Hello everyone and welcome! We really appreciate your continued interest in this collaborative and look forward to getting started. First we will start with a few housekeeping reminders:

1) To reduce the likelihood of feedback during the call, we’ve muted everyone. 
2) Please use the chat function to ask questions. We have time at the end of the presentations to respond to any questions submitted during the webinar, and we’ll open to a Q&A format at the end.
3) The webinar is being recorded. We will post it later and provide a link so you can review or share with any member of your team unable to be on the call. Please frame any questions with the understanding it will be part of the recording.
Quality Improvement Tools

- List of tools from IHI
- Review tools
  - Fishbone
  - Key Driver
  - Pareto Chart
  - Run Chart
- Real World Case Study - Susan Duncan

Thank you all again for joining us. I’d like to keep the format fairly open for your questions. Today we’ll review a few tools from the IHI Essential Toolkit. Our agenda today is:

1) List of tools from IHI
2) Review tools
   1) Fishbone or Cause and Effect
   2) Key driver diagram
   3) Pareto Chart
   4) Run Chart
3) Outside perspective
Knowledge check!

Please respond to these questions:

1. A fishbone diagram is useful for:
   a. Root cause analysis
   b. Intervention planning
   c. Current state

2. A PDSA cycle is designed for:
   a. Small tests of change
   b. Organizing projects
   c. Planning an intervention
Results

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During the last webinar, I introduced a process issue we were experiencing here at Memorial Hermann for illustration purposes. For this webinar, I’m going to use some of our findings for our current project-reduction of CT utilization in pre-op appy-as a way to illustrate how to use some of the tools from the toolkit.
First, here are the list of tools from the IHI Essential Toolkit. There are many other tools you can use but these are the ones most commonly used in healthcare. The IHI highlights nine tools. We’ll discuss 4 of these. The entire toolkit will be included in the appendix. These resources are freely available. The majority of the material presented today is taken from the toolkit.
The first tool we’ll review is the cause and effect diagram.
The cause and effect diagram is also called a Ishikawa diagram, for its creator or, a fishbone diagram, for its resemblance to the bones of a fish.

1. The effect that you wish to influence is the spine of the fish.
2. The fishbones are the 5 or 6 categories of causes for the effect. Within each category are branch bones that show sub-causes.
The cause and effect diagram is usually the first tool you employ from your toolbox. The template above is from the IHI and has as cause categories the five most commonly used: people, environment, materials, methods and equipment. You do not have to stick with these cause categories. You’ll see in a bit the fishbone developed for the CT reduction project has other categories.

It can be a little overwhelming to try to complete the cause and effect diagram all by yourself—especially the causes and sub causes under each large category. You may worry you’re going to miss something important or get sidetracked.
Brainstorming

One tool you can use in generating causes on your cause and effect diagram is brainstorming. One brainstorming method is to collect your team and have each member provide causes or subcauses of the effect you want to influence. This doesn’t need to be formal. You can have team members write these on sticky notes and then organize the ideas under the categories you’re exploring.
One way to organize the brainstorming ideas is to use an affinity diagram. Here you can see, that you might have several responses that all describe a similar sub-cause (i.e., sub-cause 2, 3, or 6), or you might only have a single response describing a sub-cause (1.4). You may be able to group several sub-causes together into a single larger cause (i.e., Cause 1).

You could then take the results from this affinity diagram and place them into the fishbone diagram.
In the last webinar, we discussed the 5 why’s as another tool/method to identify causes.
In the CT project we might ask:

Why did the patient get a CT scan?
Because its what is done routinely.
Why is a CT done routinely despite the known risks?
Because the use of US in ED for appy is limited
Why is it limited?
Because the sonographers are not trained to conduct definite appy studies
Why are the sonographers not trained?
Because there is a belief that CT is more efficacious.
And so on.
For the cause and effect diagram created for the CT project, I used a shortcut. As you know, we have been conducting qualitative interviews with some of our member hospitals. The interviewees were selected from the NSQIP Targeted Appy report. Dr. Lally reached out to several of our high performers and low performers within the collaborative and asked them to participate. All of them agreed. We recorded and coded the interviews. Here is a screenshot of our coding results.

