
VIZIENT CONNECTIONS SUMMIT
imagine
THE POSSIBILITIES
vizient.

Penn Medicine
Penn Presbyterian Medical Center

Stanford MEDICINE
Health Care

imagine
THE POSSIBILITIES

From Procedure to Progress: Coordinated Care That Reduces Setbacks

Mary Malitas, CRNP, PhD, *Nurse Practitioner*
Lisa Mangino-Blanchard, CRNP, *Nurse Practitioner*
Penn Medicine

Alex Lyapin, DNP, RN, NP-C, Manager of Advanced Practice, Cardiovascular Health
Falin Schaefer, DNP, RN, FNP-C, Nurse Practitioner, Cardiovascular Health
Nathalie Cheng, MS, CQA, LSSBB, Senior Quality Consultant, Cardiovascular Health
Stanford Health Care

Disclosure of Financial Relationships

Vizient, Inc., Jointly Accredited for Interprofessional Continuing Education, defines companies to be ineligible as those whose primary business is producing, marketing, selling, re-selling or distributing healthcare products used by or on patients.

An individual is considered to have a relevant financial relationship if the educational content an individual can control is related to the business lines or products of the ineligible company.

No one in a position to control the content of this educational activity have relevant financial relationships with ineligible companies.

Learning Objectives

- Discuss multidisciplinary approaches that improve post-procedure progression and reduce inpatient length of stay.
- Identify care standardization strategies that lower readmission risk for TAVR patients.

Penn Medicine
Penn Presbyterian Medical Center

Stanford MEDICINE
Health Care

imagine
THE POSSIBILITIES

From Procedure to Progress: Coordinated Care That Reduces Setbacks

Mary Malitas, CRNP, PhD, *Nurse Practitioner*
Lisa Mangino-Blanchard, CRNP, *Nurse Practitioner*
Penn Medicine

Alex Lyapin, DNP, RN, NP-C, Manager of Advanced Practice, Cardiovascular Health
Falin Schaefer, DNP, RN, FNP-C, Nurse Practitioner, Cardiovascular Health
Nathalie Cheng, MS, CQA, LSSBB, Senior Quality Consultant, Cardiovascular Health
Stanford Health Care

Penn Medicine
Penn Presbyterian Medical Center

imagine
THE POSSIBILITIES

Reduction in Transcatheter Aortic Valve Replacement (TAVR) Length of Stay

Problem

- Transcatheter Aortic Valve Replacement (TAVR) post operative length of stay was a formalized two-day discharge pathway and the standard of care for AM admission TAVR patients with femoral approach.

- In FY22 according to TVT Registry data, 82% of AM admission, transfemoral patients were discharged by post operative day two at Penn Presbyterian Medical Center.

- After a literature review and multidisciplinary rounding (MDR) providers concluded TAVR patients were remaining hospitalized for the second post operative day without the need for significant medical interventions.

The team understood the need to challenge the status quo and reevaluate the current state.

Quality Improvement Methodology: PDSA Cycle

imagine THE POSSIBILITIES

Plan

(12/2022-3/2023)

- Initiate workgroup and gather baseline data
- Develop discharge pilot
- Educate patients and family
- Develop Inclusion and Exclusion Criteria
- Communicate Weekly to Identify Preoperatively
- Optimize surgical scheduling and discharge testing

Do

(3/2023)

Go-live of 1-Day Post-Operative Discharge TAVR Pathway

Study

(4/2023-7/2023)

- Understand data and look to broaden inclusion criteria
- July 2023 Patients with Coronary Artery Disease and first-degree atrioventricular (AV) block patients added to the inclusion criteria
- Address discharge barriers in real time

Act

(7/2023-1/2024)

- Implement new inclusion criteria
- Revise MCOT processes through multidisciplinary team

