehealth payment. For additional details on these analyses, please see the results associated with the links below.

Go to detailed results for rural analysis


Home > Tools > Analyzers > M

Lo

Med   Me

Input ad   Input ad
Geocod   Geocod

❌ ❌
paym   paym

The Medicare Telehe
data from the Rural H
Bonus Payment Eligil
telehealth payment. F
results associated with the links below.

Go to detailed results for rural analysis

HIPAA concerns

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- 2014 a physician in Oklahoma used SKYPE to conduct telepsych services
  - Sanctioned by the state medical board
  - Placed on 2 years probation
  - Required to complete prescribing practices course
  - Skype is NOT an approved modality for video conferencing
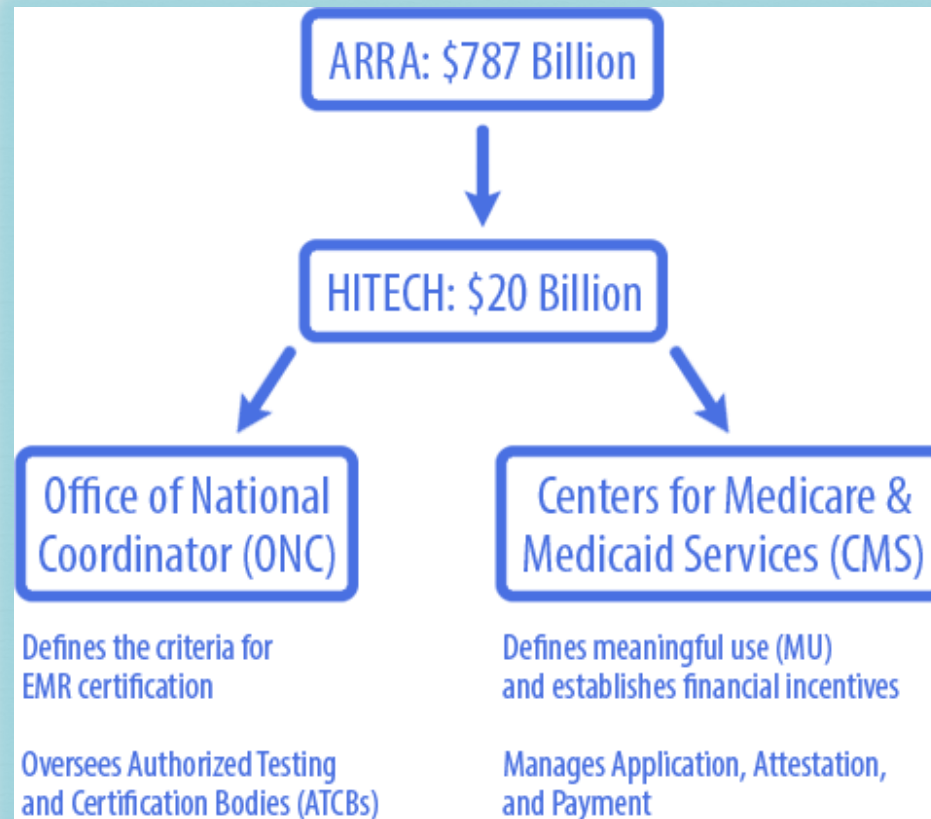
The Times They Are A-Changin' — Bob Dylan
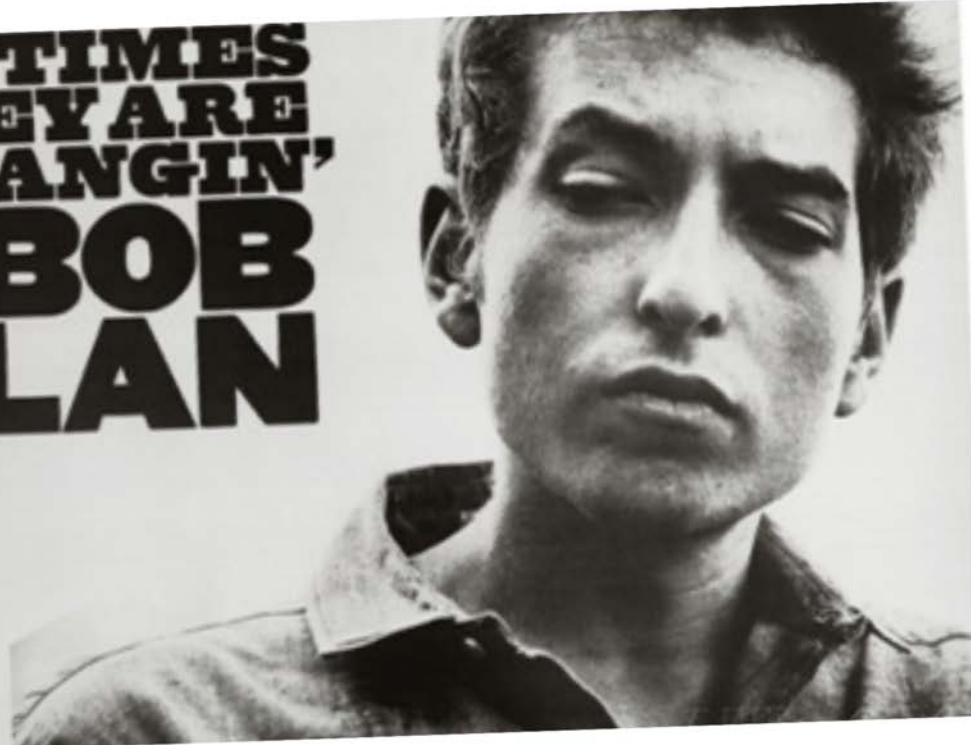
The EHR

# 2009 Stimulus Package

Institute of Medicine (IOM)

— ❧ —

 — "to Err is Human" 1999 and "Crossing the Quality Chasm" 2001
   - 98,000 deaths occur yearly due to medical errors
   - Set forth six aims for healthcare : Safe, Effective, Patient Centered, Timely, Efficient, Equitable

   - 2 of their 12 executive recommendations helped drive informatics
     i. Improve access to clinical information and support clinical decision making
     ii. Elimination of most handwritten clinical data by end of the decade

IOM cited 12 IT applications

⚖

- Web based PHR
- Patient access to information systems
- Access to general health information via internet
- EHR's with CDSS
- Pre-visit online histories

- Inter-hospital data sharing, HIE
- Patient-physician electronic messaging
- Online data entry by patients for monitoring (e.g. glucose)
- Online scheduling
- Computer assisted telephone triage assistance (nurse call centers)
- Online access to clinician or hospital performance data

Amenable Mortality

Mortality Amenable to Health Care, 1997–98 / Mortality Amenable to Health Care, 2002–03
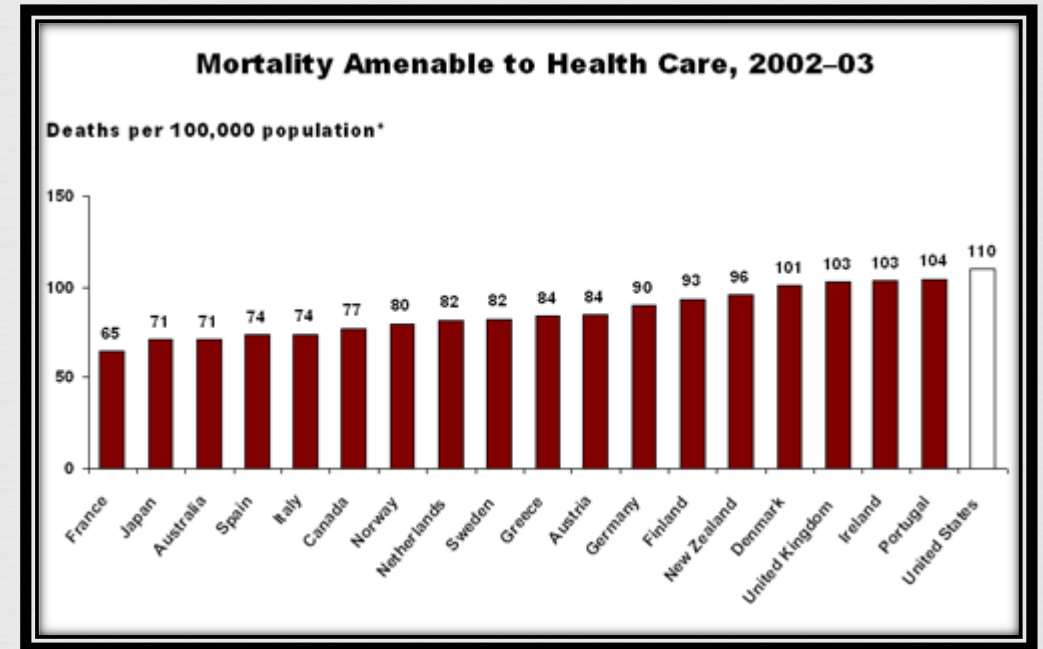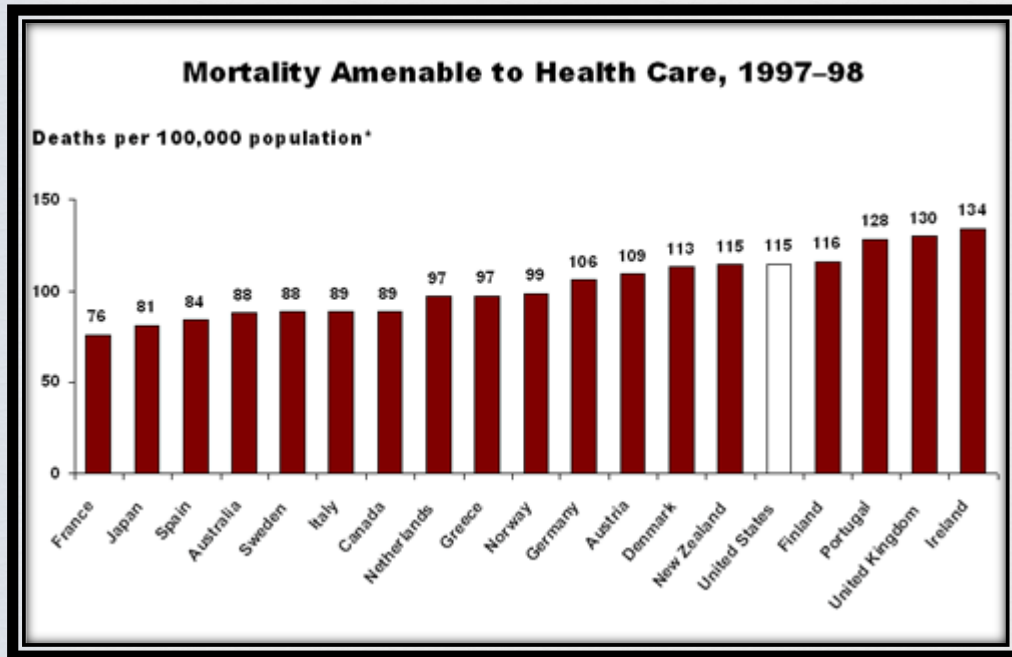
CCHIT

