SVS | VQI

In collaboration with NCDR®

2023 Quality Abstract Guide

2023 Quality Abstracts Guide

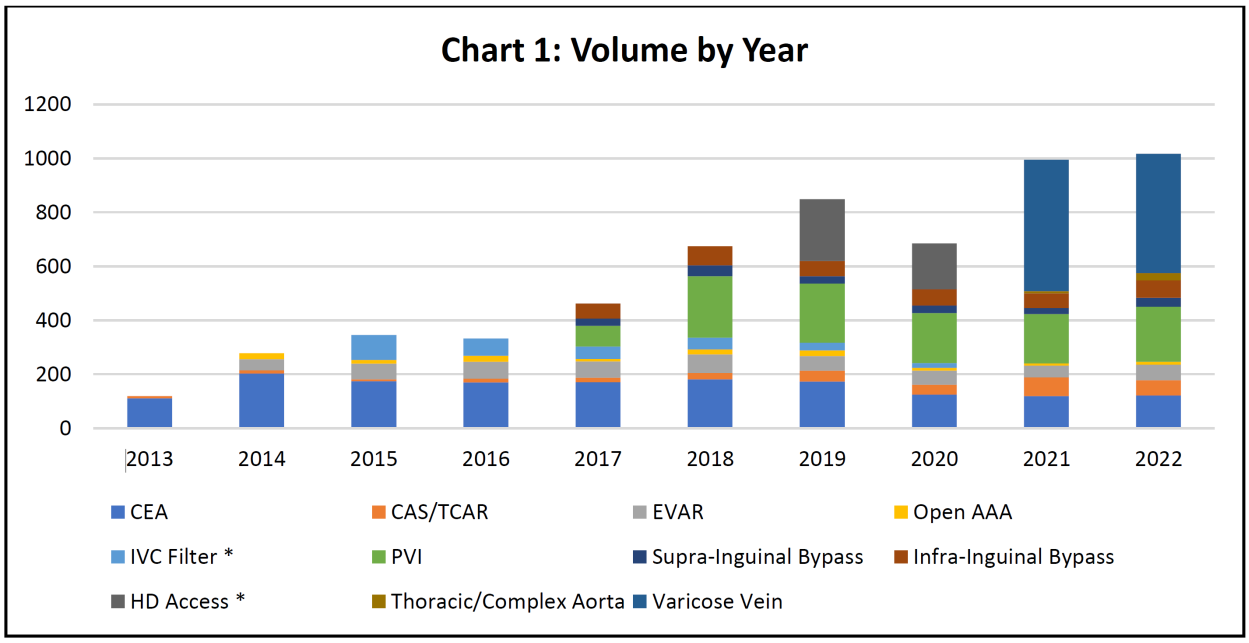
1. 10 Years of VQI Participation – A Single Systems Experience

Authors: Acino, R., Lurie, F., Mason, J.

Statement:
2022 marked the 10th year that Jobst Vascular Institute at ProMedica Health System (Jobst) has participated in VQI.

Goal:
Since 2013, Jobst has used VQI to drive quality measures, conduct research and quality improvement (QI) projects, and support educational efforts of those that train within our organization. The purpose of this review is to highlight the impact that VQI has made on our system and overall clinical practice.

Outcomes:
The utility of VQI for Jobst has grown since 2013 when involvement began with the carotid modules with 119 cases. As 2022 ended, Jobst has seen tremendous growth, with over 5,700 cases abstracted across 11 different modules (Chart 1). Monitoring quality is the largest role VQI has served ProMedica, providing the basis of our vascular quality reporting on a weekly, quarterly and annual basis for our providers and system. As our experience grew, the scope expanded to include two pillars of the mission of Jobst, clinical research and fellowship training. VQI is used for tracking volume and quality metrics specific to fellow/resident assisted cases, provides case details to support M&M conferences and serves as a platform to improve documentation. Data from VQI has been used for over 30 investigator-initiated research and quality projects, including 10 poster and podium presentations at VQI @ VAM. Unforeseen benefits realized include the ability to maintain patient lists while transitioning to an EMR, monitoring loss of follow-up and compliance of lifelong vascular patients, and identification of improvements needed in coding and billing. Last, as an IAC Accredited Vein Center, participation in the varicose vein module has proven beneficial to support re-accreditation compliance and reporting requirements.



Lessons Learned:
Choices on which modules to participate in have been driven by the desire to monitor outcomes and improve clinical practice. Decisions to change modules or cease participation have resulted from significant decreases in case volume or the ability to obtain complete data. The flexibility that the notes sections creates has enabled our team to add information for additional analysis and reporting to benefit our practice.

Jobst Vascular Institute & VQI – 10 Years

Success Factors:
A few key components to our success is the support from the C-suite and service line leadership, engagement from the physicians, and a full-time on staff abstractor. Recognition by leadership of the value-add that VQI provides to our overall vascular service line is appreciated for the internal reporting capabilities as well as regional and dashboard reporting that showcases our center, regional and national outcomes. Physician engagement has gained over the years, specific to personal and center level outcomes and the role their documentation plays in accuracy and analysis. Finally, benefits of having internal team members abstracting provides the ability to collecting/confirm information, provides timely notification of mortality/morbidity and results in frequent analysis to support preparatory for research work, quick volume or metric queries to support clinical operations.

2. A comprehensive multidisciplinary inpatient-based approach to smoking cessation for patients with vascular disease

Authors: Tanner I Kim, Anand Brahmandam, Fachreza Aryo Damara, Dana Alameddine, Arnar Geirsson, Hardik Amin, Lisa M. Fucito, Carlos Mena-Hurtado, Raul J. Guzman, Cassius Iyad Ochoa Chaar

Objectives:
Smoking cessation remains a significant challenge in the care of patients with vascular disease. This pilot study aims to evaluate the efficacy of a multi-disciplinary inpatient smoking cessation intervention that leverages surgery as a teachable moment and the post-surgery inpatient recovery period to initiate smoking cessation counseling and pharmacotherapy.

Methods:
Adult smokers with occlusive or aneurysmal arterial disease admitted for vascular surgery in a tertiary care center were enrolled. After enrollment, each patient received a multicomponent smoking cessation intervention consisting of brief counselling sessions from services during the hospitalization utilizing a gain-frame approach, a message persuasion technique where outcomes are described in positive terms. Providers representing vascular surgery, cardiology, cardiac surgery, stroke neurology, and the smoking cessation program performed the counseling sessions that contained coordinated content related to the link between cardiovascular health and smoking, the benefits of smoking cessation, and tools available for quitting. Subjects completed surveys related to smoking habits and mental health, including the Fagerstrom test for nicotine dependence and PROMIS questionnaire, respectively. Upon discharge, all patients were provided free nicotine replacement therapy (NRT) for 4 weeks. Any additional medication deemed necessary for quitting was prescribed upon discharge. Patients were given appointments for a smoking cessation program visit and routine provider follow up was scheduled. The primary endpoints were smoking cessation rates at 3 months and 1 year. (Figure)

Results:
A total of 48 patients were enrolled. The mean number of cigarettes consumed before enrollment was 17 ± 9 per day over a mean period of 40 ± 11 years. All patients had previously attempted to quit smoking and 97% had received advice from their surgeons or interventionalists to quit smoking in the prior year. Only 6% of patients had never tried to stop smoking, while 50% had more than 3 attempts at smoking cessation prior to enrollment. The mean quitting period was 9 months (range 4 - 20 months) before relapse. Stress was the reason for relapse and continued smoking in 58% of patients. Patients perceived that smoking was taking years off their life (42%), made them worry about developing heart disease (34%), and reduced their quality of life (31%). (Table) Follow up at 3-months and 12-months was obtained for 92% (44/48) and 81% (39/48) of participants, respectively. Among these participant subgroups, the self-reported smoking quit rate was 44% (N=19/44) and the smoking reduction rate was 57% (N=25/44) at 3 months. At 12-months, the quit rates and reduction rates were 51% (N=20/39) and 61.5% (N=24/39) respectively. The COVID-19 pandemic interfered with various aspects of this study including inpatient counseling and follow up with providers and the smoking cessation program.

Conclusion:

This pilot study demonstrates that an inpatient, multidisciplinary approach for smoking cessation is effective with a durable impact up to one year. Inpatient strategies leveraging time spent in the hospital, and "teachable moments" should be incorporated into smoking cessation programs.

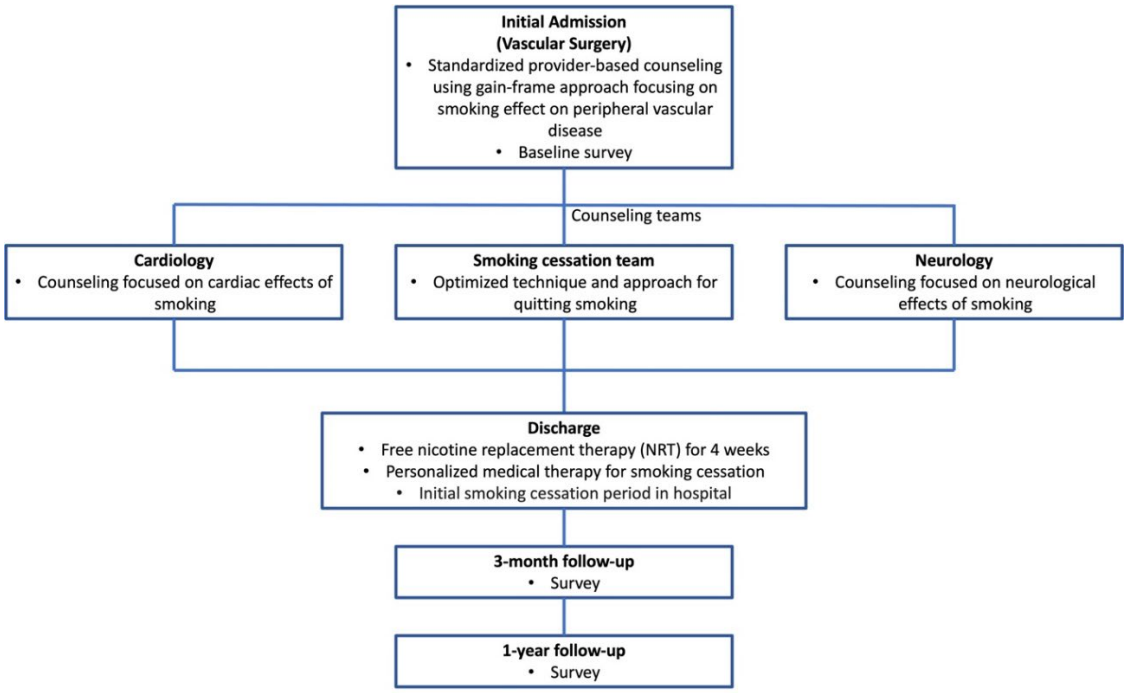


Figure: Patient enrollment flowchart

Table: Baseline Survey Questions

Survey Questions	Aggregate Responses N = 48[1] (%)
Would you like to quit smoking?	
A lot	19/30 (63%)
Some	7/30 (23%)
Not right now	4/30 (13%)
How many years have you smoked? (years)	40 ± 11
How many cigarettes do you smoke a day?	17 ± 9
How many attempts have you made to quit smoking?	
1-2	14/32 (44%)
3-4	11/32 (34%)
5+	5/32 (16%)
None	2/32 (6.2%)
What was the longest continuous period of time you were not smoking? (months)	9 (4, 20)
Have you ever tried nicotine replacement therapy (e.g. patch, gum, oral medications, etc)?	
Yes	22/32 (69%)
No	10/32 (31%)
Has a doctor advised you to quit smoking within the last year?	
Yes	31/32 (97%)
No	1/32 (3.1%)
Has your surgeon or interventionalist advised you to quit smoking within the last year?	
Yes	31/32 (97%)