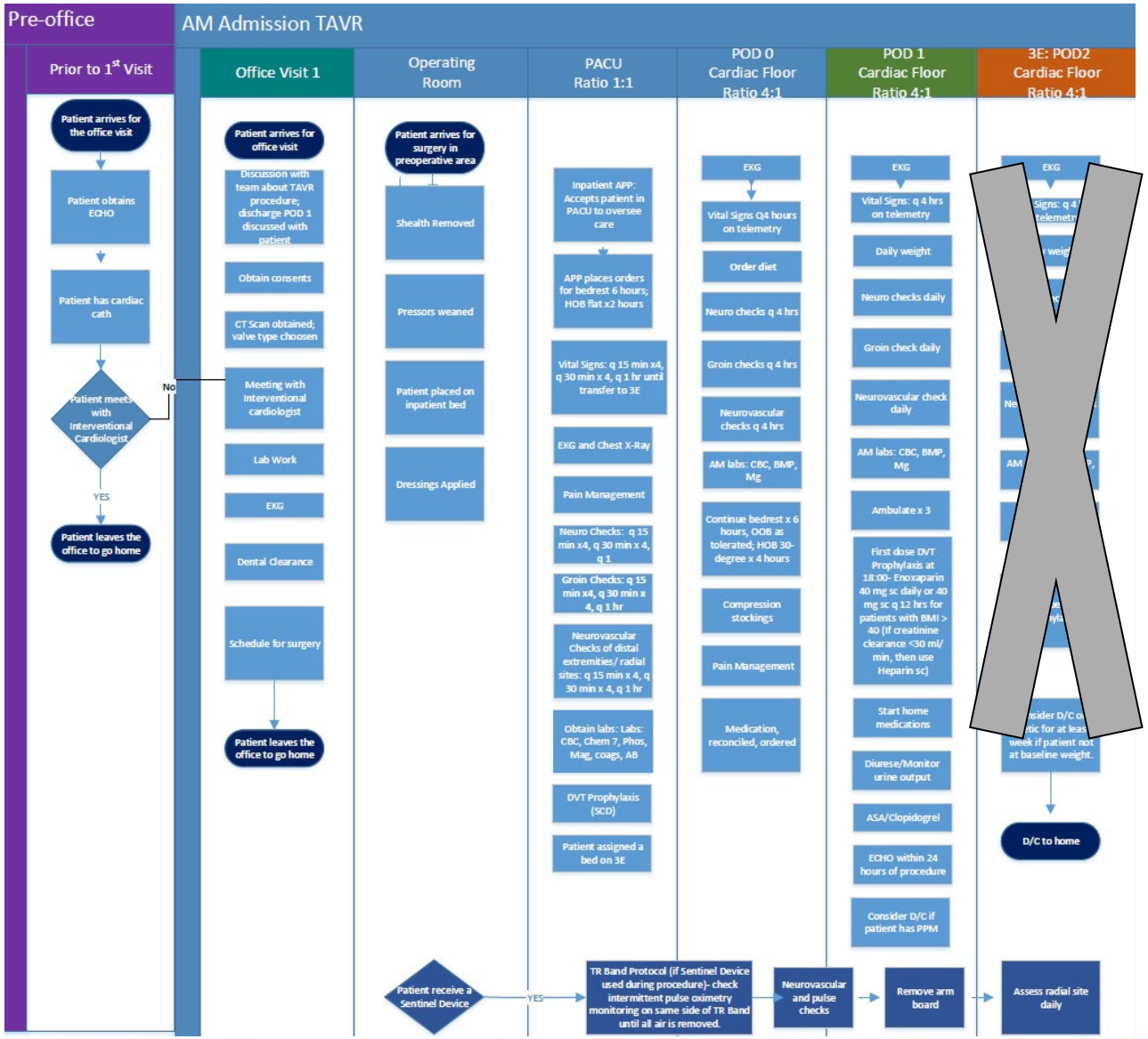
Sustain

(1/2024-1/2025)

- Continue to understand the data
- Discuss cases at monthly workgroup
- Expand methodology to other length of stay projects

Penn Medicine
Penn Presbyterian Medical Center

1-Day Post-Operative Discharge Pathway



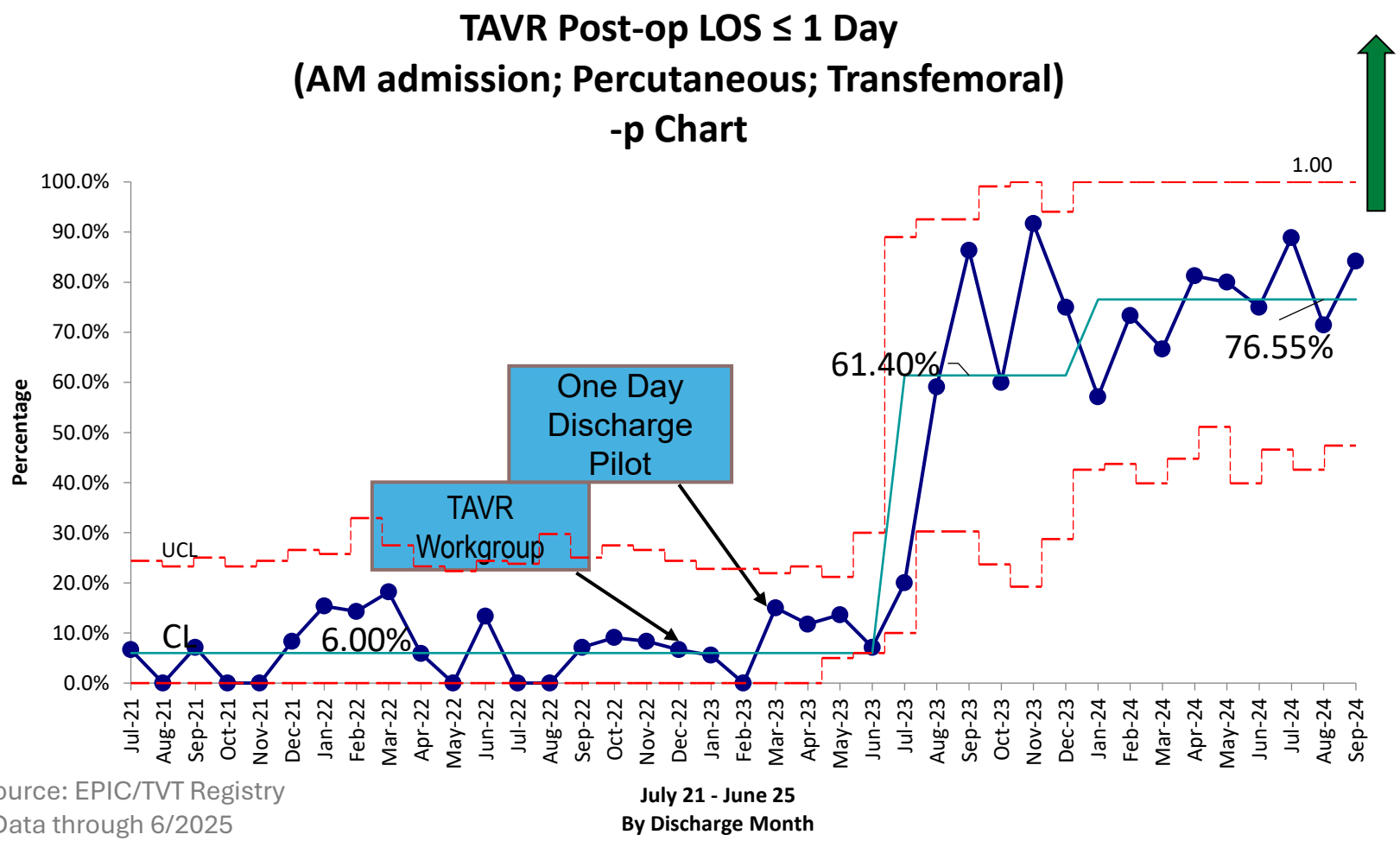
Pilot Exclusion Criteria:

