

VIREC Database & Methods Cyberseminar Series

# Extracting Data from the EHR Using CAPRI and VistAWeb

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# Overview

- What are VistAWeb and/or CAPRI?
  - Orientation and comparison
- Why use central chart review in research?
- Examples using VistAWeb and CAPRI for research
  - INSPIRE SDP (L. Williams, PI)
  - CARE TIME SDP (D. Bravata, PI)
  - Operational projects/Office of Clinical Analytics and Reporting
- Lessons learned
- Questions

# Audience poll question 1

**2015: What is the approximate total amount of snow received at your VA facility this FY?**

- a. No snow!
- b. 0.1-2 inches
- c. 2-5 inches
- d. 6-10 inches
- e. 10-24 inches
- f. 25-35 inches
- g. 36-48 inches
- h. > 48 inches



## Audience poll question 2

**What experience do you have using central chart review for VA research?**

- a. Never tried to do this before
- b. Used paper charts
- c. Used VistAWeb
- d. Used CAPRI
- e. Used both VistAWeb and CAPRI
- f. Used some other platform for central chart review

# Question 1: What are VistAWeb and CAPRI?

- **VistAWeb**
  - A VA Intranet web portal
  - Read-only access to individual patient EHR data from all VA sites
  - Developed to facilitate sharing of individual patient data among that patient's providers at other VAMCs
- **CAPRI**
  - A VA Intranet web portal
  - Read-only access to patient EHR data at one specific site of interest
  - Developed to facilitate coordination between the Veterans Benefit Administration (VBA) and the Veterans Health Administration (VHA) in the determination of Veteran benefits
- **Both systems are useful and have unique strengths for VA EHR chart review studies**

# EHR Data Portals - Compensation & Pension Data Interchange (CAPRI) & VistAWeb

## CAPRI

Requires special software and access/verify codes

Data viewed from one healthcare site at a time

**Recommendation:** Get both for maximum flexibility; no additional DART application required

VistAWeb

## Both

Read-only access to EHR one patient at a time

Require real SSN

DART

## VistAWeb

VA Intranet web portal accessed through local VistA

Data consolidated



# Considerations using VistAWeb or CAPRI

- **VistAWeb**

- Shows patient data across different facilities
- Must pay attention when separate locations share a single facility identifier
- Text searching of some data, e.g., orders, note titles, meds but not note text (available in CAPRI)
- Able to access some scanned documents

- **CAPRI**

- Single location with option to link to VistAWeb
- Enhanced search capabilities

# VistAWeb shows note title and location:

**Progress Notes**  medical record

**Logoff**

VTA  
 Sites  
 Care Team  
 Allergies\*†  
 Appointments  
 Patient Information  
 Visits/Admissions  
 Dietetics  
 Consults and Procedures†  
 Consults (DoD Remote Data Only)  
 Discharge Summaries†  
 Laboratory †  
 Anatomic Path Reports  
 Medicine †  
 Orders  
 Outpatient Encounters/GAF  
 Pharmacy \*†  
 Problem List†  
 Progress Notes†  
 Other Notes  
 Radiology †  
 Surgery Reports†  
 Vital Signs\*†  
 Health Summaries (Non-VA) for TREATMENT only†  
 Health Summaries (ANN)  
 Health Summaries (IND)  
 Health Summaries (NIN)

**Refresh Patient Data**

\* - Pages with HDR data  
\* - Pages with  Non-VA data

**Progress Notes**  medical record

**This page uses pop-up windows**  
[Click here for help on enabling pop-up](#)

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

Date Range: From: (mm/dd/yyyy)  To: (mm/dd/yyyy)  Query

Maximum Number/Site: 50  All Reports  
A maximum of 50 notes per site (plus associated addenda) will be displayed regardless of the number of notes available within the specified date range.  
[Print Report](#)