No	1/32 (3.1%)
What is the main reason you continue to smoke?	
To relieve stress	18/31 (58%)
No desire to quit smoking	8/31 (26%)
To help concentrate	3/31 (9.7%)
Fear of putting on weight	1/31 (3.2%)
Nicotine withdrawal symptoms	1/31 (3.2%)
How soon after waking do you smoke your first cigarette?	
5-30 minutes	15/32 (47%)
Within 5 minutes	9/32 (28%)
60+ minutes	5/32 (16%)
31-60 minutes	3/32 (9.4%)
Do you find it difficult to refrain from smoking in places where it is forbidden? (e.g. church, library, etc)	
No	24/32 (75%)
Yes	8/32 (25%)
Which cigarette would you hate to give up?	
Any other	19/32 (59%)
The first in the morning	13/32 (41%)
How many cigarettes a day do you smoke?	
11 – 20	16/31 (52%)
10 or less	10/31 (32%)
21 – 30	3/31 (9.7%)
31 or more	2/31 (6.5%)
Do you smoke more during the first few hours after waking up than during the rest of the day?	
No	21/32 (66%)
Yes	11/32 (34%)
Do you still smoke if you are so sick that you are in bed most of the day, or if you have a cold or the flu and have trouble breathing?	
Yes	21/32 (66%)
No	11/32 (34%)
If you have previously quit smoking, what do you think was effective in helping you quit?	
A medication I was taking	1/13 (7.7%)
E-cigarette	1/13 (7.7%)
Hospital stays	1/13 (7.7%)
Lozenges	1/13 (7.7%)
Nothing	2/13 (15.4%)
Patch	1/13 (7.7%)
Positive reinforcement from family	1/13 (7.7%)
Pregnant	1/13 (7.7%)
Staying away from people that smoke	2/13 (15.4%)
Staying busy	1/13 (7.7%)
Will power and patches	1/13 (7.7%)
What are the reasons you went back to smoking?	
Stress	4/12 (33%)
Craving	1/12 (8.3%)
Depression, Anxiety. Stress	1/12 (8.3%)
Divorce and stress	1/12 (8.3%)
Habit	2/12 (16.6%)
Left the hospital	1/12 (8.3%)
My baby passed away	1/12 (8.3%)
Stress and not being able to fill up my time doing things I like since I have so many diseases that prevent me from doing so.	1/12 (8.3%)

[1]n (%); Mean (SD); Median (IQR)
Based on the number of patients responded

3. A Retrospective Review of Discharge Medication in Symptomatic and Asymptomatic Carotid Endarterectomy Patients

Authors: Suzanne Beels, MSN, RN, AGCNS-BC, CCRN, Michelle Martin, BSN, & Erin Sydenstricker, BSN, RN

Problem Statement:
Vascular Quality Initiative (VQI) regional reports indicated that Carilion Roanoke Memorial Hospital (CRMH) had varying compliance with prescribing Aspirin (ASA)/ P2Y12 and statins for post-operative symptomatic and asymptomatic carotid endarterectomy patients upon discharge. The reports revealed that asymptomatic patients had a lower compliance rate than their symptomatic counter parts.

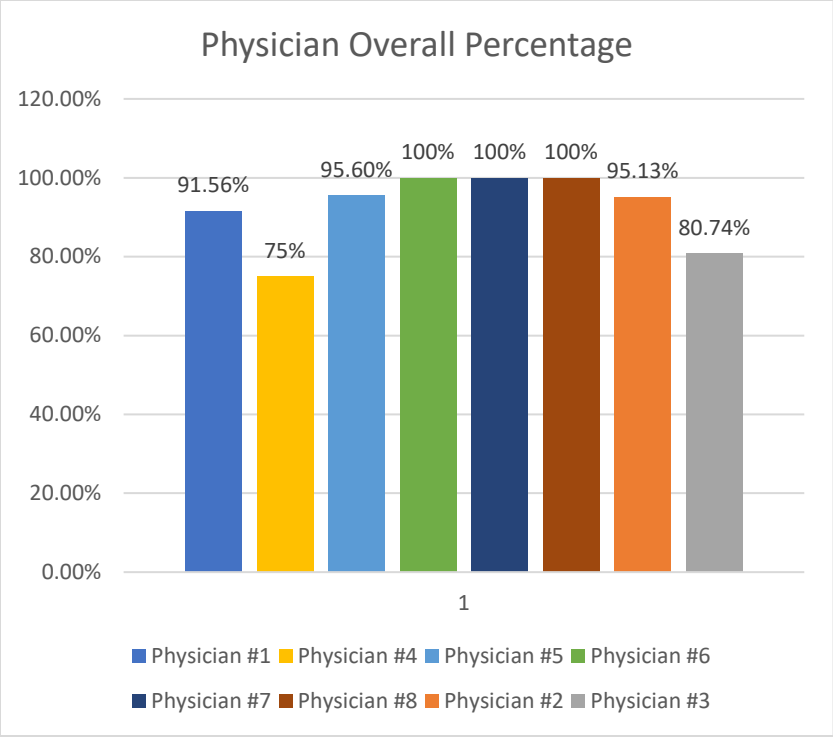
Goals:
Our first goal is to determine rationale for higher compliance in symptomatic verse asymptomatic patients by doing a retrospective review of non-compliant cases. Next goal is to help eliminate barriers to discharge prescriptions and improve documentation for exceptions. The overall goal is to obtain and maintain ≥ 96% compliance with discharge on ASA/P2Y12 and statins prior to the 2023 registry deadline. These goals are in line with VQIs national QI initiative to have all vascular patients on these medications unless not medically capable.

Improvement Strategies:
A complete retrospective review of all CEA patients from 2021 to 2022 quarter three was done by the lead data abstractor, Michelle Martin. Michelle analyzed all the data to come up with a list of patients per quarter who fell out of compliance. This list was sorted by physician and emailed to them for a chart review.

In 2021 and 2022 during our Vascular Interdisciplinary Quality Council (VIQC) meetings for data information Michelle presented information to remind the physicians of VQIs focus for prescribing ASA/P2Y12 and statin at discharge.

A Vascular discharge summary will be created within EPIC to address the required discharge medications. It will serve as a guide to providers, ensuring all expected components are prescribed or have contraindications documented.

Results:
During the review it was determined that most of the patients who fell out of compliance were asymptomatic and did not receive a statin. The lowest compliance rate for asymptomatic patients was in 2021 Q1 at 81.82% and the highest was in 2021 with 97.34%. Whereas the symptomatic compliance lowest rate was in 2021 Q3 at 94.12% and has stayed at 100% since 2021 Q4. After looking at the rates by quarter the information was then looked at by physician. There were 8 physicians who preform CEAs at CRMH across 2 different vascular groups and the Neurology department. The graph shows the results at the physician level.



Challenges/Lessons Learned:
Chart reviews revealed several consistencies. 1. Discharges with deficiencies were largely done by residents or Advanced Care Practitioners. 2. Many were weekend discharges

Documentation of intolerance and allergies needs to be documented by the providers in the history and physical or discharge summary, so it is clear why the medication was not prescribed. Data abstractors may not locate information when it is not documented in a consistent manner.

Success Factors:
Information sharing has increased over the past few months. It is expected to improve as we move forward. Situational awareness has played a large role.

A standardized smart phrase or flowsheet could help with improving compliance.

Bedside nurses can help drive compliance from the inpatient unit. Nurses will be educated on discharge expectations provided a ‘badge buddy’ to support their knowledge.

4. A Social Media Campaign to promote Safe Techniques in Femoral Access

Authors: Joshua J. Huttler, Ocean Setia, Samuel Hahn, Carlos Mena-Hurtado, Robert Attaran, Charles Matouk, Juan Carlos Perez-Lozada, Jonathan Cardella, Raul J. Guzman, Cassius Iyad Ochoa Chaar

Objectives:
Femoral artery access (FA) is frequently used for endovascular treatment of various diseases. Techniques of FA continue to evolve but remain a significant source of complications and adverse outcomes. The universal femoral access technique was developed by using dual imaging and incorporating novel anatomical information to decrease complications. (*Figure*) An educational video was developed, and a social media campaign was used to promote the technique on the internet to trainees and vascular specialists. This study describes the tools used and the results of the media campaign.

Methods:
An educational video was created which described the Universal FA protocol. (*https://player.vimeo.com/video/713050384?h=a5fa54f2df*) This video was subsequently uploaded to Twitter. A social media marketing company was contracted to advertise the video on the platform and target vascular specialists and trainees. After sixteen weeks of advertising, video views and viewer characteristics were analyzed. Impressions represent the number of times that the video appeared on an individual's Twitter feed, and video view rate describes the frequency that the video was either selected for larger view or unmuted per impression.

