C-QuIPS Radiology Project Template

Project Information

Name:

Project Title:

Team Members:

Organization/Practice Name:

Project Mentor:

Example extracted from Lam et al. Impact of defaulting to single-lumen peripherally inserted central catheters on patient outcomes: an interrupted time series study. Clin Infect Dis 2018: 67:954-957.

Planning

Problem Statement

Why are you doing this project? What is the QI problem of interest (preferably one sentence)? What are the goals of the project? Identify and define the problem that you are looking at. It is important at this stage to be clear and concise about the problem as without a clear vision at the start you may not achieve the desired outcomes. Being clear about the problem will also make it easier to realize what your intervention needs to be. If only part of the problem is considered, there may be significant gaps in your proposed intervention and this is likely to impact on both time and cost.

Example:

The utilization of multiple-lumen catheters has been associated with an increased risk of complications in patients admitted to noncritical care healthcare units, such as infection, occlusion, and thrombosis. Although prior research has shown that the use of single-lumen peripherally inserted central catheters (PICCs)prevents complications, multiple-lumen PICCs are still used for patients in noncritical care conditions.

The change of guidelines of noncritical care healthcare services to the default use of single-lumen PICCs could result in decreased complication rates for patients without other consequences.

Relevant course readings:
Chapters 2,3

Relevant course sessions:
Session 1 (Introduction to the Model for Improvement)
Session 3 (Diagnostics)

Insert text here…

Background and Description of Local Context

On a larger scale, what background knowledge or literature is relevant to this project? Critically summarize the current knowledge of the care problem being addressed. What evidence is available to guide planning? Are there known evidence-based interventions that have been implemented? In what context(s) have they worked? Having now identified the problem and before embarking on an intervention, it is important to undertake background research. Conceivably, you may not be the first person to have identified the problem and subsequently have attempted to solve it, so carrying out a search will provide some useful information into what solutions already exist, whether they have succeeded or failed, and what lessons you can learn from them. You also will need to understand your local context because this will help you to focus what the intervention should be and how it can be tailored for your specific clinical area.

Example:

Prior simulation research has shown that for every 1000 PICCs inserted annually, increasing the proportion of single-lumen PICCs by 10% may prevent up to 1 PICC-related deep venous thrombosis and 1 PICC-related catheter infection per year [Ratz et al. 2016]. Other studies demonstrated the impact of increasing the use of single-lumen PICCs to prevent PICC-related complications [Swaminathan et al. 2018; O'Brien et al. 2013].

An intervention by Swaminathan et al targeting a multi-modal approach based around provider education decreased inappropriate use by 13.8% (marginal decrease). We propose that defaulting to single-lumen PICC for all cases expect where a specific indication is provided may be a more effective strategy.

References:
Ratz D, Hofer T, Flanders SA, Saint S, Chopra V. Limiting the number of lumens in peripherally inserted central catheters to improve outcomes and reduce cost: A simulation study. Infect Control Hosp Epidemiol 2016; 37:811–7.

Swaminathan L, Flanders S, Rogers M, et al. Improving PICC use and outcomes in hospitalised patients: An interrupted time series study using MAGIC criteria. BMJ Qual Saf 2018; 27:271–8.

O'Brien J, Paquet F, Lindsay R, Valenti D. Insertion of PICCs with minimum number of lumens reduces complications and costs. J Am Coll Radiol 2013; 10:864–8.

Relevant course readings:
Chapter 4

Relevant course sessions:
Session 1 (Introduction to the Model for Improvement)
Session 3 (Diagnostics)
Session 7(Leading Change)

Insert text here…

Establishing a Quality Gap - with Baseline Data if/when Available

Describe the nature and severity of the specific local problem or system dysfunction that is addressed. What is the current state of the system under study? How do you know improvement is needed? One way to address this is to collect some baseline data. As well as assessing the prevalence of the problem, baseline measurement is used as a comparison for when your intervention has been established, completed, and tested. If there are no baseline data, it will be almost impossible to determine whether or not your intervention has made any difference to patient care. You need to think about how and what you are going to measure very carefully so that the data are meaningful (see section on 'Establishing Family of Measures').

