

Exchange Standards: Document exchange

HL7v3-Clinical Document Architecture (CDA)

HL7: Exchange Standards

HL7 Versions

- HL7 Version 2.x messaging
- HL7 Version 3 messaging
- HL7 Clinical Document Architecture (CDA)
- HL7 Fast Healthcare Interoperability Resources (FHIR)

Exchange is a Need in Healthcare



Vast amounts of patient data collected through direct clinical interactions

Medical information such as vitals, orders, prescriptions, discharge summaries, etc. dictated or recorded by hand



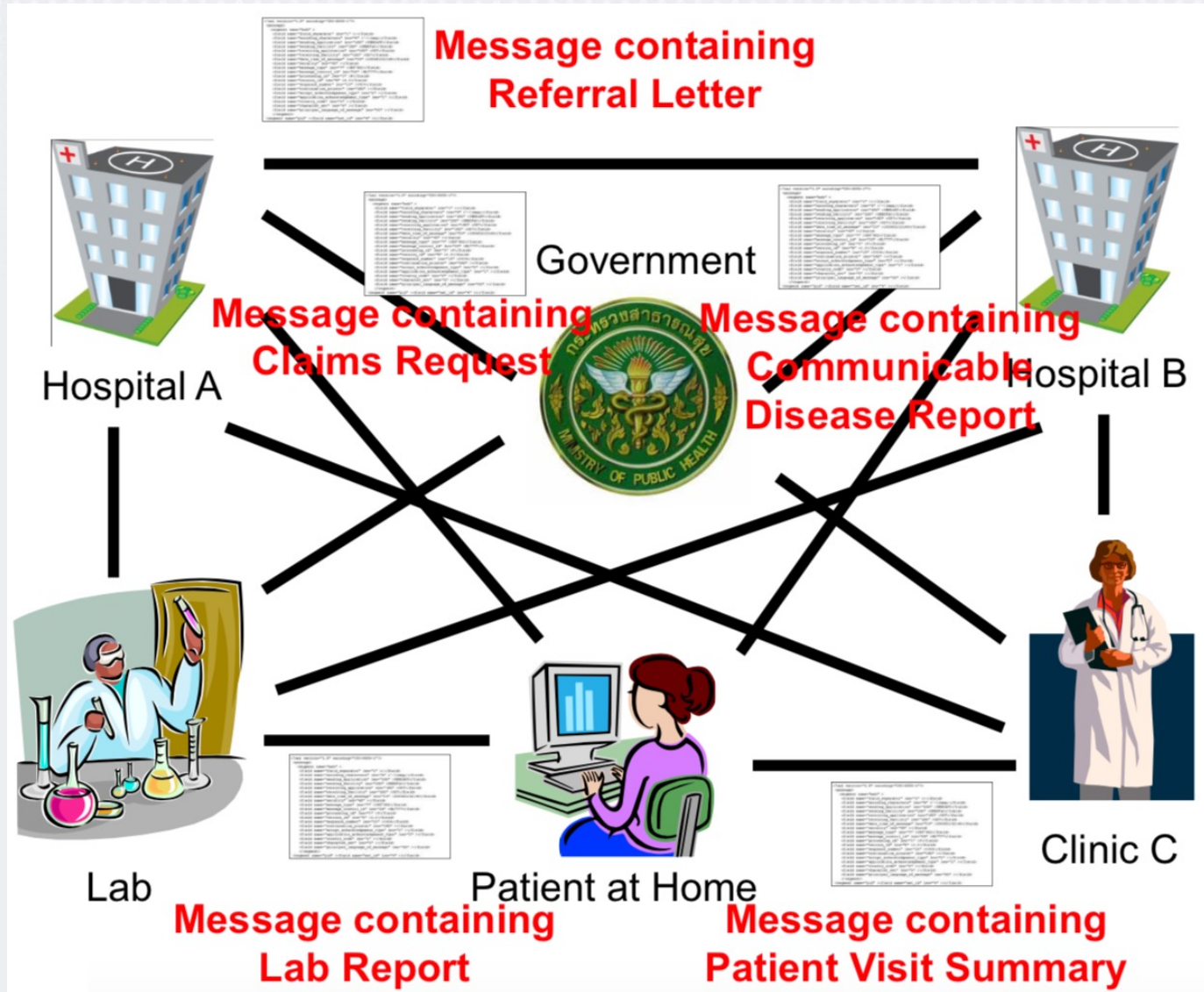
All of this clinical data was stored as paper records (documents) at each point of care

