Health Information Exchange in the VA

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HSR&D Cyberseminar • 24 September 2012

The views expressed in this presentation are those of the authors
and do not necessarily represent the views of the Department of Veterans Affairs.
Agenda for Today

• Understand the need for health information exchange (HIE)
• Learn about health information organizations
• Learn about current approaches to HIE
• Learn about insights from end users
• Gain appreciation of frameworks, measures, and research
• Questions and discussion
• *Not on agenda*: comprehensive review, results of VA evaluation, extensive technical details
Veterans make transitions in care

- There are no closed systems of care
- About half of Veterans receive care outside VA (estimates up to 70%)
- More than 80% of older Veterans (65+) also have Medicare
- 25% have at least two non-VA federal health plans

Medicare-eligible Veterans with outpatient use (1999)

Hynes DM et al., Med Care 2007; 45 (3):214-23.
Medicare Advantage in Veterans (2009)

- Only VA services (10%)
- Both (50%)
- Only Medicare Advantage services (35%)

Trivedi AN et al., JAMA 2012; 308 (1):67-72.
Medicare Advantage in Veterans (2009)

- Dual enrollment increased by 90% to 924,792 from 2004 to 2009
- VA paid $13 billion for Medicare Advantage enrollees over 6 years

Trivedi AN et al., JAMA 2012; 308 (1):67-72.
Meaningful use of electronic health record (EHR) systems

• Using EHR technology to improve care, coordination, and security, while engaging patients
• Stage 1 (2011-2012; encouraged): capture and share data
• Stage 2 (2014; required): advance clinical processes
• Stage 3 (2015): improve outcomes
Meaningful use of electronic health record (EHR) systems

- Using EHR technology to improve care, coordination, and security, while engaging patients
- Stage 1 (2011-2012; encouraged): capture and share data
  - Entry of basic patient data
  - Electronic prescribing with decision support
  - **Ability to exchange structured health information**
  - Additional options
- Stage 2 (2014; required): advance clinical processes
- Stage 3 (2015): improve outcomes
Meaningful use of electronic health record (EHR) systems

Eligible providers and hospitals must electronically transmit summary in at least 10% of transfers or referrals.

- Entry of basic patient data
- Electronic prescribing with decision support
- Ability to exchange structured health information
- Additional options
  - Stage 2 (2014; required): advance clinical processes
  - Stage 3 (2015): improve outcomes

• Using EHR technology to improve care, coordination, and security, while engaging patients
• Stage 1 (2011-2012; encouraged): capture and share data
• Stage 2 (2014; required): advance clinical processes
What is health information exchange?

“The electronic movement of health-related information among organizations according to nationally recognized standards”

- Includes clinical and administrative data
- Organizations are often diverse and competing

Governance and standards can support medical decisions and care

- The public-private Health Information Technology Standards Panel formalized HIE standards
- **Continuity of Care Document (CCD)** summarizes a patient’s medical status
- Newer groups and approaches have evolved

**HITSP**
Healthcare Information Technology Standards Panel

**HL7**
Health Level Seven International
Nationwide Health Information Network (NwHIN)

- Standards, services, and policies enabling HIE via Internet

- NwHIN Exchange: collaborators exchanging information
  - Participants
    - Federal and public-health entities
    - Integrated delivery networks
    - Private organizations
    - Health information organizations
  - Transitioning to HealtheWay, a public-private partnership
### Examples of exchangeable information

<table>
<thead>
<tr>
<th>Information source</th>
<th>Healthcare providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language spoken</td>
<td>Immunizations</td>
</tr>
<tr>
<td>Personal information</td>
<td>Insurance provider</td>
</tr>
<tr>
<td>Problem list</td>
<td>Medications</td>
</tr>
<tr>
<td>Advance directives</td>
<td>Plan of care</td>
</tr>
<tr>
<td>Allergies</td>
<td>Pregnancy status</td>
</tr>
<tr>
<td>Problem list</td>
<td>Procedures</td>
</tr>
<tr>
<td>Progress notes</td>
<td>Vital signs</td>
</tr>
<tr>
<td>Discharge summaries</td>
<td>Diagnostic results</td>
</tr>
</tbody>
</table>
The health information organization