- Inpatient prior to surgery
- History of blocks except 1o AVB
- Intraoperative complications
- Difficult access excluded by discretion at TAVR meeting
- History of TEVAR/EVR or recent pseudoaneurysm

Penn Medicine
Penn Presbyterian Medical Center

vizient.

TAVR Post-Operative Length of Stay



Source: EPIC/TVT Registry
*Data through 6/2025

Fiscal Year: Quarter	Number of patients with Post-op LOS ≤ 1 day	Total TAVR patients per quarter	Percentage of patients by quarter
2023 Q1	1	39	3%
2023 Q2	3	39	8%
2023 Q3	4	56	7%
2023 Q4	6	54	11%
2024 Q1	35	59	59%
2024 Q2	35	47	74%
2024 Q3	27	41	66%
2024 Q4	42	53	79%
2025 Q1	42	51	82%
2025 Q2	37	47	79%
2025 Q3	43	58	74%
2025 Q4	28	37	76%

*Excludes inpatients and alternative access

298 Patients discharged on Post-op Day 1 from March 2023- June 2025

Penn Medicine
Penn Presbyterian Medical Center

vizient.

Lessons Learned

Multidisciplinary Collaboration
-Involve outpatient and inpatient providers across the continuum

Communication is Key
-Address patient and provider apprehensions early and often

Lower Acuity Inclusion Criteria
-Inclusion criteria broadened after real-time data discussions

-Coronary Artery Disease patients included after go-live

Understand the Process
-Address the bottlenecks; duplicative work; and waste

-Mobile Cardiac Outpatient Telemetry process redesign

Key Takeaways

Challenge the Status Quo

- Understand the current data and opportunity for improvement
- What is best for the patient and family?
- Are we treating the provider rather than patient needs with additional days of hospitalization?
- What are we doing well that we can do better?

Flip the Script

- Begin discharge planning prior to hospitalization
- Add a clear discharge plan to the procedure discharge instructions

Change Culture

- Discuss the process with the frontline staff during and after implementation

Constant Reevaluation

- Initiate a reoccurring multidisciplinary meeting to understand the data; clinical processes; stakeholder involvement in your specific patient population

Penn Medicine
Penn Presbyterian Medical Center

imagine
THE POSSIBILITIES

Acknowledgements

Wilson Szeto, MD

Robert Li, MD

Robert Fenning, MD

Chase Brown, MD

Michael Ibrahim, MD

Paula Gabriel, RN, MSN, CCRN-CMC

Leah Cosgrove, BSN, RN

Taylor Hedgeland, MBA, RN, CNOR

Courtney Moylan PA-C

Ryan Hrapczynski, BSN, RN, CEN

Patty Baroni, RN, MSN, NE-BC

Amy Gallagher CRNP

Rose Pinckney, MHA, CSSBG

Pinki Patel, DNP, MSN, CRNP

Questions?

Penn Medicine
Penn Presbyterian Medical Center

imagine
THE POSSIBILITIES

Contact:

