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Jeremy Ellis
Tower Health

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Quality Improvement in Healthcare: A Practical Guide For Providers - Part 3

Jeremy Ellis[1]

1. Department of Internal Medicine, Reading Hospital, Tower Health, West Reading, PA 19611

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This article represents the 3rd installment of a 5-part series intended to simplify the main principles of quality improvement for the healthcare provider. As we have noted previously, the knowledge shared in this series relies heavily on my own experiential learning, gained after more than a decade of direct involvement in quality improvement within healthcare. While I endeavor to cite several key resources within this article, the reader is strongly encouraged to seek out additional literature on this topic for a wider breadth of understanding of these core concepts. The core concepts have been broken down into the following 5 topic areas:

1. Picking the right problem for a quality improvement project
2. Performing a gap analysis and constructing a process map
3. Building an aim statement and interventions
4. Defining measures and constructing a PDSA cycle
5. Assessing results in a run chart

Each topic area will be reviewed in its own installment in this 5-part series, which readers are encouraged to read in chronological order as the topics are intended to build upon each other and foster a more thorough understanding of the material.

As the reader will recall, we began our quality improvement journey together with the following case: Mr. Smith is a 45-year-old male who presents to the hospital with a unilateral throbbing headache of several hours duration. He reports a past medical history that includes migraines and admits that his current symptoms are similar to prior episodes. His examination does not reveal any focal neurological deficits and the remainder of his exam is similarly non-contributory. As part of the work-up for this present headache, an MRI/MRA head and neck is ordered. This imaging ultimately reveals no acute findings. The patient is treated symptomatically for presumed migraine headache, recovers without additional issues, and is discharged form the hospital 24 hours later. Several weeks later, the patient files a grievance with the patient advocate department for concerns of unnecessary testing in regards to the imaging ordered for his headache. This grievance prompts administration to seek your leadership on a possible quality improvement project to prevent unnecessary testing in similar future cases.

In our previous discussions, we established that this target is a viable quality improvement project and, through collection of baseline data and benchmarking, determined that a sizeable care gap exists. We are now prepared to move toward actions to drive improvement in our target process. All interventions to drive improvement should be guided by an appropriate aim statement. It will be crucial to develop this aim statement prior to constructing your interventions to ensure that every member of your quality improvement team understands precisely what you are trying to accomplish with this project. It is often very tempting to consider possible interventions and roll them out as quickly as possible, but this is an often-encountered mistake in strategic planning that can easily lead to project failure later.

As we will see as a recurring theme in the remainder of our discussions, specificity is crucial when building your team's aim statement. Not only does the aim statement define the overall mission of your team, it will also specify what constitutes "success" for your project. Though many mnemonics exist to aid in constructing a robust aim statement, the SMART mnemonic is among the easier to recall.

Correspondence to Jeremy Ellis at Jeremy.ellis@towerhealth.org

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A "SMART" aim statement will be Specific, Measurable, Achievable, Relevant, and Time-specific.[1,2] Following this guidance, we discover that three main components are necessary in any proper aim statement: Population, degree, and time.

1. What population are you targeting?
2. To what degree do you intend to change your targeted metric?
3. During what timeframe do you plan to see this change?

While these requirements appear straightforward at initial review, it is not uncommon for an incomplete aim statement to be a source of significant difficulty for many quality improvement groups. This pitfall is best demonstrated by comparing acceptable versus unacceptable aim statements. Consider the following example aim statements:

A. Improve COPD management within the XYZ Health System.

B. Reduce length of stay for patients on Floor 4 East over the next 3 months.

C. Reduce readmission rates for CHF patients by 50 percent.

D. Reduce the average length of stay for medical ICU patients by 50 percent within 9 months.

These example aim statements improve in quality from a (worst) to d (best). As we review example "a", we have loosely defined the population we are targeting (i.e. patients with COPD), but we fail to more specifically define the concept of "improve management"—as this can mean many different things to the members of your team. Furthermore, there is no mention of how much we plan to improve (degree) nor any mention of what timeframe we plan to see this change.