- Oversees HIE
- Uses nationally recognized standards
- Provides interoperability, security, and confidentiality
- Ensures authorization of those who access information
Health information organizations

- In 2009, U.S. had about 197 regional health information organizations
- 45% operational, covering 14% of hospitals and 3% of ambulatory practices
- 33% financially viable
- U.S. government provided startup funding

Indiana Health Information Exchange (IHIE)

- Statewide network with “virtual record”
- Operates largest HIE in the U.S.
  - Over 12 million patients, 19,000 physicians, 90 hospitals, 110 other healthcare organizations (long-term care and rehabilitation facilities, clinics, imaging centers, community health centers)
  - 3 billion pieces of clinical data: 80 million radiology images, 50 million text reports, 750,000 EKGs; discharge summaries, operative notes, pathology reports, and medication records
- Encounters from 90% of care provided at Indianapolis-area hospitals
- Over a million health transactions daily
- Partners with Regenstrief Institute at Indiana University
HIE should consider consumers’ preferences

- New York survey (N=170)
- 67% were comfortable with HIE process of automatic central data storage
- Primary care doctor should have emergency access without permission (93%)
- Most want:
  - Permission before routine viewing by primary care doctor (64%)
  - Ability to see who has viewed their information (86%)
  - Ability to stop electronic storage of data (84%)
  - Ability to stop all viewing (83%)
  - Ability to select which parts are shared (78%)
- 51% would trust practice to regulate security and privacy

Virtual Lifetime Electronic Record (VLER)

• Announced by President Obama in 2009
• For streamlined transitions of patients and their administrative and medical records, starting with military service
• Five capability areas defined by functionality
• VLER Capability Area 1 ("VLER Health“) chartered DoD/VA Interagency Program Office to pursue interoperability with private-sector providers
• Integrated electronic health record will use HIE to facilitate care for individuals served by DoD, VA, other agencies (e.g., Social Security Administration)
• **Intended benefits:** continuity, quality, timeliness, safety, redundancy
VLER: 13 active sites; more on the way

- Sites
  - VA and DoD: Hampton, Puget Sound, San Diego, Spokane
  - VA only: Altoona, Asheville, Buffalo, Charleston, Grand Junction, Indianapolis, Minneapolis, Richmond, Salt Lake City
- Opt-in process
  - Veteran completes authorization form (N=52,767)
  - Veteran’s identity is authenticated
  - Authorization form is validated and entered into system
  - NwHIN Exchange Partner may require additional consent
- Correlation (matching) of patients across systems
  - NwHIN Exchange Partner systems try to match Veteran’s identity to their records
  - Missing SSN, absence of visits, and other factors can prevent matching
- Evaluation underway
User interface for clinicians
Computerized Patient Record System (CPRS)
List of Data Sources

Double dagger indicates non-VA sources of data
Summary of Care Record (C32)

For C32 data sections, the date ranges are preset by the health information organization.
Medications - Prescription and Non-Prescription

<table>
<thead>
<tr>
<th>Medication</th>
<th>Status</th>
<th>Quantity</th>
<th>Order Expiration</th>
<th>Provider</th>
<th>Prescription NBR</th>
<th>Dispense Date</th>
<th>Sig</th>
<th>Source</th>
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<tr>
<td>AMLODIPINE BESYRATE 5MG TA</td>
<td>active</td>
<td>45</td>
<td>Dec 30, 10</td>
<td>INLOES, SONIA</td>
<td>762914</td>
<td>Dec 29, 09</td>
<td>TAKE ONE-HALI</td>
<td>CHEYENNE VAN</td>
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<tr>
<td>CLOPIDOGREL BISULFATE 75MG</td>
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<td>90</td>
<td>Dec 30, 10</td>
<td>INLOES, SONIA</td>
<td>782915</td>
<td>Dec 29, 09</td>
<td>TAKE ONE TAB</td>
<td>CHEYENNE VAN</td>
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<tr>
<td>WARFARIN 1MG TAB</td>
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<td>INLOES, SONIA</td>
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<td>CHEYENNE VAN</td>
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<tr>
<td>CLARITHROMYCIN 250MG TAB</td>
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<td>90</td>
<td>Jan 1, 11</td>
<td>HASHEMZADEH, DAR</td>
<td>2718221</td>
<td>Dec 31, 09</td>
<td>TAKE ONE TAB</td>
<td>DAYTON</td>
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</table>

