Methods in Quality Improvement for Academic Projects

Jennifer Thull-Freedman, MD, MSc
Quality Lead, Pediatric Emergency Medicine
November 8, 2021
Objectives

This session will review key concepts from the EPIQ workshop and elaborate upon the following:

• Identifying your primary purpose
• Clarifying differences among QI, quality assurance, implementation science, and research
• Addressing project ethics
• Analyzing and presenting data
• Planning for publication
# 10 Steps Workbook

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tool</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDERSTAND</td>
<td><strong>5 Whys</strong></td>
<td>Make a short list of 3 to 5 things you would like to improve and pick one. Have your facilitator ask <strong>5 whys</strong> to “scope” the problem down to a manageable size.</td>
</tr>
<tr>
<td>DECIDE</td>
<td><strong>Force field analysis</strong></td>
<td>Select your team members relevant to your problem from step 1. Use the <strong>force field analysis</strong> to ask what the driving and restraining factors are. Use the <strong>force field analysis</strong> to make sure that your team is complete.</td>
</tr>
<tr>
<td></td>
<td><strong>Fishbone</strong></td>
<td>Use the <strong>fishbone</strong> to identify possible root causes for your problem. Identify two or three causes that your team member feel that they can tackle.</td>
</tr>
<tr>
<td></td>
<td><strong>Feasibility tool</strong></td>
<td>These 2 or 3 root causes lead to possible interventions. Use the <strong>feasibility tool</strong> to select the intervention that is most practical for your team. Remember that you want a quick success – so select wisely.</td>
</tr>
<tr>
<td>ACT</td>
<td><strong>Process map</strong></td>
<td>Map the process that you wish to improve as it is currently happening. Choose a start and end-point first then fill in the gaps. Once done, ask yourselves how you might improve the process and create a second map.</td>
</tr>
<tr>
<td></td>
<td><strong>SMART indicators</strong></td>
<td>Select and define at least one <strong>process indicator</strong> and one <strong>outcome indicator</strong> from your process map. Both indicators should be “SMART”. You may wish to select one or more <strong>balancing indicators</strong>.</td>
</tr>
<tr>
<td></td>
<td><strong>EPIQ Aim form</strong></td>
<td>Complete the <strong>EPIQ Aim form</strong> with a clear title, aim, and indicators. The rationale may be completed later with best available evidence. Do not forget to identify the dimensions of quality that are being targeted.</td>
</tr>
<tr>
<td></td>
<td><strong>Engagement tool</strong></td>
<td>For the <strong>engagement tool</strong>, draw a table describing where your team, families, administrators, or community are with respect to readiness on the scale of being unaware to awareness, planning, acting, or maintenance. Discuss how you will engage them using…</td>
</tr>
<tr>
<td>SHARE</td>
<td><strong>EPIQ Change form</strong></td>
<td>Complete the <strong>EPIQ Change form</strong> (aim-plan-do-study). You cannot complete act except for planning a date.</td>
</tr>
<tr>
<td></td>
<td><strong>Run charts</strong></td>
<td>Plan how you will present your <strong>results</strong> to your team, administrators, families, other sites.</td>
</tr>
</tbody>
</table>
Before you start, understand your primary purpose

- Fix a local problem?
- Study the effectiveness of a particular intervention?
- Learn something that is valuable locally?
- Learn something that applies beyond the local setting?
- If the project were never going to be published, would it still have local value?
Primary Purpose

You would like to reduce the median time to treatment of pain for limb injury in your ED, which is currently 30 minutes, and decide to test if a nursing directive to treat pain at triage is an effective way to do this.

You compare time to analgesia before and after the order set change using interrupted time series. Research or QI?
You would like to reduce the median time to treatment of pain for limb injury in your ED from 30 minutes to 15 minutes.

You work with your team to identify possible changes and decide to begin with a nursing directive for analgesia to be given in triage.

You create a run chart to measure change over time.

Research or QI?
Your primary purpose is QI if:

- Your primary goal is to address a local problem
- The work is valuable regardless of publication
- Your team is willing to do more than one thing to address the problem
- You’re not trying to conclude whether or not one thing worked
- *Unless*...
  - You only have the capacity to tackle one “low hanging fruit”
  - You want to know whether something worked because you want to decide whether to make it permanent, or to scale and spread
# How is QI different from research?