If patient health records needed to be shared between providers, they usually required manual exchange (e.g. fax, "snail mail")



- Coordination of care between providers slow, costly; patient outcomes inconsistent
- Duplicative healthcare services (e.g. labs imaging) frequent

Clinical Document Exchange



Clinical Documents



8/11/17 **Ex. A-1**

THE MEDICAL CENTER OF CENTRAL MASSACHUSETTS

EMERGENCY
MEDICAL RECORD COPY

ROOM: _____ ROOM: _____

PATIENT'S LAST NAME: **Thomas** FIRST: _____ MIDDLE: _____ MAIDEN NAME: _____ SEX: **M** AGE: **43Y** ACCOUNT NO.: **9062373** MED. REC. NO.: **304292**

PATIENT'S ADDRESS: **129 Crescent St Shrewsbury MA 01545** ZIP: _____ PHONE NO.: **000000** MAR: **X** DATE OF BIRTH: **09/27/49** SOCIAL SECURITY NO.: **014409215** FIC: **B**

EMPLOYER'S ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____ PHONE NO.: _____

RELATIONSHIP: **Known** NAME: **MARY Werner** ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____ PHONE NO.: **888-3130-515** DATE/TIME OF ARRIVAL: **09/29/17 02:00**

OCCUPATION: **Eye Inj** ATTENDING PHYSICIAN: **Misc** (298190) REL. ASSG: _____

ATTENDING: _____ PTP: **E** SERVICE: **ER** OCC (REL. CO.): **11** REG. BY (REL. CO.): **914 NG** SUBSCRIBER/CO.: **Unknown** LINE: _____

INSURANCE CO. 1: **Blue Cross** GROUP NO.: _____ CERTIFICATE NO.: **009379759** SUBSCRIBER: **King Thomas** SEX: **M** REL: **PT**

INSURANCE CO. 2: _____ GROUP NO.: _____ CERTIFICATE NO.: _____ SUBSCRIBER: _____ SEX: _____ REL: _____

INSURANCE CO. 3: _____ GROUP NO.: _____ CERTIFICATE NO.: _____ SUBSCRIBER: _____ SEX: _____ REL: _____

PHYSICIAN NAME: **King Thomas** ADDRESS: **129 Crescent St Shrewsbury M A 01545** CITY: _____ STATE: _____ ZIP: _____ PHONE NO.: **000000**

ALLERGIES: **IVP, Dye**

EVENT: TIME: **2 A** TETANUS STATUS: **5-6 yrs ago** LUMP: _____ WGT: _____ BP: **138/82** HR: **98** RR: **24** R VISUAL ACUITY: _____

CHIEF COMPLAINT: **Someone poked his decision nail thru my eyeball - leaking viscous fluid. Dr O'Connell in to evaluate pt immediately - eye shield applied. #20 started with difficulty - AS locked. Alight hung - WPD into interview pt is: sister in a pt. Dr. ... into exam - pt's eye. 3 AM Discharge instructions given and pt left ambulatory 2 ... and cousin. Johnson RN**

HEALTHY SOCIAL HR: **carpal tunnel, sensitive SVT - AFB, blind x 1 yr @ eyes old, appy, fossil, Hta**

