# Successful Use Cases of Real-World Evidence

## *Transcatheter Valve Therapy*
## *STS/ACC TVT Registry*

Michael Mack, M.D.

Baylor Scott& White Health

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# RWE

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# RWE

Also found in: **Wikipedia**.

| Acronym | Definition |
|---|---|
| RWE | Rot-Weiss Essen *(Germann football club)* |
| RWE | Ralph Waldo Emerson |
| RWE | Right Wing Extremist |
| RWE | Rheinisch-Westfälische Elektrizitätswerke *(German Power Supplier)* |
| RWE | Read Write Execute |
| RWE | Religious Witness for the Earth |
| RWE | Rumble World Entertainment *(Hawaii)* |
| RWE | Reaction Wheel Electronics |
| RWE | Rockford Wind Ensemble *(Rockford, IL)* |
| RWE | Royal Wholesale Electric *(various locations)* |
| RWE | Rosewater Engineering, Inc. *(est. 1983)* |

# RWE- FDA Definition

- RWE refers to healthcare information derived from multiple sources outside of typical clinical research settings, including electronic health records (EHRs), claims and billing data, product and disease registries, and data gathered by personal devices and health applications.

# What is TAVR?

# What is the STS/ACC TVT Registry?

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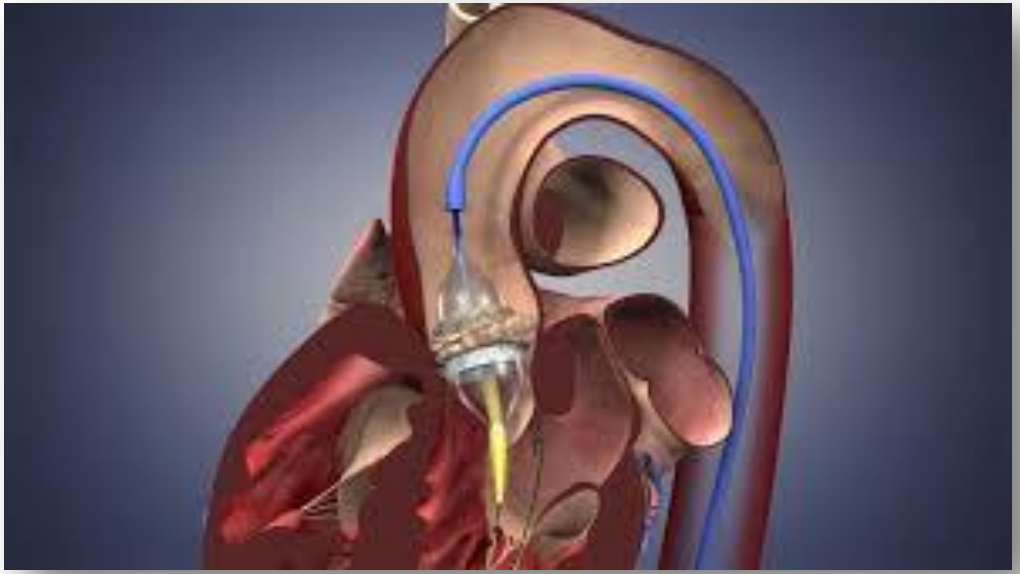
# TAVR –Transcatheter Aortic Valve Replacement



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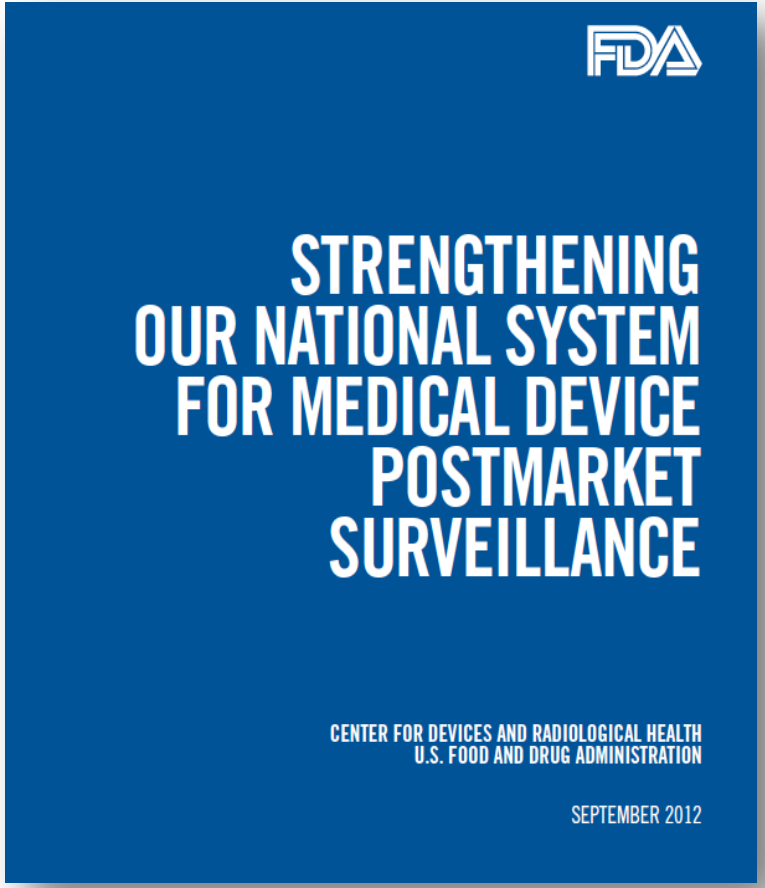


- UDI system incorporated into EHR
- National and international device registries
- Modernize adverse event reporting
- New methods for evidence generation, synthesis and appraisal

