Applying QI Principles across Sites in a System, Engaging a Team, and Rules for Data Display and Use

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March 18, 2020
Objectives

• Forming your QI team and keeping them engaged.
  • Difference between a Team Leader and a Coach.

• Coordinating efforts across a healthcare system.

• Using data for QI efforts.
Some Questions to Ponder

• What challenges have you had keeping your team engaged? How have you utilized your QI coach?

• If you are from a hospital system with multiple locations working on the same issue, how have you coordinated your efforts (or what is getting in the way?).

• What challenges have you encountered either collecting or analyzing your data for your project?
The Importance of Teams in QI
What is a Team?

“Two or more individuals, with complimentary skills, that have a common commitment and purpose and have a set of performance goals for which they hold themselves mutually accountable.”
Why Teams?

• Changing culture of healthcare delivery
• Expectations for safety, quality, value
• Improved teams associated with:
  ◦ Fewer errors, more safety
  ◦ Improved staff satisfaction and retention; reduced burnout
  ◦ Enhance quality of care and decreased cost
  ◦ Increase patient satisfaction
Types of Teams in Healthcare

• Work teams (clinical teams)
  ◦ Treatment/ward/surgical teams
  ◦ Emergency/trauma/code teams
  ◦ Research teams
  ◦ Home care teams

• Quality Improvement Teams
  ◦ Project teams

• Management Teams
  ◦ Hospital boards
Critical Teamwork Skills in Healthcare

- **Situation Monitoring** – Following performance of team members and ensuring work and procedures are running as expected.
- **Mutual Support** – Providing feedback and coaching to improve performance; completing a task for a team member when needed.
- **Leadership** – ability to direct/coordinate team members.
- **Communication** – closed loop.

Salas, 2005; Alonso, 2006
Other Conditions for Success

- **Interdependence** – Project must be important to the members. Complimentary skills are noted.
- **Leadership** – Has the desire to improve.
- **Joint Decision** – Team members all want to participate.
- **Equal Influence** – Each person has the opportunity to influence the agenda.

Lewin and Weisbord, 1987
Tuckman Stages of Group Development

- All stages are necessary to achieve success.
- Teams may move back and forth between stages – not necessarily linear.
- Tuckman later added a 5th stage – Adjourning
Forming

| Mindset:       | Why am I here?  |
|               | Do I want in?  |
|               | Will we be successful? |
| Relationship: | Guarded        |
|               | Basic information shared |
|               | Low trust      |
| Activities:   | Introductions  |
|               | Orientation to purpose |
|               | Hidden agendas |
# Storming

<table>
<thead>
<tr>
<th>Mindset:</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What role should I play?</td>
</tr>
<tr>
<td></td>
<td>Why is he/she taking charge?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relationship:</th>
<th>Conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emotional</td>
</tr>
<tr>
<td></td>
<td>Argumentative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities:</th>
<th>Confrontation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control conflicts</td>
</tr>
<tr>
<td></td>
<td>Attempting to set rules</td>
</tr>
</tbody>
</table>
Ladder of Inference

- During storming, teams generally engage in conflict.
- We can only “see” the beginning and end of the ladder. The rest happens in our heads.
- Go back to the original data and ask the person who has suggested an action to lead you through their “thought process”.

Chris Argyris and Peter Senge
## Norming

<table>
<thead>
<tr>
<th>Mindset:</th>
<th>Openness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What do you think?</td>
</tr>
<tr>
<td></td>
<td>How can I help you?</td>
</tr>
<tr>
<td></td>
<td>How can I find out more?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relationship:</th>
<th>Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ideas/feelings</td>
</tr>
<tr>
<td></td>
<td>Understanding</td>
</tr>
<tr>
<td></td>
<td>Support</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities:</th>
<th>Ground rules are established</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improved Communication</td>
</tr>
<tr>
<td></td>
<td>Gathering data</td>
</tr>
<tr>
<td></td>
<td>Confronting issues</td>
</tr>
<tr>
<td></td>
<td>Giving feedback</td>
</tr>
</tbody>
</table>

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## Performing

<table>
<thead>
<tr>
<th>Mindset:</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are we learning?</td>
</tr>
<tr>
<td></td>
<td>How can we be most effective?</td>
</tr>
<tr>
<td></td>
<td>What actions should we take?</td>
</tr>
<tr>
<td>Relationship:</td>
<td>Open Communication</td>
</tr>
<tr>
<td></td>
<td>Support</td>
</tr>
<tr>
<td></td>
<td>Decision by Consensus</td>
</tr>
<tr>
<td>Activities:</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td>Making decisions</td>
</tr>
<tr>
<td></td>
<td>Supporting others</td>
</tr>
<tr>
<td></td>
<td>Taking actions</td>
</tr>
</tbody>
</table>
How can we make our teams more successful and engaged?

