Foundations in Quality Improvement (FIQI)©

Supplemental Materials

For

Faculty and Learners

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I. Introduction to Quality Improvement

The Institute of Medicine (IOM) states that medical training should "encourage production of a …workforce better prepared to work in, help lead, and continually improve an evolving health care delivery system". (1) The Accreditation Council for Graduate Medical Education (ACGME) requires that resident physicians in all medical specialties be trained in quality improvement (QI). (2) To achieve these aims, residents must be able to systematically analyze clinical practice data using QI methods and implement meaningful change. Professional leaders in nursing formed the Quality and Safety Education for Nurses (QSEN) initiative to promote quality and safety in nursing education (3). Clearly, quality improvement education is important in the training of medical professionals.

Published QI training models include Plan Do Study Act (PDSA) (4) Lean Methodology (5), Six Sigma Methods (7) and others. Faculty at the University of Utah Family Medicine Residency Program developed the foundations in quality improvement (FIQI) curriculum to help hospitals and training centers efficiently teach healthcare professionals the essentials of quality improvement. The FIQI curriculum is based on the premise that medical trainees learn best when learning and applying QI in real-world environments.

It is our hope that medical professionals will bring these foundational QI skills to their clinical sites and immediately apply these skills to the work they do. Meaningful training requires application and reflection. The foundational skills are the start of the education in QI. More advanced training in QI skills will build upon this initial foundation.

References

1. IOM (Institute of Medicine). 2014. Graduate medical education that meets the nation's health needs. Washington, DC: The National Academies Press.
2. Accreditation Council for Graduate Medical Education. Common program requirements. Available at:http://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramResources/Common_Program_Requirements_07012011[1].pdf. Accessed August 20, 2015.
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5. Skelton SC, et al. Lean methodology improves efficiency in outpatient academic uro-oncology clinics. Urology. 2014 May; 83(5):992-7.

6. Dineen S., et al. A Prospective Six Sigma Quality Improvement Trial to Optimize Universal Screening for Genetic Syndrome among patients with Young-Onset Colorectal Cancer. J Natl Compr Canc Netw. 2015 Jul;13(7):865-72

II. Module Content Review

There are five modules in the FIQI. Each module contains didactic material and a case study. The didactic material includes a slide presentation, audio instruction and a quiz. The quiz reinforces learning objectives. Learners should be able to see, hear and interact with material. The case study is a clinical vignette that demonstrates the application of the material visually in a clinical environment.

Module 1

Learning Objectives

1. Residents can describe the role of quality improvement in healthcare delivery.
2. Residents can describe a method for quality improvement in healthcare.

Research and innovation in medical care has extended the life and wellbeing of individuals and communities. Translating the best medical innovations to hospital and clinics, however, is a difficult task. Research has shown that increased healthcare spending does not directly correlate with improved healthcare outcome for patients (1). To improve outcomes, the healthcare system can use quality improvement methods to affect change in our systems.

Providing safe, effective and efficient care requires an understanding of the complexity of the healthcare system. Modern medicine relies on healthcare teams to deliver healthcare. Teams are complex systems. They can, however, analyze and improve the care they deliver by using quality improvement methods. Quality improvement methodology is not new. Scientists like Edward Deming translated observations and insight from complex systems in nature to complex human systems (5). By incorporating quality improvement methods into healthcare innovation, we can provide safe, effective and efficient healthcare delivery in any setting.

Module 1: Key Slides

References
1. Plzen PE, Greenhalgh T. The challenge of complexity in health care. *BMJ : British Medical Journal*. 2001; 323(7313):625-628.
2. Stevenson K, Baker R, Farooq A, Sorrie R, Khunti K. Features of primary healthcare teams associated with successful quality improvement of diabetes care: a qualitative study. Fam Pract. 2001; 18(1):21-6.
3. Institute of Medicine (IOM). 2001. Crossing the Quality Chasm. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, DC: National Academy Press.
4. Hughes RG. Tools and Strategies for Quality Improvement and Patient Safety. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Apr: 1-44.
5. Deming, W. E. (1986). *Out of the crisis*. Cambridge, Mass: Massachusetts Institute of Technology, Center for Advanced Engineering Study.

Module 2

Learning Objectives

1. Residents can describe the steps for finding a meaningful quality improvement topic.
2. Residents can organize a quality improvement team.
3. Residents can create an **aim statement** for a quality improvement project.

To improve care in a clinic or hospital, individuals and teams can improve processes. One should be discerning when selecting a quality improvement project. Choose a topic that is common, has good evidence, has measurable data, and needs improvement.

QI work can be done individually, but the most effective QI work is done in teams. Teams clarify the problems, help innovate and bring change to the entire work area (clinic or hospital team). Start by organizing your team with all the key players who work in your environment (front office staff, medical assistant, nurse, technicians, managers, mid-level providers, physicians, etc.). Organize a time to meet.

Determine the exact measure that your team will try to improve and create an "aim statement". The aim is the target you are working toward. **The aim should clearly state the population, numerical goal for improvement and a date.**

Key Slides and Figures

Focus-PDSA : Find a Topic

- Is it clinically relevant in my practice?
- Are there evidence-based treatments in this area?
- Are there benchmarks or national standards?
- Is change needed? Why?
  Does baseline DATA shows gap in care?