Mary Malitas, Mary.Mailitas@pennmedicine.upenn.edu

Lisa Mangino-Blanchard, Lisa.Mangino-Blanchard@pennmedicine.upenn.edu

Stanford MEDICINE
Health Care

imagine
THE POSSIBILITIES

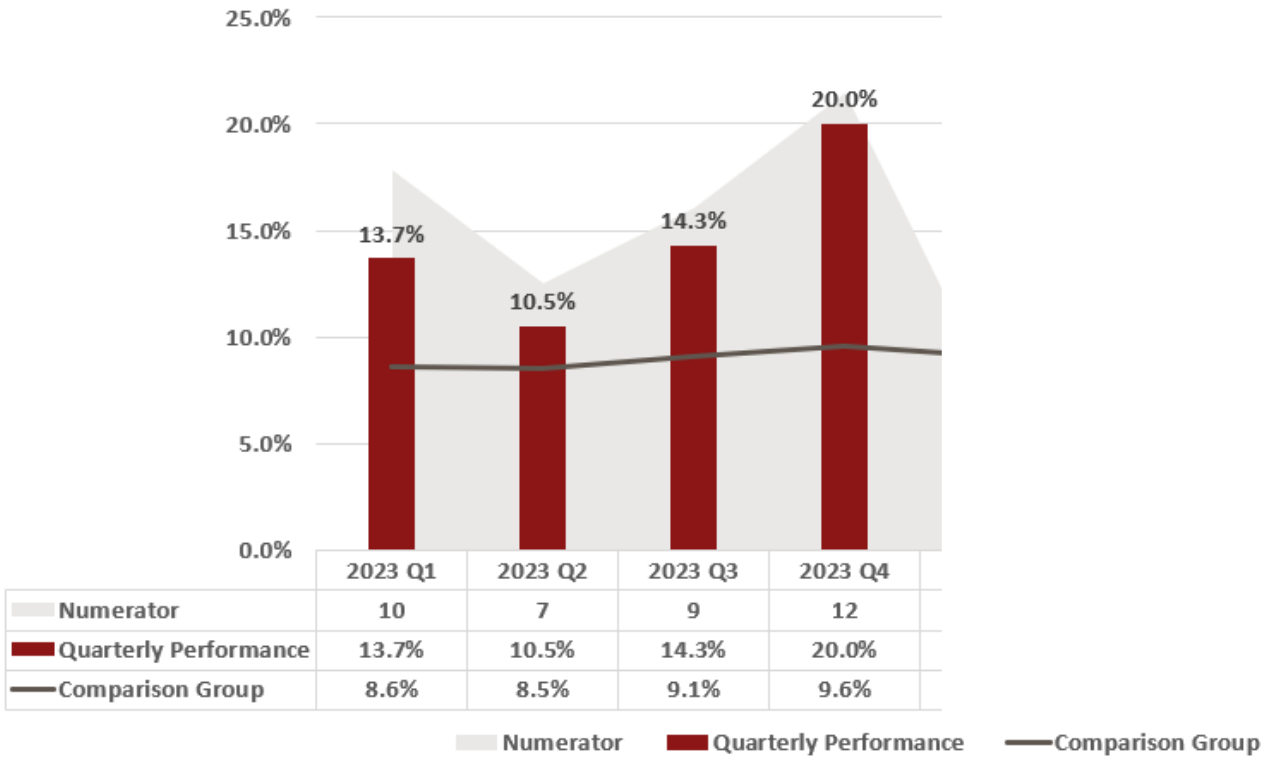
Team Up for TAVR: Reducing Readmissions Together!

Project Background

- Historically higher-than-average 30-day readmission rates
- Insufficient and inconsistent Structural Cardiology support post TAVR
- Increase continuity of care
- Decrease 30-day readmissions

Baseline Readmission Rate

30-Day Readmission

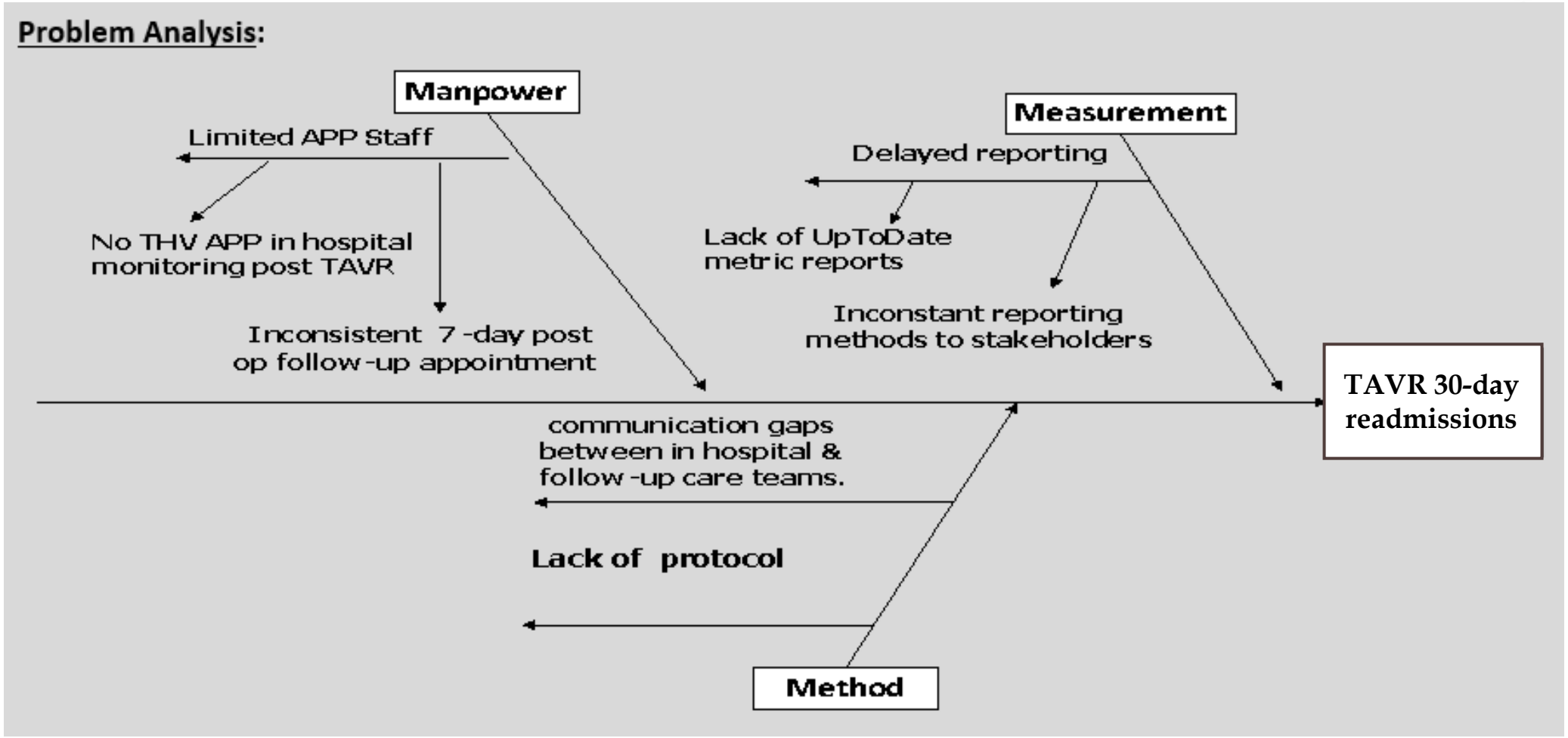


Data courtesy of SHC CVH Registries and Accreditation team

Problem SMART Goal

Implement Cardiology provider-driven protocols and a standardized TAVR care pathway to reduce R4Q 30-day readmission rate to be at or below 8.5% by the end of FY2025.

