The CART Transactional Approach
High quality, Prospective Registry Design: Issues and Answers for TREAT

Thomas T. Tsai, MD, MSc
Director of Interventional Cardiology
Clinical Co-Director CART-CL
Denver VA Medical Center
Assistant Professor of Medicine
• None
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)
  - 77 hospitals with cardiac cath facilities
  - 44 hospitals with onsite PCI/CABG capability

Most Comprehensive EMR in the Country
The Conventional Approach

The diagram illustrates the conventional approach to medical record abstracting. It starts with a hospital where a medical record is created. The record is then abstracted by abstractors, leading to errors in translation. These errors are then reviewed in the home setting. The diagram includes illustrations of a hospital, abstractors, and a home, with arrows connecting the different stages. The National Cardiovascular Data Registry (NCDR) logo is also present, indicating the involvement of this organization in the process.
The CART Transactional Approach
The CART Transactional Approach

Assessment

PCI Report

CART CL

Medical Record

Errors in translation

Quality and Management

Health Services Research

CART

VA Cardiovascular Assessment, Reporting and Tracking System

SQL

NCDR
National Cardiovascular Data Registry

NCDR-ACTION
American Heart Association's Public Reporting of Cardiovascular Outcomes
CART Supports Quality Management

- Automatic Notification
- Committee Review
- Recommended Action
- Resolution

24-72 hours

30 days
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
CART Supports Research + Longitudinal Data

CART-CL Database (Analytic)

- VA Processes of Care (e.g. medications, risk factor management, visits)
- VA Outcomes of Care (e.g. mortality, MI, risk factor control)
- External Care and Outcomes (e.g. CMS)

CART
VA Cardiovascular Assessment, Reporting and Tracking System
Future: CART Facilitates Decision Support

Joseph Patient, Jr.
MRN: 22034857
March 13, 2009

Mortality Risk

Bleeding Risk

Potential Interventions:
1. Bivalirudin
2. Closure Device
3. Radial Case
4. Exp. Sheath Removal
5. Small Size Sheaths
6. Inpatient Admission

Restenosis Risk with BMS

Consider BMS
Consider DES
Summary

• Infrastructure, infrastructure, infrastructure

• The Transactional model efficiently combines clinical care, quality improvement, device surveillance and research

• Prospective registries should consider transactional designs
Thank You
thomas.tsai@va.gov

• CART Coordinating Center
  – John Rumsfeld, MD PhD (Director)
  – Hans Gethoffer DrIng (Technical Director)
  – Tami Box
  – Meg Plomondon, PhD
  – Tom Maddox, MD
  – Tom Tsai, MD (CART-Peripheral)
  – Paul Varosy, MD (CART-EP)
  – P. Michael Ho, MD PhD
  – Greg Noonan
  – Alec Arney
  – Josie Nance

• VA Patient Care Services
  – Bob Jesse, MD PhD
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
CART Supports Research

• Immediate email reporting of major complications
  – Chief CV Consultant; CART Leadership; CART QM Committee Chair

• Monthly Site QA Reports

• National Reports (VACO, CART-QM Committee)
  – Monthly Reports:
    • Procedure counts (including fiscal year to date)
    • Major adverse event counts (including fiscal year to date)
  – Bi-Annual Reports
    • Detailed site and ‘roll-up’ data; quality metrics

• Quarterly VISN-level Reports
  – VISN CMO’s
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
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*
Procedure Date: 4/16/2007
Attending: MESSINGER, JOHN C
Operators: GARCIA, JOEL A

Procedures: Left Heart Catheterization, LV Angiography, Coronary Angiography,
Bypass Graft Angiography, Right Heart Catheterization, Aortography
Intra-Aortic Balloon 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, SF sheath, Seal closure

CATHETERS
Right coronary artery: JR 5, 5 fr

LEFT HEART CATHETERIZATION

Pressures (mm Hg)
Aorta: 80/120, mean 100

Kild Aortic Valve Stenosis
Kild Mitral Valve Stenosis

LV-ANGIOGRAPHY
EF = 46% Abnormal - Global wall motion

CORONARY ANGIOGRAPHY

------------------
Native Vessels
------------------
Summary: 2 vessel CAD
Dominance: Right dominant

Stenoses Details

<table>
<thead>
<tr>
<th>Segment</th>
<th>Stenosis</th>
<th>Characteristics and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid LAD</td>
<td>90</td>
<td>Calcified, Thrombus</td>
</tr>
<tr>
<td>Left PDA</td>
<td></td>
<td>Diffusely Diseased</td>
</tr>
<tr>
<td>RCA (overall)</td>
<td></td>
<td>Luminal irregularities</td>
</tr>
<tr>
<td>Mid RCA</td>
<td>80</td>
<td>In-Stent Restenosis</td>
</tr>
</tbody>
</table>

* Highest % Stenosis Within Segment

------------------
BYPASS GRAFTS
------------------

<table>
<thead>
<tr>
<th># Graft Type</th>
<th>Insertion Segment</th>
<th>% Stenosis Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SVG</td>
<td>1st Diagonal</td>
<td>75 Aortic/Ostial In-Stent Restenosis</td>
</tr>
</tbody>
</table>
New Clinical CART Modules (Extensible)

- **CART-Peripheral**
  - Peripheral arterial intervention

- **CART-EP**
  - Integration with ICD and pacemaker surveillance programs
  - Result: device surveillance with *transactional* data collection
    - preimplantation $\rightarrow$ implantation $\rightarrow$ clinic $\rightarrow$ remote monitoring

- **CART-CPR**
  - Documentation and tracking of in-hospital cardiac arrest

- **CART-Clinic**

- **CART-Radial**
CART-CL Analytic Database (CART-AD)

CART-CL Database (Analytic)

VA Processes of Care (e.g. medications, risk factor management, visits)

VA Outcomes of Care (e.g. mortality, MI, risk factor control)

External Care and Outcomes (e.g. CMS)
CART-CL AD Linkage to Longitudinal Data

- **CART-CL AD (Analytic)**
  - VA Processes of Care (e.g. medications, risk factor management, visits)
  - VA Outcomes of Care (e.g. mortality, MI, risk factor control)
  - External Care and Outcomes (e.g. CMS)