University of California San Francisco

empath health
UNDERSTAND. TRANSFORM.

A Comprehensive Clinical Pathway for Aortic Stenosis Reduces Wait Times to TAVR

Elizabeth M. Perpetua, DNP, ACNP-BC, ARNP, FACC; Rochelle Szuba, PhD, RN; Dianna Ramsey, BSN, RN; Sammy Elmariah, MD, FACC, FSCAI

Acknowledgements: Jena Barrios, BSN, RN; Dubravka Juric, BS; Erica Galarza; Tiffany Chu, BS; Crystal Allen, MBA; Amanda Schnell-Heringer, MSN; Brenda Mar, MSN; Kirsten Tolstrup, MD: Marko Boskovski, MD

Background

Aortic stenosis (AS) affects 2.5 million people in the U.S..[1,2] Left untreated, symptomatic severe AS has a mortality as high as 50% at 1 to 2 years.[3,4] Due to low rates of referral and treatment, and high mortality, morbidity, and costs awaiting therapy, professional societies propose a system of care for VHD.[5-10]

Comprehensive care for VHD is an important focus for hospitals. In 2023, UCSF partnered with Empath Health Services LLC to implement a comprehensive clinical care pathway to improve evaluation and treatment rates for AS and reduce wait times to transcatheter aortic valve replacement (TAVR). These efforts aligned with Target AS, an American Heart Association implementation science initiative.[11] Implementing a comprehensive clinical pathway requires people: clinical, quality, administrative, informatics, finance, and other sets of teams.[12]

Objectives

A comprehensive clinical pathway was initiated with Empath Health Services LLC at UCSF Heart and Vascular. The initial target timeline from referral order to TAVR was 60 days. Stretch target timeline was 30 days.

Primary Outcome: Wait Times

- Assess and reduce wait times from referral order to TAVR.
- As a new Target AS site, assess upstream wait times (detection with echocardiography to diagnosis) prior to referral order.

Process Metrics: Staff and Staff Time

- Assess number of clinical staff and staff time to support this clinical pathway.
- Assess number of quality/registry staff and staff time to activate and support UCSF as a Target AS site.

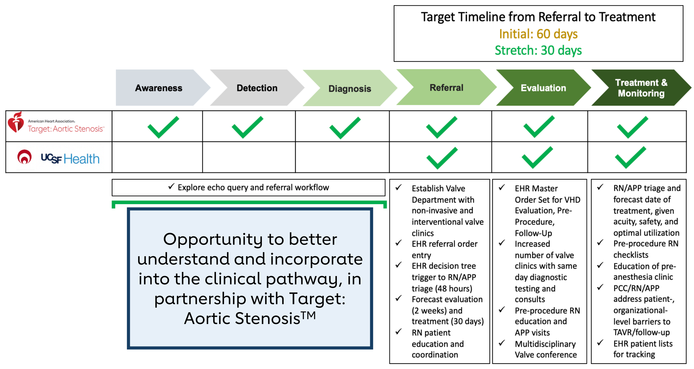

Figure 1. Empath UCSF Comprehensive Clinical Pathway and Timeline depicted within the Target AS Timeline. EHR, electronic health record; RN, registered nurse; APP, advanced practice provider.

Methods

Implementation of a comprehensive clinical pathway began in April 2023 (Figure 1). There were 2 patient care coordinators (PCCs) and no clinically licensed staff designated to the program. Over a 9-month period, Empath team (1 consulting nurse practitioner and 1 RN) trained the established and newly recruited UCSF staff on VHD clinical pathways. The primary outcomes of wait times, number of on-site visits, and number of encounters from referral order to TAVR were assessed using the electronic health record (EHR) pre- and post-implementation. Upon initiation of UCSF as a Target AS site, wait times from echo diagnosis to treatment were assessed by the quality team using the EHR and the Target AS database. The number of clinical and quality staff to implement the clinical pathway were assessed.