Vital Signs

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp</th>
<th>Pulse</th>
<th>Resp</th>
<th>BP</th>
<th>Ht</th>
<th>Wi</th>
<th>P0x</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Feb 23, 10</td>
<td>98.6</td>
<td>76</td>
<td>20</td>
<td>130 / 80</td>
<td>72</td>
<td>210</td>
<td>99</td>
<td>CHEYENNE VAMC</td>
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<tr>
<td>Apr 21, 10</td>
<td>100</td>
<td>73</td>
<td>80</td>
<td>149 / 85</td>
<td>70</td>
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<td></td>
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<tr>
<td>Feb 17, 10</td>
<td>98.2</td>
<td>75</td>
<td>20</td>
<td>146 / 82</td>
<td>72</td>
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</table>

Lab Results - Chemistry and Hematology

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Date</th>
<th>Result - Unit</th>
<th>Intery</th>
<th>RefRange</th>
<th>Source</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose [Mass/volume] in Serum or Plasma</td>
<td>Apr 21, 10</td>
<td>150 mg/dl</td>
<td>H</td>
<td>65-110</td>
<td>DAYTSR TEST LAB</td>
<td>hello there</td>
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<tr>
<td>Ethanol [Mass/volume] in Urine</td>
<td>Feb 22, 10</td>
<td>NEG mg/dl</td>
<td>0.10</td>
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<td>DAYTSR TEST LAB</td>
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<tr>
<td>Diazepam [Presence] in Urine</td>
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<td>POS</td>
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<td></td>
<td>DAYTSR TEST LAB</td>
<td></td>
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<tr>
<td>Opiates cutoff [Mass/volume] in Urine for Screen method</td>
<td>Feb 22, 10</td>
<td>NEG</td>
<td></td>
<td></td>
<td>DAYTSR TEST LAB</td>
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<tr>
<td>Benzoylacetamide cutoff [Mass/volume] in Urine</td>
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<td></td>
<td>DAYTSR TEST LAB</td>
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<tr>
<td>Cannabinoids cutoff [Mass/volume] in Urine for Screen method</td>
<td>Feb 22, 10</td>
<td>POS</td>
<td></td>
<td></td>
<td>DAYTSR TEST LAB</td>
<td></td>
</tr>
<tr>
<td>Amphetamine cutoff [Mass/volume] in Urine for Screen method</td>
<td>Feb 22, 10</td>
<td>NEG</td>
<td></td>
<td></td>
<td>DAYTSR TEST LAB</td>
<td></td>
</tr>
<tr>
<td>Barbiturate screen absent [Identifier] in Urine</td>
<td>Feb 22, 10</td>
<td>NEG</td>
<td></td>
<td></td>
<td>DAYTSR TEST LAB</td>
<td></td>
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<tr>
<td>Phenocyclidine [Presence] in Urine for Screen method &gt;25 ng/mL</td>
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<td></td>
<td>DAYTSR TEST LAB</td>
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<tr>
<td>Cholesterol in HDL [Mass/volume] in Serum or Plasma</td>
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<td>150 mg/dl</td>
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<td>35-55</td>
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<td>hello this is a comment</td>
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<tr>
<td>Glucose [Mass/volume] in Serum or Plasma</td>
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<td>115 mg/dl</td>
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<td>65-110</td>
<td>DAYTSR TEST LAB</td>
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<tr>
<td>Glucose [Mass/volume] in Serum or Plasma</td>
<td>Feb 17, 10</td>
<td>300 mg/dl</td>
<td>H</td>
<td>65-110</td>
<td>DAYTSR TEST LAB</td>
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<tr>
<td>Creatine kinase [Enzymatic activity/volume] in Serum or Plasma</td>
<td>Feb 17, 10</td>
<td>pending U/L</td>
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<td>24-349</td>
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<tr>
<td>Creatine kinase MB [Mass/volume] in Serum or Plasma</td>
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<td>pending mg/ml</td>
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<td>0.5-8</td>
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### Problems

