Data Display

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Enhancing Quality Assessment and Performance Improvement Programs in Transplant Programs and Hospitals

November 18, 2015
1. Introduction to the Transplant QAPI: Regulatory Overview
2. Worksheet Overview
3. Comprehensive Program and 5 Key Aspects of QAPI
4. Objective Measures
5. Performance Improvement Tools and Methods
6. Adverse Events
7. Transplant Adverse Event “Thorough Analysis”
8. QAPI Tools (part 1)
9. QAPI Tools (part 2)

10. **Data display**
11. Writing an effective Plan of Correction and Other QAPI Resources
12. Interpretive Guidelines
This training series will contain Quality concepts, foundational Quality practices and historical perspectives of Quality Assessment and Performance Improvement methodologies (as they were originally developed) and guidance to help transplant program’s meet compliance with the Conditions of Participation.

CMS understands that: 1) Healthcare has various definitions of what Quality is, 2) There are many methods that can be employed and 3) There are many tools that can be utilized within quality assessment and process improvement activities.

CMS also understands that some organizations blend several quality concepts and tools together to provide for a more nimble and individualized QAPI program.

This training series does not support or advocate any particular QAPI method or tool. This training fully supports that QAPI activities include data driven decisions that lead to sustained improved performance and ultimately improved patient outcomes.
Purpose and Objectives

• The purpose of this session is to enhance Quality Assessment and Performance Improvement activities within Transplant Programs through increased knowledge of data analysis and data display.

• Upon completion of this session, the participant will be able to:
  • Discuss the need for proper data display in QAPI activities.
  • Understand data analysis and the need for proper data display in reporting activities.
  • Discuss how data display can aid in data analysis and QAPI program documentation.
The 5 Key Aspects of Transplant Quality

1. Design and Scope
2. Governance and Leadership
3. Feedback, Data Systems and Monitoring
4. Systematic Analysis and Systemic Action
5. Performance Improvements
5 Key Aspects of QAPI

Data and Data Tools are involved in:

- **Aspect 1** – Design - The program is **data-driven**, reflects the complexity of transplant services, and addresses all systems of care and management practices relevant to transplantation.

- **Aspect 2** – Governance - The governing body ensures that the QAPI program is implemented, ongoing, **comprehensive**, effective, and that adequate resources are applied to conduct QAPI efforts and operate in a continuous manner. The governing body sets clear expectations for quality and safety.

- **Aspect 3** – Feedback Systems - **Process and outcome indicators** reflecting the complexity of services within the program are defined, measured, analyzed and tracked.

- **Aspect 4** – Analysis - The transplant QAPI program must **analyze** collected **data**.

- **Aspect 5** – Improvements - Performance improvements are concentrated efforts that involve **systematic gathering of information** to identify issues or problems, and subsequent development of interventions to prevent recurrences.

*Source: CMS “A Conceptual Framework for Medicare Requirements for Quality Assessment and Performance Improvement in Solid Organ Transplant Programs”*
Data Complexity Transition Slide
Data = “un-interpreted” observations or facts

Data that can help describe the situation must be collected and analyzed in order to become useful information. The information must then be analyzed in context to produce the knowledge needed to make an informed decision.
Data Characteristics

• **Valid** = The ability of the data element to measure what it is supposed to measure; its predictive value.

• **Reliable** = The ability of the data element to measure what it is supposed to measure in a reproducible way.

• **Usable** = The relative ease with which the data produced can be understood, used, and are relevant to the issues of interest.

