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The Physician-Computer Conundrum

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May 5, 2006*

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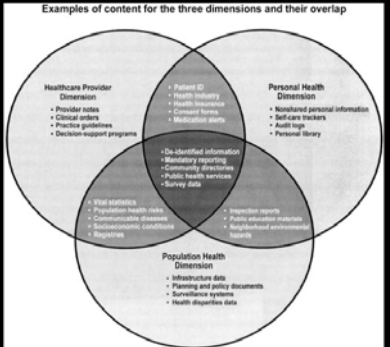
An Overview of the Existing Challenges to Introduction of the EHR in American Healthcare...

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First of all, What is it?

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Examples of content for the three dimensions and their overlap

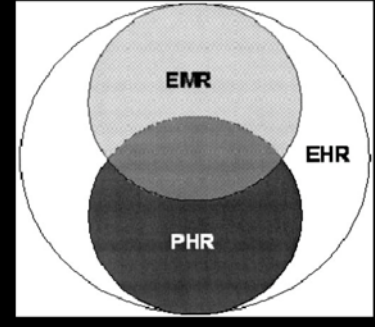


Stead, Kelly, Kobodner, JAMIA Mar/Apr 2005

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Press Release

For Immediate Release
March 15, 2005

Contact: CDC National Center for Health Statistics
Press Office, (301) 458-4800

New Study Shows Limited Use of Electronic Medical Records

Less than a third of the nation's hospital emergency and outpatient departments use electronic medical records, and even fewer doctors' offices do, according to a report released today by the Centers for Disease Control and Prevention (CDC).

About 31 percent of hospital emergency departments, 29 percent of outpatient departments, and 17 percent of doctors' offices have electronic medical records to support patient care, as reported in CDC's ambulatory medical care surveys, conducted from 2001 to 2003.

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No Lack of New Initiatives to Change this Picture...

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The New York Times
BY MARY WYGD
PHOTOGRAPH BY AP/WIDEWORLD

February 23, 2006
Market Place

WebMD Wants to Go Beyond Information

By MILT FREUDENHEIM

Mary Wygod, the entrepreneurial deal maker who built WebMD Health into one of the most-visited medical information sites on the Internet, is promoting the site as the next big thing in health care. Will shareholders reap the benefits?

By helping people enrolled in employer health plans compile personal health information online, Mr. Wygod wants to tap into the growing corporate trend: having employees pay more, if not all, of their own health costs. With more of their own money at stake, the thinking goes, people need information to help make decisions about health care.

WebMD says it has signed contracts with big health insurers and employers to operate private-access sites where employees can keep track of their medical records, look up information about diseases and compare costs and ratings for doctors and hospitals. Employers or their insurers pay licensing fees to WebMD, based on the services and number of health plan members.

Mr. Wygod's latest effort, which is still in the early stages, could be the most visible test yet of whether the time has finally come for using the Internet as much more than an online medical encyclopedia and health care news medium.

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Resistance to Change, A New Problem?

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IT Adoption in Medicine

■ *“That it will ever come into general use, notwithstanding its value, is extremely doubtful because its beneficial application requires much time and gives a good bit of trouble, both to the patient and to the practitioner.....”*


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“The Stethoscope” - London Times 1834

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How could this be?

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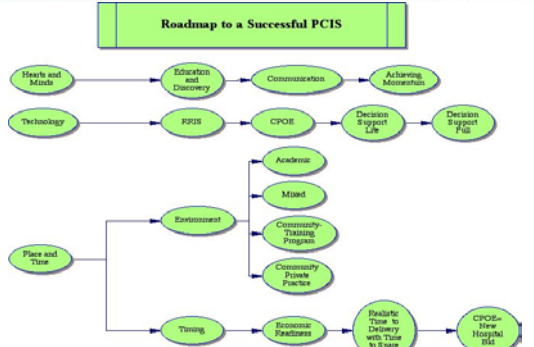
- Complexity of EHR
- The Cost of the Change
- Time Commitment for Success
- Clinicians Expectations
- Standards, Interoperability, CMT
- Challenge of Understanding Workflow
- Competing Agendas in Healthcare

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Complexity of the EHR Challenge...