Example "b", meanwhile, provides better specificity regarding our target population and provides a timeframe, but neglects to define the degree to which we intend to improve length of stay. Example "c" addresses the intended degree of change but neglects to specify an appropriate timeframe for change. Finally, in example "d", we see all three of the necessary components included: medical ICU patients (population), a 50% reduction of average length of stay (degree), and a timeframe of 9 months. Depending on the nature of your project, you may discover that additional specificity will be necessary in your aim statement, or at least in discussions that solidify group understanding of your aim statement. For instance, a project focusing on CHF patients may be limited to inpatient care, patients only on certain floors, or only heart failure with reduced ejection fraction.

Considering the three necessary components described above, the following would be an example of a robust aim statement constructed by our quality improvement team:

Decrease orders for MRI/MRA head and neck for adult patients placed in observation for uncomplicated headache* by 25% within 6 months.

This aim statement contains a target population (adults in observation with uncomplicated headache), a degree of change (decrease by 25%), and a timeframe (6 months). As noted with our "*", however, additional specificity will be necessary in discussions with your team regarding how you will define patients who have an "uncomplicated" headache. Though an operational definition for this concept is well-defined in the clinical literature[3], you will also need to consider what data is readily available for you to collect in forming this definition.

With a properly constructed aim statement in place, many quality improvement teams then face a rather unexpected problem. Rather than struggling to brainstorm possible interventions to drive improvement, many teams face the daunting realization that a myriad of possible interventions could be beneficial and are faced with the task of prioritizing which actions should be pursued first. Fortunately, several quality improvement tools exist to aid in your team's decision-making to identify the highest yield interventions. Two such tools favored by this author include the Failure Modes and Effects Analysis (FMEA) and the Pareto Analysis.[4] These two tools are particularly useful in that they are utilized to accomplish the same task but are best applied to very different circumstances, meaning that these two tools may be sufficient for most intervention selection challenges your team is likely to face.

The FMEA is best utilized if your team is targeting a process that is relatively new (i.e. you are trying to predict how the process could fail) or demonstrates a high degree of variability[5]. A high degree of variability is likely something you will have noted during direct observations and in the construction of your process map, both of which are topics covered earlier in this series. A high degree of variability does not necessarily mean that a particular process is broken in the realm of healthcare. Consider two patients presenting with sepsis: (1) an 85-year-old female presenting with a perforated diverticulum and (2) a 35-year-old male with a community acquired pneumonia. Though both patients have been diagnosed with sepsis, the severity of their illness

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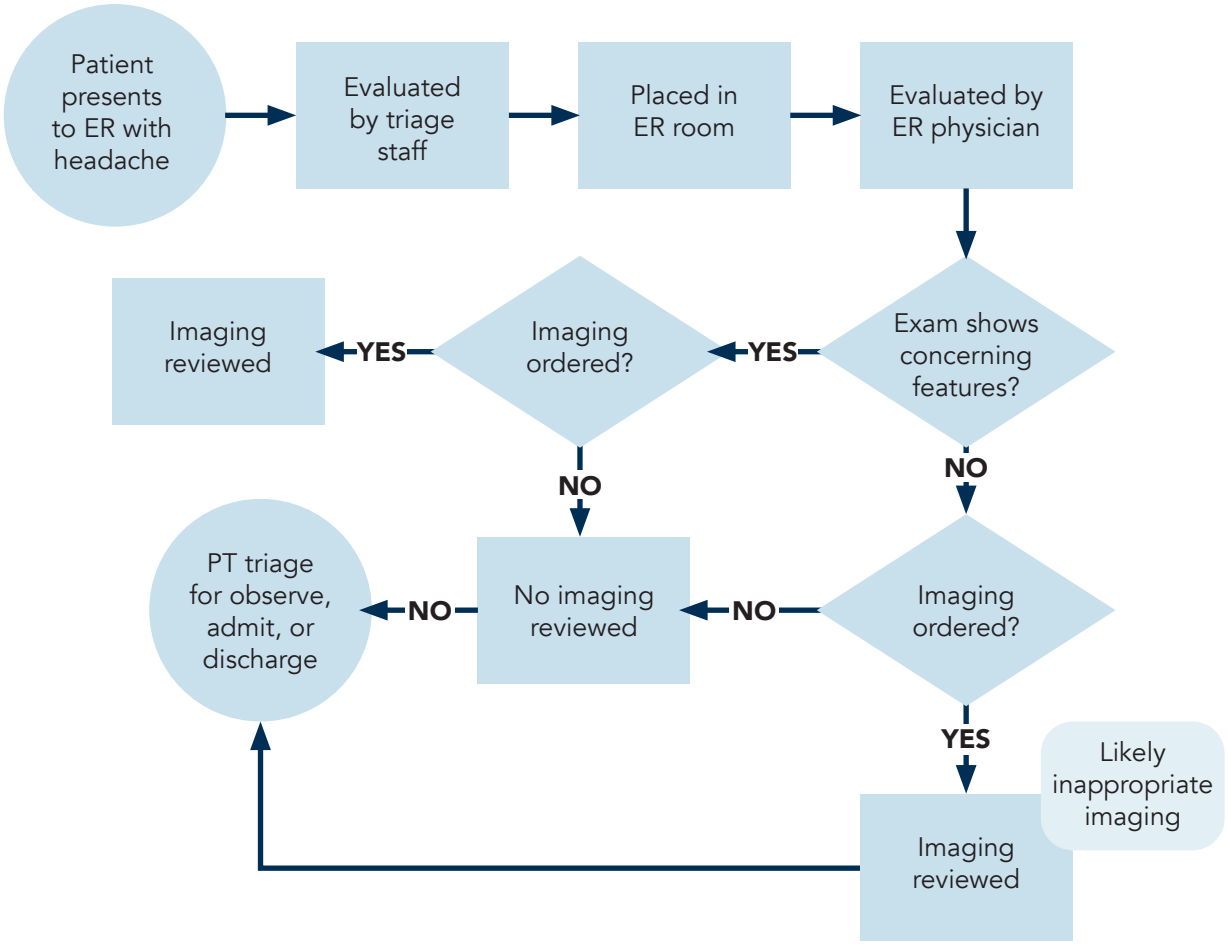
Figure 1. Headache patient process map