Focus-PDSA : Find a Topic

- Can I recruit a team ?
- Can our team get ongoing data?
- Do my staff, partners and leaders support work on this topic?

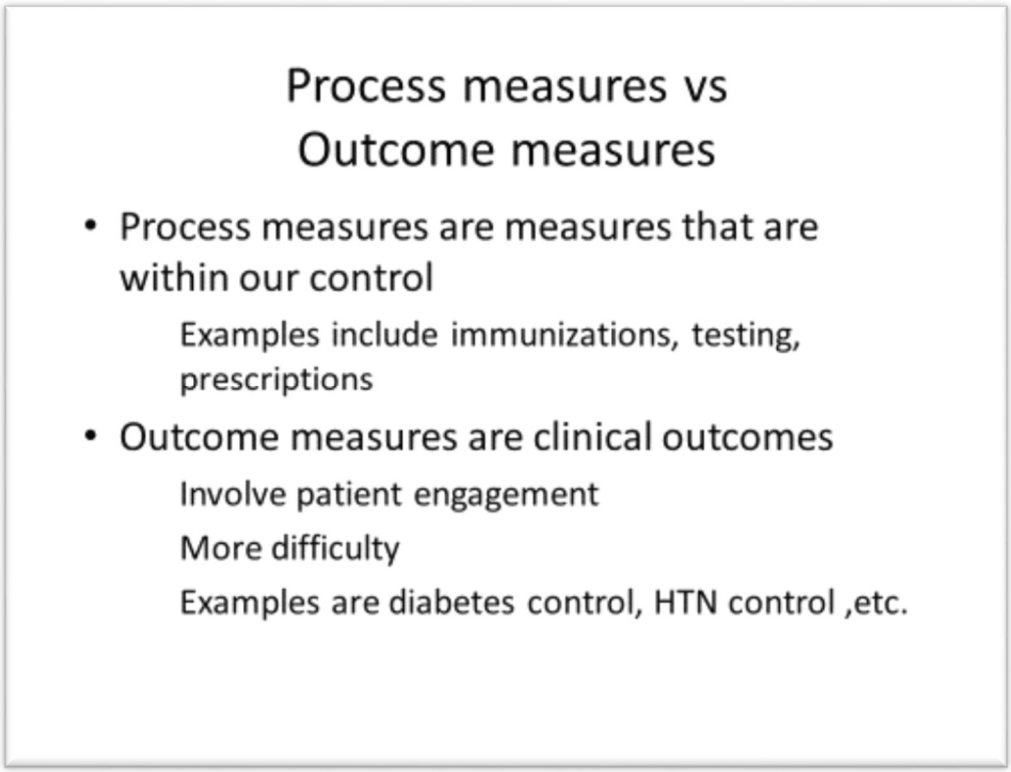
fOcus: ORGANIZE a TEAM

1. **Members & Meetings**
2. **Measures**
3. **Set Aim**

fOcus: Setting an AIM

State the aim clearly

1. **Population**
2. **Include numerical goals**
3. **Date**



References

1. Scovile R, Little K. Comparing Lean and Quality Improvement. IHI White Paper. Cambridge, Mass: Institute for Healthcare Improvement; 2014. (Available at IHI.org)

Module 3

Learning Objectives

1. Residents can create a process diagram.
2. Residents can create a fishbone diagram to describe variations in a healthcare process.
3. Residents can describe the benefits of teams in quality improvement.

Once a team sets an aim statement to improve a process, the team must work together to create an improvement plan. There are several tools that teams can use to understand the current process and recommend improvements.

The first tool is a **process diagram**. The process diagram creates a shared understanding of all the steps in a clinical process or workflow. Physicians should resist the temptation to skip this stage, as key steps of the workflow are best delineated by other members of the team with their job expertise.

The second tool is the **fishbone diagram**. The fishbone diagram identifies the reasons for variation in the process. The expertise of the team answers the question: Why do things sometimes go wrong? The reasons are displayed on a diagram that resembles the skeleton of a fish, grouping related items on each spine.

Process analysis

FIRST : Clarify healthcare processes
tool : process diagram

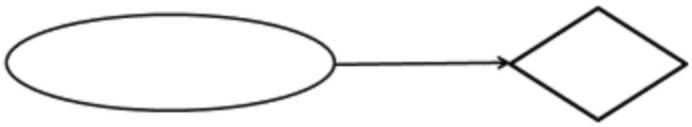
SECOND : Understand process variation
tool : fishbone

Process Diagram

- Visual tool that helps team members gain a shared understanding of the process and use this knowledge to collect data, identify problems, focus discussions, and identify resources.
- It identifies steps that do not add value. It may reveal unnecessary work, duplication, added expense, and breakdowns in communication.
- It serves as a basis for designing new processes.