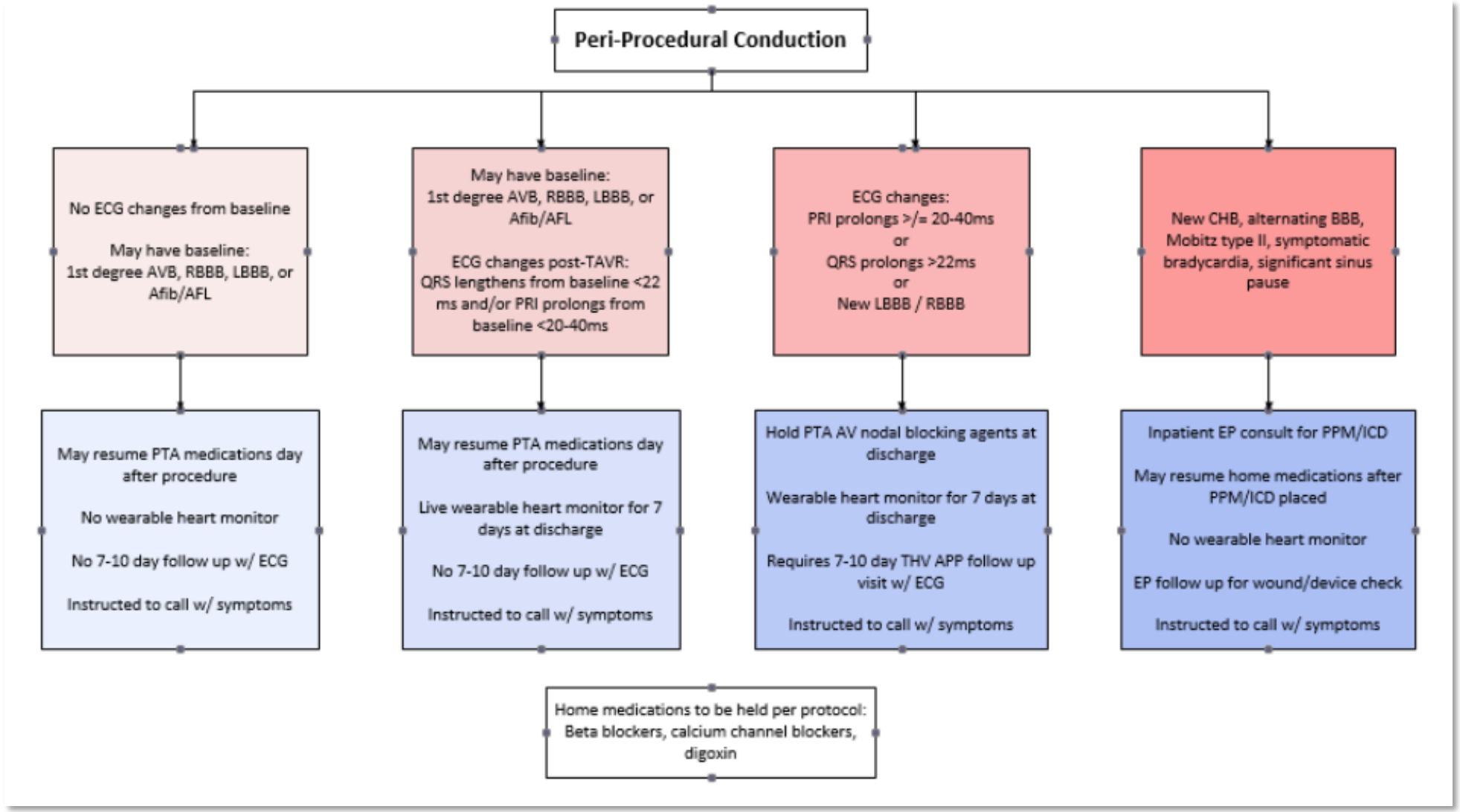
Problem Analysis



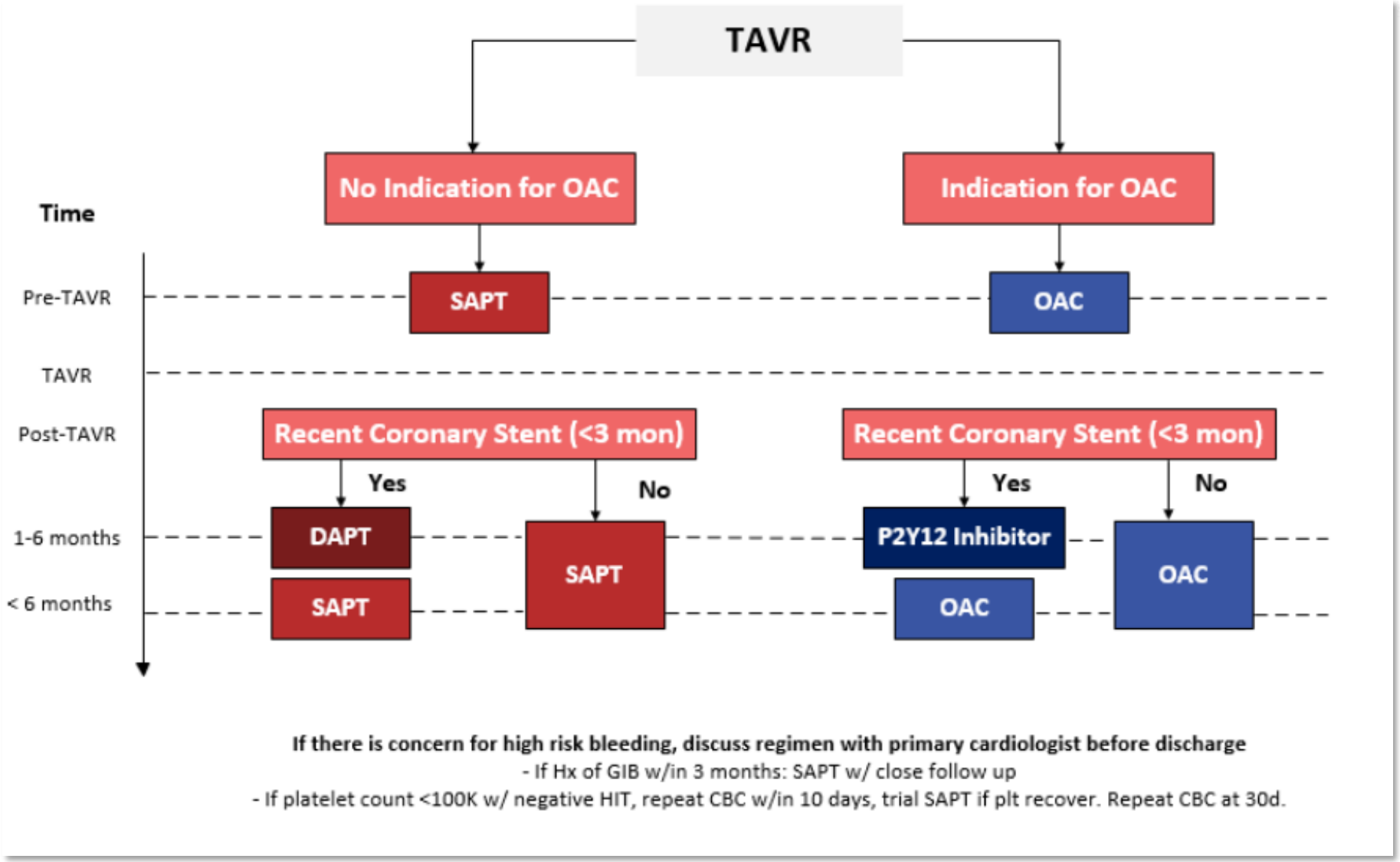
Proposed Interventions

- Increase Cardiology support
  - Structural Cardiology Advanced Practice Provider rounds while inpatient
  - Improved communication with clinic staff for post-discharge needs
- Standardize clinic approach to medication management
  - Conduction management
  - Antiplatelet and anticoagulation management
- Develop a care pathway for consistent care delivery
  - Standard approach across nursing units and care teams

SHC Conduction pathway



SHC Antiplatelet and Oral Anticoagulant Pathway



If there is concern for high risk bleeding, discuss regimen with primary cardiologist before discharge

- If Hx of GIB w/in 3 months: SAPT w/ close follow up
- If platelet count <100K w/ negative HIT, repeat CBC w/in 10 days, trial SAPT if plt recover. Repeat CBC at 30d.

TAVR Inpatient Care Pathway

Stanford MEDICINE Health Care

Inpatient Transcatheter Aortic Valve Replacement (TAVR) Pathway

Goal: Standardize pathway and incorporate structural cardiology into current TAVR post-op workflow

Target Post-Op LOS = 1 day

