

The Value of Healthcare Information Technology in Clinical Practice

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Overview

- Motivation for Healthcare Information Technology (“HIT”)
- The Value Proposition for Electronic Records (“EHR”) & HIT
- US Activities Driving HIT Adoption
- Making EHR Work in Practice: Partners Healthcare
- Q&A

Healthcare Delivery Challenges

- Medical error, patient safety, quality and cost issues
 - 1 in 4 prescriptions taken by a patient are not known to the treating physician
 - 1 in 5 lab and x-ray tests ordered because originals can not be found
 - Patient data unavailable in 81% of cases in one clinic, with an average of 4 missing items per case.
 - 18% of medical errors are estimated to be due to inadequate availability of patient information.
 - 40% of outpatient prescriptions unnecessary
 - Patients receive only 54.9% of recommended care
- A fractured and 'unwired' healthcare system
 - Medicare beneficiaries see 1.3 – 13.8 unique providers annually, On average 6.4 different providers/yr
 - 90% of the >30B healthcare transactions in the US every year are conducted via mail, fax, or phone

2006 HIT Adoption Study

Health Information Technology in the United States: The Information Base for Progress



MASSACHUSETTS
GENERAL HOSPITAL

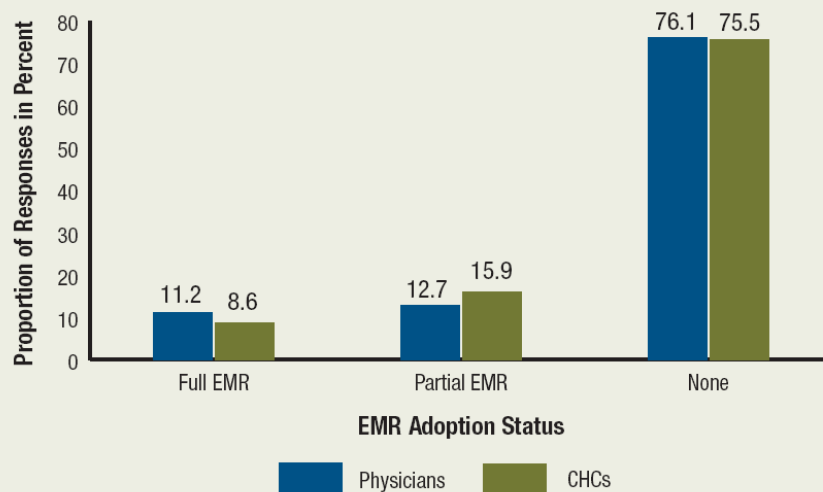
Robert Wood Johnson
Foundation

- 36 surveys identified and reviewed
- Clinical context:
 - Half assessed outpatient EHR only
 - 25% assessed both inpatient and outpatient
 - 25% focused on inpatient EHR only
- 17 surveys had adequate information for quality scoring

Outpatient EHR Use

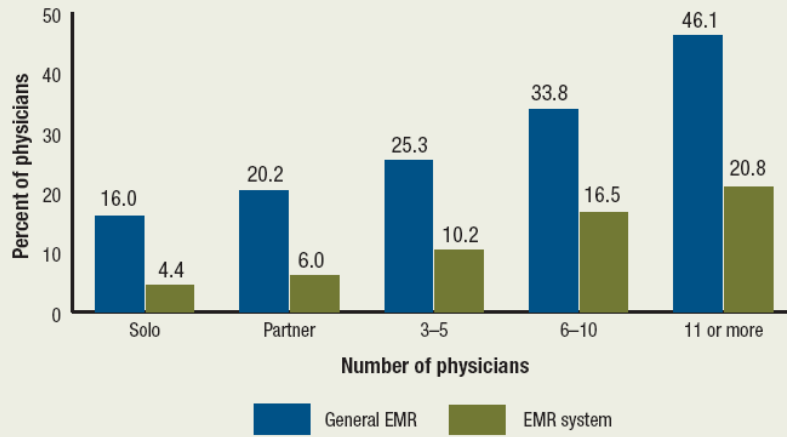
- Five surveys high quality
 - “EHR” adoption rate: 17% - 27%
 - NAMCS 2005 survey: 24%
 - Audet 2004: 27% use at least occasionally
 - CSHC 2001: 25% use at least one function
 - Use of EHR with key functionalities
 - 10% of ambulatory physicians

Figure 1: **EHR Adoption Among U.S. Physicians and Health Centers (2005-2006)**



Note: Physicians percentages are based on preliminary data from the 2005 National Ambulatory Care Survey (N=1,281 eligible physicians; 66.2 percent response rate). CHC percentages are based on preliminary data from the 2006 Survey of Health Center Use of Electronic Health Information (N=725 health center CEOs or Executive Directors; 79.5 percent response rate)

Figure 2: **Percent of physicians using electronic medical records and percent of physicians using electronic medical record system by practice size: United States, 2005**

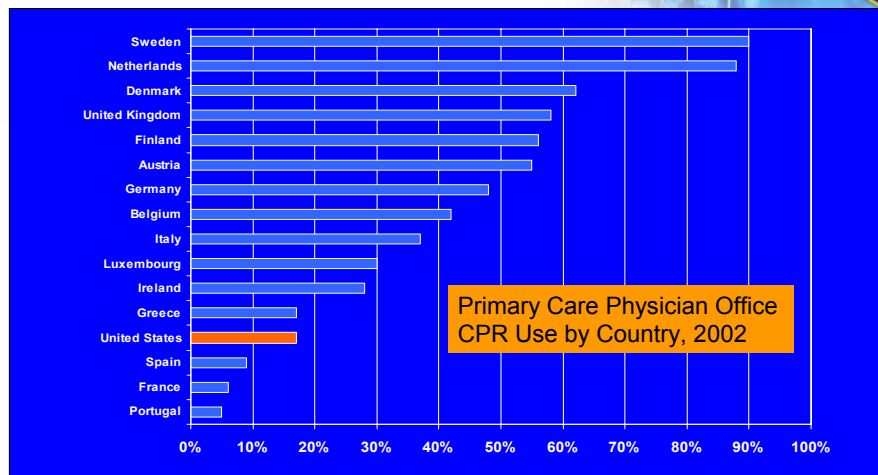


NOTES: Both trends are significant ($p < .05$). EMR is electronic medical record. General EMR is positive response to single question on full or partial EMR use. EMR system is a positive response to four minimal features: computerized orders for prescriptions, computerized orders for tests, test results and physician notes. Includes nonfederal, office-based physicians who see patients in an office setting. Excludes radiologists, anesthesiologists and pathologists

SOURCE: National Ambulatory Medical Care Survey.

The “CPR Adoption Gap”: The United States vs Others

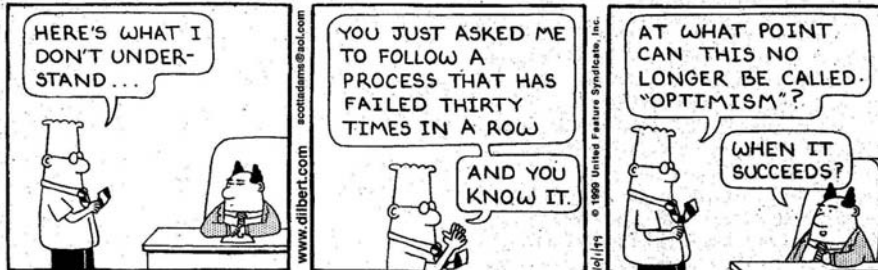
PARTNERS
Clinical Informatics
Research & Development



Primary Care Physician Office
CPR Use by Country, 2002

Dilbert Wisdom...

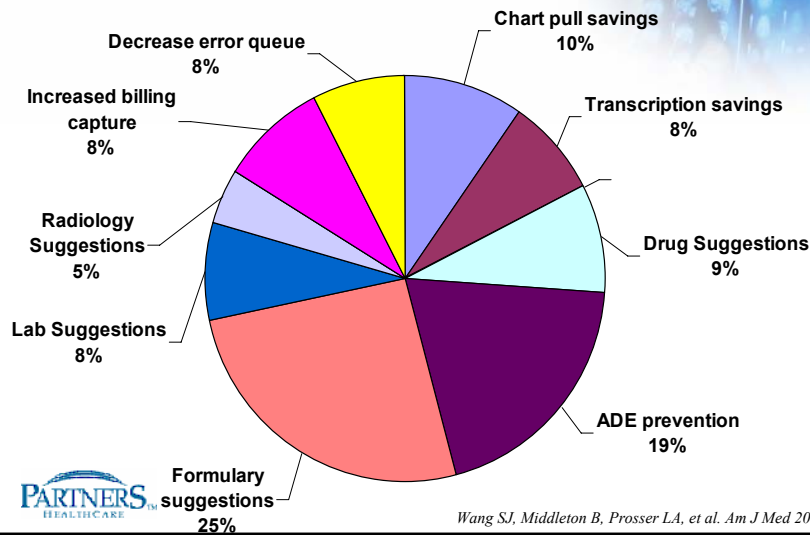
DILBERT by Scott Adams



The Value Proposition for EHR & HIT

- Headlines:
 - ROI of Partners Longitudinal Medical Record
 - \$31K Savings per provider
 - Value of ACPOE suggest
 - \$28K savings per provider
 - \$44B savings potential nationally
 - Value of Healthcare Information Exchange
 - \$78B year nationally

Breakdown of Benefit Areas for Base Case: \$31,300



Wang SJ, Middleton B, Prosser LA, et al. Am J Med 2003; 114:397-403.