This is a modified approach to brainstorming. The interview codes are grouped into categories and we can see which categories have the most frequent association with the problem we want to address.
CT Utilization Reduction Project
Fishbone

The resulting cause and effect diagram we developed is displayed here. These five categories have the greatest influence on the effect.
Knowledge check!

1. Building a cause and effect diagram helps you:
   a. Identify possible causes for a problem you want to address
   b. Identify failures in a system
   c. Identify the tasks of a project, the order they occur and duration

2. The 5 Whys or Why-Why method:
   a. Identifies benefits and barriers to addressing the problem
   b. Identifies the root cause of a problem
   c. Identifies which causes of a problem have the greatest effect
Results

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The next tool we’ll discuss is a Pareto Chart.
Pareto Principle

- **Vilfredo Pareto**: Italian economist
- **Joseph Juran**: Quality management pioneer
- **80/20 rule**: 80% of the effect is a result of 20% of the causes

The idea for a Pareto chart is derived from the Pareto principle. Vilfredo Pareto was an Italian economist in the 1900’s. He observed that 80% of the wealth was due to 20% of the people. Joseph Juran who was a QM pioneer in the 1940’s applied this principle to QI.

According to the “Pareto principle” — in any group of factors that contribute to an overall effect, roughly 80% of the effect comes from 20% of the causes. A Pareto chart is a type of bar chart in which the various factors that contribute to an overall effect are arranged in order from the largest to the smallest contribution to the effect. This ordering helps identify the “vital few” (the factors that have the largest contribution to the effect and therefore warrant the most attention), as distinguished from the “useful many” (factors that, while useful to know about, have a relatively smaller contribution to the effect). Using a Pareto chart helps teams concentrate their improvement efforts on the factors that have the greatest impact. It also helps teams explain their rationale for focusing on certain areas and not others.
Above is a generic example of a pareto chart. You have a bar chart listing different causes in descending order. The line then represents the cumulative percentage (eventually reaching 100%). The focus of one’s efforts might be on those causes that have the greatest contribution to the overall effect. Alternatively, one might focus efforts on the cases that cost the least or are least difficult to fix (modification of the chart).
This pareto chart displays some of the causes of use of CT from the decision points category on our fishbone diagram. Using this data, we may conclude that a focus on the top 3 causes would be the best for our QI project.
The next tool we’ll review is the Key Driver Diagram.
A driver diagram is a visual display of a team’s theory of what “drives,” or contributes to, the achievement of a project aim. This clear picture of a team’s shared view is a useful tool for communicating to a range of stakeholders where a team is testing and working. A driver diagram shows the relationship between the overall aim of the project, the primary drivers (sometimes called “key drivers”) that contribute directly to achieving the aim, the secondary drivers that are components of the primary drivers, and specific change ideas to test for each secondary driver.

Remember: It’s unlikely that a single individual has a clear view of an entire complex system. When developing a driver diagram, enlist the help of team members who are familiar with different aspects of the system under review.
Here is the driver diagram completed using the cause and effect exercise as the basis for each category. It’s important to recognize that there is not usually a single solution to any problem in healthcare. Due to the complexity of care delivery, working with a team is essential and the driver diagram may evolve as other perspectives are solicited. This driver diagram does build on the findings from our pareto chart.
The final tools we’ll review are Run Charts and Control Charts.
Run Chart Example

From the IHI toolkit:

A **run chart** is a graph of data over time. It is a simple and effective tool to help you determine whether the changes you are making are leading to improvement. Run charts help improvement teams formulate aims by depicting how well (or poorly) a process is performing, understand the value of a particular change, and begin to distinguish between common and special causes of variation. Common-cause variation is the natural or expected variation inherent in a process. Special-cause variation arises because of specific circumstances that are not inherent in the process.

There are rules about how you interpret the data:
Run Chart Data Interpretation

1. **Shift:** Are there 6 or more consecutive data points above or below the median? Use 8 points if you have 20 or more total data points. Don’t count points on the median.