Steps in Making Process Diagram

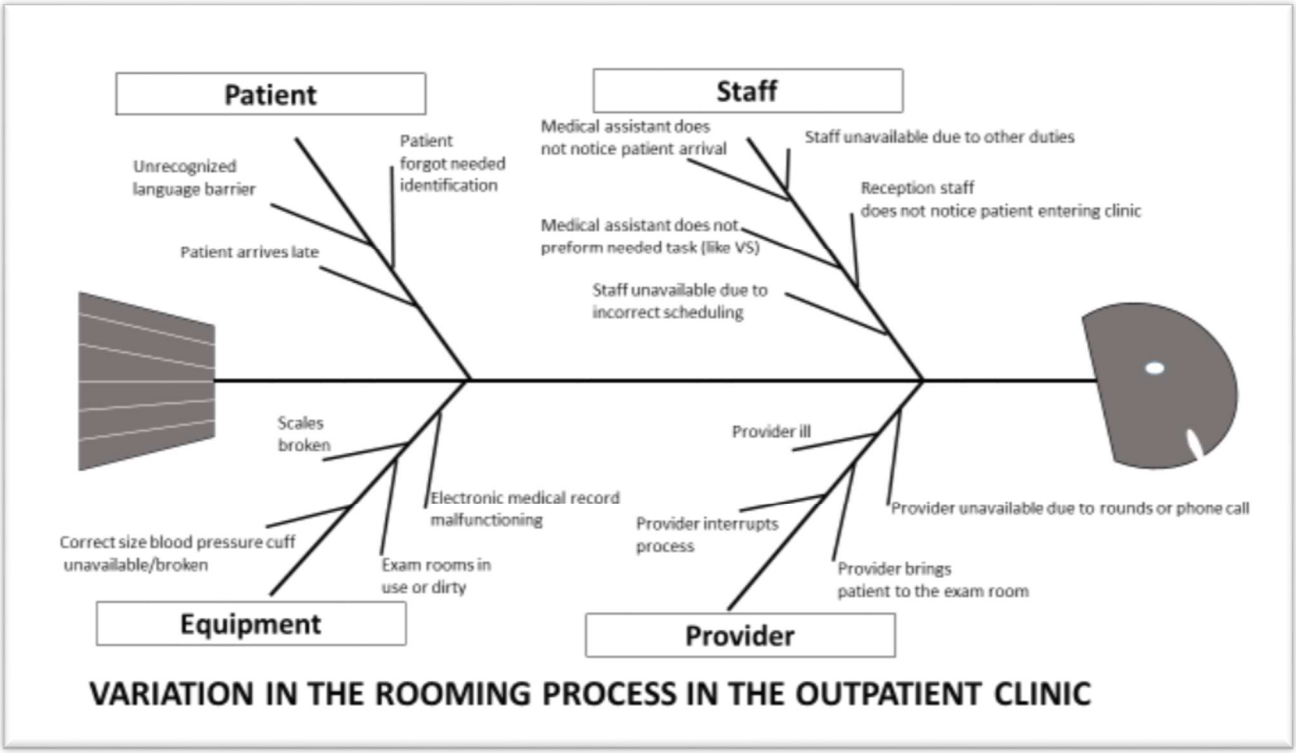
- Start at the beginning of a process
- Break entire process into steps
- Use bubbles for explanation
- Use arrows for movement



TOOL : Fishbone

- It helps a team understand the many causes of process variation.
- It graphically displays the relationship of a cause and effect.
- It helps a team identify areas for improvement.

Example Fishbone



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2. www.ihi.org/resources/pages/tools/causeandeffectdiagram.aspx
3. www.hrsa.gov/quality/toolbox/508pdfs/improvementteams.pdf

Module 4

Learning Objectives

1. Residents can create a Pareto diagram.
2. Residents can select an intervention to improve quality in a clinical area.
3. Residents can describe standard work.

Our ultimate goal is standard work. We want systems that are highly reliable and have standard practices. A Pareto diagram is a tool that is used to graphically display common errors in a process. The Pareto diagram demonstrates the common errors, which, if corrected will have the most impact.

Pareto Diagram: A Pareto diagram is a type of graph that displays items based on frequency. It represents items from most frequent to least frequent. It is based on the 80:20 rule: 80% of the variation is actually caused by only about 20% of the items in the group. See slide below for graphic example of a Pareto diagram. When selecting an intervention, look for common errors to remedy, and interventions that are under the team's control and feasible. The team can select the intervention by consensus or majority rule.

