



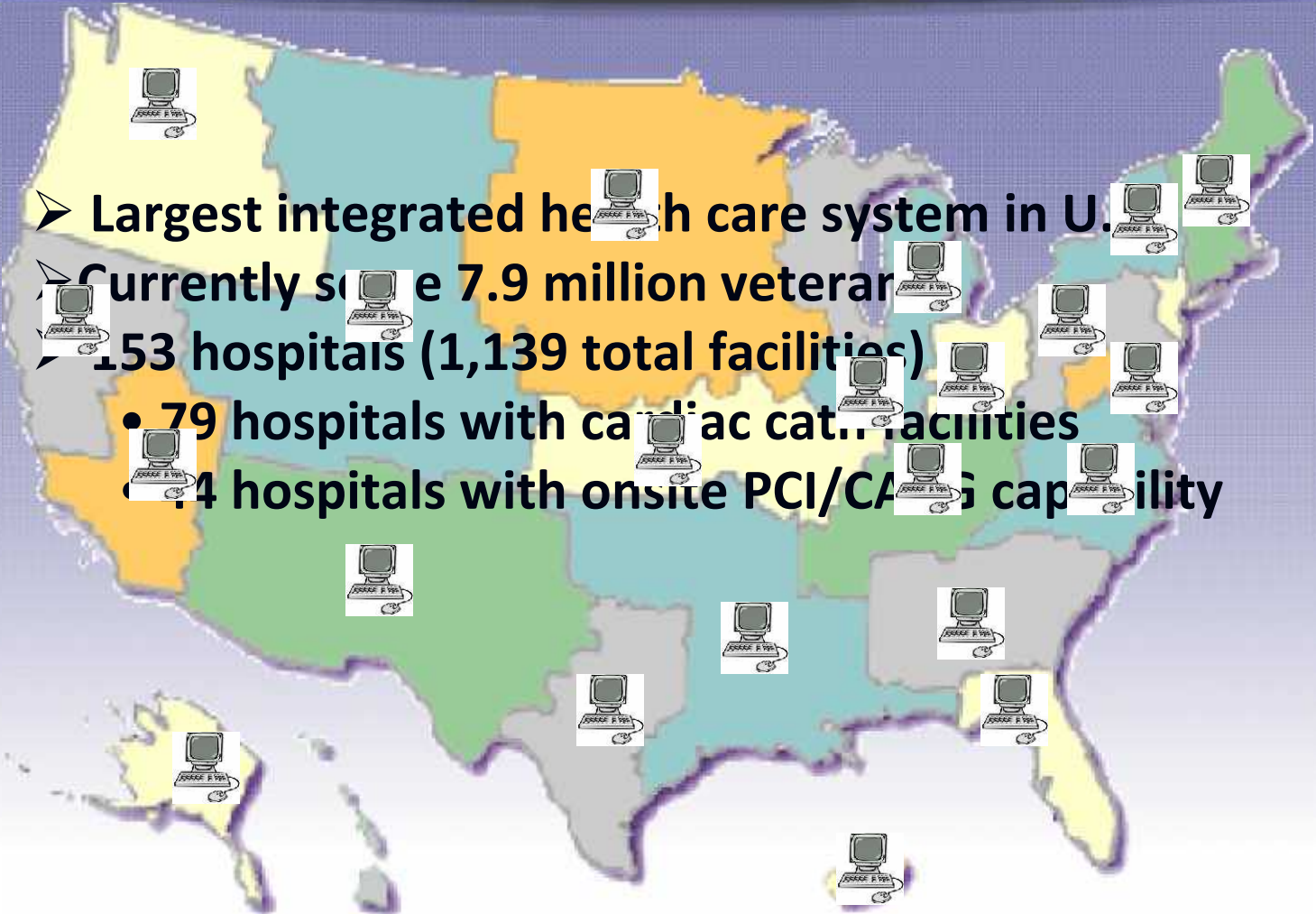
# CART

VA Cardiovascular Assessment, Reporting and Tracking System

## Integrating Structured Data Sets and Supporting Data Extraction Interoperability: the Veterans' Administration

Ehrin J. Armstrong, MD MSc  
Director of Interventional Cardiology  
Denver VA Medical Center  
Associate Professor of Medicine  
University of Colorado Denver

# The VA Health Care System

- 
- Largest integrated health care system in U.S.
  - Currently serve 7.9 million veterans
  - 153 hospitals (1,139 total facilities)
    - 79 hospitals with cardiac cath. facilities
    - 44 hospitals with onsite PCI/CAAG capability