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Status</th>
<th>Problem Code</th>
<th>Date of Onset</th>
<th>Provider</th>
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<tbody>
<tr>
<td>BRONCHOPNEUMONIA ORG NOS</td>
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<td>485</td>
<td>--</td>
<td>Jahn, DRTEST</td>
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<tr>
<td>CARDIAC MURMURS NEC</td>
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<td>--</td>
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<td>Meditech</td>
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<tr>
<td>BRONCHOPNEUMONIA ORG NOS</td>
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<td>485</td>
<td>--</td>
<td>Jahn, DRTEST</td>
<td>Meditech</td>
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<tr>
<td>URIN TRACT INFECTION NOS</td>
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<td>Aarestad, Desiree</td>
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<tr>
<td>DIAB MELL WD COMPL TYPE II OR U</td>
<td>completed</td>
<td>250.00</td>
<td>--</td>
<td>Aarestad, Desiree</td>
<td>Meditech</td>
</tr>
<tr>
<td>E. COIL UREMI NOS</td>
<td>completed</td>
<td>1411.4</td>
<td>--</td>
<td>Aarestad, Desiree</td>
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<tr>
<td>HYPERTENSION NOS</td>
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<tr>
<td>CONGESTIVE HEART FAILURE NOS</td>
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<tr>
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<td>Inland Northwest Health</td>
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<td></td>
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<td>Inland Northwest Health</td>
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### Results

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<tr>
<th>Date/Time - Count (ID)</th>
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<th>Source</th>
<th>Result - Unit</th>
<th>Interpretive</th>
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<tbody>
<tr>
<td>Dec 14, 2011</td>
<td>GLOMERULAR FILTRATION RATE, EST</td>
<td>Meditech</td>
<td>--</td>
<td>--</td>
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<tr>
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<td>Glomerular filtration rate, 1.73 sq M, predicted</td>
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<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Dec 14, 2011</td>
<td>AST</td>
<td>Meditech</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Dec 14, 2011</td>
<td>Aspartate aminotransferase</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Dec 14, 2011</td>
<td>ALKALINE PHOSPHATASE</td>
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<td>34 U/L</td>
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<td>Alkaline phosphatase</td>
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<td>25 U/L</td>
<td>L</td>
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<tr>
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<td>ALT</td>
<td>Meditech</td>
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<tr>
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<td>Aspartate aminotransferase</td>
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<td>55 U/L</td>
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<td>BILIRUBIN, TOT</td>
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<td>Bilirubin</td>
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<tr>
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<td>ALBUMIN</td>
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<td>Protein</td>
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<tr>
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<td>CALCIUM</td>
<td>Meditech</td>
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<tr>
<td>Dec 14, 2011</td>
<td>Calcium</td>
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<td>9.7 mg/dL</td>
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<tr>
<td>Dec 14, 2011</td>
<td>GLUCOSE</td>
<td>Meditech</td>
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<tr>
<td>Dec 14, 2011</td>
<td>Glucose</td>
<td>--</td>
<td>56 mg/dL</td>
<td>--</td>
</tr>
<tr>
<td>Dec 14, 2011</td>
<td>UREA NITROGEN</td>
<td>Meditech</td>
<td>--</td>
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<tr>
<td>Dec 14, 2011</td>
<td>Urea nitrogen</td>
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</tr>
<tr>
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<td>CREATININE</td>
<td>Meditech</td>
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<tr>
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<td>Creatinine</td>
<td>--</td>
<td>0.55 mg/dL</td>
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<td>Dec 14, 2011</td>
<td>ANION GAP</td>
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<td>22 mmmol/L</td>
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<tr>
<td>Dec 14, 2011</td>
<td>CHLORIDE</td>
<td>Meditech</td>
<td>--</td>
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</tr>
<tr>
<td>Dec 14, 2011</td>
<td>Chloride</td>
<td>--</td>
<td>109 mmmol/L</td>
<td>--</td>
</tr>
</tbody>
</table>
• For VA data, date ranges can be specified for various types of data
• For non-VA data, date ranges can be specified only for clinical notes
### Consults