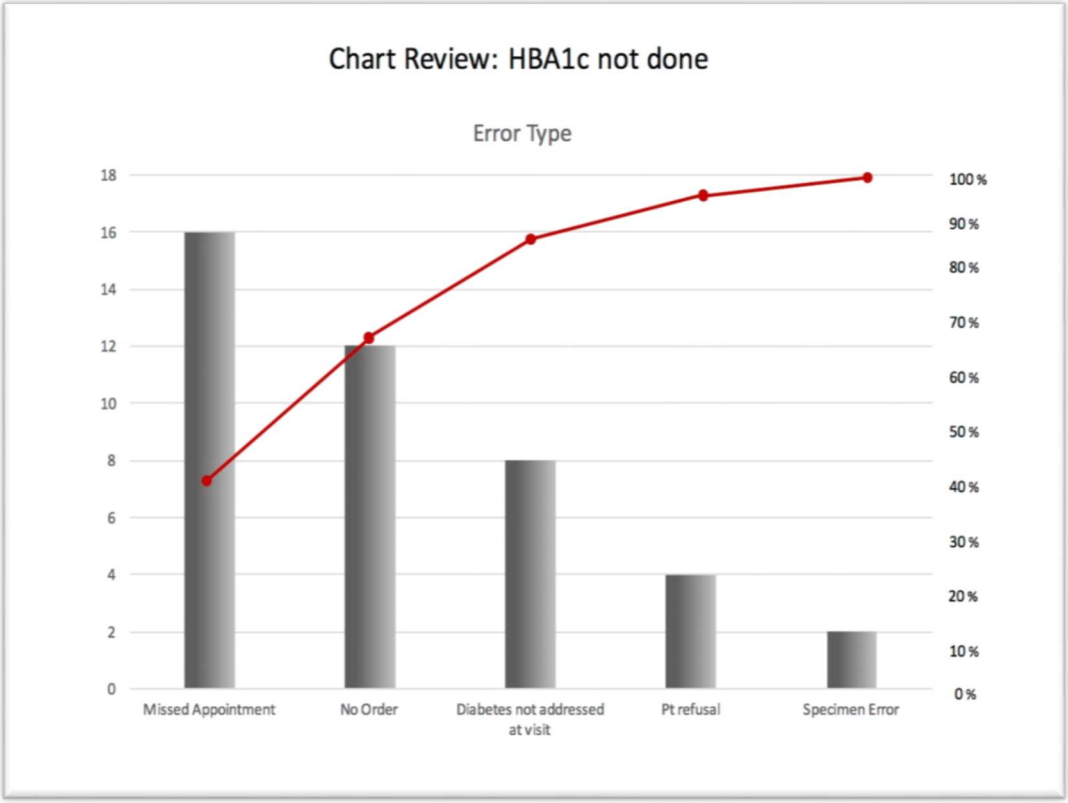
Creating standard work means that systems are reliable because of standard practices. Interventions should support standard work. After an intervention is implemented, data will demonstrate its impact. The process can then be refined further, in a cycle of improvements, using data as feedback on the effectiveness of the intervention.

Key Slides and Figures

Pareto Diagram

- Is a type of graph that displays items based on frequency
- Uses the 80/20 Rule
  - 80% of variation comes from only 20% of possible causes

Pareto Diagram



Selecting an intervention

- Look at high frequency problems
- Brainstorm as a group
  - Encourage each individual to contribute
- Select an intervention that is
  - feasible
  - under the team's control
- Agree on intervention as a group

Standard Work

- Creates the most efficient way to accomplish a task
- Uses Data
- Defines this process for all team members
- Is developed and refined over time

References

1. www.ihi.org/resources/Pages/Tools/ParetoDiagram.aspx
2. *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* by James P. Womack and Daniel T. Jones. 1996 by Simon & Schuster, New York.

Module 5

Learning Objectives

1. Residents can plan an intervention.
2. Residents can monitor an intervention.
3. Residents can create a run chart
4. Residents can implement multiple interventions to improve quality in clinical area. (PDSA cycle)

Once a team has chosen an intervention, the team outlines the steps of the intervention and chooses a start date. Before implementing change, it is important review plans with supervisors and other individuals impacted by the intervention. The intervention may need to be modified. There may be unforeseen costs or institutional perspective that needs to be addressed.

All change has cost. There may be monetary costs when processes change. All change will require teams to rethink their work. Leaders will need time to engage the team and train the team in the new workflow. When workflows change, team members naturally resist this change. It takes skill and intention to overcome healthy resistance to change. Successful leaders of change efforts understand a framework around the roles that individuals take in the change process.

When planning to implement a change, it is wise to consider the stakeholders and the roles people and organizations play in the success or failure of the change.

A. Identify Your Stakeholders: Think of all the people who are affected by your work or project, who have influence or power over it, or have an interest in its successful or unsuccessful conclusion. An example, from the *Stakeholder Analysis:*

Winning Support for your Projects (https://www.mindtools.com/pages/article/newPPM_07.htm) shows possible stakeholders:

Your boss	Shareholders	Government
Senior executives	Alliance partners	Trades associations
Your coworkers	Suppliers	The press
Your team	Lenders	Interest groups
Customers	Analysts	The public
Prospective customers	Future recruits	The community
Your family		

Although stakeholders may be both organizations and people, ultimately you must communicate with people. Make sure that you identify the correct individual stakeholders within a stakeholder organization.

B. **Connor Roles of Change**

Determine each role that every stakeholder fills. Sometimes a person will fill several roles at once. This preparation will provide clarity about the conversations you will need to have with each individual. When you communicate with a key stakeholder, you should consider "common ground" or why they should support your change (what's in it for them as risk or opportunity).

In the book "Managing at the speed of change: how resilient managers succeed and prosper where others fail" the author Daryl R. Connor identifies four key roles played in change (Table).