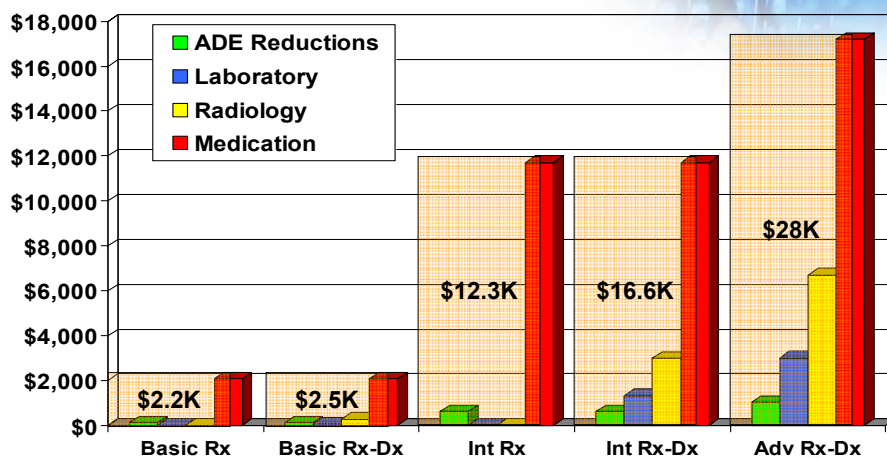
The Value of Ambulatory CPOE

- Summarized costs and benefits across clinical, financial, and organizational factors
- ACPOE Taxonomy:
 - Basic: passive references, no pt data, no EDI
 - Intermediate: some order and Rx patient-specific CDSS, limited pt data, no EDI
 - Advanced: adv. order and Rx patient-specific CDSS, full patient data, with EDI
- Full-time ambulatory provider
 - panel of 2,000, 3875 annual visits, capitation rate 11.6%
 - Total Rx, Lab, Radiology expenditures (almost \$1.2M):
 - Rx: \$650K
 - Lab: \$166K
 - Radiology: \$355K

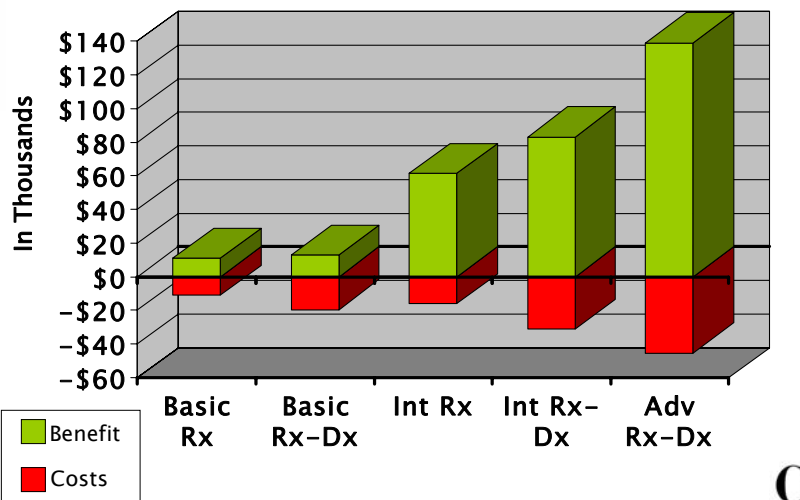
Clinical Impact of ACPOE

- Per “average” provider, Advanced ACPOE systems would prevent...
 - 9 ADE/yr
 - 6 ADE visit/yr
 - 4 ADE admission/5yr
 - 3 life-threatening ADE/5yr

Per “Average” Provider Annual Cost Saving Projections



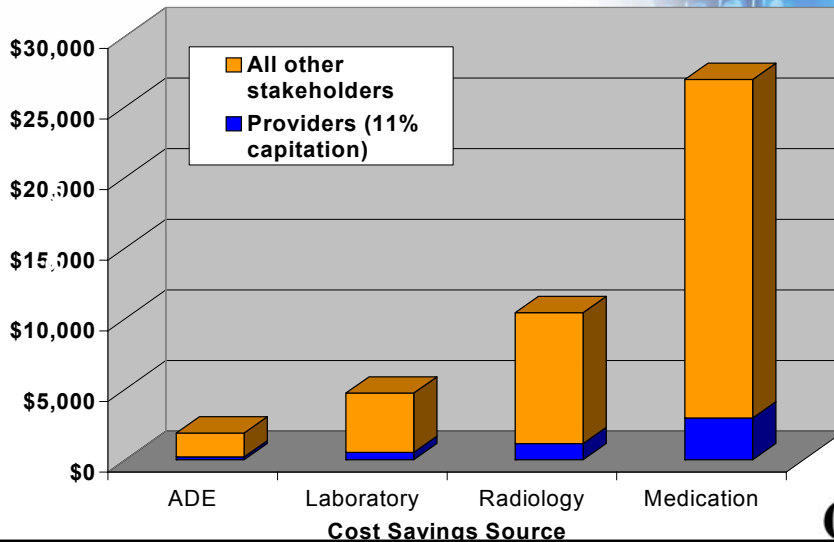
5 Yr Net Cost-Benefit for 25 Providers



Advanced Systems Produce Superior Returns

- For example, Advanced ACPOE costs nearly 4x as much as Basic, but...
 - Generates over **12x** more financial returns
 - Produces nearly **10x** greater reduction in number of ADEs
 - Provides IT infrastructure for core clinical computing – the outpatient EMR – which produces additional benefits
 - Pays for itself within first two years

National Cost Savings to Providers and Other Healthcare Stakeholders



US Healthcare System Will Benefit

- National adoption of Advanced ACPOE systems would prevent...
 - 2 million ADE/yr
 - 190,000 ADE admission/yr
 - 130,000 life-threatening ADE/yr
- Nationwide implementation of advanced ACPOE could:
 - Save the US \$44 billion annually

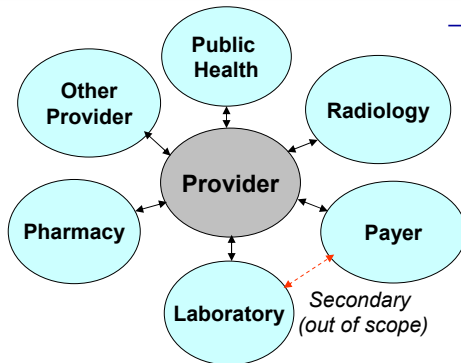
Value of HIEI: Key Findings

- **Standardized, encoded, electronic healthcare information exchange would:**
 - Save the US healthcare system \$337B over a 10-year implementation period
 - Save \$78B in each year thereafter
 - Total provider net benefit from all connections is \$34B
 - Net benefits to other stakeholders:
 - Payers \$22B
 - Laboratories \$13B
 - Radiology centers \$8B
 - Pharmacies \$1B
 - Public Health \$0.1B
- **Dramatically reduce the administrative burden associated with manual data exchange**
- **Decrease unnecessary utilization of duplicative laboratory and radiology tests**

Walker, J et al Health Aff 2005 Jan 19

HIEI Definition

- **Provider-centric encounter-based model of clinical information exchange**



— Clinical and administrative transactions and data exchange

- Between providers and other providers
- Between providers and labs, pharmacies, payers, radiology centers, and public health departments

Flow of Healthcare Information

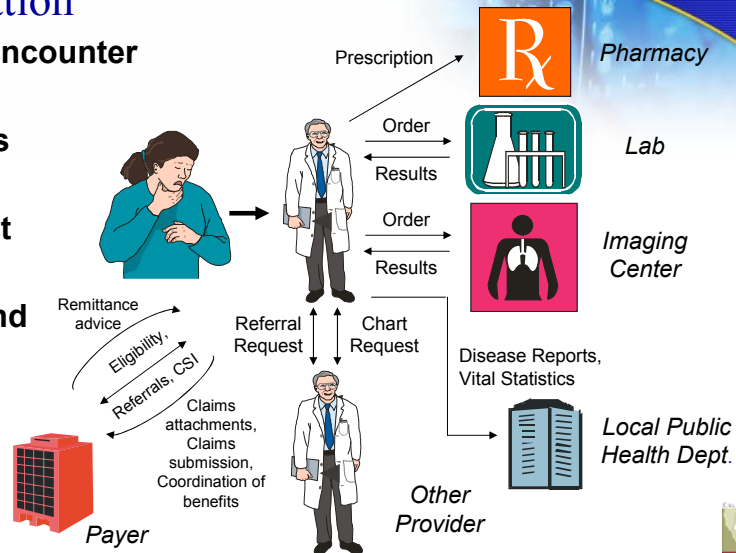
Clinical Encounter

Diagnosis

Treatment

Claims and Billing

Public Health



HIEI Taxonomy

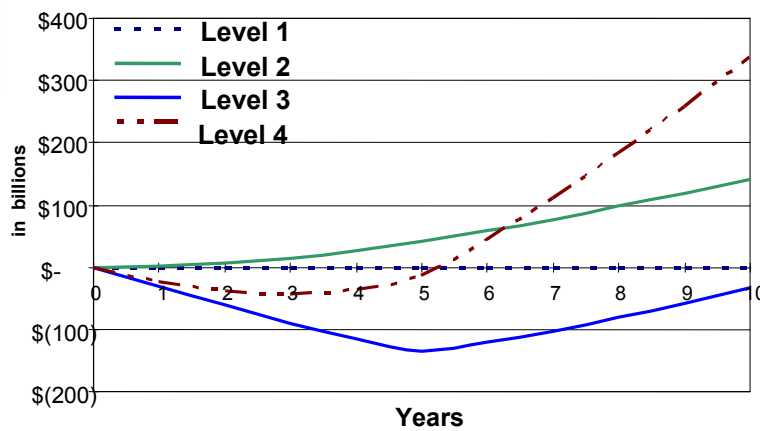
Level	Description	Examples
1	Non-electronic data	No PC/information technology
2	Machine-transportable data	Fax/Email
3	Machine-organizable data	Structured messages, non-standard content/data
4	Machine-interpretable data	Structured messages, standardized content/data