CT Surgery

- ***Admit to AAU** on Cardiac Monitor*
- ***Order Structural Cardiology Consult (#3661 orderset)***

Structural Cardiology

- ***See patient morning of POD1***

- ***CARDIOVASCULAR:***
  - Antiplatelet/anticoagulation plan: ASA +/- Clopidogrel
  - EKG
  - Discuss with structural cardiology: EKG assessment with plan to resume or hold nodal blocking agents
  - Structural Cardiology: Interpret postop ECHO, Assess distal perfusion

- ***NEURO:*** Postoperative Pain: Acetaminophen PRN. Avoid/minimize us of narcotics
- ***PULMONARY:*** No CXR. Wean supplemental O2 to OFF.
- ***GI:*** Resume regular diet
- ***GU:*** Follow standard recommendations/protocols for foley removal if present
- ***ENDO:*** Resume diabetic meds
- ***DISPO:*** PT/OT evaluation

- ***GI/GU/ENDO:*** Make recommendations on case by case basis
- ***Finalize plan of care with IC MDs***
- ***DISPO:***
  - Document cardiology care/ discharge recommendations (for patient to have at discharge & home)
  - Schedule follow-up appt
  - Communicate with Structural Heart Outpatient liaisons regarding early clinic follow-up as needed

Nursing (PACU/J5/J6/J7/M7)