TIME	BP	P	R	TEMP	PULSE	OX

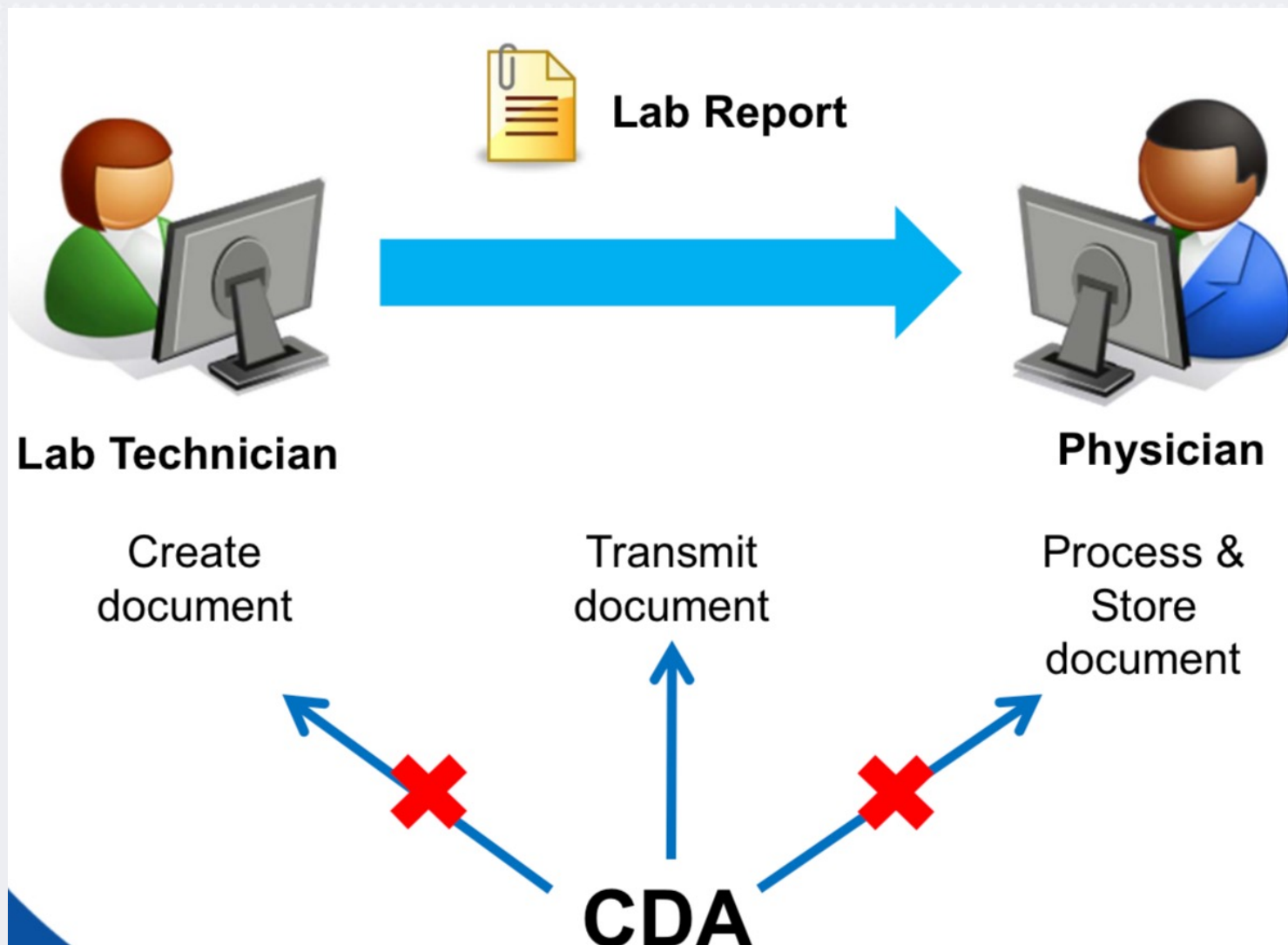
DATE	TIME	TEST	RESULT	DATE	TIME	TEST	RESULT
		EXG				MONITOR	
		MONITOR				O ₂	
		DEXSTICK					