• Methods to provide structure for teams include:
  ◦ Developing a common purpose
  ◦ Establishing norms for the team
  ◦ Develop relationships among team members
  ◦ Defining roles for team members
  ◦ Defining procedures for making decisions
  ◦ Preparing for and running a team meeting
  ◦ Following a common methodology for doing their work.
Tips for Building an Engaged Team

1. Establish direction and urgency (shared aim)
2. Select complimentary members (function/skill, not personality)
3. Pay particular attention to first meetings and actions
4. Set clear rules of behavior and group norms
5. Set and seize upon a few immediate performance-oriented tasks and goals (structure meetings to get things done)
6. Spend lots of time together (particularly in the beginning) and get to know each other.
7. Leverage the power of positive feedback & recognition
8. Use PDSA thinking to foster a culture of curiosity & learning

The Perfect Team: Google’s “Project Aristotle”

- 5 year long study at Google to discover the algorithm of the perfect team

- Looked at 180 teams around the company

- “At Google, we’re good at finding patterns... There weren’t strong patterns here.”
The Perfect Team: Google’s “Project Aristotle”

• Success was NOT related to “personality type, skills, talent, or background, etc. The “who” did not matter...

• Instead they found understanding and influencing group norms were the keys to team success.

• Specifically, successful teams had norms that allowed members to Be Heard / Be Understood / Be Known / Be Safe
The Perfect Team: Google’s “Project Aristotle”

Members speak in roughly the same proportion (“equality in distribution of conversational turn-taking”); connection

Members skilled at intuiting how others felt based on tone of voice, expressions, and non-verbal cues (“high average social sensitivity”); empathy

Psychological safety and trust

Source: What Google Learned From Its Quest to Build the Perfect Team, New York Times Magazine February 25, 2016,
Areas for Developing Ground Rules/Norms

- Attendance
- Promptness
- Participation
- Communication
- Assignments between meeting
- Interruptions and distractions
- Rotation of routine chores
- Agendas and record keeping
- Decision-making processes and tools
- Conflict management
- Confidentiality
Time for Interaction!

• What techniques have you used to keep your teams engaged?

• Have you established group norms? What is working well for you?

• Have you been able to move your team from storming to norming yet? What has helped in doing so?

• What other questions do you have?
Team Leader vs. Coach?
What is coaching?

The act (and art!) of activating people’s agency

Helping others develop insight, skills, and capabilities to improve

Coaching definition adapted from Kate Hilton and The Dartmouth Institute
The Dartmouth Institute: http://www.tdiprofessionaleducation.org/leading-coaching-quality-improvement.html
What coaching is not?

The act (and art!) of activating people’s agency

Helping others develop insight, skills, and capabilities to improve

- Telling
- Fixing
- Monitoring
- Imparting content expertise
- Being solely accountable
- Praising falsely

Coaching definition adapted from Kate Hilton and The Dartmouth Institute
The Dartmouth Institute: http://www.tdiprofessionaleducation.org/leading--coaching-quality-improvement.html
Coach Role

Early in the life of a team, the coach or facilitator may lead team meetings, conduct just-in-time training, and give the team feedback on group process issues.

As the team matures, however, the coach’s involvement with the team decreases.

Source: Executive Learning Inc, Team Training
Coaching skills

- Excellent analytic skills
- Excellent group dynamic skills
- Excellent planning and project management skills
- A sense of urgency and a focus on results
- Protected time to serve as a coach
- Customer focus (it’s not about the coach!)
- Excellent listening skills
- Ability to synthesize qualitative and quantitative information
- Ability to ask clarifying questions
- Ability to give constructive feedback
- Interviewing skills
- Facilitation skills
- Organizational skills
- Strong knowledge base
- System-level thinking and analysis
Three Major Roles on Teams

<table>
<thead>
<tr>
<th>Team Leader</th>
<th>Team Coach</th>
<th>Team Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runs Meeting</td>
<td>Training</td>
<td>Subject Matter Expert</td>
</tr>
<tr>
<td>Coordinates Work</td>
<td>Facilitation</td>
<td>All relevant disciplines</td>
</tr>
<tr>
<td>Drive Results</td>
<td>Feedback</td>
<td>Participate</td>
</tr>
<tr>
<td>Updates Sponsor</td>
<td></td>
<td>Take assignments</td>
</tr>
</tbody>
</table>

Working agreements are a way to clearly establish what everyone’s responsibilities are going to be.
Working Agreements

An explicit, yet typically informal, set of agreements between two parties (Coach/Leader, Coach/Team).