Table. Roles of Change (Connor)

Sponsor	The individual or group with power to sanction or legitimize change
Agent	The individual or group responsible for actually making the change
Target	The individual or group who must actually change
Advocate	The individual or group who wants to achieve a change but lacks the power to sanction it

In addition to monitoring the process of change, a quality improvement team should monitor the impact of the intervention by collecting data on the process or outcome. Data can be visualized easily by a **runchart** that plots data graphically over time[2]. Teams should meet periodically after an intervention to review the data and propose new or alternate interventions until the aim is achieved. The **PDSA cycle** describes multiple interventions used by a team to achieve their aim. Quality improvement teams frequently need to instigate several iterations of their intervention until success is achieved.

Once a team has achieved its goal, the team should acknowledge and celebrate this achievement. Team members should each reflect on the new workflows. When possible the team should make sure the new workflows are incorporated into the standard work of the teams prior to stopping the monitoring phase of a project. The team can then decide if it is time to adjust the goal to a new higher benchmark, dissolve the team or work on area for refinement.

Key Slides and Figures

Intervention planning

- All change has cost
- Organizational perspective
- Determine impact

How can we plan so that change is easier?

- Identify steps
- Identify tools
- Identify responsible people
- Delegate
- Create accountability
- Review with clinical leaders

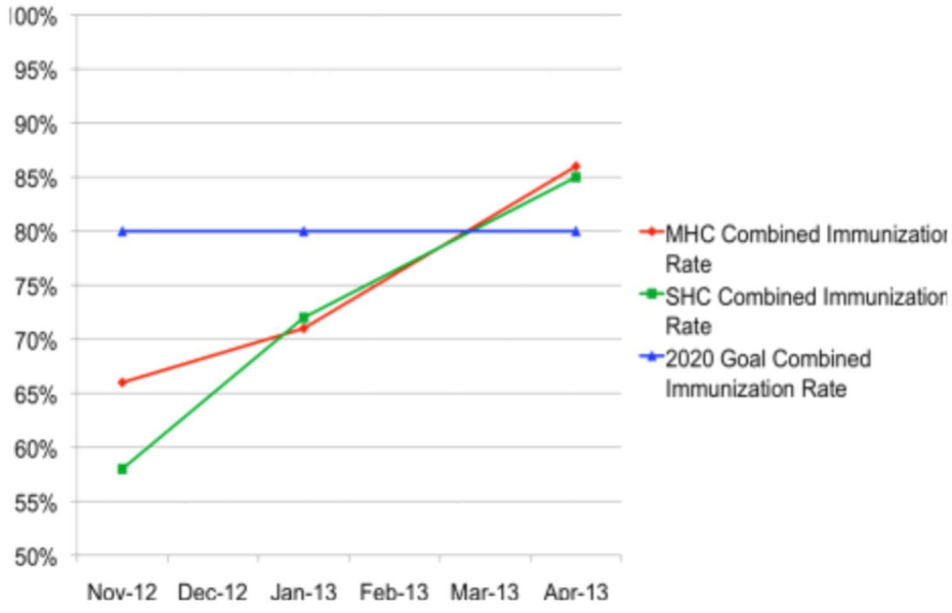
Roles in Change

- Sponsor : Individual or group with the power to legitimize change
- Advocate : Team or individual who wants change but lacks power/authority
- Target : Person who must change behavior
- Agent: Person who is responsible for making the change.

Runchart

- Defines baseline data
- Defines goal (Aim)
- Graphic used over extended time

Run Chart : Immunizations



PDSA Cycles

- Plan : Define the steps and ensure leaders agree to sponsor the change.
- Do : Describe what happens when you intervene
- Study : Monitor data
- Act : Refine or continue based on

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III. Elements of a Successful QI Program

Broad leadership support

When bringing a QI curriculum to a new environment, there will be stutters. However, as Connor's roles of change demonstrate, if you have the sponsorship from those with authority, the implementation is smoother and more likely to be successful. Work within the parameters of your leadership's vision. Determine whether your leadership and institution are willing to put resources into QI work. The primary resource is faculty and staff time, to teach QI and do QI work. If your leadership is enthusiastic, you may be able to implement wide-spread programming to teach and to do QI. If your leadership is reticent, then you will need to determine how to maximize what you can. For teaching QI, options include didactic lectures, asynchronous on-line learning, or individual one-on-one instruction built into required residency experiences. For applying QI and learning QI experientially, personal involvement in a QI project is imperative for the resident learner. As discussed in prior sections, this involvement can be as small as individual projects, or as big as leading an interprofessional team to accomplish a project. Work with what you have to create small successes. Build on those successes. Identify barriers to the work and work to overcome these. By using the Connor stages of change, you can identify the key players in making a program successful or not.

A faculty champion

Identify faculty who will be accountable to the implementation and oversight of the curriculum, which includes both the didactic instructional curriculum and the experiential component. Identify a faculty who has or wants to learn QI skills, so that they can be the content expert. They could complete the FIQI curriculum, and/or participate in other QI training, such as the IHI online training (www.ihi.org).

Leadership (residency director, clinic director, division chief, department chair) should work with the faculty champion to determine the time and resources that will be allocated to QI teaching and work. This may need to include time to also teach faculty about QI.