MEDICATION DOSE & ROUTE: **Kefzol 1 gm IV 2A RFA, Tylenol 500 mg IM 2A H**

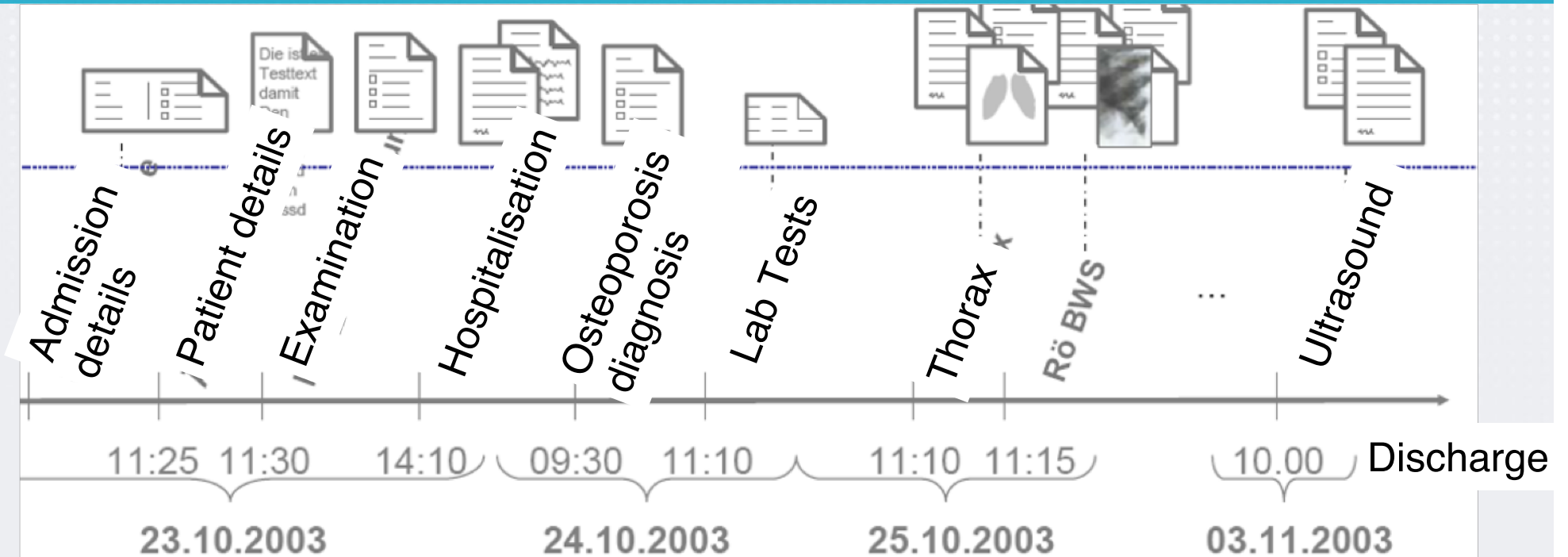
MEDICAL RECORD CALLED: _____ MEDICARE ADV: _____

PHYSICIAN'S SIGNATURE: **Johnson RN 118**

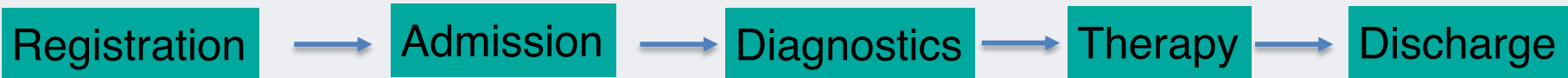
Clinical Documents



Clinical Process vs Clinical Documents



Documents in the clinical process from admission to discharge



Clinical Process

HL7: Document Exchange Standards

- HL7 CDA (Clinical Document Architecture)
 - CDA has Release 1 and 2.
 - Provides an **exchange model** for clinical documents e.g. discharge summaries and progress clinical notes
 - Aims at bringing a real-world view to patient medical records in which:
 - Healthcare providers can understand
 - Healthcare applications can **atomically process**
 - HL7 CDA is a **subset** of HL7 v2.x or HL7 v3 message

