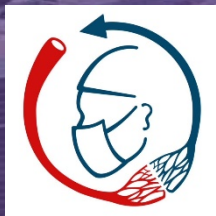




Quality Improvement: what is it and why is it important?

2022 Vascular Annual Meeting



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Disclosures

- None

Objectives

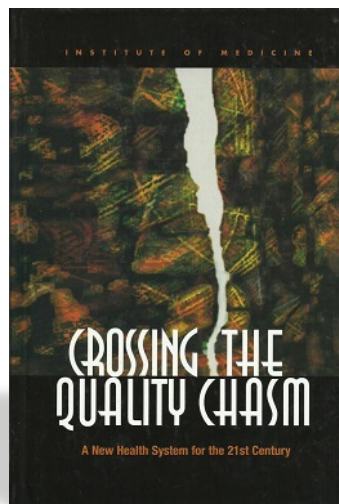
- Definition of quality and quality improvement (QI)
- Why QI is important
- Current issues in QI

What is QI?

What is Quality?

Meeting or exceeding customer expectations. *Juran Fitness for Use*

Direct correlation between the level of improved health services and the desired health outcomes of individuals and populations. *IOM*



Safe

Avoiding harm to patients from care intended to help

Patient-centered

Providing care that is respectful of and responsive to patient preferences, needs and values

Effective

Health services are provided based on scientific knowledge to those who will benefit and avoiding services to those who will not

Timely

Reducing waits and harmful delays for those who receive *and* give care

Efficient

Avoiding waste, including equipment, supplies, ideas and energy

Equitable

Providing care that does not vary in quality because of personal characteristics

What is QI?

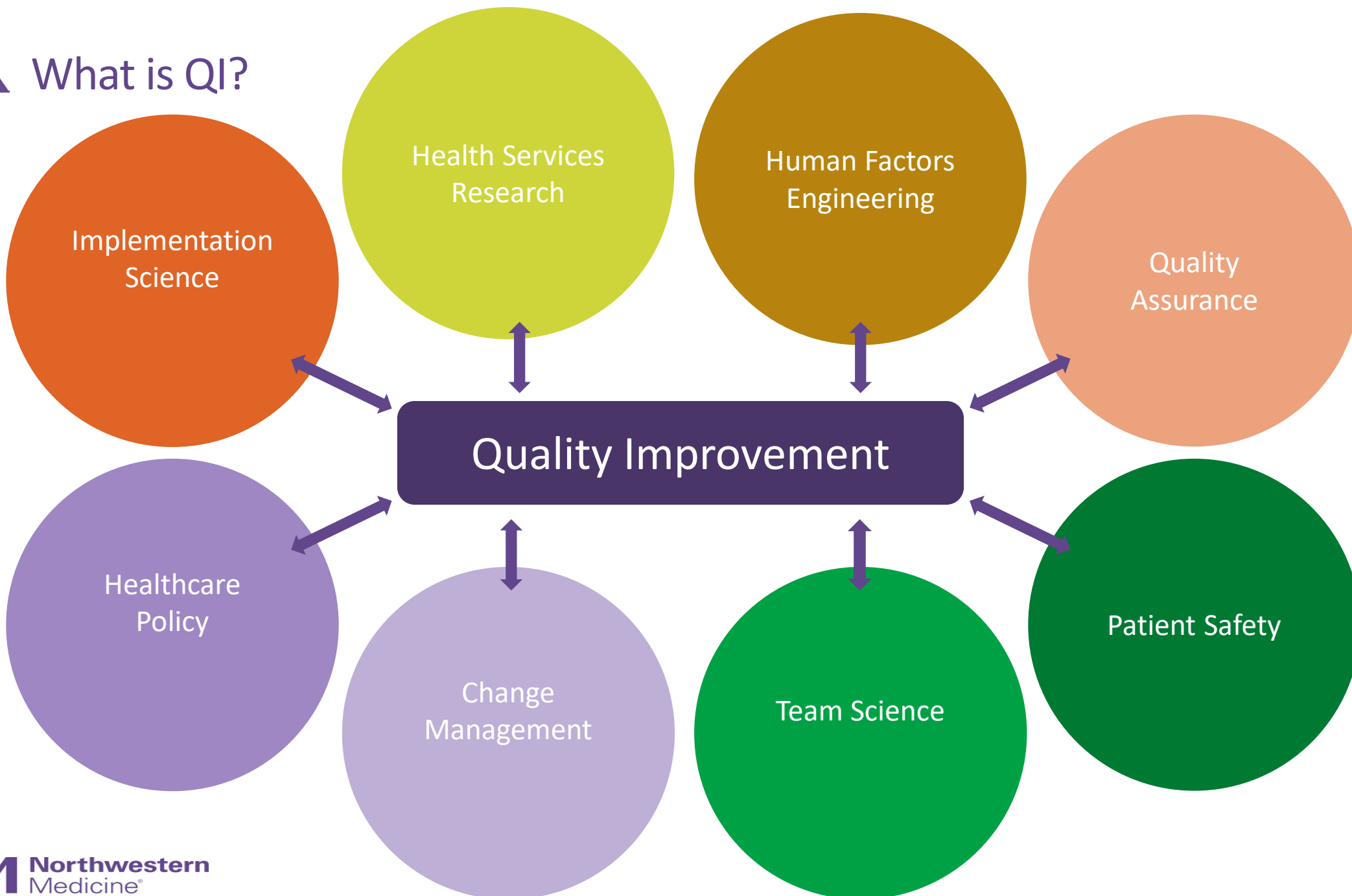
What is Quality Improvement?

Systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups. *USDHHS*

What is QI?

Traditional Research	Quality Improvement
Hypothesis	Problem Statement
Discover new evidence	Integrate evidence-based practice
Few interventions with attempt to control for confounding factors	Multiple changes simultaneously in a complex system
Comparison to control group	Comparison to pre-intervention
Conclusions obtained over long intervals	Effect of intervention assessed in rapid cycles

What is QI?



Why Quality Improvement is Important



Why Quality Improvement is Important



Why Quality Improvement is Important

The New York Times

Social Security and Medicare funds improved during the pandemic, but the long term remains dire.



By Tara Siegel Bernard and Margot Sanger-Katz

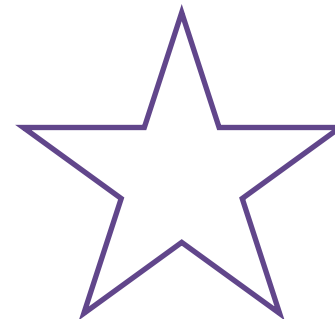
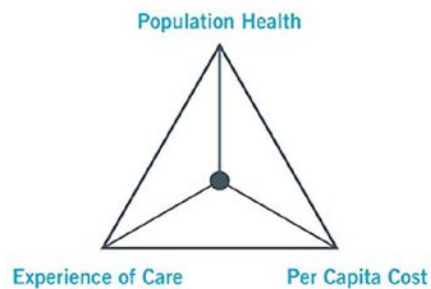
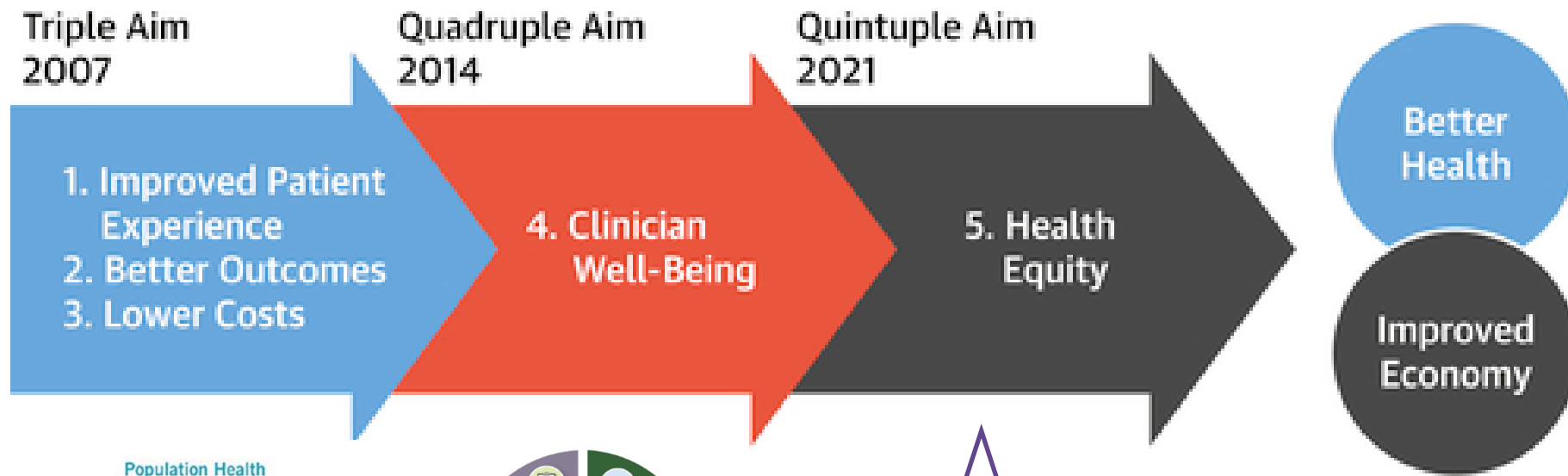
June 2, 2022

The financial health of Social Security and Medicare, two of the nation's most crucial safety-net programs, improved slightly in 2021 on the back of a strong economic recovery during the coronavirus pandemic, according to two new government reports.

However, both programs continue to face major longer-term shortfalls that could reduce retirement benefits for millions of

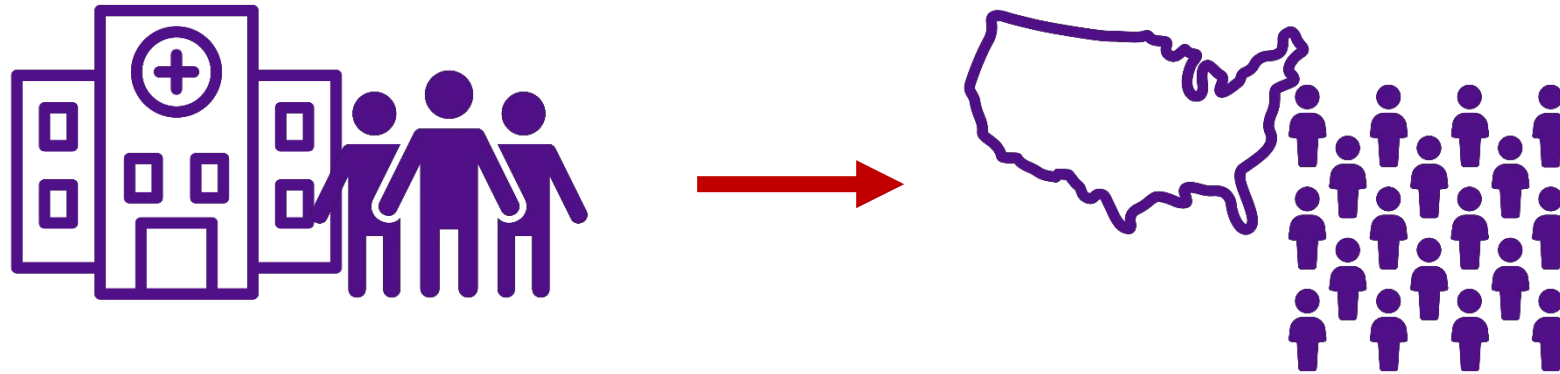


Modern Trends in Quality Improvement



What Can We Do to Help?

- Education and engagement of our physicians and staff in QI
- Focus on best practices in implementation as well as clinical care
- Contribute to advocacy efforts



Providing the best care for my patients, and saving money

Grace J. Wang, MD, MSCE, FACS

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Hospital of the University of Pennsylvania

Division of Vascular Surgery and Endovascular Therapy



No relevant disclosures

Optimizing outcomes and lowering costs

- “Optimizing Value in healthcare”
- According to Michael E. Porter:

“The best “health outcomes achieved per dollar spent”

- How does the VQI allow us to ensure good outcomes as well as limit costs?



Vascular Quality Initiative Collects Data on 13 Vascular Procedures, 1 Vascular Medicine registry

- CAS
- CEA
- EVAR
- Open AAA repair
- Hemodialysis Access
- Infrainguinal bypass
- Suprainguinal bypass
- Peripheral vascular intervention
- Lower extremity amputation
- Thoracic and Complex EVAR
- IVC filter
- Varicose vein
- Venous stent
- Vascular Medicine Registry (in conjunction with AHA and SVM)-carotid, PAD and AAA

Unlike other non-vascular registries, the VQI collects outcomes which are specific to each type of procedure

TEVAR/Complex EVAR-outcomes

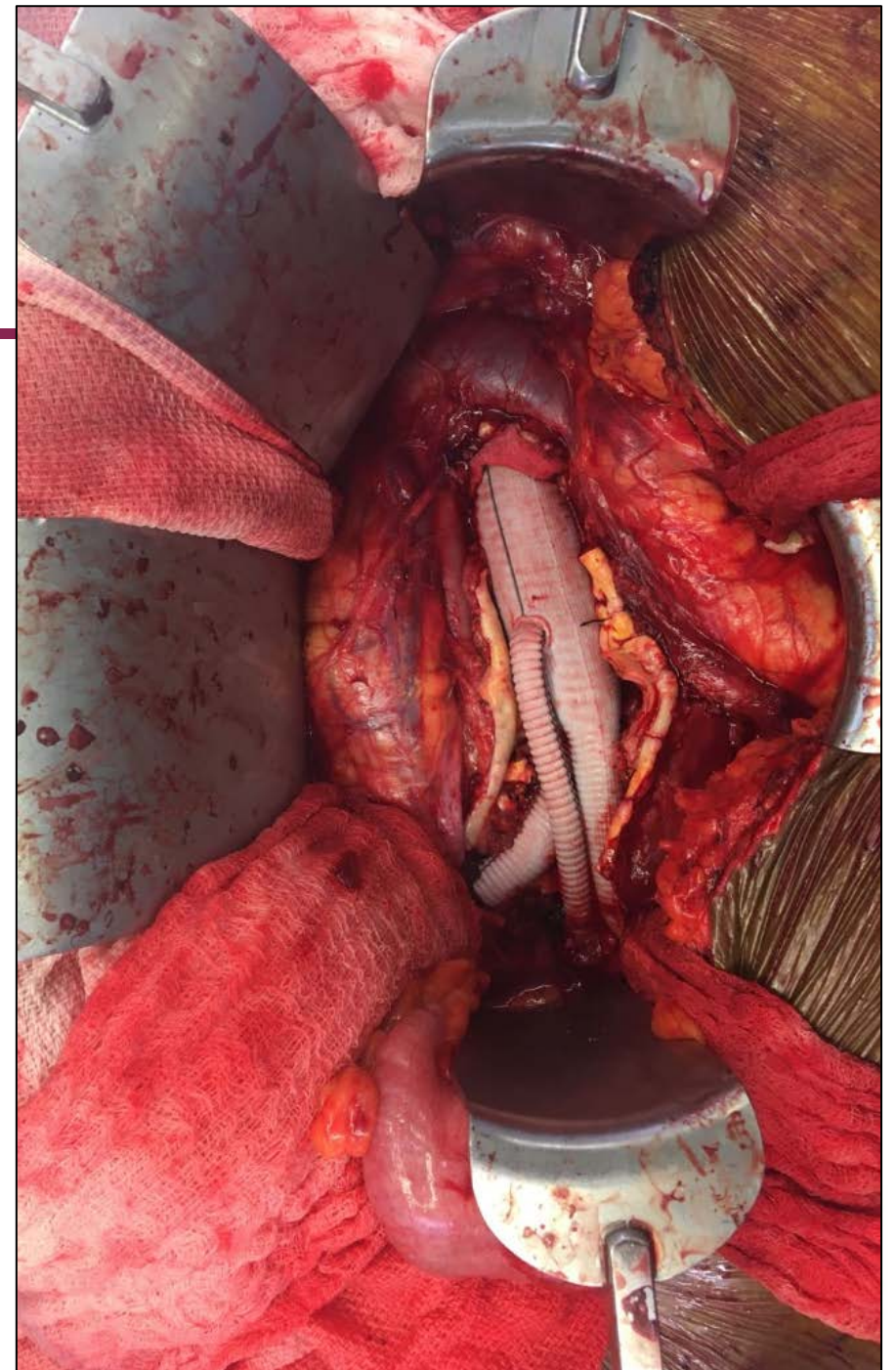
- Stroke
- Spinal cord ischemia
- Access complications
- Retrograde type A dissection
- Postoperative respiratory issues
- Death

Cerebrovascular Sx	<input type="checkbox"/> None	<input type="checkbox"/> TIA	<input type="checkbox"/> Right carotid ischemic stroke	<input type="checkbox"/> Left carotid ischemic stroke			
	<input type="checkbox"/> Right Vertebrobasilar ischemic stroke	<input type="checkbox"/> Left Vertebrobasilar ischemic stroke	<input type="checkbox"/> Bilateral ischemic stroke	<input type="checkbox"/> Hemorrhagic stroke			
If Cerebrovascular is not None or TIA ,							
Modified Rankin Score	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Spinal Ischemia	<input type="checkbox"/> None	<input type="checkbox"/> Transient	<input type="checkbox"/> Present at discharge				
If Spinal Ischemia is <i>Present at discharge</i> ,							
Leg Motor Function at Discharge	<input type="checkbox"/> Mild weakness	<input type="checkbox"/> Moderate weakness	<input type="checkbox"/> Severe weakness	<input type="checkbox"/> Paralysis			
Puncture Site Hematoma	<input type="checkbox"/> No	<input type="checkbox"/> Minor	<input type="checkbox"/> Transfusion	<input type="checkbox"/> Thrombin injection	<input type="checkbox"/> Surgical Rx		
Access Site Occlusion	<input type="checkbox"/> No	<input type="checkbox"/> Medical Rx	<input type="checkbox"/> Interventional Rx	<input type="checkbox"/> Surgical Rx			
Device Access Artery Injury	<input type="checkbox"/> None	<input type="checkbox"/> Medical Rx	<input type="checkbox"/> Endovascular Rx	<input type="checkbox"/> Surgical Rx	<input type="checkbox"/> Endovascular and surgical		
Re-intervention 1:							
Date Performed	<input type="text"/>						
Indication Details	<input type="checkbox"/> Aortic rupture	<input type="checkbox"/> Aortic enlargement	<input type="checkbox"/> FLP	<input type="checkbox"/> Extension dissection			
	<input type="checkbox"/> Malperfusion	<input type="checkbox"/> Endoleak, Type I	<input type="checkbox"/> Endoleak, Type II				
	<input type="checkbox"/> Endoleak, Type III	<input type="checkbox"/> Device contributing factors					
	<input type="checkbox"/> Non-access bleeding	<input type="checkbox"/> Other					

Open AAA repair-operative details

Procedure Information

- Anesthesia General General + Epidural
- Renal/visceral ischemic time _____ minutes
(Min/Max range: 0 to 200 minutes.)
- Distal Anastomosis Aorta CIA EIA CFA
- Graft Type Dacron, woven Dacron, knitted Dacron, coated PTE
 Non-autologous Biologic
- Proximal Clamp Position Infrarenal Above One Renal Above Both Renals
 Supraceliac
- Heparin No Yes
- Mannitol No Yes
- Crystalloid _____ ml
(Min/Max range: 50 to 15000 ml.)
- PRBC in OR _____ units
(Min/Max range: 0 to 20 units.)
- Skin Prep Chlorhexidine Alcohol Iodine Chlor + iodine alcohol All 3
- Conversion from Endo AAA No Early Late
- Exposure Anterior Retroperitoneal
- Graft Body Diameter _____ mm
(Min/Max range: 12 to 40 mm.)
- Hypogastric ligated/occluded None Single Both
- IMA at Completion Occluded Ligated
 Reimplanted
- Cold Renal Perfusion No Yes
- EBL _____ ml
(Min/Max range: 50 to 10000 ml.)
- Autotransfusion _____ ml
(Min/Max range: 0 to 9000 ml.)
- Total Procedure Time _____ minutes
(Min/Max range: 0 to 720 minutes.)
- Renal Bypass No Yes
- Other Abdominal No Yes



Open AAA-postoperative outcomes

Post-Op	
Time To Extubation	<input type="radio"/> In OR <input type="radio"/> <12 hrs <input type="radio"/> 12-24 hrs <input type="radio"/> >24 hrs
ICU Stay	_____ days (Min/Max range: 0 to 100 days.)
Myocardial Infarction	<input type="radio"/> No <input type="radio"/> Troponin only <input type="radio"/> EKG or clinical
CHF	<input type="radio"/> No <input type="radio"/> Yes
Change of Renal Function	<input type="radio"/> None <input type="radio"/> Creat. Increase > 0.5 mg/dl (44.2 umol/L) <input type="radio"/> Temp. Dialysis <input type="radio"/> Perm. Dialysis
Bowel Ischemia	<input type="radio"/> No <input type="radio"/> Medical Rx <input type="radio"/> Surgical Rx
Return to OR	<input type="radio"/> No <input type="radio"/> Yes
Stroke	<input type="radio"/> None <input type="radio"/> Minor <input type="radio"/> Major
Vasopressors Required Post-Op	<input type="radio"/> No <input type="radio"/> Yes
Transfusion # Units PRBC	_____ units (Min/Max range: 0 to 20 units.)
Dysrhythmia (new)	<input type="radio"/> No <input type="radio"/> Yes
Respiratory	<input type="radio"/> No <input type="radio"/> Pneumonia <input type="radio"/> Ventilator
Leg Ischemia/Emboli	<input type="radio"/> No <input type="radio"/> Yes, rx w/o Surgery <input type="radio"/> Required Surgery <input type="radio"/> Amputation
Wound Complication	<input type="radio"/> No <input type="radio"/> Superficial Separation / Infection <input type="radio"/> Return to OR
Return to OR for Bleeding [±]	<input type="radio"/> No <input type="radio"/> Yes

Specific outcomes can be understood in the context of operative details

CEA-Postoperative outcomes

Post-Op

Cranial Nerve Injury:

Cranial Nerve Injury at DC No Yes

Cranial Nerve Injury IX No Yes

Cranial Nerve Injury XII No Yes

Cranial Nerve Injury VII No Yes

Cranial Nerve Injury X No Yes

Other Cranial Nerve Injury No Yes

Neurologic Event:

New Neurologic Event No Yes

New Right Eye Event No TIA Stroke

New Left Eye Event No TIA Stroke

New Right Cortical Event No TIA Stroke

New Left Cortical Event No TIA Stroke

New Vertebrobasilar Event No TIA Stroke

New Non-Specific/Other Event No TIA Stroke

Time of Onset Right Eye Event Intra-op < 6hrs post-op >= 6hrs post-op

Time of Onset Left Eye Event Intra-op < 6hrs post-op >= 6hrs post-op

Time of Onset Right Cortical Event Intra-op < 6hrs post-op >= 6hrs post-op

Time of Onset Left Cortical Event Intra-op < 6hrs post-op >= 6hrs post-op

Time of Onset New Vertebrobasilar Event Intra-op < 6hrs post-op >= 6hrs post-op

Time of Onset New Non-Specific/Other Event Intra-op < 6hrs post-op >= 6hrs post-op

I
H

Special attention to: Stroke, Cranial nerve injury and cerebral hyperperfusion syndrome

Complications:

Post-Op Complications No Yes

Dysrhythmia (new) No Yes

Wound Infection No Yes

Return to OR No Yes, bleeding Yes, neurologic

Yes, both bleeding and neurologic

Yes, other CEA incision Yes, other

Myocardial Infarction No Troponin only EKG or clinical

CHF No Yes

Reperfusion Symptoms None Seizure or hemorrhage

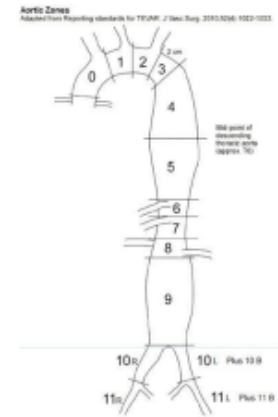
How does the VQI help lower costs?

- Endovascular procedures
 - Greater upfront costs, shorter LOS
- Open procedures
 - Less device costs, longer LOS

Granular procedural data for endovascular procedures

- TEVAR and Complex EVAR registry
- EVAR registry
- Track numbers of aortic stent grafts, diameters, lengths, adjunctive technologies such as IVUS, intravascular lithotripsy

Proximal Zone of Disease		Distal Zone of Disease	
<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 10R
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 10L
<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 10B
<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 11R
<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 11L
<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 5	<input type="checkbox"/> 11B
<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 6	
<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 7	
<input type="checkbox"/> 8	<input type="checkbox"/> 9	<input type="checkbox"/> 8	
<input type="checkbox"/> 9		<input type="checkbox"/> 9	

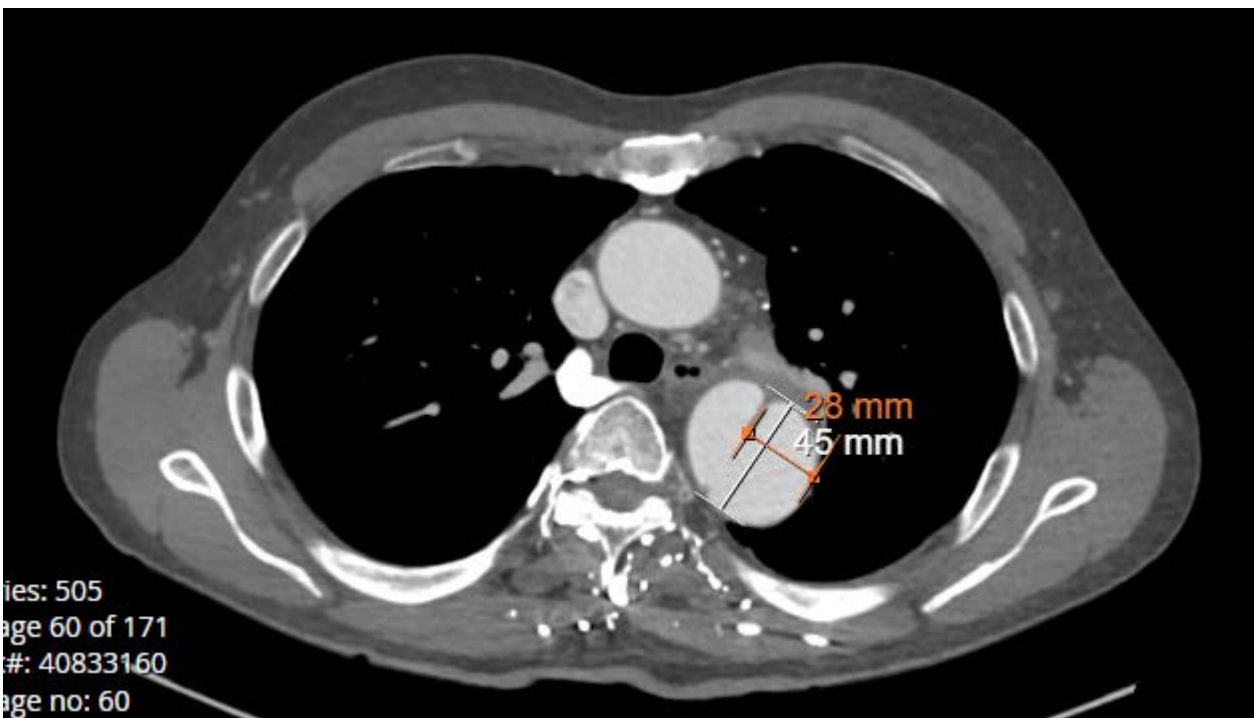


Device 1	Device Details				
	Device Diameter		Device Length		
Device 2	Device Details				

		← Device →					
		1	2	3	4	5	6
Manufacturer	Bolton Medical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cook	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cordis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Endologix	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Gore	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Lombard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Medtronic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Trivascular	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

69 year old with uncomplicated type B aortic dissection-9 months previously

- High risk category
 - 2 cm entry tear
 - 6 mm growth over 6 months



SVS/STS REPORTING STANDARDS DOCUMENT

Editors' Choice

Society for Vascular Surgery (SVS) and Society of Thoracic Surgeons (STS) reporting standards for type B aortic dissections



Joseph V. Lombardi, MD (SVS Co-Chair),^a G. Chad Hughes, MD (STS Co-Chair),^b Jehangir J. Appoo, MD,^c Joseph E. Bavaria, MD,^d Adam W. Beck, MD,^e Richard P. Cambria, MD,^f Kristofer Charlton-Ouw, MD,^g Mohammad H. Eslami, MD,^h Karen M. Kim, MD,ⁱ Bradley G. Leshnowar, MD,^j Thomas Maldonado, MD,^k T. Brett Reece, MD,^l and Grace J. Wang, MD,^d Camden, NJ; Durham, NC; Calgary, Alberta, Canada; Philadelphia and Pittsburgh, Pa; Birmingham, Ala; Brighton, Mass; Houston, Tex; Ann Arbor, Mich; Atlanta, Ga; New York, NY; and Denver, Colo

Uncomplicated
No rupture
No malperfusion
No high-risk features

Aortic diameter >40 mm
False lumen >22 mm
Entry tear lesser curve location

Aortic diameter >40 mm
Radiographic only malperfusion
Readmission
Entry tear: lesser curve location
False lumen diameter >22 mm
Complicated
Rupture
Malperfusion



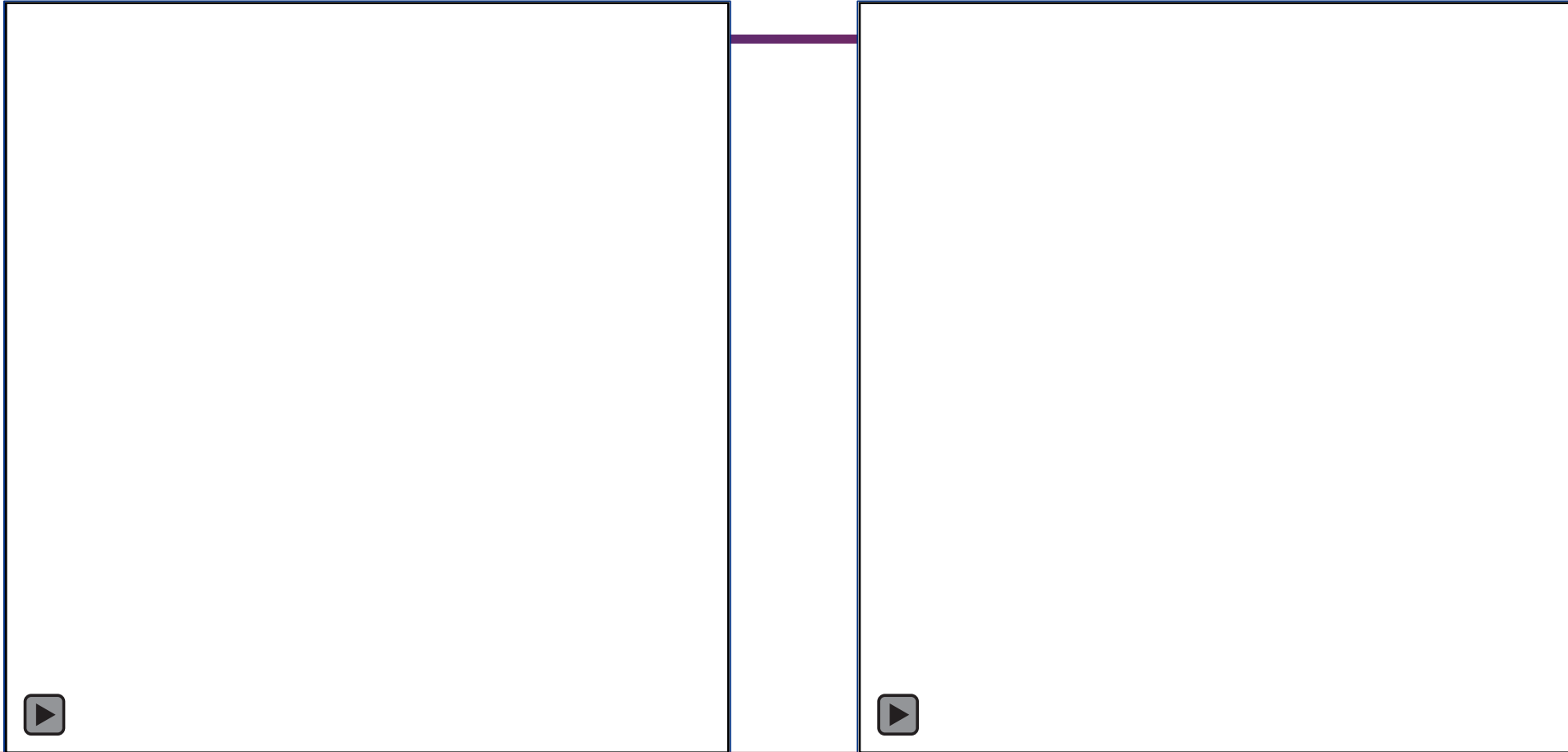
Hospital course

- Hospital day 1-left carotid subclavian bypass
- Hospital day 3-TEVAR and left subclavian coil embolization
 - IVUS

rotid



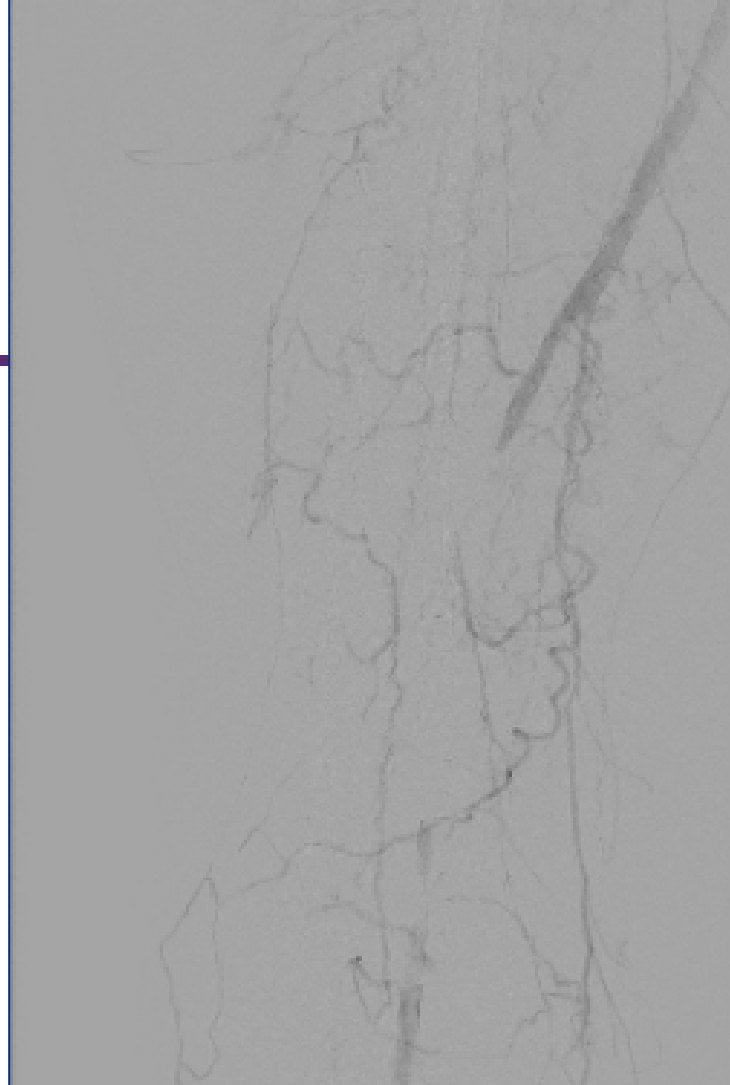
34 x 150 CTAG proximal, 37 x 200 CTAG distal
Penumbra coil-8 mm Ruby and 45 cm packing coil
2 Prostyle in right groin, 1 in left groin



These information are unique to the VQI and can be used to build consignment inventory and assist with contracting

PVI registry

- Track number of drug coated technology, diameters, lengths, adjunctive technologies like atherectomy and peripheral IVUS



Right SFA recanalization, SFA POBA, DCB, Supera stent, perclose vascular closure device

?Role of atherectomy and distal protection device, IVUS, reentry devices
Practice patterns differ, costs can quickly add up
Allows tracking of expensive device utilization

Open procedures have longer length of stay

- For open procedures
 - Track length of stay-biggest driver of cost
 - Pick homogeneous patient population (CEA, bypass for CLTI) to develop a protocol for postoperative care
 - Minimize variation in care as well as complications (i.e. wound infection for infrainguinal bypass)
 - Evaluate opportunities for streamlining care





ELSEVIER



CrossMark

Treating Peripheral Artery Disease in the Wake of Rising Costs and Protracted Length of Stay

Grace J. Wang,¹ Benjamin M. Jackson,¹ Paul J. Foley III,¹ Scott M. Damrauer,¹ Venkat Kalapatapu,² Michael A. Golden,² and Ronald M. Fairman,¹ Philadelphia, Pennsylvania

- Institutional series using VQI data-N=334, combined with billing data
- Mean age 66.4 years
- 64.7% males
- 58.5% white
- 53.6% with diabetes
- 11.1% on dialysis
- Any smoking history-80.5%
- Medicare-45.9%, Medicaid-11.9%

Prolonged vs non-prolonged LOS groups

- Prolonged LOS-greater than 7 days
- Prolonged LOS group stayed 2 weeks longer than nonprolonged LOS group (19.7 ± 12.3 vs. 4.9 ± 1.6 days, respectively, P < 0.001)
- Prolonged LOS patients more likely to be transferred and have diabetes

Table I. Summary statistics (% unless otherwise indicated) of demographics and clinical characteristics

Variables	Overall, <i>n</i> = 334	LOS ≤ 7 days, <i>n</i> = 87	LOS > 7 days, <i>n</i> = 247	<i>P</i> value
Age mean ± SD (years)	66.4 ± 12.4	65.7 ± 11.8	66.7 ± 12.6	0.523
Female gender	35.3	31.0	36.8	0.330
White race	58.5	61.4	57.5	0.382
Primary insurer				0.646
Medicare	45.9	51.1	44.2	
Medicaid	11.9	12.7	11.6	
Commercial	41.7	36.2	43.5	
Self-pay	0.5	0.0	0.7	
Mean LOS	15.8 ± 12.4	4.9 ± 1.6	19.7 ± 12.3	<0.001
Days before procedure	4.4 ± 4.9	0.3 ± 0.8	5.8 ± 4.9	<0.001
Transfer status	12.0	2.3	15.4	0.001
Diabetes	53.6	40.2	58.3	0.004
Type I diabetes	27.5	16.1	31.6	0.015
CHF	27.5	20.7	30.0	0.096
Hypertension	86.2	79.3	88.7	0.029
CAD	65.9	64.4	66.4	0.731
Smoking	—	—	—	0.119
Former	43.7	36.8	46.1	
Current	36.8	46.0	33.6	
Renal function	—	—	—	0.112
Cr < 1.8 mg/dL	82.3	89.7	79.8	
Cr ≥ 1.8 mg/dL	6.6	3.4	7.7	
Dialysis	11.1	6.9	12.5	
COPD	21.6	23.0	21.0	0.706
Statin	71.9	70.1	72.5	0.321
Aspirin	74.5	71.3	75.7	0.451
Anticoagulant	10.5	6.9	11.7	0.205

Presentation and prior surgical history

Table II. Summary statistics (%) on presentation and prior surgical history

Variables	Overall, <i>n</i> = 334	LOS ≤ 7 days, <i>n</i> = 87	LOS > 7 days, <i>n</i> = 247	<i>P</i> value
Indication	—	—	—	<0.001
Asymptomatic	9.6	11.5	8.9	—
Claudication	14.4	33.3	7.7	—
Rest pain	15.9	21.8	13.8	—

Prolonged LOS patients presented with more tissue loss and acute limb ischemia, prior ipsilateral bypass

Prior inflow stent	18.9	13.8	20.6	0.160
Prior ipsilateral bypass	5.4	1.1	6.9	0.042
Prior ipsilateral stents	20.7	16.1	22.3	0.221
Prior ipsilateral major amputation	1.5	1.1	1.6	0.756
Prior ipsilateral minor amputation	11.7	3.4	14.6	0.005
Preoperative ABI ^a	0.48 ± 0.18	0.49 ± 0.19	0.48 ± 0.17	0.686
Preoperative arteriogram	80.9	70.7	84.4	0.007
Preoperative vein mapping	78.7	58.5	85.6	<0.001

Operative variables

Table III. Summary statistics (% unless otherwise indicated) of operative variables

Variables	Overall, n = 334	LOS ≤ 7 days, n = 87	LOS > 7 days, n = 247	P value
Urgency	32.0	9.8	39.7	<0.001
Anesthesia	99.4	100	99.2	0.404
Graft origin	—	—	—	0.110
External iliac	1.9	1.2	2.1	—
Common femoral	52.3	64.6	48.1	—
Profunda	3.8	1.2	4.6	—
Superficial femoral artery	24.4	23.2	24.9	—
Above knee	—	—	—	—
Below knee	—	—	—	—
Tibial	—	—	—	—
Graft re	<p><i>Urgency, tibial or distal target and vein graft conduit were all associated with prolonged LOS</i></p>			
Femo				
Above knee popliteal	16.0	23.2	13.5	0.039
Below knee popliteal	32.3	35.4	31.2	0.489
Tibial and distal	46.4	28.0	52.7	<0.001
Vein graft	60.5	46.3	65.4	0.002
Vein segment	—	—	—	0.024
Vein 1 segment	55.5	46.3	58.6	—
Vein > 1 segment	2.2	0.0	3.0	—
Prosthetic	40.4	53.7	35.9	0.005
EBL	363.1	253.4 ± 221.4	400.4 ± 414.2	0.003
Procedure time	262.7 ± 103.6	251.6 ± 114.0	266.6 ± 99.6	0.267



Postoperative variables

Table IV. Summary statistics (% unless otherwise indicated) of postoperative variables

Variables	Overall, <i>n</i> = 334	LOS ≤ 7 days, <i>n</i> = 87	LOS > 7 days, <i>n</i> = 247	<i>P</i> value
Wound infection	2.8	1.2	3.4	0.309
Transfusion units PRBC	2.6 ± 0.2	0.6 ± 1.2	3.3 ± 3.7	<0.001
<i>Prolonged LOS cohort had an increased return to OR, primarily for toe or minor foot amputations by podiatry, also had more hyperbaric therapy</i>				
Respiratory complications	6.9	0.0	9.3	0.004
Renal dysfunction	12.2	2.4	15.6	0.002
Return to operating room	32.0	1.2	42.6	<0.001
Ipsilateral minor amputation	11.0	0.0	14.8	0.001
Postoperative flap or debridement	15.4	11.0	16.9	0.201
Hyperbaric treatment	9.1	0.0	12.2	0.001
Discharge ambulatory assist	57.0	34.1	65.0	<0.001
Discharge aspirin	89.0	91.5	88.2	0.434
Discharge anticoagulant	19.4	9.8	22.8	0.010

Multivariable logistic regression for prolonged LOS

Table VI. Multivariable logistic regression results

Variables	Odds ratio	95% CI	P value
Urgency	5.09	2.16–12.02	<0.001
Critical limb ischemia	2.12	1.45–5.00	<0.001
Return to OR-minor amputations			<0.001
Vein graft			0.013
Discharge anticoagulant independently			0.043

Urgency, critical limb ischemia indication, return to OR-minor amputations, use of vein conduit, discharge anticoagulant independently associated with prolonged LOS

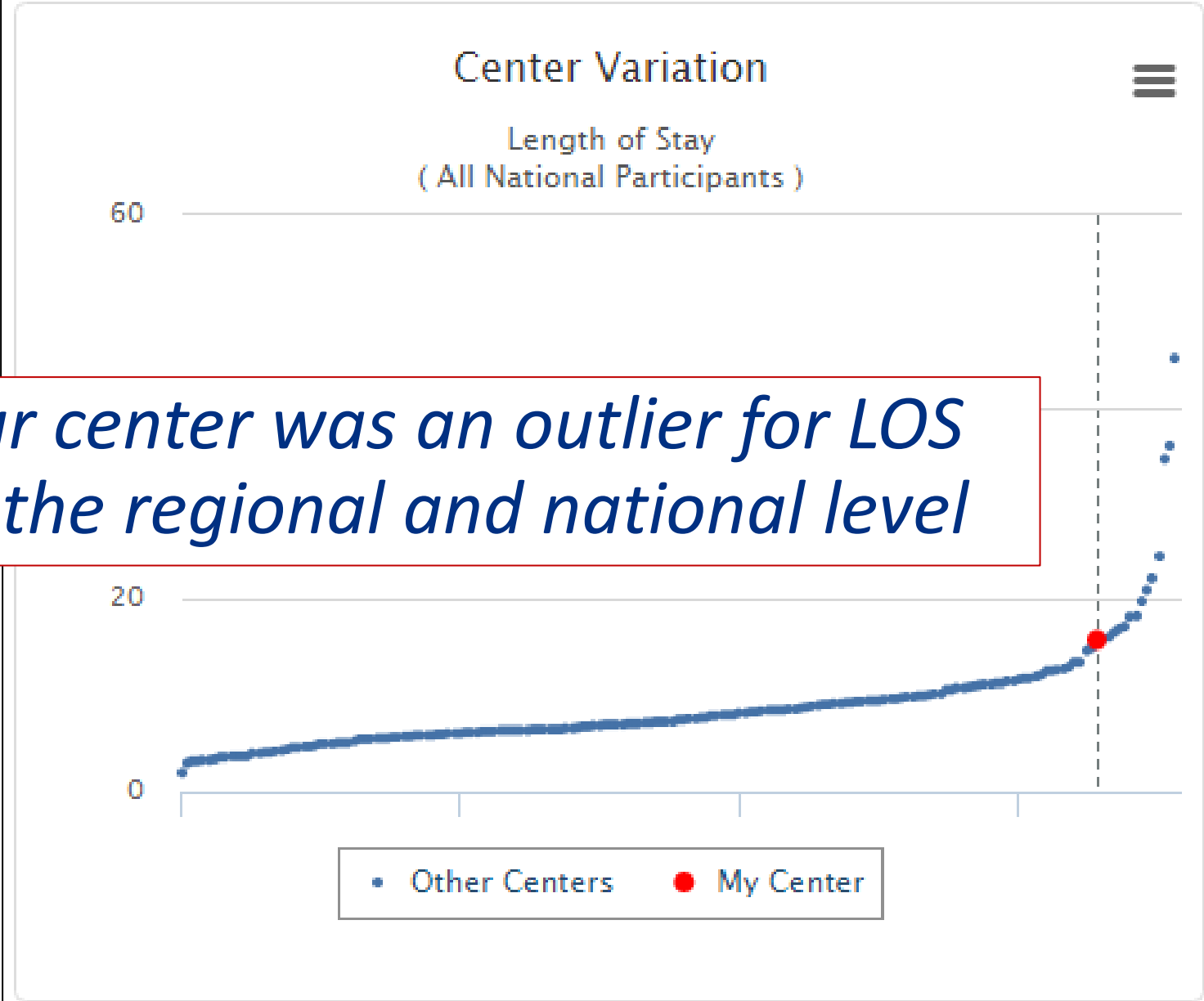
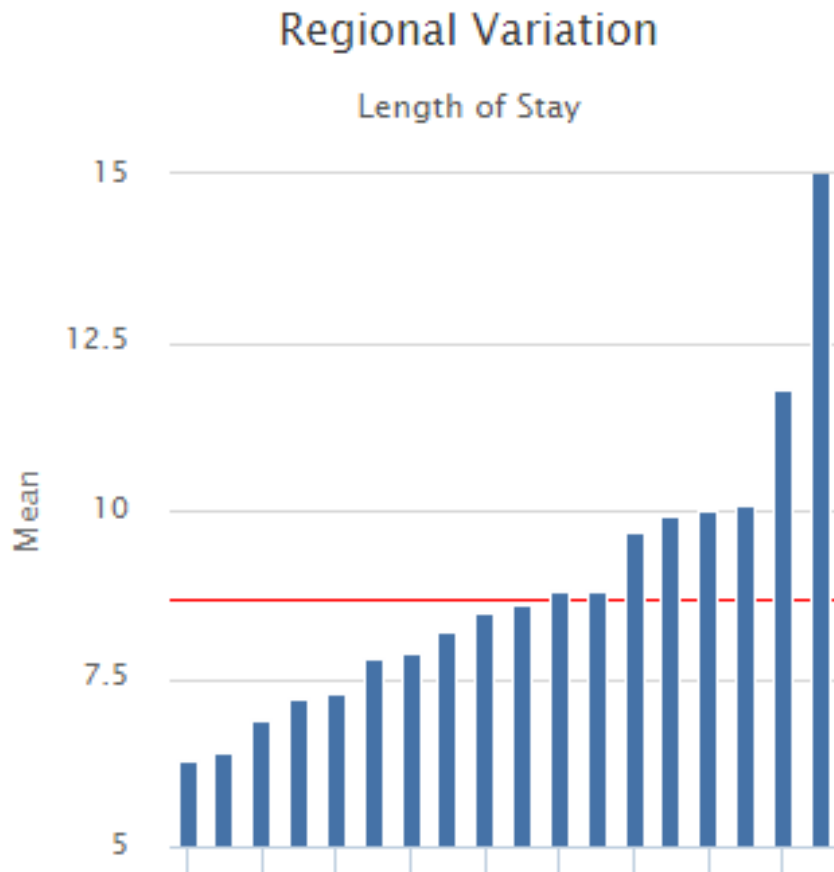
CI, confidence interval.

Comparisons to other hospitals

- LOS Index (observed/expected) used to compare our LOS to other centers in the University Health Consortium (UHC) hospitals
- LOS Index (O/E) was greater than other UHC centers (2.14 vs 1.30, $p < 0.01$)
- Our expected LOS was greater than other UHC hospitals (8.03 vs. 6.12, $P < 0.001$), however our observed mean LOS was still 10 days longer, accounting for increased LOS Index

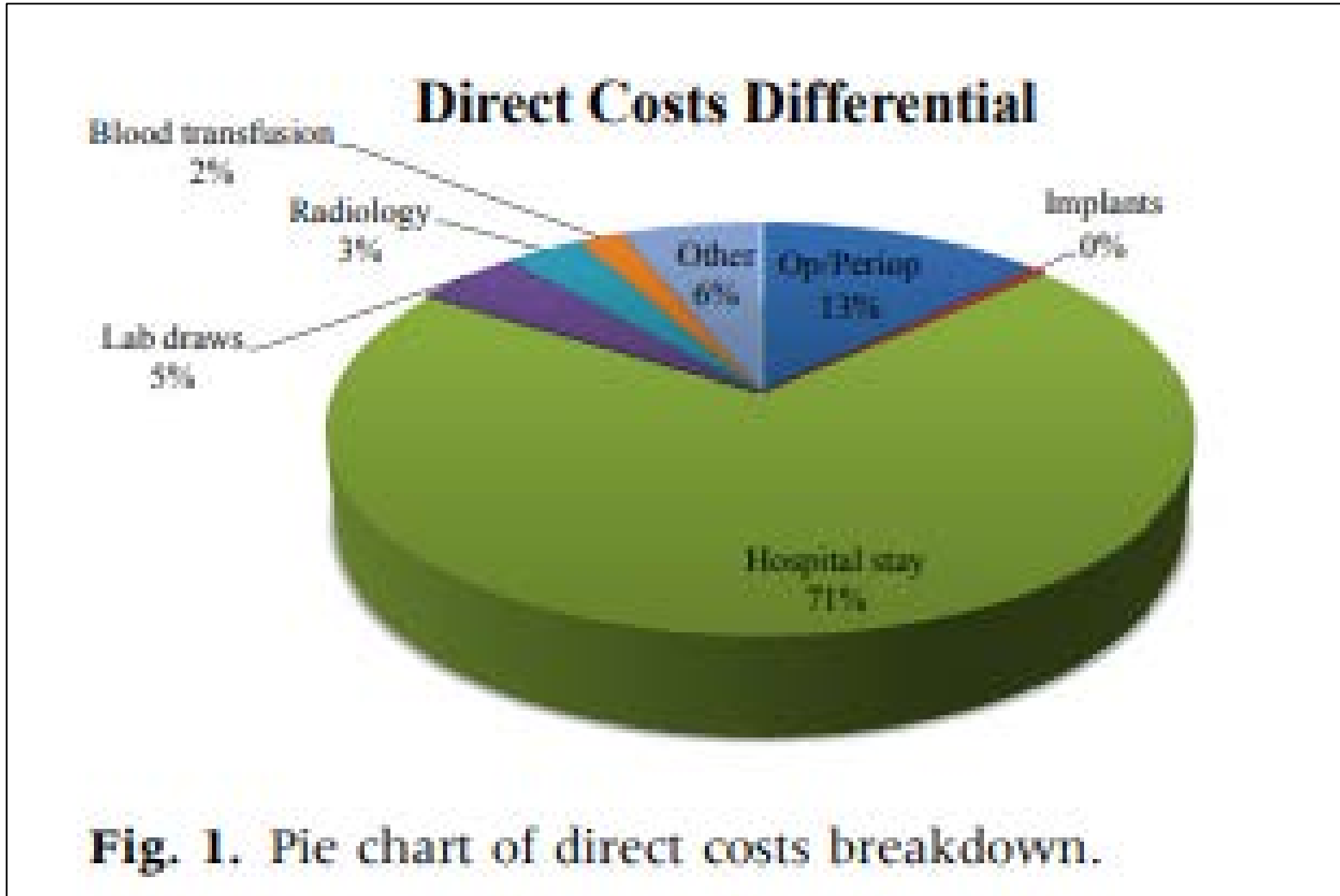
Benchmarked against Regional and National VQI participants

*Our center was an outlier for LOS
at the regional and national level*



Difference in Costs Between Groups

- Mean total cost (direct and indirect costs) was significantly higher in the prolonged LOS group (\$63,559.04 vs \$22,997.40, $P < 0.001$)
- Direct costs were the driver in this differential (\$41,325.81 vs. \$15,297.80, $P < 0.001$)
 - Hospital stay accounted for 71% of direct costs



Cost of the hospital stay accounted for the majority of the differential between the groups (\$24,970.88 vs. \$6,558.16, $P < 0.001$)

Summary of study findings

- Identified predictors of increased LOS in our lower extremity bypass patient population
 - In particular, return to the operating room for toe and minor foot amputations was a major driver
- Comparison with other UHC hospitals allowed us to compare with other similar academic centers

Data allowed us to advocate for increase in podiatry FTE, as well as advocate for limb OR room, to expedite minor amputations following lower extremity bypass

- Allowed us to identify LOS, and in particular, return to OR for minor foot surgery as major driver of increased cost of care of prolonged LOS amongst bypass patients

Conclusions

- The VQI registries encompass many common vascular procedures performed
- The outcomes captured are specific to each registry which allows tracking of relevant outcomes after each type of procedure
 - These outcomes can be benchmarked at the regional and national level
- Device data is captured in a granular fashion, allowing accurate drill-down for consignment and cost information
- These data can be used to inform decisions regarding resource allocation to provide optimal care in a value-conscious way



So you don't have a registry: EMR and paper-based QI

2022 Vascular Annual Meeting



Ashley Vavra, MD, MS

Assistant Professor

Department of Surgery, Division of Vascular Surgery

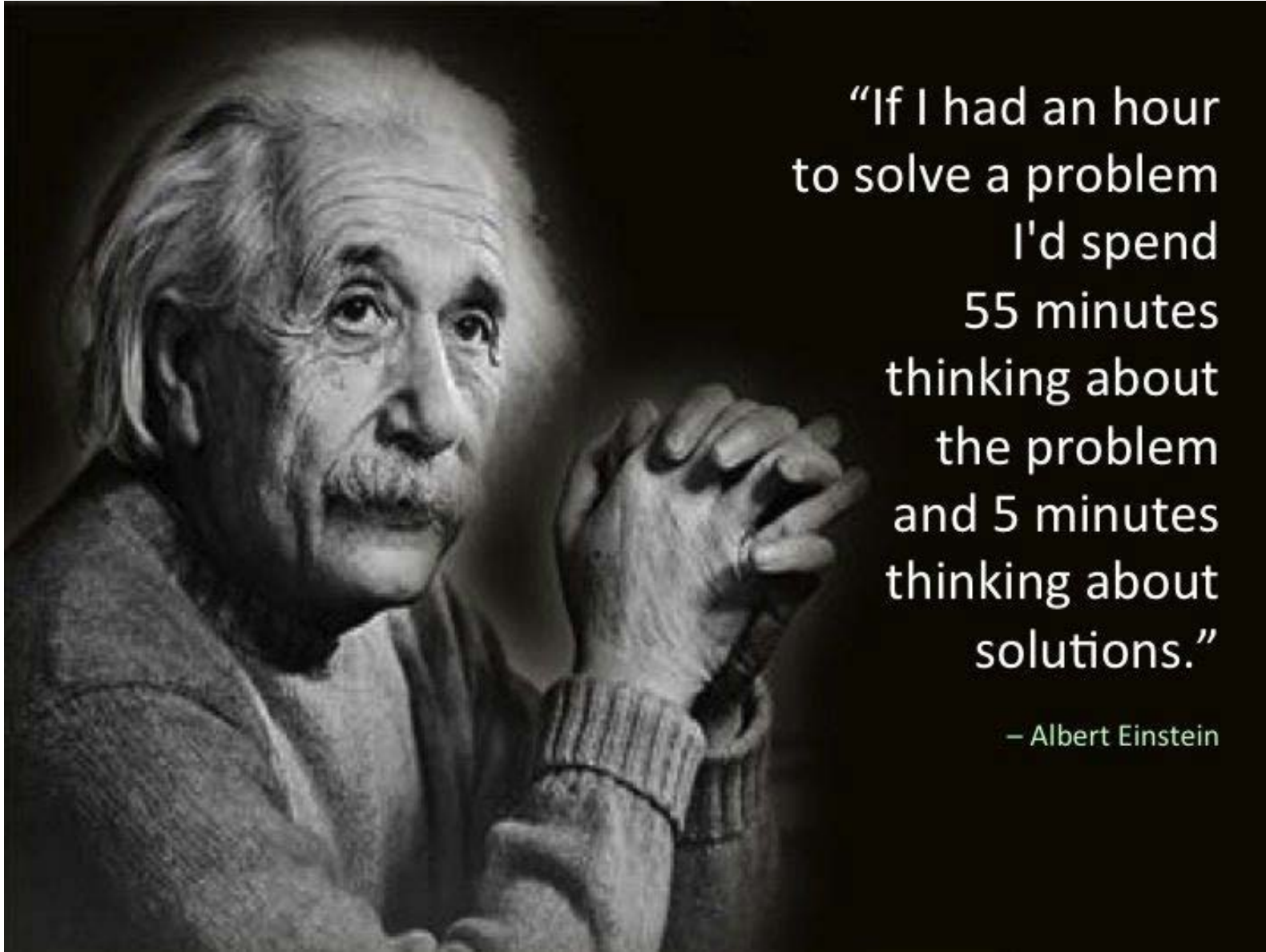
Northwestern Feinberg School of Medicine

Disclosures

- None
- *Disclaimer
 - I will be using a lot of EPIC-based examples

Outline

- Getting started with Quality Improvement (QI): an improvement framework
- How the electronic medical record (EMR) can support improvement
- How paper-based methods can support improvement



“If I had an hour
to solve a problem
I'd spend
55 minutes
thinking about
the problem
and 5 minutes
thinking about
solutions.”

– Albert Einstein

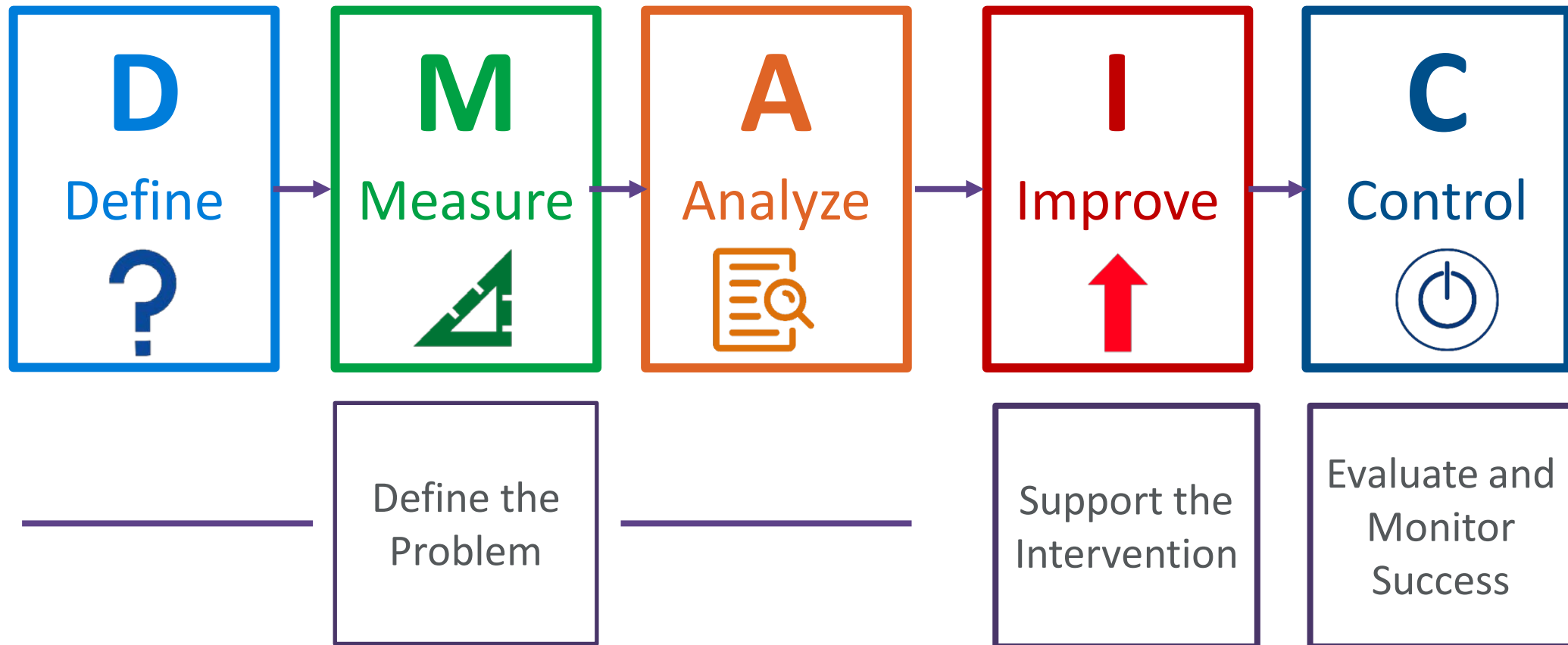
Elements of Successful Quality Improvement



Elements of Successful Quality Improvement Improvement Cycle



Improvement Cycle



Types of Measurement for QI

Process

Activities required to delivery care

- SSI prevention bundle
- Safety checklist
- Smoking cessation counseling
- Preoperative cardiac risk evaluation
- Antiplatelet and Statin adherence

Outcome

Consequence of care delivery

- Patient-reported outcomes
- Patient satisfaction
- Length of Stay
- Readmissions
- Morbidity
- Mortality

Quantitative

Numerical, measurable data
Analyzed with statistics

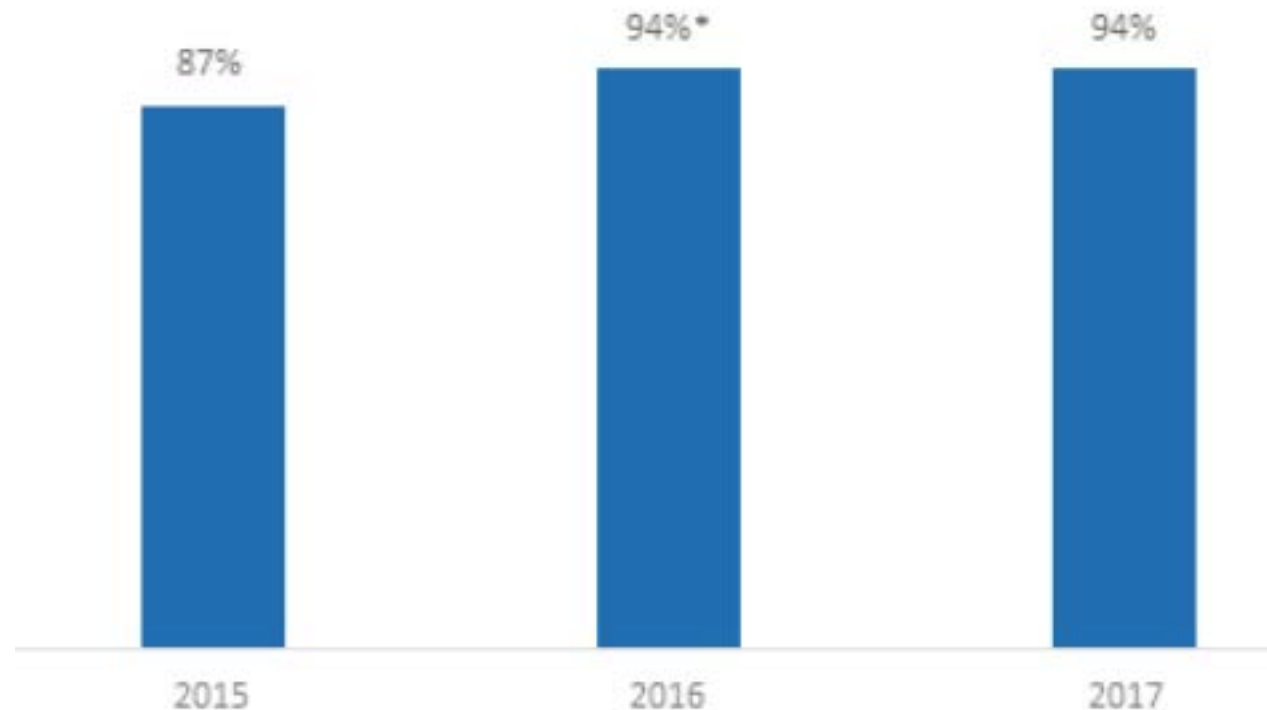
Qualitative

Description using words
Analyzed with themes

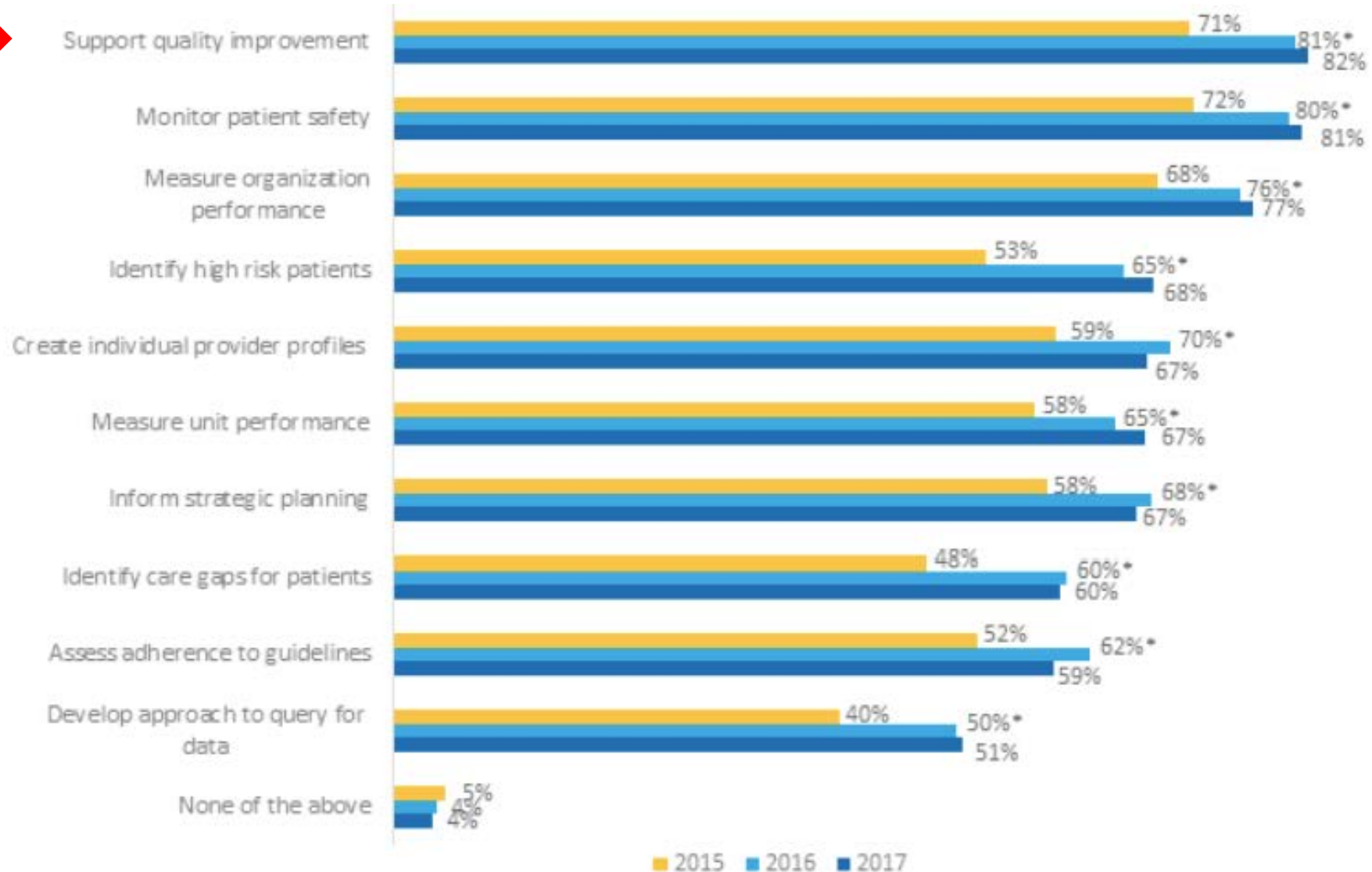
How the EMR Can Help Improve Quality

Hospitals' Use of Electronic Health Records Data, 2015-2017

- >95% of hospitals have an EMR
- In 2016 and 2017, 94% of hospitals reported using data from the EMR to inform care.



How the EMR Can Help Improve Quality



How the EMR Can Help Improve Quality

EDW Data Guide

The Northwestern Medicine Enterprise Data Warehouse (EDW) is a joint initiative across the Northwestern University Feinberg School of Medicine (NU-FSM), Northwestern Physicians Group, and Northwestern Medicine.

What data can you get from the EDW?

General Rules:

1. Due to the wide variability in which text can be entered, you are unable to obtain any data that is stored as a free-text field (e.g. text in a visit note or comment box). Text may include typos or participles that negate its value and is therefore unreliable to extract.
2. In most cases, the data is obtainable if you are able to select the value from a drop-down menu, click on it, or

ANALYTICS DATA REQUEST WORKSHEET

This sheet is to help you think through your data request. You will need to do more work prior to submitting.

1. Purpose / Goal of the Request

Puts into context how the data will be used and bring light to the some of the questions you are trying to answer

Did you consider?

- What data answers
- Who will use data
- Charter (if applicable)

2. Source System the Data Resides In

Which system(s) contain the data needed for your project? If you don't know, speaking to your manager could help.

Enterprise Data Warehouse

Northwestern Medicine Enterprise Data Warehouse (NMEDW) was designed create a single, comprehensive and integrated repository of all clinical and research data sources on the campus to facilitate research, clinical quality, healthcare operations and medical education.

A Immunizations - All Types
Single Historical Immunization
Name: MMRI
Date: 2/27/2013
Dose: 0.5 mL
Site: Right Thigh
Route: Subcutaneous

B Item Information
Item number: 4331
Name: ANA ROUTE
Description: ANA ROUTE, C
Description: 4331-AMANDATOR ROUTE
Item date: 0

Discrete field examples
Health Maintenance Override for Flu Vaccine:
Reason: Declined
Satisfied on: 2
Comment: Declined 2

Time Entry (numerical value):
Time: 15:00

would impact the data extracted?

5. Data Elements

What data elements are essential to help you know what is or isn't happening. Reference slide XXX for more information.

Did you consider?

- Is your data discrete?
- Is there a report?
- What data answers your initial questions?

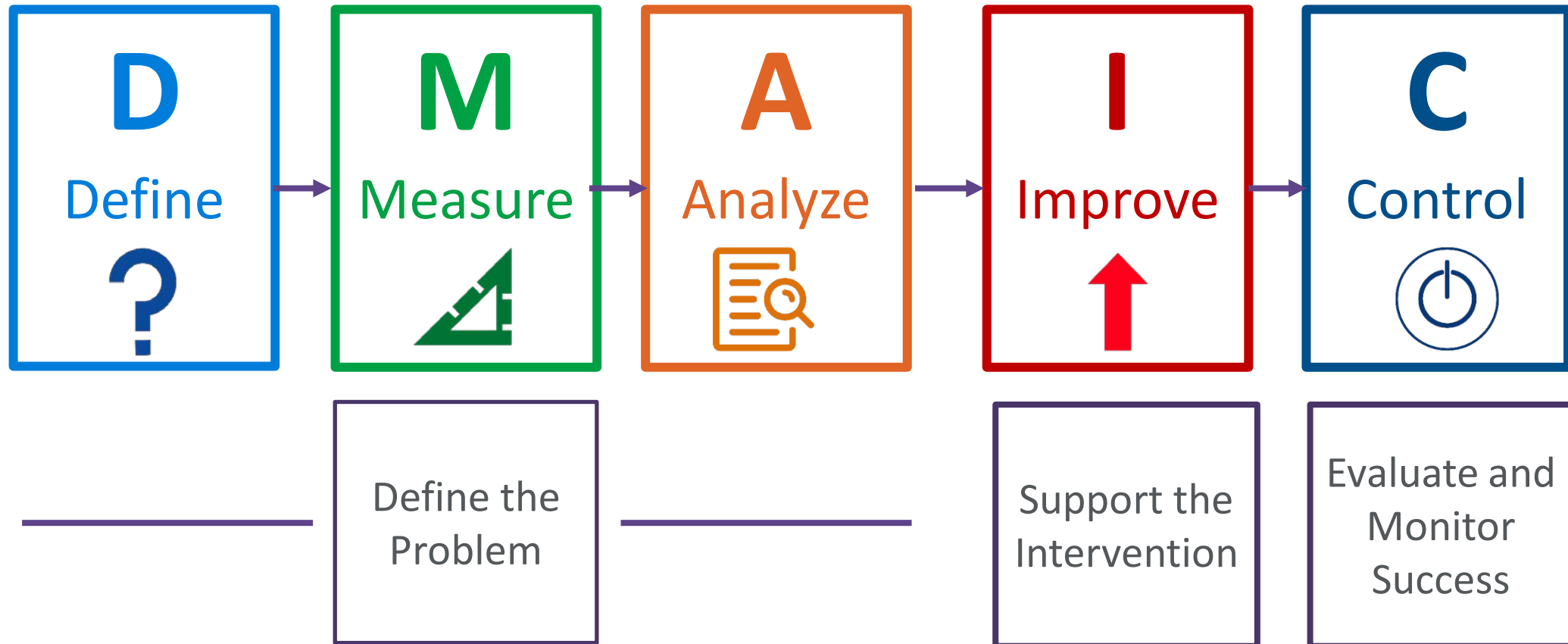
6. Inclusion and /or Exclusion Criteria

What is important to include or exclude? Patient populations, days, location, ext.

Did you consider?

- What data should not appear?
- What data should appear?

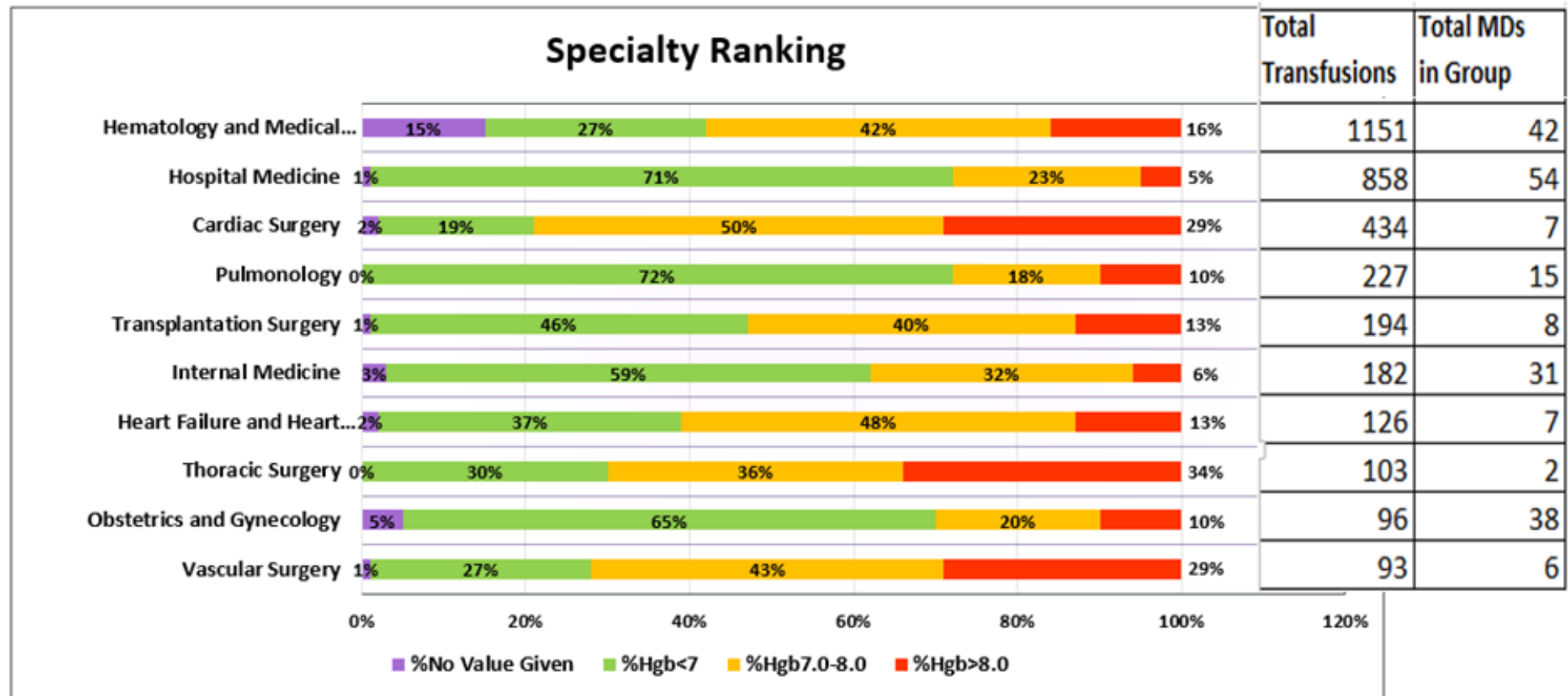
Using EMR and Paper to Support the Improvement Cycle



EMR: Define the Problem

Process

RBCs Transfusion by Specialty (excluding intra-op transfusions) FY2019-Quarter 2

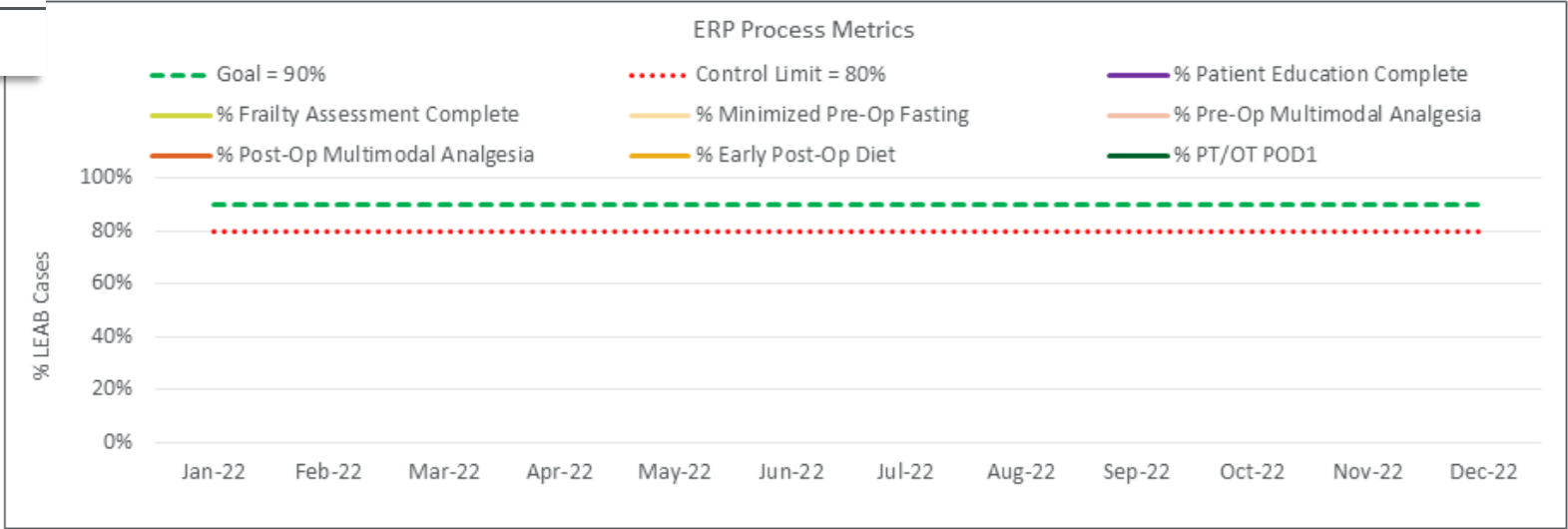


EMR: Define the Problem

Process

- Metric
- % LEAB Cases with Patient Education Complete
- % LEAB Cases with Frailty Assessment Complete

Control Measurement							
Metric	Goal	Control Limit	Review Process	Frequency	Process Owner	Threshold for Action	Recommended Action Steps
% LEAB Cases with Patient Education Complete	90%	80%	EDW Dashboard	Monthly – Email Quarterly – BCVI System Vascular Quality Committee	Corrine Benacka	3 consecutive months below control limit	Pull together work group to identify barriers and opportunities
% LEAB Cases with Frailty Assessment Complete							
% LEAB Cases with Minimized Pre-Op Fasting							
% LEAB Cases with Pre-Op Multimodal Analgesia							
% LEAB Cases with Post-Op Multimodal Analgesia							
% LEAB Cases with Early Post-Op Diet							
% LEAB Cases with completed PT/OT consult POD1							

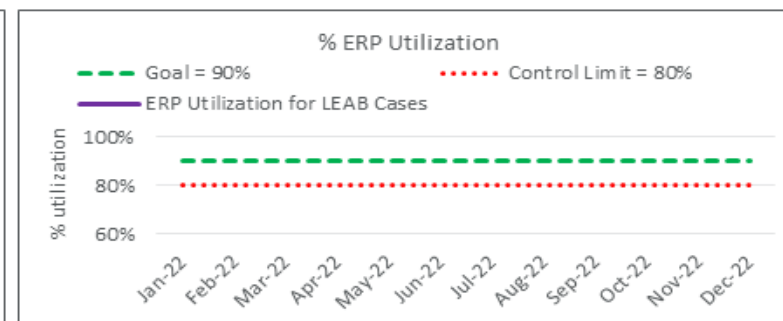
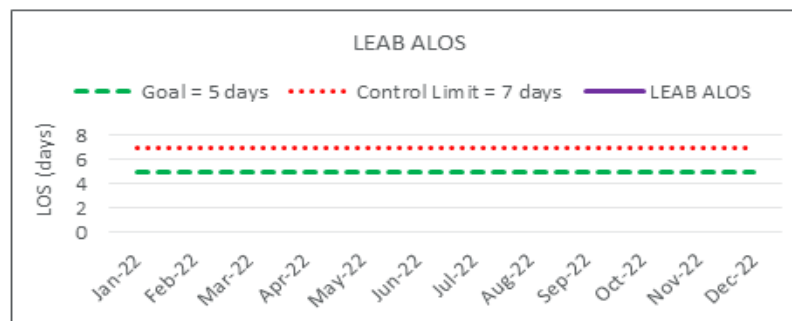
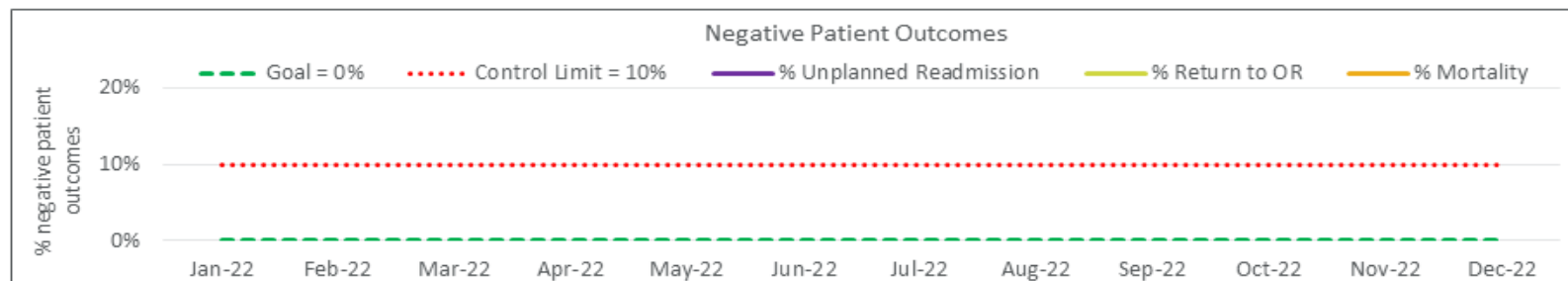


EMR: Define the Problem

Outcome

- Morbidity can be tricky
- Turnaround may be faster compared to registry

Control Measurement							
Metric	Goal	Control Limit	Review Process	Frequency	Process Owner	Threshold for Action	Recommended Action Steps
% ERP Utilization for LEAB Cases	90%	80%	EDW Dashboard	Monthly – Email Quarterly – BCVI System Vascular Quality Committee	Corrine Benacka	2 consecutive months outside control limit	Pull together work group to identify barriers and opportunities
LEAB ALOS	5 days	7 days					
LEAB Unplanned Readmission Rate (30 Days)	0%	10%					
LEAB Return to OR (30 Days)							
LEAB In-Hospital Mortality							



EMR: Support the Intervention

- Smartphrases
- Ordersets /Smartsets
 - Facilitate the process
 - Track the process

Procedure:
 Location: {vasc surg; location:27558}
 Surgeon: {Vascular Sur
 Cosurgeon: {Yes***/No
 Stated Procedure: {Vas
 Surgery date if determin
 Requested procedure le
 Anesthesia Type: {VAS
 Special Needs: {Vasc S
 Positioning: {Vasc Surg
 Preadmission: {Yes w
 Consent complete: {yes

Patient Info:
 Preferred Contact: {Pre

Allergies:
 @ALLERGY@

Current Meds:
 @CMED@

Medications:
 ASA/Antiplatelet: {Vasc
 Anticoagulation: {Vasc
 Statin: {yes no; statin:2

Contrast exposure eva
 Contrast allergy: {yes n
 GFR less than 60: {yes
 On ACE/ARB: {yes no;
 On metformin: {yes no;

Preoperative Testing:
 Pre-op clinic evaluation:
 Other required consultat
 Testing prior to procedure
 COVID testing: {yes no;

Pre-Op - Outpatient Peripheral Bypass Manage User Versions

Documentation

▼ Add Chief Complaint to Visit:

● Vascular Pre-Op

▼ Document note:

● NM AMB VASCULAR SURGERY LOWER EXTREMITY ARTERIAL BYPASS

General

▼ Diet - NMH

NPO (no solids 8h; no clear liquids 2h)
 Have a meal 8 hours before
 your arrival time. Do not

Ensure Pre-Surgery Dr
 No Print

Outpatient Orders

▼ Med Prescriptions - N

chlorhexidine 4 % liqui
 You will use the chlorhex
 Follow the specific instruc

Other

▶ Case Request

▶ Smoking Cessation - R

▶ Smoking Education- E

▶ Smoking Cessation - N

▶ Smoking Cessation - P

Labs

▶ Labs

Vascular LEAB Enhanced Recovery Protocol (ERP) Epic Resource

- The purpose of this resource is to ensure that all hospitals are aware of what clinical items (order sets, checklists, etc.) were built for ERP.
- This resource is not meant to supplant local education; rather, it can augment existing and ongoing education plans and help you identify any gaps that may exist.

Last Updated: 03/11/2022

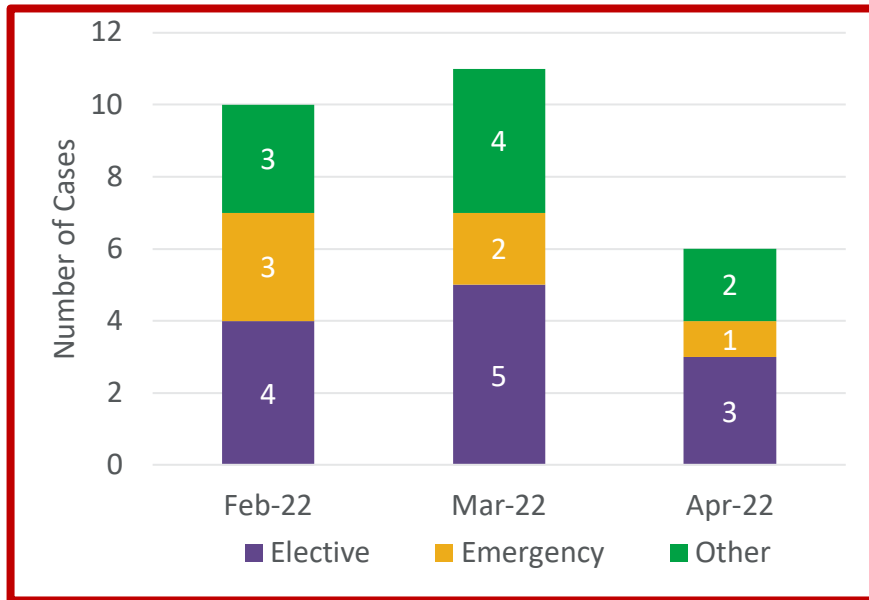
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EMR: Evaluate and Monitor Success

Insights Based on Initial Data Pull & Chart Review							
Month	# LEAB Cases	% ERP Identification	ERP-Identified Average LOS	ERP-Identified with Frailty Assessment	ERP-Identified with Ensure Pre-Surgery	ERP-Identified with Pre-Op Acetaminophen	ERP-Identified with Post-Op Multimodal Analgesia
Feb 2022	10	30%	17.87 Days	33%	33%	33%	100%
Mar 2022	11	64%	9.12 Days	71%	29%	86%	86%
Apr 2022	6	33%	5.23 Days	0%	0%	50%	50%

LEAB Distribution of Cases



Note: data through mid-April & final data set still being validated

Date	Surgeon	Type	ERP?
2/1/22	VAVRA	Emergency	No
2/4/22	RODRIGUEZ	Emergency	Yes
2/8/22	RODRIGUEZ	Elective	No
2/10/22	TOMITA	Other	No
2/11/22	TOMITA	Elective	Yes
2/17/22	ESKANDARI	Elective	No
2/18/22	HO	Emergency	No
2/22/22	RODRIGUEZ	Other	No
2/24/22	ESKANDARI	Elective	Yes
2/25/22	VAVRA	Other	No
3/2/22	RODRIGUEZ	Other	No
3/3/22	HOEL	Elective	Yes
3/8/22	RODRIGUEZ	Other	Yes
3/9/22	HOEL	Emergency	Yes
3/14/22	HO	Emergency	Yes
3/15/22	RODRIGUEZ	Elective	No

Date	Surgeon	Type	ERP?
3/16/22	TOMITA	Other	No
3/16/22	ESKANDARI	Other	Yes
3/23/22	HOEL	Elective	Yes
3/31/22	ESKANDARI	Elective	Yes
3/31/22	ESKANDARI	Elective	No
4/3/22	VAVRA	Other	No
4/4/22	HO	Other	No
4/7/22	ESKANDARI	Elective	No
4/8/22	TOMITA	Emergency	Yes
4/12/22	RODRIGUEZ	Elective	No
4/12/22	RODRIGUEZ	Elective	Yes

EMR: Data Considerations

- Need strict definitions to aid extraction
- Audit data to ensure fidelity

Column Name	Description	Definition
Acetaminophen c9	Acetaminophen Taken Pre-Op	taken within 2 hours of scheduled surgery start time
Gabapentin c10	Gabapentin Taken Pre-Op	taken within 2 hours of scheduled surgery start time
Ibuprofen c11	Ibuprofen Taken Pre-Op	taken within 2 hours of scheduled surgery start time
Multimodal Anagesia Flag	Patient received at least 2 out of 3	

EMR: Data Considerations

- Need strict definitions to aid extraction
- Audit data to ensure fidelity
- Prioritize discrete data

Nutritional Assessment

Have you recently lost weight without trying? {YES / NO / UNSURE:88814664}
Have you been eating poorly because of a decreased appetite? {YES/NO:19839}