Expectation of faculty engagement

Broad faculty support is important for QI work to be successful. If the passion and mission for QI is borne only by the faculty champion, then the effects will be minimal. Broad faculty participation is needed on many levels: teaching curriculum, advising QI projects, participating in QI interventions. Most importantly, faculty need to not undermine QI work, as resistance and sabotage can be demoralizing and costly. If you are not yet in a culture of QI, leadership needs to set the tone that QI work is valued, and participation by faculty is expected.

One means to engage faculty is to align their incentives with QI work. If QI projects regularly lead to scholarly works (ie. poster presentations), then this work aligns with faculty interests.

Alignment with operational goals

QI projects that align with operational goals of the institution or organization are stronger and smarter by design. These projects are more likely to have data that is already being measured, more likely to motivate leadership to invest resources, such as staff and faculty time, and more likely to have people support the interventions.

QI projects that do not align with operational goals have more hurdles. Data to measure outcomes may be difficult to collect. Leadership may not see the work as being worth the investment of resources. People may be less interested in changing their behaviors.

Quality improvement teams

QI work is best accomplished by actively involving those who participate in some aspect of the outcome measure. This means that physicians alone are not sufficient for QI work, as they are missing key people with job expertise on their teams. QI work will be most effective in its analysis, intervention, and implementation when multidisciplinary teams conduct it.

Committed time for team meetings

QI work takes time. Teams need to meet to do the QI work. If time is not allocated for this work, it will not get done, or will not be done well. Determine a schedule

with a time and place for teams to meet. Leadership will need to support this time for faculty and staff to meet.

IV. Implementing or Improving a Quality Improvement Program in Residency Training Sites

Residency education must include training in quality improvement methods. Residency programs should review their own specialty ACGME milestones and training requirements for QI training requirements. Surveys of faculty and residents can serve as a needs assessment. Once a program identifies a need to initiate or expand QI training, the residency faculty should determine the amount and type of resources available.

Residency training in quality improvement usually includes both a didactic curriculum that teaches QI skills, an opportunity to apply the QI skills, and reflection on the experience. The FIQI curriculum provides didactic training in foundational QI skills. Some residencies may augment this curriculum with more didactic material, but all residency programs will need to determine how residents will gain experience applying these methods. An opportunity to verbally or visually present work done in QI and/or provide reflection on QI completes the learning process.

How to start or improve a residency QI training program

Residency faculty should begin by outlining their options and resources (time, expertise, staff, leadership support, funding) for the experiential component of QI training. Residents can apply their didactic QI training in several ways. The following sections list a few options for resident QI application and describes their strengths and limitations. Options requiring fewer resources are listed first, followed by options that require more resources for implementation.

Options for residency QI experiential training

A. Participation with ongoing clinical work: One simple option for training programs to implement is to have residents participate in ongoing QI work at a hospital or clinic. Most hospitals and many outpatient practices track certain

quality metrics and have teams of individuals working to improve quality and safety in their practice. Residents can contribute to these teams.

Contributing to ongoing quality or safety improvement work requires minimal residency resources, as residents participate in work that is already underway. Residents to participate in realistic work at their clinical site. Residents can appreciate the culture of their institution, but residents may not have the opportunity to apply methods from their didactic QI curriculum. The methods used by QI committees or faculty groups may not directly correlate with the didactics of the QI curriculum. Participating with ongoing QI work may be well-suited for inpatient-focused residencies. However, residents may have a low impact on the clinical outcomes.

Pros

1. The QI work is ongoing, and it is a current priority for the clinical team; therefore, participation gives learners an opportunity to appreciate why the effort is a priority.
2. Teams are preassembled.
3. The experience requires little additional faculty effort to engage the resident.

Cons

1. The resident may not have fundamental knowledge of the problem being addressed through the team's work.
2. Residents have variable schedules, limiting their involvement in ongoing work; the team's work does not rely on resident participation.
3. Meaningful resident contribution will depend on the length and stage of the team's work, and is likely to have smaller impact with longer projects.
4. Residents do not get the 'start to finish' experience, which limits the scope of QI skill development and confidence.
5. The QI methods taught in the didactics may not match the ones used in the experience.
6. The experience may not provide the opportunity for feedback and deconstruction of the experience for educational purposes.

B. Individual clinical practice projects: Many training programs have residents work individually on their own personal practice. Residents review their own clinical practice and make corrections. It is self-reflective. The impact of the QI work may be limited.

Highly motivated residents may initiate individual projects spontaneously or be assigned the task of improving their own clinical practice. Engagement is high when a project is developed by the learner, and requires minimal program resources outside of the effort invested by the learner. Individual projects may be desirable for resource-limited training programs.

An individual QI project may increase satisfaction of the learning environment if the effort originates from the learner. However, if the QI effort is assigned to a learner, an individual project may quickly become burdensome. Working in isolation without any additional team participation will reduce satisfaction for most learners. Individual projects usually occur outside the work of the clinical practice. Sustainability and impact is likely limited.

By nature of an individual project, the scope is often limited and focused. The learner may develop an intervention without needing support within the larger system. This, in itself, may reduce barriers to carrying out small sequential iterations of change resulting in more rapid cycling to observe and learn from. The impact is likely small, as the interventions may not be adopted across the system, due to the individual design of the project.