Clinical Documents: Different formats

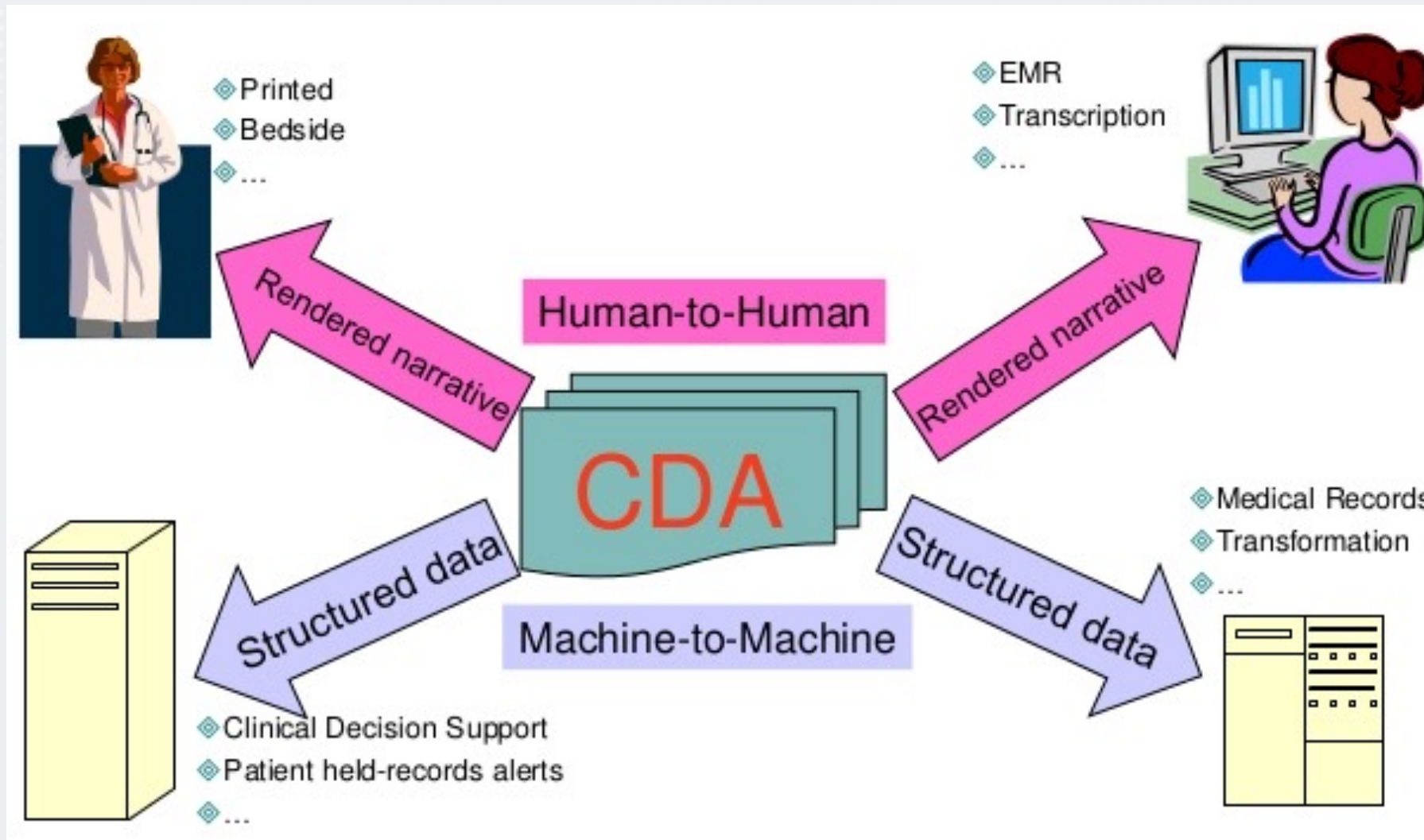
- This is a CD
- and this
- and this
- and this
- and this
- and this



HL7: Document Exchange Standards

- HL7 CDA (Clinical Document Architecture)
 - “ A **document markup standard** that specifies structure & semantics of **clinical documents** for the purpose of exchange”
 - Focuses on **document exchange**,
 - A document is packaged in a message during exchange
 - A patient medical record as an XML-based documents
- ⇒ CDA is not designed for document storage, just exchange?!

HL7: Document Exchange Standards



A Clinical Document

- A CDA document is a complete information record that can include:
 - Text
 - Images
 - Sounds
 - Other information or media
- Clinical content of the document is defined by the HL7 V3 RIM – CDA only standardizes/defines the structure required to exchange documents.

CDA

- CDA = Clinical Document Architecture
 - CDA is a HL7-standard
 - XML-standard to exchange structured documents
-
- A key distinction between **HL7 messages** and **HL7 CDA** documents
 - **messages** are packets of data sent from one system to another, get incorporated into the receiving system.
 - **documents** are basically electronic versions of physical clinical documents

CDA

- An electronic equivalent of a paper document
- Has an author/attester
- Represents a point in time view of data
- Persists as an artifact over time
- Supports simple to very complex document types

ProVation MultiCaregiver

ProVation Medical Center
GI Nurse Note
Procedure(s): Colonoscopy

Patient Name: **Martin, Rebecca**
 Patient ID: **56564567889**
 Exam Date: **7/17/2013**
 Account#:

Level of Consciousness: **Alert and Oriented x 4**
 Respiratory assessment: **Breath sounds clear / equal**
 Skin assessment: **Warm, Dry, Pink**
 Abdominal exam: **Soft**
 IV started: **YES**
 Attempts: **1**
 IV site: **Right hand**
 Size: **18 gauge**
 IV solution: **Saline Lock, Normal Saline (NS)**
 IV rate: **TKO**
 Inserted by: **MS**
 Time started: **07/18/2013 10:17**

