Health Information Technology 101: Basics for Hospitals
A Brief Agenda

- Setting the Stage
  - Information Technology (IT) & the health care system
  - A Little Perspective

- Electronic Health Records
  - It really can work now
  - Does it make any difference?
  - Some additional features and capabilities

- The Next Frontier: Personal Health Records

- The Concept of Health People
VHA is an Agency of the Department of Veterans Affairs

Locations & Affiliations

- ~1,300 Sites-of-Care
  - Including 158 medical centers, ~850 clinics, long-term care, domiciliaries, home-care programs
- Affiliations with 107 Academic Health Systems
  - Additional 25,000 affiliated MD’s
  - Almost 80,000 trainees each year
  - 60% (70% MDs) US health professionals have some training in VA
2004: Who is “VA”?
Veterans Health Administration

◆ Budget, Staff, & Patients

~193,000 Employees (~15,000 Doctors, 56,000 Nurses, 33,000 AHP)
  » 6% decrease since 1995
    ◆ 13,000 fewer employees than 1995

~ $27.4 Billion budget
  » 42% increase since 1995
    ◆ Flat at ~$19B from 1995 - 1999

– 5.1 million patients, ~7.5 million enrollees
  » 104% increase in patients treated since 1995
    ◆ From 2.5 million patients / enrollees in 1995
VA’s Patient Satisfaction Index

◆ **External American Customer Satisfaction Index**

*(University of Michigan)*

- **2000**: 79 of 100 on Outpatient Care
- **2001**: 82/100 Inpatient & 83/100 Pharmacy
  
  ◆ Significantly better than private health sector average of 68
  - Loyalty Score of 90 & Customer Service Score of 87 were healthcare benchmarks!
- **2002**: Repeat Performance - Outpatient (79) & Inpatient (81)
- **2003**: Repeat Performance - Outpatient (80) & Inpatient (81)
Health Information Technology as a Lever for Change

“Health information technology provides a mechanism for refocusing care delivery around consumers without substantial regulation and industry upheaval.

Information technology can result in better care (care that is higher in quality, safer, and more consumer responsive) and at the same time, more efficient (care that is appropriate, available, and less wasteful).

There are very few other alternatives that can achieve both of these goals in a balanced and timely manner.”

The Decade of Health Information Technology: Delivering Consumer-centric and Information-rich Health Care
July 21, 2004
US Department of Health and Human Services
Improved Health & “PAPERLESS”

Standards
- Data
- Communications

Health Info Systems
- Electronic Health Records Systems (EHRs)
- Personal Health Record Systems (PHRs)
- Info Exchange

Adoption by health organizations & persons of affordable, high quality & standards-based EHRs, PHRs & Health Info Exchange

Improved Health

Paperless (IOM)

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

* This graphic inspired by discussions at a Kaiser-Permanente and IOM sponsored meeting in October 2001.
Toward a “Virtual Health System”

◆ **Electronic Health Records (EHRs)**
  - Robust, Widespread Use of High Performance Electronic Health Records (EHRs)

◆ **Personal Health Records (PHRs)**
  - Full copy of one’s own health information along with personalized services based on that information
Safety is Not Enough

- Patients don't seek care just to be safe. Safety is Fundamental
  - Goal: Avoid Getting It Wrong
- Safety & Effectiveness, To Close to Chasm
  - Expect effectiveness in maintaining & improving health, managing disease & distress
  - Goal: Getting It Right . . . Consistently
- Patient-Centered, Coordinated Care
  - Patient is locus of control
  - Seamless across environments
  - Integrates disease-specific, general health and social needs
  - Anticipates health trajectory and modifies risks, even before traditional risk factors manifest
  - Goal: Care that is safe, effective & predictive and delivered in the time, place & manner that the patient prefers

Information Technologies & Care Coordination in Supporting These Goals

To Err is Human: 98,000 Patients

The Quality Chasm: Every Patient
“ Crossing the Quality Chasm” 2001: IOM
“... Given the huge increase in personal computer and Internet use, as well as the dramatic changes in other industries, most consumers assume that healthcare is highly electronic and computerized. The reality, however, is that 90 percent of the business of healthcare remains paper-based. Why?