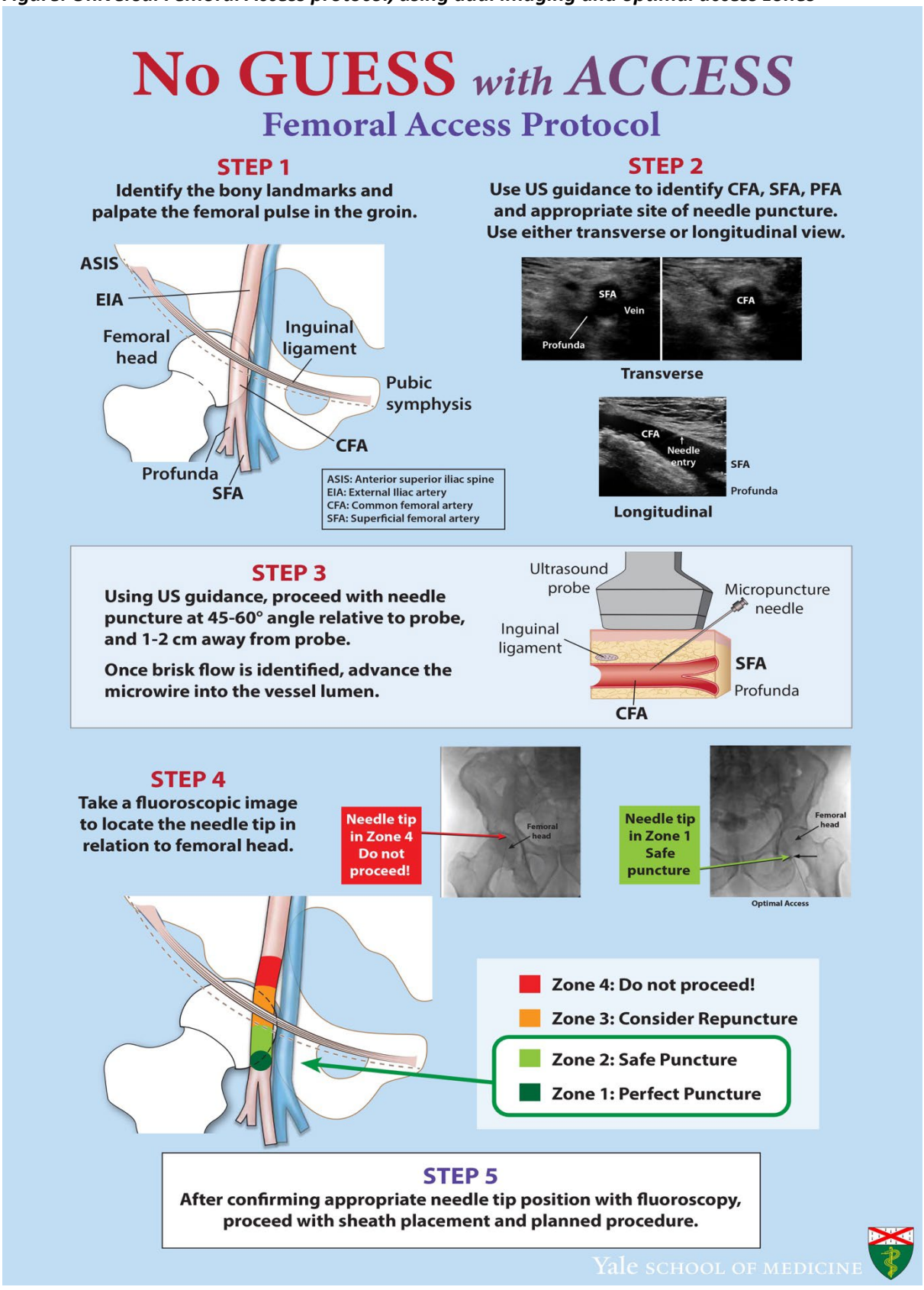
Results:
The campaign generated 178,946 impressions, resulting in 957 video completions (video completion rate = 0.53%) and a cost per full video view of $1.37. A total of $1,312 was spent to advertise the video for sixteen weeks. The overall video view rate in the population was 63.86%. Most complete video viewers were males (n=596) aged 30-39 (n=298) who were located in the Southern United States (n=308). While individuals age 50 and older had higher video view rates and interacted with the video more than younger viewers, the number of full video views and video completion rate in this population seemed lower than that of viewers 30-39 years old (n=231, 0.49% vs. n=298, 0.62%). Individuals who followed a major academic center's Twitter account represented the majority of those who fully viewed the video (n=530), and had a notably higher video completion rate (0.90%) than the rest of the viewers. Within the group interested in academic Twitter, viewers who followed "@harvardmed" and "@StanfordMed" completed the full video most frequently (*Table*). The most common keyword searches associated with complete views were "cardiology" (n=436) and "cardiologist" (n=155). Those who typed in one of the selected keywords had higher video view rates than the rest of the viewers, and were more likely to interact with the video (*Table)*.

Conclusions:
Social media advertisement campaigns are an efficient and cost-effective method for publicizing medical education videos. This tool is most useful for targeting individuals less than 40 years old who already engage with academic medical centers on the platform. Future quality improvement initiatives directed towards medical trainees should consider using social media campaigns to publicize educational materials on a national scale.

Table: Viewer Demographic and Descriptive Characteristics

	Impressions	Video Starts	Video played 50%	Video completions	Video Completion Rate	Video View Rate
Gender						
Male	99,026	94,159	1,001	596	0.60%	61.98%
Female	79,259	75,723	622	357	0.45%	66.28%
Age Ranges						
20-29	29,344	27,767	265	173	0.59%	55.92%
30-39	48,452	46,148	500	298	0.62%	61.13%
40-49	41,469	39,629	367	214	0.52%	66.78%
50 and up	47,008	45,096	413	231	0.49%	70.72%
Region, United States						
Northeast	29,841	28,442	309	205	0.69%	64.95%
Midwest	36,512	34,998	308	180	0.49%	64.39%
South	60,204	57,287	540	308	0.51%	64.64%
West	48,811	46,621	432	238	0.49%	65.97%
Academic centers followed by viewers						
@NorthwesternMed	653	629	11	11	1.68%	55.13%
@harvardmed	28,876	27,233	375	245	0.85%	59.02%
@StanfordMed	21,300	20,105	262	169	0.79%	58.98%
@UCSFMedicine	1,637	1,571	25	20	1.22%	59.07%
@NUFeinbergMed	412	383	7	6	1.46%	49.76%
@BUMedicine	295	285	7	6	2.03%	63.73%
@UMassChan	382	346	6	6	1.57%	58.64%
@BrownMedicine	293	286	5	4	1.37%	58.70%
@nyugrossman	594	559	20	14	2.36%	56.06%
@DellMedSchool	653	685	13	9	1.38%	64.78%
@IcahnMountSinai	1,349	1,275	23	15	1.11%	55.37%
@EmoryMedicine	543	523	10	6	1.10%	56.54%
@UNC_SOM	255	241	9	7	2.75%	61.18%
Followers Combined	58,600	55,417	789	530	0.90%	58.72%
Viewer Keyword Searches						
cardiology	87,376	83,341	749	436	0.50%	64.62%
cardiologist	39,491	37,708	288	155	0.39%	66.39%
neurosurgery	12,414	11,918	85	46	0.37%	66.27%
Medical student	16,835	16,084	139	69	0.41%	64.60%
Interventional cardiology	843	804	4	0	0.00%	65.95%

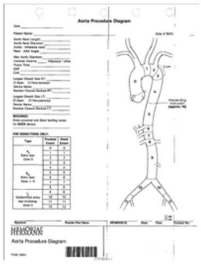
Figure: Universal Femoral Access protocol, using dual imaging and optimal access zones



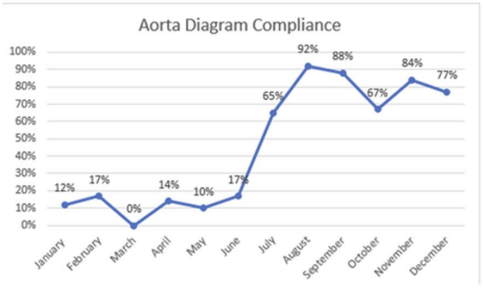
5. ACO Goals Can significantly Increase Use of Quality Improvement Tools Such as Aortic Diagrams

ACO goals can significantly increase use of Quality Improvement tools such as Aortic Diagrams

Sheila M. Coogan, MD, Rhonda A. Ransom MSML, Amanda Enerson, MSN, RN, Richi Chaudhry MHA, Jennifer P. Le, Bryan Akers, Memorial Hermann Hospital and McGovern Medical School



In 2020, our institution crafted an aortic diagram to capture procedural data for aortic interventions. This form was approved by the medical records committee. The form was designed to record landing zones and identify location of pathology for a variety of aortic diseases. Usage of the aortic diagram would reduce abstraction time and increase completeness of data capture.



Physician use of the form was limited. In July 2022, our hospital made completion of aortic diagrams 15% of our accountable care organization goals for the coming year. Average completion of the aortic diagram increased from less than 20% to consistently over 65% completion.

6. Causes of Prolonged Length of Stay for Carotid Endarterectomy and Endovascular Aortic Aneurysm Repair in the Vascular Quality Initiative: Opportunities for Process Improvement

Authors: Megon L. Berman, BS, Scott S. Berman, MD, MHA, FACS, DFSVS, John P. Pacanowski, MD, MBA, Luis R Leon, MD, FACS, Bernardo Mendoza, MD, Joshua A. Balderman, MD, Joseph E. Sabat, MD, PhD, Cody J. Kraemer, MD. ***Pima Heart and Vascular, Division of US Heart and Vascular, Tucson, Arizona***

Objective: Length of stay (LOS) for asymptomatic carotid endarterectomy (CEA) > 1 day and for endovascular aortic aneurysm repair (EVAR) >2 days has been a core quality metric reported in the Vascular Quality Initiative (VQI). The objective of this VQI quality improvement project was to determine the reasons for prolonged LOS beyond the VQI metrics for patients undergoing CEA and EVAR and analyze these causes for possible process improvement opportunities.

Methods: Patients undergoing CEA and EVAR from June 2021 through October 2022 comprised the population evaluated. Patients whose LOS exceeded the VQI benchmark of 1 day for asymptomatic CEA and 2 days for EVAR had detailed review of their hospital records for contributing factors which were categorized in our VQI registry using the hashtag system for reasons related to the procedure (#REL) but not otherwise captured in VQI, clinical causes unrelated to the procedure (#CLIN), non-clinical reasons (#NR). We also compared pre-op clinical frailty scores (CFS) between patients for each procedure who were within and outside the LOS benchmark.

Results: In the period of data collection, 83 patients underwent EVAR with a mean LOS of 1.4 days. Seven patients (8.4%) had an LOS > 2 days with a mean of 5.3 days. The remaining 76 patients had a mean LOS of 1.1 days. Of the 7 patients with prolonged LOS > 2 days, 3 had clinical causes including 2 patients with significant deconditioning and 1 with debilitating COPD. Two patients had prolonged LOS due to urinary retention. Another 2 patients had complications of the procedure including 1 with pneumonia and 1 with a groin pseudoaneurysm. CFS for EVAR patients with LOS > 2 days was 4.3 compared with 2.95 for those with LOS ≤ 2 days. In the same period, 78 patients underwent CEA for asymptomatic disease with a mean LOS of 1.5 days. Twelve patients (15.4%) had an LOS > 1 day with a mean of 3.9 days. Delay in discharge occurred for clinical reasons in 4 patients including chest pain, *C. dif* colitis, deconditioning and hyperglycemia. Another 6 patients had their discharge delayed for related reasons including 2 with hypertension, 2 with hematomas, 1 each with hypotension, and delirium. Two patients had delay in discharge due direct complications of surgery including cranial nerve injury and a neck hematoma requiring surgery. CFS for asymptomatic CEA patients was 2.97 for patients with LOS ≤ 1 day compared with 3.12 for patients with LOS > 1 day.