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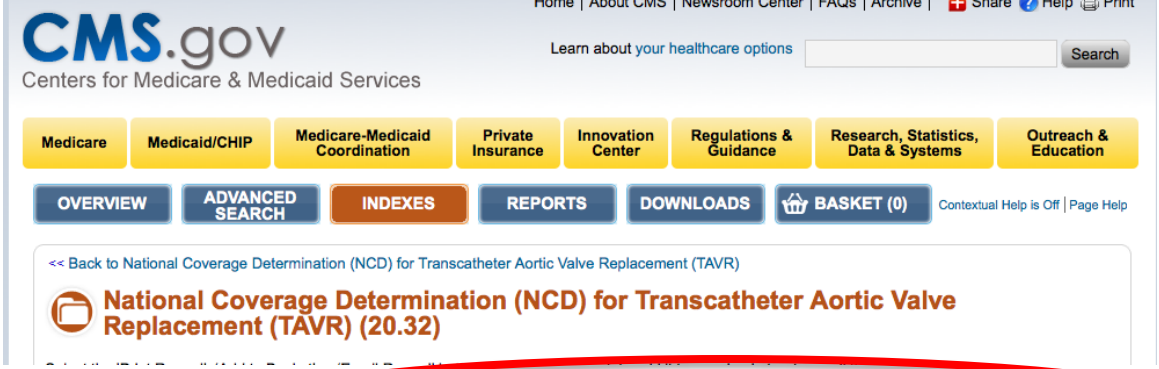


- TAVR approved under **"coverage with evidence development"**
- Approved for treatment of severe symptomatic aortic stenosis
- FDA approved indication and with an FDA approved device
- Two cardiac surgeons approve
- Performed in facility with
  - >50surgical AVR'/year (~400)
  - >400 caths/50PCI/year
  - >20TAVR/year
  - Mortality<15%
  - Stroke <15%
- Multidisciplinary Heart Team
- **Mandatory national registry participation**

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# February 2015 Health Affairs

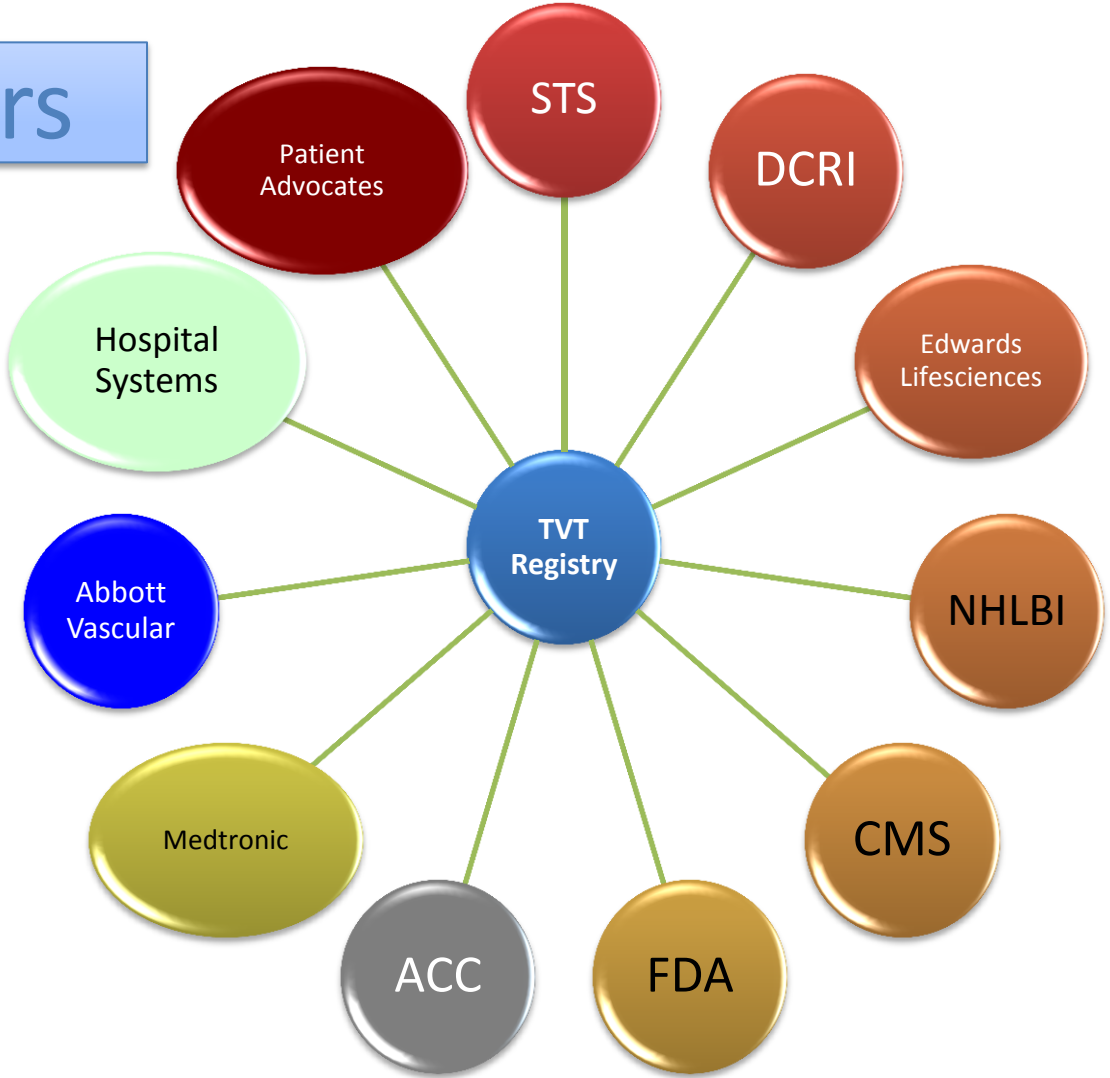
TRACKING INNOVATION

By John D. Carroll, Jeff Shuren, Tamara Syrek Jensen, John Hernandez, David Holmes, Danica Marinac-Dabic, Fred H. Edwards, Bram D. Zuckerman, Larry L. Wood, Richard E. Kuntz, and Michael J. Mack