Gaining sponsorship for individual projects may be simple since the nature of the effort is not dependent on multiple personnel, and does not require significant process change from others. However, if the effort is not in alignment with priorities of the broader system, sponsorship may be more difficult to achieve. Specifically, data may be difficult to obtain if it is not already being collected and reported.

Pros

1. Individual residents can work independently without additional resources.
2. The learner assumes full responsibility to conduct the work, without significant faculty resources.
3. The learner applies the didactic QI methods to the project.

4. Allows implementation of multiple short QI cycles without the need for consensus.
5. Gaining sponsorship may be easier for projects with limited scope and resource needs.

Cons

1. Gaining sponsorship may be more difficult if the effort is not a priority of the larger system.
2. Data may not be available for the project.
3. The resident does not learn how to make change within a larger system.
4. Work may seem burdensome to an individual who does not have access to the collective energy, expertise and shared work of a team.
5. The opportunity for team engagement, learning and improvement will be lost.
6. The impact of the resident work is likely to be small and not affect systematic change.

C. Residency group projects: Longitudinal residency group projects involve multiple residents working together on a discrete project for a pre-determined length of time. This is a collaborative peer learning effort, and typically requires faculty to facilitate and guide the group. Due to the nature of residency training, block rotation schedules allow for each resident to assume sequential roles in the QI project. This results in resident team members entering and exiting the effort at different stages in the quality improvement effort.

Resident learners may have different degrees of knowledge about QI methodology and tools, and thus it is imperative for a QI curriculum that teaches all stages of QI, and that peer learning occurs through the entirety of the effort. This can be accomplished through a regular noon conference lecture dedicated to the project. The improvement changes may be contained within the workflow of the residents, and does not necessarily attempt to impact the nursing or administrative elements involved in healthcare delivery. Given this, the selection of an improvement topic is limited if the project remains focused on areas only concerning resident work.

In a residency group project, the effort may take place in either the ambulatory setting or in the hospital. Selecting a setting is dependent upon the training

program's reach and priorities. Regardless, both settings require faculty guidance and formation of a team made up of resident trainees. A discrete longitudinal group project (as opposed to multiple individual projects) provides a more comprehensive experience to a group of learners. The residency program may determine which residents are involved in the longitudinal project, and for how long. For example, as a class, the 2nd year residents may form the team, select a topic to improve upon for the particular training year, and design the project from start to finish with contributions from all members of the group. In doing so, each member of the group is able to understand the conceptualization and implementation of the broader effort, and how their pre-assigned role relates to one another as the quality improvement effort is executed by the group. Resident learners participate in planning with clear delegation of roles.

One valuable aspect of a longitudinal group effort is the natural benefits of group learning. Learners benefit from individual experience as well as the collective knowledge of the group. Residents can participate at various levels and gain confidence together. Additionally, residents may take turns leading the effort based on their availability on clinical rotations. The leadership experience requires residents to be engaged and creative in the process. There is a group accountability that encourages engagement.

Because of the collective resident engagement in a group project, institutions may be more likely to support the QI work with resources. A longitudinal group project ensures that residents will experience the principles of quality improvement over a longer time period. This method models the slow progress that quality improvement work often takes within a complex healthcare setting.

PROS

1. A group project encourages collective experience to help solve QI problems. Residents may learn about others' perspectives.
2. A group project creates a protective learning environment.
3. Many people share the effort.
4. Residents sharing a group project are able to take on more complex or iterative interventions.
5. Residents can share the leadership role over time, rotating the responsibilities within the group.

CONS

1. The group project model is artificial and may not prepare residents for challenges that occur when applying QI methods in a complex clinical environment.
2. The group project requires collective effort. Poor participation by some group members will negatively impact the downstream experience of others in the group.
3. If the project does not include other medical personnel, the expertise of the group is limited to the knowledge of physicians, which can give an incomplete picture of complex medical systems.
4. Depending on the project focus, the QI work may not be integrated into full scope of clinical work, thereby limiting its impact.
5. Faculty time spent facilitating QI work may not be highest yield if the QI work has minimal impact.

D. Multi-disciplinary teams: Residents can participate in and lead multidisciplinary QI teams. Multidisciplinary teams include personnel from different roles in the clinical practice. The senior resident leads the team through QI work. Resident-led multidisciplinary teams provide the most opportunity for residents to apply QI methodology and practice leadership skills. This method requires the largest investment of resources, organizational oversight, and faculty participation.

Quality improvement teams assembled from all the workers in a clinical practice are likely to have the broadest impact on systems change in medical care. Assembling and organizing these teams takes effort.

Some systems will not support the labor cost of workers to participate in QI teams during the workday. Under these conditions, the QI team must meet during breaks or other “off times” to do the QI team work, which is difficult to sustain. Healthcare workers are unlikely to remain engaged in activities that are considered optional.

If clinical practices can support faculty and staff time to participate in QI work, the effort is more sustainable and productive. Teams that are organized and have regularly scheduled meetings will remain accountable and engaged. Assembling and monitoring the work of multidisciplinary teams requires a faculty or staff

champion to organize this effort and keep teams aligned with the needs of the clinical practice. Teams should be accountable for their efforts, but they should also be encouraged to pursue changes that are creative and have clinical impact. Although this effort may seem daunting, providing residents and their clinical practices with practical experiences in QI gives residents the greatest ability to show autonomy, leadership and initiative. The clinic-wide engagement in QI work has the highest potential for successful change and improvement.