... because healthcare (in the U.S.) is a trillion-dollar cottage industry!”

Shortcomings of a Cottage Industry: Dual Challenges

- **Information:**
  - 1 in 7 hospital admissions occurs because care providers do not have access to previous medical records.
  - 12% of physician orders are not executed as written.
  - 20% of laboratory tests are requested because previous studies are not accessible.
  - 1 in 6.5 hospitalizations complicated by drug error
    - » 1 in 20 outpatient prescriptions

- **Effectiveness:**
  - 98,000 Americans die each year from medical errors.
  - Virtually every patient experiences a gap in care from best evidence.
  - Health care inflation accelerating without commensurate value
    - » ↑ Uninsured & pharm uninsured
    - » ↑ Administrative costs
  - American health care is reactive;
    - » Safety net after catastrophe
    - » Marginal Prevention
    - » Unable to systematically anticipate needs that will predictably arise
  - Patient / Payors / Providers increasingly dissatisfied

» ↑ Uninsured & pharm uninsured

↑ Administrative costs

↑ Uninsured & pharm uninsured
Except in VA!

Every VA Medical Center has Electronic Health Records!
EHR
Electronic Health Records
Praise for VistA...

“VHA’s integrated health information system, including its framework for using performance measures to improve quality, is considered one of the best in the nation.”

VistA’s Contribution to VA

Creating a Culture of Quality: The Remarkable Transformation of the Department of Veterans Affairs Health Care System

“What was largely an inpatient, subspecialty-based system became a “full-service,” integrated delivery system committed to a new model of health promotion, disease prevention, and coordination of care.

…

The “culture of quality” depended on the successful implementation of several innovations: a uniform data collection system facilitated by nationwide implementation of an electronic medical record system, systematic application of quality standards, and externally monitored local area networks to monitor quality.”

Annals of Internal Medicine, Editorial, August 17, 2004.
### Active Problems
- Psychogenic Headache
- Calculus of Kidney (ICD-9-CM 592.0)
- Agitation
- Cytomegalic Inclusion Disease
- Hypomagnesemia
- Emphysema Nec
- Rat Bite
- *Meningeal*

### Allergies / Adverse Reactions
- Furosemide
- Penicillin
- Bee Sting
- Penicillins
- Sulfonamide/Related Antimicrobials

### Active Medications
- Sulfamethoxazole 800/Trimeth 160mg Tab
- Vancomycin 125mg Cap

### Clinical Reminders
- Alcohol Abuse Screening [CAGE]
- Diabetes - Urine Protein
- Diabetes - Urine Microalbumin
- Diabetes - Serum Creatinine
- Diabetes - Hemoglobin A1c
- Diabetes - Lipid Profile
- Diabetic Eye Exam
- Dementia Labs - Vit B12/Folate
- Hep C - Dz & Transmission Ed
- ACE Inhibitor for EF<40%
- Inhaler for FEV1<50% Predicted

### Vitals
- **Temperature**: 98.6°F (Mar 06, 00)
- **Pulse**: 60 (Mar 06, 00)
- **Respiration**: 18 (Mar 06, 00)
- **Blood Pressure (BP)**: 120/80 (Mar 06, 00)
- **Height (HT)**: 51 in (Mar 01, 00)
- **Weight (WT)**: 180 lb (Mar 01, 00)
- **Pulse Oximetry (PN)**: 4 (Mar 01, 00)