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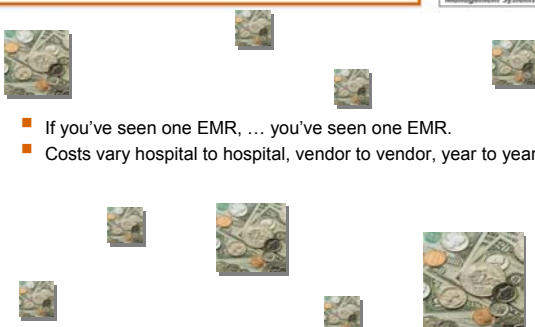
Roadmap to a Successful PCIS



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EMR Costs

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- If you've seen one EMR, ... you've seen one EMR.
- Costs vary hospital to hospital, vendor to vendor, year to year

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EMR Costs, Benefits, Risk

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The Center for Information Technology Leadership estimates that 89% of the economic benefits of CPOE accrues to the holder of financial risk for health care.

Johnston, D et al, CITL, 2003

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How Much Does This Cost?

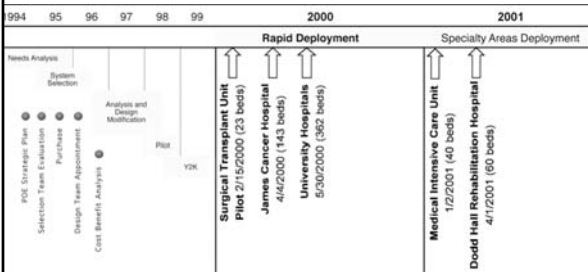
The firm, First Consulting Group, based in California, said it would cost \$210 million in one-time start-up expenditures for the 46 Massachusetts hospitals that don't have the systems to install them, or update existing technology to a minimum agreed-upon standard.

But, consultants said, the hospitals would save \$275 million annually because the systems reduce errors and, as a result, medical care for unintentional injuries to patients.

The Boston Globe, Dec. 7, 2004.



Organization Timeline...



From: Ahmad et al, JAMIA, 2002

Provider Time...

The Impact of Electronic Health Records on Time Efficiency of Physicians and Nurses: A Systematic Review

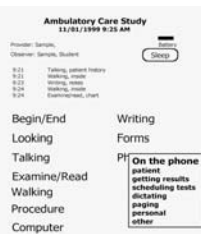
- "The use of bedside terminals and central station desktops saved nurse respectively, 24.5% and 23.5% of their overall time spend documenting during a shift"
- "...the use of central station desktops for physician order entry was found to be inefficient, increasing the work time from 98.1% to 328.6% of physician's time per working shift."

Poissant, Pereira, Tambllyn, Kawasiumi, JAMIA, May 2005

Provider Time...

Controlled Trial of Direct Physician Order Entry Effects on Physicians' Time Utilization in Ambulatory Primary Care Internal Medicine Practices

J. Marc Overhage, MD, PhD, Susan Perkins, PhD, William M. Tierney, MD and Clement J. McDonald, MD
Journal of the American Medical Association 8:363-371 (2001)



Screen from palm computer used to record data during time motion study

Study Conclusions

- Physicians using the Gopher (ambulatory care system) spent 2.2 min more per patient overall
- When duplicative and administrative tasks were taken into account, MDs spent only .43 min more per patient
- With experience, MD order entry time fell by 3.73 min per patient
- Physicians believed that the system improved their patient care and wanted the system in their practices.

Clinicians Expectations...

Our understanding of the EMR matures...

ORIGINAL INVESTIGATION

High Rates of Adverse Drug Events in a Highly Computerized Hospital

ARCHIVES EXPRESS

Jonathan R. Nebecker, MS, MD; Jennifer M. Hoffman, PharmD; Charlene R. Weir, RN, PhD; Charles L. Bennett, MD, PhD, MPP; John F. Hurdle, MD, PhD

Archives of Internal Medicine, March 23, 2005

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PEDIATRICS Vol. 116 No. 6 December 2005, pp. 1506-1512 (doi:10.1542/peds.2005-1287)

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

Objective. In response to the landmark 1999 report by the Institute of Medicine and safety initiatives promoted by the Leapfrog Group, our institution implemented a commercially sold computerized physician order entry (CPOE) system in an effort to reduce medical errors and mortality. We sought to test the hypothesis that CPOE implementation results in reduced mortality among children who are transported for specialized care.

Methods. Demographic, clinical, and mortality data were collected of all children who were admitted via interfacility transport to our regional, academic, tertiary-care level children's hospital during an 18-month period. A commercially sold CPOE program that operated within the framework of a general, medical-surgical clinical application platform was rapidly implemented hospital-wide over 6 days during this period. Retrospective analyses of pre-CPOE and post-CPOE implementation time periods (13 months before and 5 months after CPOE implementation) were subsequently performed.