<table>
<thead>
<tr>
<th></th>
<th>Research</th>
<th>Quality Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Discover new knowledge</td>
<td>Use existing knowledge to fix a problem</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>Interventions usually fully planned prior to beginning</td>
<td>Learnings from tests of change inform next steps</td>
</tr>
<tr>
<td><strong>Ethics Review</strong></td>
<td>Performed by a research ethics board</td>
<td>Performed according to local guidelines (ARECCI in Alberta); REB confirms exempt</td>
</tr>
<tr>
<td><strong>Variation and Bias</strong></td>
<td>Reduced by using inclusion and exclusion criteria, randomization</td>
<td>Reduced by standardizing processes, so that change can be detected</td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td>Sample size calculation to ensure power to detect a meaningful difference; study ends when enrolment met</td>
<td>Focus on gathering enough information to achieve a reliable measurement; project ends when aim is met (or when you declare defeat)</td>
</tr>
<tr>
<td><strong>Analysis</strong></td>
<td>Occurs after data collection complete or at a defined interim analysis; often utilizes hypothesis testing</td>
<td>Occurs in an ongoing manner throughout tests of change; often utilizes run charts or control charts</td>
</tr>
<tr>
<td><strong>Reporting standards</strong></td>
<td>Determined by study type (e.g. CONSORT for clinical trials)</td>
<td>SQUIRE 2 guideline (Standards for Quality Improvement Reporting Excellence)</td>
</tr>
</tbody>
</table>
ARECCI

- A pRoject Ethics Community Consensus Initiative
- Created in 2003 by representatives from Alberta REBs, regional health authorities, and Alberta Health and Wellness
- Recognition that all projects involving individuals and their health records can involve risk
- Standard process to review projects according to primary purpose (research or quality) and level of risk
Consultation

For projects that are determined somewhat more or definitely greater than minimal risk the ARECCI provides ethics consultation in the form of Second Opinion Reviews or reviews by an ARECCI Committee.

At this time, we are only able to offer second opinion reviews for projects based in Alberta.

In order to complete a review, project leads must submit a completed:

- ARECCI Ethics Screening Tool,
- ARECCI Ethics Guideline Tool (downloadable and fillable PDF),
- Request for a Second Opinion Review and,
- Any other pertinent documents (e.g., consent form, information sheet, data extraction sheet).

Email all documents to ARECCI.Health@albertainnovates.ca

Information and inquiries

If you have questions, please contact us: ARECCI.Health@albertainnovates.ca
4. HOW WILL YOU MAXIMIZE BENEFITS AND MINIMIZE OR MITIGATE THE ETHICAL RISKS IN THE PROJECT?

POINTS TO CONSIDER

• How will your organization and participants benefit from the project?
• What are the risks identified by the ARECCI Ethics Screening Tool and how will you minimize and mitigate them?
• What are the risks of not doing this project?
• Will your organization tolerate the risks that remain in your project?

Describe the benefits to participants and to your organization.
Legend

ℹ️ Provides more information about a question (if available).

 自动生成 a URL for bookmarking.
Note: This is not the same as selecting File > Save As in your browser. Please use this save function instead.

✉️ E-mail the results of the tool.

🖨️ Print the results of the tool.

📣 Submit feedback regarding the tool.

**Project Title:**

Date Completed: October 08, 2014

---

**Step 1: Preliminary Questions**

1. Is there an explicit requirement for review of this project by a Research Ethics Board as part of its funding arrangements? [Yes][No]

2. Are there any local policies that require this project to undergo review by a Research Ethics Board? [Yes][No]
13. Is the current project part of a continuous process of gathering or monitoring data within an organization?

Notes:

Your score indicates that the most probable purpose of your project is Quality Improvement or Program Evaluation. Please proceed to determine the category of risk to your participants.

Does your project involve...

14. Likelihood that a breach of confidentiality could place participants at risk of legal liability, denial of insurance or other damage to financial standing, employability, or reputation?

15. A real or potential conflict of interest between an investigator and the sponsor of the investigation?

16. A power relationship between the investigator and participants (e.g., manager/employee, therapist/client, service provider/recipient, teacher/student)?
Your score is 19. The project involves Somewhat More Than Minimal Risk and should be reviewed by a Second Opinion Reviewer.