- ***Monitor for complications:***
  - *Stroke*
  - Cardiac Rhythm: watch for arrhythmia, bradycardia or heart block, AFib, conduction disorders
  - Diminished or change in heart tones is a red flag of possible problems such as cardiac tamponade or pericardial effusion
  - AKI/Urinary Output: at risk for contrast induced nephropathy due to contrast during procedure, age and possible pre-existing renal insufficiency
  - Retroperitoneal Bleed (watch for back pain, flank bruising, tachycardia, refractory hypotension (does not respond to volume or pressors, drop in HCT)
- ***RN Assessment:***
  - Heart tones on admission to IICU, then Q4hrs
  - VS, Neuro assessment, CMS to LE, Groin checks, Pulse checks: Q15x4, Q30x2, Qhr x4
  - Monitor groin site for s/s of hematoma as well as bleeding
  - If radial access, avoid excessive flexion or extension of the wrist. Monitor vitals signs and TR band Q15x4, Q30x2, and 1hr post TR band removal. Document air removal volume.
- ***Diet:*** *Resume diet as tolerated (heart healthy diet)*
- ***Imaging*** *- ECHO, Chest X-Ray (if ordered), etc*
- ***ECG***
- ***Monitor for 14F R sheath*** *– for oozing*
- ***If foley present,*** *normal voiding frequency after procedure*
- ***O2:*** O2 per N/C maintain sat >92%
  - Discontinue oximetry when sats >92% on room air > 4 hrs
- ***DISPO:*** Groin management: S/S of bleeding, hematoma, when to call MD (groin issues, signs of infection, increasing signs of heart failure)

- ***BEDREST:*** Flat in bed for 6hrs post hemostasis
- ***ACTIVITY:*** Ambulate as soon as 6hr bedrest is completed
- ***LABS:*** Daily BMP, Mg, CBC w/ Diff. Monitor and add orders if concern for hemolysis/leak
- ***WOUND:*** Standard post procedure groin management. Evaluate for complications.
- ***MEDS:*** Restart home meds (HF GDMT), possible dual anti-platelet therapy vs anticoagulation if new onset AFib
- ***TAVR ECHO (TTE):*** Order morning of POD1

ECHO

- ***TAVR days*** -Tues/Fri, sometimes Wed (lab opens 7am Mon-Sun)
- ***Receive order for ECHO***
- ***Completion of TAVR ECHOs*** *prior to discharge*
- ***Perform baseline TAVR ECHO*** (Outpatient or inpatient, 90min)
- ***Limited ECHO*** in Cath lab on day of TAVR (after valve is deployed)
- ***DISPO:***
  - In the AM, Full ECHO performed (60 0r 90min depending on if patient is part of a trial)
  - Depending on workload, this ECHO can be done in the ECHO lab or a portable ECHO is used
  - Read ECHO the same day of the exam (Make note for doctor to prioritize reads)
  - Complete discharge ECHO by the following day after TAVR
- ***Post-Discharge ECHOs:***
  - Patient will come back at 30 days for outpatient ECHO, AAP visit
  - Patient will also return for ECHOs at 6 months (research trial) and 1 year (research and commercial trials)

Cardiac Rehab

- ***Transcatheter Heart Value (THV) nurse coordinators send notification of TAVR patients to Cardiac Rehab (CR)***
- ***Add to CR list***
- ***PHASE I CR:*** Have up to 1hr cardiac rehab session with patient and family post procedure:
  - Provide information about what is important, precautions, potential complications, and options for Phase II CR post discharge
  - Pt gives preferred location of outpatient (Phase II) CR facility
- ***Prior to DISPO:***
  - THV Nurse coordinators help patients make follow-up provider appointments
  - External Referral auto signed in EHR Order set post procedure
  - CR team processes referral order to pt's choice of outpatient (Phase II) CR facility.
  - SHC CR team will send referral note to Phase II CR facility to f/u with the patient to get them onboard and scheduled

Structural Heart Outpatient Team Liaisons

Direct (Shared) Line: 650-725-2687

PT/OT Consult

- ***See patient POD1*** if consult order is placed at least 24hrs in advance
- ***Perform mobility and ADL assessment***
- ***DISPO:*** Provide safe discharge recommendations after evaluation

Timeline for Go-Live

#	Task Name	Responsible	Start	Finish	Duration
1	Cardiology APP consult note	Alex Lyapin, Falin Schaefer, Martina Speight, May Koes	9/2023	10/2023	1 months
2	Medication management protocol development	Falin Schaefer, Martina Speight, May Koes	9/2023	11/2023	2 months
3	Care pathway development	Alex Lyapin, Nathalie Cheng	11/2023	2/2024	3 months
4	Cardiology APP rounds launch	Alex Lyapin, Falin Schaefer, Martina Speight	1/2024	ongoing	N/A
5	Care pathway launch	Alex Lyapin, Nathalie Cheng	3/2024	ongoing	N/A

