



VINCI Chart-Review: Tools and Services

Daniel Denhalter





Outline

- Data Types
 - Structured Data
 - Unstructured Data
- Challenges of Text
- Abstraction vs. Annotation
- Annotation Workflow
- Chart-Review Terminology
- Regulatory Requirements
- Annotation Project Workflow
- Demonstration of tools:
 - “eHost”
 - “Chart-Review”
- VINCI Annotation Services
- Questions and discussion



Data Types in the EMR

An Electronic Medical Record contains information stored in both structured and unstructured formats.

- Structured data tables most often include objective information like labs and vital signs.
- Unstructured notes most often contain the patient's experience, the provider's work-up and diagnosis, the treatment plan, and outcomes.



Structured Data

- Stored in database tables
- Includes labs, medications, vital signs, demographics, visit information, codes, etc.

Patient ID	DateTime	LabID	TestName	Specimen	Result
101010	2012-10-06 1600	0409101	Potassium	Serum	4.9
101010	2012-10-06 1600	71368168	Sodium	Serum	136
202020	2012-10-06 0900	0409101	Potassium	Serum	3.6
202020	2012-10-06 0900	71368168	Sodium	Serum	145



Unstructured Data

- Stored in the database, but with text fields.
- Includes written or dictated text notes like progress notes, discharge summaries, and radiology notes.
- Also includes semi-structured information like templates and comment fields.



Text Notes

SUBJECTIVE: The patient is in with several medical problems. He complains his mouth being sore since last week and also some "trouble with my eyes." He states that they feel "funny" but he is seeing okay. He denies any more diarrhea or abdominal pain. Bowels are working okay. He denies nausea or diarrhea. Eating is okay. He is emptying his bladder okay. He denies dysuria. His back is hurting worse. He complains of right shoulder pain and neck pain over the last week but denies any injury. He reports that his cough is about the same.

CURRENT MEDICATIONS: Metronidazole 250 mg q.i.d., Lortab 5/500 b.i.d., Allegra 180 mg daily, Levothroid 100 mcg daily, Lasix 20 mg daily, Flomax 0.4 mg at h.s., aspirin 81 mg daily, Celexa 40 mg daily, verapamil SR 180 mg one and a half tablet daily, Zetia 10 mg daily, Feosol b.i.d.

ALLERGIES: Lamisil, Equagesic, Bactrim, Dilatrate, cyclobenzaprine.

Vital Signs: His age is 66. Temperature: 97.7. Blood pressure: 134/80. Pulse: 88. Weight: 201 pounds.

HEENT: Head was normocephalic. Examination of the throat reveals it to be clear. He does have a few slight red patches on his upper inner lip consistent with yeast dermatitis.

Neck: Supple without adenopathy or thyromegaly.

Extremities: He has full range of motion of his shoulders but some tenderness to the trapezius over the right shoulder. Back has limited range of motion. He is nontender to his back. Deep tendon reflexes are 2+ bilaterally in lower extremities. Straight leg raising is positive for back pain on the right side at 90 degrees.

Abdomen: Soft, nontender without hepatosplenomegaly or mass. He has normal bowel sounds.

ASSESSMENT:

1. Clostridium difficile enteritis, improved.
2. Right shoulder pain.
3. Chronic low back pain.
4. Yeast thrush.
5. Coronary artery disease.
6. Urinary retention, which is doing better.

PLAN: I put him on Diflucan 200 mg daily for seven days. We will have him stop his metronidazole little earlier at his request. He can drop it down to t.i.d. until Friday of this week and then finish Friday's dose and then stop the metronidazole and that will be more than a 10-day course. I ordered physical therapy to evaluate and treat his right shoulder and neck as indicated x 6 visits and he may see Dr. XYZ p.r.n. for his eye discomfort and his left eye pterygium which is noted on exam (minimal redness is noted to the conjunctiva on the left side but no mattering was seen.) Recheck with me in two to three weeks.



Challenges of Text

- EMR is written by providers for other providers
- Difficulty of document interpretation
 - Photocopies
 - Misspellings and grammar errors are pervasive
 - Terminology differs from non-clinical text
 - “patient endorses being verbally abused”
 - “patient status post spinal fusion”
 - “Angina, r/o MI”
 - Abbreviations and acronyms are common
 - “50 y/o pt c DM2, HTN, c/o SOB & CP. R/O MI”
- Missing data
- Incomplete and inconsistent documentation



Abstraction vs. Annotation

- Abstraction
 - Summation of all parts (less granular)
 - High level capture
 - Can include information from annotation
 - Uses forms in Chart-Review
- Annotation
 - Detailed information (more granular)
 - Captured concept by concept
 - Can have associated additional information
 - Uses “Schema” in Chart-Review and eHost



Chart Review through Annotations

- Annotation = label that assigns meaning to data
 - Contains a pointer to start and stop points within text
 - Can have class or attribute information with it
 - Generated by human, machine or human+machine.