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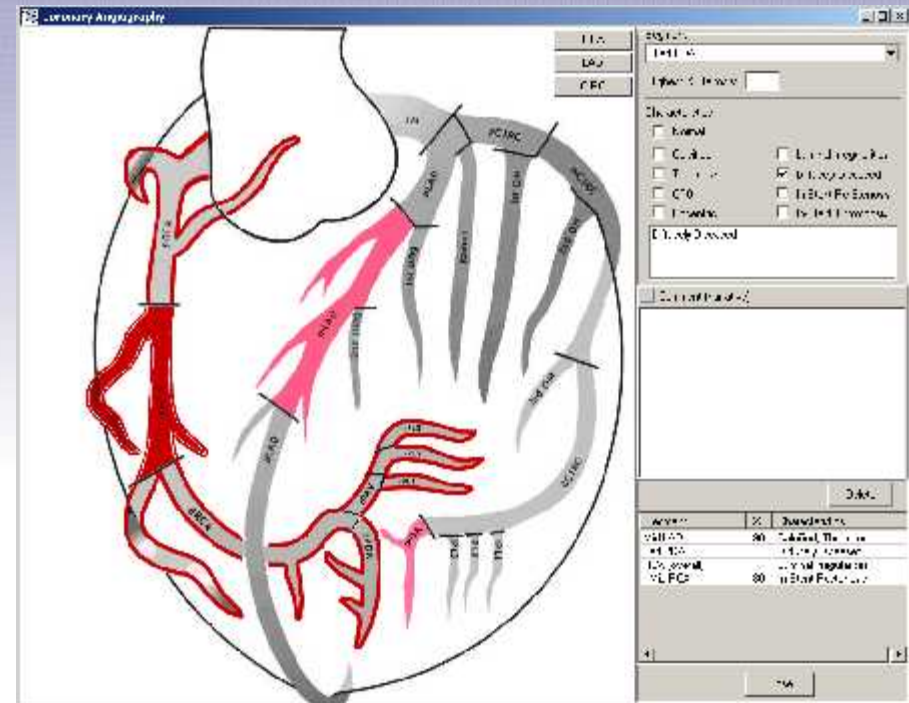
VA Cardiovascular Assessment, Reporting and Tracking System

**Most Comprehensive EMR in the Country**

# VHA Cardiovascular Assessment, Reporting and Tracking (CART) Program

ZZTII TEST PATIENT SOH  
0000000000 04/19/00

Form fields include: Sex (M), Race (W), Age (75), Height (5'10"), Weight (175), Blood Pressure (120/80), Heart Rate (75), and various checkboxes for medical history such as Diabetes, Hypertension, and Smoking.



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**Coronary Report**

Generated by the VA Cardiac Assessment, Reporting, and Tracking (CART) system

Patient: KETIL, NEDU, PATIENT 508 JIN: 00000940 DOB: 4/4/1963 AGE: 47  
 Procedure Date: 4/8/2007  
 Attending: MESSENGER, JOHN C  
 Operator: GRACIA, JOEL A

Procedures: Left Heart Catheterization, LV Angiography, Coronary Angiography,  
 Bypass Graft Angiography, Right Heart Catheterization, Aortography  
 In Situ Aortic Bypass Pump

Status: Elective  
 This was an inpatient procedure.  
 Type of procedure, site, and patient ID were verified with the patient.

Indications: Acute Coronary Syndrome, Valvular Heart Disease

ACCESS  
 Primary Arterial: Right Femoral, EP sheath, Sewl closure

CATHETERS  
 Right coronary artery: JN 3, 0 fr

LEFT HEART CATHETERIZATION

Pressure: 176/76  
 Access: 80/130, mean 100

Mild Aortic Valve Stenosis  
 Mild Mitral Valve Stenosis

LV ANGIOGRAPHY  
 Rv = 46% Anterior - Global wall motion

CORONARY ANGIOGRAPHY

Native Vessels

Summary: 3 vessel CAD  
 Dominance: Right dominant

Relevant Details

Segment	Stenosis	Characteristics and Comments
Mid LAD	50	Calcified, thrombus
Distal PDA		Diffusely Dilated
RCA (Overall)		Luminal Irregularities
Mid RCA	40	In-stent Restenosis

\* Highest % Stenosis within Segment.