HIEI National Net Cost-Benefit

	<u>Net Return over 10-year Implementation</u>	<u>Annual Net Return after Implementation</u>
Level 2	\$141B	\$22B
Level 3	-\$34B	\$24B
Level 4	\$337B	\$78B

Value of HIE standards is the difference between Level 3 & 4

10-Year Cumulative Net Return by HIEI Level



US Would Benefit from Healthcare Information Exchange

- Nationwide implementation of standardized healthcare information exchange would:
 - Save \$337B over 10 years
 - Save the US \$78B annually at steady state
 - Cumulative breakeven during year five of implementation
- There is a business case for standardized healthcare information exchange and interoperability

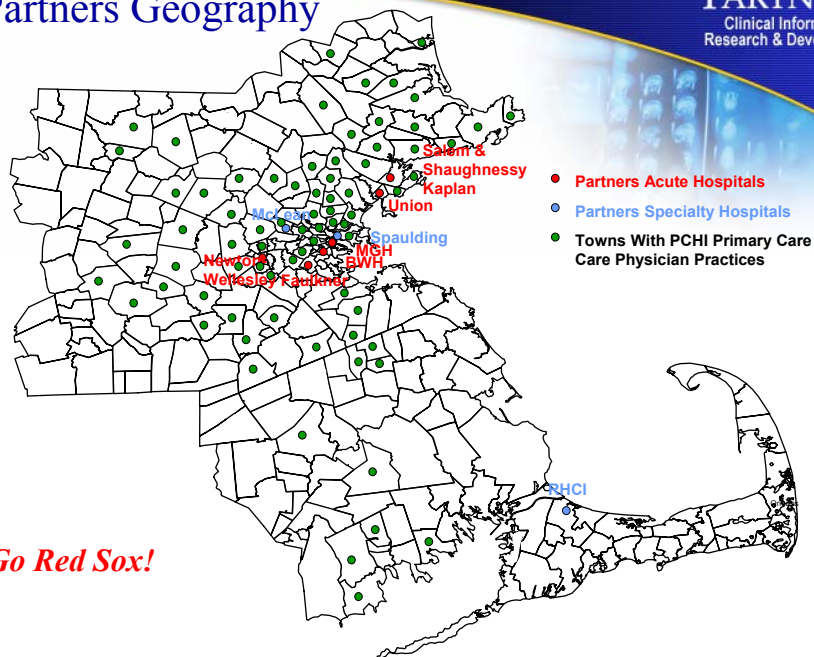
Forces Influencing HIT adoption in the USA

- Pay-for-performance
- Certification Commission for Healthcare Information Technology
- Healthcare Information Technology Standards Panel
- American Health Information Community – Breakthrough Workgroups
- NHIN Demonstration projects
- RHIO Projects
- Consumerism – Healthcare Savings Accounts, PHRs

Partners HealthCare – NHII *in situ*

- Founded in 1994
 - Brigham and Women’s Hospital
 - Massachusetts General Hospital
- Now includes:
 - Community Physician Network
 - 2 Rehab Hospitals
 - 4 Community Hospitals
 - Affiliated cancer hospital – Dana Farber
- Common Clinical IT supported by Partners Information Systems

Partners Geography



Overview of Partners IS: Scale of the Integration Effort

- 55,000 devices attached to the Partners network
- 45,000 users accounts
- 110 locations on the network
- 750 servers
- 800 applications
- 540 active projects
- 1,100 employees based in 19 locations

Partners HealthCare: Scale of the Integration Effort

- 580,000,000 results in the CDR
 - growing at a rate of 100,000 transactions/d
 - 800 GB allocated
- 25 million specimens on file
- 8 million Radiology reports
 - 75,000,000 images archived
- 2+ million Pathology reports
- 1+ million Operative notes
- 1+ million Discharge summaries
- 2+ million Microbiology Specimens

Partners IT Statistics, ca. Q4 2004

Total number of patients	3,300,000	Vital Signs	6,094,474
Physician users of CPOE	2,700	Patient Sessions	51,392,709
Patient users of the patient-provider portal	20,000	Web Sessions	18,951,058
Orders entered daily through inpatient CPOE	26,000	Patient Visits including phone call encounters	11,960,444
Telemedicine consultations annually	2,600	Appointments: Avg./day	~ 17,000
Notes in LMR	9,937,947	New Notes: Avg./day	~ 15,000
Medications	2,661,475	Edits to Notes: Avg./day	~ 10,000
Prescriptions printed (new and refills)	4,195,900	Patient Sessions: Avg./day	~220,000
Prescriptions faxed	580,781	Web Sessions: Avg./day (Average patient sessions per web session = 3)	~65,000
Health Maintenance items	2,287,706	Web pages generated: Average per day	~300,000
Immunizations	3,669,665		

What Are the Signature Initiatives?

The Signature Initiatives are five System-wide projects with one common goal:

To deliver better care to patients.

- **Care that is:**
 - **Safer**
 - **Better coordinated**
 - **More reliable in delivering proven interventions**
- **Systems that support providers in “doing the right thing.”**



What Are the Signature Initiatives?

- | | |
|--|---|
| <p>Infrastructure</p> | <p>1. <u>Investing in quality and utilization infrastructure</u></p> <ul style="list-style-type: none"> — Information systems — Other resources |
| ----- | |
| <p>Quality</p> <p style="text-align: center;">↑</p> <p style="text-align: center;">↓</p> <p>Efficiency</p> | <p>2. <u>Enhancing patient safety</u> by reducing medication errors system-wide</p> <p>3. <u>Enhancing uniform high quality</u> by measuring performance to benchmark for select inpatient and outpatient conditions</p> <p>4. <u>Expanding disease management programs</u> by supporting activities for certain patients with chronic illnesses</p> <p>5. <u>Improving cost effectiveness</u> through managing utilization trends and analysis of variance</p> |



ADVERTISEMENT



Quite possibly the biggest development in patient care since the telephone.

When Alexander Graham Bell invented the telephone in Boston in 1875, he was able to call his assistant in a nearby room using a wire. Today your physician can instantly call up your medical history, tests, medications and physicians' notes on a computer screen. It's called electronic medical record, EMR, and it's part of what we at Partners HealthCare call High Performance Medicine.

We began installing EMR in 2003. Today about 90 percent of our primary care physicians have it at our two academic medical centers, Brigham and Women's Hospital and Massachusetts General Hospital. Two of our community hospitals, Faulkner Hospital and Newton-Wellesley Hospital are finalizing implementation of EMR now. Our hospitals in North Shore Medical Center expect full implementation by next June. Among our community-based primary care physicians, more than 60 percent are using EMR or are in the course of implementing it. High Performance Medicine provides our doctors with guidance on the appropriate tests to order. For example, EMR tells them when an x-ray will be just as revealing as an MRI, but at a fraction of the cost. Physicians can write prescriptions on-line. This allows them to safely

order the right medication, detect any allergies you might have, and know which other medications you are taking, in order to avoid dangerous drug interactions.

Prescribing by computer also displays which generic drugs are effective, which have the lowest co-pay, and which are covered by your insurance. High Performance Medicine brings technological advances to the doctor's office, the pharmacy, and the neighborhood health center. We believe EMR will soon be used as effortlessly as the telephone. But with the power to help your doctor diagnose, treat and heal. For more information, go to www.Partners.org/HPM.

HIGH PERFORMANCE MEDICINE
Better, safer, more cost-effective care.

BRIGHAM AND WOMEN'S HOSPITAL



A charitable non-profit organization

MASSACHUSETTS GENERAL HOSPITAL



No one should have to decipher your doctor's handwriting to give you the right prescription.

When your pharmacist can read clearly what your physician prescribed, that means you're getting the right medication at the right dosage. This happens automatically when your doctor orders prescriptions by computer.

Physicians who prescribe by computers rather than pen and pad get alerts that point out allergies you might have to certain medications. They see all medications prescribed by other doctors in the Partners HealthCare system. This minimizes dangerous drug interactions. (Literally thousands of interactions are possible.)

There's no need to translate your doctor's handwriting. Or rely on your memory. Everything is clearly and securely kept in your doctor's computer. Your doctor can use a coding system developed by Partners pharmacists that says which generic drugs are safe and effective alternatives to heavily advertised ones. It even tells them which prescriptions are covered by your insurance and have the lowest co-pay.

Medication orders are automated at our founding hospitals, Brigham and Women's and Massachusetts General, as well as at Faulkner Hospital and Newton-Wellesley Hospital. It is the process of being implemented at our hospitals in North Shore Medical Center.