**Patient Selection**

- Today
- One Week
- Two Weeks
- One Month
- Two Month
- Six Months
- One Year
- Two Years
- All Dates

**Date Range:**

Start: (mm/dd/yyyy)  
End: (mm/dd/yyyy)

**Print Report**

<table>
<thead>
<tr>
<th>View Details</th>
<th>Item</th>
<th>Consult Time</th>
<th>Status</th>
<th>Consult Type</th>
<th>VA Service or NWIN Note Title</th>
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<td>View Detail</td>
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</tbody>
</table>

**Warning:** Avoid using "Back" button.
Clinical Notes:
details
Initial usage

• Physicians, physician assistants, nurses, pharmacy staff, mental-health providers use the system

• 5% of matched Veterans have had at least one inbound disclosure to a VA clinician
  • Veterans may not have had encounters
  • Clinicians might choose not to view data, or may be unaware
  • Similar access to Tennessee study (6.8%)
  • Even low usage may lead to improved care overall

• Outbound disclosures are also occurring
Technical dimensions

• Consider benefits and risks relative to usual care: retrieving NwHIN documents is faster than faxing requests to hospitals and waiting for replies
• Timeouts and other delays can slow data retrieval
• For multiple reasons, documents are retrieved on demand, rather than being locally cached
• Need for usability: "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"

International Organization for Standardization, ISO 9241.
Insights from End-Users

Findings from other HIE systems

Alissa Russ, PhD
VA HSR&D Center of Excellence on Implementing Evidence-Based Practice
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
3 studies:


1. Hincapie *et al.* 2011

Focus groups:
- Arizona Medical Information Exchange
- 29 physicians

Findings:
- Workflow variation
- HIE useful to prevent ‘doctor shopping’
- Helps avoid duplicate testing
1. Hincapie (cont’d)

Identified Challenges:

• Limited data availability (e.g., immunizations, mental health)

• Difficulty finding data

• Workflow efficiency
  • Some physicians relied on others to retrieve information
2. Gadd et al. 2011

Cross-sectional survey

- MidSouth eHealth Alliance
- Questionnaire for User Interaction Satisfaction
- 151 respondents: physicians, nurse practitioners, physicians assistants, nurses, others

Findings:

- 3 usability factors were positive predictors of HIE use:
  - Overall reaction
  - Learning
  - Functionality
2. Gadd (cont’d)

Findings (cont):

• Consolidating data in HIE, rather than aggregating, may facilitate implementation and use
• Focus on meeting basic expectations of HIE user base
• Usability may be more important than ‘trust’

Identified Challenges:

• Need to improve design and navigation of HIE
3. Unertl et al. 2011

Qualitative study

- MidSouth eHealth Alliance
- 6 emergency departments, 8 ambulatory clinics
- Direct observations, interviews

Findings:

- Workflow varied by site and end-user’s role
- HIE used for:
  - Pt medical history
  - Discharge summaries
  - Track completion and results of external procedures, biopsies
  - Verifying patient input
  - Referrals
3. Unertl (cont’d)

**Identified challenges:**

- “Fragmentation of information”
- EHR system at their site
- EHR systems from associated sites
- Data from information exchange
- Paper forms
Summary from end-users

End-users:

• Find value in HIE
• Likely use a core set of data from HIE
• Need more than just ‘more information’
• Desire systems that will consolidate data from all sources
Health information exchange

Frameworks, Measures, Research

David A. Haggstrom, MD, MAS

VA HSR&D Center of Excellence on Implementing Evidence-Based Practice
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Evaluation framework

1. What architectural features are compatible with NHIN?
2. What operational costs are incurred based on architectural choices made?
3. What are the mechanisms for data aggregation?
4. What core features are implemented — how is decision support implemented?

