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Increasing Academic Output through Quality Improvement Educational Strategies

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ABSTRACT

Introduction: Quality improvement (QI) work is imperative to support health systems in providing safe and effective care. Conflicting demands, including the need to complete standard work recognized for academic promotion, can hinder meaningful participation in QI work. **Methods:** At our quaternary pediatric hospital, we completed a series of plan-do-study-act cycles around developing QI educational opportunities. Our outcome measure was the number of publications containing the phrase "Quality Improvement" with at least 1 author from our institution. Our process measures included the cumulative number of employees trained in QI methods or writing. **Results:** The number of publications increased significantly from an average of 3.4 to 12.5 per quarter. The total number of employees trained in QI methods and QI writing increased throughout the study period. **Conclusions:** A series of interventions designed to increase the QI fluency of our workforce were associated with an increase in the number of QI publications at our institution. *(Pediatr Qual Saf 2025;10:e804; doi: 10.1097/pq9.0000000000000804; Published online March 13, 2025.)*

INTRODUCTION

The need for robust quality improvement (QI) in healthcare is well established,[1] but best practices for ensuring that the workforce is well-equipped to carry out QI projects are unclear.[2–4] There are many reports in the literature describing educational strategies to provide QI training to the healthcare workforce.[5–7] Using a project-based curriculum is a popular tool for multidisciplinary teaching and has been described at multiple hospitals.[8–11] However, given the background diversity and varied employee job descriptions across an enterprise, effective educational strategies require a multipronged approach.[12]

Additionally, although education is important, it is not the only ingredient necessary for successful improvement work. Lack of time to complete this work is a frequently cited barrier.[13–15] As one example, physicians at academic centers have pressure to publish to support their academic promotion. QI work is increasingly recognized as scholarly activity,[2,16] with clinicians pursuing recognition of this work as part of the academic promotion process.[17–19] Therefore, equipping clinicians with the tools to participate in and publish QI work meaningfully could, for some, reduce conflicting burdens on their time and open opportunities for them to participate in and disseminate important changes at the local, regional, or even national level while continuing to pursue academic promotion.

At our stand-alone quaternary pediatric hospital, we have made an institutional commitment to high-reliability organization principles.[20] As an underlying component of that work, we prioritized equipping our workforce with tools to participate in methodologically robust QI work. We hypothesized that training would subsequently result in more academically rigorous QI projects with related publications. Our specific, measureable, attainable, relevant, time bound aim was to double the rate of publications from our institution containing the phrase "Quality Improvement" from our baseline of 3.4 publications per quarter to at least seven publications per quarter within two years.

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METHODS

Context

We completed this work at a quaternary academic pediatric hospital in the midwestern United States with approximately 350 beds and 7,500 employees. There are 35 graduate medical education programs primarily based at the hospital, and visiting trainees from multiple training programs at the affiliated adult hospital rotate through our center to gain pediatric experience. Our hospital has a dedicated Center for Quality and Safety that employs 22 improvement consultants and provides a salary offset for 18 physician core faculty members. As of September 2023, our Center for Quality and Safety has a dedicated Director of Improvement Science (H.S.) who oversees all improvement training for the organization. Figure 1 shows a key driver diagram depicting barriers to QI publication in our institution.

Interventions

As our first intervention, in January of 2017, we launched a project-based curriculum called Improvement Scholars. The structure of this course is similar to successful programs other institutions have reported.[10,21,22] It takes place over 6 months and pairs multidisciplinary individuals with experienced mentors. Sessions include facilitated table discussions addressing progress and barriers to individual projects, didactic instruction on QI, and hands-on activities to apply new concepts. The course is open to all organizational roles, including clinical and nonclinical, frontline team members, leaders, and executive leadership. Those who attend the course can opt-in to receive a license for QI Macros for Excel (KnowWare International, Inc., Denver, Colo.) to support the creation of Statistical Process Control (SPC) charts. Participants are expected to formally present their work at the summation of the course and submit a poster summarizing their work to our hospital's National Healthcare Quality Week poster session. Participants can receive Maintenance of Certification part 4 credit, Certified Pediatric Nurse recertification credit, and/or points toward internal promotion if applicable to their role.

