DEVELOPING A STRUCTURE FOR QUALITY IMPROVEMENT EDUCATION FOR DUKE HEALTH

Sponsor: Jonathan Bae, MD, MPPS

Team Members:
Kelli Brooks, Eliseu Chuang, Donald Ellis, Matthew Luedke, Chad McCall, Chris Muckler
Background

Primum non nocere—first do no harm—is so old and essential a medical maxim that its origins are lost to antiquity. However, in twenty-first century America, tens of thousands of patients die annually due to medical errors. In the two decades since the release of the seminal Institute of Medicine report, *To Err is Human*, deaths by medical errors range between 210,000-400,000 per year, with a mean rate of approximately 250,000 deaths per year—roughly the population of Reno, Nevada. While there is no argument that the Duke Health System provides excellent medical care, we are not immune to the impact of medical errors. Internal review of hospital mortality within Duke Health suggests approximately 10% of deaths involve medical errors or system issues.

Mortality aside, error is costly: one estimate from 2008 suggested an annual cost of $17.1 billion from measurable errors alone. This does not include the cost of redundancy, delays, and other forms of waste and inefficiency. A 2012 report estimated the cost of failed care delivery and care coordination were between $127 billion and $199 billion annually.

Nationally, efforts to improve the quality of American healthcare have been accelerating. The regulatory and economic carrots and sticks proposed in *To Err is Human* in 1999 have become manifest in the risk-based reimbursement and accountable care paradigms of Medicare Access and Chip Reauthorization Act (MACRA) and third-party payors like Blue Cross Blue Shield of North Carolina (BCBS-NC). In 2019, “first do no harm” is no longer just an ethical maxim, it is a key to financial survival.

Duke Health System has responded to these ethical, regulatory, and financial pressures by developing a complex collection of quality improvement (QI) initiatives (Figure 1). All entities under the Duke Umbrella, (Duke Health, the Private Diagnostic Clinic, and Duke University School of Medicine) have their own idiosyncratic QI practices. While there are some commonalities, for example the PDC and Duke Health embracing derivatives of the Toyota Quality Management system, their organization and education programs for QI are heterogeneous and often siloed. At the provider level, this heterogeneity is more acute. Each academic department operates with its own QI paradigm, with no consistent training or expectations for QI leaders, and even more variability for training of rank-and-file providers. A consistent theme is that providers learn QI from the “school of hard knocks” and are thrust into QI roles with little preparation and a sense of discomfort.

With the adoption of Commit to Zero and Total Quality Management, the Duke Health System has embarked on a bold mission to improve the quality, safety, and efficiency of patient care. Fulfilling this mission will require a dramatic increase in the QI capacity and capability of health system personnel. According to the Agency for Healthcare Research and Quality (AHRQ), “QI capacity involves a deep understanding of and commitment to improvement to undertake ongoing, continuous QI work beyond any particular project. For a practice, this requires (1) knowledge and understanding of QI approaches, and how to use data and feedback for QI; and (2) commitment of practice leadership and staff to dedicate time and resources to QI activities.”
This project addresses the issue of QI capacity and capability in Duke Health, with a particular focus on QI leadership and training structures for clinical providers. We will offer proposals for increasing consistency and responsibility of department-level leadership of QI and disseminating more consistent pathways for foundational training for rank-and-file providers. Our deliverables will be increased human capital at a low financial and temporal cost: project-ready providers to provide QI capacity for Duke Health’s commitment to zero harm in an era of accountable care and risk-based repayment.
Method

We took a four-part approach to develop a proposal for provider QI education at Duke:

- Discussed current QI practices with quality leadership at Duke in multiple different departments and institutes.
- Developed and implemented an electronic survey of QI interest and practices of Duke Health providers.
- Investigated programs at peer institutions well known for their QI expertise, including Mayo Clinic, Geisinger Health, Children’s Hospital of the King’s Daughters, and Medical College of Wisconsin.
- Surveyed current educational offerings in healthcare QI, including the Institute for Healthcare Improvement (IHI), Lean Six Sigma, Mayo Quality Academy, and current Duke offerings (BiteSizeQI).

As a team, we first catalogued our initial QI knowledge base, determined our intra- and extramural contacts, and divided the work. We established an online folder in Duke Box for collaboration and tracking our work, and scheduled regular face-to-face and WebEx meetings among our team and with our sponsor, Dr. Bae. We learned quickly that we had different strengths: some of us are more adept at information technology, while some know more about the inner workings of Duke Health; one team member already knew a large amount about QI, while a few of us have friends working in QI at other institutions.

