Resident Research Course QI Workshop

Objectives: By the end of the workshop, participants will be able to:

1. Identify and prioritize a quality problem using a structured tool.
2. Define a problem statement and SMART aim.
3. Understand a process and identify key drivers.
4. Develop and plan small tests of change (PDSA cycles).
5. Measure and display change over time with a run chart.

9:00 – 9:15 | Mini-Lecture 1 — *From Ideas to Improvement – Dr. Jennifer Thull-Freedman*
Purpose: Show how to start with a problem focus and begin to plan a project.

9:15 – 9:48 | Break-out 1 — *Prioritizing and Defining a Problem*
Goals: Identify and define the problem, choose an outcome measure, and write a SMART aim.
Activities:

1. **Impact-Effort Chart (AMA)** – List possible issues and plot on matrix; pick one topic. *(10 min)*
2. **Problem Statement Formula** – Define the gap between current and desired performance. *(8 min)*
3. **Measurement Plan Worksheet (AMA)** – Choose primary outcome measure (just primary outcome for sake of time, but note that a complete project would likely have outcome, process, and balancing measures) *(8 min)*
4. **SMART Aim Formula** – Draft an aim statement. *(7 min)*

9:50 – 9:55 | Share-out: Each group reads its aim aloud.

9:55 – 10:10 | Mini-Lecture 2 — *Understanding the System Before Changing It – Dr. Tania Principi*
Purpose: Show why mapping and analysis prevent wasted effort.

10:10 – 10:45 | Break-out 2 — *Understanding a System and Preparing for Change*
Goals: Understand the process, identify causes, and plan first tests of change.
Activities:

1. **EITHER Cause-and-Effect Diagram OR Process Map (IHI) with optional FMEA modification** – Depending on group preference and needs of project. *(15 min)*
2. **Driver Diagram (IHI)** – Translate insights into *Primary Drivers*, *Secondary Drivers*, and *Change Ideas*. *(20 min)*

10:45 – 10:55 | Break

10:55 – 11:00 | Share-out: Each group repeats their aim and names one driver and one change idea.

11:00 – 11:15 | Mini-Lecture 3 — *Planning a Change and Displaying Data Over Time– Dr. Chandan Bal*
Purpose: Teach how to plan PDSA cycles and know if change = improvement.

11:15 – 11:43 | Break-out 3 — *Choosing a Test of Change and Creating a Run Chart*
Goals: Practice visualizing and interpreting data.
Activities:

1. **PDSA Worksheet (AMA)** – Plan first small-scale test; write prediction. Decide what 2nd PDSA will be. *(10 min)*
2. **Run Chart Template (AMA/IHI)** – Plot fictional data showing a **shift** when project is successful. **Annotate** where two PDSA cycles occurred. *(18 min)*

11:45 – 11:50 |Share-out: Groups show run chart, give brief interpretation.

11:50 – 12:00 | Wrap-Up, Questions, and Reflection

12:00 – 12:15 | Break and Opportunity for Individual Questions/Discussion with Moderators