 Certification commission for Health Information Technology
 Goals are:
 Reduce the risk of HIT investment by physicians
 Ensure interoperability
 Enhance availability of HIT incentives e.g MU
 Accelerate adoption of interoperable HIE

 The most well known and respected EHR certification body

National eHealth Collaboration

 Government-civilian-consumer collaborative since 2009
 Charged with prioritization of HIT standards to promote interoperability
 Create value cases adopted by CCHIT, ONC, HHS

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IOM vision for the EHR

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- Health information measurement and accuracy
- Result Management
  - Easy access for physicians
- Order management
  - CPOE standardizes care
- Decision Support
  - CDSS

- Electronic Communication
  - Secure messaging, text, web portals and HIE
- Patient support
  - Electronic education
- Administrative processing
  - Scheduling, claims, eligibility verification, drug recall
- Reporting and population health
  - Immunization status, biosurveillance

EHR and Improved Quality

EHR should improve patient safety through

1. Legibility
2. Access
3. Less duplication
4. Reminders for overdue tests
5. CDSS
6. Electronic problem lists

Unexpected Increased Mortality After Implementation of a Commercially Sold Computerized Physician Order Entry System

Yong Y. Han, MD*‡; Joseph A. Carcillo, MD*‡§; Shekhar T. Venkataraman, MD*‡§;
Robert S.B. Clark, MD*‡§; R. Scott Watson, MD, MPH*‡§‖; Trung C. Nguyen, MD*‡; Hülya Bayir, MD*‡;
and Richard A. Orr, MD*‡§

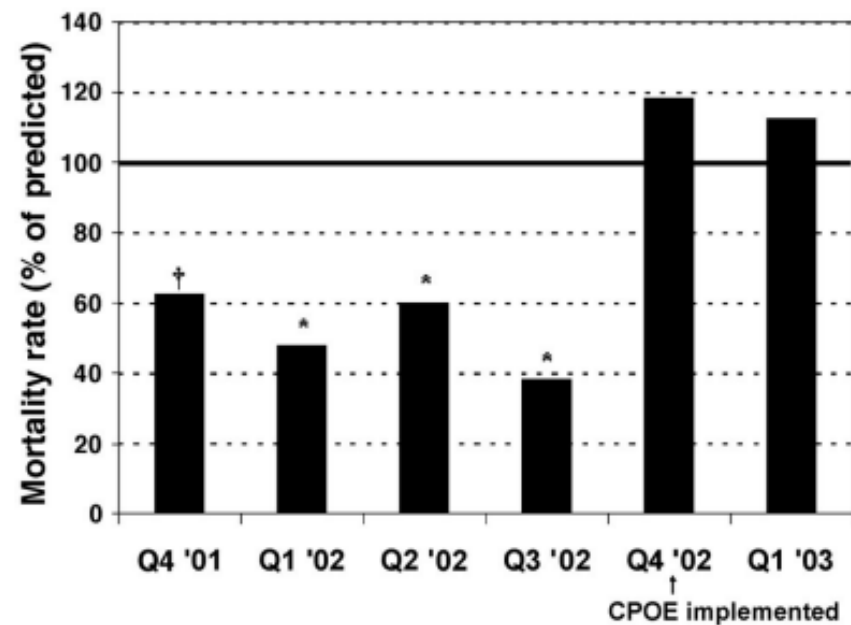Fig 1. Observed mortality rates (presented as a normalized % of predicted mortality) during the 18-month study period are plotted according to quarter of year. Observed mortality rates were consistently better than predicted before CPOE implementation, but this relationship did not remain after CPOE implementation. *$P < .05$ and †$P = .07$, (observed vs predicted mortality, z statistic). Q, quarter.

Mortality before and after initiation of a computerized physician order entry system in a critically ill pediatric population

Adam Keene, MD; Lori Ashton; David Shure, MD; Dorrie Napoleone, MT (ASCP); Chhavi Katyal, MD; Eran Bellin, MD

❧

Table 3. Factors significantly associated with mortality when adjusted for other covariates in a model that included pre- or post-CPOE status[a]

Variable	Odds of Mortality	95% Confidence Interval	p
CPOE	0.71	0.32–1.57	.392
Shock	9.41	2.90–30.49	<.001
Prematurity	3.57	1.74–7.30	<.001
Male gender	3.31	1.47–7.69	.004
Hematology/oncology diagnosis	3.14	1.44–6.86	.004

CPOE, computerized physician order entry.

[a]A purposeful selection logistic-regression analysis was performed that included all variables with p values <.25 in univariate analysis. Unit of admission was left out of this analysis because of collinearity with age.

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Adverse inpatient outcomes during the transition to a new electronic health record system: observational study

Michael L Barnett,[1,2] Ateev Mehrotra,[3,4] Anupam B Jena[3,5]

Table 2 | Adjusted patient outcomes associated with admission to hospital during first 90 days of implementation of electronic health records (EHRs) compared with prior 90 days*

Outcomes	Control hospitals (n=399)		Study hospitals (n=17)		Adjusted difference-in-differences change in outcome for study hospitals v controls (95% CI)†	P value‡
	Adjusted pre-EHR rate (95% CI)†	Adjusted post-EHR rate (95% CI)†	Adjusted pre-EHR rate (95% CI)†	Adjusted post-EHR rate (95% CI)†		
30 day mortality (%)	7.25 (7.12 to 7.40)	7.29 (7.14 to 7.45)	7.02 (6.46 to 7.75)	7.49 (6.94 to 8.07)	0.43 (−0.11 to 0.99)	0.12
30 day readmissions (%)	18.2 (17.9 to 18.5)	17.7 (17.4 to 17.9)	18.9 (17.9 to 19.9)	18.1 (17.3 to 18.9)	−0.28 (−1.19 to 0.55)	0.57
PSI-90 rate (events per 1000 admissions)	7.32 (6.79 to 7.95)	7.25 (6.73 to 7.85)	9.38 (7.39 to 11.9)	10.3 (8.1 to 13.0)	0.96 (−0.80 to 2.69)	0.28

PSI-90=patient safety for selected indicators 90.

*Hospitals newly implementing EHRs defined as those with less than a basic inpatient EHR before implementation, as defined in Jha et al 2009.[2]

†Absolute percentage changes in each outcome attributable to EHR implementation were simulated using a marginal standardization approach (see supplementary eMethods).[38]

‡Estimated from difference-in-differences model comparing change for each period compared with baseline period (1-90 days pre-implementation) between hospitals implementing EHR and control hospitals in same hospital referral region as study hospital. Models adjusted for age, sex, race, original reason for Medicare eligibility, major diagnostic category for admission, hospital referral region, and length of stay (for PSI-90 outcome only). All analyses used robust variance estimators to account for clustering of admissions within hospitals.