Title	Icon	AWTV	Date	Author	Location	Site
<a href="#">PODIATRY TECHNICIAN ASSESSMENT NOTE</a>					IN PODIATRY NAIL TECH	Indianapolis, IN
<a href="#">Addendum to PODIATRY TECHNICIAN ASSESSMENT NOTE</a>					IN PODIATRY NAIL TECH	Indianapolis, IN
<a href="#">PC PREVENTIVE HEALTHY [EDU]</a>					IN PURPLE MD	Indianapolis, IN
<a href="#">PC GERIATRIC NOTE</a>		Progress note			IN PURPLE MD	Indianapolis, IN
<a href="#">Addendum to PC GERIATRIC NOTE</a>					IN PURPLE MD	Indianapolis, IN
<a href="#">PROSTHETICS/ORTHOTICS CONSULT RESULT</a>					IN PROS CLINIC - FITTER	Indianapolis, IN
<a href="#">NURSING OUTPATIENT NOTE</a>					IN PRC WILLIAMS-X	Indianapolis, IN
<a href="#">CBEC/HBPC COMMUNICATION NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN
<a href="#">Addendum to CBEH/HBPC COMMUNICATION NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN
<a href="#">CBEC/HBPC NURSING VISIT NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN
<a href="#">CBEC/HBPC PHARMACY MEDICATION EVALUATION</a>					IN HBPC PHARMACY	Indianapolis, IN
<a href="#">PROSTHETICS/ORTHOTICS CONSULT RESULT</a>					IN PROS CLINIC - PEDORTHIST	Indianapolis, IN
<a href="#">CBEC/HBPC NURSING VISIT NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN
<a href="#">CBEC/HBPC NURSING VISIT NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN
<a href="#">CBEC/HBPC COMMUNICATION NOTE</a>					IN HBPC RN/LPN	Indianapolis, IN

# Notes from multiple care sites: VistAWeb

## HISTORY & PHYSICAL - INPATIENT

Site: Tennessee Valley HCS

Date: Author:

Location: 1A(MED)-MU

LOCAL TITLE: HISTORY & PHYSICAL - INPATIENT

STANDARD TITLE: PHYSICIAN H & P NOTE

DATE OF NOTE:

AUTHOR:

URGENCY:

Resident:

Intern:

CHIEF COMPLAINT: Left sid

HISTORY OF PRESENT ILLNESS

Patient is a MALE

CHF, obesity hyperlipidemi

Center in

administered by the family

patient had episodes of se

that the pain subsided and

the patient complained of

that he stopped breathing

The patient only stopped b

## NEUROLOGY GENERAL NOTE

Site: Tennessee Valley HCS

Date: Author:

Location: 2N-MED-NA

LOCAL TITLE: NEUROLOGY GENERAL NOTE

STANDARD TITLE: NEUROLOGY NOTE

DATE OF NOTE:

ENTRY DATE:

AUTHOR:

EXP COSIGNER:

URGENCY:

STATUS: COMPLETED

\*\*\* NEUROLOGY GENERAL NOTE Has ADDENDA \*\*\*

Chief Complaint: Acute stroke

HPI: This year-old MALE w/ hx HTN who started having difficulty talking and left sided weakness yesterday at about pm was brought to ER via ambulance. His initial SBP was which gradually went down at ER to He denied any trauma, headache, change in vision, LOC or seizure activity. On arrival to ER, his speech improved but left hand became heavy as per patient. Head CT was negative.

On initial exam, NIH stroke scale was 1, suggesting that he does not need thrombolytics.

# Admits at multiple care sites: VistAWeb

## Expanded ADT

## Expanded ADT

medical

Patient Selection

Patient Selection

Date Range:  Today  One Week  Two Weeks  One Month  Two Months  Six Months  One Year  Two Years

From: (mm/dd/yyyy) To: (mm/dd/yyyy)

Date Range:  Today  One Week  Two Weeks  One Month  Two Months  Six Months  One Year  Two Years  All Dates

From: (mm/dd/yyyy) To: (mm/dd/yyyy)

Print Report

Print Report

Tennessee Valley HCS

Atlanta, GA Tennessee Valley HCS

### Tennessee Valley HCS

### Tennessee Valley HCS

Printed for data from \*\*\*\*\* CONFIDENTIAL SUMMARY pg. 1 \*\*\*\*\*  
 \*\*\*\*\*  
 \*\*\*\*\* DOB: \*\*\*\*\*

Printed for data from \*\*\*\*\* CONFIDENTIAL SUMMARY pg. 1 \*\*\*\*\*  
 \*\*\*\*\*  
 \*\*\*\*\* DOB: \*\*\*\*\*