Section 1: Prioritizing and Defining a Problem

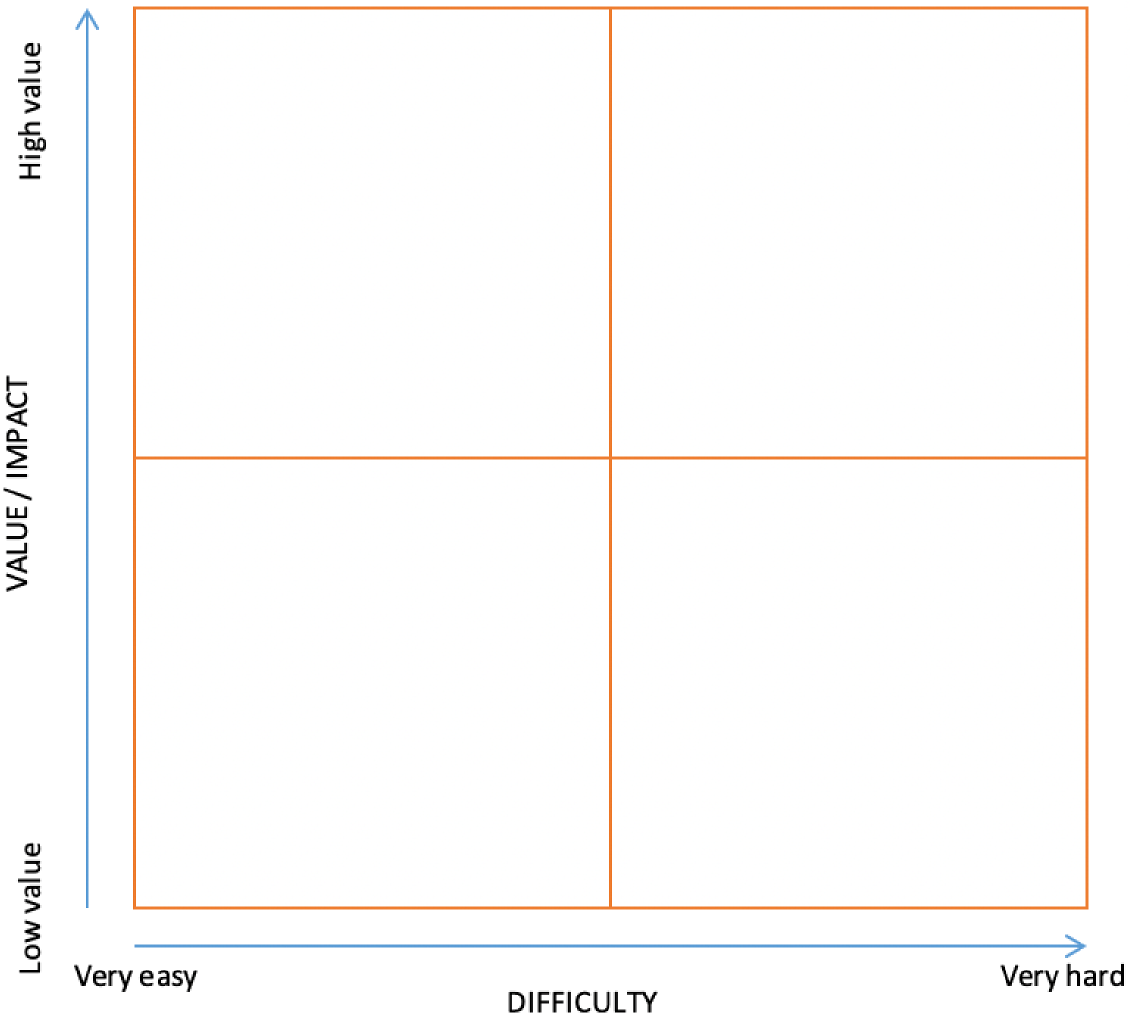
Tools Used:

- **Impact-Effort Chart (AMA)** – List possible issues and plot on matrix; pick one feasible/high-impact topic.
- **Measurement Plan Worksheet (AMA)** – choose primary outcome measure (just primary outcome for sake of time, but note that a complete project would likely have outcome, process, and balancing measures)

ACTIVITY 1: PRIORITIZATION

An **Impact-Effort Grid** or **PICK Chart** is a prioritization matrix that helps QI teams to either prioritize which problems to address or to identify changes to test. Ideas that are high impact and low effort should be implemented first.

Draw a large impact action grid on the flip chart. Each person should write down their potential project idea on a sticky note. Share your idea with the group and discuss where it would best fit on the grid. Stick it on the grid. After each person has added their idea, collectively decide which project the group will focus on today.



https://www.albertadoctors.org/resource-centre/quality-improvement-resources/impact-effort-chart/

ACTIVITY 2: WRITING A PROBLEM STATEMENT

When implementing change, it is important to clarify the problem to be solved. A problem statement is a concise description of the problem that will be addressed. Ideally, it is helpful if the problem is described quantitatively. The problem is generally written in one sentence and typically includes ***what*** is wrong, ***where*** it's happening, and ***for whom***. Some groups will add a phrase about why the problem matters, for example, how it impacts patients.

Before writing a problem statement, teams may need to gather evidence. For this exercise, you can make up numbers based on your best guesses, so that your problem statement is as descriptive as possible. The statement should be specific, quantitative, and neutral, avoiding opinions on causes or possible solutions.