Questions that affected your final score:

19. Collection of data through technical procedures or diagnostic tools routinely employed in the setting? 1 pts

20. The use of tests, surveys, interviews, oral history, focus groups, or observation of public behavior where the participants can be directly or indirectly identified through the information recorded? 2 pts

22. Personally identifiable data, documents, records or specimens originally collected solely for purposes not related to the current study? 2 pts

23. Special populations or any individuals or groups in a socially vulnerable position? 3 pts

28. A person who does not normally have access to participant records and whose use of records is for a secondary purpose? 11 pts

Ethics Screening Score Cutoff Points
What about Implementation Science?

- IS = the study of methods to promote uptake of evidence into practice
- Both IS and QI share goal of improving quality
- QI begins with a local problem
- IS begins with an underutilized EBP and seeks to develop knowledge that will apply beyond the local problem

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

Associates in Process Improvement, 1992
QI Involves Systems

• “The System” = how things are done now

<table>
<thead>
<tr>
<th>Resources (Inputs)</th>
<th>Activities (Processes)</th>
<th>Results (Outcomes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>What is done</td>
<td>Service delivery</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>How it is done</td>
<td>Behaviour change</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
<td>Health status change</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td>Patient experience</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Donabedian, 1980

“Every system is perfectly designed to get the results it gets.” - Paul Batalden, IHI
• Quality Improvement is the purposeful measurement of a process and analysis of change with the goal of improving an outcome

• Quality Assurance is the process taken to provide confidence that a satisfactory outcome will result
  – Alberta Evidence Act (S.9) uses the term “Quality Assurance” to describe activities that “study, assess or evaluate the provision of health services”
What is “QI Research”? 

• Efforts to build knowledge that add to understanding the science of quality improvement 

• Examples 
  – What contextual factors or strategies support improvement? 
  – Is an improvement project generalizable? 
  – What factors contribute to successful spread?
Imagine you have finished your research project. What problem can you address with this new knowledge?

Write a problem statement for the QI project you could design after finishing your research.
# FMEA Analysis

## 10 Steps Workbook

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tool</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Whys</td>
<td></td>
<td>Make a short list of 3 to 5 things you would like to improve and pick one. Have your facilitator ask 5 whys to “scope” the problem down to a manageable size.</td>
</tr>
<tr>
<td>Force field analysis</td>
<td></td>
<td>Select your team members relevant to your problem from step 1. Use the force field analysis to ask what the driving and restraining factors are. Use the force field analysis to make sure that your team is complete.</td>
</tr>
<tr>
<td>Fishbone</td>
<td></td>
<td>Use the fishbone to identify possible root causes for your problem. Identify two or three causes that your team member feel that they can tackle.</td>
</tr>
<tr>
<td>Feasibility tool</td>
<td></td>
<td>These 2 or 3 root causes lead to possible interventions. Use the feasibility tool to select the intervention that is most practical for your team. Remember that you want a quick success so select wisely.</td>
</tr>
<tr>
<td>Process map</td>
<td></td>
<td>Map the process that you wish to improve as it is currently happening. Choose a start and end point first then fill in the gaps. Once done, ask yourselves how you might improve the process and create a second map.</td>
</tr>
<tr>
<td>SMART indicators</td>
<td></td>
<td>Select and define at least one process indicator and one outcome indicator from your process map. Both indicators should be ‘SMART’. You may wish to select one or more balancing indicators.</td>
</tr>
<tr>
<td>EPIQ Aim form</td>
<td></td>
<td>Complete the EPIQ Aim form with a clear title, aim, and indicators. The rationale may be completed later with best available evidence. Do not forget to identify the dimensions of quality that are being targeted.</td>
</tr>
<tr>
<td>Engagement tool</td>
<td></td>
<td>For the engagement tool, draw a table describing where your team, families, administrators, or community are with respect to readiness on the scale of being unaware to awareness, planning, acting, or maintenance. Discuss how you will engage them using</td>
</tr>
<tr>
<td>EPIQ Change form</td>
<td></td>
<td>Complete the EPIQ Change form (aim-plan-do-study). You cannot complete act except for planning a date.</td>
</tr>
<tr>
<td>Run charts</td>
<td></td>
<td>Plan how you will present your results to your team, administrators, families, other sites.</td>
</tr>
</tbody>
</table>
• Failure Modes and Effects Analysis
• One more tool for understanding the problem and developing change ideas
• Outlines steps in a process
• Evaluates process for potential failures
• Identifies potential solutions
Process: Pediatric limb injury pain assessment and treatment at triage