Multidisciplinary approach: It's a Team Effort

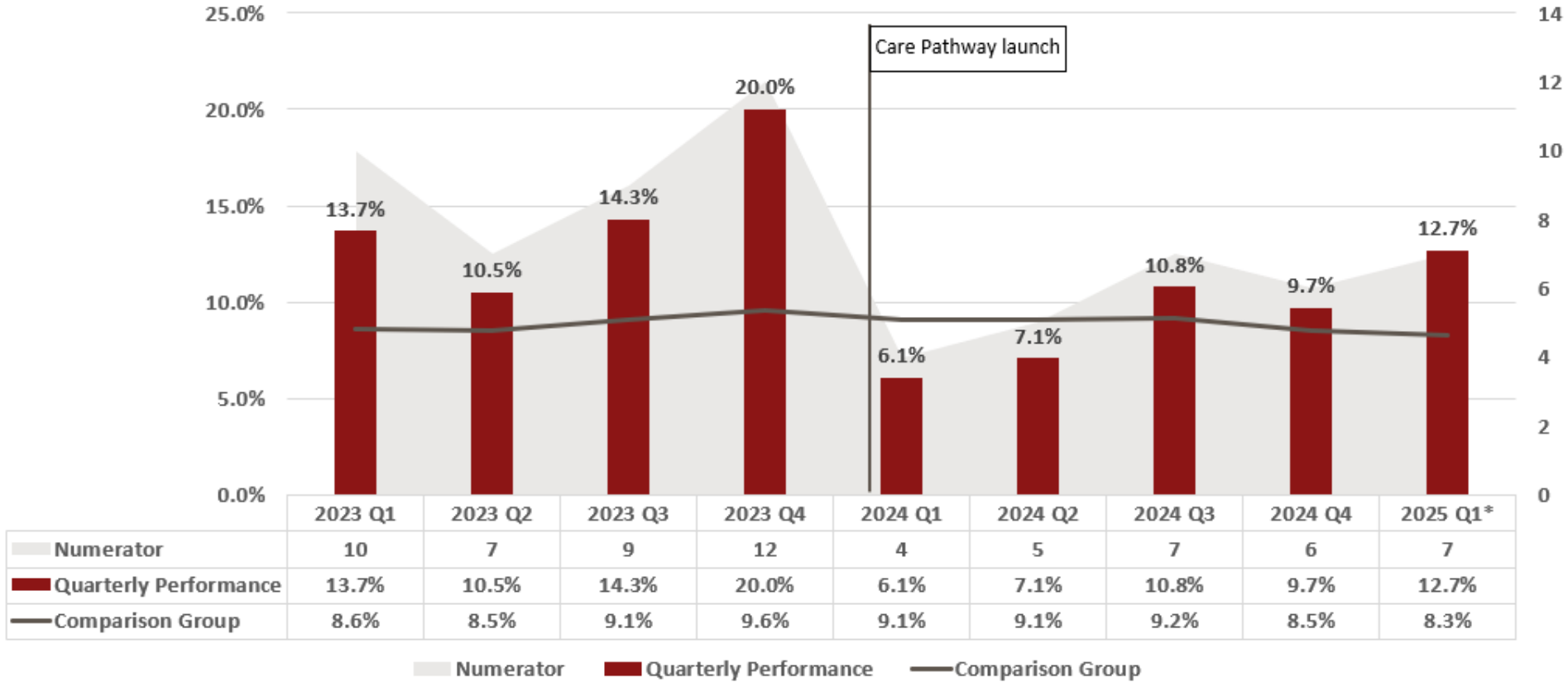
- Cardiologists
- Cardiology APPs
- Cardiology RNs
- CT Surgeons
- CT Surgery APPs
- Quality team
- Liaison team
- Operational leaders
- Registries and Accreditation
- Nursing units
- Echo Lab
- PT/OT
- PACU
- Cardiac rehab

Project goals

1. Standardize post-TAVR patient care by introducing new care pathway
2. Decrease 30-day readmissions post-TAVR procedure 
3. Introduce Cardiology APP rounds post-TAVR
4. Develop evidence-based post-TAVR medication management guidelines

Post Intervention Results: Readmission Rates

30-Day Readmission



	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1*
Numerator	10	7	9	12	4	5	7	6	7
Quarterly Performance	13.7%	10.5%	14.3%	20.0%	6.1%	7.1%	10.8%	9.7%	12.7%
Comparison Group	8.6%	8.5%	9.1%	9.6%	9.1%	9.1%	9.2%	8.5%	8.3%

Data courtesy of SHC CVH Registries and Accreditation team

* Data is still preliminary

Lessons Learned

- Analyze root cause of the problem
  - Start with assessment and alignment across team
- Consistent multidisciplinary communication is key
  - Involve main players early to ensure project moves forward
- Evaluate resources
  - Utilize the resources that are already available

Key Takeaways

- Evaluate your processes
  - Use outcomes data to guide your decisions
  - Ensure care decisions are based on patient’s individual risk factors
- Collaborate within the larger Heart Team
  - Identify interventions with largest potential for improvement
  - Learn about other teams' challenges
  - Educate front line staff
- Review trends and be ready to pivot
  - Monitor your outcomes and balancing measures
  - Adjust course as needed

Acknowledgements

Cody Parsons, PharmD
Martina Speight, MS
Amanda Deeter, BSN
Margaret Koes, MSN
Richard Quitevis, MS
Kirsten Thomas, BSN

References

- Capodanno D, Collet J-P, Dangas G, et al. Antithrombotic therapy after transcatheter aortic valve replacement. *JACC: Cardiovascular Interventions*. 2021;4(15):1688-1703.
- Kolte D, Khera S, Sardar MR, et al. Thirty-Day Readmissions After Transcatheter Aortic Valve Replacement in the United States: Insights From the Nationwide Readmissions Database. Circ Cardiovasc Interv. 2017;10(1):e004472. doi:10.1161/CIRCINTERVENTIONS.116.004472
- Lilly SM, Deshmukh AJ, Epstein AE, Ricciardi MJ. 2020 ACC Expert Consensus Decision Pathway on Management of Conduction Disturbances in Patients Undergoing Transcatheter Aortic Valve Replacement: A Report of the American College of Cardiology Solution Set Oversight Committee. *JACC Journals*. 2020;76(20):2391-2411.

Questions?

Contact:

Mary Malitas, Mary.Mailitas@pennmedicine.upenn.edu

Lisa Mangino-Blanchard, Lisa.Mangino-Blanchard@pennmedicine.upenn.edu

Alexey Lyapin, ALyapin@stanfordhealthcare.org

Falin Schaefer, FSchaefer@stanfordhealthcare.org

Nathalie Cheng, NCheng@stanfordhealthcare.org