Write one sentence describing your problem using this formula or a similar format:

For [population], [what problem] + [occurs how often/at what rate], which leads to [undesired outcome].

____

ACTIVITY 3: SELECTING MEASURES

How will you know if changes are leading to improvement? Fill out the chart for your primary outcome measure. If time permits, add a process and balancing measure.

Measure Type	**Measure**	**Data source**	**Frequency**	**Collection Process**
Outcome measure *The main thing you want to achieve. Measures whether the problem is improving.*				
Process measure *Measures whether a process driving the outcome is working appropriately.*				
Balancing measure *Captures whether fixing one thing worsens another.*				

ACTIVITY 4: WRITING AN AIM STATEMENT

Purpose: Describe what improvement in your outcome you want to achieve, by how much, and by when. Your aim defines success for your QI project and guides when you no longer need to test changes.

Make it SMART: Specific, Measurable, Achievable, Relevant, and Time-bound

Use this formula: We aim to [improve what] for [whom] from [baseline] to [target] by [timeframe].

____

Section 2: Understanding a System and Planning a Change

Tools Used:

1. **EITHER Cause-and-Effect Diagram OR Process Map (AMA) with optional FMEA modification** – depending on group preference and needs of project.
2. **Driver Diagram (IHI)** – translate insights into *Primary Drivers*, *Secondary Drivers*, and *Change Ideas*.

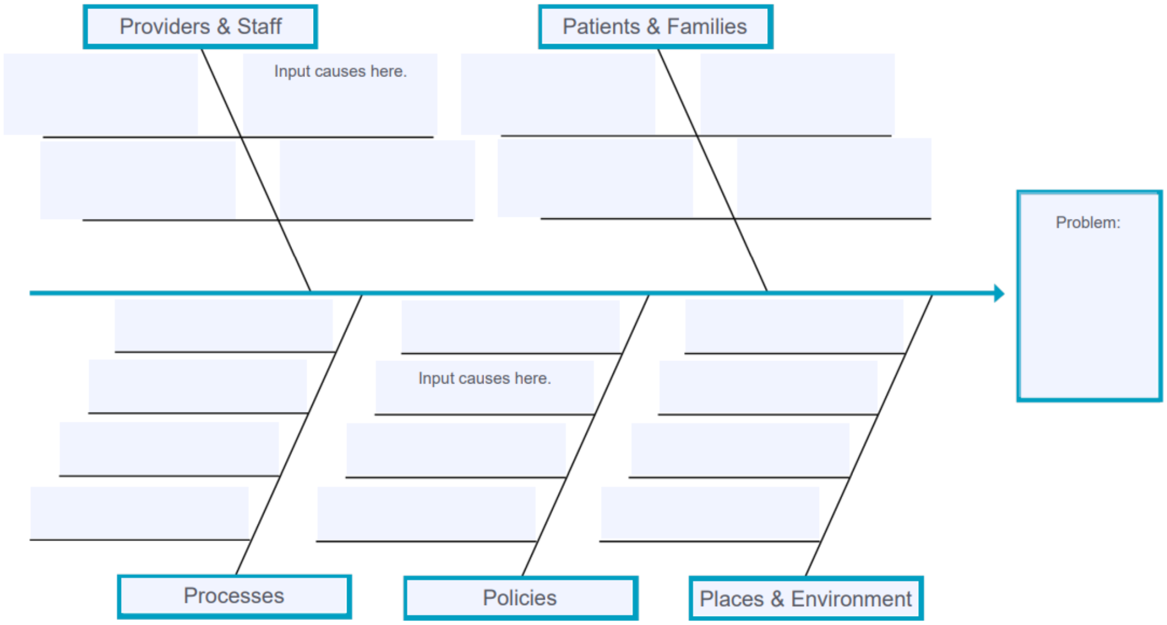
Decide if your group would prefer to create a **Fishbone Diagram** <u>**OR**</u> a **Process Map** <u>**OR**</u> divide in 2 subgroups and do **both.**