Results

From Q1 2023 to Q1 2024, 129 patients underwent TAVR. Mean wait time from EHR referral order to treatment in Q1 2023 was 68 days with 6 to 7 encounters which were not optimally coordinated to minimize the number of in-person visits. In Q1 2024, the mean wait time was 44 days with 3 to 4 encounters coordinated in 2 in-person visits (Figures 2 and 3). During this time, UCSF hired 1 RN, 1 practice supervisor, and 1 PCC.
A senior quality director led the efforts to activate UCSF as a Target AS site. A total of 40 patients were randomly selected for this analysis (Figure 4). UCSF met the Target AS goal of 90 days from echo diagnosis to treatment (Table 1). The work endeavored upon by Empath and UCSF teams to implement this clinical pathway and initiate Target AS included extensive discussion and collaboration with administrative, informatics, finance, and other interdisciplinary/departmental partners.

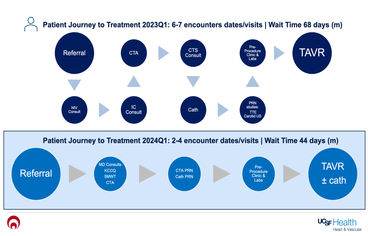

Figure 2. Patient Journey to TAVR. Pre- and Post-Implementation of Empath UCSF Comprehensive Clinical Pathway. CTA, computerized tomography angiogram; IC, interventional cardiology; CTS, cardiothoracic surgery; cath, cardiac catheterization; PRN, as needed; TTE, transthoracic echocardiogram; MD, medical doctor; KCCQ, Kansas City Cardiomyopathy Questionnaire; SMWT, 5 meter walk test.

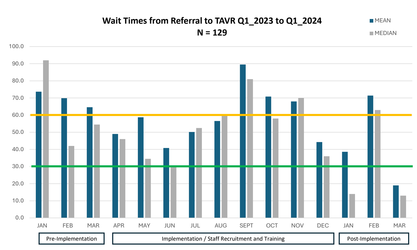

Figure 3. Wait Times from Referral to Treatment Q1 2023 to Q1 2024. Mean and median wait times, pre- and post-Implementation of Empath UCSF Comprehensive Clinical Pathway. X-axis, number of days from referral order in EHR to TAVR.

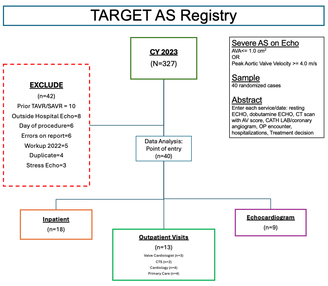

Figure 4. Target AS Registry Analysis Flow Diagram. 327 patients met criteria. 42 patients were excluded. Per Target AS Registry initiative, 40 patients randomly selected for analysis and achievement of the Target AS wait time of 90 days from echo diagnosis to treatment with surgical aortic valve replacement (SAVR), TAVR, or continued monitoring vs. no treatment.

Point of Entry	Average Time to Echo or Symptom Documentation (d)	Average Time of AS STAGE 01 Diagnosis to TAVR/SAVR (d)	Continue to Follow (n)	Discontinued (n)
Inpatient (n=18)	1.7 d	TAVR (n=5) 30.8 d	4	9
Outpatient (n=13)				
Valve Cardiologist	8 d	TAVR (n=1) 47 d	2	0
Cardiac Surgery	50.5 d	SAVR (n=1) 2 d TAVR (n=1) 32 d	0	0
General Cardiologist	26.5 d	TAVR (n=1) 68 d	3	0
Primary Care	22.2 d	SAVR (n=1) 81 d	3	0
Echo (n=9)	22 d	TAVR (n=3) 32 d	5	1

Table 1. Target AS Registry Cohort Analysis. The point of entry and timeline to treatment vs. no treatment was further analyzed for the 40 patients randomly selected to the Target AS Cohort. The Target AS benchmark of 90 days from echocardiogram detection to treatment/follow-up was met. The point of entry was further reviewed to understand the processes of referral and identify opportunities to incorporate the upstream awareness to diagnosis into the Empath UCSF Comprehensive Clinical Pathway.

Conclusions

A comprehensive clinical pathway for AS reduces wait times to TAVR. Limitations to be addressed in continuous quality improvement efforts include the lack of automated reports for querying the total number of referrals for AS and their rates of treatment, continued monitoring, or no treatment. Participation in the Target AS initiative expands the optimization of the comprehensive care pathway to include echocardiographic detection to diagnosis, and monitors treatment rates for AS, including SAVR, in order to improve quality and outcomes. Due to high mortality, morbidity, costs, and capacity constraints, clinically driven, dynamic assessment and intervention of this patient population is critical and requires a "high touch, high tech" approach. Designated leadership and investment in resources are needed to implement comprehensive clinical pathways for VHD.