----- EADT - ADT History Expanded -----

----- EADT - ADT History Expanded -----

Eligibility: NSC, VA PENSION VERIFIED  
 No rated disabilities

**Patient cared for at Nashville VAMC** → NA-NEUROLOGY  
 2N-MED-NA

(ISC) LOS: 3

ENT

Eligibility: SC LESS THAN 50% VERIFIED  
 Total S/C %: 30

20% S/C  
 10% S/C

ADM DIRECT

Procedure DX ULTRASOUND-HEART  
 Procedure PHYSICAL THERAPY NEC  
 Procedure C.A.T. SCAN OF HEAD  
 Procedure CONTR CEREBR ARTERIOGRAM  
 Procedure MAGNET RESON IMAG BRAIN/BRAIN STEM  
 Procedure C.A.T. SCAN OF HEAD

**Patient cared for at Murfreesboro VAMC** → MEDICAL STEP DOWN  
 PCU-MU  
 MU-ACUTE MEDICINE  
 1A (MED) -MU  
 MU-ACUTE MEDICINE

LOS: 7







File Edit Tools Help

Other Facilities Visited

C&amp;P Exams 7131 Request Reports Admin Health Summaries Clinical Documents VistAWeb

18 Items

Report Builder

Current View:

Searched Documents

3:30, MENTAL HEALTH  
 14:27, CONSULT RE  
 15:12, BLOOMINGTON  
 13:16, PV RESIDENT  
 12:19, PV LAB-CAROT  
 14:09, SPEECH PATH  
 15:08, BLOOMINGTO  
 10:36, RECREATION  
 12:38, RITS/POLYTR  
 09:53, SPEECH CONS  
 08:16, RECREATION  
 16:22, PHYSICAL THE  
 13:52, SICU INTERDI  
 11:38, SPEECH PATH  
 5:26, SPEECH PATHC  
 2:53, SICU INTERDIS  
 9:34, PHYSICAL THE

Using the search term  
 “carotid” (bottom right  
 corner) only notes  
 containing this word are  
 shown, and the word is  
 highlighted within the note.

CD-9-CM

Os. He

## ACTIVE NON-VA MEDICATIONS

## STATUS

ACTIVE NON-VA MEDICATIONS	STATUS
1) NON-VA ASPIRIN 325MG EC TAB 325MG ORALLY EVERY DAY	ACTIVE

## 5 TOTAL MEDICATIONS

Vet reports little history of substance use. He states he first began drinking alcohol in his late teens, and for many years drank approximately weekly. He states that currently, he drinks "a couple of times a year." He states beer was always his drink of choice when he drank, and he "always drank 2 beers." Despite this, he reports that he had one DUI in the past. He reported it was about 15 years ago, but his daughter states it was more like 30 years ago ("more than 15 years before he retired"). He denies any history of illicit substance use or of misuse of prescription medications. He denies history of tobacco use.

## PERTINENT FAMILY HISTORY

- mother died at age 89 due to "mostly old age"
- Alzheimer's disease (brother)
- dementia (?) - sister
- much of family history is unknown, as Vet reports he has no contact with his father's side of the family.

## BEHAVIORAL OBSERVATIONS

Vet was cooperative, pleasant, and appropriate throughout the interview, which was completed first. He then completed the RBANS with apparent reasonable effort and engagement, though he had difficulty following or remembering instructions at times. Upon finishing that test, he immediately asked if he was finished and expressed a desire to go home. He agreed to complete additional tests before leaving; he was initially presented with the Shipley-2 Vocabulary test and was asked if he could see and read it. He stated he could, but when

Divisions

Find: carotid

Search

1) Notes 2) Discharge Summaries 3) Consults 4) Vitals 5) Meds 6) Labs 7) Imaging 8) Diet 9) Nutritional Assessment U) Order Summary Y) Procedures Z) Problem List

Ready.