Fishbone diagrams, also known as cause-and-effect diagrams, or Ishikawa diagrams, are created using a structured brainstorming process. All ideas should be listed without judgement or filtering. They are used to capture the insights and ideas of everyone involved. The diagram is structured around 5 categories that prompt consideration of multiple causes of a problem. The categories often used in healthcare are known as the 5 Ps, or:

- Providers and staff
- Patients and families
- Procedures and processes
- Places (or equipment)
- Policies

Steps:

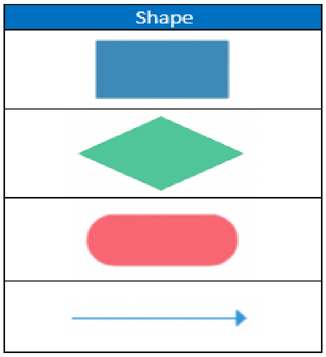
1. Draw a fishbone diagram on the flipchart as shown in the figure below. Then phrase the problem in the form of a question: what causes the problem to happen? Write the question in the “fish head” box.
2. What are the things you believe cause this problem? Write them on the diagram during verbal brainstorming. Because this is brainstorming, ideas are being gathered at this stage. Don’t spend time yet discussing the merits or relative importance of the ideas.
3. Try to have ideas in each category.
4. Once the ideas have been gathered, the group can identify those that you want to explore further.



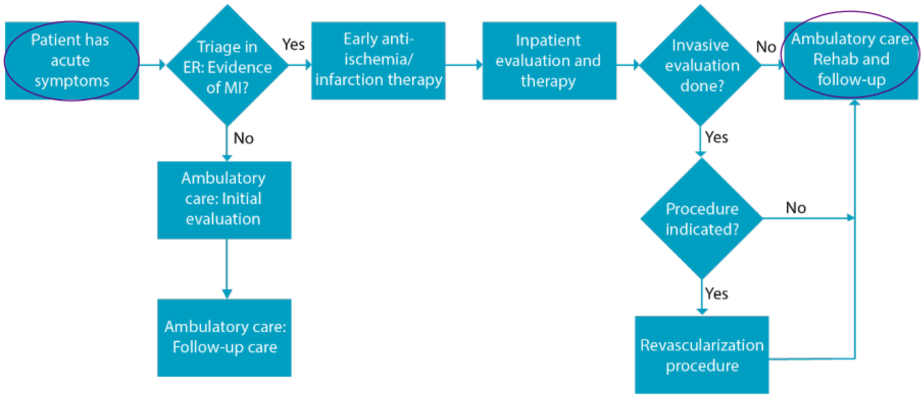
A **process map** (also called a *flowchart*) is a simple diagram showing the steps in a process, in the order they happen. It helps a team understand how the system currently works — before trying to change it. Process maps are useful to build a shared understanding of the process, identify bottlenecks, delays, unnecessary steps, or communication breakdowns, and focus improvement efforts where they will have the most impact. The goal is to understand the current reality, not to design a new system (yet!).

How to create a process map:

1. **List the steps** of the process as it currently operates.
2. Write each step in a **box** (or on a sticky note).
3. Use a **diamond shape** for any yes/no **decision point**.
4. Use **ovals** for the start and end of the process.
5. Connect the boxes and diamonds with arrows to show **the order of steps.**

