Digital Hospital 21st Century: You Certainly Can't Manage It If You Don't Understand It (YCCMIIYDUI)

November 22, 2013

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President-Elect ACCE, President of Sherman Engineering, LLC, USA

Joseph Welsh, JD, MBA
CEO, Collegiate Consortium for Workforce and Economic Development, USA

Second WHO Global Forum on Medical Devices
Workshop Overview

• 21st Century Digital Hospital: where healthcare is going
  – Seen through lens of how a USA healthcare system uses its EHR & how the USA HIMSS Davies EHR Award measures improved care. [http://apps.himss.org/davies](http://apps.himss.org/davies), Tom Judd

• Clinical Engineers and EHRs: new ways for CEs to serve
  – How Clinical Engineers benefit from learning and later managing EMR-EHR technologies in their careers, as well as use various tools and standards to accelerate medical device interfaces to EMR-EHRs, Paul Sherman via Skype

• Integrating the Healthcare Enterprise: how CEs have been contributing
  – Overview and emerging IHE global programs [http://www.ihe.net/](http://www.ihe.net/), the USA EHR Meaningful Use Stage 2 incentive program, and IHE-USA Patient Care Device Testing-Certification programs, Elliot Sloane via Skype

• EMR Training Programs: how CEs can get started
  – Overview of new EMR training programs and EMR-STAR cloud-based virtual classrooms that Clinical Engineers can use, including open source EMR tools: OpenEMR, OpenMRS, and VistA, Joe Welsh via Skype
Background/Terminology

1. **EMR/EHR/PHR:** Access to patient information plays a vital role in the provision of effective clinical care by health professionals. Diagnosis and treatment can be improved if health professionals have easy access to accurate and comprehensive medical records of patients ... Many countries are now introducing Electronic Medical Records / Electronic Health Records (EMR / EHR)* to improve the management of patient information, enhance health care services, and allow for rapid communications between health care providers. [See PHR also below.]

2. **Health IT** (Health information technology): Enables substantial improvements in health care quality and safety, compared to paper records. Yet health IT can only fulfill its enormous potential if risks associated with its use are identified, if there is a coordinated effort to mitigate those risks, and if it is used to make care safer.”


*Electronic Medical Records / Electronic Health Records (EMR / EHR) are often referred to interchangeably ... An EMR/EHR is a real-time longitudinal electronic record of an individual patient’s health information that can assist health professionals with decision-making and treatment. Data found in a record may include patient demographics, past medical history, vital signs, examination and progress notes, medications, allergies, immunizations, laboratory test results, radiology reports, living wills, and a health power of attorney. It can be made rapidly available through Health IT to authorized personnel providing patient care in different locations including across national boundaries. It can also support the collection of data for other uses such as billing, quality management, public health disease surveillance and reporting.*

**PHR = Personal Health Record**, defined as: a health record where health data and information related to patient care is maintained by the patient, and typically gathered by way of the EMR & other sources.

Second WHO Global Forum on Medical Devices
Tom Judd, MS, CCE, CPHQ, CPHIMS, FACCE

Education
- MS AE, 1973, Naval Postgraduate School, BS AE, 1972, US Naval Academy, graduate work Biomedical Engineering, Johns Hopkins University/Med. School
- Nationally certified in Health Technology-HT, Quality, & Health Information

Professional Positions
- National Project Director, Clinical Technology Kaiser Permanente-KP, Atlanta, Georgia, 2006-present; focus on medical device-EHR integration
- Former Director of Quality and Patient Safety, KP Georgia, 1994-2006
- Various HT roles: teaching, community, and hospital systems, 1979-1994
- WHO-PAHO Health Technology Advisor, 1989-present, in 40 countries

National/Global Roles
- HIMSS Davies EHR Enterprise Award Committee (national), 2010-2013
- Created ACCE Advanced HT Workshops, 1991 (health leader training for 70 countries)
- American College of Clinical Engineering - ACCE: Fellow, Advocacy Chairman
- Created NGO Global Assistance for Medical Equipment (GAME) 2004
About Kaiser Permanente (KP)

Largest private integrated healthcare system in the U.S.