## Transcatheter Valve Therapy Registry Is A Model For Medical Device Innovation And Surveillance

STS
ACC
FDA
CMS
Industry

# The Stakeholders



## 2011

***July 2011***
TVT Registry proposed at FDA Advisory Panel for Edwards Sapien Valve

***Nov 2011***
Edwards Sapien THV FDA approval for Ext High Risk

***Dec 2011***
STS/ACC TVT Registry Launched Version 1.0

## 2012

***May 2012***
CMS issued National Coverage Decision for TAVR

## 2013

***Feb 2013***
STS/ACC TVT Registry Launched Version 1.2

***Sept 2013***
STS/ACC TVT Registry Launched Version 1.3

***Oct 25, 2013***
FDA approval of Abbott MitraClip

## 2014

***June 17, 2014***
Edwards Sapien XT FDA approval for High Risk

***Aug, 7, 2014***
CMS issued National Coverage Decision for TMVR

## 2015

***March 30, 2015***
Medtronic CoreValve FDA approval for ViV on tissue valve

***June 17, 2015***
Edwards Sapien 3 FDA approval for High Risk

***June 23, 2015***
Medtronic Evolut R FDA approval for High Risk

***Oct 9, 2015***
Edwards Sapien XT FDA approval for VIV on tissue valve

## 2016

***Jan 11, 2016***
Medtronic CoreValve FDA approval for High Risk

***March 2,2016***
Edwards Sapien XT FDA approved for Pulmonic Valve

***Aug 18, 2016***
Edwards Sapien XT & 3 FDA approval for Intermediate Risk

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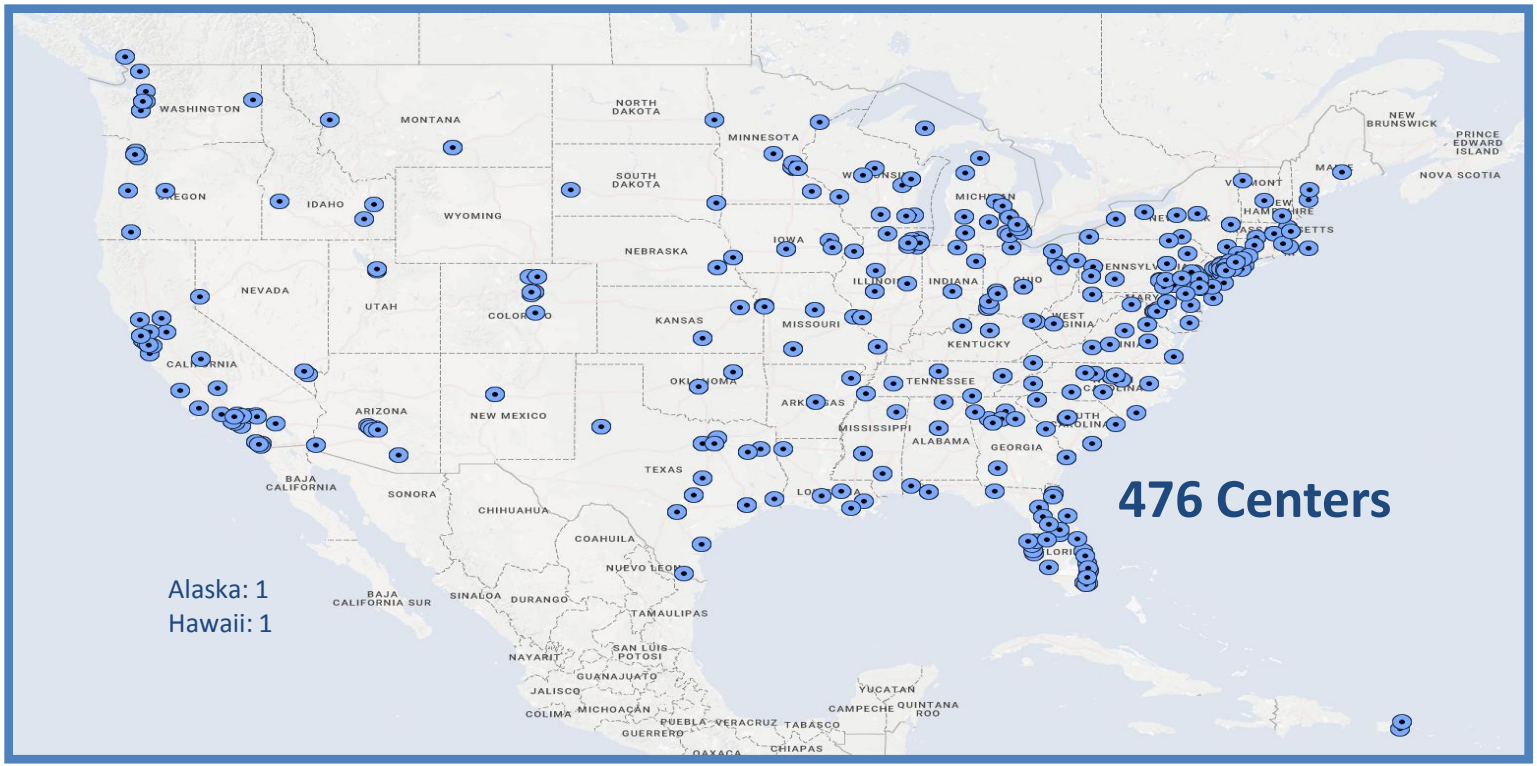
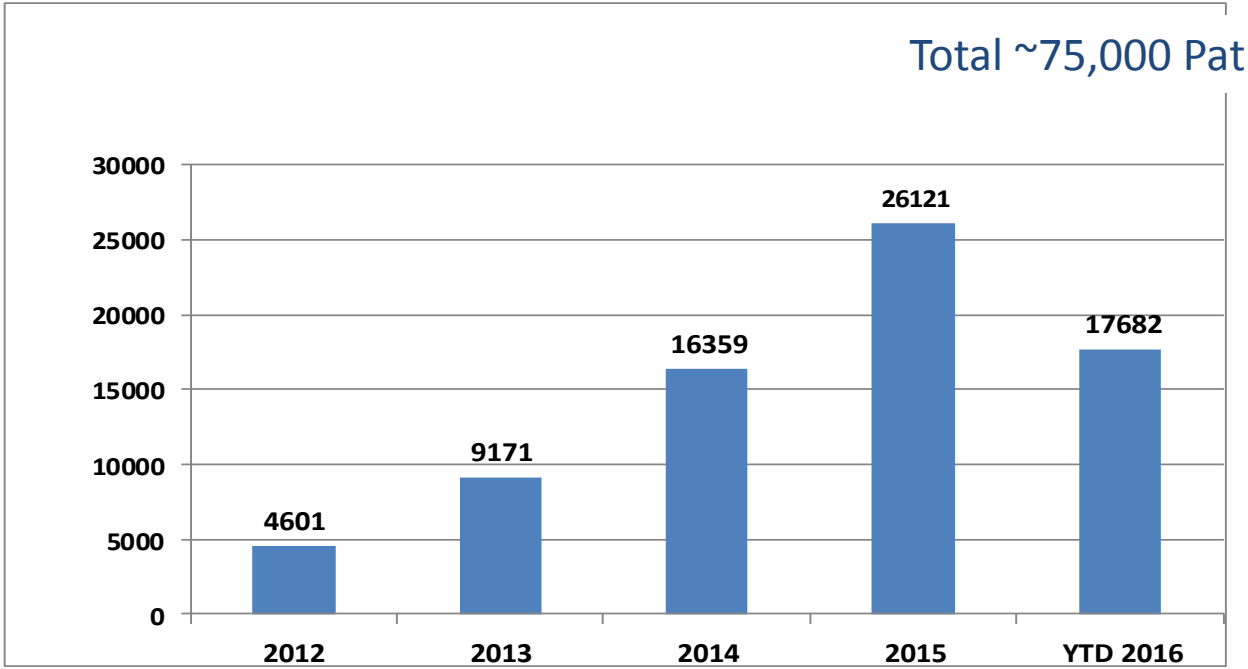
# TAVR Centers in North America