### Recent Lab Results
- Anc-Bleeding Time Blood Lc Lb #925448 (Feb 25, 00)

### Appointments / Visits / Admissions
- Mar 13, 00 09:00 - Nursing Procedure Dream
- Feb 29, 00 08:09 - Allergy Injections (9a) - Check
- Feb 25, 00 19:54 - Id/Pc Volpp (8a) - Delete
- Feb 14, 00 13:35 - Allergy Injections (9a) - Check
- Jan 11, 00 08:00 - Short Stay Unit Surg - Cancel
- Dec 16, 99 15:00 - Hpw Minority Vet Grp 3b-120
- Dec 15, 99 09:00 - Mhc Pena 1c-251 - Check
- Dec 01, 99 14:57 - Audio Inter - Den Date: 04-04-20
Chart Metaphor, Combining Text and Images
So... 

What Else Can an EHR Do?
Clinical Reminders

Contemporary Expression of Practice Guidelines

- Time & Context Sensitive
- Reduce Negative Variation
- Create Standard Data
- Acquire health data beyond care delivered in VA

Links Reminder With the Action

With Documentation
The VHA/DOD Clinical Practice Guideline for Management of Dyslipidemia recommends that patients with Ischemic Heart Disease have a lipid profile/ LDL every one to two years; and that patients taking lipid lowering medications have a lipid profile/ LDL at least every year.

Most recent dLDL-C: 58.0 mg/dL 5/15/2001

Most recent ALT/SGPT: 10.0 mU/ml 4/5/2001@15:25 serum

☐ Outside lipid profile in past year at another VA or non-VA facility.

☐ Order a FASTING lipid panel (TC, HDL, LDL and TG)

☐ Order a NONFASTING lipid panel (TC, HDL and LDL)

☐ Order a serum ALT/SGPT: patients on HMG CoA reductase inhibitors ("statins") should have periodic aminotransferase levels monitored to check for development of hepatotoxicity.

☐ Patient refuses lipid profile testing.

☐ Defer lipid profile.

☐ Life expectancy less than one year; this resolves the reminder for one year.

Orders: LipoProt Ana [fasting]
**Reminder Resolution: IHD Elevated LDL**

The VHA/DOD Clinical Practice Guideline for Management of Dyslipidemia recommends an LDL goal of <120 mg/dl for patients with Ischemic Heart Disease; the NCEP Adult Treatment Panel II recommends a more stringent goal of <100 mg/dl. Consider initiating or adjusting lipid lowering treatment.

- **Most recent dLDL-C:** 145.0 mg/dL 1/14/2000
- **Most recent ALT/SGPT:** 21.0 mU/mL 2/6/2002@11:24 serum

- Patient documents a more recent outside LDL <120.
- Place a NEW order for Simvastatin
- Order a directly measured LDL cholesterol
- Order a FASTING lipid panel (TC, HDL, LDL and TG)
- Order a NONFASTING lipid panel (TC, HDL and LDL)
- Order a serum ALT/SGPT: patients on HMG CoA reductase inhibitors ("statins") should have periodic aminotransferase levels monitored to check for development of hepatotoxicity.

- No lipid treatment change is needed based on patient's current status.
- Lipid lowering medications are contraindicated.
- Lipid lowering management provided by another VA or non-VA facility.
- Patient refuses lipid lowering therapy.
- Defer lipid lowering medications.

- Life expectancy less than one year; this resolves the reminder for one year.

**Recent Lab Results:**
- **GLUCOSE:** 101.0 mg/dL 2/6/20
- **CREAT:** pending mg/dL 3/1/L
- **K:** 4.2 mmol/L 2/6/20
- **CO2:** 25.0 mmol/L 2/6/20
- **SGPT:** 21.0 mU/mL 2/6/20
- **ALK PHOS:** 95.0 mU/mL 2/6/20
- **CA:** 9.9 mg/dL 9/21/1
- **WBC:** 23.5 K/µm³ 5/18/2
- **HCT:** 32.4 % 5/18/2
- **MCV:** 75.0 cmm 5/18/2
- **PLT:** 40.0 K/µm³ 5/18/2
- **T.CHOLESTEROL:** 198 (JAN 14, dLDL-C: 145.0 mg/dL 1/14/2
- **HBGLOBIN:** HGBALC: 5.0 %