Division: INDIANAPOLIS VAMC

News

VistA

## Question 2: Why use central EHR-based chart review?

- 1) What about using notes in the CDW?
- 2) Cost/accuracy vs. local chart reviews
- 3) Confirm data in VA administrative datasets, e.g.:
  - Validate case ascertainment strategies
  - Assess clinical vs. administrative completion of an action
- 4) Capture data not available in VA administrative datasets, e.g.:
  - Scanned records
  - Some types of narrative data
    - Written orders
    - Comment fields

# Issue 1: Using CPRS TIU notes in the VA Central Data Warehouse (CDW)

- TIU text notes are available in the CDW, but:
  - Review of bulk text notes not as user-friendly as the chronological notes organized in tabs in VistAWeb and CAPRI
  - Currently, date and time of note entry is stripped from the TIU notes in the CDW
  - Searching for specific text strings more straightforward in CAPRI and VistAWeb
- Not all text elements are available in the CDW (e.g. order text, addendums to data entry, scanned documents)

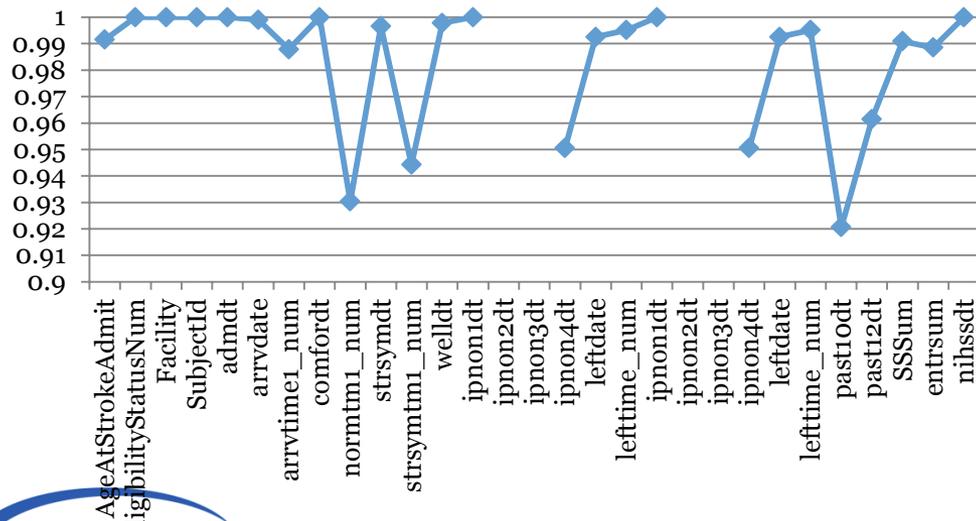
## Issue 2: Local vs. Central Chart Review?

- Expense, training, quality control often favor central EHR-based chart review over independent local reviewers in research studies
- INSPIRE SDP example
  - 11-site study comparing two methods of improving inpatient stroke quality indicators
  - Stroke admission defined using ICD9 discharge codes
    - Opened 2,305 charts
    - 1,600 full review
    - ~160 random 10% inter-rater reliability
  - 118+ variable chart review form, 11 quality indicators

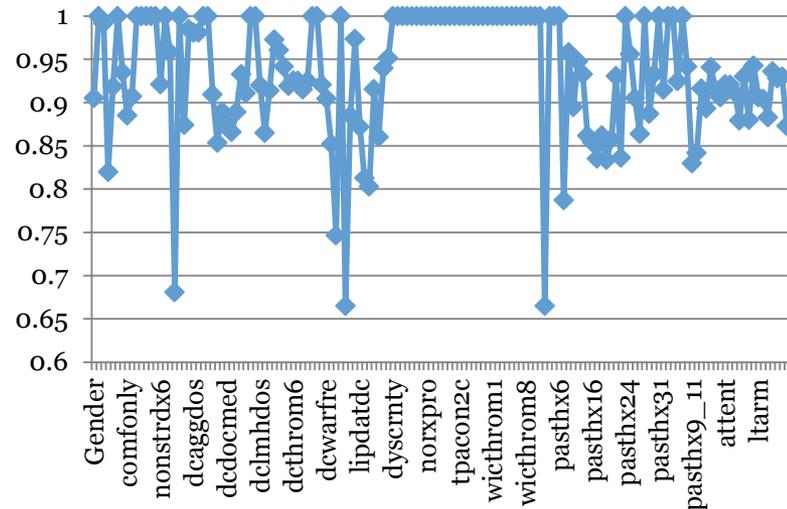
# Central Chart Review Quality

- Data quality extremely high
  - 113/118 variables > 0.8 ICC/kappa
  - QI result agreement (ineligible, passed, failed) excellent with kappas 0.84-0.96