The most important thing we learned about team-based project work is to define the scope of the problem early. We rapidly found that a QI educational infrastructure could be approached from a number of different angles. We could develop in-house educational modules for Duke staff with a range of interest in QI, from short modules for all staff to provide a limited baseline of knowledge, to in-depth courses for faculty and trainees planning to develop and lead QI projects. However, through our investigations of current educational offerings and discussions with our sponsor, we determined that our focus should be on proposing a framework for developing QI leaders at Duke.
Findings

1. Survey results

We distributed a Qualtrics survey to all PDC and Duke Hospital Medicine providers with ten questions gauging their opinions, experience, and interest in QI. Over 270 responses were received. We found that our providers see QI as important and most are interested in learning more about it (Figure 2).

![Figure 2. Provider opinions about QI.](image)

Slightly less than half of providers have already led QI projects, and of those that have not, only 14% have not been involved in projects in the past (Figure 3).

![Figure 3. Percentages of providers involved in QI projects.](image)

However, we found that providers have not had consistent education in QI. Most providers have learned about QI “on-the-job,” with only a minority of respondents having taken courses from the Institute for Health Improvement (IHI), Six Sigma, or other sources (Figure 4).

![Figure 4.](image)
Coupled with the lack of consistent educational opportunities, we asked the subgroup of respondents that reported at least some comfort participating in QI projects about a series of common QI methodologies. We found that fewer than half of that subgroup were at least somewhat comfortable with any of the methodologies. Some of the methodologies, such as failure modes and effects analysis (FMEA), made the majority of respondents uncomfortable (Figure 5).

Finally, we asked respondents how much time they were willing to commit to learning about QI over the coming year. There was a wide range, from 0-500 hours, with a median of 24 hours (Figure 6).
Figure 6. Providers are willing to commit significant time to learning QI over the coming year.

These results indicate that our respondents understand the importance of QI, are significantly involved in projects, and are willing to learn, but have limited knowledge and are uncomfortable, at present, with QI methodologies. However, the survey has some limitations, most notably responder bias. We hypothesize that providers responding to this are more inherently interested in QI than non-responders. This likely skews our data towards greater comfort, education, and experience in QI, which suggests that the deficits in QI knowledge and education would be larger in a more representative sample.

2. Conclusions from discussions with Duke quality leadership

Duke QI efforts are fragmented, with wide variation among clinical departments and health system entities:

- The Department of Pediatrics has developed a comprehensive curriculum for QI instruction.
- Other departments have departmental QI champions with variable titles and financial/time support, but do not have formalized educational curricula.
- Graduate Medical Education programs accredited by ACGME require training and projects by residents but each GME program has widely different curricula and project requirements.
- Duke has many individual talents in QI yet most operate within their own department.
- BiteSizeQI, a pilot program by the Duke Cancer Institute, led by Arif Kamal, MD, Steve Jon Nicolla, MBA, and Steve Power, is a web-based curriculum designed to “help users identify a problem or deficiency in their workplace, and then walks the user through the fundamentals of quality improvement to help fix the problem.”

The Duke Quality System, being implemented as a part of the Commit to Zero initiative, is predominantly focused on the operational side of QI (e.g., the huddle system and the A3 method of problem solving), but training for health system leadership is still evolving.

3. Examples of QI educational programs from peer institutions

Peer institutions with experience in QI education and operations have different approaches:

- Cleveland Clinic Improvement Model:
  - Focus on PDSA (Plan-Do-Study-Act) cycles, root cause analyses, and A3 problem solving.

- Mayo Quality Academy
  - Tiered educational system:
    - Bronze level: short course on QI principles for all staff
    - Silver level: requires additional coursework, completion of a QI project, and passing a written examination
- Gold level: requires two QI projects with dissemination (posters/publications) and a comprehensive examination
  o Educational system offered for a fee to external clients.
- Geisinger Health System
  o System-wide educational initiatives are not a priority.
  o Data-driven approach to quality, which is a priority due to Geisinger’s integrated health delivery network (owning both the insurance company and the hospital system for most patients)

4. On-line QI educational curricula

- Institute for Health Innovation Open School (http://www.ihi.org)
  o Wide variety of on-line courses in quality and safety
  o Certification available (Basic Certificate in Quality and Safety)