• **Recordable** = The ability to capture and measure the data element.
## Types of Data

<table>
<thead>
<tr>
<th>Nominal / Ordinal</th>
<th>Continuous / Discrete</th>
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<tbody>
<tr>
<td>• Nominal data are items which are differentiated by a simple naming system</td>
<td>• Continuous measures are measured along a continuous scale which can be divided</td>
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<tr>
<td>• Ordinal data are set into some kind of order by their position on a scale</td>
<td>• Discrete variables are measured across a set of fixed values</td>
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## Transplant Data Sources - Examples

### Internal
- Medical Records
- Admissions & Readmissions
- Evaluations
- Discharges
- Patient Satisfaction
- Adverse Events
- Committee meetings
- Financial Audits
- Complaints and Grievances
- Operative Reports

### External
- United Network for Organ Sharing (UNOS)
- Organ Procurement and Transplantation Network (OPTN)
- Scientific Registry of Transplant Recipients (SRTR)
- Centers for Medicare and Medicaid Services (CMS)
- American Society of Transplant Surgeons (ASTS)
- U.S. Department of Health and Human Services (organdonor.gov)
- National Institutes of Health (U.S. National Library of Medicine – MedlinePlus)
- Other Professional Associations and Consortiums
Data collection is an essential first step, but raw data must be analyzed and used to assess quality and improve performance.

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Analyzed Data

A data-driven program is one that analyzes raw data, turns the data into useful information and uses this information to make decisions related to program services and care practices.

- Referral to Listing
  - Trend analysis shows an increasing trend line away from the benchmark.
  - Benchmark = 90 days;
  - Year Average = 140.7

- Reasons for Delayed Evaluations
  - Analysis shows some reasons for delayed evaluations that include: Medical Clearance, Dental Clearance, Missed Appointments, Illness

- Evaluation Process Review
  - A review of the evaluation process shows that patients are required to have appointments over many days and the population has transportation difficulties

What is causing the delays?
Why are the reasons occurring?
What can we do?
Data Analysis

DATA → STATISTICS → DECISIONS
Which is Better?

- 75%
- 90%
- 99%
Which is Better: Lower or Higher?

<table>
<thead>
<tr>
<th>75%</th>
<th>90%</th>
<th>99%</th>
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<tbody>
<tr>
<td>75% = 3 out of 4 people win the lottery</td>
<td>75% = 3 out of 4 recipients with graft failure</td>
<td>Recent poll indicates people feel 75% of statistics are made up</td>
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</table>
Percentages can have many meetings

<table>
<thead>
<tr>
<th>75%</th>
<th>90%</th>
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<tbody>
<tr>
<td>75% = 3 out of 4 people win the lottery</td>
<td>90% rate on ABO and other vital data verification means 1 of 10 recipients may receive a mismatched organ.</td>
<td>99%</td>
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<tr>
<td>75% = 3 out of 4 recipients with graft failure</td>
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<tr>
<td>Recent poll indicates people feel 75% of statistics are made up</td>
<td></td>
<td>A 90% submission rate for OPTN data is out of compliance with CMS regulation at 42 CFR §482.82(a)</td>
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Choose Carefully How Data is Presented

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<th>75%</th>
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<tr>
<td>75% = 3 out of 4 people win the lottery</td>
<td>90% rate on ABO and other vital data verification means 1 of 10 recipients may receive a mismatched organ.</td>
<td>99% means that there will still be 5,000 incorrect surgical operations per week according to statistics and Six Sigma principles.</td>
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<td>75% = 3 out of 4 recipients with graft failure</td>
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<td>99% means there is a 1% medication error rate: 1 error for every 100 doses administered</td>
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<td>A 90% submission rate for OPTN data is out of compliance with the CMS regulation at 42 CFR §482.82(a)</td>
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Recent poll indicates people feel 75% of statistics are made up.
Displaying Data
## Deciphering Displayed Data

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<th>Effective Display</th>
<th>Problems with Display</th>
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<td>• Easily understood</td>
<td>• Biased labeling</td>
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<tr>
<td>• Clear labels</td>
<td>• Comparing pie charts of different sizes</td>
</tr>
<tr>
<td>• Complete</td>
<td>• The usage of thin slices which are hard to discern may be difficult to interpret.</td>
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<tr>
<td>• Important information is highlighted and explained</td>
<td>• Making a pie chart 3D or adding a slant will make interpretation difficult due to</td>
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<tr>
<td>• At the proper scale</td>
<td>distorted effect of perspective.</td>
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<td>• Targets and goals identified (if applicable)</td>
<td>• Improper scaling</td>
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<tr>
<td></td>
<td>• Truncated graph</td>
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<td>• Axis changes</td>
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<td>• No scale</td>
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<td>• Improper intervals/units</td>
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<td>• Omitting data</td>
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### Program

The program QAPI member should be interpreting the data to turn raw numbers into knowledge which will assist in making decisions that lead to action towards improvement.