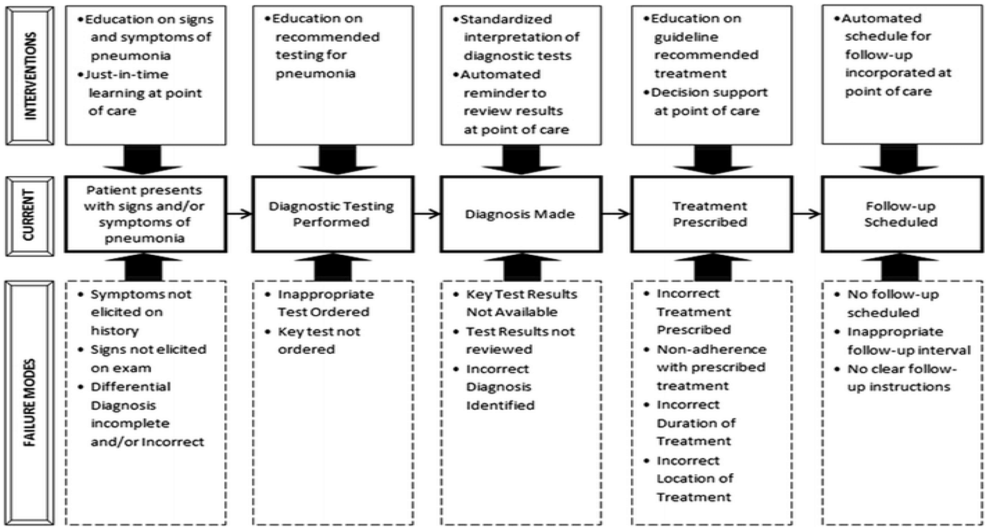


Example (from IHI Toolkit):



A process can also be used to create a simplified Failure Modes and Effects Analysis (FMEA) diagram.

1. Create a process map in which all steps are in one row.
2. Below the process map, add a row for "failure modes", listing how the step in the process might fail.
3. Above the process map, add a row for interventions directed toward preventing the failure mode.



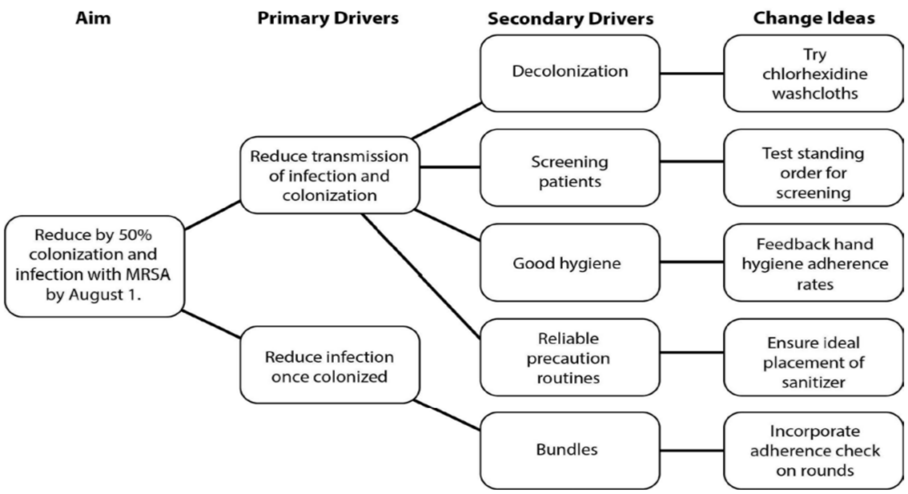
INTERVENTIONS	•Education on signs and symptoms of pneumonia •Just-in-time learning at point of care	•Education on recommended testing for pneumonia	•Standardized interpretation of diagnostic tests •Automated reminder to review results at point of care	•Education on guideline recommended treatment •Decision support at point of care	•Automated schedule for follow-up incorporated at point of care
CURRENT	Patient presents with signs and/or symptoms of pneumonia	Diagnostic Testing Performed	Diagnosis Made	Treatment Prescribed	Follow-up Scheduled
FAILURE MODES	• Symptoms not elicited on history • Signs not elicited on exam • Differential Diagnosis incomplete and/or Incorrect	• Inappropriate Test Ordered • Key test not ordered	• Key Test Results Not Available • Test Results not reviewed • Incorrect Diagnosis Identified	• Incorrect Treatment Prescribed • Non-adherence with prescribed treatment • Incorrect Duration of Treatment • Incorrect Location of Treatment	• No follow-up scheduled • Inappropriate follow-up interval • No clear follow-up instructions