Example:

Although no baseline data were available in the institution of the investigators of the project, they proposed to assess the impact of defaulting to single-lumen PICC insertion in noncritical care units during 21 June 2016–20 February 2017 (baseline period) and 21 February 2017–20 October 2017 (intervention period) in their institution.

Relevant course readings:
Chapters 1, 5

Relevant course sessions:
Session 1 (Introduction to the Model for Improvement)
Session 3 (Diagnostics)
Session 4 (Measurement I – Quantitative Measures)

Insert text here…

Engaging Others

The essence of a quality improvement project is making transformational change within a team or organization. This necessitates being able to communicate with different people and to lead the change in the face of potential opposition and criticism. You will need to work to identify and engage stakeholders who have an interest in, or might be affected by, the change that you are planning. You will also want to articulate how you plan to integrate these stakeholders into your QI project activities – will you invite them to join your team? Engage them to get input and feedback? Keep them informed? This will help you to map out relevant stakeholders for your QI project.

Example:

To appropriately engage healthcare professionals in the practice change the investigators of the project had to ensure that the professionals who would be affected by the policy change would perceive that the proposed intervention would result in better outcomes for patients while not adding risk to patients or substantial increase of work efforts for their teams.

During the 3 months prior to the intervention, appropriateness criteria for multiple-lumen PICCs were developed following extensive consultation with hospital physicians. These criteria were disseminated along with a new hospital policy stating that any multiple-lumen PICC order from noncritical care in patient units would be defaulted to single-lumen by IR unless one of the following indications were specified with the order: administration of 2 or more long-term intravenous antibiotics, intravenous chemotherapy, total parenteral nutrition, or use in medical assistance in dying. Awareness was raised about the new policy by announcing it at physician business meetings, rounds, and on the hospital intranet both 1 month before and 5 months after the intervention.

The aforemenetioned engagement strategy was to introduce the idea to all healthcare professionals involved with the care of noncritical ill patients to first get the professionals to be aware and understand the concept and plan, and then to support the initiative.
The initiative started small; it was implemented on 21 February 2017 on noncritical care units, and after a pilot experience it was expanded to include other units on 19 June 2017.

The message that this initiative would not increase the workload of nurses, residents and staff, but would improve patient outcomes and in fact facilitate the healthcare professionals' workflow due to the expected reduction of PICC-related complications, was critical for the engagement of the teams.

Relevant course readings:
Chapters 7, 8, p166

Relevant course sessions:
Session 2 (Intro to Safety, Intro to Stewardship)
Session 6 (Patient Engagement in QI & PS)
Session 7 (Leading Change)

> **Insert text here…**

Resources Required

Consider resources that will be required. Examples of these include: Budget, Dedicated Staff Time (is necessary for senior management to know, especially if the dedicated time is significant) For example, if you require the team to be available a half day every week, a process owner to spend 20% of his/her time, back-fill for front line staff, etc.

Example:

In this example there would be an increase of required resources for quality QI project if we need to ask for any resources. It is important, however, to verify whether the department where the project is being conducted has dedicated resources for QI and if there are stakeholders who are willing to participate and support the initiative by investing resources for the conduct of parts of the project.

Relevant course readings:
Chapters N/A

Relevant course sessions:
Session 7 (Leading Change)

> **Insert text here…**

Aim Statement

What are the aims of this project? What do you hope to accomplish by doing this project? Aims should be specific, clear, and well-defined and should, at minimum, describe the target population, desired improvement and targeted timeframe (remember "how much, by when") Consider using the SMART approach: specific, measurable, actionable, realistic and timely.