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Toward successful migration to computerized physician order entry for chemotherapy

J. Jeon , MASc [*] , S. Taneva , PhD [*] , V. Kukreti , MD [†‡] , P. Trbovich , PhD [§,‖#] , A.C. Easty , PhD [§#] , P.G. Rossos , MD MBA [**††] , J.A. Cafazzo , PhD [*,‖#]

Contributing factor	Organizations reporting this contributing factor (n=13)
Wrong dose selection error in CPOE	7
Drug delivery scheduled for the wrong time (that is, date) in CPOE	7
Change to an order in CPOE did not get communicated	5
Failure to process an order	5
User ignoring an important alert or warning in CPOE	5
Duplicate medical order error in CPOE	4
Manual data entry error	4
Wrong drug selection error in CPOE	3
Wrong route of administration selection error in CPOE	2
Order made to a wrong patient in CPOE	2
Other (wrong regimen selected, wrong body weight)	2

Impact of computerized physician order entry on medication prescription errors in the intensive care unit: a controlled cross-sectional trial

Kirsten Colpaert[1], Barbara Claus[2], Annemie Somers[3], Koenraad Vandewoude[4], Hugo Robays[5] and Johan Decruyenaere[6]

Table 3

Medication prescription error analysis in computerized and paper-based units

	Computerized unit	Paper-based unit	P
Total prescriptions (n)	1,286	1,224	NS
Total MPEs (n)	44	331	<0.001
% MPEs	3.4	27.0	<0.001
Minor MPEs	9	225	<0.001
Per 100 orders	0.7	18	
Intercepted MPEs (n)	12	46	<0.001
Per 100 orders	0.9	3.8	
Non-intercepted potential ADEs (n)	21	48	<0.001
Per 100 orders	1.6	3.9	
Total ADEs (n)	2	12	<0.01
Per 100 orders	0.15	1.0	
Intercepted MPEs and serious MPEs	35	106	<0.001
Serious MPEs	23	60	<0.001

ADE, adverse drug event; MPE, medication prescription error; NS, not significant.

Immediate Benefits Realized Following Implementation of Physician Order Entry at an Academic Medical Center

Hagop S. Mekhjian, MD, Rajee R. Kumar, PhD, Lynn Kuehn, MSN, RN,
Thomas D. Bentley, MS, RNC, Phyllis Teater, MBA,
Andrew Thomas, MD, MBA, Beth Payne, MS, RN, CCRN, Asif Ahmad, MS, MBA
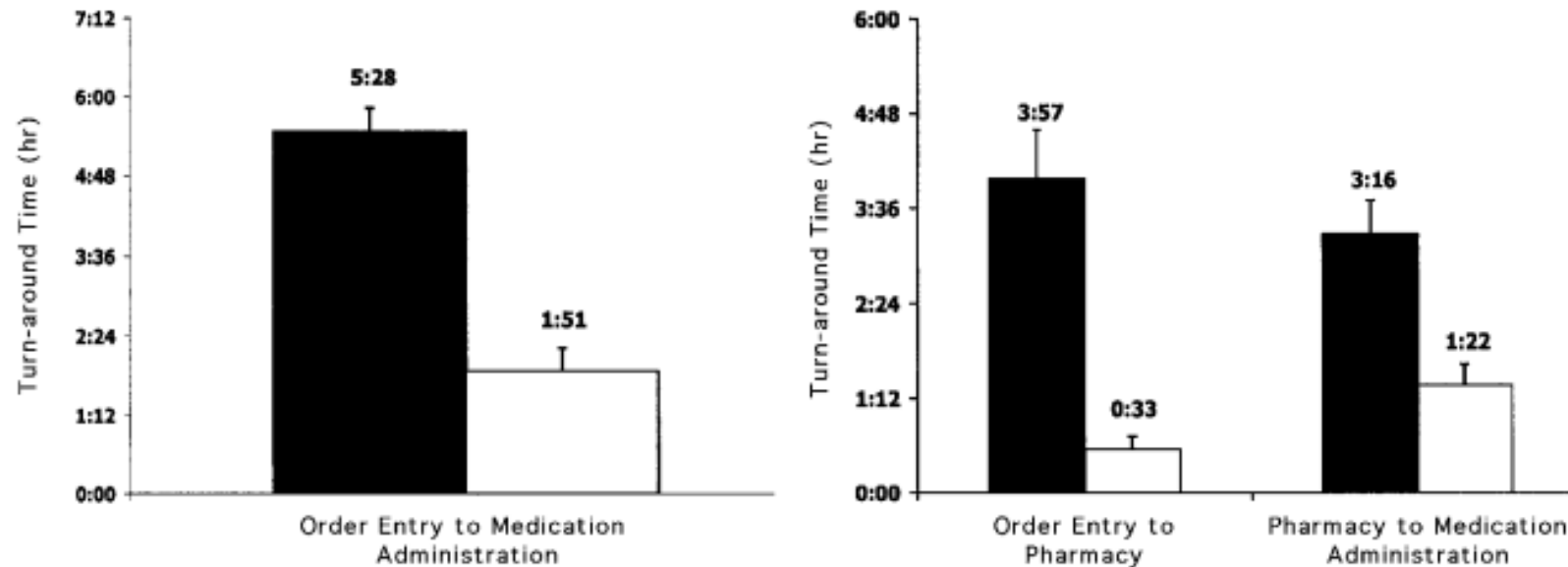
Figure 1 Medication turn-around times. *Left*, Overall, from order entry to medication administration in the transplant service. *Right*, Two phases, from order entry to pharmacy, and from pharmacy to medication administration in the transplant service. *Black columns*, pre-POE (n=46; Jan 15–Feb 15, 2000); *white columns*, post-POE (n=70; May 30–Jun 25, 2000).

Immediate Benefits Realized Following Implementation of Physician Order Entry at an Academic Medical Center

Hagop S. Mekhjian, MD, Rajee R. Kumar, PhD, Lynn Kuehn, MSN, RN, Thomas D. Bentley, MS, RNC, Phyllis Teater, MBA, Andrew Thomas, MD, MBA, Beth Payne, MS, RN, CCRN, Asif Ahmad, MS, MBA

Time and Motion Studies

Medication Turn-around Times

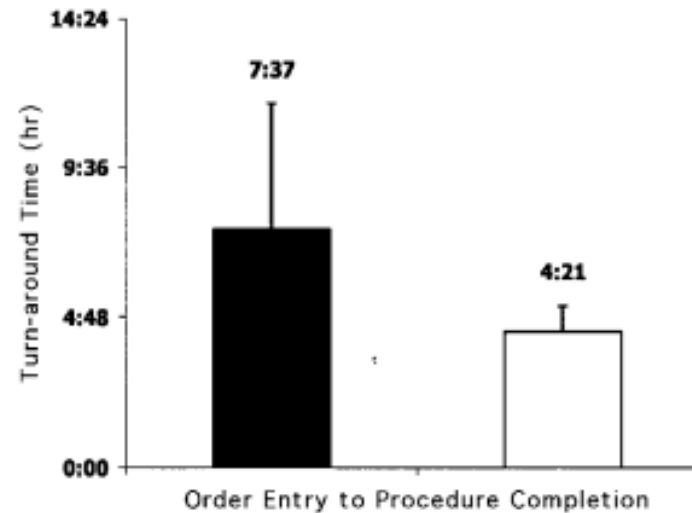The results of measurements of 46 medication events

Figure 2 Radiology turn-around times, from order entry to procedure completion, in the transplant service. *Black column*, pre-POE (n=11; Jan 15–Feb 15, 2000); *white column*, post-POE (n=54; May 1–30, 2000).

How Do Residents Spend Their Shift Time? A Time and Motion Study With a Particular Focus on the Use of Computers

Lena Mamykina, PhD, David K. Vawdrey, PhD, and George Hripcsak, MD, MS

Table 1

Time Spent on Different Clinical Activities by Residents per Shift, Time and Motion Study, General Medicine Service, New York-Presbyterian/ Columbia University Medical Center, June and July 2010

Activity category	Average total time spent, min	% of average shift time
Computer read/write	364.5	50.6
Documenting	128.7	17.9
Talking	292.3	40.6
Paper read/write	186.0	25.8
Moving/waiting	80.0	11.1
Rounds	79.7	11.1
Patient	67.8	9.4
Phone	54.0	7.5
Personal	22.8	3.2
Looking for	2.4	0.3
Total	1,149.4	159.6

- 50% of time on the computer
- 9.4% of the time with patients

- Part of the patient contact time, residents were multitasking on mobile or WOW device.

SPECIAL ARTICLE

Electronic Health Records and Quality of Diabetes Care

Randall D. Cebul, M.D., Thomas E. Love, Ph.D., Anil K. Jain, M.D., and Christopher J. Hebert, M.D.