- Data must be complete
- Undesired trends should be identified and acted upon
- Actions taken should be monitored for sustainability

### Surveyors

Surveyors do not interpret data.

Surveyors question data to ensure the data is valid, reliable and that appropriate actions have been taken based on the interpreted results of the data.
Different Tools for Different Purposes

Implementing QAPI Activities

Implementation starts with identification of the issues, design of the approach, data collection and validation, and then data analysis and display. Staff carrying out these activities will start by collecting raw data, using tools such as:

• Spreadsheets
• Run charts
• Check sheets

Monitoring, Tracking and Sharing QAPI Results

Monitoring performance and trends requires different tools. At this level, raw data and data collection tools are not useful. The data need to be analyzed and results need to be displayed effectively, using tools such as:

• Run charts
• Control charts
• Summary graphs
### Example: Program QAPI Committee
- Detailed Scorecards
- Dashboards
- Spreadsheets
- Control charts
- Bar graphs
- Pie charts
- Histograms
- Meeting Minutes
- Performance Improvements

### Example: Hospital Executive Committee
- Summary Scorecards
- Composite Dashboards
- Summary reports
- Summary meeting minutes
Organizing the Tools

Data Display
- Control chart
- Run chart
- Histogram
- Pie / Bar chart
- Venn diagram

Data Analysis
- Check sheet
- Histogram
- Scatter diagram
- Frequency table
- Pareto chart

Data Reports
- Control charts
- Frequency table
- Pie / Bar chart
- Spreadsheets (scorecards)

Problem Solving
- Ishikaw diagram
- Flowchart
- Pareto chart
- Venn diagram
Identifying Problems with Data Display
How to Evaluate A Graph

- Look at the Title
- Look at the X axis
- Look at the Y axis
- What are the “units” of each axis?
- What are the scales?
- Look for where X & Y axes cross
- Check for “holes” in the data

Remember: The ‘Y’ axis must always go up, in order to stand on it’s “legs”
Example

Better
Histogram

Example

Better

“Reasons for Missed Appointments”

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<td>OTHER APPOINTMENTS</td>
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<tr>
<td>FAMILY EMERGENCY</td>
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</table>
### Average Number of Days from Referral to Listing
#### FY 2020

<table>
<thead>
<tr>
<th>Month</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>157</td>
</tr>
<tr>
<td>FEB</td>
<td>329</td>
</tr>
<tr>
<td>MAR</td>
<td>128</td>
</tr>
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<td>APR</td>
<td>83</td>
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<tr>
<td>MAY</td>
<td>95</td>
</tr>
<tr>
<td>JUN</td>
<td>68</td>
</tr>
<tr>
<td>JUL</td>
<td>117</td>
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<tr>
<td>AUG</td>
<td>222</td>
</tr>
<tr>
<td>SEP</td>
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</tr>
<tr>
<td>OCT</td>
<td>88</td>
</tr>
<tr>
<td>NOV</td>
<td>169</td>
</tr>
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</table>

1 outlier with medical clearance issues

No referrals

Benchmark 90 days
Control Chart

Example

Average Number of Days from Referral to Listing
2010 to 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
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<th>Nov</th>
<th>Dec</th>
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<tbody>
<tr>
<td>2010</td>
<td>157</td>
<td>329</td>
<td>128</td>
<td>83</td>
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<tr>
<td>2011</td>
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<td>104</td>
<td>103</td>
<td>118</td>
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<td>90</td>
</tr>
<tr>
<td>2013</td>
<td>85</td>
<td>140</td>
<td>64</td>
<td>189</td>
<td>97</td>
<td>45</td>
<td>209</td>
<td>106</td>
<td>107</td>
<td>111</td>
<td>105</td>
<td>94</td>
</tr>
</tbody>
</table>

Better

Referral to Listing Control Chart

LCL (3 STD's) = 0

Benchmark = 90 days

Avg 132.1

UCL (3 STD's) = 268

Process Change Made

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Patient calls with concern

Medical Care needed?