- Lean Six Sigma certification (various online providers)
  o White and Yellow Belt certifications offered online (such as https://www.sixsigmaonline.org)

- Mayo Quality Academy
  o Online curricula and on-site training offered (https://qualityacademy.mayo.edu), based on the Bronze-Silver-Gold levels described earlier
Risks and Alternatives

Risks of action:

- Consumption of financial resources for training
- Consumption of provider time for training and projects
- Creation of a new training infrastructure to unify QI efforts, which may partially duplicate ongoing processes

Risks of inaction:

- Maintained absence of a standardized approach for QI training to support the Commit to Zero initiative
- Duplicated QI efforts continue in various institutional “silos”
- Lack of a pipeline for uniform QI training of Duke institutional leaders, potentially reducing the effectiveness of QI projects
- Missed collaborative opportunities
- Given the quality of Duke providers and the interest in QI, there would be opportunity lost for Duke to be a thought leader in this arena

Alternatives considered:

- **Broad learning modules covering all Duke faculty and staff**
  - We rejected this alternative because of the variable interest in QI among these groups and the significantly increased resources required.

- **Development of a novel Duke-specific curriculum**
  - We rejected this due to the availability of well-developed curricula, such as IHI Open School and Six Sigma.
  - Curricula are extant at Duke, including BiteSizeQI and the curriculum developed by the Department of Pediatrics.
Recommendation

We make the following proposals:

1. Cultivate practice QI leadership
   a. Increase consistency and accountability at the department QI leadership level by establishing baseline funding for a minimum time support (estimate 0.1 FTE).
   b. Departmental QI leadership should have a basic level of formal QI training, at minimum to include IHI Open School certification, Six-Sigma Yellow or Green Belt, or similar training.
   c. Establish objectives and key results (OKR) for supported work with the goal of cultivating QI capacity from rank-and-file providers
      i. OKR1: Department QI leader is tasked with identifying QI interested and QI ready providers and maintaining a roster available to health system & PDC leadership.
      ii. OKR2: Department QI leaders are tasked with providing coaching for QI-interested and QI-experienced providers and encouraging access to formal QI training materials (institutionally branded or third party).
      iii. Further OKRs to be established at department and service-line discretion, to address the unique QI requirements of their practice

2. Increase human capital through QI training of rank-and-file providers
   a. Duke Health should invest in formal QI didactics for QI interested but inexperienced providers.
      i. Funded access to either self-directed or face-to-face QI didactics. Options could include institutional access subscriptions to third-party programs (e.g., IHI Open School, Six Sigma White/Yellow-Belt) or investment in expansion of existing introductory Duke-branded curricula (Pediatrics).
         1. For the purposes of this proposal, the most financially and temporally expedient option would be institutional access to third party training.
         2. OKR1: QI interested providers would need to demonstrate milestones for completion of baseline training, to include demonstration of a training certificate and participation in QI activities
      ii. For QI-experienced providers who have had basic education and are engaged in projects, provide funded access to sophisticated project-based QI training.
         1. Existing third-party programs (Six Sigma Green Belt) or Duke-branded programs (BiteSizeQI, Pediatrics) remain options, though at this level, cost streams favor institutional options.
         2. Given additional cost and complexity of this level of training, department QI leaders can help serve as gate keepers and referral sources for access.
3. **OKR2:** Participants in this phase of training would be required to demonstrate completion of their education program and demonstrate the ability to lead QI activities including Learning from Defects reviews, Root Cause Analyses, and QI projects.

4. **OKR3:** Providers completing this phase of training are expected to assist departmental QI leadership in coaching inexperienced providers.
Next Steps and Key Elements for Success

In order to implement these recommendations, the following next steps are needed:

1. QI leadership
   a. Determine the current level of health system and/or clinical department funding for QI leadership.
      i. If necessary, request increases to departmental FY20 or FY21 budgets in order to establish a baseline 0.1 FTE time support for QI leaders.
   b. Provide financial support for formal QI training for QI leadership if this has not already been done.
      i. One option: IHI Open School at $300 per person or as a part of a site license (see 2.a below).

2. QI didactic training of interested providers
   a. Investigate health system funding for QI didactics. Options include a site license for IHI Open School or investment in internal curricula.
   b. Through departmental QI leadership, publicize the opportunity for this training.