About 60 percent of Partners community-based primary care physicians also can prescribe by computer and that number grows every week.

This upgrading is part of what we call High Performance Medicine. HPM takes advantage of digital technology to make our already outstanding care even better.

But the best reason for prescribing by computer is that it is safer for our patients. And it doesn't take an Egyptologist to understand that's good for all of us.

For more information, go to www.Partners.org/HPM.

HIGH PERFORMANCE MEDICINE
Better, safer, more cost-effective care.

BRIGHAM AND WOMEN'S HOSPITAL

PARTNERS
HEALTH CARE
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Sometimes our sickest patients prefer to get coached at home.

Elderly patients or those with chronic conditions such as diabetes or heart disease are often more comfortable at home than in the hospital.

If their doctors say it's appropriate, we try to accommodate and support them. These patients, about three percent of all patients, account for nearly one-half of health care costs in Partners HealthCare's contracts with managed care companies.

Most of that three percent have diabetes, heart failure, or myocardial infarction. We provide them help in managing their diseases. Patients work at maintaining their health at home, which keeps them from having to be re-hospitalized.

Partners founding hospitals, Brigham and Women's and Massachusetts General, have funded nurse practitioners in "coaching" programs. In just three years these programs have reduced the rates of re-admission for heart failure alone by 15 percent.

A pilot program assigns registered nurse-coaches to maintain regular phone contact with Medicaid and uninsured patients who have volunteered to have their care monitored. The nurses are available 24 hours a day.

The nurse-coaches make sure their patients are taking medications, getting refills, keeping doctor's appointments, and reporting for tests. They also provide valuable two-way feedback between doctor and patient.

Coaching programs are part of Partners High Performance Medicine efforts to control health care costs. Savings have been significant and that affects taxes and insurance premiums.

But the real test is with our patients. They often tell us that, as much as they like our doctors and nurses, there's no place like home.

For more information, go to www.Partners.org/HPM.

HIGH PERFORMANCE MEDICINE
Better, safer, more cost-effective care.

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Informatics Innovators



Vanderbilt Medical Center



Massachusetts General Hospital



Brigham & Women's Hospital



Kaiser Permanente



Stanford Hospital

...a recent systematic review in *Annals of Internal Medicine* found that 25% of all studies took place at the above institutions.

Secure Clinical Communication And Notification of Results

Automatic Reminders

Summary Flowsheets

Intuitive Chart Summary

Coded Clinical Data

Customizable Desktop

The screenshot displays a complex clinical informatics interface. At the top, there's a navigation bar with options like 'Select', 'Desktop', 'PI Chart Summary', 'Oncology', 'Custom', 'Reports', 'Admin', 'Sign', 'Results', 'Resource', and 'Popup'. Below this, the main area is divided into several sections: 'Reminders' (with a note about influenza vaccination), 'Medications' (listing various drugs like Aspirin, Lisin, and others), 'Vitals' (showing respiratory rate, O2 sat, height, weight, and BMI), 'Allergies' (listing allergies like Penicillin), 'Health Maintenance' (with a table of IPN items), and 'Physicians' (listing various medical professionals). The interface is highly customizable with multiple toolbars and a sidebar on the left containing 'Advance Directives'.

Warning
You are ordering: AMOXICILLIN
Drug - Allergy Intervention

Alert Message: The patient has a documented allergy: Penicillins. Reaction: Unknown.

Keep New Order - select reason(s)

Patient does not have this allergy, will D/C pre-existing allergy

Reasons for override:

Patient has taken previously without allergic reaction

Low risk cross sensitivity, will monitor

No reasonable alternatives

Other

Continue New Order Cancel

Automatic Alerts in the Clinical Workflow

ALLERGIES:
 Erythromycins - Rash / Sulfa - Steven's Johnson / ASA (ACETYSALICYLIC ACID) - Itching

Medica MICROMEDEX(R) Healthcare Series - Microsoft Internet Explorer provided by Partners Health...

Dose: 25 MG
 Duration: day(s)
 Dispense:
 Refills:

KnowledgeLin

MICROMEDEX(R) Healthcare Series Integrated Index

Terms Matched{VIOXX, VIOXXALT; }

- **Summary Documents**
 - [Drug Summary Information \[ROFECOXIB - Drug Summary Information\]](#)
- **Drug Information**
 - [Ingredients from DRUGDEX Tradename Products \[ROFECOXIB - Drug Evaluation\]](#)
 - [PHYSICIANS' DESK REFERENCE \[VIOXX ORAL SUSPENSION - Complete Monograph\]](#)
 - [Ingredients from MARTINDALE Tradename Products \[ROFECOXIB - Complete Monograph\]](#)
 - [List Of DRUGDEX® Tradename Products](#)
 - [List Of MARTINDALE Tradename Products](#)
- **Disease Information**

LMR OMA14 - Microsoft Internet Explorer provided by AT&T WorldNet Service

Address: http://ppd.partners.org/scripts/phweb.swl?APP=LMR&OPT=LMR&BUTTON=PATIENTRESULTS&SESSION=59875211

Patient Name: 16560526 (BWH) 02/15/1951 (52 yrs.) F

BM949 BIMA

Result Letter Tickler To Do Patient Called

Test Name	BWH 10/09/03 15:01	BWH 10/12/01 17:00	BWH 01/31/01 09:12	BWH 01/24/01 15:35
WBC	12.14 (C)	9.94	9.95	7.74
HCT	39.0	39.8	36.6 (H)	41.9
HGB	13.2	13.2 (H)	11.0 (H)	13.5
RBC	4.55	4.65 (H)	4.02 (H)	4.64
PLT	325	384 (H)	276 (H)	347
MCV	85.6	85.6 (H)	91.0	90.3
MCH	28.9	28.5	29.4	29.1
MCHC	33.7	33.3	32.3	32.2
RDW	13.4	13.5	13.6	13.5
%POLY-A	73.7	60.7		65.0
%LYMPH-A		21.2		28.3
AMONO-A	0.47	0.50		0.35

Actions:

- Acknowledge Result
- Forward Result
- Add Interpretation to Letter
- Back to Result List
- Close Current Visit

Alerts and Guidelines

Medications

- Bupropion hcl sustained rel...
- Buspar 7.5MG 1 BID
- Ciclopirox olamine 0.77% 1...

Problems

- Leg edema
- Migraine headache
- S/p fibroma removal
- Menopause

Applet WebLink started

Results Management and Patient Communication

Checking results, writing letters

PARTNERS Clinical Informatics Research & Development

11/28/1923 (82 yrs.) F

BM949 BIMA

Result Letter Tickler To Do Patient Called

Test Name	BWH 10/19/06 17:31	BWH 03/03/06 17:10	BWH 10/04/05 09:23	BWH 12/09/04 10:59
WBC	4.12	3.00 (L)	4.08	2.70 (L)
HCT	21.6 (L)	37.5	37.2	36.1
HGB	10.7 (L)	12.2		
RBC	3.23 (L)	3.96		
PLT	169	169		
MCV	96.0 (L)	94.8	96.3 (L)	95.7 (L)
MCH	32.5 (L)	20.9	21.0	21.4
MCHC	33.9	32.6	32.1	32.8
RDW	13.4	13.1	13.2	13.6
%POLY-A	58.4		60.7	56.8
%LYMPH-A	33.7		33.7	35.4
%MONO-A	5.8		4.7	4.8
	1.6		0.7	2.5
	0.4		0.2	0.5
ANEUT-A	2.41		2.29	2.59
ALYMP-A	1.39		1.29	1.62
AMONO-A	0.24		0.17	0.22
			0.02	0.11
			0.01	0.02

Actions:

- Acknowledge Result
- Forward Result
- Add Interpretation to Letter
- Quick Letter
- Turbo Letter
- User Comments:
- Back to Result List
- Close Current Visit

Alerts and Guidelines

Medications

- Alphagan (BRIMONIDINE TAR...
- Asa 81 MG PO QD

Problems

- Breast radiotherapy, sip...
- Tim

Tickler

Paragraphs, letter templates

Add turbo letter

Information Access → Knowledge Linking

Partners Handbook

Overview

Partners Handbook is a repository of clinically-oriented electronic resources. It aggregates many online textbooks and journals, manuals, guidelines, research tools, forms and documents and, of course, many relevant clinical topics. The textbooks online include UpToDate, Harrison's, Redbook, Merck Manual, OVID, PubMed, PDR, Micromedex and more.

Quick Links

- Micromedex
- UpToDate
- Ovid
- Drug Information
- eTextBooks
- Patient Information
- Medical Literature
- Clinical Topics
- Manuals
- Guidelines
- Forms & Documents
- Clinical Calculators
- DXplain
- Partners Sites
- Feedback

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[Visit UpToDate >>](#)

Drug Information

Drug Formularies, Drug Administration Guidelines, drug related textbooks and references.
[Connect to Drug Information >>](#)

Disclaimer

Though a resource for patient care, research, and education, handbook cannot substitute for clinical judgment based on the individual circumstances of each patient. If you have any questions or concerns about the information, please [click here](#).

Diabetes Monograph

CLAUS, SANTA C 06222244 (BWH) 12/25/1900 (104 yrs. J.M)

BP goal < 130/80 LDL goal < 100 A1C goal < 7

Reminders

- Patient is overdue for Pap smear (rec: q 3 years).
- Patient is overdue for HbA1C (rec: q 6 months).
- Patient is Overdue for both Cholesterol and LDL tests (< 1 year).
- Patient is overdue for Ophtho exam (rec: q 1 year).
- Patient with diabetes overdue for urine microalbuminuria.