Example:

To change the default procedure of insertion of venous access catheters in noncritically ill of a single healthcare institution in Canada from multiple or single-lumen PICC insertion to exclusive single-lumen PICC insertion, unless an exceptional indication was provided, during a period of time of 8 months, aiming at a change of catheter-related complications of at least 10% during the study period (expected post-intervention complication rate, 20%), in comparison with the rate observed in a similar period of time of 8 months in the same institution (known pre-intervention complication rate, 30%), without significant unintended consequences.

Relevant course readings:
Chapter 3

Relevant course sessions:
Session 1 (Introduction to the Model for Improvement)
Session 3 (Diagnostics)
Session 7 (Leading Change)

Insert text here…

Establishing Family of Measures (outcome, process, balancing)

What are your outcome measures, process measures or balancing measures? Will you be measuring qualitative data or quantitative data? Don't forget about fidelity outcomes. Describe the measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability (if available).

Example:

Baseline complication rate per month in the 8-month interval: in %.

Post-intervention complication rate per month in the 8-month interval: in %.

Baseline infection rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Post-intervention infection rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Baseline occlusion rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Post-intervention occlusion rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Baseline thrombosis rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Post-intervention thrombosis rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Baseline PICC re-insertion rate: number of infections related to PICC / total number of patients who underwent PICC per month.

Intervention PICC re-insertion rate: number of infections related to PICC / total number of patients who underwent PICC per month.

% adherence to proposed directive per month during the study period.

Relevant course readings:
Chapters 5

Relevant course sessions:
Session 4 (Measurement I – Quantitative Measures)
Session 11 (Measurement II – Qualitative Measures)

Insert text here…

Describing the problem with process tools

It's said that you cannot fix what you do not understand…and often you don't understand! In other words, once it has been established that there is a problem, the next step is describing your problem in detail. The causes of a problem are often multi-factorial and the problem needs to be observed from many different perspectives. You need to consider the features of the current system that are contributing to the problem. One tool useful for mapping out and understanding the current system is called a process map. This involves looking at a process, such as a patient journey, and trying to map it out in stages. The resulting flow will help to understand the process and suggest possible areas for intervention such as bottlenecks or unnecessary handovers. Another such tool is a cause and effect diagram. This is a brainstorming tool that helps teams to consider and categorize the various contributing factors for a given quality problem.
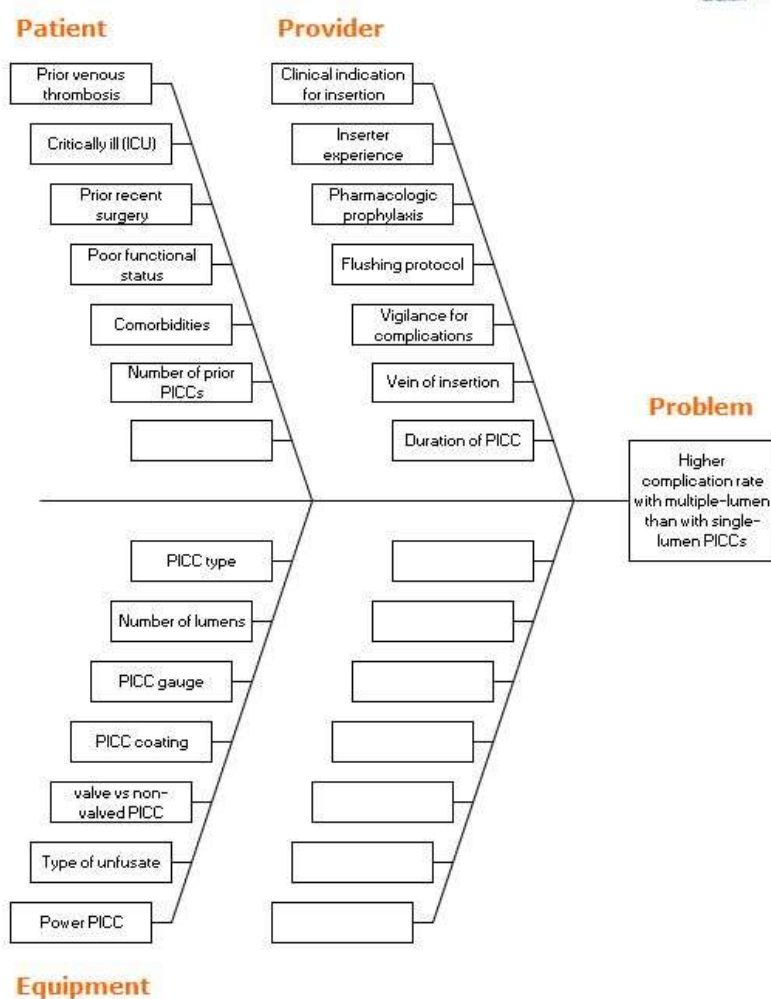
Example:

Here is a basic process map of the factors that concur to the problem of multiple-lumen PICCs leading to a higher complication rate than single-lumen PICCs.

1: Patient: The patient's clinical history and healthcare conditions are partially responsible for the stated problem.

2: Provider: Clinical indication, experience of the healthcare professional and team, and characteristics of the protocol used for the procedures play a role on PICC-related complications.

3: Intervention material/equipment: Characteristics of the PICC itself concur to the stated problem.

Following is a "fishbone" diagram showing the root causes of the problem.

A fishbone (Ishikawa) diagram with four categories (Patient, Provider, Equipment) leading to the Problem.

Patient:
- Prior venous thrombosis
- Critically ill (ICU)
- Prior recent surgery
- Poor functional status
- Comorbidities
- Number of prior PICCs

Provider:
- Clinical indication for insertion
- Inserter experience
- Pharmacologic prophylaxis
- Flushing protocol
- Vigilance for complications
- Vein of insertion
- Duration of PICC

Equipment:
- PICC type
- Number of lumens
- PICC gauge
- PICC coating
- valve vs non-valved PICC
- Type of unfusate
- Power PICC

Problem:
Higher complication rate with multiple-lumen than with single-lumen PICCs

Relevant course readings:
Chapters 4

Relevant course sessions:
Session 3 (Diagnostics)
Session 4 (Measurement I – Quantitative Measures)
Session 9 (Intro to Human Factors Engineering)
Session 11 (Measurement II – Qualitative Measures)
Session 15 (LEAN)

Insert text here…

Theory of Change and Candidate Change Concepts/Ideas

Ideas for changes often come from working in the system, from other similar improvement efforts, or from change concepts and theory. It is critical to take what you have learned from your efforts understanding the problem to articulate a theory for why your problem is occurring. Is it a knowledge problem? A patient expectation problem? An issue related to excess variation? As you consider potential changes, how do the candidate change concepts or ideas map to the theory for why the problem exists? What are the key points within the current state that are opportunities for change and improvement? You may want to mention here barriers to change that you encountered and how you overcame them.

Example:

Rationale for medical directive and theory as to how this intervention will reduce uncertainly about type of PICC to be used in noncritically ill patients:

1. We no longer rely on physician only for making a decision about using a multiple- vs single-lumen catheter for a noncritically ill patient.
2. The criteria for appropriateness will be well defined for nurses, trainees and physicians so less ambiguity about whether patient will undergo a single- or multiple-lumen PICC.
3. Nurses will not be awaiting for an order from a physician to prepare the patient for the PICC insertion since the directive gives them the ability to go ahead with the preparation for the procedure based on the pre-specified criteria.

Relevant course readings:
Chapters 7

Relevant course sessions:

Session 2 (Intro to Safety)
Session 3 (Diagnostics)
Session 7 (Leading Change)
Session 3 and 15 (LEAN and Process Mapping)
Session 9 (Intro to Human Factors Engineering)

Insert text here…

PDSA Cycles (ideally 2-3 cycles at least)

The PDSA or Plan, Do, Study, Act cycle is the tool at the heart of the model for improvement. Please provide an overview of your PDSA cycles so that others can understand the process you went through in improving your intervention. Try to provide enough detail so that others can understand what you did and what you learned through your PDSA cycles. We would expect projects to contain at least two to three PDSA cycles.