Pt arrives; does pre-triage or full triage

RN decides whether to ask about pain

Patient reports pain

RN chooses analgesia approach

RN retrieves analgesia

RN administers and records analgesia

Pt to WR or treatment room

• Pain protocol
• Project posters

• Pain protocol
• E-pod RN

• Pharmacy support to Triage RN / Epod RNs
• Standing MD orders for analgesics

• Triage / Epod RN

• Failure modes

• Interventions

• Current process
**Smart aims and driver diagrams**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tool</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Understand</strong></td>
<td></td>
<td><strong>5 Whys</strong>  Make a short list of 3 to 5 things you would like to improve and pick one. Have your facilitator ask 5 why's to “scope” the problem down to a manageable size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Force field analysis</strong>  Select your team members relevant to your problem from step 1. Use the force field analysis to ask what the driving and restraining factors are. Use the force field analysis to make sure that your team is complete.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Fishbone</strong>  Use the fishbone to identify possible root causes for your problem. Identify two or three causes that your team member feel that they can tackle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Feasibility tool</strong>  These 2 or 3 root causes lead to possible interventions. Use the feasibility tool to select the intervention that is most practical for your team. Remember that you want a quick success - so select wisely.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Process map</strong>  Map the process that you wish to improve as it is currently happening. Choose a start and end-point first then fill in the gaps. Once done, ask yourselves how you might improve the process and create a second map.</td>
</tr>
<tr>
<td><strong>Decide</strong></td>
<td></td>
<td><strong>SMART indicators</strong>  Select and define at least one process indicator and one outcome indicator from your process map. Both indicators should be SMART. You may wish to select one or more balancing indicators.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>EPIQ Aim form</strong>  Complete the EPIQ Aim form with a clear title, aim, and indicators. The rationale may be completed later with best available evidence. Do not forget to identify the dimensions of quality that are being targeted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Engagement tool</strong>  For the engagement tool, draw a table describing where your team, families, administrators, or community are with respect to readiness on the scale of being unaware to awareness, planning, acting, or maintenance. Discuss how you will engage them using.</td>
</tr>
<tr>
<td><strong>Act</strong></td>
<td></td>
<td><strong>EPIQ Change form</strong>  Complete the EPIQ Change form (aim-plan-do-study). You cannot complete act except for planning a date.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Run charts</strong>  Plan how you will present your results - to your team, administrators, families, other sites.</td>
</tr>
</tbody>
</table>
Start with the Aim

Example:

We will increase the proportion of patients with limb injury who receive analgesic medication at triage from 32% to 40% within 6 months.
Return to your problem statement.

Write a SMART aim to describe how you might try to improve. What measure would correspond with this aim?
KEY DRIVER DIAGRAM: Improving pain treatment

SMART AIM
We will increase the proportion of patients with limb injury who receive analgesic medication at triage from 32% to 40% within 6 months.

GLOBAL AIM
Improved pain management for ED patients.

KEY DRIVERS

- Family awareness and empowerment
- Standards for pain treatment
- Accurate pain assessment and documentation
- Resource availability
  - Medications
  - Tools and supplies
- MD and Nursing prioritization of pain assessment and treatment
- Staffing/patient volume

INTERVENTIONS

- Provide signage and tools to empower families and raise awareness of options
- Develop a guideline for acute pain assessment and treatment. Have tools available
- Redesign fast track work flow to improve efficiency
- Share feedback from families and progress toward goals; solicit input from front lines

Key
Green shaded = what we have begun working on
How are you feeling?

Let's work together to reduce pain.

We can help by:
- helping kids rate their pain
- providing pain medicine
- asking about no-needle options
- using comfort positions for procedures
- offering items on our comfort menu

Kids can help by:
- talking to us - ask questions and let us know what we can do for you

Grown-ups can help by:
- letting us know if your child isn’t comfortable
- providing distraction, reassurance, a soothing voice, or a loving touch
- ask about how to support your child during a procedure

Our commitment to comfort:
We’ll do our best to promote comfort by helping to lessen pain and anxiety. Please let us know what we can do to help.

Is your child having a needle?

Please ask if
Numbing Cream
(Maxilene® or Ametop®)
is right for your child.

Our goal is to use
numbing cream
BEFORE ALL POCKES
For IV starts & blood work
(as long as your child doesn’t need their IV or blood work right away).

It takes at least
30 minutes to work.
If we forget, remind us early!

