Electronic transfer of radiology reports to GP systems and other hospitals

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14 years local NHS IT experience, 4 years UoP, active in HL7 UK since 2005
  ◦ All NHS IT projects involve integration or interoperability
  ◦ Surprisingly few national standards/solutions to integrate primary and secondary care
    • PMIP
    • Choose & Book
    • ITK
    • ... ?

Variability exists at technical and operational levels: information flows and work flows
Distinct design paradigms

- Portal/hospital EPR viewer
  - Cerner
- Shared repository
  - NHS Lothian (InterSystems, SCI Store)
- Direct messaging into GP EPR
  - Rotherham Imaging Centre (Pukka-j, Indigo4)
- Messaging hub (HIE)
  - Charlotte Radiology (InterSystems)
  - Alder Hay (Medisec Software)
  - Other products: Orion Rhapsody, MIG, PCTI, new vendors
- Integrated requesting and reporting (order comms)
  - Peterborough City Hospital (Sunquest Information Systems)
EPR viewer: Cerner

*Final Report*

Reason for Exam

Findings

Exam: CT CHEST WITH CONTRAST
Date of Service: 06/18/2008
Accession: CT-08-000009

Associated: CT ABDOMEN WITH CONTRAST  CT-08-000009
Associated: CT PELVIS WITH CONTRAST  CT-08-000009

CT OF THE CHEST, ABDOMEN, AND PELVIS

CLINICAL HISTORY: Abdominal pain with history of skin cancer.

TECHNIQUE: Arterial phase enhanced images of the abdomen were then obtained, followed by venous phase enhanced images of the chest, abdomen and pelvis.

COMPARISON: CT performed at outside institution dated March 21, 2006.

FINDINGS

Chest: The lungs are clear. Incidentally noted is an asygos lobe. The heart and great vessels are normal. There is no lymphadenopathy.

Abdomen: There is a large, lobulated heterogeneously enhancing mass involving liver segments 5 and 6, measuring 8.3 cm AP x 7.2 cm transverse x 11.8 cm longitudinal. The remainder of the liver is normal. There is a large heterogeneously enhancing periporal lymph node that measures 3.8 cm AP x 3.2 cm transverse x 4.1 cm longitudinal. The enlarged lymph node displaces the gallbladder anteriorly and causes mild compression of the IVC at the level of the left renal vein insertion. There is a smaller subcapsular portal lymph node adjacent to the common hepatic artery. No other enlarged lymph nodes are seen. The portal, splenic, and inferior mesenteric veins are patent. There is a replaced left hepatic artery arising from the celiac axis.

The spleen, pancreas, gallbladder, adrenals, and both kidneys are normal. The bowel is not obstructed. There is wall thickening involving the third portion of the duodenum through the proximal jejunum. There is no free fluid. The aorta is normal in caliber.

Pelvis: The bladder, uterus, and adrenal structures are normal. There is a small amount of free fluid within the pelvis, likely
Shared repository: NHS Lothian

TrakCare RIS

SCI Store

Proprietary interface

Portal view

Paper

Planned

Report
**Direct messaging: Rotherham Imaging Centre**

**Diagnostic Provider Location**

- Pukka-j RIS PACS produces diagnostic images and reports as DICOM Studies and Structured Report (SR)

**Remote Radiology Reporting**

- Pukka-j RIS PACS transfers radiology images to remote reporters as DICOM studies. Radiologists complete the report and transfers to Pukka-j an HL7 ORU Result Message.

**Central RIS PACS Server**

For radiology report communication the Pukka-j RIS PACS Server converts DICOM Structured Reports (SR) to HL7 Results (ORU) messages and vice versa.

**GP Practice Management System**

- The radiology result is received by the referrers system e.g.: EMIS, SystemOne

**Image Exchange Portal**

- IEP is the national image and sharing network for transferring diagnostic images and reports from one organisation to another.

**Clinical Messaging Solution**

- Indigo 4 Keystone Enterprise messaging solution receives from Pukka-j an HL7 result message to convert and communicate to the referrer.
Messing hub: Charlotte Radiology

InterSystems Ensemble

Requesting, reporting, billing

Reports

HL7 translation & routing

Multiple test requesters

Requests, reporting, billing
Future Functionality
Integration with ImageNow
Copy of all documents into Electronic Document Management System

Electronic Prescribing
Digital Dictation & Medical Transcription

Clinical Documentation Architecture

PAS (Meditech)

Future Functionality
Output to Neighbouring Hubs: Cheshire, Cumbria, Lancashire, Greater Manchester, North Wales and onto their neighbours

MedisecTrust
Collects and stores discharge summaries from Prescribing (JAC), Outpatient Attendance, Discharge and One-Off Letters from Digital Dictation and A&E Discharge Summaries from PAS (future functionality)

MedisecNET

PSL Out-Sourced Letter Service

GP System or Practice (for letters)

ITK2

Future Functionality
Integration with ImageNow
Copy of all documents into Electronic Document Management System

Patient Care Inquiry (PCI) Link
Copies resulting documents back into PAS for viewing during patient consultations
Order comms: Peterborough

- RIS
- Sunquest ICE
- Hospital & GP requesting & reporting
- Can integrate with GP system
- Various interfaces
- Portal view

Requests & reports
Comparing design paradigms

Typical degree of integration
(where requester has different EPR to reporting institution)

- Typical use of global standards
  - EPR viewer
  - Shared repository
  - Direct messaging
  - Messaging hub (HIE)
  - Integrated requesting & reporting
Variations in GP workflow

Impact of electronic medical record on physician practice in office settings: a systematic review

Francis Lau¹*, Morgan Price², Jeanette Boyd³, Colin Partridge⁴, Heidi Bell¹ and Rebecca Raworth⁵

Abstract

Background: There is an increasing need to learn from the experiences of those working in physician office settings. To address this need, we conducted a systematic review of the literature on the impact of electronic medical records (EMRs) in Canada. There is a need to learn from the experiences of those working in physician office settings. To address this need, we conducted a systematic review of the literature on the impact of electronic medical records (EMRs) in Canada.