BY-PASS GRAFTS

Graft Type	Insertion Segment	% Stenosis	Location
1 SVG	1st Diagonal	75	Aortic/Ostial
	In-stent Restenosis		

1/34



**CAR**  
 VA Cardiovascular As

# CART characteristics

Cath labs		79
Coronary procedures		362,287
	Angiograms	274,893
	PCIs	87,394
Health care providers		810
Patients		249,034
PCIs performed for ACS (2014)		57.5%
Severity of CAD noted on cath (2014)	3 vessel	12.1%
	2 vessel	13.1%
	1 vessel	17.3%
	Non-obstructive	20.5%
	Normal	12.1%
Procedural complications (2014)	MAE	0.06%
	Other	5.0%



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# VHA CART Data Elements

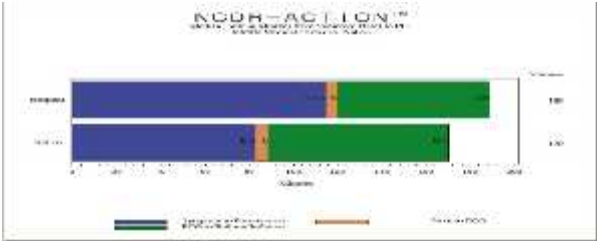
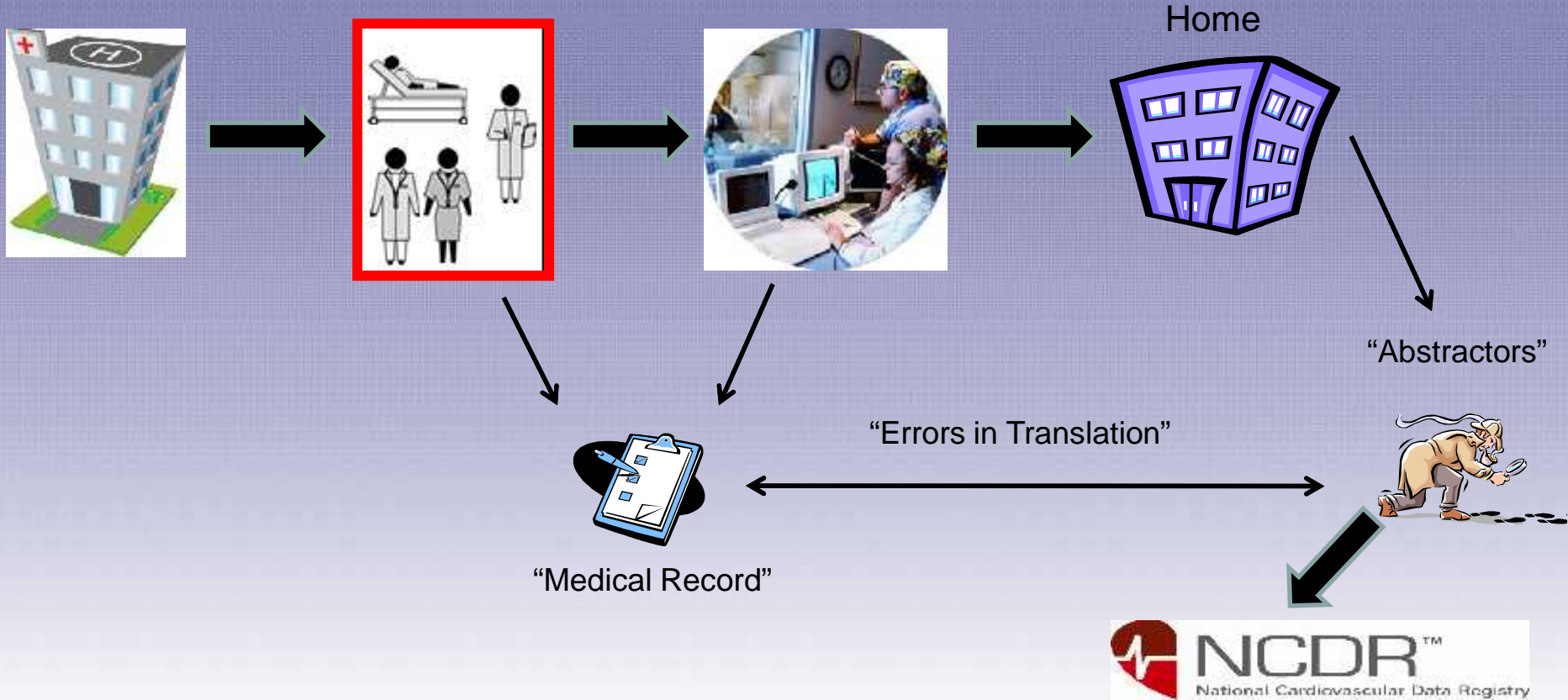
- CART Data is standardized using ACC clinical definitions.
- CART Data is also linked to longitudinal patient care data, including clinic visits, hospitalizations, and pharmacy prescriptions.
- CART Data is organized to generate real-time access to knowledge.