2. **Trend:** Are there 5 or more sequential data points all going up or all going down? Use 8 points if you have 20 or more total data points. If two consecutive points are the same value, only count once.

3. **Number of runs:** Are there too few or too many runs? A run consists of one or more consecutive data points on the same side of the median. A run doesn’t include data points that fall on the median.

These data interpretation rules are applied after you’re implemented your tests of change. Shifts indicate that the change you are measuring in the data isn’t random. That is true of all the run chart rules.
A control chart, which includes an upper control limit (UCL) and a lower control limit (LCL), goes further to help teams distinguish between common and special causes of variation within a process. Use a control chart when you have more than 15 data points and want more insight into your data.

Control charts help improvement teams identify special-cause variation in a process, identify early signs of success in an improvement project, and monitor a process to ensure it is holding the gains from a quality improvement effort.
Knowledge check!

1. What does the Pareto 80/20 rule mean?
   a. A minimum of 20 incidents must occur before intervention is needed
   b. 20% of your staff are to blame for majority of process issues
   c. 80% of the effect is a result of 20% of the causes

2. A run chart is useful in helping you ‘see’:
   a. If the changes you are making are having the intended effect over time
   b. If the problem you are addressing corrects itself without intervention over time
   c. If the number of procedures increases over time
Results

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   a. **If the changes you are making are having the intended effect over time**
   b. If the problem you are addressing corrects itself without intervention over time
   c. If the number of procedures increases over time
Choosing the Correct Tool

How do you go about choosing the right tool for your particular project? The quality toolbox has an extensive matrix which lists each tool discussed within to the appropriate steps from the 10 step generic process.

THE TOOL MATRIX
The Tool Matrix (Table 1.1, page 8) lists all the tools in the book and categorizes them in three different ways to help you find the right one. To search for a tool, ask yourself What do we want to do with this tool?
A carpenter who wants to cut something will look for some type of saw, not for a screwdriver. Quality improvement tools also can be grouped according to how they are used.

*Project planning and implementing tools:*
When you are managing your improvement project.

*Idea creation tools:*
When you want to come up with new ideas or organize many ideas.

*Process analysis tools:*
When you want to understand a work processor some part of a process. Processes
start with inputs coming from suppliers, change those inputs, and end with outputs going to customers.

_Data collection and analysis tools:_
When you want to collect data or analyze data you have already collected.

_Cause analysis tools:_
When you want to discover the cause of a problem or situation.

_Evaluation and decision-making tools:_
When you want to narrow a group of choices to the best one, or when you want to evaluate how well you have done something. This includes evaluating project results
In our last webinar, we reviewed the generic 10 step quality improvement process outlined in The Quality Toolbox and mapped the PDSA to those steps.
Match Tool to Process Step

<table>
<thead>
<tr>
<th>Tool</th>
<th>Generic Process Step</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Charter 2 Customer Needs 3 Current State 4 Opportunities 5 Root causes 6 Changes 7 Do it 8 Monitor 9 Standardize 10 Learnings</td>
</tr>
<tr>
<td>Driver diagram</td>
<td>X  X</td>
</tr>
<tr>
<td>Fishbone</td>
<td></td>
</tr>
<tr>
<td>Pareto</td>
<td></td>
</tr>
<tr>
<td>Run or control chart</td>
<td>X  X  X  X  X  X</td>
</tr>
</tbody>
</table>

Here we’ve mapped the tools we’ve discussed today to those same steps in the QI process.
Quick evaluation

1) How comfortable are you with QI tools?
2) How comfortable are you applying QI tools?
3) How comfortable are you in leading a QI project at your hospital?
We’d like to spend the remaining time answering your questions. Please use the raise hand function if you’re on the desk top app. Otherwise, please text me.
The slide deck and a link to the recording of this webinar will be forwarded to all as soon as it is available. It will also be posted on our website. There is an appendix which includes the complete interview guide as it currently stands as well as other resources of interest.
Appendix

Resources

- Institute for Healthcare Improvement (IHI) Resources; available here: http://www.ihi.org/resources/Pages/default.aspx
- American Society for Quality (ASQ) Resources; available here: https://asq.org/quality-resources