We collected participant feedback for all educational sessions. Based on this feedback, we updated the Improvement Scholars curriculum in January 2018, and a dedicated program coordinator was identified to support the course. Given the widespread interest in participation, we added a second cohort each year starting in June 2022, and a variation called "Scholars for Teams" was added in March 2024, which allowed entire QI teams to attend together rather than a single team representative attending the didactic sessions alone.

We recognized that resident physicians present a unique challenge to QI training, given their finite tenure at a training program and competing clinical obligations. To operate within these constraints, we worked with residency leadership to create a mentored curriculum that fits their Accreditation Council For Graduate Medical Education requirements[23] and aligns with the organization's needs. This curriculum was started in July 2018 as mentored QI work primarily led by the second-year pediatric residents within their continuity clinic. Didactic topics were similar to Improvement Scholars but pared down to the most practical applications. Sessions were taught at the start of the residents' continuity clinics and during an annual retreat by curriculum faculty. Each resident clinic worked collaboratively
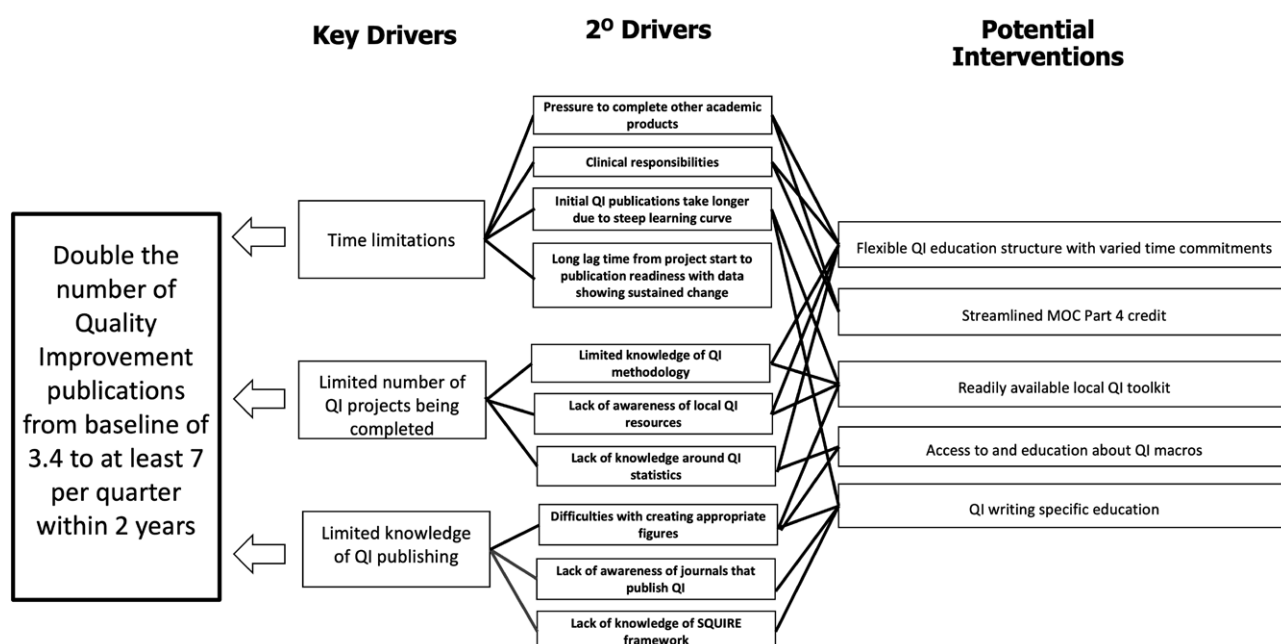

Fig. 1. Key driver diagram. MOC, maintenance of certification.

on the improvement initiative over a 10-month timeline. Similar to the expectation for Improvement Scholars, residents must formally present their outcomes and submit a poster to National Healthcare Quality Week. They are granted Maintenance of Certification part 4 credit if they complete their project.