- Over 27,000 patients -- 46 clinics
- Composite Standards with EHR 35% higher than paper
  - Timely recommended testing and referrals
- Clear advantage in quality with end points such as:
  - A1c<8
  - BP < 140/90

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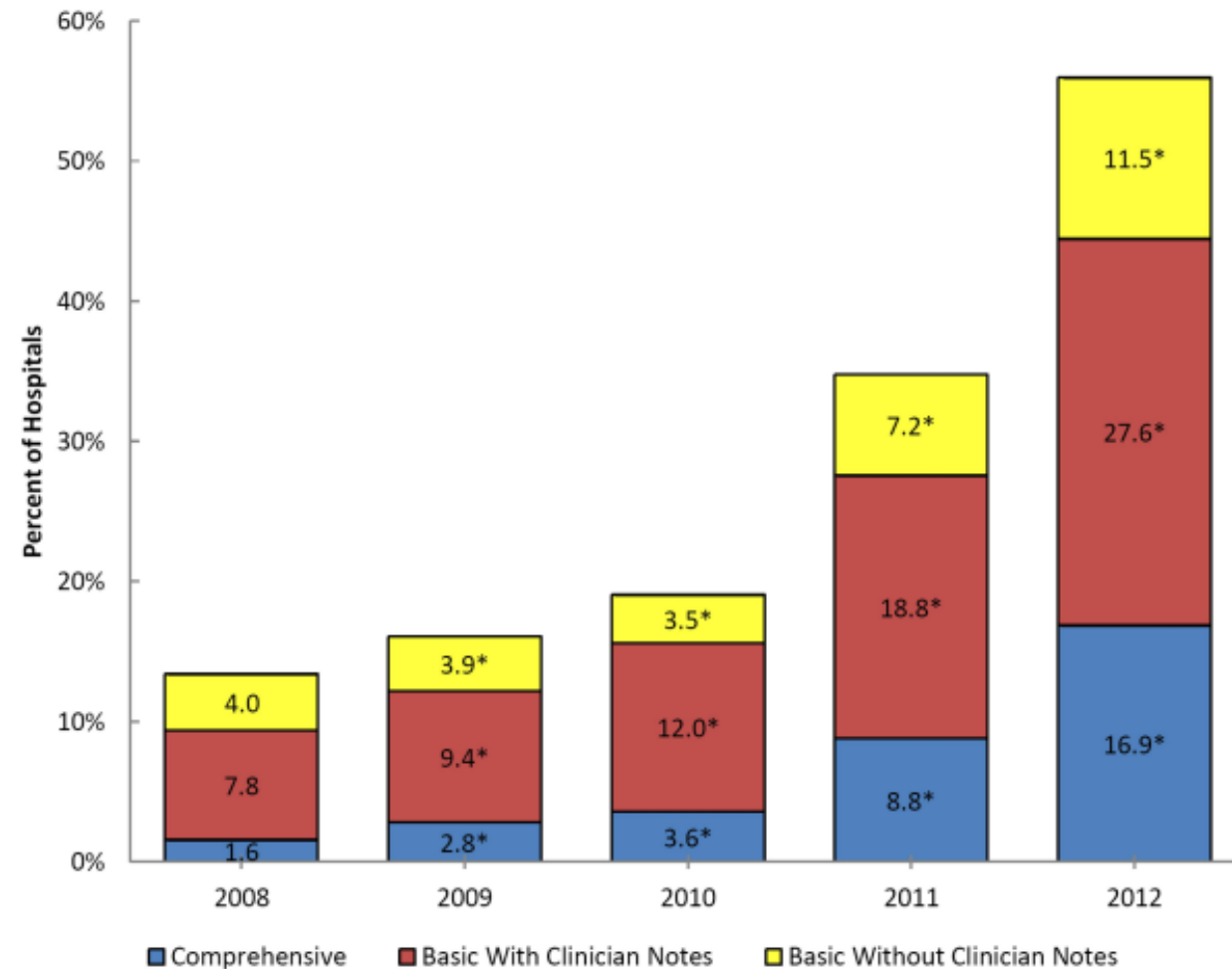
E-prescribing adoption

The percent of physicians e-prescribing using an EHR has rapidly increased since 2008.

Figure 1. Percent of physicians e-prescribing using an EHR from December 2006 and April 2014.
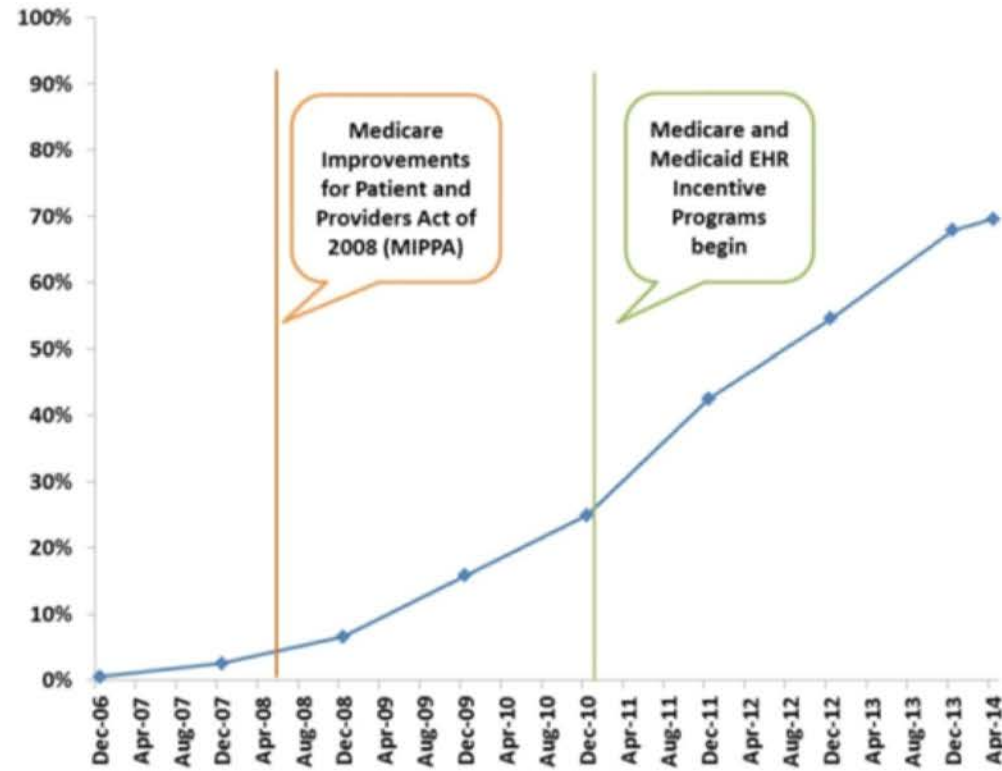
SOURCE: ONC analysis of physician prescriber data from Surescripts. Denominator from SK&A 2011 Office Based Providers Database.

Medscape Medical News

e-Prescribing Controlled Substances Now Legal Nationwide

Robert Lowes

August 31, 2015

 Vermont became the last state to approve on August 28, 2015

 In Florida, it is allowed with an electronic token
 Must enter the token number each time you prescribe

The New York Times

N.Y. / REGION

The End of Prescriptions as We Know Them in New York

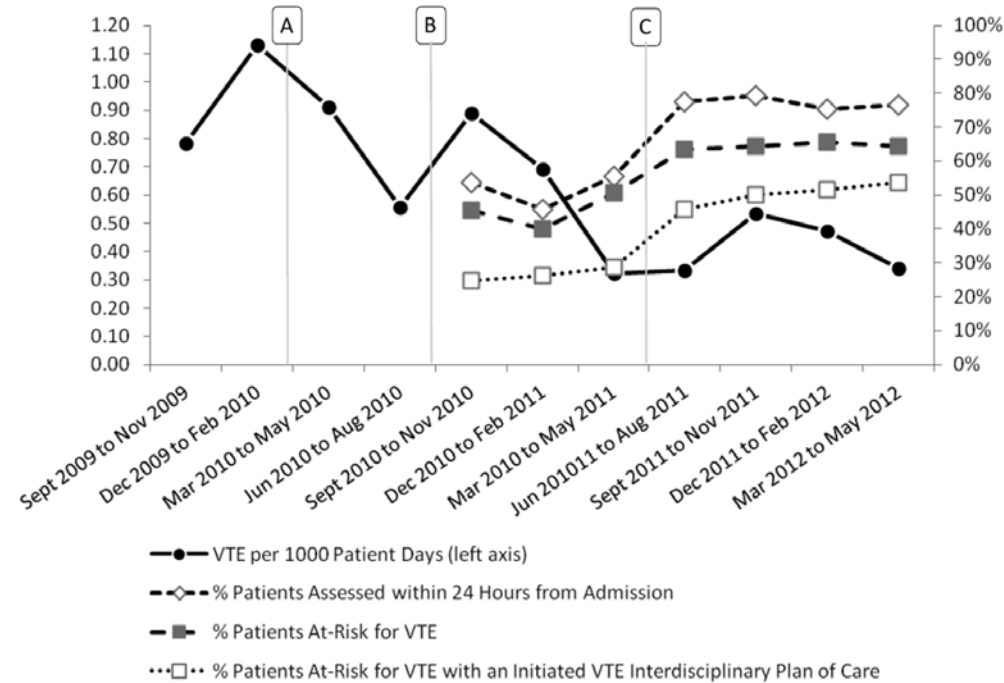By SHARON OTTERMAN   MARCH 14, 2016

- Began March 27, 2016
- Physicians now face penalties and fines
- Many pharmacies no longer accept paper prescriptions from NY state providers (except during system downtime, natural disasters, etc)
- Applies to both controlled and non controlled substances

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Computerized Clinical Decision Support to Prevent Venous Thromboembolism among Hospitalized Patients: Proximal Outcomes from a Multiyear Quality Improvement Project

Robert C. Amland, Bonnie B. Dean, Hsing-Ting Yu, Hugh Ryan, Timothy Orsund, Jeffrey L. Hackman, and Shauna R. Roberts

Figure 1. Relationship Between VTE CDS Utilization and VTE Outcomes

Legend:
— ● — VTE per 1000 Patient Days (left axis)
— ◇ — % Patients Assessed within 24 Hours from Admission
— ■ — % Patients At-Risk for VTE
··□·· % Patients At-Risk for VTE with an Initiated VTE Interdisciplinary Plan of Care

Note. CDS, clinical decision support; VTE, venous thromboembolism.