ICC\_1k



kapp



# Chart review expense example

- 11-site study, reviewing 2.5 years of stroke admissions (approximately 2,300 charts)
  - Site level load is approximately 75 stroke cases per year
  - If prospectively reviewing cases, volume small
    - Difficult to find sites willing and able to hire some small % of a research assistant
  - If retrospectively reviewing cases, would still need central EHR review to assess local accuracy
  - Training, maintaining, retaining the off-site personnel over a 3-year study is not feasible

## Issue 3: Confirm data in VA admin datasets

- Case ascertainment
  - Is the administrative algorithm you have defined actually capturing the subjects, events, episodes of care that you intend?
- Validation of electronic measures of VA processes of care

# E-measure example: TIA care

Measure	Measure Validation							Pass Rates			
	Denominator (N=528)			Numerator (for patients in both admin & chart denominator)				Admin Pass Rate		Chart Pass Rate*	
	Disagree	% Agree	% Valid Disagree	N	Disagree	% Agree	% Valid Disagree	Eligible	Pass Rate	Eligible	Pass Rate
Carotid Imaging	44	91.7%	100.0%	472	39	91.7%	23.1%	8325	51.4%	516	69.0%
Carotid Stenosis Management	10	98.1%	100.0%	8	0	100.0%	-	314	25.2%	12	33.3%
Antihypertensive Intensification	77	85.4%	100.0%	133	16	88.0%	0.0%	2781	27.0%	169	27.8%
Hypertension Control	60	88.6%	25.0%	384	41	89.3%	0.0%	18533	91.2%	431	67.7%
Lipid Measurement	33	93.8%	100.0%	485	50	89.7%	0.0%	8371	79.2%	529	79.6%
Cholesterol Lowering Medication	72	86.4%	100.0%	352	44	87.5%	13.6%	6647	75.3%	401	85.3%
Cholesterol Med Intensification	85	83.9%	82.4%	283	27	90.5%	14.8%	5016	27.5%	345	25.8%
Brain Imaging	59	88.8%	100.0%	453	22	95.1%	77.3%	8283	86.1%	497	98.4%
Holter Monitor	27	94.9%	100.0%	442	13	97.1%	0.0%	7271	4.8%	492	2.8%
Antithrombotics at Discharge	43	91.9%	97.7%	461	65	85.9%	32.3%	8019	82.3%	508	91.3%
Atrial Fibrillation: INR Ordered	25	95.3%	0.0%	36	1	97.2%	0.0%	723	82.6%	44	95.5%
Atrial Fibrillation: INR 2-3	21	96.0%	95.2%	29	2	93.1%	0.0%	593	28.8%	42	23.8%
HbA1c Measurement	40	92.4%	72.5%	184	7	96.2%	0.0%	3465	78.0%	207	79.2%
Speech Language Pathology	14	97.3%	-	394	32	91.9%	-	5727	35.1%	443	21.2%

# E-measure example: Antithrombotic by hospital day 2

Local Chart			CDW Chart			Sources of Error	
<u>Denominator</u>							
EHR	Elig	Inelig	Total	Elig	Inelig	Total	<u>False Negative</u>
Elig	79	1	80	2010	65	2075	tPA not given = 12
Inelig	6	5	11	26	29	55	Comfort care = 5
Total	85	6	91	2036	94	2130	Elective carotid = 6
Sens	92.9%			98.7%			<u>False Positive</u>
Spec	83.3%			30.9%			tPA given = 15
PPV	98.8%			96.8%			Contraindication = 34
NPV	45.5%			52.7%			Comfort care = 12
<u>Numerator**</u>							
EHR	Pass	Fail	Total	Pass	Fail	Total	<u>False Negative</u>
Pass	80	0	80	1822	18	1840	Meds only documented in notes = 23
Fail	0	5	5	29	167	196	Others = 6
Total	80	5	85	1851	185	2036	<u>False Positive</u>
Sens	100.0%			98.4%			Med order/not given= 9
Spec	100.0%			90.3%			Subq heparin = 4
PPV	100.0%			99.0%			Others = 5
NPV	100.0%			85.2%			