and the resulting experience of their hospitalizations may be quite different indeed. This can be contrasted to other processes, such as obtaining a routine chest x-ray or certain surgical procedures, where the expected variability may be less pronounced.

The FMEA allows for higher degrees of variability by relying on your team's process map to drive analysis. Therefore, this method is only useful if your team has constructed a robust process map that has been vetted by your key stakeholders. The FMEA invites you to ask three questions for each step on your process map (or perhaps a selected portion of your process map):

1. What could go wrong? (modes)

2. Why would it happen? (causes)

3. What are the consequences? (effects)

For each step in your process map being analyzed with the FMEA tool, first list out each way that step could possibly fail (i.e. failure "modes"). Next consider the possible causes of each failure "mode". Lastly, describe the consequences of that specific failure[1,4]. Let's review an example to help clarify these tasks. Consider Figure 1, a (very simplified) process map:

To complete an FMEA, (*Table 1*) we first consider each of the steps in the process map we intend to analyze. For each of those steps, we list the common ways in which that step might fail or malfunction. For instance, in our example, a physical exam to identify concerning features may fail if the exam is incomplete or inaccurate. When considering the causes of why such a failure may occur, insufficient medical knowledge or physical diagnosis skills would be a potential culprit. Lastly, the obvious consequences to this failure would be missing possible red flag features to a headache and a fear of this miss may lead to reflexive ordering of imaging for all patients presenting with headache.

You have likely noted that the FMEA continues with a series of numbers to describe "occurrence", "detection", "severity," and "RPN." These numbers reflect

Table 1. Headache patient FMEA

Step	Failure Mode	Cause	Effects	Occurrence	Detection	Severity	RPN
Evaluated by triage staff	-not evaluated by triage-incorrectly evaluated by triage	-volume-time inexperience	Patient not correctly triaged.	7	7	6	294
Placed in ER room	-not placed in room	-no room available-patient leaves AMA	Patient does not receive medical treatment.	7	2	8	112
Evaluated by ER physician	-inaccurate evaluation -incomplete evaluation -failure to evaluate	-volume -time -fatigue -distractions	Patient inadequately assessed for emergency conditions.	6	8	8	384
Exam with concerning features	-incomplete exam -inaccurate exam	-medical knowledge -physical diagnosis skills	-headache red flag features could be missed -reflexive ordering of imaging for all headaches	8	9	9	648

the overall negative impact of a particular failure mode, as assessed by your team and key stakeholders, with "0" being least detrimental and "10" being most detrimental. For instance, a "0" for occurrence means that a particular failure mode is very UNLIKELY to occur, whereas a "10" would indicate this failure happens quite frequently. For detection, a "0" means that the failure would be very EASY to detect, whereas a "10" means the failure would often go unnoticed for quite some time. In essence, a higher number for detection means the failure is harder to detect. The grading for severity is self-evident, with a "0" indicating the consequences of that failure are very mild whereas a "10" indicates very severe consequences. These numerical assessments allow us to calculate the risk priority number (RPN), which is simply the product of these three numbers multiplied together[6].