9 Million members
17,000 physicians
173,000 employees
37 hospitals
611 clinics
37 Million office visits a year
3000 clinical research studies
$50 Billion annual revenues

EHR: Largest, most advanced deployment

PHR: nearly 6 Million members signed up!

Source: George Panagiotopoulos, KP, June 2013
KP: Committed to Using the EHR for Better Healthcare

1. Meeting USA EHR Meaningful Use requirements
2. CPOE, best practice alerts/alarms drive EBM care
3. Social media interfaces driving Patient Engagement
4. Interactive patient care at Point of Care
5. Data mining for Clinical Decision Support (CDS)
6. Medical device integration in hospitals and clinics
7. Patient data from mobile applications for NCDs (chronic disease)
8. Wireless infrastructure/RTLS improve clinical workflows
9. Emerging Genomic patient evaluation
10. Facilitates telehealth for improved access & e-consult
USA EHR “Meaningful Use” Regulations

Meaningful Use Vision to Transform Healthcare Delivery

Utilize technology → Access to information → Transform health care

- Improved population health
- Enhanced access and continuity
- Data utilized to improve delivery and outcomes
- Patient engaged, community resources
- Patient self management
- Patient centered care coordination
- Team based care, case management
- Evidenced based medicine
- Registries for disease management
- Registries to manage patient populations
- Privacy & security protections
- Care coordination
- Structured data utilized
- Basic EHR functionality, structured data
- Patient informed
- Privacy & security protections

Stage 1
- Stage 2
- 3-Part Aim
- Accountable Care “Stage 3”

Evolution of health care... enabling total health in an efficient, convenient and continuous personalized engagement

Centralized Health Services
1985-1994

Computerized Health Care
1995-2010

Digital Health
2010- Future

CARE WHERE YOU ARE

INTRODUCTION
Making lives better by expanding the boundaries of Total Health beyond hospitals and clinics into everyday life — at home and on the go

Digital Health Vision
- Personalizing the health care experience
- Bringing care to wherever you are
- Improving outcomes and promoting health
- Sustaining leadership in connected care through “One KP”

“The new integration is not about the delivery system, it’s about how you integrate with the member’s life.”

Bernard Tyson,
President,
Kaiser Foundation Health Plan & Hospitals

DISCLAIMER: The views and opinions of the Kaiser Foundation Health Plan & Hospitals do not necessarily reflect the views of the Kaiser Permanente organization.

Kaiser Permanente is an Industry Leader in HIT

KP HealthConnect
- Not just an EMR
- Program-wide system that integrates clinical record, appointments registration, ancillaries and health plan
- Member access to information and outcomes

All Hospitals at HIMSS Stage 7
- At the end of 2011, only 1% of U.S. hospitals were at Stage 7
- 100% of Kaiser Permanente’s hospitals (36) have achieved Stage 7

HIMSS Davies Award Winner
- Recognizes excellence in the implementation of EHRs
- Achieving the goals of safer, high quality and patient-centered care through the innovative, comprehensive and consistent use of information technology

Digital Health care where you are...

INTERACTION TOOLS enabling the interaction...

CONNECTED HEALTH electronic medical records...

FOUNDATION “bricks & mortar” healthcare

Electronic Medical Records / Health Information Exchange

Staffed beds
Face-to-face
In-home
Virtual

Internet/Intranet
Mobile
Social
Voice/Video

Hospital/
Pharmacy
Imaging
Lab

Vilardi, O’Brien, KP, HIMSS, March, 2013
KP SmartCARE Priority Focus Areas

Clinical Transformation

**Rapid Sign-On**
Eases the burden and repetition of logging-in to the EHR every few minutes

**Clinical Intelligence**
Provides cognitive support and real-time contextual information

**Workflow Automation**
Manage tasks, schedules, and events

**Mobility**

**Biomedical Device Integration (BDI)** captures patient data automatically resulting in real-time, accurate, easily available patient information. BDI is foundational to the KP SmartCARE Strategy.