- Emergent
  - Patient to Surgery and Admission
  - Ready for Discharge?
    - Y
      - Discharged with appointment
    - N
      - Continue Care
  - Patient to Emergency Room
- Non-emergent
  - Patient to office for examination
  - Patient sent Home with scheduled follow up

F/U with office appointment
Fishbone Diagram 1

Example

FISHBONE ANALYSIS

CAUSE (Reason for Re-Admission)

- Fever
  - Patient Education
  - No Complications during procedure
- Fatigue
  - Discharge Planning and Education
  - No Complications during procedure
- Bleeding
  - Discharge Education
  - No Complications during procedure

EFFECT

- Re-Admission under 30 days of discharge
- Selection Criteria Appropriate
- No Complications during procedure
- Discharge Planning and Education

- Nausea
- Vomiting
- Other

The Cause categories can be anything that leads to the Effect.
Fishbone Diagram 2

Better

FISHBONE ANALYSIS

CAUSE (Reason for Re-Admission)

- Patient
  - Patient condition
  - Fever
  - Fatigue
  - Bleeding
- Equipment
  - No equipment issues
  - Nausea
  - Vomiting
  - Infection
- Environment
  - Water / Air cleanliness
  - Discharge
  - Education

EFFECT

- Re-Admission under 30 days of discharge

The Cause categories can be anything that leads to the Effect.
DATA DRIVEN DECISION MAKING
Decision Making Example

Referral to Listing
- Trend analysis shows an increasing trend line away from the benchmark.
  - Benchmark = 90 days;
  - Year Average = 140.7

Reasons for Delayed Evaluations
- Analysis shows some reasons for delayed evaluations that include: Medical Clearance, Dental Clearance, Missed Appointments, Illness

Evaluation Process Review
- A review of the evaluation process shows that patients are required to have appointments over many days and the population has transportation difficulties

### Data

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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</thead>
<tbody>
<tr>
<td>MEDIAN REFERRAL</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>TO LISTING (# DAYS)</td>
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<td>128</td>
<td>83</td>
<td>95</td>
<td>68</td>
<td>-</td>
<td>117</td>
<td>222</td>
<td>92</td>
<td>88</td>
<td>169</td>
</tr>
</tbody>
</table>
Step 1 – Determine Current Performance

• Develop a run chart (line chart) to understand and visualize the level of current performance.

• Items needed: raw data over a period of time, spreadsheet for creating chart, benchmark data, period average, and actions already taken.
Run Chart Example

Analysis: Year Average is 137.6 days; Benchmark is 90 days (over 8 of 11 months) Action Required

Average Number of Days from Referral to Listing
FY 2020

<table>
<thead>
<tr>
<th>Days</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>157</td>
<td>329</td>
<td>128</td>
<td>83</td>
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<td>117</td>
<td>222</td>
<td>92</td>
<td>88</td>
<td>88</td>
<td>169</td>
</tr>
</tbody>
</table>

Benchmark 90 days

No Action – 1 patient outlier

Year Avg 137.6 days

missing data
Step 2 – Identify Reasons Underlying Performance

• Develop a histogram to understand and visualize the reason(s) underlying current performance.

• Items needed: Total number of patients being evaluated, the reason for delay for any patient that has experienced a delay over the given time period, and spreadsheet for creating Histogram.
Histogram Example

### REASONS FOR DELAY TO LISTING

<table>
<thead>
<tr>
<th>Reason</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>FY 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Clearance</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
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<td>2</td>
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<td>3</td>
<td>2</td>
<td>2</td>
<td>20</td>
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<tr>
<td>Dental Clearance</td>
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<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Missed Appointments</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>69</td>
</tr>
<tr>
<td>Illness</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<td>0</td>
<td>1</td>
<td>4</td>
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</tbody>
</table>

### REASONS FOR DELAY TO LISTING

FY 2020

- Medical Clearance: 20
- Dental Clearance: 9
- Missed Appointments: 69
- Illness: 8
- Other: 4
Step 3 – Analyze factors leading to effect

- Conduct a cause/effect analysis using a fishbone diagram to understand and visualize factors contributing to missed appointments.