# Commercial TAVR Patients in the TVT Registry

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Source: STS/ACC TVT Registry Database as of Aug 2016

# What Data Are Collected?

- Case Report Form- >400 data fields
- Demographics, provider and facility characteristics
- History/risk factors, cardiac status, and health status
- Indications for the procedure
- Pre, intra, and post procedure data and adverse events
- Quality of Life (KCCQ)
- Outcomes at 30 days and one year

# What “Real World Evidence” of Medical Device Performance is Developed ?

- Near real time outcomes of virtually all devices implanted
- Risk adjusted center performance
- Long term outcomes via linkage with CMS

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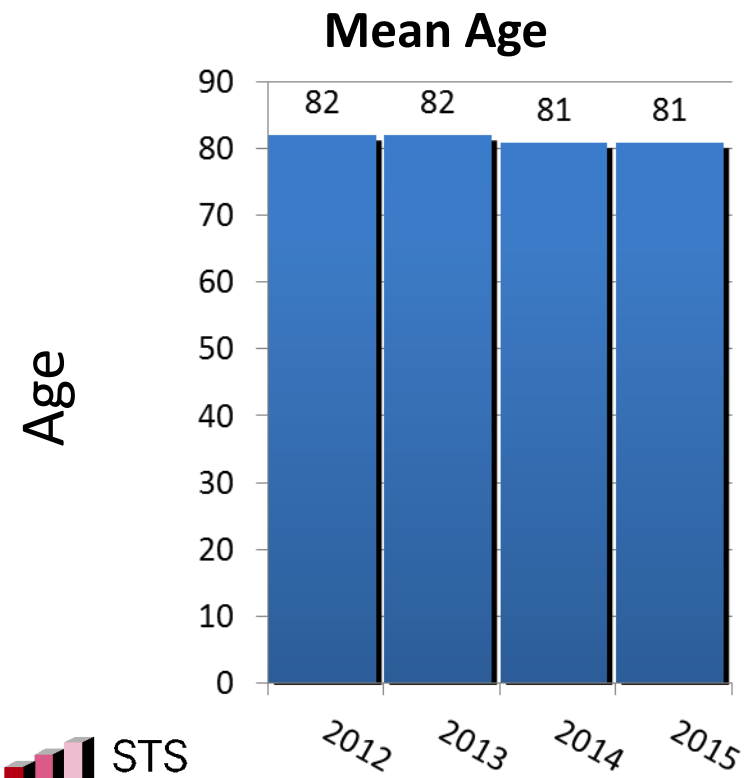
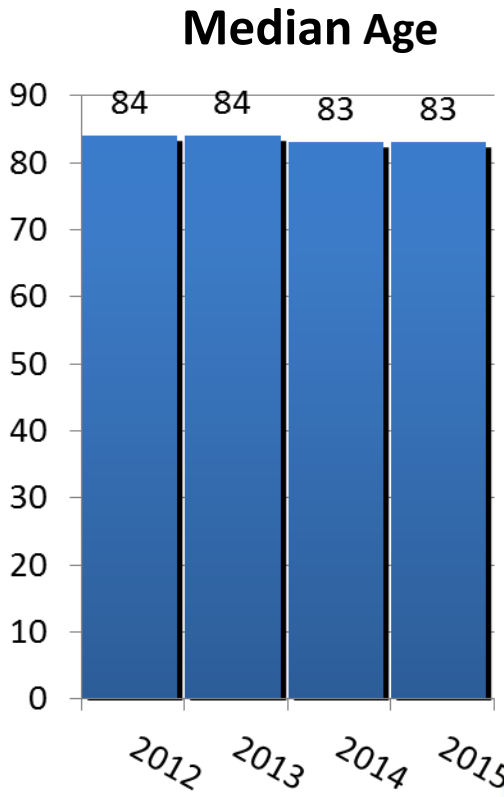
# TAVR: Age of the Patients




No major age "creep", i.e. decrease in the age of the population being treated.