DISCHARGE User: msmith

Patient transferred by and report received from: **ii**
 Siderails up on bed upon receipt of patient? **YES**
 Transportation after procedure: **YES**
 Driver location: **Waiting Room**
 Driver's name/Relationship/Phone: **John/husband/ 891-2712**
 May we share the results of the procedure with your driver? **YES**
 May we contact you tomorrow for a follow-up call? **YES**

Level of Consciousness: **Alert and Oriented x 4**
 Skin assessment: **Warm, Dry, Pink**
 Abdominal exam: **Soft**
 Does the patient currently have pain? **NO**
 Bowel sounds: **Present**
 Passing flatus? **YES**

DISCHARGE CRITERIA

Oxygen saturation on room air >=94% or equal to pre-sedation state? **YES**
 Able to ambulate independently (or at baseline)? **YES**
 Able to take PO fluids? **YES**
 IV discontinued: **YES**
 IV site assessment: **Drv, intact**
 IV removed by: **MS**
 Time removed:
 Amount IV fluids infused:
 Comments:
 Patient's valuables returned/reviewed? **YES**
 Patient valuables returned to: **Patient**

Patient belongings removed/reviewed in Pre-Procedure

Patient Belongings Removed/Reviewed: **YES**
 Patient items removed: **Contact lenses, Hearing Aid**
 Patient belongings stored: **Stored with patient**
 Patient meets discharge criteria as set by physician and approved by facility? **YES**
 Discharge instructions given to: **Patient, Spouse**
 Discharged to: **Home**
 Discharged via: **Ambulatory**
 Discharged under the care of: **Spouse**

CARE PLANS User: j Jones

PRE-PROCEDURE

1. Anxiety regarding impending procedure.
 Actions: Assess patient for non-verbal clues, listen, clarify questions. Allow use of coping mechanisms. Refer to support system.
 Outcomes: Expresses decreased anxiety and increased understanding of procedure:
 Status: **MET**
2. Lack of understanding of procedure and medications.

Nurse Note Sample
 ProVation Medical Center
 Patient Name: **Martin, Rebecca**
 Patient ID: **56564567889**
 Exam Date: **7/17/2013**
 Procedure(s): **Colonoscopy**

Level of Consciousness: **Alert and Oriented x 4**
 Abdominal exam: **Soft**
 IV started: **YES**
 Attempts: **1**
 IV site: **Right hand**
 Size: **18 gauge**
 IV solution: **Saline Lock, Normal Saline (NS)**
 IV rate: **TKO**
 Inserted by: **MS**
 Time started: **07/18/2013 10:17**

ALLERGIES AND ALERTS
 Allergies: **MET**
 Alerts: **None**

CURRENT MEDICATIONS
 Ibuprofen: **None**
 Fish Oil: **None**
 Ginseng: **None**

DISCHARGE CRITERIA
 Patient ID verified: **YES**
 Verified name of patient: **YES**
 Procedure(s) scheduled: **YES**
 Patient meets discharge criteria as set by physician and approved by facility? **YES**

Example- Physician Letter as a CDA

The diagram illustrates a physician letter as a CDA (Clinical Document Architecture). The letter is shown on the left, and callouts on the right identify its components:

- Header** (blue box):
 - Document Information
 - Encounter
 - Service Actors
 - Service Targets
- Body** (dark blue box):
 - Structured (narrative)
 - Text, Coded Entries

The physician letter itself contains the following text:

Klinik und Poliklinik für Urologie
 Direktor: Univ.-Prof. Dr. med. L. Hertle

Univ.-Klinik und Poliklinik für Urologie • D-48149 Münster

Herrn
 Dres. med. Tschuschke und Rutte
 Urologie
 Windthorststr. 19
 48149 Münster

48149 Münster, 11.07.2002

Korrespondenz:
 Albrecht-Solken-Platz 33
 48149 Münster
 Telefon: 0251 83-183-0

Urologische Poliklinik
 Sekretariat: 0251 83-47444
 Durchwahl: 0251 83-47446
 Fax: 0251 83-49739

Empfänger:
 Dres. med. Tschuschke und Rutte, 48149 Münster, Windthorststr. 19
 Nachrichtlich an:
 Dres. med. Feoltrup/Prahl/Paulus, 48149 Münster, Himmelreichallee 37

Kurzarztbrief

Herr Ernst Testpatient 1, geb. am 01.01.1930
 54382 Wasserlesch, Waldstr. 1

Sehr geehrter Herr Kollege,

nachfolgend berichten wir über Ihren Patienten, Herrn Ernst Testpatient 1, der sich in der Zeit vom 12.04.2000 bis zum 11.07.2002 in unserer stationären Behandlung befand.