Results. Among 1942 children who were referred and admitted for specialized care during the study period, 75 died, accounting for an overall mortality rate of 3.86%. Univariate analysis revealed that mortality rate significantly increased from 2.80% (39 of 1394) before CPOE implementation to 6.57% (36 of 548) after CPOE implementation. Multivariate analysis revealed that CPOE remained independently associated with increased odds of mortality (odds ratio: 3.28; 95% confidence interval: 1.94-5.55) after adjustment for other mortality covariables.

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Recent Report: Potential benefits and problems with CPOE

- 570 facilities, voluntary web reporting system
- Facilities with CPOE reported fewer inpatient and more outpatient med errors than facilities without CPOE (NS)
- Facilities with CPOE less frequently reported med errors that reached or harmed pts.
- Over 7 months in 2003, 7,000 CPOE related med errors were reported, 0.1% resulted in harm.

Zhan et al, Am J Health-Syst Pharm. 2006; 63:353-8

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Recent Report: Potential benefits and problems with CPOE

Quantitative and qualitative analyses indicated that CPOE could lead to Med errors due to:

- Faulty computer interface
- Miscommunication with other systems
- Lack of adequate DS
- Common human errors
 - Knowledge deficit
 - Distractions
 - Inexperience
 - Typing errors

Zhan et al, Am J Health-Syst Pharm. 2006; 63:353-8

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Recent Report: Potential benefits and problems with CPOE

Year	Performance
Yr 1	1
Yr 2	1
Yr 3	16

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The Human Factor,

How ready is the US Healthcare workforce for the EHR?

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File Edit View Go Favorites Window Help

CareWeb

Data Trending

Back Forward Stop Refresh Home Favorites History Search AutoFill Larger Smaller Print Mail Preferences

CPI #: Name: DOB: 12/1/1931 Sex: F

Laboratory Results - as of 01/30/2000 08:22:15

Trend for tests in order: CBCP
 Maximum number of most recent orders shown: (Change Max Number)

Collection Date	1/18/00	1/7/00	9/29/99	5/4/99	2/27/99	2/26/99	2/24/99	12/28/98	11/17/98	8/18/98	6/4/98	4/14/98	4/6/98	3/26/98	1/20/98
WBC	15.1 H	10.6 H	10.0	12.5 H	21.8 H	14.5 H	11.1 H	12.8 H	10.9 H	11.0 H	10.9 H	10.9 H	11.7 H	10.5 H	9.7
RBC	4.22	3.76 L	3.86 L	4.08	3.75 L	3.83 L	3.83 L	3.75 L	3.66 L	3.64 L	3.78 L	3.76 L	3.82 L	3.80 L	3.80 L
HGB	12.5	10.9 L	11.4 L	11.9 L	11.4 L	11.4 L	11.7 L	11.6 L	11.4 L	12.0	11.8 L	11.9 L	11.9 L	11.7 L	11.8 L
HCT	38.5	34.3 L	35.1	36.5	34.8 L	35.4	35.7	34.9 L	34.5 L	34.4 L	35.6	35.0	36.0	35.7	34.3 L
MCV	91.1	91.0	90.9	89.2	92.7	92.4	93.2	93.1	94.2	94.4	94.2	93.1	94.0	93.7	90.1
MCH	29.7	28.9	29.7	29.3	30.3	29.8	30.5	30.9	31.0	31.3	31.6	31.5	31.1	30.7	31.0
MCHC	32.6	31.6	32.6	32.8	32.7	32.2	32.7	32.3	32.9	33.1	33.6	33.8	33.0	32.8	34.4
RDW	14.5	14.6	14.6	14.6	15.9	13.9	13.7	13.3	13.7	13.3	13.7	13.1	13.2	13.5	15.2
PLT	274	285	291	306	319	313	288	270	270	295	308	305	302	300	
MPV	9.4	8.7	7.7	8.2	8.6	8.4		7.7	8.0	8.3	8.4	7.7	8.4	8.3	7.8

NOTE: Results for each instance of a test are shown, regardless of whether it was part of a CBCP order.