Conclusions: Prolonged LOS for EVAR and CEA are infrequent events. For EVAR patients, management of urinary retention with foley catheter placement and subsequent outpatient voiding trial will reduce this clinical problem as a contributor to prolonged LOS for EVAR patients. For patients undergoing CEA, delay in discharge was more commonly attributed to the conduct of the surgical procedure and peri-operative management. For both CEA and EVAR, pre-existing frailty may identify patients at risk which could potentially be addressed in the interval prior to surgery through pre-emptive case management assessment for discharge needs along with education for the patient and caregivers to be prepared for disposition to skilled nursing facilities or home with home health services.

7. Collaboration is Key – Unlocking Discharge Medication Compliance

Authors: Carrie Horner and Bridget Rafferty-Himler

Abstract:
The purpose of this Quality Improvement project was to improve discharge medication compliance for all vascular surgery patients. The Vascular Surgery department (consisting of two surgeons and 3 APPs), with the assistance of the Quality Analytics department (consisting of data abstractor, Coordinator, and Manager) identified a need for improvement across all vascular surgery types. Communication procedures were set up between both departments for several key points: education on care guidelines and surgical process, clarification of questions during the abstraction process, notification of details on fall-outs, and decisions for most appropriate locations of needed documentation. Quality Analytics worked with Informatics to establish order sets and a physician discharge form to include appropriate discharge medications. Senior leadership assigned primary accountability to the APPs by including this as a performance metric. Percent compliance was calculated for FY 2020, with improvement plans created by the surgical team initiating during FY 2021. Compliance percentages and fall-out patient details were communicated monthly from Quality Analytics to the surgical team. All members of the surgical team were involved in increasing medication compliance prior to discharge and assuring compliance on fall-outs during outpatient follow-up appointments. Significant improvement was achieved across all vascular surgery types. One example is that discharge medication compliance was improved for EVAR surgeries from 75% in FY 2020, to 89.6% in FY 2021, to 100% in FY 2022 and maintenance of 100% compliance FY 2023 to date. A second example is improvement in specifically statin prescribing at discharge for PVI procedures from 80.2% in FY 2020, to 95.5% in FY 2021, to 100% in FY 2022 and maintenance of 100% compliance FY 2023 to date. Communication for clarification occurs throughout the abstraction process, as needed. Processes continue with communication of fall-outs monthly and meetings quarterly between the Vascular Surgery team and Quality Analytics for evaluation of processes for any needs of improvement or clarification.

8. Coordinated patient outreach for reduction of unplanned postoperative 30-day readmission

Authors: Zach M. Feldman, MD MPH MS, Srihari Lella, MD, Sujin Lee, MD, Tiffany Bellomo, MD, Sunita D. Srivastava, MD, Matthew J. Eagleton, MD, Anahita Dua, MBChB MBA MS, Nikolaos Zacharias, MD MPH

Objectives:
Despite decades of recognition of the harms represented by 30-day readmissions and national efforts to reduce them, much of the change in risk-standardized readmission rates nationally has been attributed to changes in risk-adjustment. We constructed a multi-pronged readmission reduction quality improvement (QI) initiative aimed at addressing the clinical drivers of readmission after vascular surgery.

Methods:
After internal review determined that an outsized proportion of 30-day readmissions occurred within two weeks and that a significant portion were unplanned readmissions, two PDSA (Plan-Do-Study-Act) cycles were developed. First, a division-wide standardized follow-up appointment requirement was made: all discharged patients would be scheduled for follow-up before two weeks, with in-person visits required for all groin incisions and ischemic lower extremity wounds, and telehealth appointments allowed otherwise. Second, a set of disease-specific symptom alert "Calling Cards" were developed and distributed to patients on elective surgical booking, to facilitate telephone access to the division at all times. All patients discharged from our institution by vascular surgeons were included in the protocol. The primary outcome measure was 30-day readmission rate. Process measures included percentage of surgical booking mailings that included calling cards. Fisher's exact test was used to evaluate relationships between pre-intervention and post-intervention cohorts and success on the outcome measure.

Results:
Baseline performance on the 30-day readmission primary outcome measure was 14.1% in the 12 months prior to intervention, across 723 discharges. Over half (59%) occurred in the first 14 days after discharge and 39% occurred in the first week after discharge. Both PDSA interventions were implemented simultaneously. In the 3 months after intervention, 57 patients were included in the PDSA cycle protocols. Process measure success for the percentage of surgical booking mailings that included Calling Cards was 35%, influenced by a migration to electronic surgical booking communication during the PDSA cycles. Performance on the 30-day readmission primary outcome measure was improved to 10.5%, however this did not reach statistical significance (p=0.55).

Conclusion:
The consensus-driven development and implementation of a QI protocol to reduce 30-day readmission, based on increased patient communication and more standardized patient follow-up, showed promising results at our institution, with over 25% improvement in the primary outcome measure. Further efforts to improve readmission should focus on decreasing barriers to patient-provider communication after discharge.

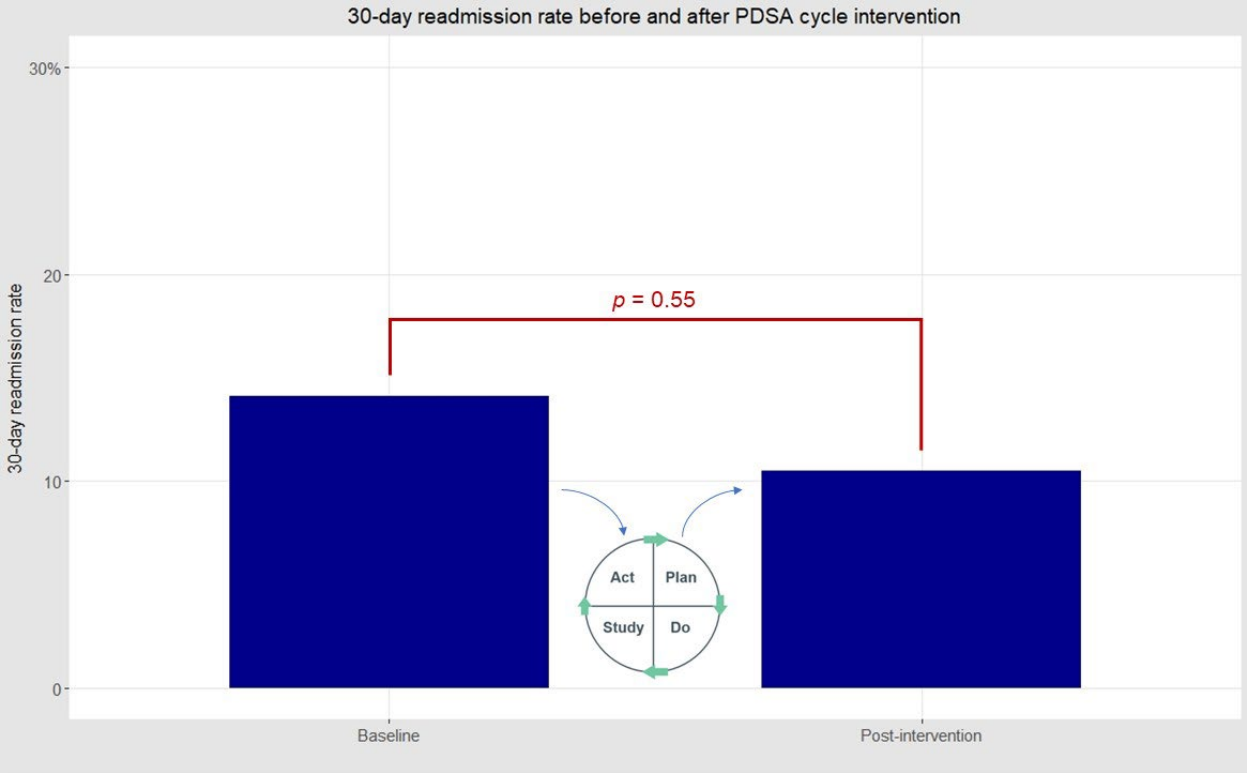


Figure. Pre-intervention and post-intervention bar chart demonstrating 30-day readmission rates.

9. Data Validation: Developing a standard inter-rater review process for the VQI Registry

Authors: Jen Harris RT (R), Indiana University Health

Summary Statement:
Indiana University Health (IUH) desired to ensure consistent reporting of VQI Registry data between registry coordinators.

Goals / Objectives:
IUH recognized an opportunity to establish a process to validate consistent interpretation of data elements between registry coordinators. The goal was to develop an inter-rater review (IRR) system for the coordinators that would highlight data element discrepancies.

Process:
In establishing the IRR process, the PVI module was the focus as seven hospitals currently participate in the module. Patients with one vessel treated were chosen in the initial stage of the process. Forty-eight data elements were selected for re-abstraction. High priority was given to data elements that support regional quality improvement efforts such as: prescription of evidenced-based medications at discharge and improving pre-procedure ankle-brachial index (ABI). Additional data elements included items with high likelihood of discrepancy between coordinators.

Twenty patients were randomly chosen for re-abstraction per quarter, beginning with Q1 2022. An excel spreadsheet was utilized with tabs to separate original abstraction from re-abstracted cases. When possible, coordinators did not re-examine their own cases. Coordinators met on a quarterly basis to review results of IRR and discuss discrepancies. Clarifying questions were sent as needed to Pathways Support (Pathwayssupport@fivoshealth.com) for guidance on appropriate method of abstraction. In instances where the mismatch rate was higher than 10%, action plans were created for how to interpret data element moving forward. As future version updates are released to the PVI module, the IRR document can be easily modified to accommodate any additional data elements needed.

Results:
Q1 2022 overall agreement rate between abstractors was 93.0%: 91.5% in Q2 2022 and 93.8% in Q3 2022. Q4 2022 results are pending at this time.

Conclusions:
The development and implementation of an IRR is a foundational step toward ensuring consistent abstraction between data coordinators. With seven hospitals currently participating in the PVI module, stakeholders have confidence that data is being reliably abstracted across all facilities.

10. Discharge Medication Alerts for CEA Patients Improves VQI Medication Compliance

Authors: Rhonda A. Ransom MSML, Amanda Enerson, MSN, RN, Richi Chaudhry MHA, Sheila M. Coogan, MD Memorial Hermann Hospital and McGovern Medical School

Patients who undergo CEA, require antiplatelet medications and statins prescriptions at discharge. If not prescribed or addressed at discharge, the encounters do not meet Vascular Quality Initiative standards and fall out during routine chart audits.