Medications

- Clonopin (OXYBUTYNIN CHLORIDE) 5 MG (5MG TAB)
- Levoxyl (LEVOTHYROXINE SODIUM) 100 MCG (100)
- Lisiprolol 10 MG (10MG TABLET take 1) PO BID x 30
- Perocet (OXYCODONE APAP) 1 TAB (5-325MG TI)
- Ritalin SR (METHYLPHENIDATE SUSTAINED RELEASE)
- Tylenol WITH CODEINE 80MG (ACETAMINOPHEN/)
- Zolpidem TARTRATE 5 MG (5MG TABLET take 1) PO

Last Known Values

Urip (24hr)	20 mg/total		
0-165 mg/24 hrs	9/7/04		
palb/cre	1.3 mg/g Cr		
<30.0	5/31/02		
A1C	NOT DONE %		
< 7%	10/29/04		
Glu	<20 mg/dl	112 mg/dl	
70-110	3/8/05	11/24/04	
Chol	188 mg/dl	100 mg/dl	
< 200	4/1/05	3/30/05	
Tri	57 mg/dl	100 mg/dl	
< 150	4/1/05	3/30/05	
HDL	83 mg/dl	50 mg/dl	
> 40	4/1/05	3/30/05	
LDL	94 mg/dl	105 mg/dl	
< 100	4/1/05	3/30/05	
SGOT	NOT DONE U/L	26 U/L	
9-32	11/22/04	11/17/04	
BLIN	99999 mg/dl	14 mg/dl	

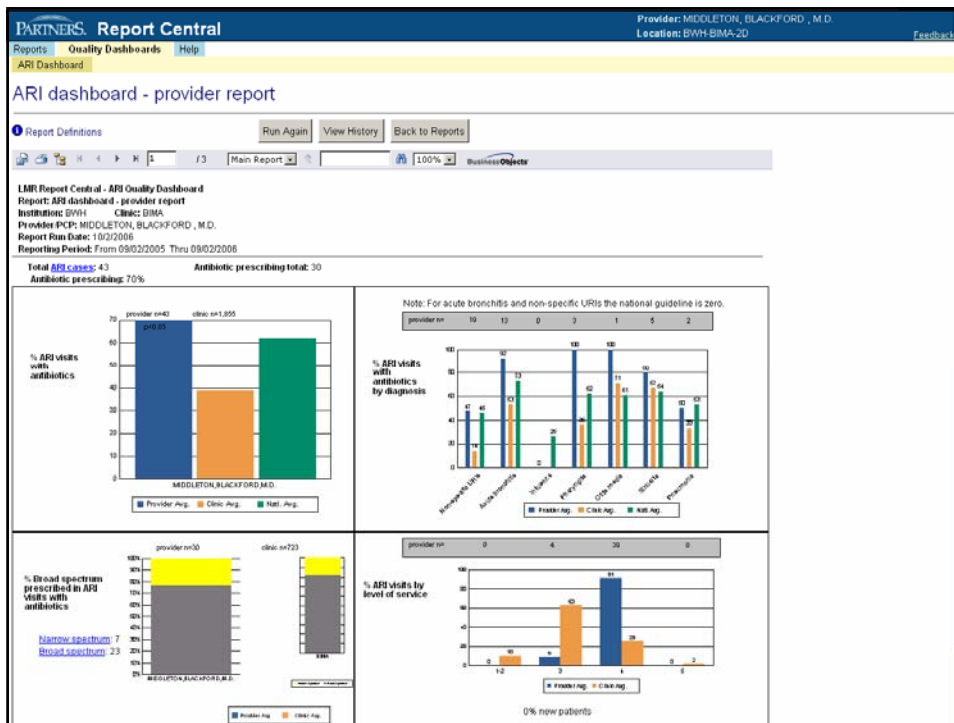
Other info

- weight 160 pounds 3/24/05
- height 56 inches 3/23/05
- BP 160/98 3/23/05
- smoking non smoker
- aspirin asa/nsaid intolerance
- Major CV comorbidities
- myocardial infarction
- H/O Renal insufficiency
- osd
- Peripheral neuropathy
- Angioplasty
- Cardiac bypass graft surgery
- H/O Renal insufficiency
- osd

Reminders

- glycemia Consider checking A1C to
- No A1C within last three months. Last A1C
- than 8 months ago) above target range
- lipids
- Last LDL (94) done on 4/1/05 (9 days ago)
- albuminuria
- palb/cre up to date. Last palb/cre (20 months ago).
- Allergies last updated 4/6/05
- artificial christmas trees rigor, disc
- Erythromycins hives,
- Sulfa hives, gi intolerance.
- NSAIDs itching.
- CARBAMAZEPINE gi intolerance.
- Penicillins anaphylaxis.
- Deaputs hives, mental status change

Patient Disease Management



CAD Quality Dashboard – Summary Page

Quality Dashboards: Coronary Artery Disease

Institution: BWH Clinic: BIMA User: LINDER, JEFFREY A., M.D., M.P.H. Role: Provider

Summary Measures Patient Lists

Measure	My Value (N)	Clinic Average (N)	Target
Lipid Management: % of patient with LDL < 100	61% (19)	63% (1747)	> 62%
Anti-platelet Management: % of patients on anti-platelet agent	90% (28)	82% (2271)	
Blood Pressure Management: % of patients with BP at or below goal	74% (23)	64% (1778)	> 68%
Smoking Status Documentation: % of patients with smoking status documented	97% (30)	75% (2072)	
BMI Documentation: % of patients with BMI documented	61% (19)	54% (1501)	
Beta-blocker Management: % of patients on beta-blocker	84% (26)	74% (2035)	> 80%
ACE Inhibitor/ARB Management: % of patients on ACE inhibitor/angiotensin-receptor blocker	71% (22)	67% (1843)	
Zero Defect Care: % of patients with zero deficiencies	0% (0)	1% (19)	
Total # of My CAD Patients:		31	

CAD Quality Dashboard – All Measures Graphical Screen



CAD Quality Dashboard – Apply Filters (Patient Lists View)

Summary Measures Patient Lists

All Patients Filters My Lists

Filters ... Show/Hide Filters: [-]

Lipids At goal: <100 LDL >= 100 LDL >130 Overdue Not recorded

Blood Pressure At goal Above goal Markedly above goal Out of date Not recorded

Smoking Status Meet goal Do not meet goal Recently quit Out of date Not recorded

BMI At goal Above goal Markedly above goal Out of date Not recorded

Anti-platelet Meets goal Not on (indicated/ not contraindicated) Contraindicated

Beta-blocker Meets goal Not on (indicated/ not contraindicated) Contraindicated Not indicated

ACE-I/ARB Meets goal Not on (indicated/ not contraindicated) Contraindicated Not indicated

Future Visits Within 1 week Within 2 weeks Within 1 month Within 3 months

Visits in last year 0 1 2 3 or more

Sex Female Male Unknown

Age <18 18-40 41-50 51-60 61-70 71-85 >85

Deficiency points 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Apply Filters