# Examples of surprising discrepancies: “False positives” in administrative data

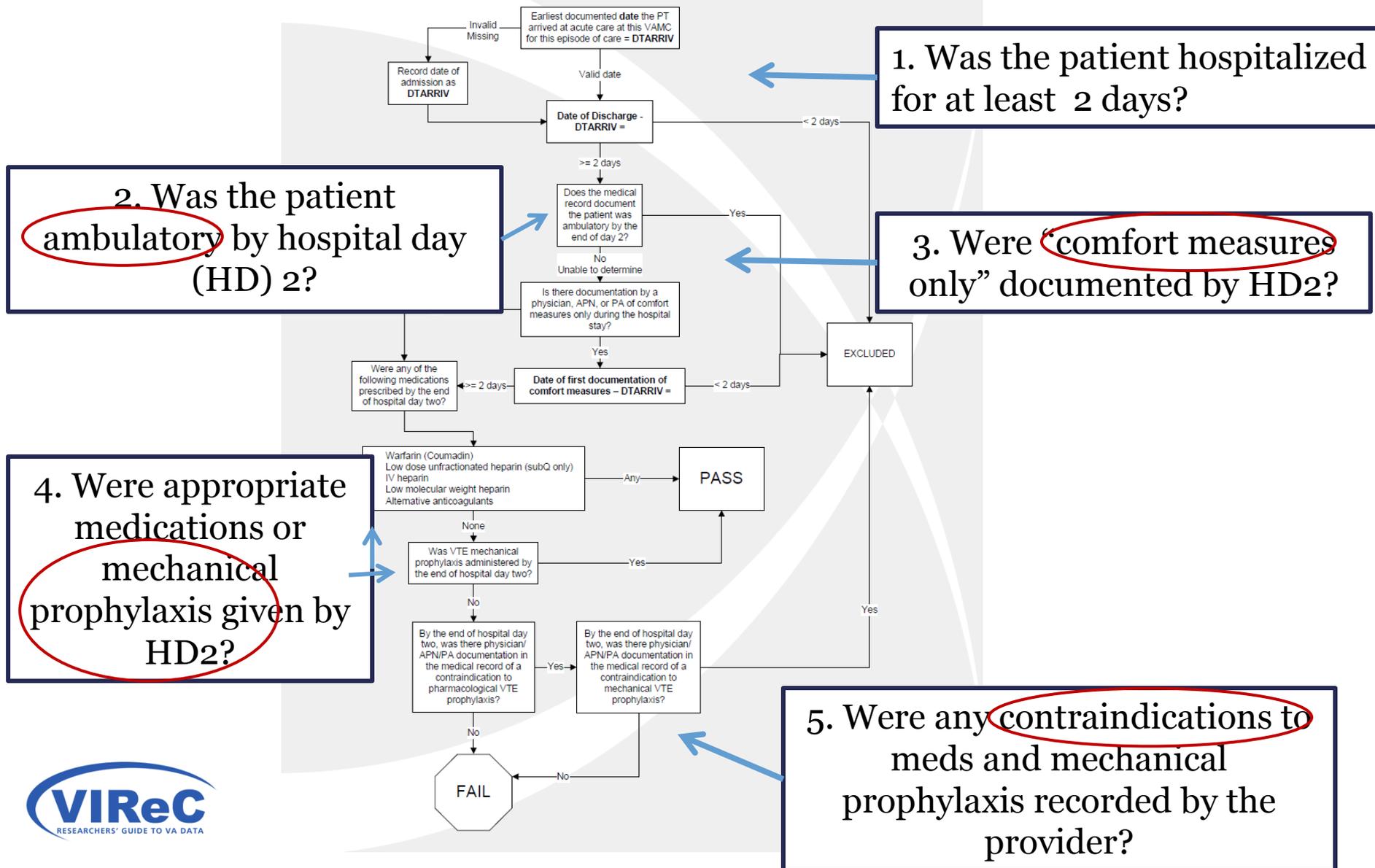
- Admission with stroke ICD9 primary discharge code in VA administrative data is actually for an episode of non-VA care paid for by the VA
- An inpatient consult electronically completed per administrative data states “patient discharged before being seen, will schedule as outpatient.”
- A medication noted as given in VA Bar Code Medication Administration (BCMA) data has a note entered that says “held, patient off floor.”
- An outpatient medication is not discontinued electronically but provider note records instruction to stop the medication