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# The Conventional Approach



# The CART Transactional Concept

- **Transactional Quality and Management:**
  - *a healthcare redesign process through which clinical practices are both enhanced and ensured real-time.*
  - *If specific data are needed for patient care, to improve quality and increase patient safety, these data should be available and accessible at the point of care and not abstracted after the fact*

*Robert Jesse, VA Acting Principal Deputy Undersecretary for Health*



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# The CART Transactional Concept

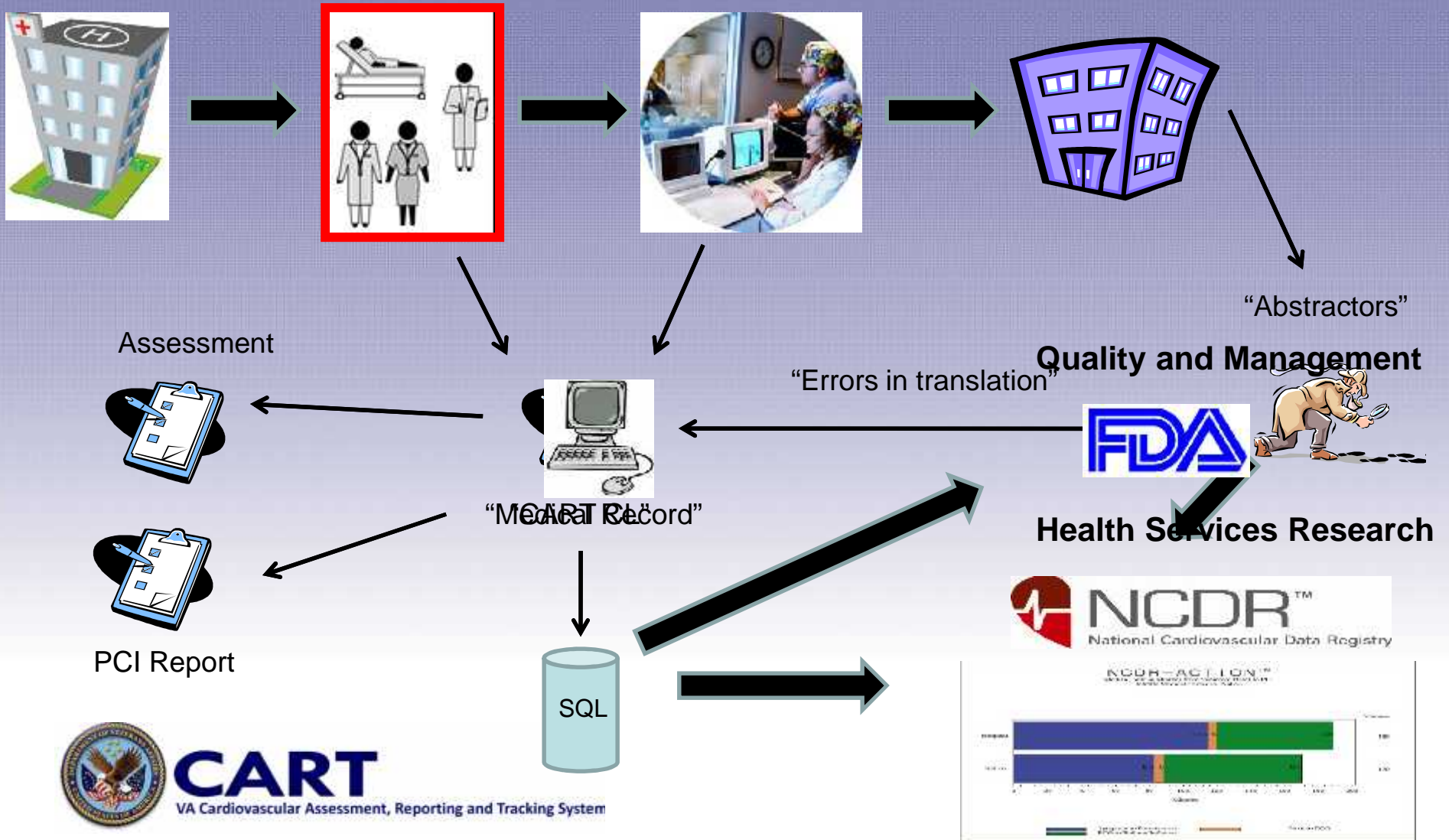
- Clinical tool that improves efficiency of care
  - Integration with CPRS
  - Efficient Report Generation
    - Faster than dictation
    - VHA-wide standardization
    - Report completion in real-time
- Integration of data collection into the *transaction* of care
  - *No duplicate data entry*
  - *Used as part of regular clinical care*
  - *Pre-procedure, diagnostic procedure, & PCI report*
  - *No new personnel*
  - *Core of American College of Cardiology data elements and standards*