Vilardi, O’Brien, KP, HIMSS, March, 2013
Patient Room of Future

KP at HIMSS 2013

KP & ATT, NCD (Diabetes Pilot)

Wireless in Healthcare

WLAN/Wi-Fi
Foundational utility for mobile applications, devices and users.

Member Benefits
Guest access and cellular signal augmentation in our facilities.

RFID and Real-time Location Systems
Asset tracking, inventory management, patient tracking, HIMS and temperature monitoring.

In-building Voice and Video
Voice and video over Wi-Fi 500 MHz phone systems and DECT 0.0 phone & headset audio.

Wide Area Data
3G/4G, DR facility connectivity, temporary, mobile connectivity.

Mobile Messaging
SMS, legacy and 2-way paging systems, nurse call paging and wireless waveform.

Patient Monitoring
Telemetry (WMTS), home healthcare device monitoring.

Indoor extension of cellular/public safety
A two-way radio signal that provides in-building coverage for cellular phones and first responder (police, fire, ambulance)

HCSC Pilot Results demonstrate similar success

<table>
<thead>
<tr>
<th>Will it stick?</th>
<th>Will participants embrace?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage Exceeds RCT Based on Weekly Average Blood Glucose Entries</td>
<td></td>
</tr>
<tr>
<td>Over 18K Entries</td>
<td>7% Adoption Rate</td>
</tr>
<tr>
<td>Type</td>
<td>Not Total</td>
</tr>
<tr>
<td>BG</td>
<td>63%</td>
</tr>
<tr>
<td>Medication</td>
<td>12%</td>
</tr>
<tr>
<td>Center</td>
<td>25%</td>
</tr>
</tbody>
</table>

Would recommend. Would continue

88% Participants: EM Helped them Manage their Diabetes
Mobile Health

mHealth Applications & Connected Devices

**mHealth app explosion, number of apps**
- 2008: 6,840
- 2012: 17,000
  - >70% CAGR

**Profusion of connected devices, millions of CDs**
- 2012: 21
- 2017: 170
  - 8X increase

Christensen, KP, HIMSS, March, 2013
Integrated mobile apps for KP patients and clinicians

- Mobile electronic health record
  - Android and Apple iOS
  - View part of your health record
  - See your lab results
  - Send a secure message to your physician
  - Refill your prescriptions
  - Book an appointment with your physician

- KP Locator
  - iPhone platform
  - Find any KP facility using iPhone GPS

- Every Body Walk
  - App to encourage fitness and walking

- Professional Applications for access to EMR/EHR by clinicians

KP, George Panagiotopoulos, June 2013
Transforming Care with Health IT

- Leadership / Governance
- Cross functional collaboration
- Real Time, actionable data
- Clinical Decision Support
- Usability
- BioMedical Device Integration
- Mobility
- Performance Improvement & Removing Waste
- Patient & Family Engagement
- Predictive Analytics

US EMR Adoption Model™

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
<th>2012 Q2</th>
<th>2012 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Complete EMR; CCD transactions to share data; Data warehousing: Data continuity with ED, ambulatory, OP</td>
<td>1.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDS (variance &amp; compliance), full R-PACS</td>
<td>6.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed loop medication administration</td>
<td>11.5%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, Clinical Decision Support (clinical protocols)</td>
<td>13.3%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets), CDS (error checking), PACS available outside Radiology</td>
<td>42.4%</td>
<td>41.3%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
<td>11.7%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries - Lab, Rad, Pharmacy - All Installed</td>
<td>5.1%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All Three Ancillaries Not Installed</td>
<td>7.9%</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

Data from HIMSS Analytics® Database © 2012

Vilardi, O’Brien, KP, HIMSS, March, 2013
HIMSS Davies EHR Award

Tom Judd had the privilege of serving on this national HIMSS Committee 2010-2013

• How are health systems using the EHR – once fully deployed, eg, Stage 6 or 7 - in innovative ways; have to demonstrate via 5 case studies