Our Goal was to increase discharge medication compliance or documentation of contraindications of the discharge medication within the VQI CEA procedures.

This project engaged Vascular surgeons, physician trainees, midlevel providers, and nursing staff involved in implementation and evaluation of a focused effort to improve discharge medication for all CEA patients at ten centers in the Memorial Hermann Hospital System.

A discharge medication alert within Cerner application was built by our IT department. Memorial Hermann Health System went live with the discharge medication alert April 2021. Education to providers occurred when the discharge alert was launched and was ongoing at campus meetings. Memorial Hermann has monitored the CEA discharge medication with the Spring and Fall reports for Pathways. Memorial Hermann reported out as of June 2022 to our physician groups.

Prior to the discharge medication alert, Memorial Hermann System compliance rate for CEA Discharge medication for calendar year 2020 was at 86.3%. Since the discharge medication alert, Memorial Hermann System compliance rate for CEA Discharge medication for calendar year 2021 was at 92.1% and for calendar year 2022 was at 95.4%.

The discharge alert and education of the team members participating in patient discharge significantly improved compliance with VQI discharge medications for CEA patients.

11. Early Results of Patient Reported Outcomes for Peripheral Vascular Interventions for Claudication

Authors: Scott S. Berman, MD, MHA, FACS, DFSVS, Megon L. Berman, BS, John P. Pacanowski, MD, MBA, Luis R. Leon, MD, FACS, Joshua A. Balderman, MD, Bernardo Mendoza, MD, Joseph E. Sabat, MD, PhD, Cody Kraemer, MD. ***Pima Heart and Vascular, Tucson, Arizona***

Background:
Vascular claudication impacts patient lifestyle with relatively low risk of limb loss. Outcome assessment for revascularization to treat claudication, however, does not routinely include an evaluation of the impact the treatment had on that lifestyle. The objective of this study was to use patient reported outcomes (PRO) for patients with claudication undergoing peripheral vascular intervention (PVI) and determine if there is a relationship between PRO, ankle-brachial index (ABI) and clinical frailty score (CFS).

Methods:
As part of our chartered quality improvement project for the Vascular Quality Initiative, we prospectively collected CFS, ABI and PRO data (using the SF-6 claudication tool) for patients undergoing PVI for claudication between October 2019 and February 2022 using our VQI PVI module with hashtags for CFS, ABI and SF-6 scores prior to intervention (PRE), at early follow-up (POM1) (4-6 weeks) and long-term follow-up (POY1) (9-21 months). PRO data was collected by administering the SF-6 survey to the patient at the time of their appointment at each interval by the clinical staff. Statistical comparisons between the PRE, POM1 and POY1 data were performed using *t*-tests and ANOVA.

Results: During the period of review, 378 patients underwent PVI for claudication, of which 62% were male and 38% female. The interventions were performed in the office-based lab in 68%, hospital outpatient in 20% and hospital inpatient in 12%. No patient suffered a major complication or required amputation related to the index procedure or during the follow-up period. PRO data was collected prior to the intervention in 111 cases (30%). Data analysis revealed significantly greater PRO score at POM1 compared with PRE (13 ± 4 vs. 18 ± 5; $t(30) = 5.599$; $P < 0.0001$) (Figure 1). POM1 ABI was significantly greater than that recorded at PRE (0.93 ± 0.14 vs. 0.68 ± 0.20; $t(23) = 5.791$; $P < 0.0001$) (Figure 1). Frailty score (CFS) significantly improved (decreased in value) from PRE to POM1 (4 ± 1 vs. 3 ± 1; $P = 0.014$, $d = 0.47$). *Post hoc* tests revealed PRO score to be significantly higher at POM1 compared to PRE (19 ± 5 vs. 13 ± 4; $P = 0.001$), and POY1 (18 ± 5) compared to PRE ($P = 0.0009$). There was no significant difference between PRO scores at POM1 and POY1 ($P = 0.642$) (Figure 2).

Figure 1. Comparison of PRO and ABI at PRE and POM1

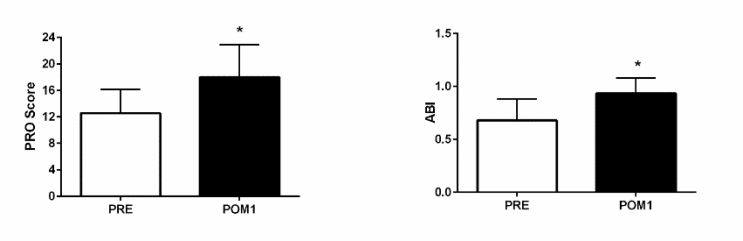
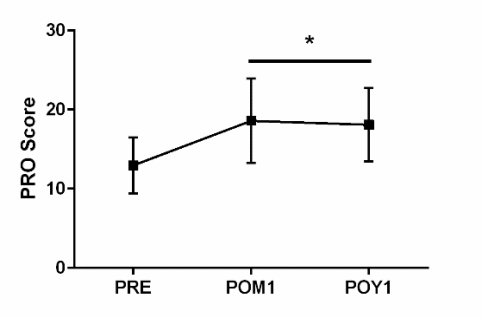


Figure 2. PRO comparison: PRE, POM1, POY1.



Conclusions: In this preliminary report of PRO for patients undergoing PVI for claudication, the patient's perception of a positive outcome of therapy correlated with improvement in ABI and CFS at one month and was sustained at one year. Further work is necessary to see if these outcomes are durable beyond 1 year follow-up and if integrating collection of PRO and CFS into clinical workflow can improve compliance with data collection to increase sample size.

12. Expediting Care in Patients with a Ruptured Abdominal Aortic Aneurysm to Decrease Mortality and Length of Stay

Author: Tracy Campin

Problem Statement:
Currently no standardized protocol exists at Nebraska Medical Center to expedite care in patients with a suspected ruptured abdominal aortic aneurysm (rAAA) to facilitate timely intervention and decrease mortality and length of stay. In calendar year 2020, VQI data demonstrated patients who arrived directly to the emergency department (ED) with a rAAA had an average mortality rate of 67% and average mean length of stay (LOS) of 36 days. Patients transferred from an outside facility (OSF) with a rAAA had a mortality rate of 33% and average mean LOS of 27 days.

Goals:
Design and adopt an rAAA standard protocol to facilitate timely recognition, diagnosis, and transfer to the operating room. Secondly, Nebraska Medicine will show a decrease in mortality rate and length of stay exhibited by VQI data.

Results:
We used a phased approach for our rAAA protocol project. Phase 1 included patients who arrived directly to the ED and Phase 2 comprised patients who were transferred to Nebraska Medicine from an outside facility. Phase 1 went live on December 8, 2021, while Phase 2 is scheduled for February 1, 2023. Only one rAAA patient was admitted directly through the ED since implementation of Phase 1, however, the patient was discharged home after 5 days, a significant improvement from outcomes in 2020.

Improvement Strategies:
We used a process map to provide visual insight into the workflow and provide increased collaboration between departments. Communication was improved by creation of a group notification system and defining specific criteria for the activation of the pathway.

Challenges/Lessons Learned:
One of the biggest challenges was the low volume of rAAA patients. In 2020, Nebraska Medicine cared for 6 rAAA patients, 3 patients in 2021, and 2 in 2022. Even with low volumes, the high risk of mortality for these patients continue to make this a worthwhile project.

Success Factors:
Team engagement and support, improved communication and collaboration between departments and a decrease in mortality and length of stay.

13. Title: Implementation and dissemination of frailty assessment within the vascular surgery clinic workflow: a review of the University of Utah's local and regional quality improvement initiatives

Authors: Julie Hales, RN, MSN; Larry Kraiss, MD; Benjamin S. Brooke, MD, PhD

Problem Statement:
Frailty is a multidimensional syndrome of loss of reserves (energy, physical ability, cognition, health) that gives rise to vulnerability to adverse events (Rockwood et al, CMAJ, 2005). Frailty-based instruments such as the Clinical Frailty Scale (CFS), when assigned before and after a patient undergoes vascular surgery, are useful for predicting long-term clinical and functional outcomes. The CFS has been implemented in the clinic workflow of multiple Rocky Mountain VQI (RMVQI) regional centers and captured in the VQI registry of participating institutions by hashtag format. However, a patient's frailty status is not currently captured using established variables in VQI registries.

Goal:
To describe the University of Utah's (UU) quality improvement efforts, from 2017 to present, first with the implementation of frailty assessment within its own clinic workflow and then with dissemination to other RMVQI centers.

Improvement Strategies:
Beginning April 2017, UU Providers began assigning the CFS score to clinic patients at the pre-operative time point. Two years later, in September 2019, UU facilitated the dissemination of clinic frailty assessment using the CFS at three other RMVQI centers. One year later, in September 2020, all participating centers began documenting the CFS score of clinic patients at both the pre-operative and long-term follow-up time points. Data Managers at each participating center transcribed the CFS from the provider's documentation to the VQI database case forms using the hashtag format.

Since inception, the UU project team has presented education and training at bi-annual RMVQI meetings to discuss project barriers and facilitators and reinforce end-goals. The UU project team developed an Epic EMR CFS documentation flowsheet within the Epic Electronic Medical Record (EMR) to improve the efficiency of assigning and documenting the CFS. Later, the UU project team implemented a 'hard-stop' within the Epic clinical workflow to enforce documentation of the CFS at every clinic visit.

Results:
Since April 2017, CFS data from participating RMVQI centers has been regularly 'pulled' and aggregated by the UU project team. The UU project team has evaluated this data and informed the RMVQI and the Greater National VQI group of its findings regarding: 1. center experiences of incorporating routine frailty assessment within the vascular surgery clinic workflow; 2. feasibility and challenges associated with multi-center implementation; and 3. determinations whether the CFS is being accurately and consistently applied to patients across different centers. Presentations of findings have led to the formation of a National VQI Frailty Assessment working group.

Challenges/Lessons Learned:
Providers are unable to accurately assign the CFS if a face-to-face visit does not occur, such as during the COVID-19 pandemic. Further, obtaining LTF is a recognized challenge within the VQI. Without a LTF face-to-face encounter, a patients' frailty status cannot be accurately determined. Large hospital organizations require time-extensive institutional approvals prior to being permitted to join RMVQI Quality Improvement projects.

Success Factors:
VQI provider and data manager champions at the University of Utah and RMVQI regional centers are essential and effective in promoting the adoption of the CFS within the vascular surgery clinic workflow.