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# The CART Transactional Approach



# Data Resources at Austin Information Technology Center

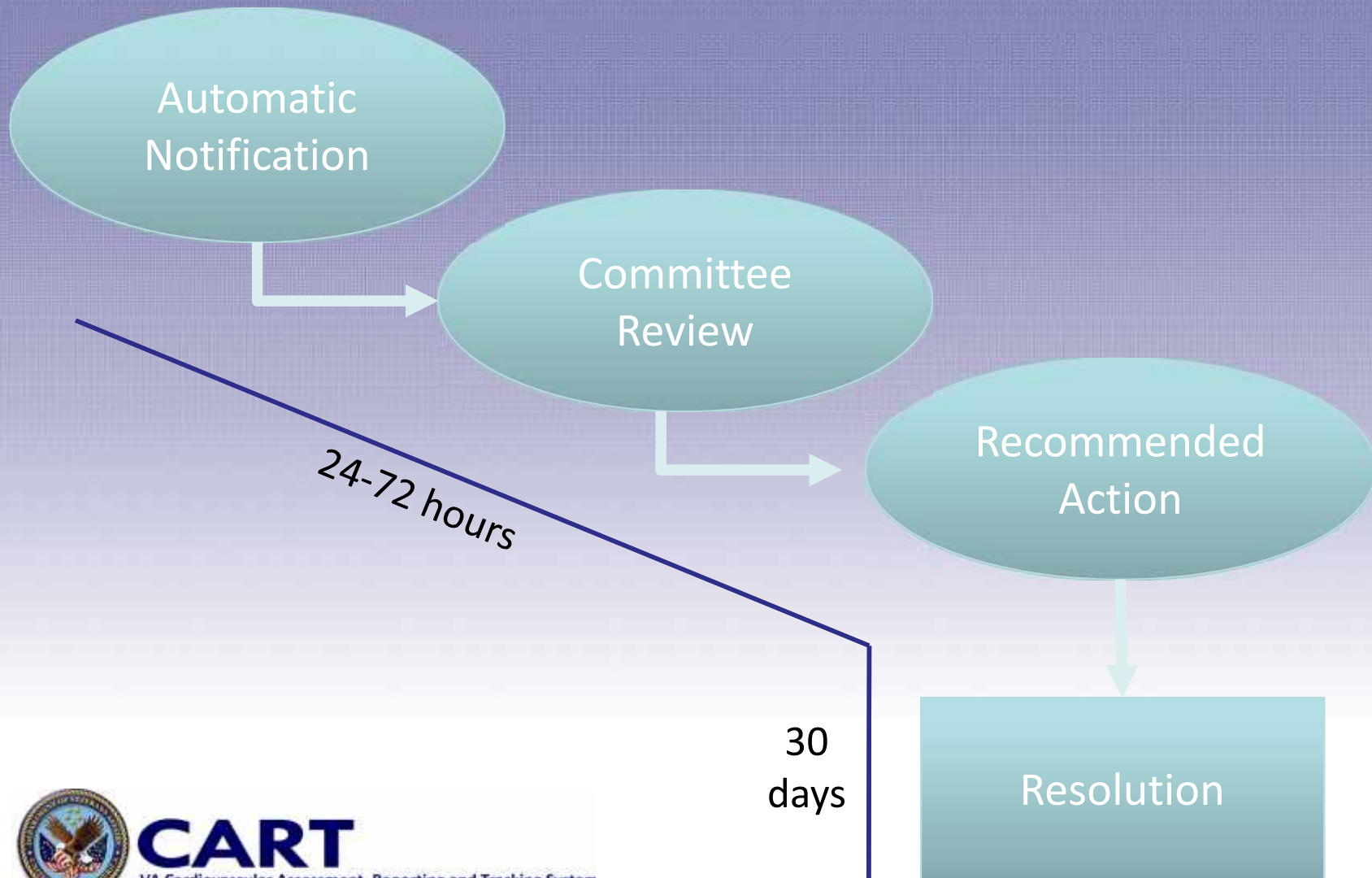
- VA National Patient Care Databases (NPCD)
  - Medical SAS Datasets (MedSAS)
- Decision Support System (DSS)
- Vital Status Files
- VHA Service Support Center (VSSC)
- Corporate Data Warehouse (CDW)
- Resident Assessment Instrument/Minimum Dataset (RAI-MDS)
- Real SSN



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# CART Supports Quality Management