“The CXR shows LLL consolidation.”

Span: 15:31

Class: Finding

Assertion: Present



Annotation Project Workflow

1. Define concepts and variables
2. Select annotation tool
3. Select documents
4. Develop annotation guideline
5. Identify annotator qualifications
6. Train and manage annotators
7. Measure adjudication or annotation quality



Chart-Review Terminology

- **Clinical Element**

- Definition and configuration of various chart record information to be viewed during chart abstraction and/or annotation.
- Examples:
 - Lab values
 - Notes
 - Radiology reports
 - ICD-9/10 Codes
 - Medications
 - Vital status
 - Etc.

- **Project**

- The overall system in which process, task, schema, forms, and clinical element will be defined.
- This connects to your Database within VINCI
 - i.e. (ORD_Duvall_201108061D)



Chart-Review Terminology

- **Process**

- A group of patients, notes, event, or any other documented item that can uniquely defined
- Examples (groups of):
 - Patient ICN, SSN, SCRSSN, SID
 - Document ID, TIUDocumentSID
 - MedicationsID, LabID
 - EventID, VisitID
 - Etc.

- **Task**

- The individual unique item to be reviewed within the process.
- Examples:
 - Patient
 - Note
 - Event
 - Visit
 - Medication
 - Lab
 - Etc.



Chart-Review Terminology

- **Schema**

- Defines classifications, class attributes, and values for the process. This allows for the identification of concepts and variables within the record presented.
- Examples:
 - Smoking
 - Attribute: smoking status
 - Value: current
 - Patient DOB
 - Attribute: Date of Birth
 - Value: 01.12.1970

- **Form**

- A survey questionnaire that allows you to answer questions pertinent to the presented documentation.
- Examples:
 - “Does the patient have associated co-morbidities”
 - YES/NO
 - If Yes, then select from the following:
 - » Chronic Heart Failure
 - » Chronic Kidney Disease
 - » Diabetes
 - » Etc.



Regulatory Requirements

- IRB Approval
- DART Approval
 - Request Real SSN
 - Request CDW production domains
 - Request TIU Text Notes
 - Ensure a HIPAA Waiver
- Contact VINCI@va.gov

IDENTIFIERS [\(More about identifiers\)](#)

- Real SSN
- Scrambled SSN
- Identifiable data but no real or scrambled SSNs

Does your study require a HIPAA Waiver?

- Yes
- No



eHOST Demo

eHOST



eHOST

eHOST MK3@2014.02.03

- Result Editor
- NLP Assisted
- Pin Extractor
- Dictionary Manager
- SYSTEM Setting
- Sync Assignments
- EXIT

NAVIGATOR

4 Classes: [4/5 annotations]

- EXAM
- FINDING [1/1]
- NEUROVASCULAR_ANATO
- SIDEDNESS [1/2]
- 0 Public Attributes:
- Relationships:[0/0]

Current Note All Notes

Document Viewer

r0003.txt

Text Display | Annotation Information | Reports

CAROTID SERIES COMPLETE

Reason: TIA

UNDERLYING MEDICAL CONDITION:
72 year old man with TIA

REASON FOR THIS EXAMINATION:
Eval for carotid stenosis
CAROTID STUDY

HISTORY: TIA.

FINDINGS: No prior studies for comparison. There is complete occlusion of the **left ICA** and associated internalization of the **external carotid artery** on the **left**. There is also absent flow involving the left vertebral artery. There is a significant focal **hypoechoic plaque** involving the right ICA. Similar plaque involving the right ECA. The peak systolic velocities on the right are 264, 56, and 15 cm per second for the ICA, CCA, and ECA respectively. The ICA to CCA ratio is 5.3. There is antegrade flow involving the right vertebral artery.

IMPRESSION:

1. Occluded left-sided ICA and left-sided vertebral artery.
2. 70-79% right ICA stenosis.
3. Near occlusion of the right external carotid artery.