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**Clinical Reminder Activity**

**Health Factors:** LIPID LOWERING MEDS INITIAL ORDER
**Orders:** SIMVASTATIN
CLINICAL REMINDER ACTIVITY

IHD Elevated LDL:

Ordered Simvastatin for initial lipid lowering therapy.
Some National VistA Statistics
(Total / Daily)

- **Number of orders**
  - 1.14 Billion / >860,000

- **Number of Documents**
  (Progress Notes, Discharge Summaries, Reports)
  - 533,000,000 / >510,000

- **Number of Medications Administered with BCMA**
  - 500,000,000 / >580,000

- **Number of Images**
  - 197,000,000 / ~340,000
## Performance Measurement Setting the U.S. Benchmark for 18 Comparable Indicators

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>VA 2003</th>
<th>Medicare 03</th>
<th>Best Not VA or Medicare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advised Tobacco Cessation (VA x3, others x1)</td>
<td>75</td>
<td>62</td>
<td>68 (NCQA 2002)</td>
</tr>
<tr>
<td>Beta Blocker after MI</td>
<td>98</td>
<td>93</td>
<td>94 (NCQA 2002)</td>
</tr>
<tr>
<td>Breast Cancer Screening</td>
<td>84</td>
<td>75</td>
<td>75 (NCQA 2002)</td>
</tr>
<tr>
<td>Cervical Cancer Screening</td>
<td>90</td>
<td>62</td>
<td>81 (NCQA 2002)</td>
</tr>
<tr>
<td>Cholesterol Screening (all pts)</td>
<td>91</td>
<td>NA</td>
<td>73 (BRFSS 2001)</td>
</tr>
<tr>
<td>Cholesterol Screening (post MI)</td>
<td>94</td>
<td>78</td>
<td>79 (NCQA 2002)</td>
</tr>
<tr>
<td>LDL Cholesterol &lt;130 post MI</td>
<td>78</td>
<td>62</td>
<td>61 (NCQA 2002)</td>
</tr>
<tr>
<td>Colorectal Cancer Screening</td>
<td>67</td>
<td>NA</td>
<td>49 (BRFSS 2002)</td>
</tr>
<tr>
<td>Diabetes Hgb A1c checked past year</td>
<td>94</td>
<td>85</td>
<td>83 (NCQA 2002)</td>
</tr>
<tr>
<td>Diabetes Hgb A1c &gt; 9.5 (lower is better)</td>
<td>15</td>
<td>NA</td>
<td>34 (NCQA 2002)</td>
</tr>
<tr>
<td>Diabetes LDL Measured</td>
<td>85</td>
<td>88</td>
<td>85 (NCQA 2002)</td>
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<tr>
<td>Diabetes LDL &lt; 130</td>
<td>77</td>
<td>63</td>
<td>55 (NCQA 2002)</td>
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<tr>
<td>Diabetes Eye Exam</td>
<td>75</td>
<td>68</td>
<td>52 (NCQA 2002)</td>
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<tr>
<td>Diabetes Kidney Function</td>
<td>70</td>
<td>57</td>
<td>52 (NCQA 2002)</td>
</tr>
<tr>
<td>Hypertension: BP &lt; 140/90</td>
<td>68</td>
<td>57</td>
<td>58 (NCQA 2002)</td>
</tr>
<tr>
<td>Influenza Immunization</td>
<td>76</td>
<td>P</td>
<td>68 (BRFSS 2002)</td>
</tr>
<tr>
<td>Pneumococcal Immunization</td>
<td>90</td>
<td>P</td>
<td>63 (BRFSS 2002)</td>
</tr>
<tr>
<td>Mental Health F/U 30 D post D/C</td>
<td>77</td>
<td>61</td>
<td>74 (NCQA 2002)</td>
</tr>
</tbody>
</table>
And yet a few more features....
Care Management: Clinician Dashboard, Result