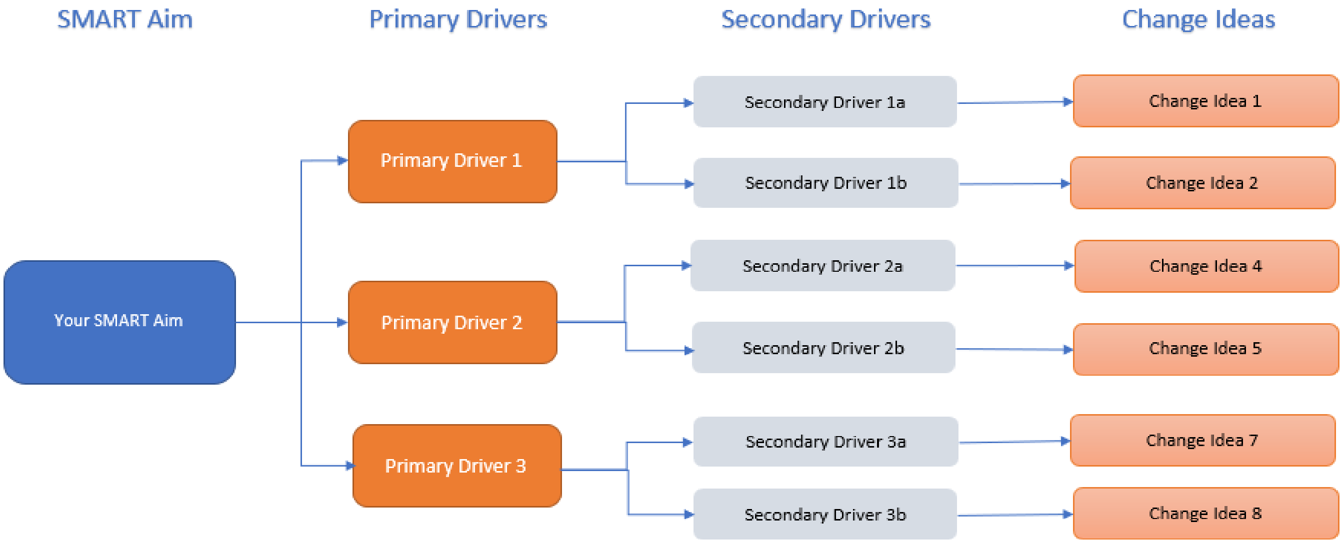
A **driver diagram** is a visual display of the theories of what will contribute to achieving the aim. It shows the relationship between the aim of the project, the primary drivers (also called "key drivers") that contribute directly to achieving the aim, the secondary drivers that are components of the primary drivers (if applicable), and specific change ideas or interventions to test for each driver.

Instructions:

1. Write your aim in a box on the left side of the page
   - Describe what you want to improve, by how much, for whom, and by when.
2. In a vertical column, add your primary drivers and draw lines connecting them to the aim.
   - These are the big factors that most influence your aim.
3. Add your secondary drivers in boxes to the right of the primary drivers and connect them with lines.
   - Secondary drivers can link to more than one primary driver.
   - Secondary drivers can be omitted if the primary drivers have sufficient detail.
4. List your change ideas.
   - These are specific actions or tests you will try to improve the secondary drivers.
   - Place them in boxes to the right of the secondary drivers and connect them.
   - Change ideas can also link to more than one secondary driver.