Pros:

1. Multidisciplinary QI teams have the greatest potential for substantive impact on improving clinical systems.
2. Teamwork and buy-in of clinical providers and staff can be a powerful outcome from multidisciplinary teams.
2. Residents can practice leading teams and display leadership skills.
3. Faculty can monitor and coach QI methods during team meetings.
4. Faculty can monitor and coach leadership skills during team meetings.

Cons:

1. Team dynamics can augment a team or make the team's work more difficult.
2. Residents with less developed organizational and/or leadership skills may find this experience challenging.
3. Faculty participation and observation is required for success of the teams. Faculty should be present to coach residents during team meetings. The faculty time required for implementing this model is high.
4. Faculty or staff oversight is needed to coordinate team assembly and operations.
5. Labor costs are high for multidisciplinary team members to participate in the QI teams.

Comparison Table

Resources	Participation in ongoing project	Individual project	Resident group project	Multi-disciplinary team
Individual resident time	Low	High	Low	High
Faculty time	Low	Low	High	High
Faculty supervision	Low	Low	High	High
Potential for clinical impact	Low	Low	Low or Variable	High
Resident autonomy	Low	High	Low	High
Resident leadership experience	Low	Low	Variable	High
Scholarship Opportunities	Low	Low	Variable	High

V. Sharing Quality Improvement Work through Scholarship

The success of quality improvement work is primarily measured by its impact on healthcare delivery. Quality improvement work can also be used to produce scholarship. Boyer described scholarship as a method that systemically advances the teaching, research, and practice of a given academic field of study through rigorous inquiry. (1) Scholarship is significant to its profession, is creative, can be documented, can be replicated or elaborated, and is peer-reviewed through various methods.

The American Council for Graduate Medical Education (ACGME) lists competencies in for each specialty. Residency and fellowship training programs must provide training in practice-based learning and improvement (PBLI) and scholarship. Work done to in quality improvement meets the requirements for PBLI in most specialty training programs. Work done in quality improvement may also be shared with others within a residency program, within an institution and within a community of colleagues. This may meet the ACGME requirements for scholarship in some specialties. (2)

Quality improvement work has the primary goal of improving care of populations of patients and therefore frequently does not meet the definition of human subjects' research. It is important to review quality improvement protocols to make sure the work does not meet criteria for research. IRB approval is required for research that includes human subject interaction. Human subject interaction can be defined as the following:

Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains

(1) Data through intervention or interaction with the individual, or
(2) Identifiable private information.

Because most quality improvement work uses data from panels of patients and not individual patients, the IRB is likely to provide a waiver for "human subjects' research". It is always wise to review your work and scholarship in quality improvement with your local IRB to make certain your work is either exempt from IRB oversight or conforms to any required IRB oversight. (3)

Squire 2.0 Format

The Squire guidelines reflect a specific format for publishing work in quality improvement. The guidelines are meant to increase transparency and applicability of work in quality improvement. An updated version of the guidelines, Squire 2.0 was published in 2016. The following table lists the component framework for quality improvement publications. (4)

Squire Components

1	Title	Including goals for improvement , specifically quality , safety, effectiveness, patient-centeredness, timeliness, cost, efficiency or equity
2	Abstract	Structured summary
3	Problem description	Nature and significance of local problem
4	Available knowledge	Relevant previous studies
5	Rationale	Informational frameworks, models and concepts
6	Specific Aims	Purpose of the project and report
7	Context	Contextual elements
8	Intervention(s)	Description of intervention(s)
9	Study of the intervention	Approach to measures
10	Measures	Specific measures selected
11	Analysis	Quantitative and qualitative steps to draw inference from data
12	Ethical considerations	Ethical considerations and conflict of interest
13	Results	Timeline, modifications and results
14	Summary	Findings and relevance of results
15	Interpretation	Impact on people and systems
16	Limitations	Limits to the generalizability of the work
17	Conclusions	Usefulness, sustainability, implications and next steps

Scholarship calendar

Residency training is a busy time. A scholarship calendar can help residents and faculty meet submission deadlines for abstracts and posters.

To create a scholarship calendar, list all possible venues for sharing scholarly work, including name, date and location of the event and the submission deadline. The calendar should be reviewed frequently during the work cycle to ensure that the submission is completed.

Scholarly Activity	Date	Location	Submission Deadline
Event A			
Event B			
Event C			

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3. http://www.hhs.gov/ohrp/regulations-and-policy/guidance/faq/quality-improvement-activities/
4. Squire 2.0 (Goodman D, et al. BMJ Qual Saf 2016;0:1–24. doi:10.1136/bmjqs-2015-004480)

VI. Summary & Contact Information

We hope that the foundations in quality improvement (FIQI) curriculum will help hospitals and training centers efficiently teach healthcare professionals the essentials of quality improvement, by learning and applying QI in real-world environments.

For questions regarding these curricular materials, please contact,
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VII. Further Reading and References

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