Find

Annotation Editor

Selected Annotations:

left

Span: 272 | 276 : left

Class: SIDEDNESS

Comment:

Relationships: --- (Related to) ---> "ICA"

Attributes: "Unilateral" = Left

Creation Date: d Sep 30 09:08:08 MDT 2015

Annotator: Example



Chart-Review Demo

Chart-Review



Chart-Review: Project Setup



ChartReview

[Home](#)

[Admin](#) ▾

[Help](#)

[Settings](#)

[Logout \(vhaslcdnhad\)](#)

[Switch User](#)

[< Project List](#)

Project: VINCI_NLP

General Configuration

[Documents](#)

[Project Users](#)

[Processes](#)

⚙️ [Actions](#) ▾

Project Name	VINCI_NLP
Priority	①
Active	true
Description	jdbc:sqlserver://VHACDWRB02.vha.med.va.gov:1433;databasename=VINCI_NLP;useKerberos=true;domain=VA.GOV
Database Connection URL	jdbc:sqlserver://VHACDWRB02.vha.med.va.gov:1433;databasename=VINCI_NLP;useKerberos=true;domain=VA.GOV
Database Schema	Dfit
JDBC Driver	com.microsoft.sqlserver.jdbc.SQLServerDriver
JDBC Username	
JDBC Password	*****

Siman Tables Exist

Siman database tables exist in project database.



Chart-Review: Configuration



ChartReview

[Home](#)

[Admin](#) ▾

[Help](#)

[Settings](#)

[Logout \(vhaslcldenhad\)](#)

[Switch User](#)

Project: [VINCI_NLP](#)

[< Clinical Element Configuration List](#)

Show Clinical Element Configuration

General Configuration

[Columns](#)

[Content Template](#)

Name	CR_TEST_PATIENT
Description	CR_TEST_PATIENT information
Active	true
Title Field	patienticn
Description Field	patienticn
Type	LIST
All Elements By Patient Id Query	select patienticn, PatientSID, DxDateTime, visitsid, icdcode, ICDDescription, TIUDocumentSID, TIUDocumentDefinitionSID, TIUDocumentDefinition, ReferenceDateTime, ReportText, episodebeginDateTime, Sequential_ID, Task_ID from Dflt.SmokingDocExpanded where patienticn = ?
Single Element Query	select patienticn, PatientSID, DxDateTime, visitsid, icdcode, ICDDescription, TIUDocumentSID, TIUDocumentDefinitionSID, TIUDocumentDefinition, ReferenceDateTime, ReportText, episodebeginDateTime, Sequential_ID, Task_ID from Dflt.SmokingDocExpanded where patienticn = ?
Created By	vhaslcldenhad
Created Date	2017-07-27 15:38:33.83





Chart-Review: Schema



ChartReview

Home

Admin ▾

Help

Settings

Logout (vhaslcldenhad)

Switch User

Project: VINCI_ANA

View Schema

[General Configuration](#)

[Attributes](#)

[Classifications](#)

Delete	Name / Color	Attributes
	Name: <input type="text" value="Current Smoker"/>	<input type="text" value="Certainty"/> <input type="text" value="Tobaco product type"/>
	Color: <input type="text" value="# ff7070"/>	
	Name: <input type="text" value="Former Smoker"/>	<input type="text" value="Certainty"/> <input type="text" value="Last known smoke"/> <input type="text" value="Tobaco product type"/>
	Color: <input type="text" value="# f4ec57"/>	
	Name: <input type="text" value="Never Smoker"/>	<input type="text" value="Certainty"/>
	Color:	





Chart-Review: Form



ChartReview

[Home](#)

[Admin](#) ▾

[Help](#)

[Settings](#)

[Logout \(vhaslcldenhad\)](#)

[Switch User](#)

Project: [VINCI_ANA](#)

View Form

[Info](#)

[Form](#)

1. [Section: Patient_status](#)
 1. [Item: Has the patient ever smoked](#)
 2. [Item: Patient's gender](#)
 3. [Item: Age at first smoked](#)
2. [Section: Smoking intensity](#)
 1. [Item: Smoking fequency](#)
3. [Section: Cigar Use](#)
 1. [Section: Does the patient have a history of cigar Use?](#)
 1. [Item: If Yes \(Last Date of Use\)](#)
4. [Section: Cigarette Use](#)
 1. [Item: Does the patient currently use Cigarettes](#)
 1. [Item: If Yes \(Date of Last Use\)](#)
5. [Section: Pipe Use](#)
 1. [Item: Does the patient currently use a tobacco pipe](#)
 1. [Item: If Yes \(Date of Last Use\)](#)

[Back](#)



Chart-Review: Process Select



ChartReview

[Home](#)

[Admin](#) ▾

[Help](#)

[Settings](#)

[Logout \(vhaslcldenhad\)](#)

[Switch User](#)

Project: [VINCI_ANA](#)

Welcome to Chart Review

Refresh

Show Completed Processes

Sort By: ▾

[CR_TEST_Synth_20170717](#) >

TODO: 1 | HOLD: 0 (All Holds)

[Next Assignment](#) >

[CR_TEST_Synth_Pres](#) >

TODO: 5 | HOLD: 0 (All Holds)