  – Deploy CPOE, CDS, & measure ROI; see [http://apps.himss.org/davies/](http://apps.himss.org/davies/)

1. Clinical Value (Core Case Study)

Hawai‘i Pacific Health’s EHR has been critical to improvements in overall safety, quality, and effectiveness of care. Significant measureable improvements have been achieved in reducing or eliminating ventilator associated pneumonia, catheter associated urinary tract infections, and central line associated bloodstream infections. Similar improvements have been accomplished in core measures, including very good performance in children’s asthma and recently adopted perinatal core measures. Outpatient clinical care improvements in diabetes, hypertension and cancer screening have benchmarked HPH Clinics to the 90th percentile of the country on many measures. The EHR, and Health IT as a whole, has served as the cornerstone of this success.

  1. Reduce support costs by consolidating 32 major systems. These systems included 3 radiology information management systems, 3 pharmacy systems, 3 patient scheduling systems, 7 patient accounting systems, 3 charge masters, 7 patient management systems, 4 medical records/coding systems, a standalone EMR, and a clinical messaging system.

  2. Improve net revenue through the reduction of avoidable write-offs. Prior to the implementation, approximately 2.6% of annual hospital gross revenue ($16 million) was being written off to bad debt and avoidable administrative adjustments. A reduction to 2.0% could produce improvements of more than $1 million in net revenue annually.

  3. Reduced transcription costs. Movement toward online clinical documentation and integrated voice recognition would mean less dependence on Transcription.

  4. Improved Cost-to-Collect. Operating on a single platform allowed savings through improved efficiency, better charge capture, and consolidation of 3 hospital billing groups and 3 physician billing/coding groups.

2. Return on Investment (Core Case Study) – hard & soft ROI

Hawai‘i Pacific Health, Hawai‘i’s largest health system and largest private employer, has demonstrated an annual return on investment from an integrated EHR of 9.0% over ten years. Success was achieved through the integration of all revenue cycle functions and by driving financial and clinical performance through transparency, collaboration, and accountability.

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...and choose... 3 Menu Case Studies
Macedonia Health System

• Minister of Health (MoH): Mr. Nikola Todorov; [www.zdravstvo.gov.mk](http://www.zdravstvo.gov.mk) (MoH website*)

• May 2013*: Introduced Мој Термин (“My Term”), a Health IT (HIT) set of tools
  – “An integrated national system for electronic scheduling and recording medical interventions.”
    From MoH website; similar to MyChart (USA EMR) includes:
    – Patient (Pt.) Registry - Admission scheduling, history - e-Prescription (e-Rx, national Drug Formulary)
    – Provider Registry - e-Referral : secondary, tertiary - Communications between providers
    – e-Scheduling - EMR: primary, second., tertiary Pt. data - Patient web portal
    – MoH created a HIT unit to: (1) monitor EMR deployment; (2) HIT HW infrastructure; (3) HIT SW testing
    – MoH introduced Balanced Scorecard & Pay for Performance

• Health system overview (**Source: Health Strategy ... 2020, published 2007**)

  Population
  – 2,087,171 (July 2013 est.), 480,000 in Skopje, 71 Municipalities (**Source: CIA Factbook**)

  Hospitals
  – Skopje**: 4,751 hospital beds: Military Hospital (420 beds), specialized hospitals (1,848 beds)
    Daily hospitals (360 beds) & University Clinical Centre (2,123 beds, tertiary)
  – **15 secondary hospitals outside Skopje (with adult medicine, surgery, OB/Gyn, and pediatrics)

  Providers
  – Physicians per 100,000 = 274 (Source: European Health for All, 2011)
  – **607 of 1,722 primary care physicians in private practice
  – *Recent MoH contract connecting pharmacies in 45 locations around country for e-Rx

Affiliations
  – *SEEHN – South-eastern Europe Health Network (10 member states & partners)
  – *Increasing numbers of USA and other international physician exchange MOUs
Health IT (HIT) in Macedonia