Working agreements specify:

1. Who the client is (remember we are all customers of each other)
2. The aim and objectives of the relationship
3. The roles and responsibilities of each
4. Any other ground rules for the relationship

If broken provides opportunity to reflect, learn and rework as needed.
Time for Interaction!

• Do you have a separate team leader and coach?

• Does everyone understand their role?

• Does anyone have a story about how they have used a formal or informal working agreement?

• What other questions do you have?
Working Across a System
Key Questions to Provide Clarity...

- How do we move from testing to making the change permanent? (Implementation)
- How do we hold the gains from improvement over time? (Sustainability)
- How do we improve more quickly across a system?
  - How do we engage individuals to adopt changes identified elsewhere? (Spread)
  - How do we build the infrastructure to allow adoption of changes in different contexts and larger scope? (Scale-up)
Improvement Sequence: Definitions

**Test** – Try and adapt ideas to learn what works in your system

**Implement** – Make a change a permanent part of the day to day operation of the system

**Sustain** – Hold the gains of improvement

**Spread** – Have individuals adopt the changes

**Scale-up** – Overcoming the *structural issues* that arise during spread
Which System are you working in?

<table>
<thead>
<tr>
<th>Nursing Services</th>
<th>Macro-systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. a hospital, multiple hospitals, a state, a region)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing Divisions</th>
<th>Meso-systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. a division, a clinical department, pathology, IT)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frontline Nursing Units</th>
<th>Micro-systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. a ward or unit, a clinic, home care nurses)</td>
<td></td>
</tr>
</tbody>
</table>
Breakthrough Series Collaborative Model

Enlist at least 10 team members

Topic Selection & Mission

Expert Meeting

Prework

Framework & Changes

LS1

LS2

LS3

Sustaining Improvement

Spread

Dissemination (publications, etc)

Key

LS Learning Session
AP Action Period

Ongoing Supports

Email listserv
Team reports
Assessments

Calls & webinars
Site visits
Sponsor

*AP: continue reporting data as needed to document success
Working Across our Healthcare System at Penn

**Penn Medicine Collaborative Model**

- **Project Selection**
- **Expert Meeting**
- **Pre-work**
- **Kickoff Meeting**
- **Framework with Proposed Changes**
- **Identification of local teams**
- **6 to 12 months**
- **Results Meeting**
- **Holding the Gains**
- **Sustain and Disseminate**

**Action Period Activities:**
- Monthly Conference Calls
- Site visits/coaching
- Monthly Reporting
- Testing of changes (Lean, Six Sigma, MFI-PDSA)
- Enhance initial solutions
- Opportunities for presentation and learning (both project based and didactic).
- Email listserv/sharepoint site
- Tableau Dashboards
Attributes of an idea that facilitate adoption

- Relative Advantage
- Simple
- Trialable
- Compatible
- Observable

Hard Core and the Soft Periphery

Hard Core – the element of the intervention that carries the key potential benefit.

Soft Periphery – complementary arrangements involved in delivering the benefit. May take a variety of forms depending on the local environment.

“If the soft part of the intervention is poorly organized, it may destroy the benefit of the hard core.”

Langley, BMJ Qual Saf, 2011
Key Components/Considerations for your work

• Each location where patient care happens should have its own local team.

• Identify shared resources and create a support structure for those, like a task force (create the right mesosystem).

• Data, Data, Data – do it once for the system.

• Change ideas developed in one place likely need to be adapted to work in a different location.
A Proposed System Framework

System Task Force (mesosystem):
Common resources or functions, data resources, determine interventions, process IS/EMR needs, has representation from all local teams.

Hosp 1: NAS
Hosp 1: OUD
Hosp 1: MM
Hosp 2: NAS
Hosp 2: OUD
Hosp 3: MM
Hosp 3: NAS
Time for Interaction!

• What are some examples of how you have consolidated resources to work across your system?

• Have you set up a system task force (mesosystem) for your health system PAPQC project work? What have been your challenges?

• What other questions do you have?
Data for Quality Improvement
IHI Model for Improvement

Model for Improvement

What are we trying to accomplish?