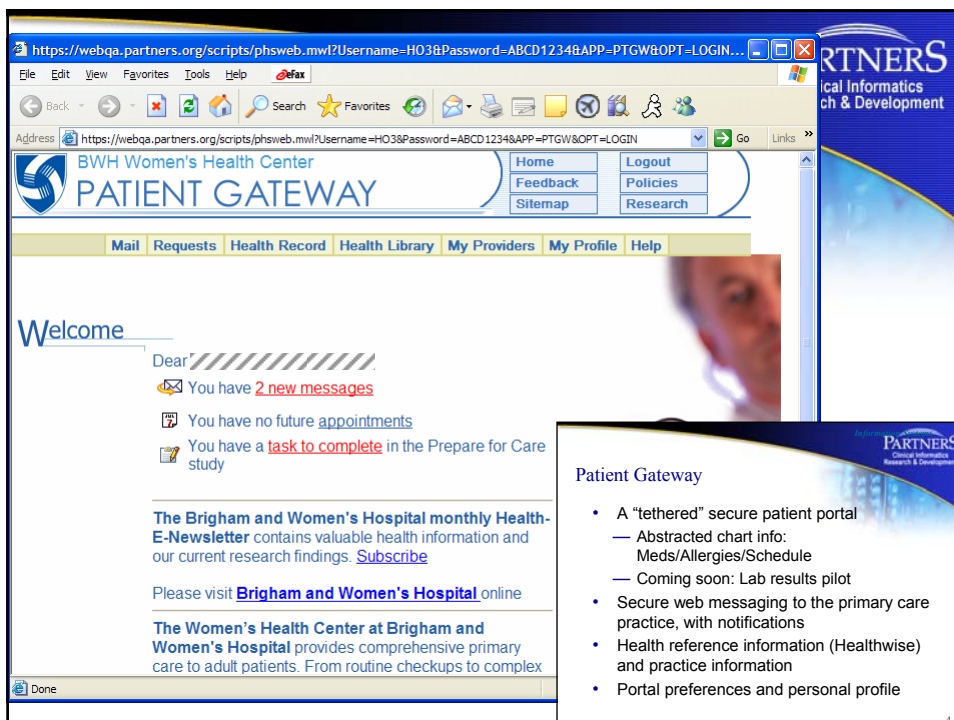
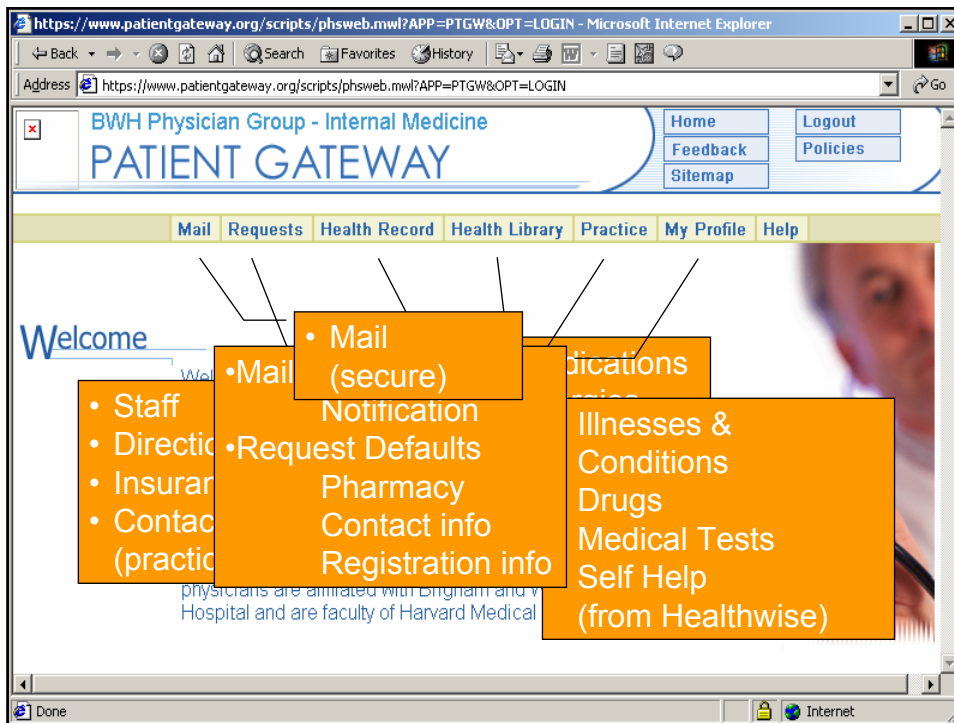
Name	MRN	Sex	Age	Visits (next)	LDL	BP	AP	BB	ACE/ARB	Smoking	BMI	Defic
	03299377	F	76	1	95 (9/9/04)	128/58 (2/16/05)	Y	Y	N	Never (10/24/03)		5
	13724307	F	45		43 (11/13/01)	138/76 (12/16/05)	N	N	N	Active (11/13/01)	25	8
	13181243	F	87	9	74 (7/25/06)	124/63 (8/10/06)	Y	Y	N	Never (7/13/06)	186	4
	02106722	F	77	4	91 (9/14/06)	149/95 (9/1/06)	Y	N	Y	Never (10/13/05)	38	5
	03424991	F	53	8	117 (9/14/06)	114/69 (8/17/06)	Y	N	Y	Never (12/21/98)	30	2
	01831122	F	87	12	79 (11/16/06)	117/53 (8/24/06)	Y	Y	Y	Active (2/10/05)		4
				11	146	134/78	N	N	N	Past		

The screenshot displays a medical software interface with several key components:

- SmartView: Intelligent Data Review (template driven):** A table showing patient data for 11/2/2005, 9/23/2004, 6/22/2004, and 3/21/05. It includes fields for BP (120/80, 130/80, 125/70), Weight (185, 164, 178, 180), and HbA1c (8.1, 8.8, 8.8, 8.8).
- SmartNote: Free text and Coded Clinical Documentation (template and rule driven):** A text area containing a detailed medical history, including Chief Complaint (Chest Pain), History of Present Illness (Angina Template), Past Medical History (Diabetes, Hypertension, CAD, etc.), and Allergies (Sulfa drugs, Penicillin, etc.).
- SmartOrders: One-click disease specific order recommendations and workflow support:** A list of treatment goals and orders, such as "Start Metformin 500MG (500MG Tab take 1) PO BID" and "Start Metformin PO...".
- Other sections:** Patient Demographics, Problems (Diabetes Mellitus Type 2, CAD, DVT, CHF), Medications (Glibenclamide, Aspirin, Lisinopril, etc.), and Allergies.

The advertisement features two main images and sections:

- Top Left:** A woman sitting at a desk with a laptop, with the text "She's scheduling an appointment." above her.
- Top Right:** A man sitting at a desk with a computer, with the text "He's refilling a prescription." above him.
- Text:** "Introducing Patient Gateway - the fast, efficient, and secure way to reach your doctor's office. Developed by Partners HealthCare System, Patient Gateway uses the power of the Internet, so you can renew prescriptions, request referral authorizations for specialist appointments, and access quality health and wellness information - at your convenience. With Patient Gateway, connecting with your doctor's office has never been easier!"
- Contact Information:** "Enroll online today at: www.patientgateway.org or email us at: patientgateway@partners.org"
- Logos:** Patient Gateway logo and logos for Massachusetts General Hospital and Massachusetts General Physicians Organization.



PARTNERS
Clinical Informatics
Research & Development

https://webqa.partners.org - Patient Gateway :: Research Home :: Office Chart - Microsoft Internet Explorer

Patient Gateway
Connecting with care

Office Chart Information

Research Home > Office Chart

Selected information from your physician's office chart is shown below. For more details about an item, click on it. Office chart information is usually reviewed/updated as part of a routine yearly visit. [More about office chart information](#)

Screening & Prevention, Family History Checklist (chart data from 08/10/2005 02:41PM)

Screening & Prevention

- Due**
 - Tetanus/Diphtheria booster *Details not available*
- Up to Date**
 - Pap smear *see report in Results (entry 11/03/2004)*

Family History Checklist
Information about medical conditions in your relatives is used in your medical care to identify possible risks you might have for developing the same or other conditions. To find out how your family history information can affect your medical care and risk, please review these [Family History medical conditions](#).

Done Internet

PARTNERS
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Research & Development

https://webqa.partners.org - Patient Gateway :: Research Home :: Office Chart Information :: Sc - Microsoft Inter...
https://webqa.partners.org - HealthWise - Microsoft Internet Explorer

Patient Gateway
Connecting with care

Screening & Prevention

Research Home > Office Chart Information > Screening

Screening and prevention information from your physician on the "I" icon next to the name. Screening and prevention [screening & prevention](#)

Due **Up to Date**

Tetanus/Diphtheria booster

TETANUS/DIPH
Details not available

THIS ITEM IS DUE

What this is:
The combined tetanus and diphtheria vaccines protect against tetanus, a bacterial infection that causes painful spasms of the neck, jaw, and back. Diphtheria is a bacterial infection that causes a sore in the throat and can lead to heart failure and death. Vaccination against tetanus and diphtheria is recommended every 10 years.

Why this is due:
To prevent tetanus and diphtheria, a tetanus/diphtheria vaccine is recommended every 10 years. Your record shows that you have not received a tetanus/diphtheria vaccine in the last 10 years.

Topic: Diphtheria, pertussis, and tetanus vaccines

DTaP immunizations protect people against diphtheria, whooping cough (pertussis), and tetanus (lockjaw). Before vaccines were available, many people died from these diseases.