14. Implementing a system standard for carotid stent certification

Author: Lillian Camino, RPVI, RVT

Affiliation: Indiana University Health (Arnett, Ball Memorial, Bloomington, Methodist, Saxony, and West Hospitals)

Problem Statement:
As several Indiana University Health (IUH) facilities expressed a desire to expand services to include transcarotid artery revascularization, the need for a system standardized guide to acquire and sustain carotid facility certification became evident. IUH created a guide with the mandatory requirements a facility is held accountable to in order to be compliant with the Centers for Medicare & Medicaid Services National Coverage Determination (CMS-NCD).

Background:

In 2005, CMS determined that there should be a minimum standard facilities and providers must meet in order to perform carotid artery stenting (CAS), including the newer transcarotid stenting technique (TCAR). Health centers wanting to perform carotid stenting are required to be meet the standards established by CMS to perform and be reimbursed for this type of procedure. After initial certification, facilities must also recertify on a biennial basis to ensure optimal patient quality of care and outcomes.

Methodology:

A literature review of transcarotid stenting publications was completed. A system guide to ensure individual facilities wanting to expand patient services to include this procedure type were compliant with CMS standards was developed. Steps taken include the following:

- Review CMS National Coverage Determination Percutaneous Transluminal Angioplasty (PTA) 20.7
- Create SBAR (situation-background-assessment-recommendations) for internal stakeholders
- Develop Carotid Stent System Standards document based on CMS NCD PTA 20.7:
    - Infrastructure Requirements,
    - Process Requirements (for CMS Initial Certification and for CMS Recertification),
    - Recertification Timeframes,
    - Physician Privileging,
    - Oversight Committee,
    - Patient Selection,
    - Embolic Protection Device Utilization
    - Outcomes
- Present proposed Carotid Stent System Standards document to IUH systemwide multi-disciplinary Clinical Effectiveness Council for approval for use across all interested facilities
- Distribute approved Carotid Stent System Standards document to facilities and operational care team(s)
- Perform a facility assessment and staff credentials to identify opportunities to align with system standards
- Enroll VQI-CAS Module from VQI/FIVOS for CMS-approved national CAS registry compliance
- Quality Improvement program: establish a dedicated data coordinator for abstraction, outcomes data analysis, CMS data submission, and CMS question query.
- Identify person responsible for verifying and submitting recertifications at each facility

- Create autotext to assist physician with mandatory data elements captured within the registry for external reporting
- Verify any current participation in CMS approved Carotid Stenting Investigational Studies

Results:

The implementation of a system standard for CAS certification assisted facilities in successfully expanding programs across IU Health. The established standards will require periodic verification for any changes in policies or inclusion of new certification requirements by CMS. Internal stakeholders found benefit in having a system strategy for certifying and recertifying programs.

Value Statement:

IUH system benefits from having a systemwide strategy for carotid stenting facility certification. It provides an easy-to-follow guide to support program/services growth and sustainment.

Conclusions:

Carotid stenting falls within CMS regulation for procedures of a complex nature. Having a standardized document provides reassurance that facilities are compliant with the stringent requirements for becoming and sustaining certification as a CAS facility.

References:

- *https://www.cms.gov/medicare-coverage-database/view/ncd.aspx?NCDId=201*
- *https://www.cms.gov/Medicare/Medicare-General-Information/MedicareApprovedFacilitie/Carotid-Artery-Stenting-Facilities*
- *https://www.cms.gov/Medicare/Medicare-General-Information/MedicareApprovedFacilitie/CASrecert*
- *Carotid Artery Stenting (CAS) Investigational Studies | CMS*
- *https://www.vqi.org/directory/*

15. Influence of ACEi/ARBs on Length of Stay for Vascular Patients Undergoing Open Aortic Surgery and Infra-Inguinal Bypass

Authors: Kiran Goyal M.D., Kristine Orion M.D., Patricia Blake RN., MSN, and Donald Logan

Problem:
Increased length of stay (LOS) for vascular patients undergoing open aortic surgery (OAAA) and infra-inguinal bypass.

Background:
Angiotensin-converting enzyme inhibitors (ACEi) and angiotensin II receptor blockers (ARBs) have been included in the first line treatment for patients with hypertension (HTN) and have been correlated with decreased major cardiovascular events in patients with coronary artery disease. Little has been shown in the realm of peripheral vascular patients. We reviewed causes for increased LOS for our surgical patients, and among the causes was HTN as well as post-operative events (myocardial infarction, bleeding and stroke).

Goals/Objective:
Review VQI data to evaluate whether patients on a pre-operative ACEi/ARBs have decreased LOS compared to patients who are not.

Results:
We reviewed patients undergoing open AAA and infra-inguinal bypass from October 2018 – September 2022. We believed we had the biggest opportunity for improvement in those surgeries. Patients excluded were documented as having uncontrolled HTN pre-operatively. Total mean LOS was used for open AAA and post-operative mean LOS for infra-inguinal bypass. This second measure was chosen because we frequently have inpatients admitted for other reasons who subsequently need revascularization.

There were 57 patients in the open AAA group and 130 patients in the bypass group. Patients undergoing open AAA on a pre-operative ACEi and/or ARB had a mean LOS of 333 hours (Table 1); those not on ACEi/ARB had mean LOS 361 hours. This trended towards but did not reach statistical significance ($p = 0.071$). Those patients undergoing infra-inguinal bypass while on a pre-operative ACEi/ARB had post-op mean LOS of 157 hours compared to those not on medications of 150 hours (Table 2). This also was not statistically significant ($p = 0.74$).

We subsequently analyzed LOS for post-operative complications (Table 3 and 4). Patients who suffered MI or stroke, had transfusion > 1 RBC or a return to the OR for bleeding, had longer LOS for patients undergoing both open AAA and infra-inguinal bypass.

Table 1. Open AAA. Pre-operative ACE/ARB

	n	Mean LOS (hrs)
ACEi/ARB (yes)	32	333
ACEi/ARB (no)	25	361

p = 0.071

Table 2. Infra-inguinal bypass. Pre-operative ACE/ARB

	n	Mean LOS (hrs)
ACEi/ARB (yes)	75	157
ACEi/ARB (no)	55	150

p = 0.74

Table 3. Open AAA and post-operative complications.

OPEN AAA

MI: No N = 76	Mean LOS	Median LOS
Total LOS	12	9
Postop LOS	12	8

MI: Yes N = 3	Mean LOS	Median LOS
Total LOS	35	32
Postop LOS	34	30

PRBC >=1 or Return to OR for Bleeding: No N = 26	Mean LOS	Median LOS
Total LOS	8	7
Postop LOS	7	7

PRBC >=1 or Return to OR for Bleeding: Yes N = 53	Mean LOS	Median LOS
Total LOS	16	12
Postop LOS	15	10

Stroke: No N = 78	Mean LOS	Median LOS
Total LOS	13	9
Postop LOS	12	8

Stroke: Yes N = 1	Mean LOS	Median LOS
Total LOS	25	25
Postop LOS	25	25

Table 4. Infra-inguinal bypass and post-operative complications.

INFRA BYPASS

MI: No N = 242	Mean LOS	Median LOS
Total LOS	8	6
Postop LOS	6	5

MI: Yes N = 6	Mean LOS	Median LOS
Total LOS	14	15
Postop LOS	12	14

PRBC >=1 or Return to OR for Bleeding: No N = 169	Mean LOS	Median LOS
Total LOS	6	4
Postop LOS	5	4

PRBC >=1 or Return to OR for Bleeding: Yes N = 79	Mean LOS	Median LOS
Total LOS	14	11
Postop LOS	9	7

Stroke: No N = 246	Mean LOS	Median LOS
Total LOS	8	6
Postop LOS	6	5

Stroke: Yes N = 2	Mean LOS	Median LOS
Total LOS	26	26
Postop LOS	22	22

Conclusions:

Patients on ACEi/ARBs pre-operatively tended to have shorter LOS after undergoing both open AAA and infra-inguinal bypass. Neither were statistically significant, however, LOS was near 30 hours shorter

after open AAA. It is not surprising that those patients having post-operative complications would have longer LOS.

Improvement strategy- To continue to work on limiting post-operative cardiovascular complications. To develop a tool engaging the primary care team pre-operatively. Goal would be to optimize HTN and consider an ACEi/ARBs if clinically appropriate and greater than one month out from surgery.

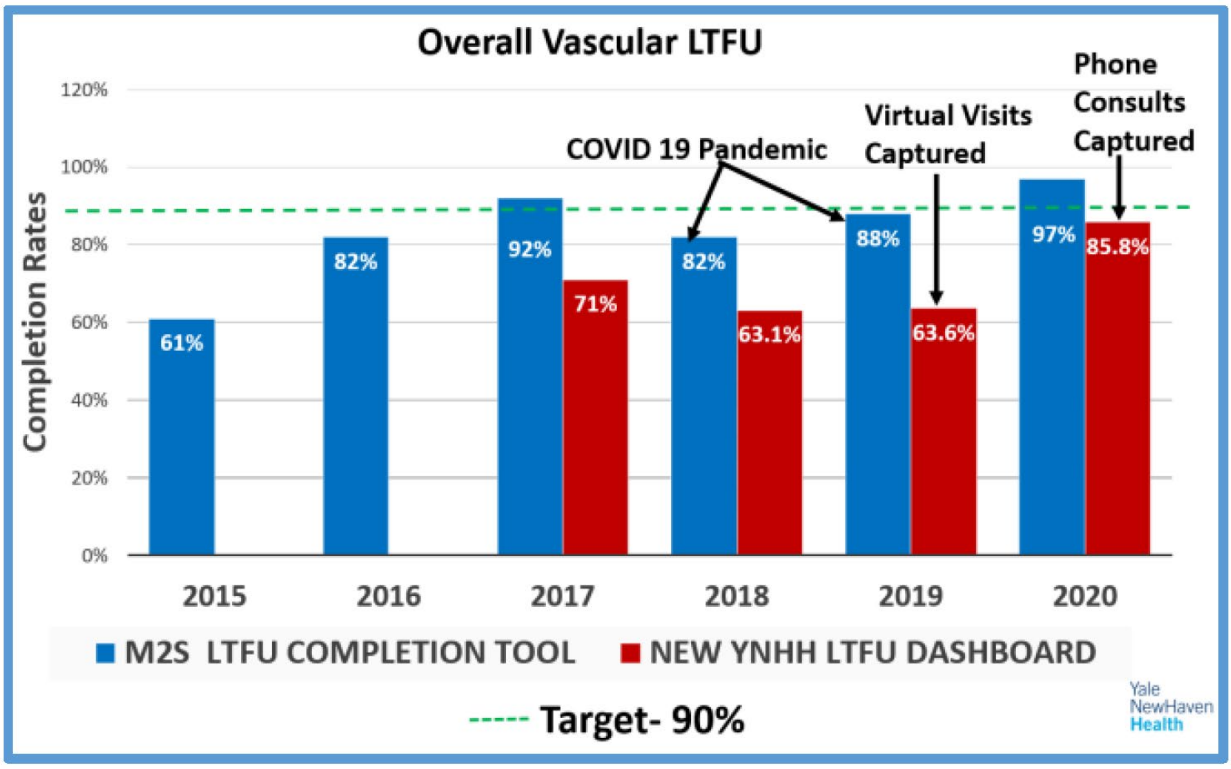
16. Managing the Pursuit: Optimizing Long-Term Follow-Up at the Heart and Vascular Center, Yale New Haven Hospital