Table 2. Odds Ratios for Differences in Observed VTE Rates by Admission Cohorts

Admission Cohort[a]	No. of Months	No. of Admissions	No. of Pt. Days	No. of VTE	VTE/1,000 Pt. Days	OR[b]	95% CI	p
Baseline	6	8,619	32,481	31	0.954	–	–	–
VTE Nursing Content (A)	6	8,910	32,680	24	0.734	0.75	(0.44–1.27)	.28
CPOE and VTE Advisor (B)	6	8,092	31,631	25	0.790	0.86	(0.50–1.46)	.58
VTE Advisor Alert and Notify Flag (C)	6	7,716	29,957	13	0.434	0.65	(0.49–0.87)	.0039
Study Endpoint	6	7,644	29,491	12	0.407	0.71	(0.55–0.93)	.014

[a]Cohorts defined by date of admission; September 1, 2009 to May 31, 2012.
[b]Odds Ratio; baseline compared to admission cohorts (A, B, C, Study Endpoint); logistic regression.
CPOE, computerized provider order entry; VTE, venous thromboembolism.

What Evidence Supports the Use of Computerized Alerts and Prompts to Improve Clinicians' Prescribing Behavior?

Angela Schedlbauer, MD, Vibhore Prasad, MBChB, Caroline Mulvaney, PhD, MSc,
Shobha Phansalkar, RPh, PhD, Wendy Stanton, BA, Dip Lib, David W. Bates, MD, MSc,
Anthony J. Avery, DM

Table 1 ■ Category of Alerts and Types of Alerts Showing a Beneficial Effect on Prescribing and/or Clinical Outcome

Category of Drug Alerts	Number of Alert Types	Number of Studies with Beneficial Effect on Prescribing	Number of Studies with No Effect on Prescribing	Number of Studies with Positive Effect on Clinical Outcomes
Basic drug alerts				
1. Drug allergy warnings	1	1[24]	—	—
2. Drug–drug interactions	1	—	1[24]	—
3. Duplication alerts	0	—	—	—
4. Basic medication order guidance	2	2[24,28]	—	—
Advanced drug alerts				
1. Drug-laboratory alerts	4	4[26,27,31,36]	—	1[31]
2. Drug-condition alerts				
2a Drug–disease contraindication	0	—	—	—
2b appropriate prescribing	4	2[17,28]	2[18,19]	—
2c drug-age alerts	4	3[30,34,35]	1[33]	1[30]
3. Drug-formulary alerts	4	4[21,23,28,32]	—	2[21,32]
4. Dosing guidelines based on:				
4a Renal Function	2	2[29,31]	—	1[29]
4b age	0	—	—	—
4c pregnancy/childbearing potential	0	—	—	—
4d Pediatric patients/weight based dosing	1	1[20]	—	—
4e indications	0	—	—	—
Combination of basic and advanced features	4	4[22,24,25,28]	—	—
Total	27	23	4	5

Alert types showing beneficial effect on prescribing (second column), no effect on prescribing (third column) and positive effect on clinical outcomes (fourth column) compared to total number of alerts in a certain alert category (first column).
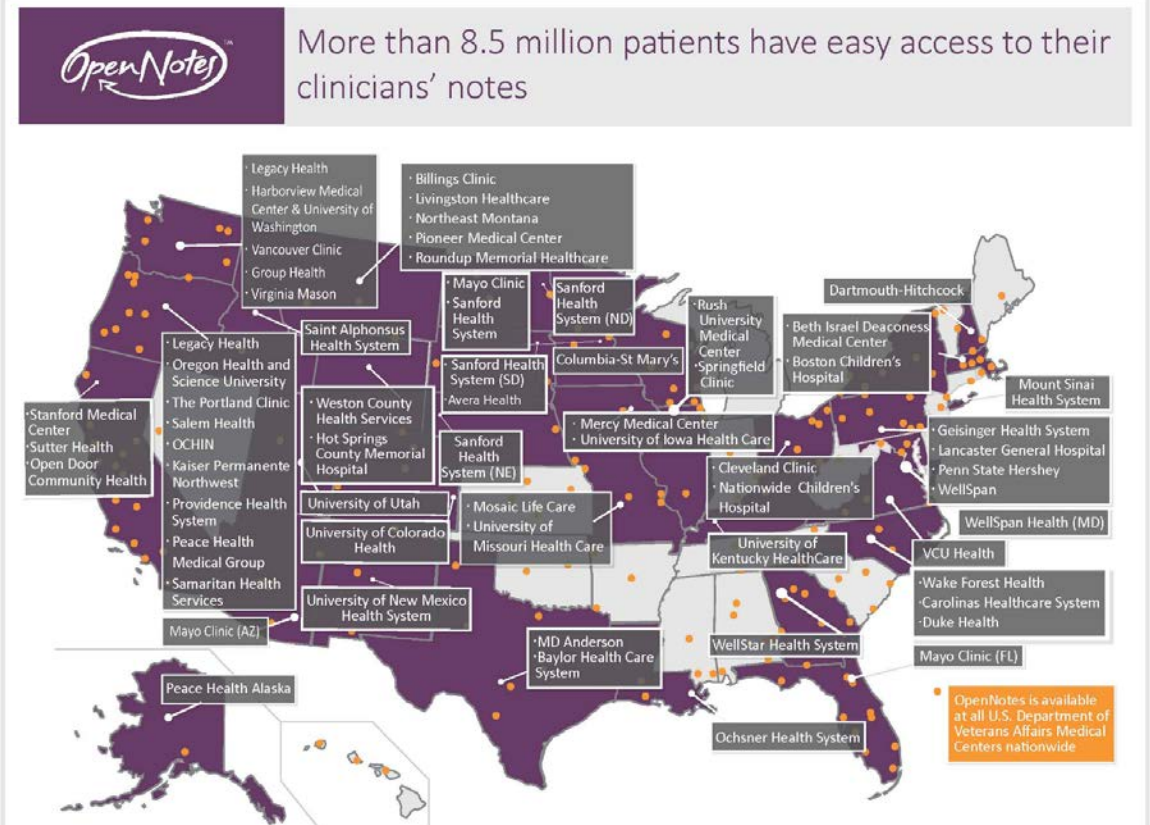
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Patient portals and Open notes

- Open Notes project gaining steam
- Patient portals
  - Which labs to show and when?
  - VA blue button
  - Now over 10 Million users

More than 8.5 million patients have easy access to their clinicians' notes

Barriers to EHR adoption

Cost	In-Office			SaaS		
	Upfront Cost	Yearly Cost	5 Year TCO	Upfront Cost	Yearly Cost	5 Year TCO
Estimated Average Cost	$33,000	$4,000	$48,000	$26,000	$8,000	$58,000

Doing the Math - The Five Main Components of EHR Implementation

To estimate how much EHR ownership will cost your organization, you should consider the five main components of EHR implementation. These cost components relate to ambulatory primary care settings, as opposed to hospitals which may have different cost structures.

- **Hardware:** Potential hardware costs may include database servers, desktop computers, tablets/laptops, printers, and scanners.

- **EHR Software:** Potential software costs include an EHR application, interface modules (e.g. lab interface module), and upgrades to your EHR application. Remember, software costs vary depending on whether you select an on-site EHR deployment or a SaaS EHR deployment.

- **Implementation Assistance:** Potential implementation assistance costs include IT contractor, attorney, electrician, and/or consultant support; chart conversion; hardware/network installation; and workflow redesign support. Your local Regional Extension Center (REC) can help. Contact your local REC to find out if you are eligible for free or reduced-price support.

- **Training:** Your organization will need to train your physicians, nurses, and office staff before and during EHR implementation. Physicians, nurses, and office staff need to understand how to use the EHR and associated hardware and how the EHR will create new workflows for your practice.

- **Ongoing Network Fees and Maintenance:** Potential ongoing costs include hardware and software license maintenance agreements, ongoing staff education, telecom fees, and IT support fees. In addition, your organization may need to hire new staff, such as IT operations staff, clinical data analysts, or application analysts.

Barriers to adoption

 Inadequate time

 Inadequate expertise/workforce

 Cost

 Interoperability

 Workflow changes

 Privacy

 Legal

 behavioral

Table 1. Office-Based Physicians' Top 5 "Major Barriers" to EHR Adoption.