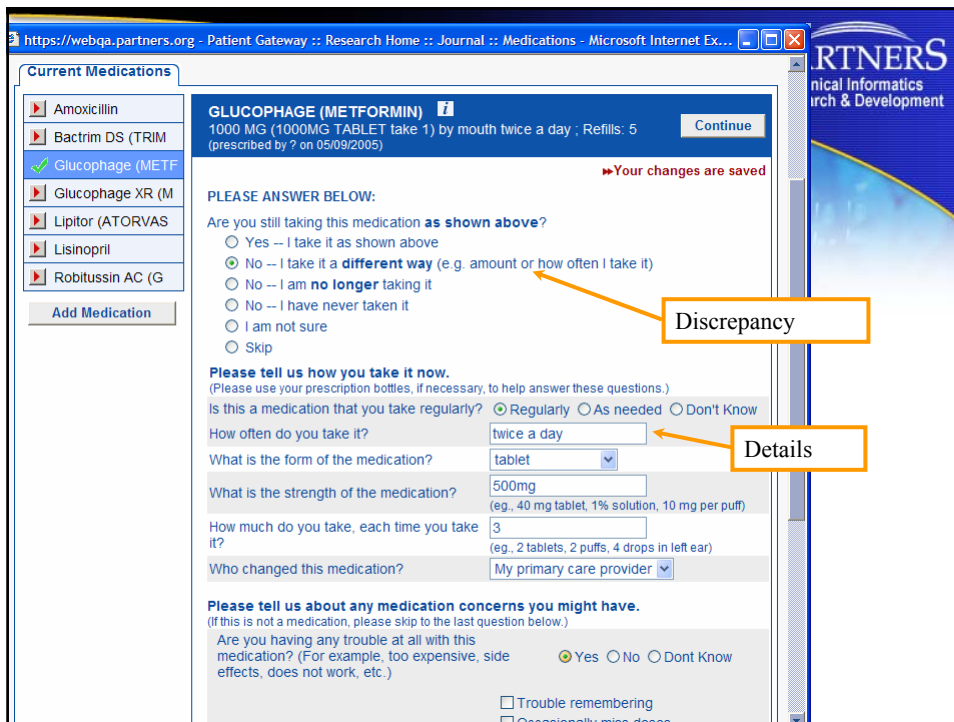
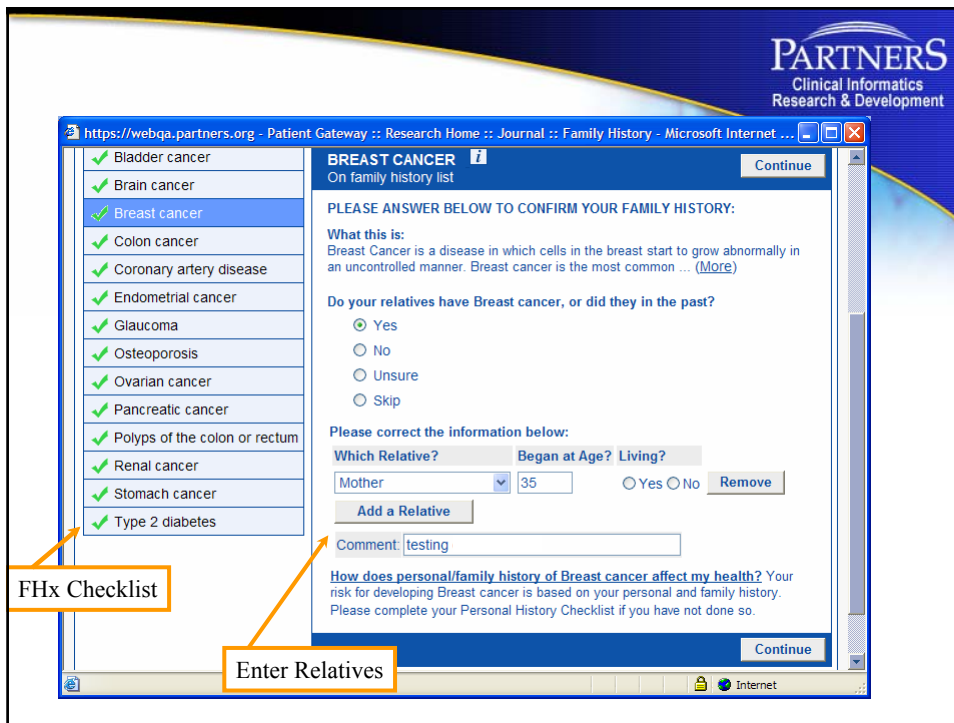
Children

Usually, DTaP vaccinations are given throughout childhood at specific ages, for a total of five injections. An immunization usually is given at:

1. 2 months of age.
2. 4 months of age.
3. 6 months of age.
4. 15 to 18 months of age. This dose can be given as early as 12 months of age if at least 6 months have passed since the third dose and another visit is unlikely by the time a child is 15 to 18 months of age.
5. 4 to 6 years of age.

Sometimes the fourth and fifth injections of DTaP cause a more severe reaction (swelling and redness) at the site than the first three injections of the vaccines. Ask your health professional what to do if such a reaction occurs.

Done Internet



Patient-centered Care Management

Brigham Internal Medicine Associates
PATIENT GATEWAY

Home | Logout
Support | Policies
Sitemap

Mail | Requests | Health Record | Health Library | Practice | My Profile | Help

Are you Up-to-date?
 HbA1c
 Cholesterol
 Eye exam

How are you doing with your diabetes medications?
 Metformin
 Glipizide
 Norvasc

Are you on Target?
 Blood Sugar control
 Cholesterol
 Blood Pressure

How is your diabetes self-care?
 Nutrition
 Regular Exercise
 Self-testing (glucose)
 Self-testing (blood pressure)
 Foot care
 Daily aspirin use
 Smoking status

Taking Aspirin Each Day

Aspirin is an important medicine for reducing the risk of heart attacks and stroke, although this medication may not be appropriate for all patients.

How does taking aspirin help?
 Blood pressure is usually measured in the office during a visit. If it is not available, it may mean that after it was checked in the

Are you currently taking Aspirin?
 Yes
 No

Would you like to discuss Aspirin at your next visit?
 I want to discuss this at my next visit.
 I'm unsure about discussing this with my doctor at the next visit.
 I don't want to discuss this at my next visit.
 Reason:
 Skip this item.
 Other:

View Next Item

PARTNERS Clinical Informatics Research & Development

Increasing Enterprise Integration: Partners Advanced Informatics Infrastructure

Increasing the level of enterprise integration is supported by core IT services that can be integrated with and/or accessed by site-based applications.

These IT services integrate and communicate with the site-based and enterprise applications via a *service-oriented architecture* made up of layered components.

This approach leverages:

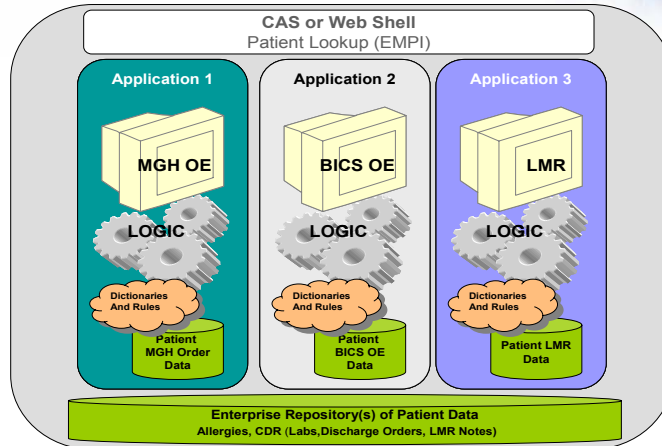
- A common technology infrastructure;
- Common data, terminology and rules (especially those associated with allergies, problems and medications);
- Shared clinical services and applications; and
- Customized views and capabilities for specific user types.

Overview of a Service-Oriented Architecture

Web-Based Portals <small>Physicians, Nurses, Researchers, Administrators</small>	<small>Provide customized access to relevant clinical applications and patient information based on end user roles and individual requirements.</small>
Applications <small>Order Entry, Clinical Documentation, Order Processing</small>	<small>Aggregate services into logical components that support specific functions</small>
Services <small>Clinical Decision Support, Event Scheduler, Notification, CDR access</small>	<small>Re-usable software modules that address specific clinical IT capabilities</small>
Knowledge & Data <small>Data Repositories, Controlled Medical Terminologies, Catalogues, Dictionaries and EMPI</small>	<small>Logic and tools that access data repositories for patient information, knowledge and terminology</small>
Infrastructure <small>Data Center, User Devices, Networks, Security</small>	<small>Technical foundation and support for clinical applications and end users</small>

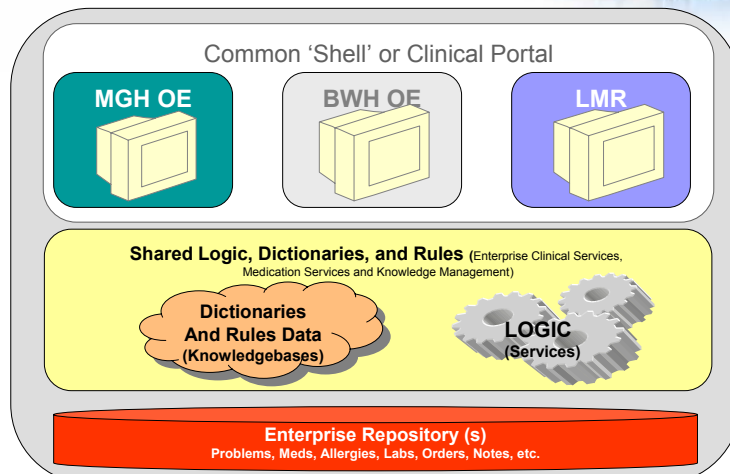
Discrete vs. Shared Data, Knowledge, Logic

Many Partners' applications utilize discrete data, logic and knowledge or rules; most are not integrated across sites – creating islands of information and supporting varying levels of functionality.



The Future: Shared Data, Knowledge, and Logic

Future clinical applications will take advantage of shared repositories of enterprise data, knowledge, and logic, in a *services-oriented architecture*



Knowledge Management Portal

Home Browse by Topic Filter-based Search

Welcome to the KM portal!

Announcements

We've changed!

With usability in mind, we recently underwent a redesign of our Knowledge Management portal. Alan Rose, usability expert in CARD, has completed interface redesign for other Partners applications such as Patient Gateway and LMR to name a few. The Knowledge Management portal is about a year old and we thought it would be the right time to implement usability improvements and provide our users with easier to use search interfaces.

What has changed? First, we upgraded our code to a .NET platform through the hard work of **Web Integration Team** and **PHS Web Development**. Second, we've improved our graphical interface and site layout, and we've added bread crumbs for improved taxonomy navigation. With filter-based search, you will find you can refine your search within the same screen without having to use the back button. With keyword search, navigation between pages of search results is easier to use. These are just a few of the improvements you will find.

If you are visiting the site for the first time, please visit our getting started guide which provides an overview of search capability and functions. You can also review the glossary of terms to familiarize yourself with our site's terms and terminology.

If you have feedback related to the site's redesign, please email Cathyann Harris at charris@partners.org who is coordinating the development, deployment efforts for this site.