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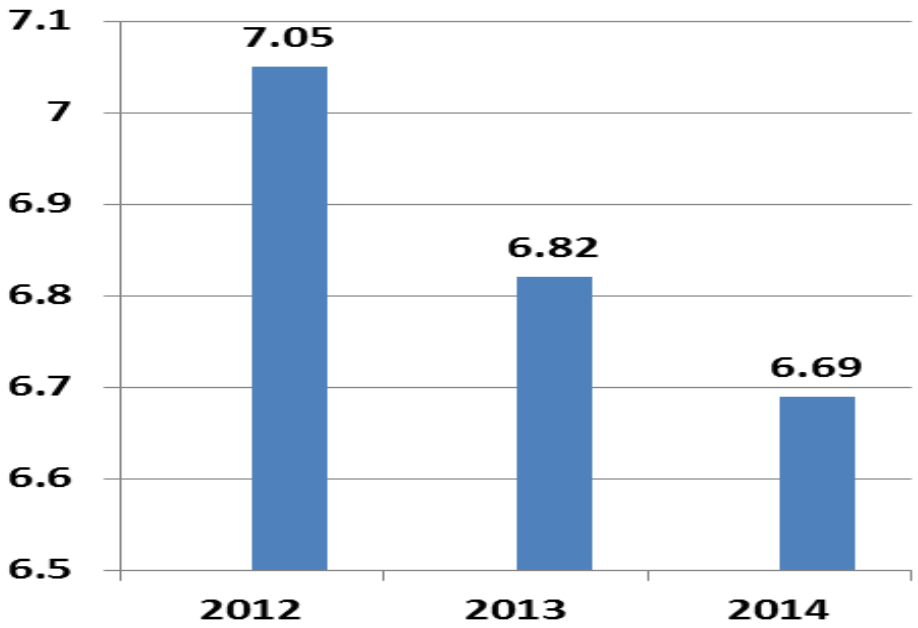
Source: STS/ACC TVT Registry Database as of Jan 17, 2016

# Median STS Risk Score for all TAVR Procedures

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Source: DCRI Query April 2, 2015

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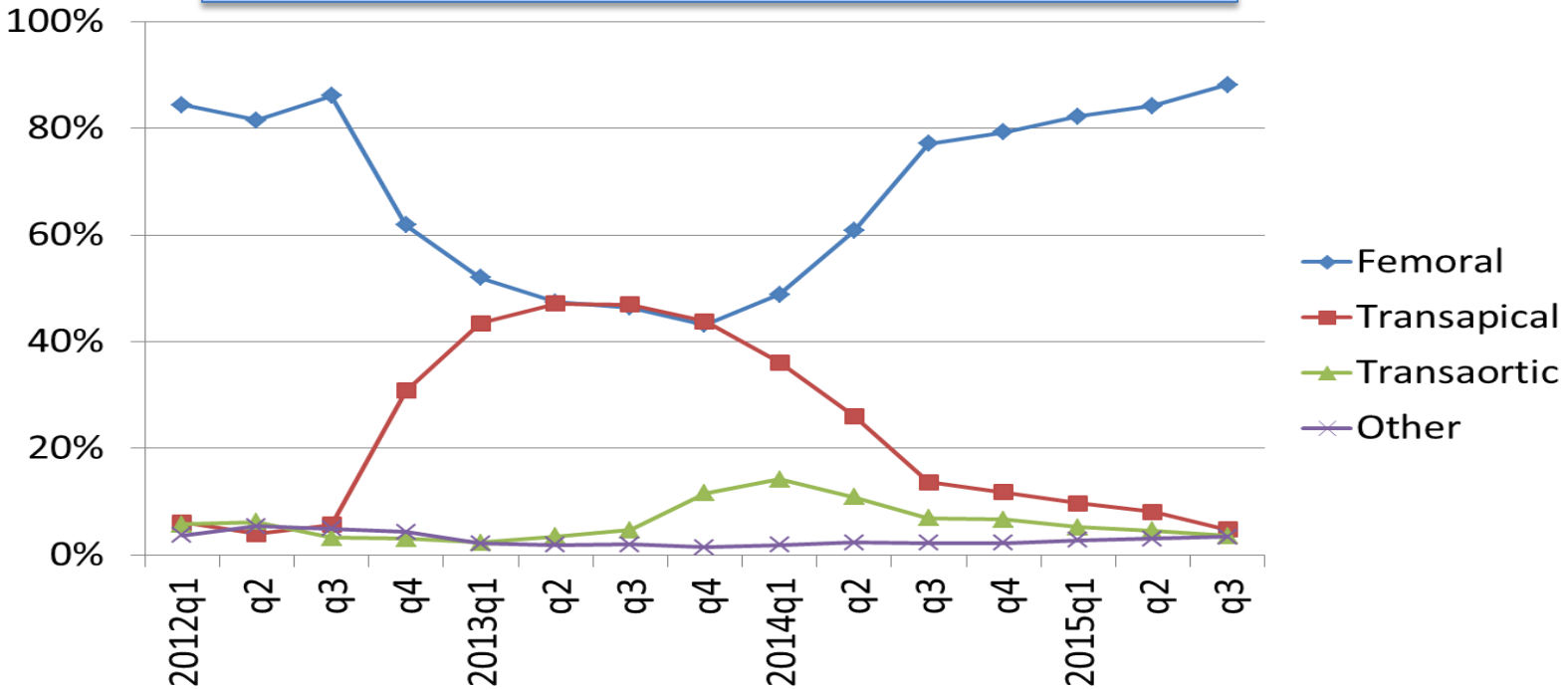
# TAVR Access Site