AHS Commitment to Comfort®
**Run Charts**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tool</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDERSTAND</td>
<td>5 Whys</td>
<td>Make a short list of 3 to 5 things you would like to improve and pick one. Have your facilitator ask &quot;5 whys&quot; to &quot;scope&quot; the problem down to a manageable size.</td>
</tr>
<tr>
<td></td>
<td>Force field analysis</td>
<td>Select your team members relevant to your problem from step 1. Use the force field analysis to ask what the driving and restraining factors are. Use the force field analysis to make sure that your team is complete.</td>
</tr>
<tr>
<td></td>
<td>Fishbone</td>
<td>Use the fishbone to identify possible root causes for your problem; identify two or three causes that your team member feels they can tackle.</td>
</tr>
<tr>
<td></td>
<td>Feasibility tool</td>
<td>These 2 or 3 root causes lead to possible interventions. Use the feasibility tool to select the intervention that is most practical for your team. Remember that you want a quick success – so select wisely.</td>
</tr>
<tr>
<td></td>
<td>Process map</td>
<td>Map the process that you wish to improve as it is currently happening. Choose a start and end point first then fill in the gaps. Once done, ask yourselves how you might improve the process and create a second map.</td>
</tr>
<tr>
<td></td>
<td>SMART indicators</td>
<td>Select and define at least one process indicator and one outcome indicator from your process map. Both indicators should be “SMART”. You may wish to select one or more balancing indicators.</td>
</tr>
<tr>
<td></td>
<td>EPIQ Aim form</td>
<td>Complete the EPIQ Aim form with a clear title, aim, and indicators. The rationale may be completed later with best available evidence. Do not forget to identify the dimensions of quality that are being targeted.</td>
</tr>
<tr>
<td></td>
<td>Engagement tool</td>
<td>For the engagement tool, draw a table describing where your team, families, administrators, or community are with respect to readiness on the scale of being unaware to awareness, planning, acting, or maintenance. Discuss how you will engage them using</td>
</tr>
<tr>
<td></td>
<td>EPIQ Change form</td>
<td>Complete the EPIQ Change form (aim-plan-do-study). You cannot complete act except for planning a date.</td>
</tr>
<tr>
<td></td>
<td>Run charts</td>
<td>Plan how you will present your results to your team, administrators, families, other sites.</td>
</tr>
</tbody>
</table>
"If you can't measure it, you can't improve it."

- QI saying of uncertain attribution
Before/After Studies

Did your project result in a change?
Pain study example

• Pain scale signs were created to determine whether this would result in more patients receiving analgesia in < 30 minutes

• In the week prior to the intervention, 16.6% met the target; one month after the intervention, 44.4% met the target

• Was the intervention a success?
“Premature pizza party error”

- M. Siska, CCHMC
Proportion of patients receiving analgesia

% receiving analgesia

Target: 50%
Desired direction ↑

Time 1

Time 2

Week
Data over time

What can you conclude here?

Or here?
Run Charts and Control Charts

- How do we know if variation is not random?
- How do we look at QI data and identify non-random changes, if monitoring in real time rather than using traditional statistical methods at the end of the project?
Run Charts and Control Charts

- Statistical Process Control introduced by Walter Shewhart at Bell Labs in 1920’s
- Described “common cause” and “special cause” variation
  - Common cause is variation due to chance
  - Special cause is variation beyond what is expected by chance
- Allows surveillance for non-random change
Types of variation

• Common Cause Variation
  – Random
  – Not explainable
  – Do not waste time investigating

• Special Cause Variation
  – Non-random
  – May be explained
  – Consider investigating
## Special Causes

<table>
<thead>
<tr>
<th>Shift</th>
<th>Trend</th>
<th>Run</th>
<th>Astronomical</th>
</tr>
</thead>
</table>
| • 6 or more consecutive points either *all* above or below the median | • 5 or more consecutive points all going up or all going down | • A series of points in a row on one side of the median  
• May have too many or too few for number of data points | • Not a statistical observation  
• Logically obvious that a data point is unlike any of the others |
Run Charts

Rule 2: Trend

Rule 1: Shift
Run Charts

Rule 3: Number of Runs

- Data line crosses once
- Too few runs: total 2 runs

Need to refer to a table for expected number of runs for number of data points
Control Charts