1. What technology choices are made and what are the implications (i.e., open-source?)
2. How is standards harmonization achieved between NHIN recommended standards and ours? What costs are incurred to attain harmonization?
3. What are some barriers encountered and how were they overcome?

1. How does NHIN policy affect the local HIE?
2. Will stakeholders be more reluctant to participate in local vs. national HIEs?
3. How is the legal landscape at state-borders addressed?
4. What impact will a change in administration have on policy issues?

1. Provider Satisfaction and Value
2. Consumer Satisfaction and Value
3. Cost and Financial Indicators — are we saving money?
4. Clinical Outcomes — are we improving care?
5. Sustainability Model — what are some lessons learned — which of these are generalizable?

Dixon BE et al., J Am Med Inform Assoc 2010; 17 (3):295-301.
Evaluation framework

VA clinical outcomes are not yet known.

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3. What are the mechanisms for data aggregation?
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Dixon BE et al., J Am Med Inform Assoc 2010; 17 (3):295-301.
Randomized controlled trial of HIE among providers of care for HIV

**Design:** randomized at patient level

**Setting:** 6 infectious disease clinics paired with 9 ancillary community-based settings providing HIV case management

**Participants:** 254 patients with HIV

**Intervention:** HIE for 2 years/patient

**Outcomes:**

*Medical records:* HIV viral loads, CD4 counts, antiretroviral (ARV) prescriptions

*Patient surveys* (0, 12, 24 months): hospitalizations, emergency-department use, quality of life (Medical Outcomes Study SF-36)

**Results:** no statistically significant differences (ARVs slightly higher)

**Limitation:** small amount of info exchanged, no direct HIE access data

Early Randomized Controlled Trial in an Emergency Department (ED)

**Design:** randomized at patient level

**Setting:** large, longitudinal EHR system from an urban hospital to physicians at either of 2 emergency departments with large crossover

**Participants:** 16,374 intervention; 16,094 controls

**Intervention:** information to ED physician both as printed abstract & by means of online access to EHR system

**Outcomes:** charges, hospital admissions, repeat emergency visits, and emergency physicians’ satisfaction with the information

**Results:** decreased charges by $26/encounter at one hospital, but no effect at the other hospital

  • No differences in admission rates or repeat emergency visits
  • Problem lists, medications most useful

**Discussion:** marked differences in workflows/information access across sites

Recent impact of HIE on emergency care

• **Design**: matched case-control study
• **Setting**: all major emergency departments (12) in Memphis, TN
• **Participants**: 15,798 HIE cases (12,120 patients)
  
  15,798 non-HIE controls (13,832 patients)

• **Cases (exposures)**: emergency visits with HIE access (Aug 2007 to Aug 2008)

• **Controls**: emergency visits with no HIE access - matched by age, gender, race, care delivery site, discharge diagnostic code, primary payer

• **Outcomes**:
  
  • Hospital admissions from the emergency department
  • Admissions for observation
  • Laboratory testing
  • Head CT, body CT
  • Chest x-ray, ankle x-ray
  • Echocardiograms
Recent impact of HIE on emergency care

- *HIE data were accessed in 6.8% of emergency visits*
- **11 emergency departments directly accessed only HIE data via browser**
  - Decrease in hospital admissions
  - Increase in head CT and chest x-ray
- **12th emergency department relied more on printed summaries:**
  - Decrease in hospital admissions
  - Significant decreases in head CT, body CT, and lab tests
- **Financial summary**
  - HIE access was associated with annual cost savings of $1.9 million
  - Net of annual operating costs, HIE access reduced overall costs by $1.07 million
  - Hospital admission reductions accounted for 98% of cost reductions