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Source: STS/ACC TVT Registry Database as of Jan 17, 2016

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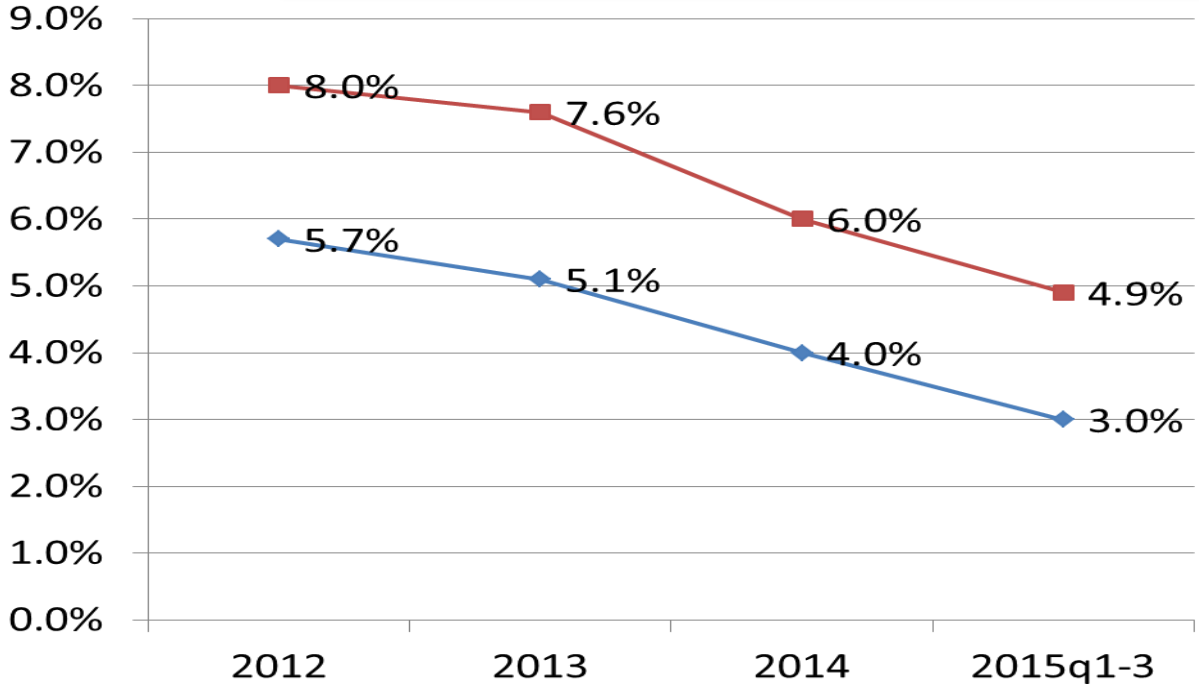
# Mortality after TAVR




Almost a 50% drop in mortality over a 3 year period.

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*Source: STS/ACC TVT Registry Database*
*46865 records as of 2-20-15*

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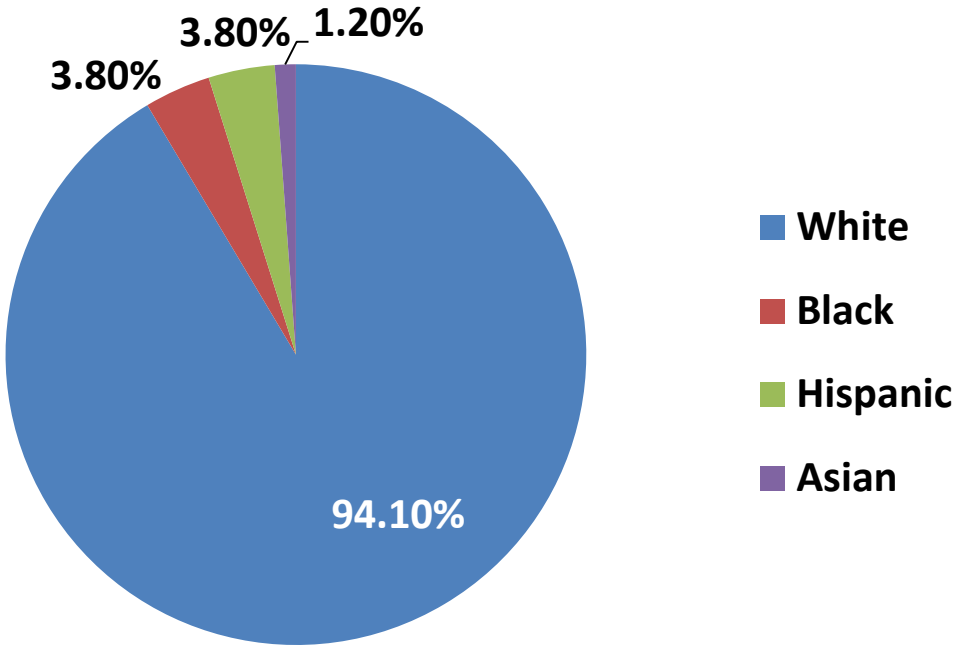
# Racial Breakdown of Patients in TVT Registry

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Source: STS/ACC TVT Registry 2016 Q1Outcomes Report