The RPN is, in fact, the final result of the FMEA that is used to assess which failure modes are most impactful to target early. A particular type of failure within your process that has a higher RPN is a more valuable target for an earlier intervention to improve. In our example above, the FMEA suggests that your quality improvement team should develop an intervention to improve that quality of the initial headache exam as an early target as the RPN for this step is higher than the other evaluated steps. By focusing on the steps with the highest RPN, the FMEA directs your team to target problems that are the most common, hardest to detect in real time, and cause the most severe consequences4.

An important consideration for the FMEA tool is the inherent subjectivity involved with assigning a numerical value describing the overall impact of a particular failure within your process. How do you assess one failure to have a severity of "7" and another with a severity of "5"? Your concerns about this subjectivity are correct. The FMEA relies on a degree of consensus and is therefore best completed as a group effort with key stakeholders in identifying approximate values for these criteria[7]. This subjectivity is what allows the FMEA to be a very flexible tool that can adapt to workflows with significant variability.

In contrast to the FMEA, the Pareto analysis is a tool best applied to processes with less inherent variability. This tool works best when analyzing processes where overt failures can be recorded and tabulated reliably. When you record and tabulate any missteps in your targeted workflow, the Pareto analysis instructs us that we can apply the 80-20 rule. This rule states that 80% of the problem is due to 20% of the causes. When this rule holds true, it will be important to separate the causes into the vital few and the useful many[1,4]. Let's consider an example to clarify this principle.

A colleague's quality improvement team is analyzing delays in start time for your cardiac catheterization lab. Over the past 6 months, 33 cases have been delayed by 30 minutes or more. Your team reviews the charts for the 33 cases, and record the following

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causes for the delays.

A. Procedure consent not on the chart-15 occurrences

B. Patient was not made NPO after midnight-11 occurrences

C. Patient goals of care changed- 2 occurrences

D. Schedule changed for emergency case-2 occurrences

E. Acute patient condition change-1 occurrences

F. Staffing shortage-1 occurrence

G. Equipment malfunction-1 occurrence

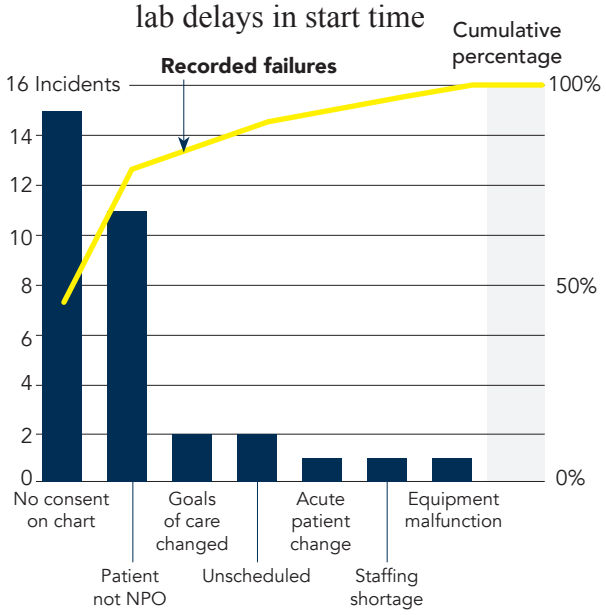
If we graph this data (*Figure 2*) according to incidence, we can quickly see which challenges constitute the majority of the problem.

From Figure 2, we can see that the recorded failures of the process cross the 80% mark within the "patient not NPO" category. Applying the 80-20 rule to this analysis, the quality improvement team should target the issues of missing consent and failure to make a patient NPO prior to the procedure for early interventions. These two particular challenges represent the "vital few" while the other recorded causes for delay are the "important many."