Among EHR adopters	*Non-adopters*
1. Cost of purchasing a system (52%) 2. Loss of productivity (37%) 3. Annual maintenance cost (27%) 4. Adequacy of training (27%) 5. Finding EHR to meet practice needs (25%)	1. Cost of purchasing system (73%) 2. Loss of productivity (59%) 3. Annual maintenance costs (46%) 4. Finding EHR to meet practice needs (46%) 5. Adequacy of training (40%)

The long-term financial impact of electronic health record implementation

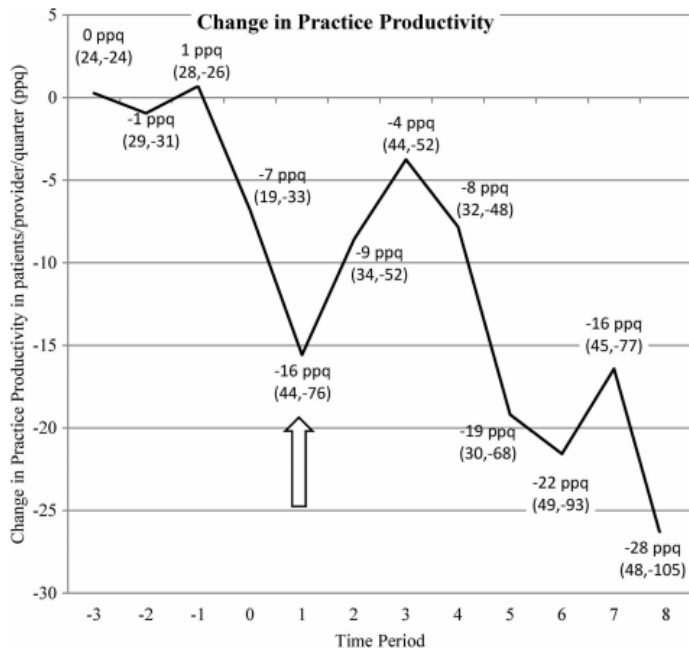Michael J Howley,[1] Edgar Y Chou,[2] Nancy Hansen,[3] Prudence W Dalrymple[4]

Figure 1 Changes in practice productivity around electronic health record (EHR) implementation. Changes are measured as the group-centered average of patients/provider/quarter (ppq) compared to the baseline (time −3 to time −1). First and third IQRs are in parentheses. The arrow at time 1 denotes EHR implementation.
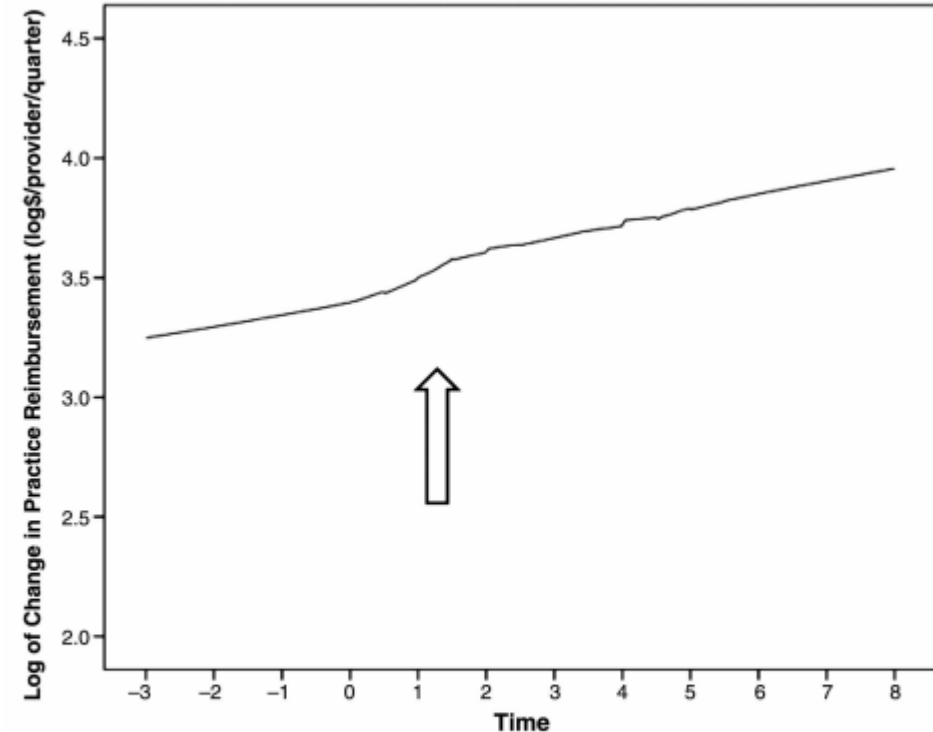

Figure 4 Scatterplot of change in practice reimbursement from the pre-implementation baseline. Below, the scatterplot for the log-transformed variable used in the statistical analysis.

Services

Our Services:

The South Florida Regional Extension Center serves as your trusted, unbiased advisor on the path to Meaningful Use. As a vendor-neutral entity, we will provide expert guidance on the software and services that make sense for your practice.

In an effort to grow in order to meet the needs of our members, the SFREC will be offering several service lines at a discount to our members. 2014 will be a year of growth for the SFREC and its members. Let us bring you the same valued service lines as we have to over 3000 physicians within our membership.

Service Lines

❯ Electronic Health Records

❯ Health Information Exchange

❯ Direct Secure Messaging

❯ Doctor Dispense AMPM Inc.

❯ Sage Credit Card

❯ Solaris Imaging Professional

❯ Health Compliance Partners

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Connecting for Care
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info@southfloridarec.org

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RansomWare--Locky

 ~

— Healthcare more vulnerable to Cyberattacks

— Most spending of time/money has been focused Hipaa Compliance and less so network security

— Multiple systems with hundreds of interfaces

— Less intense security training for employees/doctors
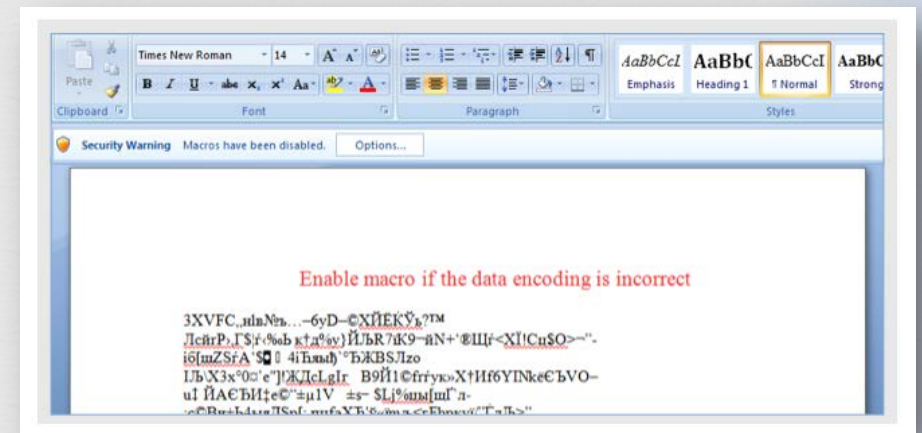
RansomWare and Security

〜

 Multiple hospital systems attacked
- Medstar – 10 hospital (43K)
- Kansas health (17K)
- Alvarado Health & Kings Daughter's health
- Many more smaller critical access hospital and physician practices

 Most end up paying the ransom

 Payment demanded in Bitcoin
- 1 Bitcoin = $655

Ransomware attackers collect ransom from Kansas hospital, don't unlock all the data, then demand more money

Kansas Heart Hospital declined to pay the second ransom, saying that would not be wise. Security experts, meanwhile, are warning that ransomware attacks will only get worse.

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The Social Media Impact

Online Reviews

www.physicianwiki.com

Dr. SMITH Reviews

Dr. GARY JOE SMITH , – FAMILY PRACTICE is one of the most famous doctor in NASHVILLE, TN, having specialization in FAMILY PRACTICE. Here is reviews and rating Based on various surveys.

GARY JOE SMITH Service	Rating (out of five)
Emergency Appointment Access	3.5
Environment of the office	3.3
Behavior of staff	4.8
Usual Waiting Time for Dr. SMITH	4.3
Medical Condition Explanation	4.6
Listen & Answering questions	4.6
Time Spent on a single patient By Dr. SMITH	3.3

Physician Marketing

— ❧ —

 Website – face of the practice

 Social media presence on Facebook, Twitter, LinkedIn, Doximity

 Search Engine Optimization services

 Reputation defender services

 ZocDoc, DocASAP, DocMeIn, and others

Survey results

❧

- 41% of people said social media would affect their choice of a specific doctor, hospital, or medical facility.
  - (source: Demi & Cooper Advertising and DC Interactive Group)

- 30% of adults are likely to share information about their health on social media sites with other patients, 47% with doctors, 43% with hospitals, 38% with a health insurance company and 32% with a drug company.
  - (source: Fluency Media)

- 60% of social media users are the most likely to trust social media posts and activity by doctors over any other group.
  - (source: Infographics Archive)

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Health Information Exchange

Health Information Exchange

ᚬ Critical element of Meaningful Use

ᚬ Important to all healthcare organizations and federal programs

ᚬ Cheaper form of data transmission in the long run

ᚬ Strong Federal push for further development

Health Information Exchange (HIE)

⸙

- Driven Primarily by the federal government (HITECH Act)
  - Improvement of disability process, continuity of medical care, bio-surveillance, research, natural disaster response.
- Prevention of electronic silos of information to replace our current paper ones
- Creating a comprehensive game plan to share health information among disparate partners

CCD

Continuity of Care Document

Based on the health language standard HL-7

Generated by the EHR and used in communication in standard sections to HIOs and CDW

Advance Directives

Directive	Decision	Effective Date	Termination Date	Status	Comments
Health Care Proxy	N/A			Inactive	
Do Not Resuscitate	N/A			Inactive	
Do Not Intubate	N/A			Inactive	