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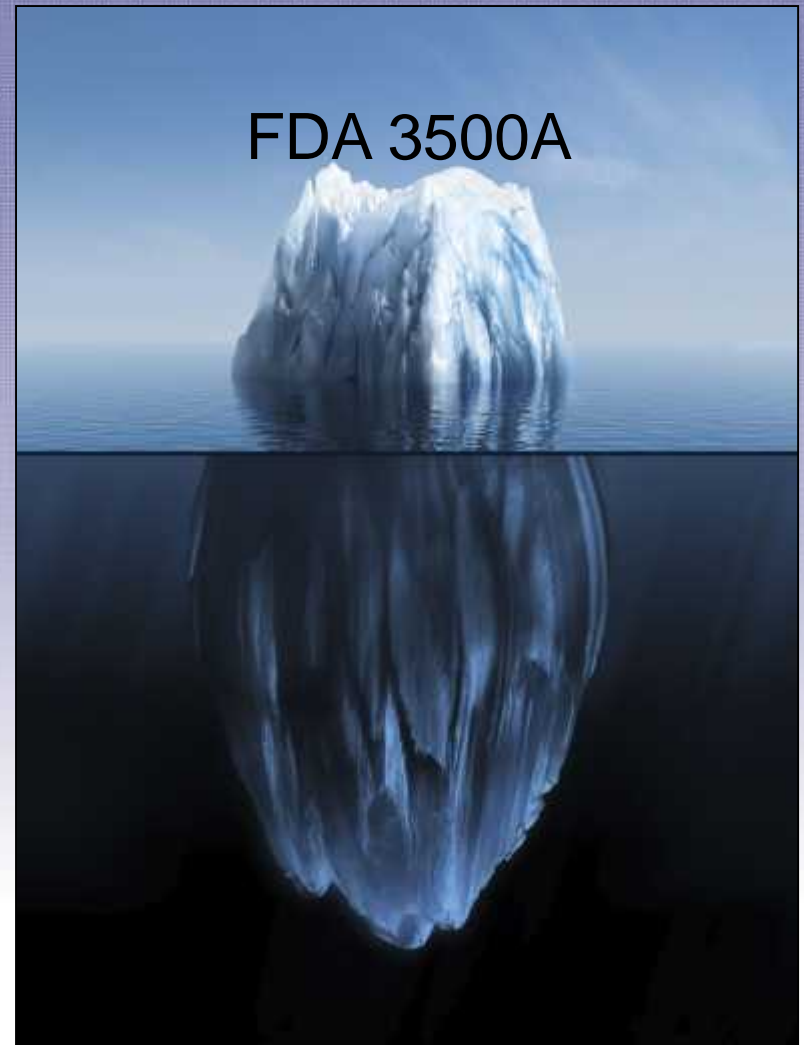
# CART Supports Device Surveillance

- Discussions Initiated in 2006
- CART-CL as Sentinel Patient Safety Network for cath lab device surveillance
- CART-CL modified to capture unexpected problems with devices
- Monthly reports informally exchanged with FDA (no PHI) in 2007



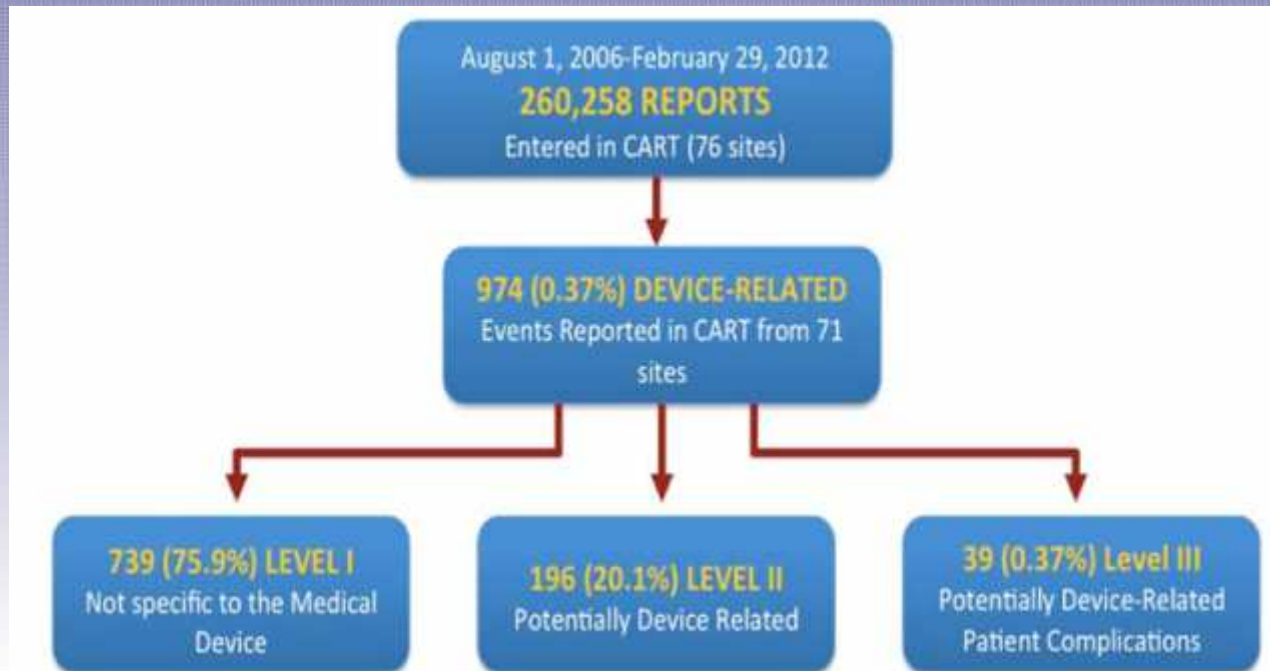
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# Device Surveillance