## Issue 4: Capture data not in VA admin datasets

- Scanned documents
  - Not always accessible in VistAWeb, not in CAPRI
- Data elements that reflect complex aspects of care
  - Discussion of comfort care or advanced directives
  - Coordination of care between providers
- Data elements that reflect clinician judgment
  - Documentation of reasons not to provide an evidence-based treatment (patient declines treatment, ineligibility, etc.)
- Text-based data elements with high inter-site and intra-site variability (difficult to use text mining/NLP)
  - Different methods for conducting and documenting dysphagia screening
  - Different locations, providers, notes, language to document ambulatory status

# VTE prophylaxis flowchart

DVT Prophylaxis by End of Hospital Day 2



# TIA Guideline Concordant Care Components

Processes of Care		Specification
1a	Carotid Artery Imaging	Carotid imaging procedure within 2 days of index event
1b	Carotid Stenosis Management	Carotid stenosis procedure (endarterectomy or stent) within 14 days of index event
3a	Lipid Measurement	Fasting lipids measured within 2 days of index event or within the prior 180 days
3b	Lipid Management	Prescribed cholesterol-reducing therapy within 7 days
3c	Cholesterol Lowering Intensification	Intensification of cholesterol-reducing therapy within 7 days of discharge
4	Brain Imaging	Brain imaging (Brain CT or MRI) within 2 days of index event
5a	Electrocardiography	ECG within 2 days of index event
5b	<b>Telemetry</b>	Telemetry within 2 days of index event or admitted to ICU/CCU/SICU
5c	Holter	Holter as part of their index event or within 30 days of discharge
6a	Antithrombotics by Hospital Day 2	Antithrombotic therapy within 2 days of index event
6b	<b>Antithrombotics at Discharge</b>	Antithrombotic therapy within 2 days after discharge

- Telemetry a written order
- Telemetry results in scanned docs

- Aspirin not recorded as non-VA med
- Exclusions not in admin data

# Lessons learned about using VistAWeb and CAPRI for research:

- **Optimal way to collect complex clinical chart-recorded data**
  - Consider complexity and data quality requirements
    - Chart review is not a simple process, and it can be hard to consistently do it with a high level of accuracy
  - Develop standard chart review manual and update with local examples as they are noted
    - Where key data elements are most often found in a given facility: Orders? Notes? Consults?
    - What note titles are most likely to have data you need
  - Standardize search features and terms

# Lessons learned about using VistAWeb and CAPRI for research:

- **Increase estimated time per chart review** from local CPRS by some small factor (10-15%) to take into account view switching and page loading issues
  - However, additional search features may end up saving time depending on what you are looking for

# Lessons learned about using VistAWeb and CAPRI for research:

- **Surprising discrepancies between electronic and chart data**
  - This is key to helping others learn about the strengths and weaknesses of various data sources
  - Discrepancies can also suggest what data elements might be considered for standardization

# Lessons learned about using VistAWeb and CAPRI for research

- **Organization/administrative pearls:**
  - Designate one person from your study to submit and stay in communication via the DART process
- **Keep your chart reviewers happy!**
  - Breaks for other types of work
  - Shared positions if possible
  - Regular team meetings to discuss questions, resolve differences, update chart review manual
  - Prizes for “Best Story of the Week”

# Resources/Help

- VHA Data Portal (VA intranet only)
  - <http://vaww.vhadataportal.med.va.gov/Tools/CAPRI.aspx>
  - <http://vaww.vhadataportal.med.va.gov/Tools/VistAWeb.aspx>
- VistA Documentation Library
  - <http://www.va.gov/vdl/default.asp>
- VIREC (VA intranet only)
  - <http://vaww.virec.research.va.gov/CAPRI-VistAWeb/CAPRI.htm>
  - <http://vaww.virec.research.va.gov/CAPRI-VistAWeb/VistAWeb.htm>
  - Comparing CAPRI & VistAWeb  
<http://vaww.virec.research.va.gov/CAPRI-VistAWeb/CAPRI-VistAWeb.htm>
  - Using VistAWeb for the First Time for Research  
[http://vaww.virec.research.va.gov/Tutorials/Overview.htm#VistAWeb Tutorial](http://vaww.virec.research.va.gov/Tutorials/Overview.htm#VistAWeb_Tutorial)

# Questions?