The research reported in this short article was carried out to identify potential changes in clinical and administrative workflow resulting from the introduction of the system. The study considers the impact of electronic records on workflow and the introduction of the system. The study considers the impact of electronic records on workflow in general practice.

Matthew Cauldwell, Caroline Beattie, Benita Cox, William Denby, Jessica Ede-Golightly and Fiona Linton

Results: For patients attending a general practice in the UK, the Patient Access to Electronic Healthcare Records System (PAERS) allows patients to register their arrival at a GP’s surgery and to view their healthcare record electronically whilst in the waiting area. The research reported in this short article was carried out to identify potential changes in clinical and administrative workflow resulting from the introduction of the system. The study considers the impact of electronic records on workflow pre and post introduction of the system. The study considers the impact of electronic records on workflow in general practice.

Key points: The impact of electronic records on workflow in general practice.

Introduction

Recent legislation within the healthcare sector has led to an increase in the use of electronic medical records (EMRs) in Canada. The study considers the impact of electronic records on workflow and the introduction of the system. The study considers the impact of electronic records on workflow in general practice.

Users’ perspectives of key factors to implementing electronic health records in Canada: a Delphi study

Carrie Anna McGinn¹, Marie-Pierre Gagnon², Nicola Shaw³, Claude Sicotte⁴, Luc Mathieu⁵, Yvan Leduc⁶, Sonya Gienfer², Julie Duplantie⁶, Anis Ben Abdeljelil⁷ and France Légaré⁸

Abstract

Background: Interoperable electronic health record (EHR) solutions are currently being implemented in Canada, as in many other countries. Understanding EHR users’ perspectives is key to the success of EHR implementation projects. This Delphi study aimed to assess in the Canadian context the applicability, the importance, and the
Value of standards

- Standards facilitate value added services, aggregation and information re-use
  - HL7 v2 result messages used to trigger alerts to requesting clinicians for new radiology reports and send reports from ISTC to Trust PACS (Portsmouth Hospitals NHS Trust)
  - Service management (Trust level)
  - Population health (GP and public health)
  - Commissioning (CCGs/CSUs)
  - Research (HERCs, AHSNs): global need not just UK
Value of standards

- Standards for document format
  - HL7 CDA is the globally dominant exchange format for clinical documents
  - Adopted by most national programmes
  - Supported by many HIT vendors
  - Easily implementable in a staged approach
  - US C–CDA has template for radiology report
  - ITK could use non-coded CDA template

- Standards for a repository approach
  - IHE XDS–I.b
  - Registry/repository model, supports CDA
  - Implemented for VNAs?
HL7 Clinical Document Architecture

- **CDA is a data exchange standard** for clinical documents
  - Specifies the structure and semantics of a clinical document (such as a discharge summary or radiology report) for the purpose of data exchange.

- A CDA document is a **complete information object**
  - Can be sent inside an HL7v3 message or exist independently
  - Can include text or multimedia content

- **CDA documents are encoded in eXtensible Markup Language (XML)**
  - CDA documents derive their machine readable meaning from the HL7v3 Reference Information Model (RIM) coupled with terminology such as SNOMED CT and LOINC
## CDA basics: header and body

<table>
<thead>
<tr>
<th>Clinical Document</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Header</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Body</strong></td>
</tr>
</tbody>
</table>
CDA Body with data “blob”

Clinical Document

Header

Non XML Body

Text

Non-XML data (eg image)
CDA with narrative text only

Clinical Document

Header

Structured Body

Section

Text (narrative block)
CDA with coded entries

Clinical Document

Header

Structured Body

Section

Text (narrative)

Entries (coded data)
Conclusions

- Accenture survey (2012): Only 46% GPs electronically request diagnostic tests
  - Radiology e-requests perhaps 10–20% at most (?)
  - US ‘meaningful use’ target is 30% of radiology orders by CPOE (but no standards specified)
- Paradox: GPs and radiology are leaders in use of healthcare IT systems, but not together...
- UK market is fragmented by divergent NHS political structures and information strategies
  - Infrastructure and view of standards varies widely
  - PRSB may have role in influencing alignment
Conclusions

- Economics of interoperability needs a health system-wide view
  - Costs and benefits occur in different organizations
  - Incentives needed: ‘paperless NHS by 2018’???
- CDA is a stable widely used standard to adopt
  - Radiology proposals into ISCF2 are to be encouraged!
  - Extend C&B for diagnostics to include order comms with CDA reporting?
- Variation in GP workflow not well understood
  - UoP research project in planning stage, participants welcomed!
Thank you for your attention

- Questions?

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“To care appropriately you must share appropriately” (Caldicott2)