Allergies, Adverse Reactions, Alerts

Allergy Name	Allergy Type	Status	Severity	Reaction(s)	Onset Date	Date of Last Episode	Treating Clinician	Treatment Method(s)	Comments
POLLEN	MA	Active		• SNEEZING;ITCHY;WATERY EYES	2009-03-15T00:00:00Z	Unknown			

Medications

Brand Name	Generic Name	Start Date	Stop Date	Current Medication?	Ordering Clinician	Indication	Dosage	Frequency	Instructions	Comments
GLUCOPHAGE		2008-11-22T00:00:00Z		Yes	Henderson, Claire		500MG	BID		
LASIX		2008-11-22T00:00:00Z		Yes	Henderson, Claire		20MG	OD		
ENALAPRIL		2008-11-22T00:00:00Z		Yes	Henderson, Claire		5MG	BID		
GLYBURIDE		2008-11-22T00:00:00Z		Yes	Henderson, Claire		5MG	QD		
ABSORBABLE CALCIUM		2009-03-15T00:00:00Z		Yes	Khasidy, David		1200MILLIGRAM	OD		
ASPIRIN		2009-03-15T00:00:00Z		Yes	Khasidy, David		81MILLIGRAM	OD		

Results

Test Description	Test Time	Test Comments	Text Results	Atomic Results				Result Comments

Test Item	Value	Reference Range	Comments
WBC (test code = WBCIR)	12.00 10x9/L	4.00-11.00 (units = 10x9/L)	
RBC (test code = RBC)	3.31 10x12/L	3.80-5.30 (units = 10x12/L)	
HGB (test code = HGB)	8.8 g/dL	11.7-16.1 (units = g/dL)	
HCT (test code = HCT)	27.7 %	37.0-51.0 (units = %)	
MCV (test code = MCV)	83.7 fL	80.0-101.0 (units = fL)	
MCH (test code = MCH)	26.7 pg	27.0-32.0 (units = pg)	
MCHC (test code = MCHC)	31.9 g/dL	32.0-37.0 (units = g/dL)	

CBC With Platelet and Differential — Test Time: 2011-03-28 01:11:00

Procedures And Interventions

Procedure	Date / Time Performed	Performing Clinician
HOM HLTH AIDE/CERT NURSE ASST PROV CARE HOM;-HR	2008-09-15T00:00:00Z	165446198

Encounters

Start Date/Time	End Date/Time	Encounter Type	Admission Type	Care Provider	Care Facility	Care Department	Encounter ID
2008-11-21 15:27:00		Outpatient	O	Emerson, Jane	MMC	MMC	56225676842

Figure 4: Percent of non-federal acute care hospitals that electronically exchanged laboratory results, radiology reports, clinical care summaries, or medication lists with outside providers and hospitals: 2008-2013.
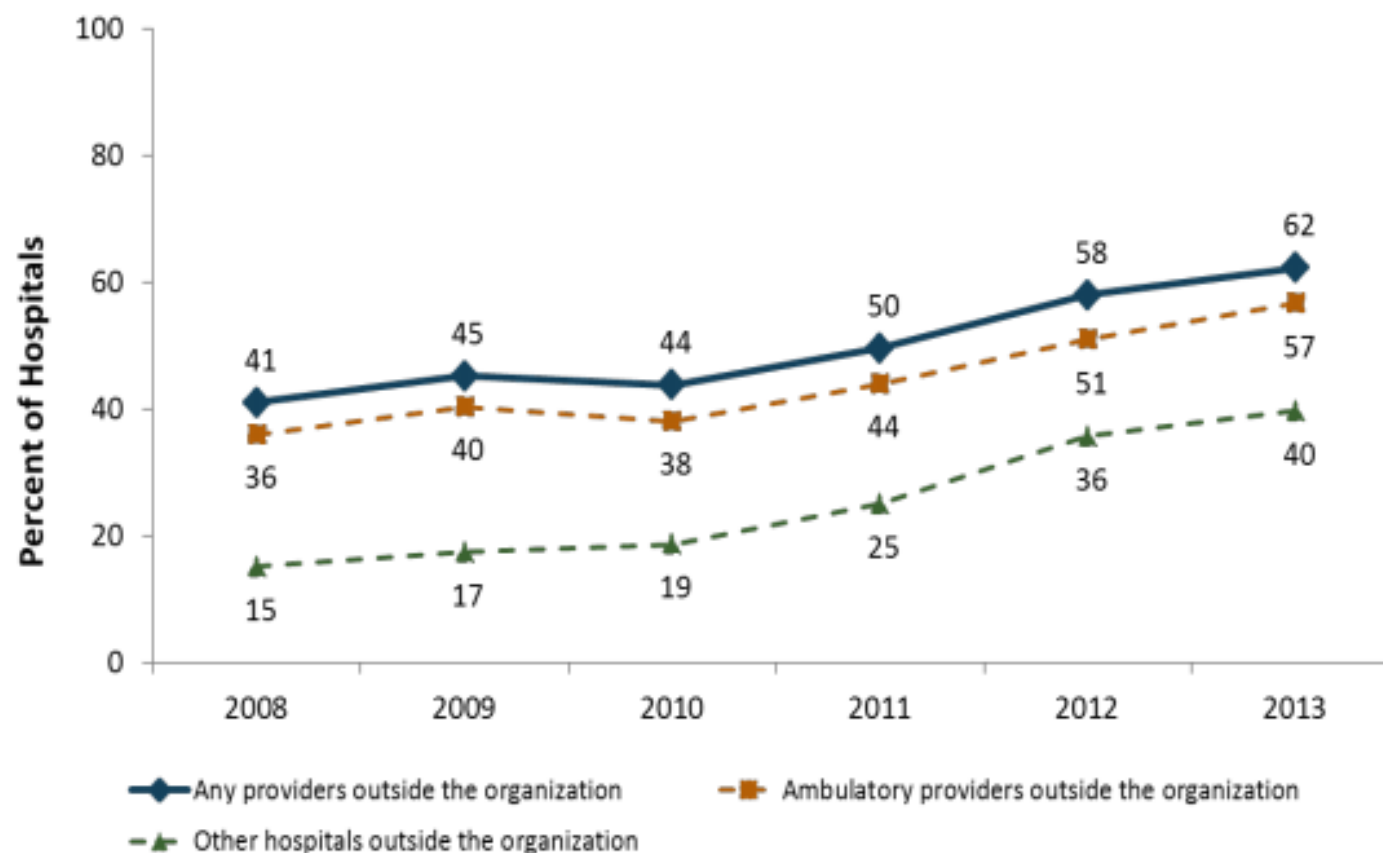
ஐ Florida SHOTS (State Health Online Tracking System) is a free, statewide, centralized online immunization registry that helps health-care providers and schools keep track of immunization records

- ஐ **Access patient records** from other providers.
- ஐ **Verify immunization status** and check immunization schedules.
- ஐ **Upload historical data** and update immunization histories.
- ஐ **Register new patients** and enter up-to-date vaccination information.
- ஐ **Produce and print the 680 form** required for child-care and school attendance.

Clinical Data Warehouse

- Shared database that collects, integrates and stores clinical data from a variety of sources
- Clinical NOT administrative data
- Collects from EHR's, radiology, lab, or pathology systems
- Issue of clinical notes—NLP may help
  - Problem based documentation
- Unlike EHR's, designed to support queries about groups
 - More complex—associations of groups (does A co-occur with B?)

CDW

❧

- Enable organizations to monitor quality
  - Track infectious agents
  - Track ADE on large scale

- Identify trends in populations
  - Quite useful for comparative effectiveness research (CER)
  - For example, Drug A was superior to Drug B in a clinical trial
   - Based on CDW data was the outcome actually better in Drug A than Drug B in real practice?

Figure 2.6: Overview of clinical data warehousing (ETL = Extract, transform and load)
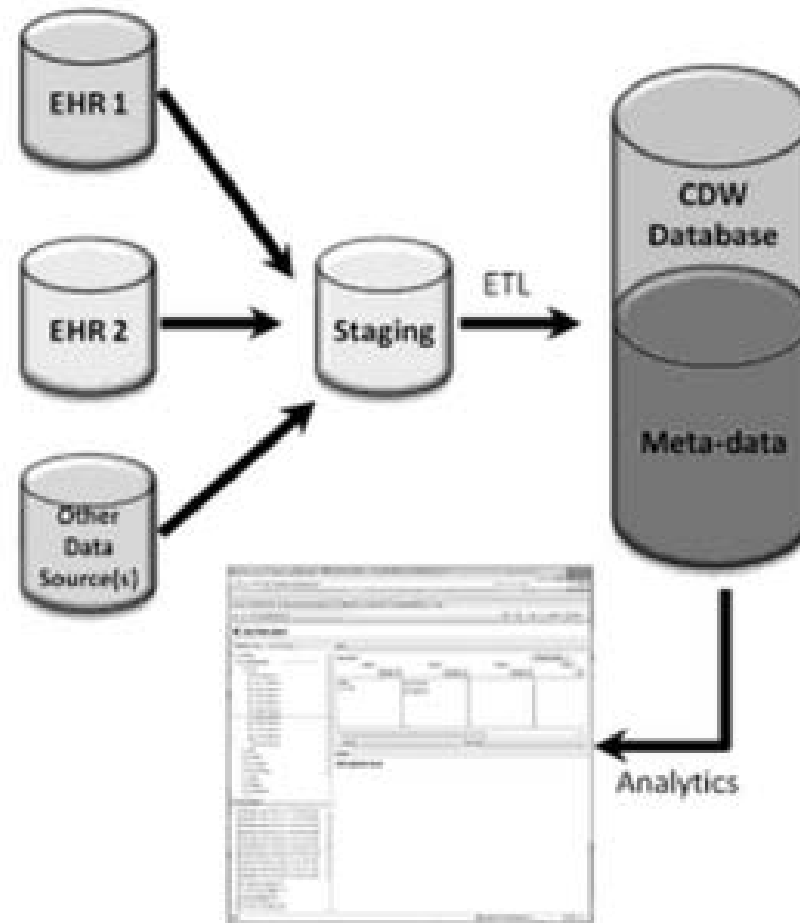
2005 ONC HIE Report