Example:

P: What are criteria for utilization of single-lumen PICCs. Can the staff of a radiology department agree on these?

D: Development of appropriateness criteria for multiple-lumen PICCs was conducted at multiple meetings and consultations with hospitals physicians.

S: The following criteria were agreed upon by all staff:

1. Any multiple-lumen PICC order from noncritical care inpatient units would be defaulted to single-lumen by IR unless one of the following indications were specified with the order: administration of 2 or more long-term intravenous antibiotics, intravenous chemotherapy, total parenteral nutrition, or use in medical assistance in dying.

2. An awareness campaign about the new policy of using single-lumen PICC according to the agreed criteria would be announced at physician business meetings, rounds, and on the hospital intranet both 1 month before and 5 months after the intervention.

3. The intervention would be implemented on a given date on noncritical care units, excluding medical oncology and general surgery, and would be expanded to include these two units 6 months afterwards.

4. Emergency Department (ED) and outpatient clinic PICC orders would be excluded due to the low baseline number of double-lumen PICC orders.

A: These criteria can be incorporated into a medical directive post intervention if the project is successful. Success was defined as decreasing PICC-related complications per year by at least 10% based on previously conducted simulations.

"Prior simulation studies suggest that for every 1000 PICCs inserted annually, increasing the proportion of single-lumen PICCs by 10% may prevent up to 1 PICC-related deep venous thrombosis and 1 PICC-related catheter infection per year."

Reference:
Ratz D, Hofer T, Flanders SA, Saint S, Chopra V. Limiting the number of lumens in peripherally inserted central catheters to improve outcomes and reduce cost: A simulation study. Infect Control Hosp Epidemiol 2016; 37:811–7.

Relevant course readings:
Chapter 7

Relevant course sessions:
Session 6 and 8 (PDSA + Run charts and control charts)