Abnormal Results
Red Square

Normal Result
Blue Circle

Expand or Collapse Results

Link Task

Acknowledged All
Gray

Acknowledge Result

New results may be viewed, acknowledged and associated with tasks for follow-up
Bar-Coded Medication Administration (BCMA)

Virtually Eliminates Errors at the Point of Administration
PHR
Personal Health Record
Those who have been the least traditional users – people of lower income levels, lower education levels, or the elderly – are among the fastest adopters of this technology.

A NATION ONLINE: How Americans Are Expanding Their Use of the Internet
U.S. DEPARTMENT OF COMMERCE February 2002
What Is My HealthVet?

- My HealthVet is a new ehealth portal where veterans, family, and clinicians may come together to optimize veterans’ health care.

- Web technology will combine essential patient record information and online health resources to enable and encourage patient/clinician collaboration.

- Veterans will be provided with information on benefits, services, and special programs, and can request services online.
Principles:

• The veteran "owns" his/her My HealthVet Personal Health Record

• The VistA Computerized Patient Record System (CPRS) is the authoritative VA medical record

• The veteran can request that a copy of his/her VistA record be electronically extracted and sent to the My HealthVet system
HealthPeople Initiative: Toward a “Virtual Health System”

◆ EHRs –
  – Provide financial incentives
  – Strongly encourage private sector vendors to make available affordable, high quality, standards-based EHRs
  – Strongly encourage provider-based efforts like AAFP
  – Continue to improve HealthePeople-VistA & make available

◆ Standards –
  – Consolidated Health Informatics as federal leadership
  – Strongly encourage public/private development/adoptions of national standards

◆ PHRs –
  – Strongly encourage public/private sector to work together to develop & make available PHRs for persons

◆ EHR/PHR Info Exchange (IE) –
  – Strongly encourage public & private sector to work together to develop & make available national “exchange” solution
What Causes Value?

◆ Innovation in business practices
◆ Economic value results from incremental innovations rather than "big bang" initiatives
◆ Strategic value results from the cumulative effect of sustained initiatives to innovate business practices
Studies of Sustained IT Excellence

Achieving and Sustaining IT Excellence

- Strong, sustained and clear themes often provided the basis for IT decisions
  - We must continuously improve the care we deliver
  - We must improve the professional lives of our providers
  - We must engage the patient as an active participant in their care

- Individuals and leadership matter
  - Leaders who are smart, honest, seasoned, committed and value the healthy exchange of ideas
  - Leadership engages in the information systems conversation and once committed has the strength to stay the course
  - Leadership asks hard questions and is pragmatic but it never loses sight of its beliefs and value
  - Leadership has focus and stamina and endures
Achieving and Sustaining IT Excellence

- Relationships between IT and organization individuals and teams are crucial
  - CIO/CEO/COO/CFO/CMO/CNO
  - Project teams and project managers
  - Various mechanisms to integrate physicians into the IT agenda and activities

- Technical infrastructure both enables and hinders
  - Possesses characteristics of agility, potency, supportability, reliability and efficiency
  - Provides critical capabilities, e.g., enables the extension of applications to anywhere on the globe or allows delivery of applications to any form factor
Achieving and Sustaining IT Excellence

- Innovation is encouraged and is recognized to take time
  - Supports experimentation and creativity
  - Encouragement is practical, goal-directed, bounded and managed

- Evaluation of IT opportunities is thoughtful
  - Folds the IT agenda into the strategy conversation and the budget discussion
  - Applies disciplined upfront and post-implementation review
  - “Allows” instinct and raw beliefs

- Processes, data and differentiation forms the focus of impact
  - Referral, order entry or patient access
  - Quality measures, referral patterns or financial status
  - Patient-physician communication or referring physician booking of specialist appointment