Example: Driver Diagram





NHS Template available at https://share.google/7jydkkY30aa7NXKDs

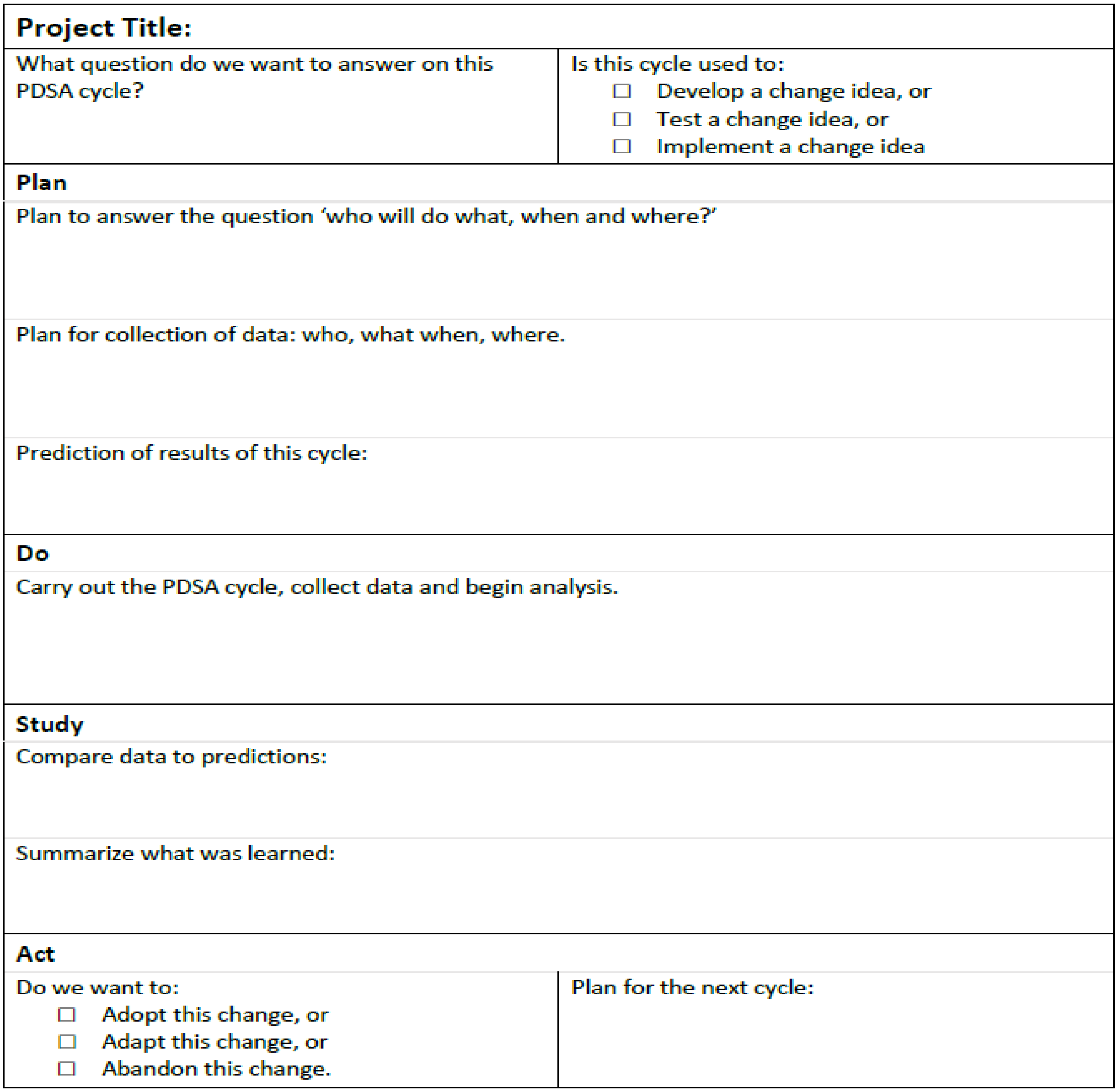
Section 3: Planning a Change and Creating a Run Chart

Tools Used:

1. **PDSA Worksheet (AMA)** – Plan first small-scale test; write prediction. Decide on what 2nd PDSA will be.
2. **Run Chart Template (AMA) –** Draw a run chart of what your project will look like if it is successful, with a “shift” occurring sometime after your 2nd PDSA cycle.

A **PDSA cycle** (Plan–Do–Study–Act) helps your team test a small change, learn from the results, and refine your idea before expanding it. The goal isn’t to prove success right away — it’s to **learn quickly and efficiently.**

- Review your ideas for change (from your Driver Diagram or brainstorming).
- Decide which ideas are most likely to have high impact with low effort.
- Start with a small test of change. Remember, you are testing a change, not officially implementing it.
- Complete the worksheet below (from AMA QI Resources):