References

1. Nkomo VT, et al. Burden of valvular heart diseases: a population-based study. Lancet. 2006 Sep 16;368(9540):1005-11. doi: 10.1016/S0140-6736(06)69208-8. PMID: 16980116.
2. Osnabrugge RL, et al. Aortic stenosis in the elderly: disease prevalence and number of candidates for transcatheter aortic valve replacement: a meta-analysis and modeling study. J Am Coll Cardiol. 2013 Sep 10;62(11):1002-12. doi: 10.1016/j.jacc.2013.05.015. Epub 2013 May 30. PMID: 23727214.
3. Otto CM. Timing of aortic valve surgery. Heart. 2000 Aug;84(2):211-8. doi: 10.1136/heart.84.2.211. PMID: 10906267; PMCID: PMC1760905.
4. Leon MB, PARTNER Trial Investigators. Transcatheter aortic-valve implantation for aortic stenosis in patients who cannot undergo surgery. N Engl J Med. 2010 Oct 21;363(17):1597-607. doi: 10.1056/NEJMoa1008232. Epub 2010 Sep 22. PMID: 20961243.
5. Malaisrie SC, et al. Mortality while waiting for aortic valve replacement. Ann Thorac Surg. 2014 Nov;98(5):1564-70; discussion 1570-1. doi: 10.1016/j.athoracsur.2014.06.040. Epub 2014 Sep 18. PMID: 25240781 Malaisrie et al, 2014, Ann Thor Surg.
6. Abbasom D et al. Increasing Wait-Time Mortality for Severe Aortic Stenosis: A Population-Level Study of the Transition in Practice From Surgical Aortic Valve Replacement to Transcatheter Aortic Valve Replacement. Circ Cardiovasc Interv. 2020 Nov;13(11):e009297. doi: 10.1161/CIRCINTERVENTIONS.120.009297. Epub 2020 Nov 10. PMID: 33167700.
7. Li SX et al. Trends in Utilization of Aortic Valve Replacement for Severe Aortic Stenosis. J Am Coll Cardiol. 2022 Mar 8;79(9):864-877. doi: 10.1016/j.jacc.2021.11.060. PMID: 35241220.
8. Sethi A, et al. The cost of waiting for a TAVR in Medicare beneficiaries with severe aortic stenosis. Struct Heart. 2024.
9. Nishimura RA, et al. 2019 AATS/ACC/ASE/SCAI/STS Expert Consensus Systems of Care Document: A Proposal to Optimize Care for Patients With Valvular Heart Disease: A Joint Report of the American Association for Thoracic Surgery, American College of Cardiology, American Society of Echocardiography, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2019 May 28;73(20):2609-2635. doi: 10.1016/j.jacc.2018.10.007. Epub 2019 Apr 19. PMID: 31010779.
10. Otto CM, et al. 2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2021 Feb 2;77(4):e25-e197. doi: 10.1016/j.jacc.2020.11.018. Epub 2020 Dec 17. Erratum in: J Am Coll Cardiol. 2021 Feb 2;77(4):509. doi: 10.1016/j.jacc.2020.12.040. Erratum in: J Am Coll Cardiol. 2021 Mar 9;77(9):1275. doi: 10.1016/j.jacc.2021.02.007. Erratum in: J Am Coll Cardiol. 2023 Aug 29;82(9):969. doi: 10.1016/j.jacc.2023.07.010. PMID: 33342586.
11. Lindman BR, et al. Target Aortic Stenosis: A National Initiative to Improve Quality of Care and Outcomes for Patients With Aortic Stenosis. Circ Cardiovasc Qual Outcomes. 2023 Jun;16(6):e009712. doi: 10.1161/CIRCOUTCOMES.122.009712. Epub 2023 Jun 20. PMID: 37339188.
12. Perpetua EM, et al. Best Practice Recommendations for Optimizing Care in Structural Heart Programs: Planning Efficient and Resource Leveraging Systems (PEARLS). Struct Heart. 2021 Mar-Apr;5(2):168-179. doi: 10.1080/24748706.2021.1877858. Epub 2022 Mar 21. PMID: 35378800; PMCID: PMC8968322.