❧

- Should be a <u>decentralized architecture</u> built using the internet
- Linked by <u>uniform communication</u>
- Software of <u>open standards</u> and policies
- <u>Network of Networks</u> approach
- NO SINGLE CENTRAL DATA REPOSITORY
- Will require Hundreds of HIO's to be interoperable with thousands of individual healthcare entities
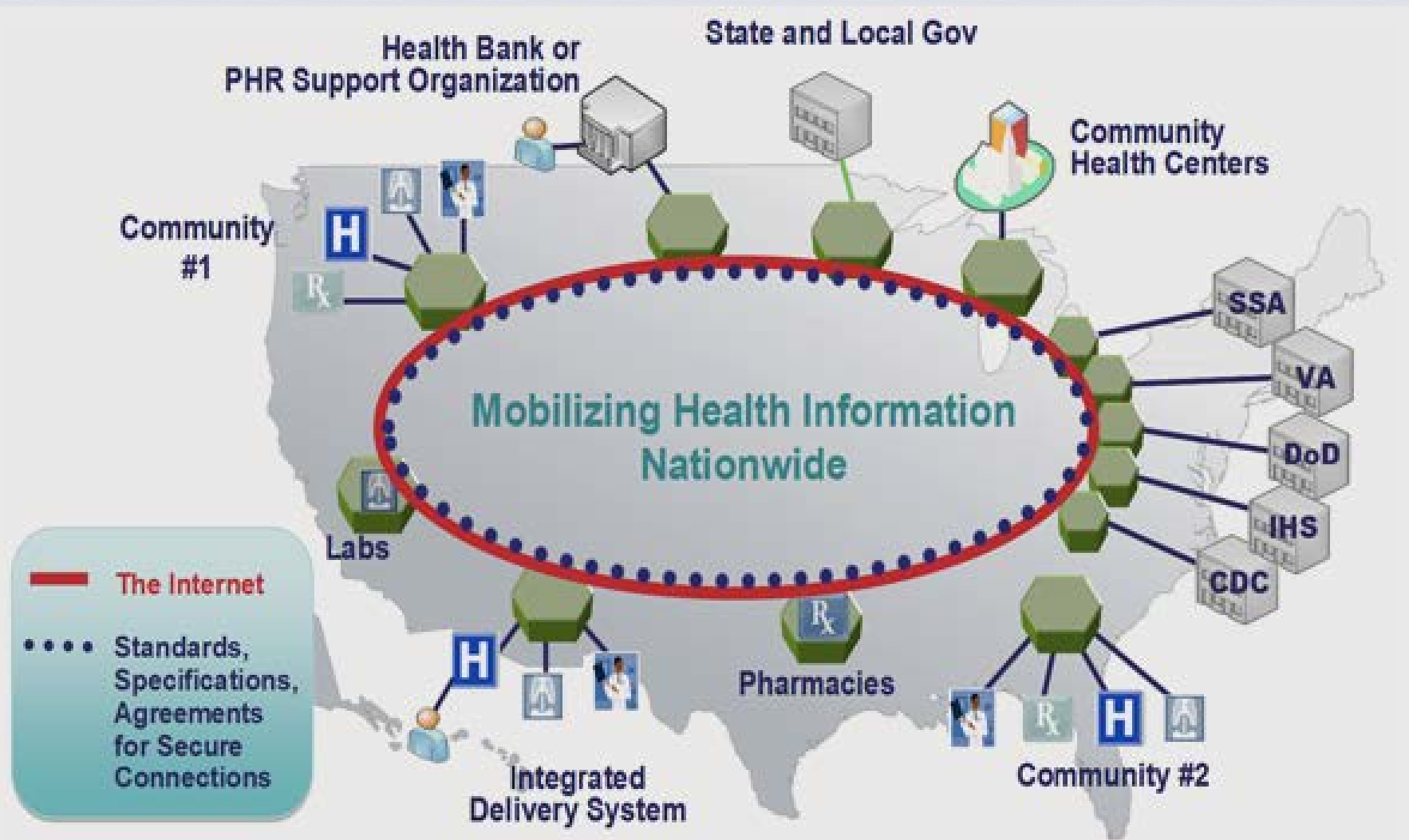
NHIN prototype project

ର

 2005 ONC provided $18.6 million for initiative awarded to 4 contractors
  ଓ Accenture, Computer Sciences Corp, IBM, Northrop Grumman
 Results
  ଓ Network of network approach is possible
  ଓ Common standards are critical but immature
  ଓ Same infrastructure should support consumers and providers
  ଓ Evolutionary approach rather than massive replacement

NHIN Trial Implementation

- 2007 HHS sent out a RFP (request for proposal) for phase 2
  - Trial implementation phase
  - Cost $22.5 million
- Awarded to 9 operational HIO's
- CDC also awarded contracts to study support of HIE in bio-surveillance
- DOD and VA joined as 10th partner
- Six additional ONC grants in 2008

NHIN Exchange

- Using the specs and services of NHIN trial implementation
  - Health information exchange began in 2009
- Social Security Administration was the first federal agency to use the Exchange
  - Successful exchange has reduced SSA's time to retrieve disability verification information from 84 days to 46 days.
  - SSA released $17.4 million to expand their ability to exchange with 15 additional HIO's

Florida HIE

 Managed by the contractor Harris Corp

 Offer Direct project connectivity and patient CCD lookup services

 Back bone is MIRTH technology (open source code)

 Three existing HIO's are the first participants

 http://www.fhin.net/

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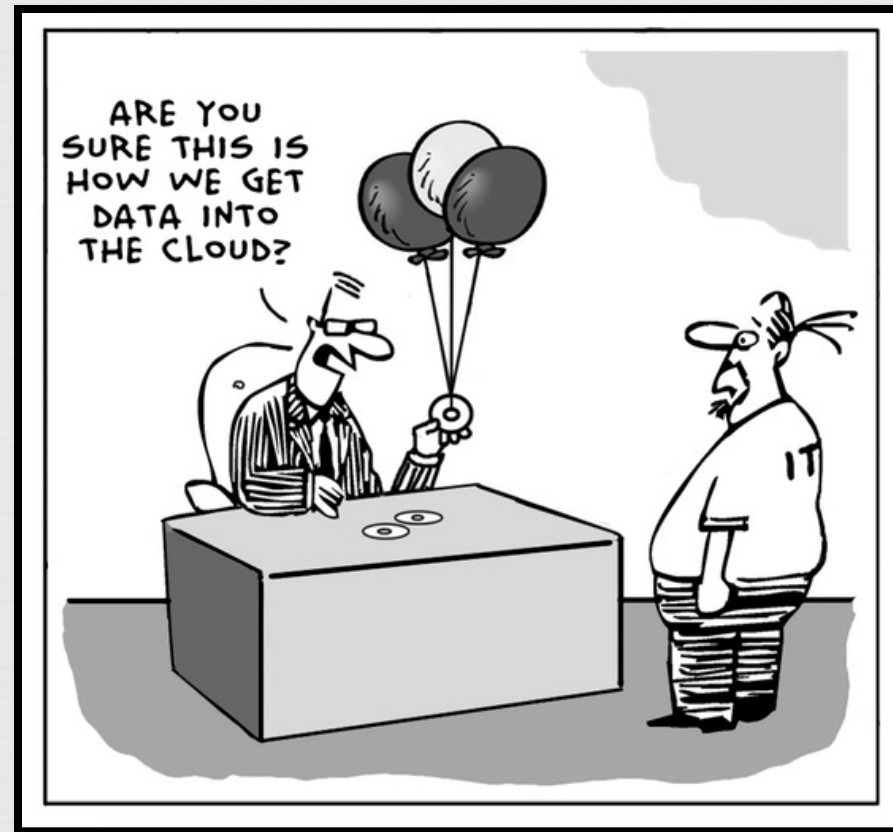
AGENCY FOR HEALTH CARE ADMINISTRATION

VLER

 Virtual Lifetime Electronic Health Record
 An initiative per President Obama April 2009 for DOD and VA to create a lifetime medical record for members of armed forces
 Using NHIN standards and CONNECT software must communicate with civilian health organizations
 Eleven pilot sites as of 2011

Questions

References

- Health Informatics—A practical guide for healthcare and Information Technology professionals
  - Robert Hoyt, Ann Yoshihashi, Nora Bailey
- Bill Hersch 10x10 OHSU course
- HealthIT.gov
- American Medical Directors of Information Services listserv (AMDIS)
- Clinical trials and studies as per slides

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