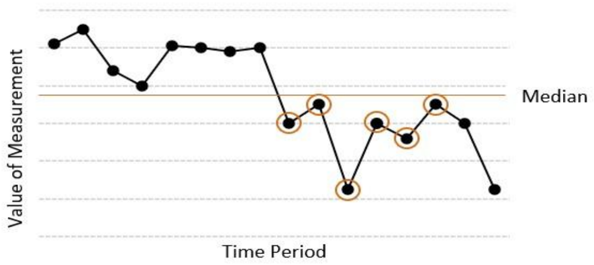


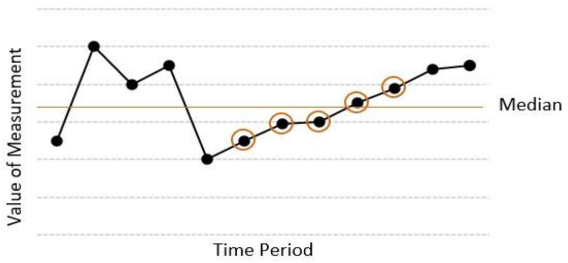
Project Title:	
What question do we want to answer on this PDSA cycle?	Is this cycle used to: ☐ Develop a change idea, or ☐ Test a change idea, or ☐ Implement a change idea
Plan	
Plan to answer the question ‘who will do what, when and where?’	
Plan for collection of data: who, what when, where.	
Prediction of results of this cycle:	
Do	
Carry out the PDSA cycle, collect data and begin analysis.	
Study	
Compare data to predictions:	
Summarize what was learned:	
Act	
Do we want to: ☐ Adopt this change, or ☐ Adapt this change, or ☐ Abandon this change.	Plan for the next cycle:

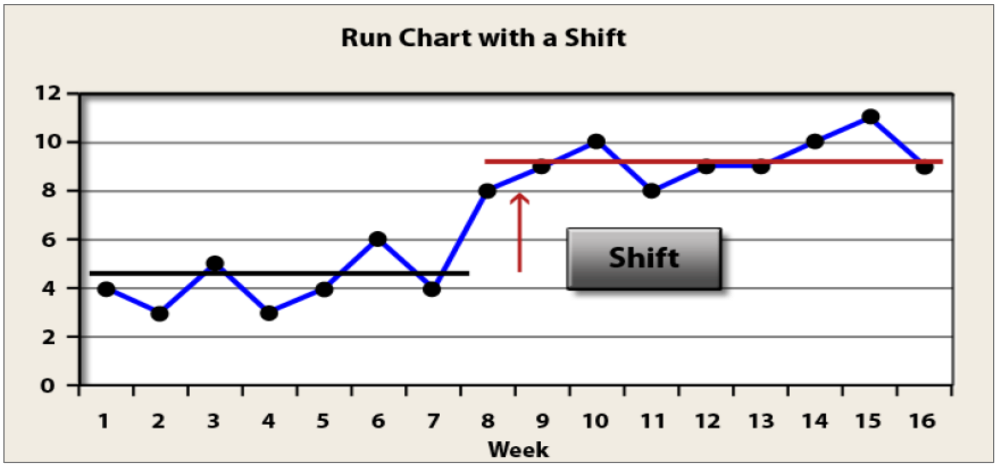
A **run chart** is a tool used to display data over time and includes the median. Usually data is collected before testing a change to establish a baseline median. Once the team is ready to test changes, the median is kept in the same place, even as new data is added. Using a set of rules based on probability, a team can then see if changes are resulting in non-random variation in the direction of desired improvement.

A **shift** is a set of 6 consecutive points all above or all below the previous median. A point that is on the median does not contribute to a shift or break a shift. A **trend** is a set of 5 consecutive points all increasing or decreasing. A point that is the same as the previous does not contribute to a trend or break a trend. When one of these patterns is observed and the change is sustained (at least 6 points), then a new median can be added, starting when the nonrandom variation was first observed.

Some teams will use QI software to create **Statistical Process Control (SPC)** charts. An SPC chart is similar to a run chart but adds control limits which are defined as 3-sigma from the mean, which allow a deeper understanding of whether variation is random (common cause) or unlikely to be random (special cause).







Mock Run Chart Instructions:

1. Draw your axes.
   - Label the Y-axis with your measure (e.g., *% of patients receiving topical anesthetic*).
   - Label the X-axis with time (e.g., *Weeks 1–20*).
2. Add your first 10-12 data points — this is your *baseline data.*
   - Connect the dots with a line.
3. Draw the median of these data points. Also add a horizontal line depicting your improvement aim.
4. Presume you will now start your PDSA cycles.
   - Mark where your first and second PDSA cycles begin on the X-axis.
5. Add another 10–15 data points showing what you think might happen as you test changes.
   - Show a shift sometime after your 2nd PDSA cycle.
6. Start a new median line beginning at the first point in the shift.
7. Add a title