Objective:
To improve and sustain long-term follow-up (LTFU) rate of > 90% for patients undergoing vascular procedures at YNHH

Authors:
• Sandy Fillion MSN, RN-BC; Sandra.Fillion@YNHH.org
• Erin Wilson MSN, RN-BC, CNL, CNML; Erin.Wilson@YNHH.org

Methods:
At the YNHH Heart and Vascular Center (HVC) inadequate follow-up of patients after vascular procedures was identified for cases performed in 2015 (61%). The completion rate for LTFU as defined by Vascular Quality Initiative (VQI) is number of patients who had a vascular procedure with a one-year follow-up during a 9 to21-month window. The following interventions were performed:
• 2016 – Utilized the Plan-Do-Study-Act methodology, a gap analysis was conducted. Performance Improvement team led by dyad partners; charter & key drivers were established.
• 2017 – Partnered with Joint Data Analytics Team to standardize documentation templates. Created automated reports & built an internal vascular dashboard to include LTFU, capturing LTFU only from vascular providers, whereas M2S Pathways (VQI) includes LTFU from any provider.
• 2017 initiated ongoing surveillance & quarterly reporting and sharing of missing LTFU cases directly with providers
• 2021 – Optimized LTFU report to capture all virtual visits
• 2022 – Optimized LTFU report to capture all phone call visits.

Results:



Discussion:

The overall LTFU of 82% was reached for cases performed in 2016.Despite improvement, 157 patients were lost to follow-up. Successfully met the performance target of >90% LTFU rate for 2017 vascular cases through 3 key drivers: Patient Communication, Provider Engagement & Technology.
However, there was a drop in LTFUs (2018, 2019 cases) impacted by the pandemic. Restoration is currently underway with the inclusion of virtual visits.
During 2022 (for 2020 LTFUs):

- The HVC Performance Improvement Coordinator began emailing providers directly with individualized patient case lists of patients approaching the end of the 21-month window
- The abstractors started capturing phone calls in the YNHH dashboard to better align with the VQI data definition for long term follow up
- **Combined, these two efforts have resulted in 2020 LTFU rate of 85.8% on the YNHH Dashboard for vascular providers only, and 97% for VQI (M2S Pathways) including follow-up by any provider.**

Implications:

New plans to replicate the vascular LTFU PI project across the system, as we expand registry participation. New proposal to optimize VQI registry data retrieval and correlate patient outcomes with LTFU compliance.

17. Our Transition from NCDR®PVI Registry™ (Peripheral Vascular Intervention Registry) to Vascular Quality Initiative (VQI) Registry for Carotid Artery Stent (CAS) Outcomes

Author: Lisa Wilbert – Stony Brook University

Objective/Introduction:
In 2021, The American College of Cardiology and the Society for Vascular Surgery moved to a single vascular registry to measure outcomes. All data collection for Carotid Artery Stents moved to this united vascular registry at that time. VQI is now the registry that is utilized for our national benchmarking and The Joint Commission Stroke Certification, as well as being a requirement of Centers for Medicare and Medicaid Services (CMS) Carotid Artery Stenting facility credentialing. Utilizing these data, we felt there was an opportunity for our institution to better understand the specifications in VQI and develop tools and reports to guarantee accuracy and completeness of data entered as well as identify performance improvement opportunities.

Methods:
First steps included a thorough review of the VQI specifications for the CAS registry in addition to downloading the most recent VQI Regional Quality Report to identify the current state of our CAS outcomes. We created a biweekly email to the team containing information about the most recent patients abstracted and any post-operative occurrences. The CAS population list was updated to include information on Procedure type (Transfemoral Carotid Artery Stenting (TFEM) vs. TransCarotid Artery Revascularization (TCAR)), whether the patient was symptomatic, if embolic protection was deployed, if the patient was a mortality, new stroke, or had any other complications and if the patient met CMS or other high-risk criteria. It was identified that some required metrics were difficult to obtain from the current electronic medical record (EMR), so a Carotid artery stent procedure note was developed for medical record documentation. The note was updated and improved based on feedback from the physician team as well as the abstraction team. A monitoring tool was also created to see how often these new notes were being utilized.

Results: Documentation improvement initiatives helped our clinical team demonstrate the excellent care they provide by ensuring that accurate documentation lives in the medical record and can be easily extracted for use in quality and registry work. Other documentation enhancements were made including updating procedural sections in the post-operative PowerNote for Carotid Artery Stents and vascular imaging ready/available date time fields. The quality team and the clinical team met to review exclusion criteria for mortality and stroke for any additional documentation opportunities.

Conclusions: The transition from NCDR (National Cardiovascular Data Registry) PVI to VQI Registry for CAS Outcomes has provided our institution with opportunities to improve documentation and reporting. Both the clinical and quality team have more information to improve the outcomes and care of these patients.

18. Quality Improvement Process: Reducing Groin Complications after Vascular Interventions

Authors: Kevin Colbert M.Eng, Dylan Brooks M.D., Bright Benfor M.D., Eric Peden M.D., Maham Rahimi M.D., Ph.D

Problem Statement:
Vascular procedures involving groin incisions often have complications that delay wound healing. This requires further intervention leading to increased length of stay, readmission, and an increased morbidity & mortality, including limb loss. A retrospective review indicated our institution's complication rate was 45.5% and suggested an area for improvement.

Goals:
The goal of this quality improvement initiative was to identify high risk patients and improve perioperative management strategies to reduce complications.

Improvement Strategies:
A team of surgeons, researchers, and informaticists were formed as key members in the quality improvement project. Three main initiatives were taken:
● Surgeons worked with informaticists to identify the appropriate CPT and ICD codes for procedures that would be included in a retrospective study of the appropriate patient population to assess institutional rates of operative complications.
● Researchers identified key risk factors from an exhaustive literature review (gender, BMI, ever-smoker, end-stage renal disease, reoperation, prosthetic use, and emergent status) and created a prediction model for high complication risk categorization. This was then integrated into a phone application for a rapid assessment of additional procedures.
● Surgeons revised and implemented perioperative protocols for high risk patients. High risk patients were given adjunct perioperative management which included a muscle flap, negative pressure wound therapy (NPWT), and other wound products.

Results:
The retrospective review of the first initiative identified 198 patients between the years 2016-2019. Of these, 88 (45.5%) had complications which included infections, seromas, hematomas, skin necrosis, and dehiscence. The risk assessment model used to aid surgeons was then created and identified high risk patients with a sensitivity and specificity of 92.47% and 60.98%, respectively. Revised perioperative protocols were implemented and a subsequent review of vascular surgeries involving groin incisions was performed showing an over 30% reduction in complications. From the years 2020-2021, 132 patients were identified meeting our criteria and 19 (14.4%) had postoperative complications, shown in **Figure 1.**

Conclusions:
By creating a workflow for departmental review of institution wide data, we identified an area for quality improvement that resulted in a restructuring of guidelines for patient care. The success of this workflow has paved the way for systematically reviewing other areas for potential improvements where we continue to use multidisciplinary teams to improve departmental quality of care.

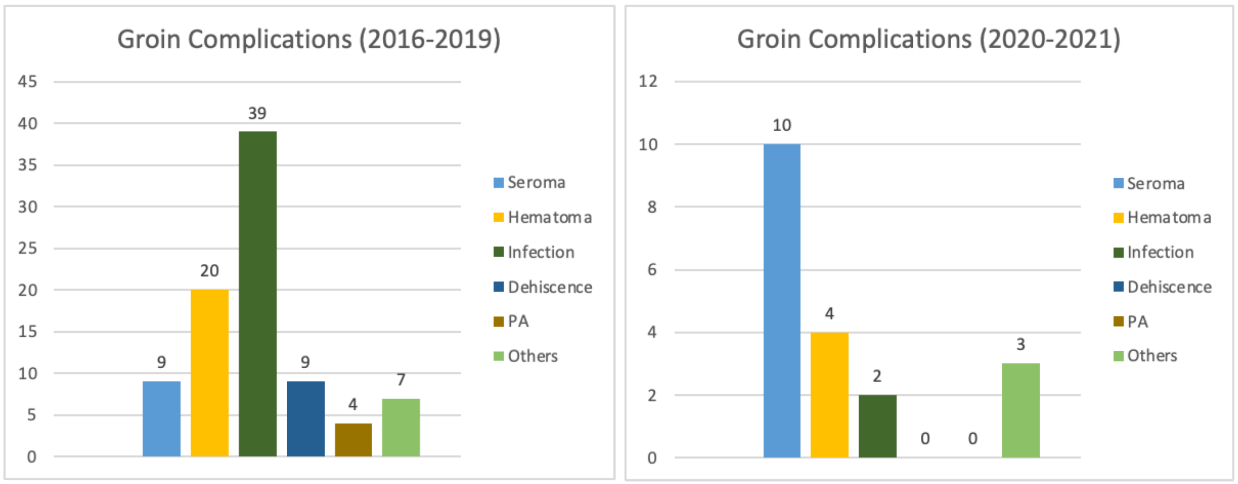


Figure 1: Complications from vascular intervention requiring groin access from 2016-2021 before **A.** and after **B.** the use of perioperative protocol.

19. Quarterly Long-term Follow Up Notifications and VQI LTFU Epic Templates improve Overall Long-Term Follow-Up in VQI

Authors: Debra Berry, FNP-BC., Amanda Enerson MSN, RN, Rhonda A. Ransom, MSML, Richi Chaudhry MHA, Naveed u. Saqib, MD, Gordon H. Martin, MD, Sophia Khan-Makoid, MD, Sheila M. Coogan, MD

Our hospital participates in four VQI modules: Carotid Angioplasty and Stent (CAS), Carotid Endarterectomy (CEA), Thoracic Endovascular Aneurysm Repair (TEVAR), and Endovascular Aortic Aneurysm Repair (EVAR). Long-term follow up (LTFU) is essential to understand outcomes for vascular procedures but LTFU rates are low. From July 1, 2019 to June 30, 2020, LTFU rates were as follows for each module: CAS 58% regionally, 65% nationally; CEA 58% regionally ,71% nationally; EVAR 55% regionally, 70% nationally; and TEVAR 45% regionally 70% nationally. To improve LTFU, Memorial Hermann Hospital Southeast received quarterly updates from the VQI managers advising physicians when patients were within the 9 to 21 month LTFU window. In addition, specific LTFU templates were created in EPIC for each of the modules to capture all data required in VQI. LTFU compliance went from 63% during the period of October – December 2021 to 90% compliance from October – December 2022.