• 1st phase of EHR & tools deployed 5/13, more coming

• Next: using the Global EMR-Adoption model (page 12), examples:
  – Laboratory (Lab) & Radiology (Rad/Imaging) Results as well as Pharmacy
  – PCP (Adult, Pediatrics, Prenatal) Management EHR implementation – capture PC H&P, etc. to share with secondary level Hospital Information Systems (HIS)
  – Use of IHE standards as basis for HIT interoperability, eg, Lab & Rad

• Needs: use HIT tools as basis for quality measurement (QM) & improvement (QI), leveraging physician exchange best practices; 30 from USA in 2013 (100? In 2014)
  – CPOE: examples: building consensus for prenatal care content by OB/Gyns; primary care physicians agree what to treat at their level, what to refer higher; create proper incentives through P4P to support this consensus clinical content
  – QM: recommendation to create small teams of nurses overseen by physicians who can teach these kind of best practices while measuring outcomes
  – QI: utilize best practices, example of Ventilator Acquired Pneumonia (VAP) for neonates, addressed by Bubble CPAP introduced in NICU to address high VAP
  – Training the Trainers for EHR/EMR use: to ensure widespread use
“What a long strange trip it's been”

13 years in 'pure' electronics
   Military, private business

Then...

1 year 'medical'
24 years in CE
   24 in the US Veterans hospitals
   1 in CE/EMR

Fuzzy math? (I'll explain)
EMRs/EHRs

The next great Biomedical Engineering Challenge
My year in the 'medical' field:

I have come full circle!
Why bother with EMRs?

The data our devices produce will go somewhere!

Patient physiologic data
Equipment status
Equipment location

If we don't manage that information with the same skill we use to manage the devices, how do we protect the patients or ensure correct medical care?
What CE's need to know about EMRs

How the EMR works
Who manages/is responsible for the information, and the information interchange
What happens when things go wrong
How to make sure medical device output is accurate and delivered to the right place, and that the receiving EMR interprets and stores it properly!

SO, how can we learn these skills?
EMR-STAR: Part of the solution?

EMR System Training Access & Resources
EMR-STAR

EMR-STAR: Helping Everyone Get Hands-On EMR Skills

• Diverse EMR software exposure
• Varied user interfaces
• See One, Do One, Teach One learning paradigm
• Learning to learn
• Problem solving – goal seeking tasks
• Real-world clinical scenarios
EMR-STAR

• HEALTH e WORKFORCE CONSORTIUM – FREE ONLINE CURRICULA

  • Health Information Technology
  • CAHIMS Academy - New Entry Level Certification
  • Healthcare Data Analytics
  • Healthcare Database Management and Design
  • Healthcare Computer Networking
  • Health IT Security
  • Mobile Device Management in Healthcare
  • Mobile Health Software Development
EMR-STAR

• EMR-STAR: Multiple Environments
  • Hospitals
  • Clinics
  • Physician practices

• Departments, such as lab, radiology, and pharmacy, too...
3 Open Source Systems now in the EMR-STAR library – Hosted by CHIRP

• **OpenEMR** – Physician practice management

• **OpenVista** – Full-hospital EMR (used by Veteran’s Administration’s system in USA)

**OpenMRS** – Hybrid “best practices” EMR to support HIV, tuberculosis, and other community health centers, including in- and out-patient uses
Benefits of EMR Mastery:

Great education for tech management staff

Opportunities to save money now and through device's life cycle through smart purchasing and negotiation for current, future versions and updates

Better ability to manage, maintain systems, devices,

Improved relationships with all stakeholders, clinicians, C suite, IT

Ability to stay ahead of the deadlines (Meaningful Use, acquisition of IT systems and updates/upgrades)

Retain and expand your role and image

Improved ability to conform to regulations, accreditation, etc.