In July 2022, we adapted the residency QI program based on participant feedback to allow the second-year residents to choose the clinical division (eg, critical care, neonatology, hospital-based medicine) where they wanted to focus their QI work and extend the timeline to 15 months. We moved teaching sessions to resident noon conferences, and mentorship was provided by faculty with expertise in quality and safety from the division where the work takes place.

Although the Institute for Healthcare Improvement's Model for Improvement is a popular structure for QI projects in healthcare settings,[24] other methodologies provide valuable tools to address specific concerns. To support education and ensure that employees had streamlined access to an evidence-based resource, we created a Lurie Children's improvement framework in July 2019. This structure incorporated the Model for Improvement, Lean, and Six Sigma elements. It is freely available on our hospital's intranet for any employee, regardless of whether they participated in a formal QI education program.

Acknowledging that academic reporting of QI work per the Standards for Quality Improvement Reporting Excellence (SQUIRE) 2.0 guidelines differs from other forms of academic writing and that there is great value in the dissemination of lessons learned from QI projects, our institution developed a course called "QI Writers" to equip attendees with skills to publish QI findings effectively. Development of this course began in September 2018 when the institution hired SQUIRE 2.0 authors to train a small cohort of employees who would then go on to teach others within our institution (a "train the trainer" model). The course started in October 2019 and spans seven sessions that cover journal selection, writing etiquette, the fundamentals of QI writing following the SQUIRE guidelines,[25] each section of the article (Introduction, Methods, Results, and Discussion), peer review of manuscripts, submission process, and responding to reviewers. We select participants from previous Improvement Scholar cohorts. Each session is led by a faculty member with experience publishing QI findings, many of whom were taught during the initial "train the trainer" sessions. Participants are expected to complete a QI article by the course's end and be ready for journal submission.

We recognized that the project-based Improvement Scholars course required a significant time commitment that was not feasible for all employees. This prompted the design and rollout of two introductory workshop structures in February of 2021: a 2-hour introduction to improvement science and a 6-hour workshop series of three 2-hour sessions focused on comprehension of QI concepts without a practical application component. We evaluated workshops using a plus-delta survey at the end of each session.[26]

Study Outcomes
The outcome measure of interest for this work was the number of publications indexed in PubMed that contained the exact phrase "Quality Improvement," with at least one author who listed Lurie Children's as an academic affiliation. Although this measure would not capture all completed QI projects, it could reflect both trends in the number of completed projects as well as the workforce's mastery of QI principles, as published projects would have been subject to peer review.

Our process measure was the cumulative number of employees, faculty, and trainees who had undergone training in QI methods through any of the formal QI educational offerings.

Analysis
The outcome measure of interest was evaluated using a C SPC chart, and the center line shift was determined using standard rules for special cause variation. The number of employees trained was tracked on a run chart. Analyses were performed in JMP Pro (JMP Pro version 16.0.0, SAS Institute, Inc., Cary, N.C.).

Ethical Considerations
Our local institutional review board evaluated this work and determined that a full review was not required.

RESULTS
The number of monthly QI publications demonstrated a centerline shift in Quarter 2 of 2020 from an average of 3.4–12.5 publications per quarter. The annotated SPC chart is shown in Figure 2. Run charts of the total number of employees trained in QI methods (Fig. 3) and QI publication (Fig. 4) increased steadily throughout the study period. Nine manuscripts have been published to date by those who participated in QI writers, representing 4.3% of the 207 articles published after the implementation of the course. One hundred five of the 200 (52.5%) articles published after our centerline shift included at least 1 author who had completed a formal QI educational offering at our hospital.