- **Out-of-control point**
- **Upper control limit (UCL)**: 22.01
- **Centerline**: Avg = 20.40
- **Lower control limit (LCL)**: 18.78
Control Chart Zones

- Zone A $\pm$ 3 sigma
- Zone B $\pm$ 2 sigma
- Zone C $\pm$ 1 sigma

Mean or Average

$X$
SPC: “Special Causes”

- Any point above $+3\sigma$
- 2 out of the last 3 points above $+2\sigma$
- 4 out of the last 5 points above $+1\sigma$
- 8 consecutive points above center line
- 8 consecutive points below center line
- 4 out of the last 5 points below $-1\sigma$
- 2 out of the last 3 points below $-2\sigma$
- Any point below $-3\sigma$
- 6 consecutive points trending up or down
- 14 consecutive points alternating up and down

3σ Upper Control Limit
2σ
1σ
Center Line
1σ
2σ
3σ Lower Control Limit
Children 4-17 with limb injury receiving \( \geq 1 \) dose analgesia

Increase from 32% to 44%

Aim: 40%
Interrupted Time Series

• Design for evaluating effect of an intervention over time
• Measures slope and intercept of line before and after designated time points
• Accounts for trends that may have been taking place prior to intervention

Kontopantelis E et al Regression based quasi-experimental approach when randomisation is not an option: interrupted time series analysis *BMJ* 2015;350:h2750
Interrupted Time Series

- Rate of change of the proportion of patents receiving analgesia in the ED increased at the beginning of the improvement phase and was sustained through the sustainability phase ($p < 0.05$).
### 10 Steps Workbook

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tool</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNDERSTAND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S Whys</td>
<td>5 Whys</td>
<td>Make a short list of 3 to 5 things you would like to improve and pick one. Have your facilitator ask <em>5 whys</em> to “scope” the problem down to a manageable size.</td>
</tr>
<tr>
<td>Force field analysis</td>
<td></td>
<td>Select your team members relevant to your problem from step 1. Use the <em>force field analysis</em> to ask what the driving and restraining factors are. Use the <em>force field analysis</em> to make sure that your team is complete.</td>
</tr>
<tr>
<td>Fishbone</td>
<td></td>
<td>Use the <em>fishbone</em> to identify possible root causes for your problem. Identify two or three causes that your team member feel that they can tackle.</td>
</tr>
<tr>
<td>Feasibility tool</td>
<td></td>
<td>These 2 or 3 root causes lead to possible interventions. Use the <em>feasibility tool</em> to select the intervention that is most practical for your team. Remember that you want a quick success – so select wisely.</td>
</tr>
<tr>
<td>Process map</td>
<td></td>
<td>Map the process that you wish to improve as it is currently happening. Choose a start and end point first then fill in the gaps. Once done, ask yourselves how you might improve the process and create a second map.</td>
</tr>
<tr>
<td>SHARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMART indicators</td>
<td></td>
<td>Select and define at least one <em>process indicator</em> and one <em>outcome indicator</em> from your process map. Both indicators should be &quot;SMART&quot;. You may wish to select one or more <em>balancing indicators</em>.</td>
</tr>
<tr>
<td>EPIQ Aim form</td>
<td></td>
<td>Complete the EPIQ Aim form with a clear title, aim, and indicators. The rationale may be completed later with best available evidence. Do not forget to identify the dimensions of quality that are being targeted.</td>
</tr>
<tr>
<td>Engagement tool</td>
<td></td>
<td>For the <em>engagement tool</em>, draw a table describing where your team, families, administrators, or community are with respect to readiness on the scale of being unaware to awareness, planning, acting, or maintenance. Discuss how you will engage them using.</td>
</tr>
<tr>
<td>SHARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPIQ Change form</td>
<td></td>
<td>Complete the EPIQ Change form (aim-plan-do-study). You cannot complete act except for planning a date.</td>
</tr>
<tr>
<td>Run charts</td>
<td></td>
<td>Plan how you will present your results to your team, administrators, families, other sites.</td>
</tr>
</tbody>
</table>

- Sustainability planning
- Spreading change
- Sharing learnings
Sustainability Planning

- **Measurement**
  - What measurement will continue?
- **Ownership**
  - Who will be in charge?
- **Communication and Training**
  - How will people be kept informed?
- **Hardwiring Change**
  - How can the right actions be made easy?
- **Assessment of Workload**
  - How will impact on workload be managed?
A Framework for Spread