- Items needed: Total number of patients missing appointments, the reason for delays over the given time period, and blank fishbone diagram template.
Fishbone Analysis Example

Fishbone Diagram

Cause

PATIENT
- FORGOT APPOINTMENT
- ILLNESS
- APPOINTMENT REMINDERS
- EDUCATIONAL DOCUMENTS

EQUIPMENT
- IMAGING
- CARDIAC TESTING
- TRANSPORTATION
- POPULATION INCOME LEVEL

PROCESS
- SCHEDULING
- NUMBER OF APPOINTMENTS
- TRANSPLANT TEAM
- CARDIAC / DENTAL

Effect

MISSED APPOINTMENT

MATERIALS

ENVIRONMENT

MANAGEMENT
Fishbone Analysis

• This tool often generates many contributing factors that may lead to the effect. Carefully examine each category when brainstorming potential solutions.

• Contributing factors may lead to questions that require further clarification. The program may need to use other data tools to find the answers.

• Since the data indicate that missed appointments were the largest contributor to delays in evaluations, the program will next want to consider the issues facing patients who need to attend multiple and varied appointments.
Step 4 – Understand reasons behind missed appointments

- Develop a Histogram to determine the reasons patients are missing appointments.

<table>
<thead>
<tr>
<th>REASONS FOR DELAY TO LISTING</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
<th>FY 2020</th>
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</thead>
<tbody>
<tr>
<td>MEDICAL CLEARANCE</td>
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<table>
<thead>
<tr>
<th>REASONS FOR MISSED APPOINTMENTS</th>
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<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
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<th>DEC</th>
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<td>3</td>
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<td>2</td>
<td>3</td>
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</tbody>
</table>

- Items needed: Total number of patients missing appointments, the reason for missing the appointments over the given time period, and a spreadsheet to create the chart.
### Histogram Example #2

#### REASONS FOR MISSED APPOINTMENTS

<table>
<thead>
<tr>
<th>Reasons for Missed Appointments</th>
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<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
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<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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<tbody>
<tr>
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<td>0</td>
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<td>2</td>
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<td>2</td>
<td>3</td>
<td>69</td>
</tr>
<tr>
<td>Transportation</td>
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<td>2</td>
<td>3</td>
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<td>2</td>
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</tr>
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<td>1</td>
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<td>0</td>
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<td>5</td>
</tr>
</tbody>
</table>

#### REASONS FOR MISSED APPOINTMENTS

**FY 2020**

- **Forgot Appointment:** 69
- **Transportation:** 37
- **Illness:** 17
- **Family Emergency:** 9
- **Other Appointments:** 5
Data-Driven Decision

• The objective measure ‘Referral to Listing’ presented undesired performance, which could lead to negative patient outcomes.

• A Run chart established the current level of performance.

• A Histogram displayed the reasons ‘why’ the delays were occurring and identified missed appointments as the major reason.

• Use of a Fishbone diagram helped the team identify contributing factors underlying the missed appointments.

• Exploration of the contributing factors helped generate potential solutions to improve performance and, ultimately, patient outcomes.

• The next step would be to take action on “Transportation” and “Forgot Appointment” factors.
Closing
Closing Summary

- QAPI data must be collected and analyzed in order to be turned into useful information.
- The data must be valid, reliable, usable and recordable.
- An important aspect of data, data display and quality measures is that they are meaningful.
- QAPI data displays and reports should be clear and easily understood.
Questions & Answers
Contact Information

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Nurse Consultant

Centers for Medicare & Medicaid Services

Center for Clinical Standards and Quality

Survey & Certification Group

Phone 410-786-3353

Email  michele.walton@cms.hhs.gov