DISCUSSION
Through widespread and varied QI educational offerings, we have provided QI education to more than 10% of our hospital's workforce and more than tripled the number of QI publications from our institution. Although the ideal "dose" of QI training to create a culture shift in an institution is unknown,[27] our educational programming has significantly impacted academic productivity within the
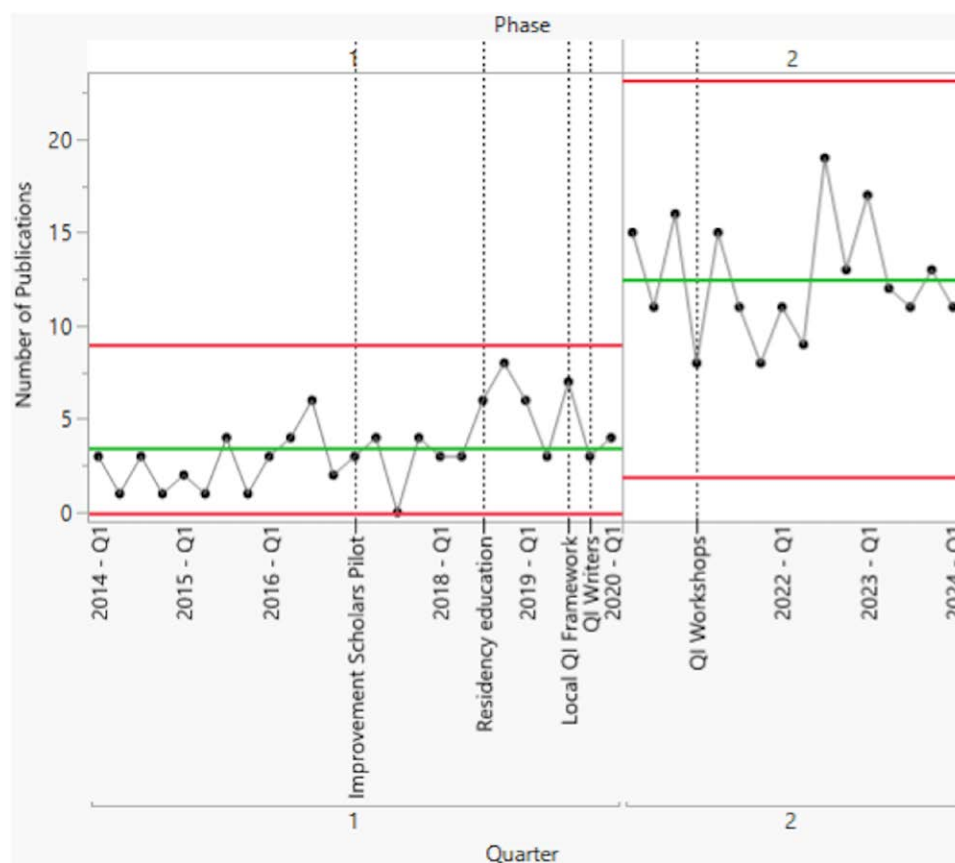
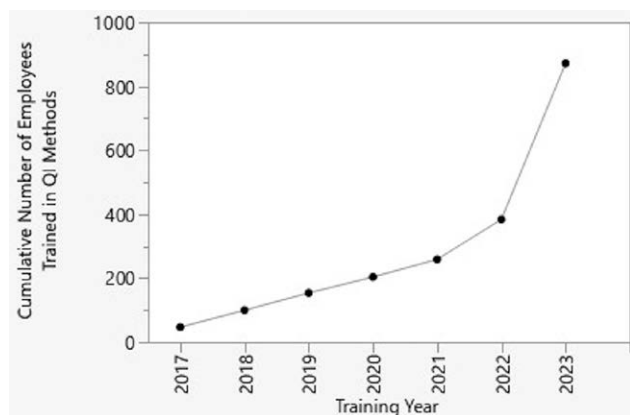**Fig. 2.** C chart of number of QI publications per quarter.