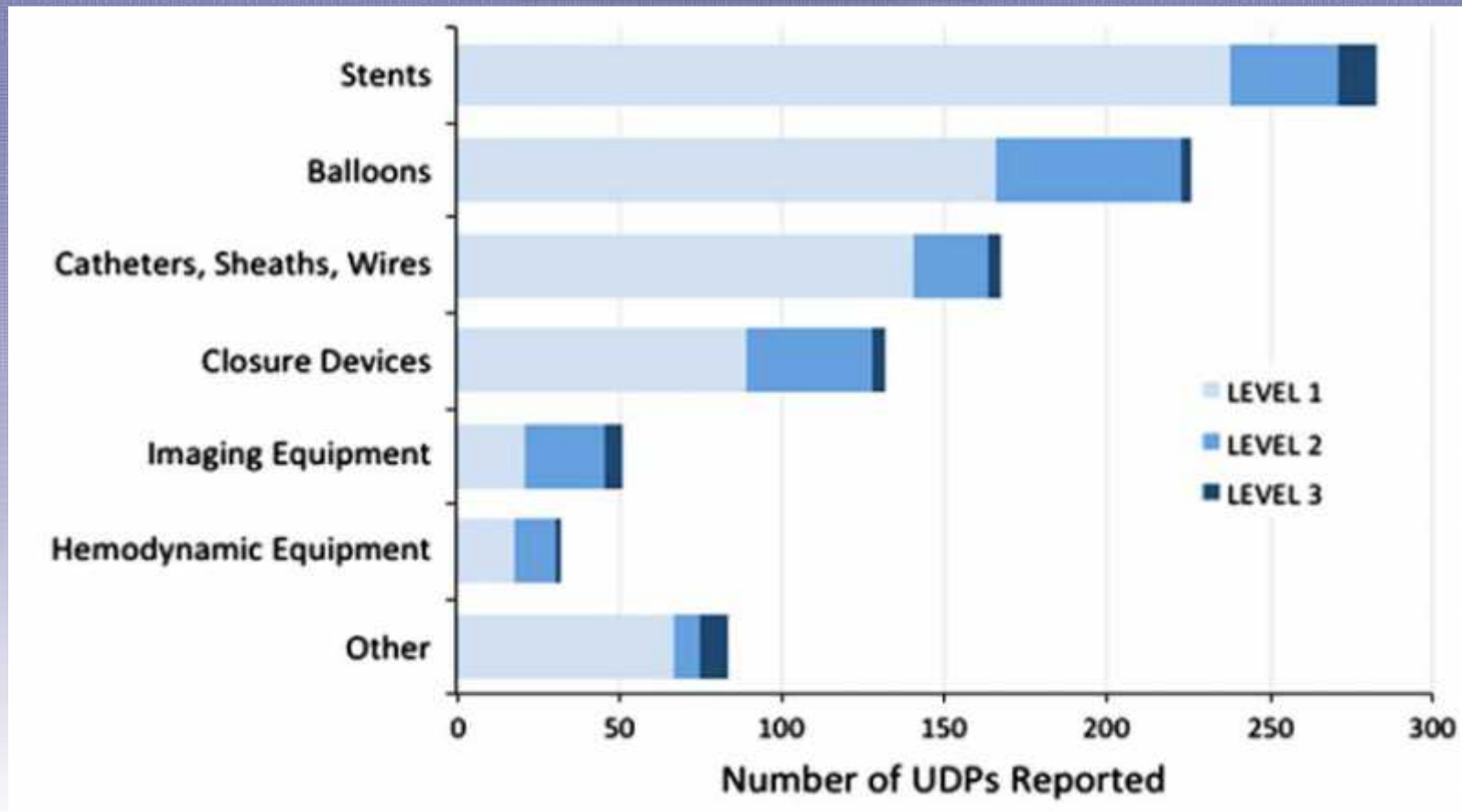
- Unexpected device problems (UDP) reported immediately at time of procedure.