Lessons from empiric research

• Amount of information exchanged is important metric
• Access to transaction data improves strength of study design
• Mixed methods important to understand implementation
• Evidence suggests downward pressure on costs
  • Important to stakeholders
  • Quality important, too
HIE in emergency care: “who, what, and why”

- **Mixed methods:**
  - Cross-sectional audit log data
    - Overall usage trends
    - User logon statistics
    - Data types accessed by users
  - Semi-structured interviews
  - Direct observation in emergency departments actively using HIE

- **Results:**
  - Higher rates of access for (1) return visits, (2) sites for the underserved, (3) patients with high levels of comorbidity, (4) sites providing access to clerks, RNs, & MDs
  - Providers noted retrieving additional history (29%), preventing repeat tests (20%), comparing new to retrieved results (10%), avoiding hospitalizations (3%)

“A Novel Set of Proposed Metrics for Electronic Quality Reporting”

- A literature review identified quality metric sets for ambulatory care
  - Ambulatory Care Quality Alliance (AQA)
  - National Quality Forum (NQF) ambulatory care measures
  - National Committee Quality Assurance (NCQA) Healthcare Effectiveness and Data Information Set (HEDIS) measures
- Two rounds of quantitative rating of individual metrics
- 36-member national expert panel validated rating process & final metric set
- Metrics were developed *de novo* to capture additional expected effects of EHR systems (reduced utilization)

Conceptual framework

Kaushal et al.

Clinical data residing elsewhere

HIE transaction(s)

Information-processing capacity

McDonald et al.

Amount of clinical data available elsewhere

Type of clinical data available elsewhere

Study question: HIE \( \uparrow \) goodness of fit?

Outpatient clinical encounter(s)

Traditional receipt of Clinical Data by a Health Care Provider (no HIE)

Electronic receipt of Clinical Data by a Health Care Provider At the Point of Care (HIE)

Electronic data capture

Quality/cost measures

Underuse

Cost

Overuse

Information-processing requirements

- Sociodemographics
- Disease
- Comorbidity

- Type of provider(s)
- Number of provider referrals

Medical Decision Making

Provider (Interdependence)

Patient (Complexity)
# Ambulatory measures of underuse

<table>
<thead>
<tr>
<th>PREVENTION</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Colorectal cancer screening</strong> up-to-date (age 50–80)</td>
<td></td>
</tr>
<tr>
<td>% of women 40–69 years of age who had a mammogram to screen for breast cancer</td>
<td></td>
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<tr>
<td>% of patients 50–64 years who received an influenza <strong>vaccination</strong></td>
<td></td>
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<tr>
<td>% of patients 65 years and older who received an influenza <strong>vaccination</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DIABETES</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>% of pts 18–75 years of age with diabetes whose most recent <strong>HbA1c</strong> level during the measurement year is &gt; 9.0%</td>
<td></td>
</tr>
<tr>
<td>% of pts 18–75 years of age with diabetes who had one or more <strong>HbA1c lab tests</strong> during the measurement yr</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ASTHMA</th>
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<tbody>
<tr>
<td>% of patients 18–56 years of age who were identified as having persistent asthma and who were appropriately prescribed <strong>medication</strong> during the 12-month period</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CARDIOVASCULAR DISEASE</th>
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<tbody>
<tr>
<td>% of patients w/ <strong>ischemic vascular disease (diagnosis)</strong> who have documentation of use of <strong>aspirin</strong> or another antithrombotic during the 12-month measurement period (<strong>medication</strong>)</td>
<td></td>
</tr>
<tr>
<td>% of patients with ischemic vascular disease whose most recent <strong>LDL-C</strong> had a result of less than 100mg/dL</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CONGESTIVE HEART FAILURE</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>% of patients with <strong>CHF (diagnosis)</strong> who also have paroxysmal or chronic <strong>atrial fibrillation</strong> who were prescribed <strong>warfarin</strong> therapy (<strong>medication</strong>)</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>MENTAL HEALTH</th>
<th></th>
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<tbody>
<tr>
<td>% of patients 18 years of age and older who had a <strong>follow-up visit</strong> within 30 days after being discharged for an inpatient mental health stay (including hospitalizations for depression, schizophrenia, attention deficit disorder, and personality disorders)</td>
<td></td>
</tr>
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<thead>
<tr>
<th>OSTEOPOROSIS</th>
<th></th>
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<tbody>
<tr>
<td>% of patients aged 50 years and older with fracture of the hip, spine, or distal radius who had a central dual-energy x-ray absorptiometry (DXA) measurement ordered or performed or pharmacologic therapy prescribed (<strong>procedure</strong>)</td>
<td></td>
</tr>
</tbody>
</table>