In conclusion, notification of clinic of patients who should be coming for follow-up prevented fallout and EPIC specific templates improved capture of data required for long-term follow-up in VQI.

20. Templated Note for Improved Vascular Quality Initiative Data Acquisition

Authors: Mikael Fadoul MD, Philip Batista MD, Bruce Tjaden MD, Katherine McMackin MD, Jeffrey Carpenter MD, Joseph Lombardi MD MBA. ***Division of Vascular Surgery, Cooper University Hospital, Camden NJ***

Problem Statement:
Data acquisition for the Vascular Quality Initiative (VQI) can be a burden for an institution and requires significant time and resources. This can include dedicated research staff, data mining, retrospective data analysis, and data entry. A non-standardized process allows for a multitude of compliance issues and inefficiencies.

Goal:
To implement a standardized institutional process to obtain timely data acquisition for the VQI data points regarding EVAR, TEVAR, TCAR and open AAA thus improving the overall compliance and workflow.

Improvement Strategies:
The VQI modules including: EVAR, TEVAR, TCAR, and open AAA, were identified as having multiple data points missing in the initial communication of data to the research staff. This led to significant time revisiting cases and communications to obtain complete records for VQI data acquisition. In response, we sought to implement standardized templates for brief operative notes that would include the necessary data points that were frequently absent for the associated VQI modules.

Results:
Retrospective review of data acquisition practices at our institution pre and post implementation of standardized brief operative note templates. We analyzed data compliance, defined as completion of the associated VQI data set in the brief operative note immediately post-operatively, during the pre-implementation phase, December 2020 – April 2021, which had a compliance rate of 23% (n=34). During the post implementation phase, August 2021 – June 2022, the compliance rate was 88% (n=83). This led to an absolute 65% improvement, and a relative improvement of 282% in overall compliance with VQI data acquisition during the post-implementation phase, with the largest increases in the TCAR and open AAA modules (Figure 1).

Challenges/Lessons Learned:
The implementation period required frequent reminders. After this early adoption period, physician practices improved. This demonstrated the necessity of an institutional protocol to aid in the early adoption process for physicians using the standardized brief operative templates to improve VQI compliance. Given the dependence on physician input, there is room for error, and is reflected in the less than 100% compliance rate during the post-implementation phase.

Success Factors:
The creation and implementation of these standardized brief operative templates led to a significant increase in compliance with VQI data acquisition. This in turn may lead to a decreased turnaround time with the research staff performing the data logging and improved overall workflow with decreased communications with the provider to revisit delinquent cases and provide outstanding datapoints.

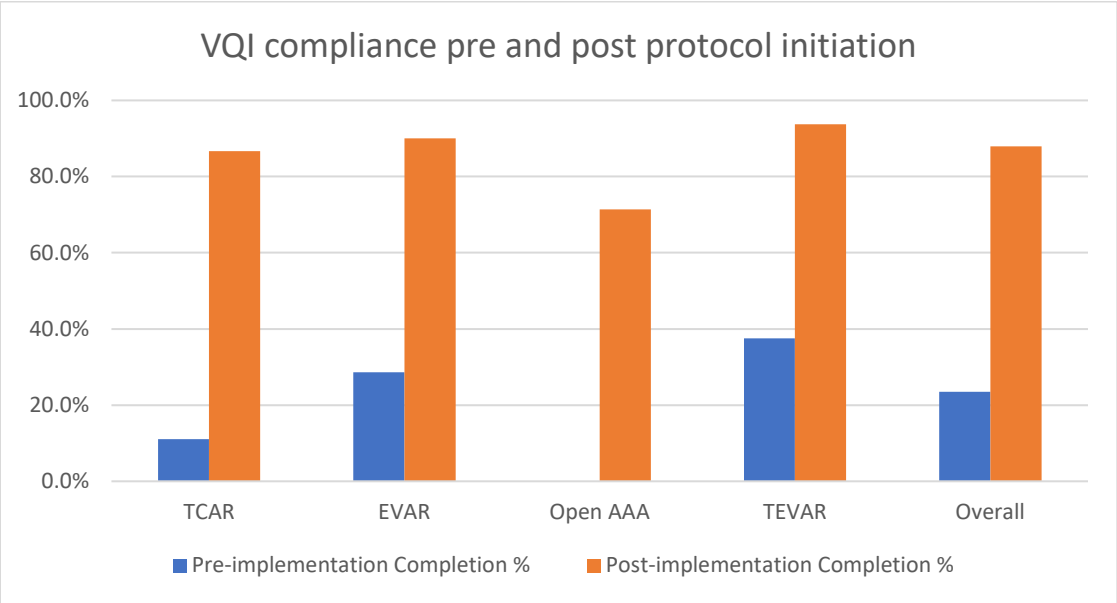


Figure 1: Pre and post-implementation compliance rates

21. TEVAR/Complex EVAR Claims Audit

Author: Donna Fleming

Problem Statement:
In 2022, Cleveland Clinic received notice of our required participation in the VQI Claims Audit. Our TEVAR/Complex EVAR audit of 2021 cases was successfully completed with only 1 case missing from VQI that required entry. However, during the process we also discovered that we only had 86% case match for this module. This meant there were cases in our VQI database that did not have matching CPT codes provided to us through billing. We were curious to see why cases we had identify through operative schedules did not have eligible matching CPT codes.

Goals:
To investigate coding of unmatched cases in VQI. Improved collaboration with coding/billing department to discover opportunities for coding interpretation and improved procedure documentation to more accurately identify cases eligible for VQI, as well as potentially increase opportunities for reimbursement. We would like to achieve a 95% match rate next time we participate in VQI Claims validation process.

Improvement Strategies:
The Hospital Manger completed the Claims Validation process. We identified 16 cases that were in VQI TEVAR/Complex EVAR module, but did not have an eligible matching CPT code per VQI. These cases were confirmed to meet inclusion criteria.

With the support of the Department Chairman, we requested the Finance Department to authorize an audit of these cases to be performed by billing and coding experts.

Upon review, cases that had been miscoded were asked to be re-coded and possibly re-billed. For any cases not corrected, we requested feedback from billing to help us improve our procedure documentation.

Results:
Of the 16 procedures we felt met inclusion criteria that did not have matching codes for the TEVAR/Complex EVAR module, 12 were ultimately corrected to codes that did match VQI eligible CPT codes. 11 cases were incorrectly coded as TEVAR extensions (CPT code 33886) as opposed to a TEVAR code 33880 or 33881. 1 case was coded an EVAR (CPT code 34705) but was corrected to complex EVAR code (34845.) 4 cases did not have any changes made to their coding.

Challenges/Lessons Learned:

- Despite specialty expertise, coding and billing interpretation is a complex process for Vascular and Cardiothoracic Surgery.
- Operative notes require detailed documentation to assist coders for accurate coding and billing.
- Ongoing education is also required for coders to fully understand complex vascular procedures.

Success Factors:
Results of this audit demonstrated that there were many instances were completion TEVAR cases were billed as TEVAR extensions. Along with improved identification of VQI eligible cases, we are also able to increase our revenue by correctly coding these cases.

The coding/billing department has instituted the following:

- Additional review of 2022 TEVAR cases which have resulted in additional corrections.
- Internal coding guidelines implemented for Frozen Elephant Trunk procedures and staged thoracic aorta repairs.
- Documentation improvement feedback by will be provided for TEVARS, total arch, and Frozen Elephant Trunk procedures when they are identified. These cases will be continuously reviewed for documentation improvement and coding accuracy.

22. Use of Vascular Quality Initiative Data to Target Area of Opportunity for Infrainguinal Bypass

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Problem Statement:
The Froedtert Hospital Summer 2021 Vascular Quality Initiative (VQI) Best Practices Dashboard for procedures completed between April 1, 2020 and March 31, 2021 indicated that our center had wound infection rates significantly higher than our region and we were in the bottom 25th percentile of VQI overall. Specifically, the infection rate for infrainguinal bypass for patients with claudication was 25% and infrainguinal bypass for patients with chronic limb threatening ischemia (CLTI) was 5.1%.

Goal:
Our goal was to decrease wound infection rates for infrainguinal bypass procedures by 50% by December 2022.

Improvement Strategies:

- Created a multidisciplinary team including surgeons, fellows, advanced practice providers, inpatient nursing, clinical program manager and service line leadership to perform a deep dive into the patients identified with infection
- Completed literature search regarding best practice recommendations for care of vascular surgical patients
- Collected data on specific elements; including but not limited to antibiotic use, antibiotic timing, surgical procedure duration, site prep and bacteria identified
- Practice change to perform pre-operative surgical clipping outside of the operating room for both inpatient and outpatient procedures
- Implemented Nose to Toes program utilized for vascular surgery enterprise wide which also included education, build of panel order in Epic and creation of compliance report to track appropriate ordering and completion
- Focused discharge instructions pertaining to surgical incision care at home
- Obtained grant funding to cover cost of discharge packet of chlorhexidine wipes
- Investigated but did not implement proposed GetWell Loop for infrainguinal bypass patients
- Monthly System Performance and Operations Team (SPOT) reviews all infections for opportunity

Results:
One year later, the Froedtert Hospital Summer 2022 VQI Best Practices Dashboard for procedures completed between April 1, 2021 and March 31, 2022 indicated that our center has 0% wound infection rates for infrainguinal bypass for both claudication and CLTI, and we are in the top quartile. We continue our efforts for reducing infections and the latest Fall 2022 VQI Best Practices Dashboard for procedures completed between July 1, 2021 and June 30, 2022 our center remains at 0% for infrainguinal bypass for both claudication and CLTI.

Challenges/Lessons Learned:

- IT resources where a challenge and delayed implementation as we had to wait for the Nose to Toes panel order build and modification of the pre-operative order set.
- Our center is part of a larger healthcare organization so enterprise implementation required communication and education at multiple sites.
- We identified the need to track patients that received a discharge packet in order to complete follow up questions at the first post op clinic visit regarding incision care at home.
- It was important to communicate expectations pre op for patients regarding surgical site care post op, which includes showering before hospital discharge and incision care at home.

Success Factors:

- Engagement of the multidisciplinary team to improve the outcomes for this patient population
- Our monthly SPOT meetings allow for robust discussion of implemented strategies

We would like to thank the Vascular System Performance and Operations Team, Vascular Surgery Clinic and 11CFAC staff for all of your efforts in this quality improvement work.