Leadership, communication, social networks, culture of urgency and persistence

Learning systems, data systems, infrastructure for scale-up, human capacity for scale-up, capability for scale-up, sustainability

IHI, 2006
Test Scale-Up

- Aim: To form a quality improvement collaborative among the 3 Calgary general ED's to:
  1. Improve the proportion of children receiving analgesia for limb injuries from 23% to 40%
  2. Reduce the median time to analgesia from 89 minutes to < 60 minutes
Test Scale-Up

• Interventions
  – Quality improvement collaborative (QIC)
  – Project leads taught QI skills, shared resources
  – Interdisciplinary teams at each site
    • Physicians, nurses, orthopedic technicians
  – Each site developed key driver diagrams, set aims, planned tests of change (PDSA cycles)
  – Monthly QIC meetings to share learnings
Results

% of Visits with Analgesia

- Median: 21%
- Median: 34%
- Median: 34%

Implementation
April 1, 2016

Sustaining change
Oct 1, 2016 – Sept 3, 2017

Median Triage to Analgesia Minutes

- Median: 89 minutes
- Median: 56 minutes
- Median: 45 minutes
Full Scale

- 97 ED’s invited, 36 accepted
  - All geographic zones
  - 40% of pediatric ED visits in Alberta
## Full Scale

### Process measures
- For patients 0-12 years of age undergoing phlebotomy
  - Proportion receiving topical anesthetic cream
- For patients 0-16 years of age with a fracture
  - Proportion with a documented pain score
  - Proportion who receive analgesic medication
  - Median time to analgesia

### Balancing measures
- Length of stay, opioid use
Methods

- NACRS Fracture Visits
- Meditech
- Sunquest
- Millennium

(alteryx)

Randomization

Commitment to Comfort Chart Audit Report

Commitment to Comfort QIC Measures

REDCap
Results

Small Multiples: Topical Anesthetic
Results

Topical Anesthetic Provided with Lab Tests
Children 0-12 years
June 2016 - May 2018

Aim: 50%

↑ from 11% to 30%
Special cause+
ITS p < 0.001 jump
p < 0.05 slope

N = 2910
Median Minutes to Analgesia
Children 0-16 with Fracture
(June 2016 – June 2018)
Results

Balancing Measures

Opioid Given
Children 0-16 Years with Fractures

Length of Stay, Minutes

- Start of webinars
- Start of tests of change
SQUIRE 2.0 Guidelines

- Developed in 2008, updated in 2015, by a consensus panel of QI publication experts
- Gives authors a framework upon which to structure a QI manuscript
- The same framework can also be instrumental in project design
- Goal is to support high-quality writing about improvement efforts

http://squire-statement.org
### SQUIRE 2.0 Guidelines

#### Title and Abstract

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Title</strong></td>
<td>Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patient-centeredness, timeliness, cost, efficiency, and equity of healthcare)</td>
</tr>
</tbody>
</table>
| **2. Abstract** | a. Provide adequate information to aid in searching and indexing  
  b. Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions |

#### Introduction

<table>
<thead>
<tr>
<th></th>
<th><strong>Why did you start?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Problem Description</strong></td>
<td>Nature and significance of the local problem</td>
</tr>
<tr>
<td><strong>4. Available Knowledge</strong></td>
<td>Summary of what is currently known about the problem, including relevant previous studies</td>
</tr>
<tr>
<td><strong>5. Rationale</strong></td>
<td>Informal or formal frameworks, models, concepts, and/or theories used to explain the problem, any reasons or assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work</td>
</tr>
<tr>
<td><strong>6. Specific Aims</strong></td>
<td>Purpose of the project and of this report</td>
</tr>
</tbody>
</table>

#### Methods

<table>
<thead>
<tr>
<th></th>
<th><strong>What did you do?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7. Context</strong></td>
<td>Contextual elements considered important at the outset of introducing the intervention(s)</td>
</tr>
</tbody>
</table>
| **8. Intervention(s)** | a. Description of the intervention(s) in sufficient detail that others could reproduce it  
  b. Specifics of the team involved in the work |
Summary

- Identifying your primary purpose will help you determine if your project should be designed as QI or research.
- QI starts with a problem, tests changes, and measures improvement over time.
- Run charts or control charts are essential to all QI projects.
- Methods and tools exist to guide project design, spreading and sustaining change, and sharing learnings.
Questions?