*This is an opportunity for professional growth!*
Finally:

Change is difficult
Change is inevitable
Even old dogs can learn new tricks
For us to learn, grow and advance, we need to be uncomfortable
Here is another opportunity for us to be the 'Go to' people.
Elliot B. Sloane, PhD, CCE, FHIMSS

- President & Founder, CHIRP, a non-profit educational agency
- Director, Electronic Medical Record System Training and Access Resource, www.EMRSTAR.org
  - CHIRP began in 2012 a 3-year exclusive contract via the US Government Department of Labor to design, develop, implement, and provide EMR-STAR training for 2000+ new “Information Age” healthcare workforce employees, through both on-line and through community college courses.
  - Currently assisting several countries in addition to the USA
- HIMSS roles (Global Health IT Society):
  - HIMSS Annual Conference Education Committee
  - Past Chair, HIMSS Security and Privacy Steering Committee
- IHE (Integrating the Healthcare Enterprise-IHE) roles:
  - Co-Chair, IHE International Board of Directors
  - Board of Directors, IHE-USA
- Other professional roles:
  - Sponsor, IEEE 11073 Medical Informatics Standards
  - Advisory Board, UL/AAMI 2800 Interoperable Medical Device Standard
  - Past Board of Directors, ACCE, IEEE EMBS, ANSI/HITSP project
  - WHO & PAHO Volunteer Advisor, since 1978!
- www.ebsloane.org & www.ebsloane.org/HealthSystemsEngineering/
Dr. Elliot Sloane

• A road less traveled, perhaps...
• Four Decades in Medical Device and Health IT Systems

• 15 years in non-profit research, development, & independent testing, standards, and forensic investigation of medical technologies
  At ECRI Institute, from “bench” to CIO and COO
  - Worked with FDA on medical device standards
  - Arrhythmia detection disclosure and apnea monitors
  - Investigated medical technology injuries and deaths
  - Developed computer systems for medical device nomenclatures, “Hazard Reports,” feature comparisons, product directories, and medical device maintenance and safety assurance

• 10 years in a publicly-traded corporation, medical device manufacturing, repairs, 24x7 rental/delivery, and medical device and drug manufacturing and distribution
  At MEDIQ Life Support Services, from COO through CTO and CRO
  Registered with FDA as device and drug manufacturer
  Owned and managed a fleet of 500,000 medical devices nationwide

• 15 years as a professor, consultant, and businessman
  — focused on Health IT, Health Systems Engineering, Medical Device Data Systems Research, Wireless Medical Devices, and Patient Safety
Resources/Topics for Discussion

• IHE — Integrating the Healthcare Enterprise
  – Overcoming EMR Interoperability Challenges
  – IHE Global Structure
  – Other similar Health IT Case Studies
    • Overview of Saudi Arabia, Colombia IHE adoption
    • Laboratory Results Reporting Example Use Case

• EMR-STAR
  – On-line curriculum ‘Virtual’ EMR Training
  – Screen shots of EMR examples
Interoperability: Highest Cause of Health IT project failures

Health Interoperability Standards: how can we realize the promise?
Interoperability: From a problem to a solution

Base Standards

- OASIS
- ISO
- W3C
- DICOM
- IEEETransition
- CDISC
- LOINC
- IHTSDO
- ITU

Profile Development

- IHE
- Continua

Specific Extensions

eHealth Projects
IHE: A Framework for Interoperability

- A common technical framework for harmonizing and implementing multiple standards
  - Application-to-application
  - System-to-system
  - Setting-to-setting

- Enables seamless health information movement within and between enterprises, regions, nations

- Promotes unbiased selection and coordinated use of established healthcare and IT standards to address specific clinical needs
IHE Organizational Structure

IHE International Board

Example Deployment Committees
- IHE North America
  - Canada
  - USA
- IHE Asia-Oceania
  - China
  - Japan
  - Korea
  - Australia
- IHE Europe
  - Austria
  - France
  - Germany
  - Netherlands
  - Italy
  - Norway
  - Spain
  - Sweden
  - UK