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# Device Surveillance with CART



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Tsai et al, Med Care 2013;51:S57-S61

# Current Limitations

- CART data input is limited to the cath lab.
  - Does not currently capture procedures by radiologists, vascular surgeons.
- Peripheral vascular CART module still in testing.
  - Many peripheral procedures entered in CART, but lack standardization.
  - Upcoming CART PVI module will contain data elements in concordance with NCDR-PVI registry.



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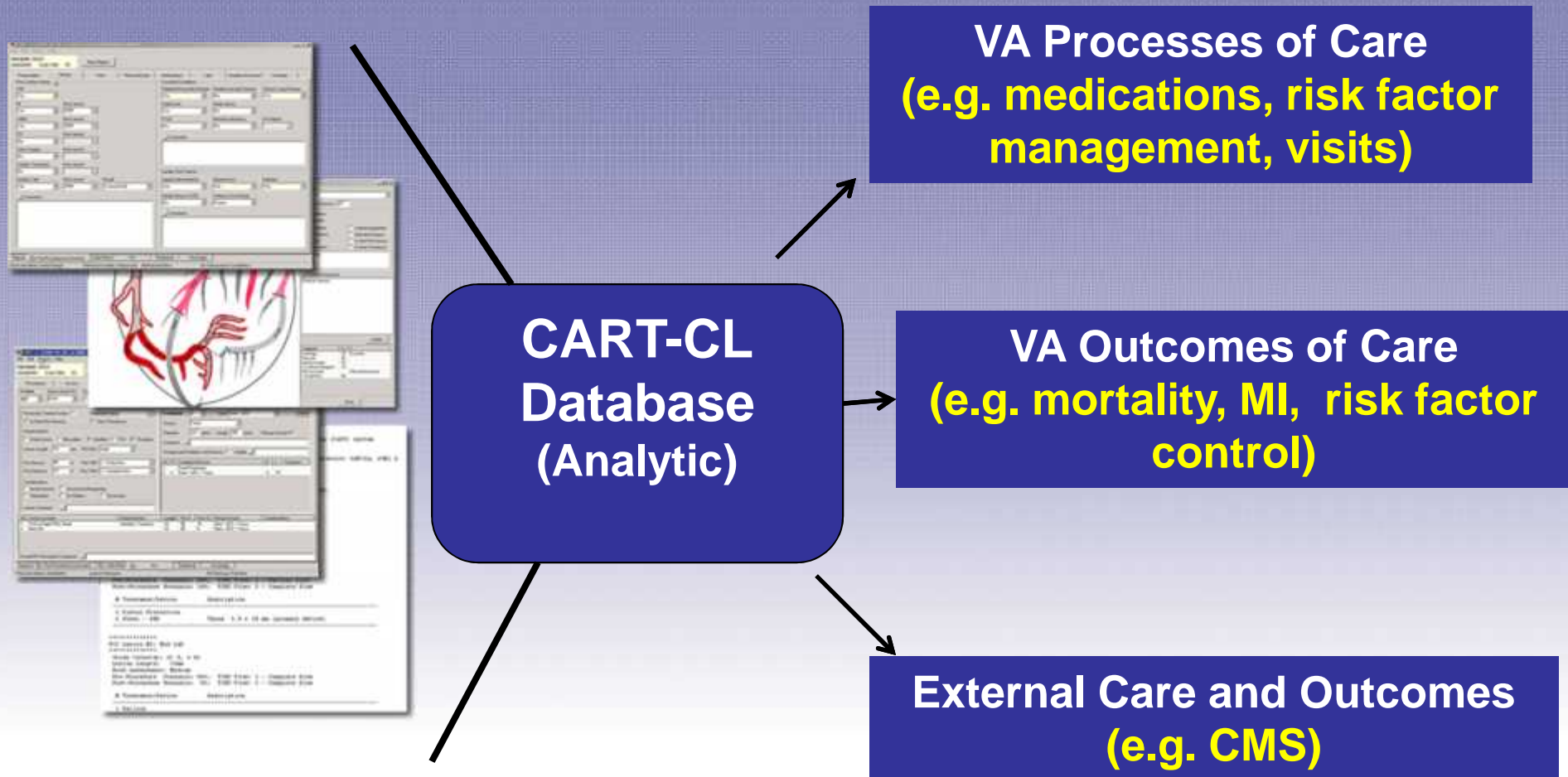
# CART

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## Thank You

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# CART Supports Research + Longitudinal Data



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