3. Advanced training for experienced providers
   a. Begin investigation of options for training of providers once didactic training has been completed (see 2.a.ii. under Recommendation).

The key elements for success of this proposal are:

1. Stakeholder buy-in
   a. Health system and departmental leadership must be willing to financially support QI leaders within each clinical unit/department as the foundation of a more unified QI educational system at Duke.
   b. Departments must be willing to provide a baseline standard of QI education for interested providers.
   c. As a positive externality, the PDC is already using our survey data to better understand their provider QI needs, and is considering components of our leadership recommendation for their quality programs.

2. Integration/complementarity with current Duke Quality System (Commit to Zero)
   a. QI projects proposed by leaders and providers trained under this proposal should dovetail with the Commit to Zero initiative, ideally being integrated into a similar “huddle” system.
   b. This QI educational proposal should not compete with the Commit to Zero initiative, but rather, complement it.
3. Visibility of training opportunity and ongoing projects
   a. This educational proposal will only be successful if broadly publicized in each clinical unit.
   b. It will also only succeed if projects started as a result of this initiative are visible and successes are celebrated.
Acknowledgements

- Jonathan Bae, MD, CPPS, Associate Chief Medical Officer for Patient Safety and Clinical Quality, Duke University Health System
- Jennifer Swanson, MD, FACEP, Associate Chief Medical Officer, Duke Urgent Care
- Janet Prvu Bettger, ScD, FAHA, Director of Health Policy and Implementation Science Research and Associate Professor, Department of Orthopaedic Surgery
- Deborah “Hutch” Allen, PhD, RN, CNS, FNP- BC, AOCNP, Director of Nursing Research and Evidence-Based Practice, Duke University Health System
- Christopher Mantyh, MD, Chief of Quality, Department of Surgery
- Heather McLean, MD, Vice Chair for Quality, Department of Pediatrics/ Co-Director for Quality & Safety, Duke Children’s
- Noppon Setji, MD, Medical Director, Hospital Medicine, Duke University Hospital
- Suchita Shah Sata, MD, Hospitalist, Duke University Hospital
- Aparna Kamath, MD, Medical Director of Quality and Patient Safety, Duke Regional Hospital, Associate Director of Mortality Review, DUHS
- Arif Kamal, MD, MBA, Associate Professor of Medicine, Division of Medical Oncology, Associate Professor of Business Administration and Population Health Sciences
- Robin Anderson, DUHS Performance Services
- Nneka Comfere, MD, Director, and Barbara Jordan, Administrator, Mayo Quality Academy
- Jordan Olsen, MD and Amanda Haynes, MD, Geisinger Health Department of Pathology
- Sandip Godambe, MD, PhD, MBA, FAAP, FACPE, Vice President, Clinical Integration and Quality, Children’s Hospital of the King’s Daughters
References

1. Makaray MA, Daniel M. Medical Error—the third leading cause of death in the US. *BMJ.* 2016;353:i2139.


Appendices

Appendix 1. Text of Qualtrics Survey

**DUHS Physician Quality Improvement**

Q1 Have you led a quality improvement (QI) project?
- Yes
- No

Q2 Have you participated in a QI project?
- Yes
- Maybe
- No

Q3 Did you feel equipped to lead the QI project(s)?
- Extremely knowledgeable
- Very knowledgeable
- Moderately knowledgeable
- Slightly knowledgeable
- Not knowledgeable at all

Q4 What is your comfort level leading a QI project?
- Extremely comfortable
- Somewhat comfortable
- Neither comfortable nor uncomfortable
- Somewhat uncomfortable
- Extremely uncomfortable

Q6 Are you familiar with resources to learn QI methodology?
- Yes
- No
Q5 How did you learn to work with QI projects?

1. BiteSize QI (Duke product, currently in close beta)
2. IHI (Institute for Healthcare Improvement)
3. MHA/MBA or equivalent degree
4. Six Sigma training
5. Other ___________________________________________
6. On-the-job

Q13 How comfortable are you in using these QI tools?

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Q12 How important do you see QI in your work?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q8 Are you interested in learning more about QI?

- Yes
- Maybe
- No
Q9 How much time are you willing to commit to learning QI over the next year? (in hours)

Q14 Are you interested in mentoring providers interested in learning QI?
- Yes
- Maybe
- No

Q10 How many QI projects do you plan/hope to participate over the next 2 years?

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