Diagnosen:
 Typhus abdominalis
 aktuell:
 Meningitis bei anderenorts klassifizierten Mykosen G02.1*
 Sonstiger und nicht näher bezeichneter mechanischer Ileus K56.8

Prozeduren:
 Naht Muskel 5-853.1
 Exzision u. Destruktion intrazerebrales Tumorgewebe hirnigen Lok.onA5-015.00
 Inzisionsbiopsie Augenlid 1-620

Anamnese und körperlicher Untersuchungsbefund:
 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et justo odio dignissim qui blandit praesent luptatumzzril delenit augue duis dolore te feugiat nulla facilisis.

Labor: Nachweis der hier, ebenfalls Laborbestände in Präzisionsanalyse
 5.12.2000.: Serumchemie I; Harnstoff-N 14 < 24 mg/dl; Kreatinin 0,8 < 1,1 mg/dl; Bilirubin (ges.) 0,3 < 1,2 mg/dl; GOT 40 < 45 U/l; GPT 42 < 49 U/l; Gamma-GT 29 < 48 U/l; Alkalische Phosphatase 67 60 - 170 U/l; LDH 248 < 240 U/l; PCHE 2919 - 3500-8500 U/l; CK 68 < 70 U/l; CK-MB < 10 U/l CK-MB; Lipase 58 < 190 U/l; CRP 1,4 < 0,5 mg/dl; Kleines Blutbild; Leukozyten 10,80 + 4,0 - 10,0 Tsd./µl; Thrombozyten 153 150 - 350 Tsd./µl; Gerinnung; TPZQuick 78 70 - 130 %; INR 0,85 - 1,1 INR; PTT 39 + 24 - 36 sek.; Antithrombin III 72 - 80 - 120 %; Blut/Plasma; Laktat < 0,3 - 0,4 - 2,0 mmol/l nldm; Heparinisiertes Blut; Troponin I i Serum folgt ng/ml <; CK-MB : CK-MB-Bestimmung nur, wenn CK > 80 U/l.; INR: Angabe von INR nur bei Quick < 50% -oldm -newer Befundbereich ab dem 14.09.00.

Example: CCD (Continuity of Care Document)

555,555-1010

Document maintained by	Good Health Clinic
Contact info	Work Place: 17 Daws Rd. Blue Bell, MA 02368, USA Tel: (555)555-1212

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Allergies, Adverse Reactions, Alerts

Substance	Reaction	Status
Penicillin	Hives	Active
Aspirin	Wheezing	Active
Codeine	Nausea	Active

Medications

Medication	Directions	Start Date	Status	Indications	Fill Instructions
Proventil 0.09 MG/ACTUAT inhalant solution	2 puffs QID PRN wheezing	2011-03-01	Active	Bronchitis (32398004 SNOMED CT)	Generic Substitution Allowed

Problems

1. Pneumonia: Resolved in March 1998
2. ...

Procedures

Example: CCD -underlying XML

```
- <!--
*****

CDA Body

*****

-->
- <component>
- <structuredBody>
  <!-- ***** -->
  - <!--

*****

Allergies, Adverse Reactions, Alerts

*****

-->
- <component>
- <section>
  <templateId root="2.16.840.1.113883.10.20.22.2.6.1" />
  <!-- Alerts section template -->
  <code code="48765-2" codeSystem="2.16.840.1.113883.6.1" />
  <title>Allergies, Adverse Reactions, Alerts</title>
  - <text>
  - <table border="1" width="100%">
    + <thead>
    - <tbody>
      - <tr>
        <td>Penicillin</td>
        - <td>
          <content ID="reaction1">Hives</content>
        </td>
        <td>Active</td>
      </tr>
    </tbody>
  </table>
  </text>
  </section>
</component>
-->
```