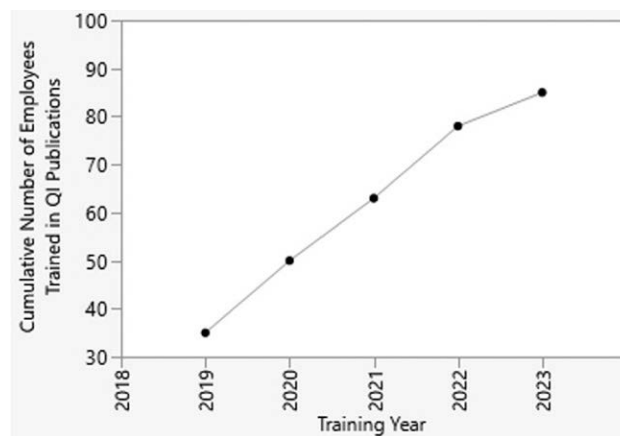**Fig. 3.** Cumulative number of employees trained in QI methods.

Fig. 4. Cumulative number of employees trained in QI publications.

QI space, which may serve as a proxy for the completion of successful improvement efforts and provides authors with a tangible product that can be promulgated during academic promotion.

Implementing a formal course in QI article preparation can increase QI writing competency and publications.[28] In our setting, including the QI writers course was likely a component of our sustained success. However, only a small fraction of the papers published after the center line shift were authored by those who went through QI writers. Given the long time frame over which QI projects are conceptualized, iterated, drafted

into an article, and carried through the peer-review process, the center line shift seen shortly after the institution of this program was more likely driven by our earlier training interventions. This presumption is supported by the many previous publications that show an increase in QI productivity after completion of local QI education programs.[9–11]

This growing recognition of QI efforts as valuable contributions to academic medicine and the increasing number of journals that have committed to publishing

QI work[29–31] were likely essential components of our success. Historically, it is well-established that faculty on "clinician-educator" tracks are at lower academic tiers than their peers on traditional research tracks.[32,33] Supporting and encouraging QI training that teaches rigorous QI methodology, as outlined here, is associated with increased publications, addressing a historical barrier to QI participation for clinician-educators.

This project has multiple limitations. We could not collect data on the total number of QI projects completed at our institution during the study period, and we cannot definitively prove that the increase in publications resulted from our interventions. However, after our centerline shift, most publications had an author who completed one of our QI educational offerings. It is important to recognize that the time from project initiation to article publication is long, especially for QI articles, which show that improvement was sustained over time. Therefore, we expected that the effects of training programs on publication rates would show a significant delay. We did not collect data on project timelines and dates of initial article submission for all publications, so the impact of earlier interventions on our centerline shift is difficult to evaluate, and this question is further confounded by the evolution of our interventions over time.

This work was also impacted by leadership changes at our hospital in 2020. The new leadership prioritized an institutional culture shift to High-Reliability Organization principles, and this clear support of a culture of safety by leadership likely had a positive impact on both the number of employees choosing to participate in QI education and employee perception that the publication of QI work would be valued by leadership. Although this may limit generalizability to other institutions without similar sponsorship, we hope it highlights the benefits of promoting quality and safety for leaders at such sites.

The COVID-19 pandemic occurred during our study period, and it is difficult to definitively understand the impact of the large-scale disruptions on these results. The influences of care disruptions and lockdowns on publication rates during the pandemic are complex,[34] and although the pandemic created many new opportunities for improvement that could be addressed through QI methodology, new barriers developed that likely interrupted work to address preexisting concerns.

CONCLUSIONS

By ensuring that our employees have the opportunity for QI education in a format that best fits their role and schedule, we both emphasize that high-quality and safe care is an institutional priority and equip our workforce to partner in this goal. We observed a significant increase in QI publications following the development of these resources. