SVS QI Toolkit Task 3

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Task 3

Task 3: Data and measurement	1. Angela Kim 2. Adam Johnson 3.
CONTENT	1. Role of data in quality improvement 2. Types of data commonly used in improvement (donebedian SOP, balance measures) 3. Sources for data in QI (list specific databases that are available, +/- of each, type of data) 4. How to select and track QI measures a. Pareto chart b. Driver diagram c. Run/control chart d. Cause and effect diagram 5. Challenges and potential solutions for data in vascular surgery QI projects
Resources	QI intro series, IHI website/toolkit

Purpose

SVS | Society for Vascular Surgery

Vascular Specialists | Trainees & Students | Patients and Referring Physicians

Vascular Specialists Overview

Education and Meetings
- Vascular Annual Meeting
- CME Credit Process Update
- Meetings
- Coding & Reimbursement Workshop
- SVS Presents
- SVS OnDemand
- Audible Bleeding Podcast
- Rutherford's Vascular Surgery
- VESAP

Practice and Quality

Clinical Quality
- Clinical Guidelines
- Quality
- National Quality Verification Program for Vascular Care
- Perioperative Management Guide
- Vascular Quality Initiative

Practice Administration
- Practice Tools
- Branding Toolkit
- SVS Compensation Study
- Valuation

Research
- Journals
- Basic & Transitional
- Grants & Funding
- Clinical Research

Networking
- SVSConnect
- Affiliated Organizations
- International Chapters

SVS Sections
- Community Practice
- Physician's Assistants
- Young Surgeons Section
- SVS Women's Section
- Sub-Section on Outpatient & Office Vascular Care (SOOVC)

Careers
- Job Bank
- Awards & Scholarships
- Leadership Development Program

Role of Data in Quality Improvement

Role of Data in Quality Improvement

The modern quality improvement practices have initially been influenced by the continuous improvement in the automotive industry. These practices have been adopted in the healthcare system to deliver safe, consistent, and effective care to patients. Qualitative and quantitative data can be used to answer questions, monitor changes, and inform decision-making within a healthcare system (Figure 1). Use of data in quality improvement differ from traditional research with the expectation to assess results in shorter intervals and to incorporate existing evidence correlated with high-quality care into practice rather than posing new evidence.

Figure 1
Data in Quality Improvement?
Measuring and tracking data in quality improvement can improve patient care at a various system levels by:

1. Identifying priorities of healthcare and selecting areas for change
2. Monitoring existing systems and changes secondary to intervention
3. Defining success of intervention and whether implemented intervention was responsible for the change

Types of Data

Types of Measures in Quality Improvement

A healthcare system is comprised of multiple factors and sources that affect outcome. Similarly, multiple data measures are required to understand the performance of a complex system and monitor quality improvement. The Donabedian model classifies measures to assess and compare the quality of healthcare systems in forms of outcome, process, structure, and balancing measures.

Types of Data

Figure 2
What Data Do We Need?
Within a healthcare system, a range of data measures can be selected to examine the pre- and post-intervention states:

Outcome Measures Evaluate the impact of healthcare provision on the status of patients and populations	• Aim: To reduce the rates of surgical site infection following open aortic surgeries • Outcome measure: 30-day surgical site infection rate
Process Measures Evaluate quality of the method used to deliver the desired outcome	• Aim: To reduce wait time for patients with chronic limb-threatening ischemia by using a new referral form • Process measure: Percentage of referrals received that are appropriate or require further information
Structure Measures Evaluate the capacity of the environment, service, and provision of care	• Aim: To improve operating room efficiency • Structure measure: Proportion of circulating nurses to number of active operating rooms
Balancing Measures Evaluate the unintended consequences of the change that can be positive or negative	• Aim: To reduce the length of stay following lower-extremity revascularization • Balancing measure: Readmission rate, discharge disposition

Sources of Data

Sources of Data in Quality Improvement

Data used to assess healthcare quality are available from various sources including administrative data, registries, patient medical records, patient surveys and interviews, and direct observation. The selection of the data source depends on the types of measures required to evaluate and monitor quality improvement interventions and the quality of the data from various information systems.

Sources of Data

Figure 3

Selecting for the source of data

It is important to consider the types of measures to be extracted from the data source and the quality of the data. The data may vary in accessibility, availability, accuracy, completeness, consistency and usability across various data sources. (Adapted from Vavra 2023 *J Vasc Surg Vasc Insights*)

	Advantages	Disadvantages
Administrative Data Individual user level data collected from claims, encounter, admission, and provider systems	• Available electronically • Available for a population of patients and across various payers • Comparable with uniform coding systems and practices • Less costly compared to patient medical records and registry databases	• Quality of data dependent on accuracy of documentation, classification, and collection • Limited clinical information • Timeliness with lag between data entry and access
Registries Collection of clinical data to assess clinical performance and quality of care as a part of a larger regional or national data system	• Provides epidemiological information that can be used to calculate incidence rates, risks, and monitor trends in incidence and outcomes • Can be used as a benchmark and for comparisons	• Costly to participate • Quality of data dependent on accuracy of documentation classification, and collection

*Redacted segments on Patient Medical Records, Patient Surveys and Interviews, Direct Observation

QI Tracking Measures

Pareto Chart

A bar chart composed of a various factors that contribute to an overall effect arranged in order from largest to smallest contribution of effect

Driver Diagram

A diagram that displays identified “primary or secondary drivers” or contributors and relationship between them in relation to the overall aim of the project

Run Chart

A graph that depicts the current performance of a process and monitors whether interventions lead to improvement

Cause and Effect Diagram

A fishbone diagram that identifies contributors to certain effect or outcome and examines the relationship of cases to the effect and to each other

QI Tracking Measures

Pareto Chart

A bar chart composed of a various factors that contribute to an overall effect arranged in order from largest to smallest contribution of effect

Background

A Pareto chart is a bar chart composed of various factors that contribute to an overall effect arranged in the order from the largest to smallest contribution to the effect. It identifies and allows concentration of improvement on the "vital few" factors that have the largest contribution to the effect and "useful many" factors that have relatively smaller contribution to the effect.

The dataset for a Pareto chart can be create in table format with headings of contributing factors to an overall effect, magnitude of each factor, percentage of the total each factor represents, and cumulative percentage for each factor.

QI Tracking Measures

Pareto Chart

A bar chart composed of a various factors that contribute to an overall effect arranged in order from largest to smallest contribution of effect

Instructions

The Pareto chart can be created manually or using a software including R with qcc package. The horizontal axis (X) is labeled with the factors contributing to the overall effect in order of largest to smallest. The left vertical axis (Y) is labeled with the unit of comparison from 0 to the total. The right vertical axis is labeled as cumulative percentage from 0% to 100%.

The magnitude of the effect is depicted using a bar chart using the unit on the left vertical axis. The cumulative percentage is demonstrated using a line graph from 0% to 100%. The “vital few” factors are identified by the factors that contribute to 80% of the cumulative percentage.

QI Tracking Measures

Pareto Chart

A bar chart composed of a various factors that contribute to an overall effect arranged in order from largest to smallest contribution of effect

Delay Type	Frequency (No.)	Percentage (%)	Cumulative Percentage (%)
A: Delay in securing transportation to or placement in planned discharge disposition	76	46.1	46.1
B: Delay in coordinating discharge planning with allied healthcare workers, patient, patient's family	33	20.0	66.1
C: Delay in receiving services or equipment for discharge	24	14.5	80.6
D: Delay in recognizing discharge needs	17	10.3	90.9
E: Delay in diagnostic tests or consultation service	10	6.1	97.0
F: Complication or exacerbation of comorbidities	5	3.0	100
Total	165	100	

QI Tracking Measures

Pareto Chart

```
options(repos = list(CRAN="http://cran.rstudio.com/"))
install.packages("qcc")
```

```
##
## The downloaded binary packages are in
##  /var/folders/0_/nx97xfc94y16ww2lv3yht_z00000gn/T//Rtmpa8Im4z/downloaded_packages
```

```
library("qcc")
```

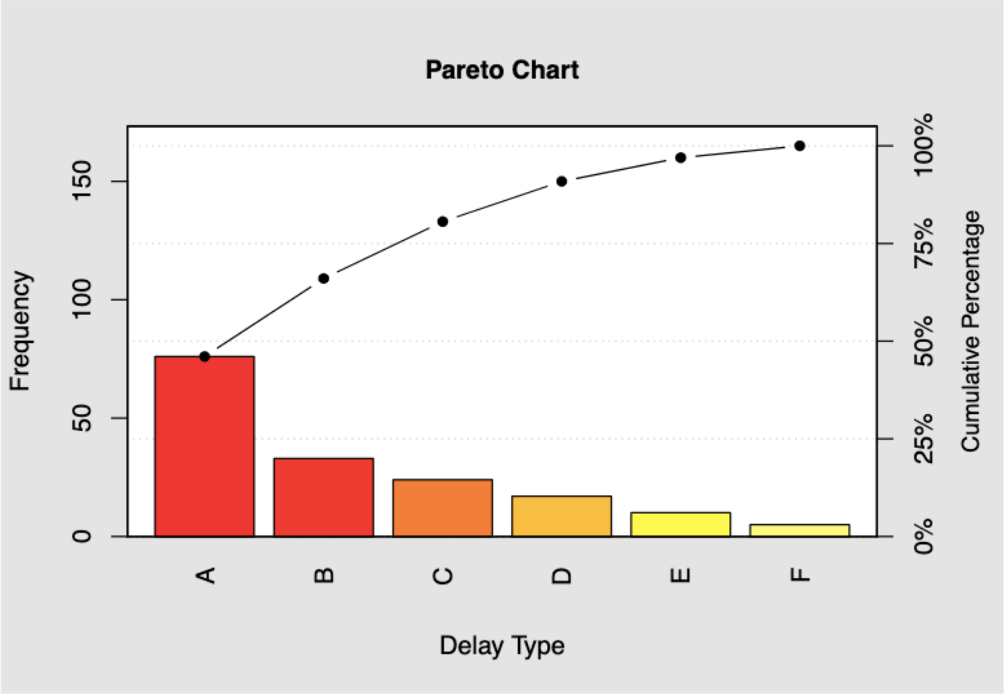
```
## Package 'qcc' version 2.7
```

```
## Type 'citation("qcc")' for citing this R package in publications.
```

```
df <- data.frame(delay.type=c('A', 'B', 'C', 'D', 'E', 'F'))
df$frequency = c(76, 33, 24, 17, 10, 5)
df
```

```
##   delay.type frequency
## 1          A        76
## 2          B        33
## 3          C        24
## 4          D        17
## 5          E        10
## 6          F         5
```

```
pareto.chart(df$frequency,
             main='Pareto Chart',
             xlab='Delay Type',
             col=heat.colors(length(df$frequency))
)
```




```
##
## Pareto chart analysis for df$frequency
##     Frequency  Cum.Freq. Percentage Cum.Percent.
##   A 76.000000  76.000000  46.060606    46.060606
##   B 33.000000 109.000000  20.000000    66.060606
##   C 24.000000 133.000000  14.545455    80.606061
##   D 17.000000 150.000000  10.303030    90.909091
##   E 10.000000 160.000000   6.060606    96.969697
##   F  5.000000 165.000000   3.030303   100.000000
```

Case Studies

- Selected from QI initiatives within vascular surgery to demonstrate how to use various data sources, measures, and tracking measures

Length of Stay Reduction

Surgical Site Infection Reduction

Example

- Prototype link