[Next Assignment](#) >

[CR_User_Load_Testing_1](#) >

TODO: 496 | HOLD: 2 (All Holds)

[Next Assignment](#) >





Chart-Review: Interface



ChartReview

Home

Admin

Help

Settings

Logout (vhaslodenhad)

Accessibility

Annotation

Task

Done Save Hold/Next Submit/Next Task Info

Task Name: CR_TEST_Synth_Pres (197617)
Principal: CR_SYNTH_Smoking_Patients_20170717
Description: no detailed description

Items

- 1.1. Smoked **Current_Smoker**
- 1.2. gender
- 1.3. age
- 2. Smoking intensity
- 2.1. frequency
- 3. Cigar Use
- 3.1. Does the patient have a history of cigar Use?
- 3.1.1 Last Date of Use

Previous Skip Next/Complete

1.1. Has the patient ever smoked:

- Yes
- No
- (Clear Answer)

Annotations

All Annotations Wrap

Span	ClinicalEle...	Class	Type	Creation D...	ClinicalEl...
	TOBACCO USE DISORDER	CR_SYNTH_Sr 800000085674	Current_Smoke New	2017-08-09T16:42:12Z	CR_SYI

Certainty:

High

Tobacco product type:

Cigarettes

CR_SYNTH_Smoking_Patients_20170717

Summary

Done

Classify

ScrSSN: 111000111
Race: White
Gender: M
DOB: 1950-01-01

CR_SYNTH_Smoking_Documents_20170717

List (5 of 5)

Detail: Right Description Wrap Auto-select Search Detail View

	ReferenceDateTime	TIUDocumentSID	TIUDocumentDefinition
✓	Nov 1, 2012 12:00:00 AM	800000000099	ADMIN_NOTE
✓	Oct 11, 2012 12:00:00 AM	800000032581	Clinic Visit Note
✓	Nov 29, 2012 12:00:00 AM	800000045678	Nursing Shift Note Assessment
✓	Nov 21, 2012 12:00:00 AM	800000078432	Followup Summary
	Nov 20, 2012 12:00:00 AM	800000085674	Followup Summary

View in new tab Done Popup Annotation Text

Classify

- 2. Other chronic Pain (ICD-9-CM 338.29)
 - 3. Edema * (ICD-9-CM 782.3)
 - 4. Posttraumatic Stress Disorder * (ICD-9-CM 309.81)
 - 5. Disruption of External Operation (Surgical) Wound (ICD-9-CM 908.32)
 - 6. Health Maintenance (ICD-9-CM V85.9)
 - 7. Other joint derangement, not elsewhere classified, involving ankle/foot
 - 8. Negative PPD
 - 9. Long Term (current) use of Anticoagulants (ICD-9-CM V58.81)
 - 10. Osteoarthritis * (ICD-9-CM 715.90)
 - 11. Venous Embolism and Thrombosis of unspecified deep Vessels of lower
 - 12. PPD
 - 13. Chronic Kidney Disease, Unspecified
 - 14. Amputation Status of the Lower Limb Below the Knee
 - 15. Hyperlipidemia * (ICD-9-CM 272.4)
 - 16. Ankle Pain
 - 17. Sprain of lateral collateral ligament of knee (ICD-9-CM 844.0)
 - 18. **TOBACCO USE DISORDER**
- ALLERGIES/ADRs: MORPHINE, FENTANYL PATCH

CURRENT MEDICATIONS:

Amlodipine 5 mg 1 tablet daily
Ascorbic acid 500 mg 1 tablet daily with iron - uses twice daily
Aspirin 81 mg 1 tablet daily
Atenolol 100 mg 1/2 tablet daily
Cyclobenzaprine 10 mg 1 tablet three times daily if needed for muscle spasms -
*takes about twice a day
Cyproheptadine 4 mg 1 tablet at bedtime for sleep/nightmares
Desipramine 25 mg 5 tablets at bedtime for neuropathic pain and sleep

Choose Classification

Select an item:

[1.1. Smoked x

Schema: DD050217_Smoking_Reduced

- Current_Smoker**
- Former_Smoker
- Never_Smoker
- Not_Current_Smoker
- Not_Relevant_Document
- Unknown_Smoking_Status

OK Cancel



VINCI Annotation Services

- Range of services
 - Education and training
 - Project definition and guideline development
 - Contracting annotators
 - Full Chart-Review projects



VINCI Services Team

VINCI@va.gov

VINCIservices@va.gov

- Concierge
- Data Provisioning
- Compliance
- Feasibility
- Recruitment
- **Annotation / Chart Review**
- Natural Language Processing
- Analytics and Data Services
- Application Development