How will we know that a change is an improvement?

What change can we make that will result in improvement?

Act
Plan
Study
Do
How will we know that change is an improvement?

Outcome Measures

• The voice of the customer or patient.
• Reflects the problem you are trying to solve.
• Describes how your overall system is performing.

Process Measures

• Steps logically linked to outcome of interest.
• Addresses how key parts of the system is performing.

Balancing Measures

• Describes what happens to the system as processes and outcomes have changed.
• What are the unintended consequences or alternate explanations?
### Example NAS Family of Measures

| Outcome Measure: | • Length of stay for all opioid exposed newborns (OEN)  
|                  | • Length of stay for all OEN who required pharmacologic treatment. |
| Process Measure: | • Compliance with ESC scoring system.  
|                  | • Percentage of all OEN receiving non-pharmacological interventions.  
|                  | • Percentage of the day OEN rooming in with mom.  
|                  | • Compliance with treatment algorithm |
| Balancing Measure: | • Readmissions within 30 days due to withdrawal symptoms.  
|                  | • Impact of ESC on nursing patient care tasks |
The Importance of Operational Definitions

If data collected **differently by different people**, or **differently each time collected**, it makes it hard to know whether **changes in the data are due to the changes tested** or from **inconsistencies in data collection**.
What is a goal?
The whole ball or half the ball?  Courtesy of Bob Lloyd, IHI
Run Chart

Graphical display of data plotted in some type of order, usually over time. Also has been called a time series or a trend chart.

Minimum requirements:

• Line graph of data points
• Median line
• Indication of goal
• Annotations

Perla, BMJ Qual Saf, 2011
Why Use A Run Chart?

Cycle Time
Results for Units 1, 2 and 3

<table>
<thead>
<tr>
<th></th>
<th>Avg. Before Change</th>
<th>Avg. After Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle Time (min)</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>SD</td>
<td>11.36</td>
<td>13.15</td>
</tr>
<tr>
<td>$t$ (22)</td>
<td>7.88, $p &lt; .001$</td>
<td></td>
</tr>
</tbody>
</table>

Perla, BMJ Qual Saf, 2011
Understanding Variation

- In QI, we are looking for changes in key data.
- But all things vary naturally – fact of life.
- Need tools to identify true changes in data versus natural background variation.
- And, we want to identify true changes fast.
- Run and Control charts: tools to help interpret variation – identify signal and noise.
## Noise vs. Signal

<table>
<thead>
<tr>
<th>Common Cause Variation <em>(Noise)</em></th>
<th>Special Cause Variation <em>(Signal)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is due to regular, natural or ordinary causes that are inherent in the design of the process</td>
<td>Is due to irregular or unnatural causes that are not inherent in the design of the process</td>
</tr>
<tr>
<td>Statistically similar to other data points.</td>
<td>Statistically different from other data points.</td>
</tr>
<tr>
<td>Results in a “stable” process that is predictable</td>
<td>Results in an “unstable” process that is not predictable</td>
</tr>
<tr>
<td>Also known as <strong>random</strong> or unassignable variation</td>
<td>Also known as <strong>non-random</strong> or assignable variation</td>
</tr>
</tbody>
</table>
How many data points do I need to start a run chart?

• Start to plot your data on a run chart as soon as you have some!

• The median will be calculated and continued to be adjusted until you have established a baseline of 10 data points.
  • 10 patients, 10 days, 10 weeks, 10 months, 10 quarters...

• Why 10?
  • At least 10 data points are required to apply the probability based run chart rules.
Probability Based Rules for Run Chart Analysis

If visual analysis leaves us uncertain that change(s) yielded improvement, we may use probability based rules to analyze the run chart.
Figure 3  Rules for identifying non-random signals with run charts.
Why Bother... What Do we Do With A Signal?

- Signals can be evidence of *improvement*
  - That changes are adding up to improvement

- Signals can be evidence that *things got worse*
  - Changes caused unexpected degradation of process or outcome
  - Something else entered the process resulting in a signal

- Action when seeing a signal?
  - *Go learn* from signal and take appropriate action
Proper Use of the Median

• When should we apply a median?
  • Will depend on your situation
  • If very little data baseline median may be only a few data points
  • If want to apply probability-based rules for analysis of run chart need 10 data points for median

• If graph shows no signals (shift, trend, runs astronomical) and median made from 10 or more data points freeze and extend median into the future.
  • This will result in earliest possible detection of signals
FIGURE 3.23 Run Charts for Waiting Time Data