This site is intended to help anyone at Partners who is engaged in embedding clinical knowledge into the various electronic health record systems share that knowledge with each other. Partners has a rich inventory of order sets, rules, reminders, expert dosing databases, drug information, and documentation templates embedded in a rich array of clinical systems. The Partners Knowledge Management Team has begun the process to inventory and catalogue these assets to support sharing and efficient maintenance.

You can access these assets in three ways:

[Keyword Search](#) [Browse by Topic](#) [Filter-based Search](#)

Site navigation is organized by the four key domains of the Partners Signature Initiatives: Quality, Safety, Disease Management, and Trend Management.

Filter-based search makes it possible to look at content comparatively. For example, if one would like to compare order sets for cardiac interventions at the Brigham and Women's Hospital and the Massachusetts General Hospital, then filter-based search is the simplest way to view information sifted for these attributes.

Alternatively, if one wants to see all the content related to managing anticoagulation, then navigating there from the Safety section of site navigation will be the simplest. For more information on this please go to "Getting Started". Our team will continue to catalogue and update in the upcoming years, particularly as more hospitals implement physician order entry systems and the LMR.

In addition, in 2005, we'll begin implementing specialized tools to support better collaboration with subject matter experts in content development as well as more efficient management of the tracking, versioning, and cataloging needed for content management. We look forward to working with all of you to make the portal work for you.

If you are looking for content and cannot find it, or if you are having technical difficulty with the site, please contact the Help Desk at 617-732-5927 and open a ticket under the **KNOWLEDGE MANAGEMENT** queue, we'll be glad to help. Our hours of primary support are **8:30-4:30 Mon-Friday**.

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Compare Content Across Organizations

Knowledge Management Portal

Keyword search → Site Search: Search

Home Browse by Topic **Filter-based Search**

Search Criteria

Clinical Disciplines

- All Clinical Disciplines
- Anesthesiology/Perioperative Medicine
- Behavioral Medicine
- Burn Management
- Cardiology (Interventional)
- Cardiology (Medical)
- Cardiology (Surgical)
- Emergency Medicine
- Endocrinology
- Gastroenterology
- General Medicine
- General Surgery
- GI Colorectal Surgery
- Hematology and Oncology
- Infectious Disease
- Nephrology
- Neurology
- Neurosurgery
- Neurophysiology
- Obstetrics and Gynecology
- Orthopedic

Filters

Entity: All Entities, BWH, MGH, IFCI

Venue: Clinic Care, All Venues, Ambulatory Care

Patient Age Group: All, All Patient Age Groups, Geriatric

Application: All Applications, BICS Event Monitor, BICS Order Entry

Content Type: All Content Types, Drug Information, Expert Dosing

Patient Safety: Alerts and Notifications, All Patient Safety, Consequent Order/Lab Display

Disease Management: All Disease Management, Coronary Artery Disease, Diabetes

Submit Filter Search

Results

Document Title	Content Type	Entity	Selected Search Filters:
Aortic Surgery Post Op Pathway - BWH View Details	Order Sets and Templates	BWH	Clinical Disciplines • Cardiology (Surgical)
Atrial Fibrillation Protocol - MGH View Details	Order Sets and Templates	MGH	Entity • BWH • MGH
Cardiac ICU Additional Post Op Orders Transplant Patients - MGH View Details	Order Sets and Templates	MGH	Venue • All Venues
Cardiac Surgery Admission Pre-Op - BWH View Details	Order Sets and Templates	BWH	Patient Age Group • All Patient Age Groups
Cardiac Surgery Admission Pre-Op - MGH View Details	Order Sets and Templates	MGH	Application • All Applications
Cardiac Surgery Elbow B Front Door Same Day	Order Sets and Templates	MGH	Content Type

IBUPROFEN - Microsoft Internet Explorer provided by Partners Healthcare System

documentum eRoom

My eRooms > Partners Gerlos v2 > NSAIDs and COX-2 Inhibitors > NSAIDs database > IBUPROFEN

IBUPROFEN

a database entry created by Severio Naviglia on 10 Sep 04

Rollup Name	IBUPROFEN
Route	PO
Lexicomp Reference	... Use lowest effective dose for shortest period possible...
Current BCS FOC	Q6H, PRN
Current BCS Min.Dose	200 MG
Current BCS Max.Dose	800 MG
Current BCS Prt.Dose	400 MG
Current BCS Substitute Meds	
Current BCS Message	
Proposed Gerlos FOC	Q6h
Proposed Gerlos Min.Dose	200 MG
Proposed Gerlos Max.Dose	800 MG
Proposed Gerlos Prt.Dose	400 MG
Proposed Gerlos Substitute Meds	
Proposed Gerlos Message	

Comments

Suggest regular, not prn, treatment for 5-7 days and then re-evaluate. (Claus Hamann, Partners Healthcare, 30 Sep 04 10:29am)

Agree (Jatin Dave, 30 Sep 04 11:21pm)

Round 1 Summary (Oct 18) (Eileen Yoshida, Partners Healthcare, 18 Oct 04 4:00pm)

1. Agreement on min dose, max dose and preferred (default) dose.
2. Re: frequency - suggestion made to change to q6h (NOT q6h prn) for better pain management. In addition, in LMR, we technically, we default to prn dosing, therefore, must use q6h.

I would like to see max dose at 600mg (James Rudolph, 26 Oct 04 8:51pm)

However, I can be easily persuaded to keep it at 800.

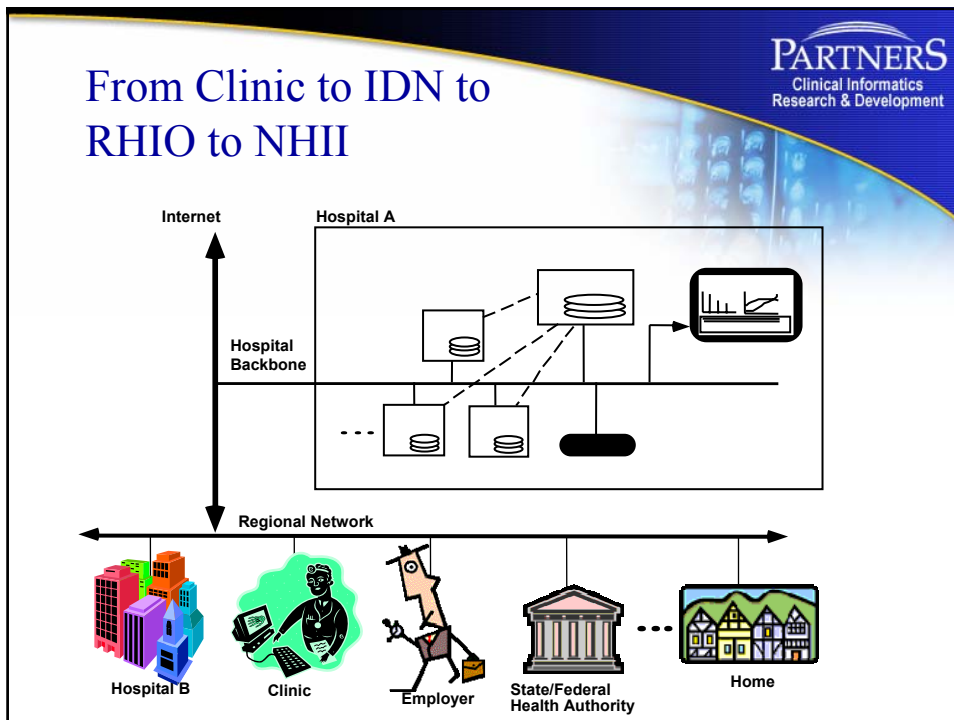
Ibuprofen (Andrew Seger, 29 Oct 04 8:55am)

Default Dose = 400 mg every 6 hours; current labeling says max is 3200 mg daily;
max dose = 800 mg max frequency = Q6H = 2400 mg QD

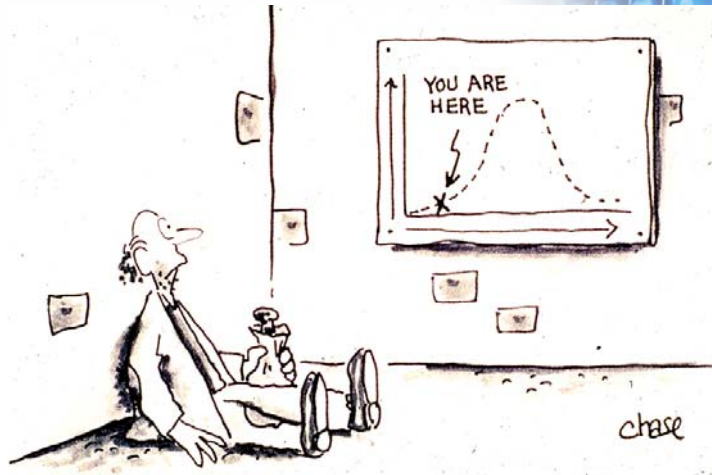
Round 2 Summary (Nov 14) (Eileen Yoshida, Partners Healthcare, 15 Nov 04 10:56am)

1. Still need to finalize max dose of ibuprofen.
2. I will try to pull (and post) Ann Rheum Dis 2004 reference to see if this is helpful.

Multi-Clinician Collaboration on a 300 x 5 Decision Table



Where Are We?



“I conclude that though the individual physician is not perfectible, the system of care is, and that the computer will play a major part in the perfection of future care systems.”

*Clem McDonald, MD
NEJM 295:1355, 1976*

Thank you!
Blackford Middleton, MD
bmiddleton1@partners.org