Global Development Domains
- Radiology
- IT Infrastructure
- Laboratory
- Cardiology
- Patient Care Coordination
- Pathology
- Radiation Oncology
- Patient Care Devices
- Eye Care
- Public Health, Quality and Research
- Pharmacy
- Endoscopy
- Dentistry

Professional Societies / Sponsors

Contributing & Participating Vendors
The IHE Development Domains

17 Years of Steady Evolution 1998 – 2013

- **Radiology** since 1998
- **Dentistry** since 2010
- **Pathology** since 2006
- **Endoscopy** since 2010
- **Pharmacy** since 2009
- **Eye Care** since 2006
- **Quality Research & Public Health** since 2006
- **Patient Care Devices** since 2005
- **Radiation Oncology** since 2004
- **Laboratory** since 2004
- **Cardiology** since 2004
- **Patient Care Coordination** since 2004
- **(Healthcare) IT Infrastructure** since 2003
Kingdom of Saudi Arabia

Ministry of Health Adopted IHE as the National Standard for eHealth in May, 2013

*Adopt/adapt IHE standards whenever possible*

First Goal: Standardizing the SeHe Interface

Standardizing the interface at KSA level:

Enable Interoperability through:
- Use cases (What to exchange)
- Interoperability Specifications
- Policies (Requirements)

Will not include/constrain:
- Local system design
- Intra-organization Interop
- Management Processes to implement Policies

**Saudi eHealth Exchange Platform (SeHe)**
(e.g., patient and provider directory, repository, access control)
Use Case – Share Lab Coded Results (1)

**Laboratory publishes results to iEHR**

- Register patient
- Provide patient care
- Order Labs,
- **create results**
- **update results**
- Discharge patient

- Source is responsible to maintain accuracy of results:
  - Update for errors, incomplete results.

**Lab Result Document includes:**
- Source Information
- Set of Coded Lab Results with units
Use Case – Share Lab Coded Results (2a)

Look for prior results

1 - Create and publish a lab report, triggered by hospital care and/or primary care

2a - Query/retrieve lab reports, provide follow-up patient care
1 - Create and publish a lab report, triggered by hospital care and/or primary care

2b - Optional notification from iEHR/eHealth Interop Platform to the ordering physician when lab reports/results are published.
Cofounder and board member of the non-profit Center for Healthcare Information Research and Policy (CHIRP), and CEO, Collegiate Consortium for Workforce and Economic Development

• Prior Clinical Experience, Teaching and Fellowships, and Humanitarian Aid
  – A decade of Clinical Experience in Respiratory Care serving as Technical Director of Respiratory Care services and Occupational Disease.
  – A decade of experience installing more than $50M of medical technology into health systems in transitional economies worldwide
  – Research Fellow in International Law and Health Policy at Temple University School of Law
  – Adjunct faculty, Flagship Course for Health Reform at the World Bank Institute
  – Decades of working with Clinical Engineers on health technology projects!

• Current Teaching and Fellowships
  – Appointment as Fellow in Human Resource Development at the School of Education at Drexel University in US
  – Adjunct faculty in School of Biomedical Engineering and Graduate School of Education at Drexel University
  – Lead curriculum developer, CHIRP EMR-STAR program

Licensed Attorney in US
Electronic Medical Record
Curriculum and Training Support

• CHIRP is developing, testing, and delivering clinically relevant curriculum for newcomers to the electronic medical records field
• Focus on integration of technical and clinical applications of the technology
• Partnering with education and training providers to support program delivery
  – Can be used on many teaching platforms, including Blackboard, Moodle, or Canvas
Curriculum Approach: “Adult Learners”

• We are using the *See one, do one, teach one* approach.
  – The classic “train the trainer model”

• **Bite-sized chunks:** Very simple hands-on clinical, operation, and administration training tasks
  – Configuration and customization training could easily be added, and the learners gain real-world experience on actual products!

• **Easily adapted to other languages, and/or EMR software,** AND *can be used to train clinicians!*
  – We would welcome partners to build global training resources!