Run Chart (k = 4)
Median = 86.75

Run Chart (k = 5)
Median = 88.3

Run Chart (k = 8)
Median = 87.5

Run Chart (k = 10)
Median = 88.7
If median not frozen / extended will be a delayed detection of signals
If median not frozen / extended will be a delayed detection of signals
If median not frozen / extended will be a delayed detection of signals
Trend Lines on Run Charts

**FIGURE 3.38** Run Chart from Figure 3.22 with Seventh Week Added

- **Percent L&D Epidurals Within 30 Minutes**
- **Evidence of Statistical Improvement: Appropriate Use of Trend Line**

Goal 95% or >

Regression = 65.6071 x week + 20.679

Week

- Change 1
- Change 2 & 3
- Change 4
No signal of improvement on chart, therefore improper to use trend line.
Time for Interaction!

• Are you using run charts to analyze your data? How are you creating them?

• How often do your teams or leaders react to the last data point as opposed to understanding data points in the context of others?

• How often are you using “Red, yellow, green” tables or charts to evaluate project performance in QI? What do you think is the problem with that approach?

• What other questions do you have?
Control Charts
Why are Shewhart Charts preferred over Run Charts?

Because Control Charts...

1. Are more sensitive than run charts:
   - A run chart cannot detect special causes that are due to point-to-point variation (median versus the mean)
   - Tests for detecting special causes can be used with control charts

2. Have the added feature of control limits, which allow us to determine if the process is stable (common cause variation) or not stable (special cause variation).

3. Can be used to define process capability.

4. Allow us to more accurately predict process behavior and future performance.
Shewhart or Control Charts

- Used when you have at least 12 data points, but ideally 20 (converting from a run chart to a control chart).

- Also called a control chart, the Shewhart Chart is a statistical tool used to understand variation in a measure due to common and special causes.

- A Shewhart Chart has 3 lines: a center (mean) line, an upper limit line and a lower limit line (control limits).

- A mathematical equation is used to calculate the upper and lower limits of changes to be expected within the existing system (+/- 3 standard deviations).
The choice of a Control Chart depends on the type of data you have collected.

**Continuous (Variables) Data**

Time, money, scaled data (temperature, length, volume), workload or productivity (throughput, counts)

**Attributes Data**

- **Defectives (classification)**
  - percent that meet a particular criteria (OK vs not OK)
  - % of staff who receive QI training)
  - % of new inpatients with a skin assessment completed within 12 hours)

- **Nonconforming Units**

- **Nonconformities**

- **Defects**
  - (count)
  - data are counted, not measured. Must be whole numbers. (e.g., number of errors, falls or incidents)
5 Rules for Determining a Special Cause in Control Charts

1. A **single point** outside the control limits
2. A run of **eight** or more points in a row above or below the center line
3. **Six** consecutive points in a row increasing (trend up) or decreasing (trend down)
4. **Two out of three consecutive points** near a control limit (outer one third of chart)
5. **Fifteen consecutive points** in a row near the center line (inner one third of the chart)
FIGURE 4.5  Rules for Determining a Special Cause

1. A single point outside the control limits.

2. A run of eight or more points in a row above (or below) the centerline.

3. Six consecutive points increasing (trend up) or decreasing (trend down).

4. Two out of three consecutive points near (outer one-third) a control limit.

5. Fifteen consecutive points close (inner one-third of the chart) to the centerline.
### “Special Cause” in Run vs. Control Charts

<table>
<thead>
<tr>
<th>Rule</th>
<th>Run Charts</th>
<th>Control Charts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consecutive increasing or decreasing points</td>
<td>5 (6, if more than 20 points)</td>
<td>6 (8, if more than 20 points)</td>
</tr>
<tr>
<td>Number of points on the same side of the center line.</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Astronomical point</td>
<td>One “unusual” point</td>
<td>One outside the UCL or LCL</td>
</tr>
<tr>
<td>Points around the center line</td>
<td>Too few or too many crossings of center line</td>
<td>15 around the inner third</td>
</tr>
<tr>
<td>2 out of 3 in the outer third</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Center line</td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>Control Limits</td>
<td>No</td>
<td>Yes (+/ 3 SD)</td>
</tr>
</tbody>
</table>
Shewhart Charts and Improvement

• Most common use in improvement activities is to learn about variation and the impact of changes.

• These five rules can be used to provide evidence of an improvement (or unintended loss) to a process or system.

• These rules can also be used to point to losing ground in an improved area.
Any final questions?