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# Data Quality Program

**Event Adjudication**

- Verifies and provides additional information for key events (stroke, TIA and repeat intervention, plus HF admission for MitraClip)

**Audit Program**

- Evaluates accuracy and reliability
- Assesses proper and complete reporting of cases
- Voluntary and self audits

**Data Outlier Program**

- Provides outlier alerts to registry participants

# Event Adjudication

- 2170 events reviewed by clinical event team
- Summary of disagreements:
  - TIA (determined as either an ischemic stroke 20% of the time)
  - Stroke of undetermined origin (determined as ischemic stroke 1/3 of the time)
  - AV or MV re-intervention (determined as “no event 10% of the time)
  - Heart failure readmission (determined as “no event 1/3 of the time)

# Real World Evidence Generation

## *From Patient Level Data*

- Regulatory
  - Postmarket
  - Premarket
- Quality Improvement
- Research

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# "Real World Evidence"
## *Post Market*

- 30 day outcomes on virtually all patients (except VA)
- Quarterly data safety reports to FDA
- Nested Post Approval Studies
  - Edwards, Medtronic, Abbott Vascular
- Lifetime follow up of Partner 3 low risk patients (>10 years)

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# "Real World Evidence"
## *Pre Market*

- Off label use for label expansion
  - Alternative access in inoperative patients
  - Alternative access in high risk patients
  - Valve-in-Valve in inoperable and high-risk patients
- Continued access protocols
  - Sapien 3
  - CoreValve
- IDE studies

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# “Real World Evidence”
# *Quality Improvement*

- Quarterly reports to sites benchmarked nationally
- Risk adjustment
- Risk calculator
- Appropriate use criteria performance
- Public reporting

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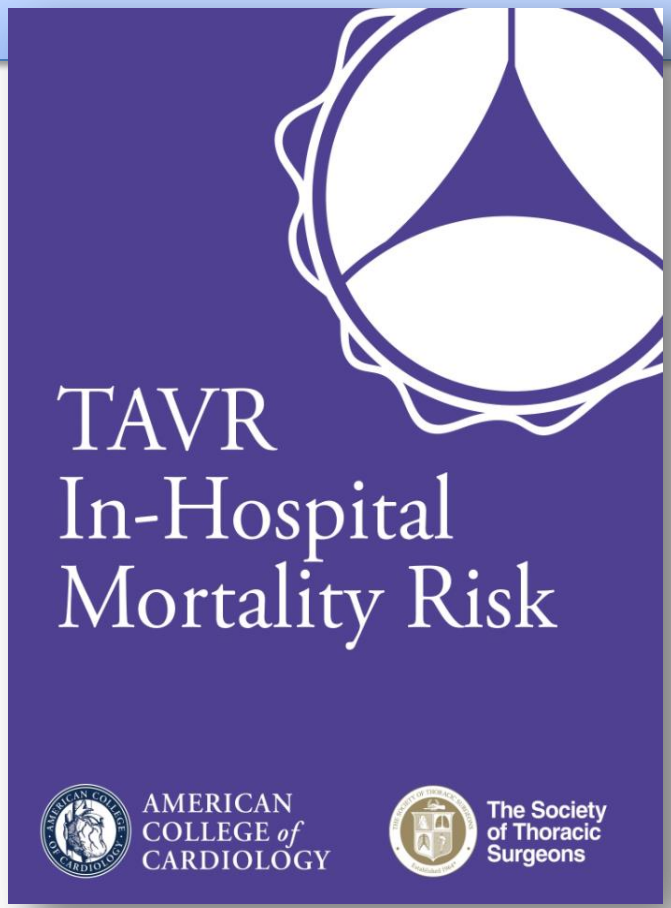
# TAVR Risk Calculator




- STS Risk Score:
  - 30 Day
- TAVR Risk Calculator:
  - In-Hospital only

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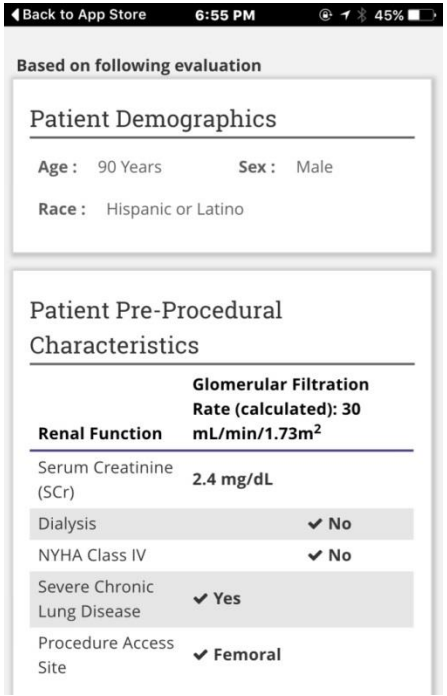