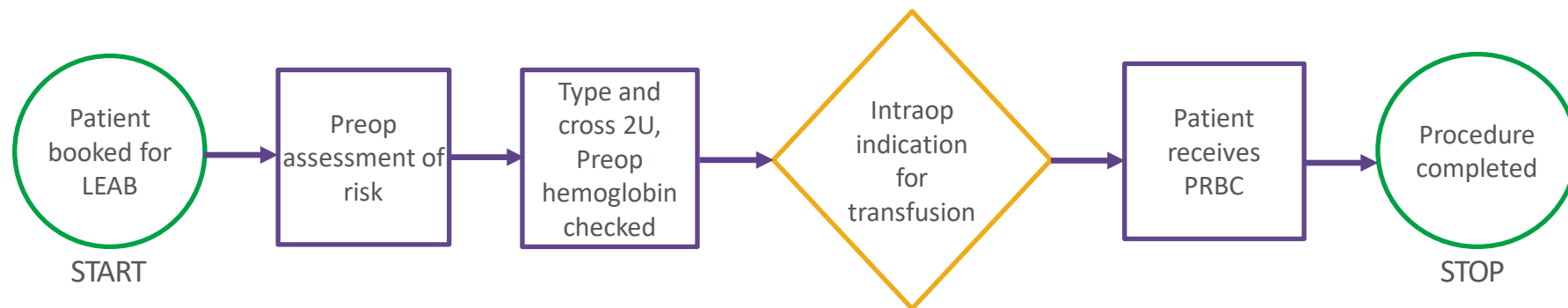
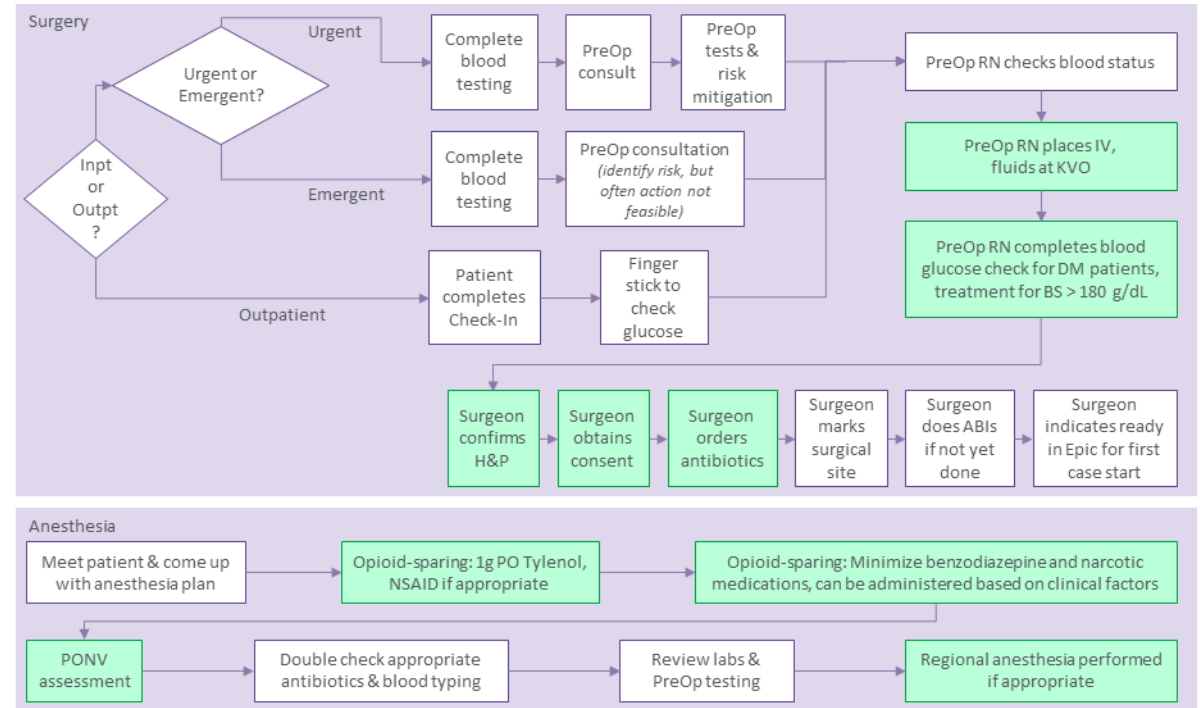
NSQIP modified frailty index (5 factors)

1. Chronic obstructive pulmonary disease or pneumonia: {YES / NO / UNSURE:88814664}
2. Congestive heart failure: {YES / NO / UNSURE:88814664}
3. Dependent functional status: {YES / NO / UNSURE:88814664}
4. Hypertension: {YES / NO / UNSURE:88814664}
5. Diabetes: {YES / NO / UNSURE:88814664}

The screenshot shows a web-based form titled "NM OR CASE REQUEST". The form is divided into several sections. At the top, there are fields for "Provider:", "Location:", "Procedure Date:", and "Patient Class:". Below this is "Panel 1", which contains fields for "Procedure 1", "Proc (MD Stated Pt in Comments)", "Code:", "Laterality:" (with buttons for "Left", "Right", "Bilateral", "N/A"), "Anesthesia:" (a dropdown menu with "General" selected and circled in red), and "Comments:". Below "Panel 1" are fields for "Case Classification:", "Is this an add-on case?", "Requestor contact information", "Patient Phone # Day Before Surgery", "Additional Supporting CPT Code(s)", and "Perioperative Pain Management Block Request?". The bottom section includes "Assisting Surgeon:", "Request Second Room?", "Hold Scheduling for Second Surgeon?", "Start Time:", "Surgical Time Required", "Is this case expected to be longer/shorter than is typically required for this procedure?", "Robotic Case?", "Queue Transaction ID", "Additional Radiology needs:", "Other Equipment needs:", "Other Staffing Needs:", "Is patient coming from a prior appointment?", "Pre-Op Clinic Appt Type:", "Patient requires an ICU bed?", and "Enhanced Recovery Protocol (ERAS)?" (checkbox, circled in red).

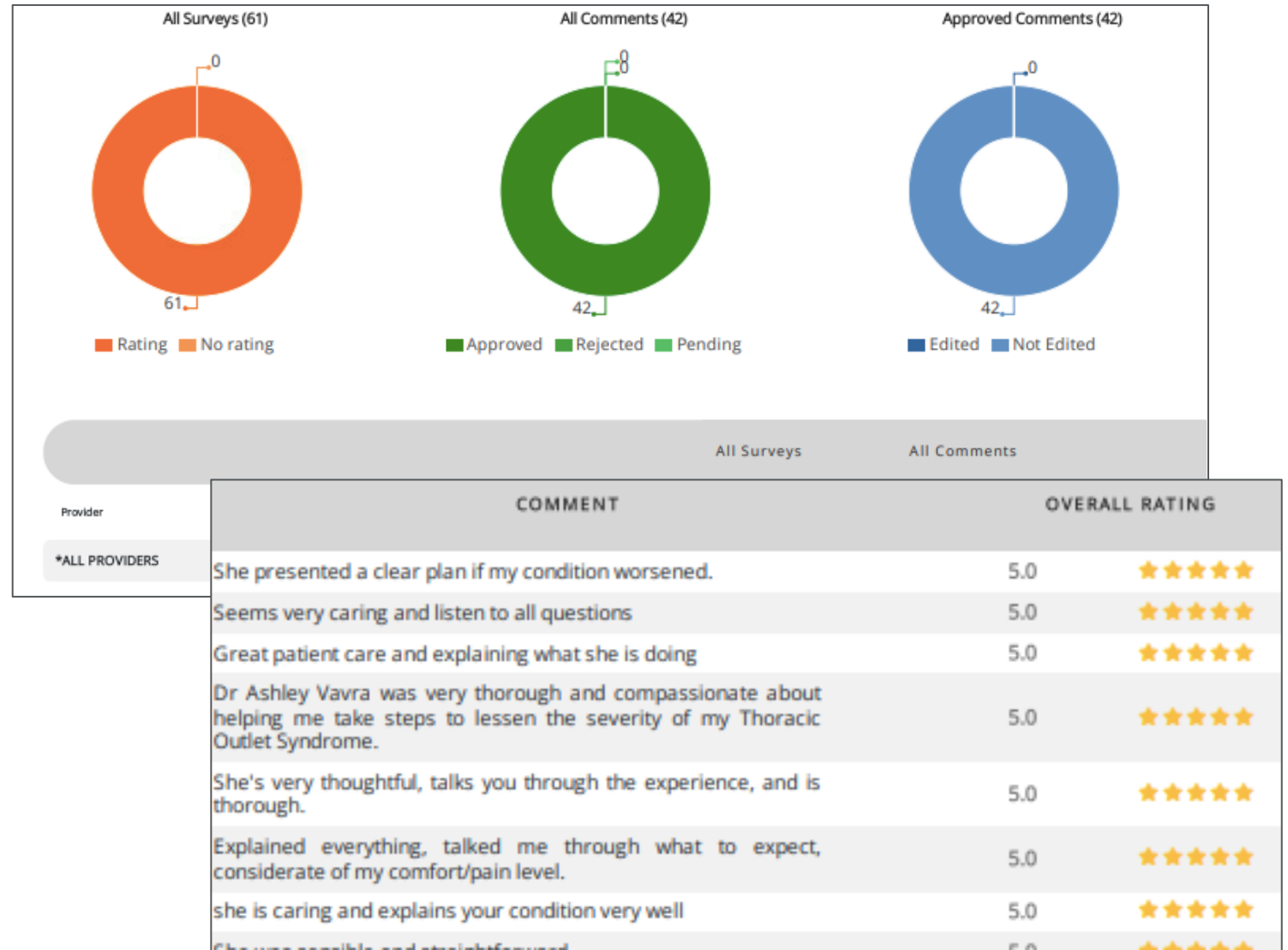
QI by Paper: Define the Problem and Evaluate Success

- Observation and Audit
 - Process maps
 - Value stream
 - Audit of interventions



QI by Paper: Define the Problem and Evaluate Success

- Surveys and interviews
 - Satisfaction
 - Evaluation of barriers



QI by Paper: Define the Problem and Evaluate Success

- Surveys and interviews
 - Satisfaction
 - Evaluation of barriers



➤ Indications:

- Anemia (hgb < 8 g/dL)
- Blood loss
- Hemodynamic Instability
- History of coronary disease



➤ Deeper Themes:

- Communication around the decision to transfusion

QI by Paper: Define the Problem and Support Intervention

- Manual Data Collection

Help Us Understand Why Vascular Surgery Patients Receive Blood Transfusions!!

Indication for Transfusion (check all that apply)

- Anemia
- Hemodynamic Instability
- Volume Resuscitation
- Patient/Cardiac Risk Factors
- Other _____

Decision to Transfusion: Was the decision to transfuse discussed with the surgery team?

- Yes, discussed with surgery
- Yes, initiated by surgery
- No
- No, but will do so now

Something we're missing or feedback on this process? Please write here:

QI by Paper: Data Considerations

- Time Considerations for collection
- Stakeholder analysis prior to interviews

Summary

- The EMR and Paper are effective and essential tools for QI
- Specific tools and resources will be institution specific
- The SVS can help!



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Quality Improvement

The QI Community

The SVS PSO encourages centers to submit quality improvement charters on projects using SVS VQI data. This process has helped the SVS PSO identify groups working on similar initiatives and facilitate networking opportunities. All members are encouraged to participate in focused group calls whether or not they have a charter. As the projects reach completion, the SVS PSO will aggregate data and share best practices with the full VQI membership.

The SVS PSO also provides resources to assist SVS VQI centers with their QI projects:

- *QI Project Guide and National Initiative Supplement*: These booklets provide the foundation and step-by-step guidance to begin and complete a QI project. The *QI Project Guide* is designed to assist centers that are just beginning a QI project but may be useful at any stage of the QI process. Subsequently, the SVS PSO created a National Initiative Supplement which focused on the progress with the two national QI priorities: Optimal Discharge Medications for Vascular Patients and Endovascular AAA Long-Term Follow-Up with Imaging. (Available on [Members Only portal](#))
- The "Members Only" area of the SVS VQI website ([link to Members Only portal](#)) offers access to national QI materials, including presentations and videos, as well as a QI discussion forum to encourage interaction among centers.
- National and regional meetings and quarterly calls help VQI data managers share best practices and QI project ideas. Find your [region](#) to see details.

Quality Improvement Updates

RECENT WEBINARS:

[Click here to view upcoming webinars/events and recordings](#)

Upcoming Quality Focus Calls:

[SVS PSO Quarterly Charter Focus Call - July, 19 2022](#)

[SVS PSO Quarterly Charter Focus Call - October, 18 2022](#)

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LATEST VQI NEWSLETTERS:

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Quality

SVS is committed to im
the ever-changing hea

SVS | CONNECT

HOME DIRECTORY COMMUNITIES ▾ PARTICIPATE ▾ MENTOR MATCH ▾ BROW

QUALITY IMPROVEMENT COMMUNITY

COMMUNITY NAVIGATOR


COMMUNITY HOME

DISCUSSION 2

LIBRARY 0

EVENTS 0

MEMBERS 13

LATEST DISCUSSION POSTS 



WELCOME, COMMUNITY MEMBERS!

BY: [JESSICA SIMONS](#), 26 DAYS AGO

Hi members! I am delighted to see how many people have joined this community already! The QI Committee envisions this as a forum for discussion about any QI issue

QIC BRANDING VIDEO

BY: [CARRIE MCGRAW](#), 6 DAYS AGO

I have posted the QIC Branding Video on one take! [More](#)

Thank you!