**De novo metrics (including overuse)**

<table>
<thead>
<tr>
<th>Blood Tests</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How many tests were already completed for a patient that are less than [insert appropriate repeat interval] old at the time of the 2\textsuperscript{nd} test?</td>
<td></td>
</tr>
<tr>
<td>• Creatinine (10 days); Sodium (10 days)</td>
<td></td>
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<tr>
<td>• Total cholesterol (6 weeks); HDL (6 weeks); Hemoglobin A1c (12 weeks)</td>
<td></td>
</tr>
<tr>
<td>• Thyroid stimulating hormone (6 weeks); Liver function tests (ALT/AST) (6 weeks)</td>
<td></td>
</tr>
<tr>
<td>• Hemoglobin (10 days); Ferritin (8 weeks)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Imaging Tests</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>X-rays, ultrasounds, CT scans, and MRIs ordered over a 1-year period</td>
<td></td>
</tr>
<tr>
<td>• how many represent tests for which results were already completed for that patient &amp; are no more than 60 days old at the time of the 2\textsuperscript{nd} test?</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Cardiac Tests</th>
<th></th>
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<tbody>
<tr>
<td>Stress tests, echocardiography, and cardiac catheterization ordered over a 1-year period</td>
<td></td>
</tr>
<tr>
<td>• how many represent tests for which results were already completed for that patient &amp; are no more than 90 days old at the time of the 2\textsuperscript{nd} test?</td>
<td></td>
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</tbody>
</table>

- **Other measure domains**: discharge medication documentation, referrals, follow-up after discharge, ambulatory care sensitive hospitalizations, readmissions

Additional resources

Grant Final Report
Grant ID: R18HS017067

Developing and Using Valid Clinical Quality Metrics for HiT with HiE

Inclusive Dates: 10/01/07 – 03/31/11

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§ New York-Presbyterian Hospital, New York, NY
** Health Information Technology Evaluation Collaborative, New York, NY
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‡‡ Taconic Independent Practice Association, Fishkill, NY

Performing Organization:
Weill Cornell Medical College

Project Officer:
Steve Bernstein
Conclusions about HIE research

• Conceptual frameworks can inform research consideration of...
  • Patient factors and provider factors
  • Information characteristics
  • Clinical decision-making role

• Both underuse & overuse of medical services potentially effected by HIE

• Need to consider impact of HIE in multiple settings
  • Emergency department
  • Ambulatory care/primary care
  • Specialty care
  • Inpatient care
Summary

• In the U.S., HIE has shown early signs of benefit for health care
• VLDR is improving, expanding, and evaluating its HIE program
• Need to address technical issues, usability, patients’ preferences, and sustainability
• Much research is needed!
Credits and thanks

• Tim Cromwell, Jamie Bennett
• Colene Byrne, Nelson Hsing, Lois Olinger, Elaine Hunolt, Eric Pan, Karl Banty, Nathan Botts, Lauren Mercincavage
• Omar Bouhaddou
• Brian Dixon
• Darrell Baker, Bryan Mitchell
Questions

• Questions now?

• Questions later?
  • Mike Weiner <michael.weiner4@va.gov>
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