Close

psid01gslv01.univ.michigan.edu

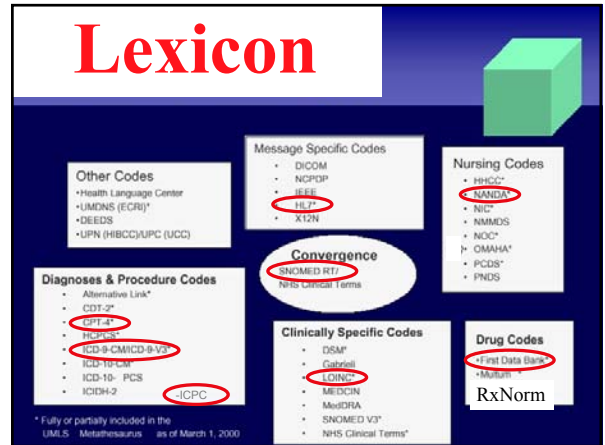
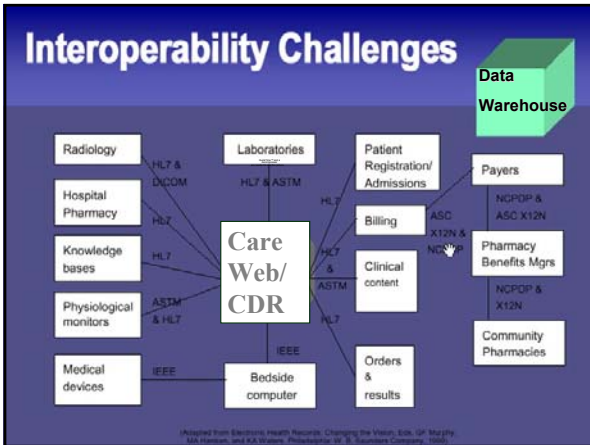
Image Import

THE UNIVERSITY OF MICHIGAN

Normal sinus rhythm
 digital infarct - age undetermined
 Abnormal ECG

Technician: MARY ANN CARTER
 Exam: V121-41430

Revised by: REB ACCT
 Confirmed by: PIED MORADY, MD
 VOLT: 10.0



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Challenge of Understanding Workflow and Clinical Decision Making...

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Understanding Workflow

Figure 3-2 CDS opportunities in clinical workflow

START OF VISIT

END OF VISIT
Transactions, orders, documentation

RESULTS ARRIVE

CDS Opportunities:

- A. Pre-visit questionnaires, Patient reminder notices
- B. Provider reminders
- C. Structured documentation
- D. Patient info display, Paramedic guidance
- E. Consequent actions
- F. Mailings completion
- G. Warnings Feedback
- H. Alerts
- I. Communication
- J. Alerts
- K. Communication
- L. Time-based alerts

Clinical Decision Support Implementers * Workbook, Osheroff, Pifer, Stig, Jenders and Teich, 2004

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15th January 1000 - 1053

2540, 640 grams
12 days old

The baby is tolerating feeds with a changing stool and is on erythromycin.

He is still ventilated on an SLE ventilator - pressures 23/4 (mean = 11), Ti0.4 = 45/min and needs an PICO2 at 60-70%.

The baby is on erythromycin and 15 ug of dopamine and vasotocum.

A chest X-ray was carried out at 0952.

"In this experimental task, participants performed better when presented with a textual summary of the medical scenario than when it was presented as a set of trend graphs."

Law et al., J of Clin Monitoring and Computing 2005

15th January 1000 - 1053

You see the infant first at 1000.

The baby has poor capillary refill. The HR = 164 and mean BP = 22. The PO2 = 7.8, PCO2 = 10 and sat = 90. The central temperature = 37.2°C, and peripheral temperature = 33.9°C.

A blood gas is taken which shows a pH=7.1, PCO2 = 6.8, PO2 = 7.2 and BE = -12. The lactate = 0.5, glucose = 5.9 and electrolytes are normal.

At 1010 the mean BP = 24 and HR = 155. CO, CO2 and sat are unchanged. A CXR shows compressed mediastinum and over distended lungs and so the peak airway pressure at 1025 is decreased to 20 and at 1028 to 18. The PCO2 has crept up to 11.1. Oxygenation is OK on both the sat's and transcutaneous PICO2.

Doctors and nurses are all actively discussing the management round the cot. The mean BP has fallen to 20 and the peripheral temperature has increased to 34.4°C.

Interim Conclusions...

- Business as usual isn't working, financial incentives aligned to providers is long overdue
- Engage consumers as key stake-holders in promoting HIT in improvement of quality of healthcare delivery
- There must be greater emphasis on medical knowledge incorporated into systems
- Building systems that learn are needed, adding actual valuable clinical information with each implementation
- Software that better reflects an *understanding* of the complex relationships and workflow between clinicians is long overdue
- A timeline for change is beginning to take shape.

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Thank you!

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