Insert text here…

Project Results

Did your changes result in an improvement? What changes were implemented as part of the QI project? Using the measures that you defined for your project, display your data over time using a run or control chart to determine whether there is special cause variation seen that would indicate that your changes resulted in an improvement.
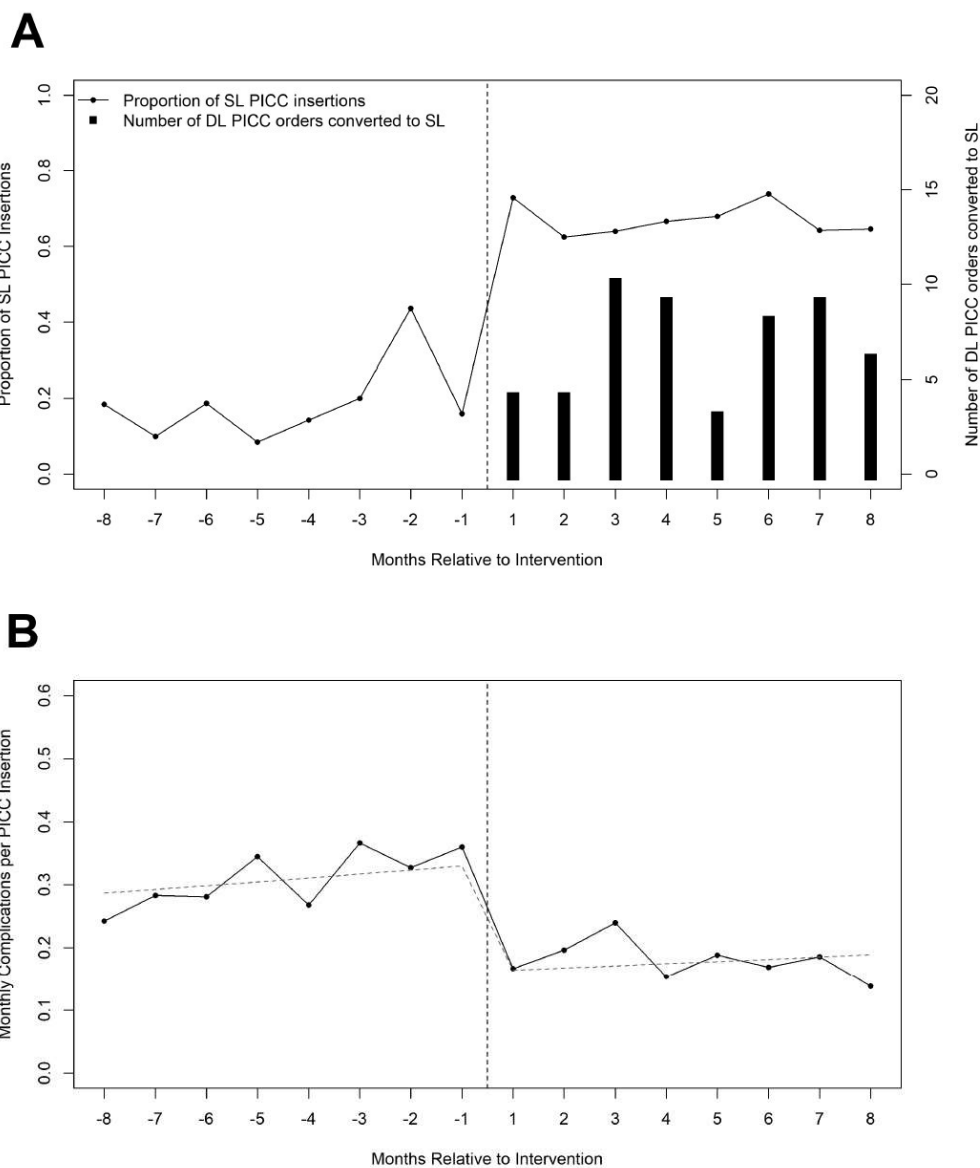
Example:

Figure 1. *A*, Monthly proportion of single-lumen PICC insertions. *B*, Monthly complication rate before and after defaulting to single-lumen PICC insertion (vertical dashed line). Abbreviations: DL = double lumen; PICC, peripherally inserted central catheters; SL = single lumen.

Relevant course sessions:
Session 6 and 8 (PDSA + Run charts and control charts)

Insert text here…

Anticipated Barriers and Mitigation Strategies

Describe any challenges and barriers you came across and the strategies you used to mitigate during your project.

Example:

Limitations on generalizability of the results of this project to other institutions

1.The evaluation of this project was limited to a single acute-care hospital and excluded the critical
care patient population, where the need for multiple intravenous infusions would make a single-lumen default policy unfeasible.
2. Although the intervention focused on optimizing single-lumen PICC selection, the order entry process did not address inappropriate orders for PICCs that may not have required insertion in the first place.
3. The investigators' institution began with relatively low single-lumen utilization, whereas hospitals with a higher baseline may not achieve the same impact on PICC-associated complications using a single-lumen default policy.

> **Insert text here…**

Lessons Learned

What are the implications and lessons learned? Discuss the factors that promoted the success of the project and that were barriers to success. What did you learn from doing this project? What are your reflections on the role of the team? Discuss the project's significance on the local system and any findings that may be generalizable to other systems. What are your next steps?

Example:

1.Participants of a QI project may not fully understand the guidelines and planning of the project in its initial stage requiring supervision of auditors of the project about adherence/compliance to the proposed protocol.
Of 160 multiple-lumen PICCs ordered post-intervention, 53 (33.1%) did not meet pre-established criteria and were automatically converted to single-lumen insertions.

2.The investigators of the project would need a larger sample size to be able to show the impact of the new directive on reduction of infection and thrombosis monthly rates, as the results of this project were driven only by a reduction of the monthly rates of PICC-related occlusions.

> **Insert text here…**