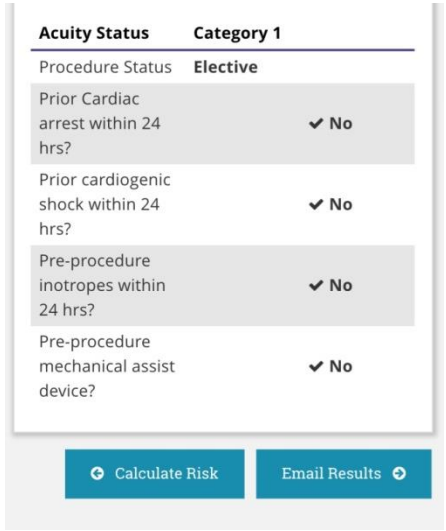


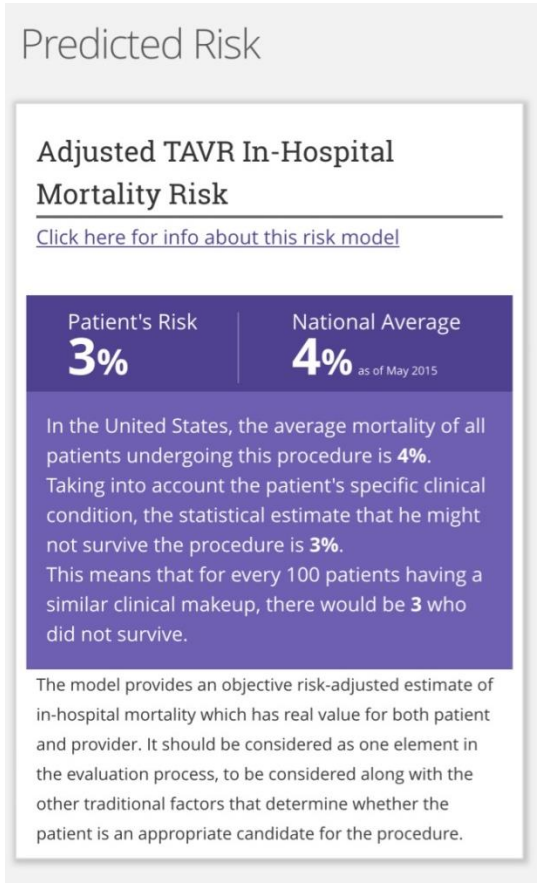


Includes 9 variables that are entered by user

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# Steps to Establish Public Reporting

- Establish what metrics to report
- Obtain independent endorsement from NQF
- Define program policies and procedures
- Obtain consent from registry participants
- Decide what publication vehicle/display

# "Real World Evidence"
## *Research*

- Annual Report in JACC, Annals Thoracic Surgery
- Pragmatic randomized trials
  - CLOE (NHLBI Review)
- Volume/Outcome Relationship at Clinical Sites
  - Inform CMS
- PCORI Grant
  - Management of Aortic Stenosis-*Patient Education and Decision Aids*

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# What “Value” Has Been Created So Far ?

- Near Real-time Reporting of Early Outcomes in Virtually All Patients
- Clinical data allowing “risk adjustment”
- One Year Outcomes by Linkage to CMS Claims
- IDE trials for label expansion
- Comparative effectiveness studies with SAVR
- QI at site level

# Challenges

- Scalability
  - Beyond an expensive device ($32K) and single payer (CMS)
- Sustainability
  - Beyond NCD
- Site Burden and Expense
  - Autopopulation from EHR's?
- Creating/Demonstrating Value
  - Does every device need to be tracked in perpetuity?

# Registry Sustainability – Fit-to-Purpose Infrastructure

## ~~Shared Benefits of Multi-Stakeholder Partnerships~~

**ACCF/STS**

### Databases/Registries

ACC NCDR
- CathPCI
- ICD
- IMPACT
- LAAO
- AF Ablation
- PVI

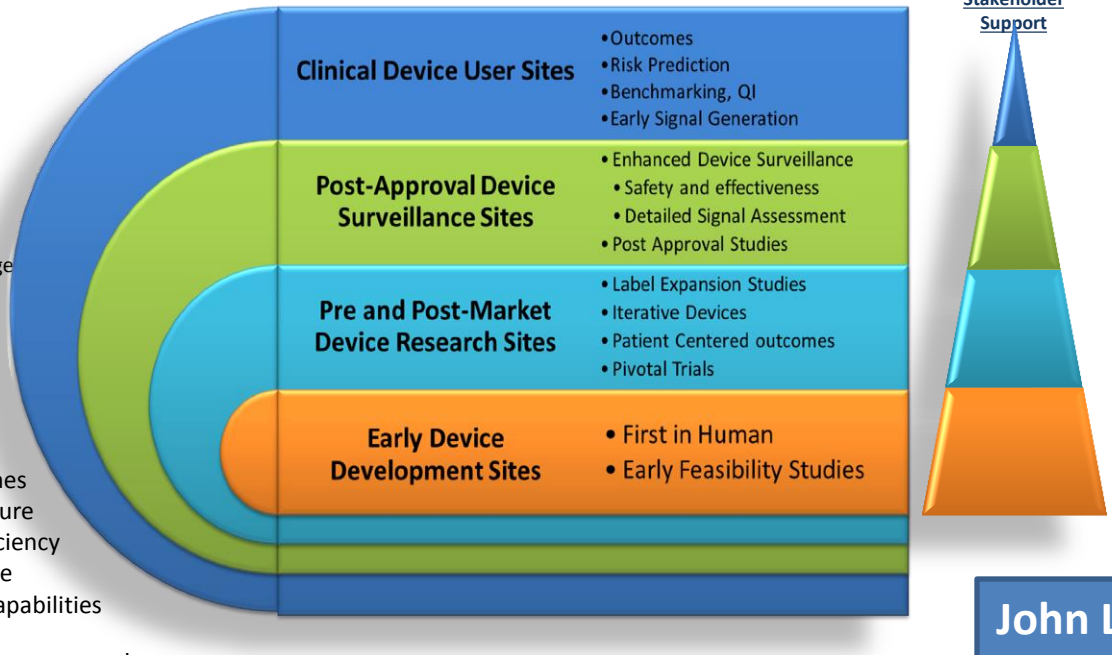
STS National Database
- STS ACS
- STS CHD
- STS Thoracic Surge

Joint STS and ACC
- TVT Aortic
- TVT Mitral
- TVT Tricuspid

### Tier Criteria

- Case mix
- Volume and Outcomes
- Research Infrastructure
- IRB/Contracting Efficiency
- Clinical Infrastructure
- Dataset Needs vs. Capabilities

### Tiered Site Certification*




*Sites apply for certification level desired for each database.
Free to use certification level for each database in marketing.

**John Laschinger**
**FDA CDRH**