Now that we have reviewed two common tools to select the highest yield target in a process, we will finish our discussion today with a brief overview of the types of interventions commonly deployed in a quality improvement effort. Please note that the following commentary on interventions and their effectiveness reflect my own experiential learning through various project successes and failures. Broadly speaking, your team should almost always favor the use of system-level interventions, when feasible. This is in contrast to interventions focused on the provider level of the workflow, though these are commonly deployed as well.

Interventions at the level of the system concentrate on simplifying the target process as much as possible for the front-line staff. This often involves reducing the number of steps in a process, eliminating unnecessary controls, removing redundancies, or cutting out avoidable intermediaries. For instance, when considering our prior example of delays for cardiac catheterization, you could eliminate the extra steps of printing a procedure consent by making the process digital and integrated with the electronic medical record. Alternatively, the team might consider establishing NPO after midnight as the default order for a diet for any patient on the catheter lab schedule, thereby eliminating the need for a provider to remember this order in the first place. These sorts of

Figure 2. Cardiac catheterization lab delays in start time



system-level interventions are often the most powerful because they make the correct action the easy action. If an intervention can make the correct path into the path of least resistance, it will often result in measurable improvement.

In many cases, system-level interventions are challenging because they may be slow to deploy, require the approval of many committees, and may experience varying stakeholder buy-in. Interventions at the level of the provider, meanwhile, may be faster to implement and require less robust buy-in from stakeholders. When considering provider-level interventions, this author often categorizes possibilities according to historical effectiveness. In this author's experience, these interventions can be divided into actions that typically do not work, those that may work some of the time, and interventions with a high likelihood of success. We will discuss opportunities within each of these categories, but I caution the reader to note that this reflects the experiential knowledge of the author and may vary within your own institution.

Interventions that often have limited or short-term effectiveness include utilization review, continuing medical education (CME), and practice guidelines. While each of these actions certainly have a role in improving care, they may not translate into the significant drivers for improvement your team is aiming to implement. Utilization review is often hindered by many provider's inherent dislike for oversight. Educational interventions may drive small improvements early in the project, but this effect often wanes and suffers from a lack of sus-

tainability. Meanwhile, the development of practice guidelines create excellent references for benchmarking, but themselves may be slow to change behavior at the level of the individual provider.

Interventions with medium effectiveness include actions such as academic detailing, provider report cards (or dashboards), and clinical reminders or clinical decision support. Academic detailing is an intensive form of education that involves one-on-one sessions with a content expert to review the targeted practice with a provider. In common parlance, you may know this as "at-the-elbow" education—that is, when a local expert helps guide you through a particular workflow in real-time that may be new to you or has been identified as an area for improvement. Clinical reminders or decision support can be very powerful tools but must be deployed at the right time for the right provider. In the absence of these considerations, reminders built into an electronic medical record can become intrusive distractions that delay a provider's workflow and lose stakeholder buy-in very quickly. Provider report cards and dashboards can similarly be powerful tools, but need to focus on metrics that are actionable and attributable. Too often, in this author's experience, dashboards display very high level metrics that any individual provider will be challenged to impact meaningfully or may be difficult to attribute at the level of the provider to create a useful report card.

Lastly, provider-level interventions that are often successful include financial incentives and organizational changes. While financial incentives are self-explanatory, organizational changes may involve recruiting personnel with expertise in driving change or obtaining additional IT resources to support quality improvement initiatives generally. Importantly, organizational change often involves engaging and educating the workforce in the principles of quality improvement science, whether through a structured curriculum or through the humble efforts of an interested party authoring a series of articles on the topic. Regardless of the strategy used, the goal is to achieve a "critical mass" of educated and engaged workforce to seek out and drive improvement opportunities. Achieving this "critical mass" can have lasting and dramatic effects on the quality improvement efforts of your institution, as opposed to the typically briefer and more difficult to sustain improvement experienced with limited clinical education seen with CME interventions in quality improvement.

We can now conclude our 3rd installment of this quality improvement primer with a better understanding of aim statements, tools to select early targets for improvement, and the array of intervention types available for most quality improvement projects. This knowledge should build upon the topics covered in earlier articles of this series, and will be necessary to fully understand the concepts we move on to in our next discussions with future sections. Our next discussion will move forward into developing robust measures for our project and begin the construction of a Plan-Do-Study-Act (PDSA) cycle, the foundational tool for deploying our chosen interventions. Afterwards, we will conclude our series with a review of how to interpret our obtained data in a simple and actionable fashion via the run chart.

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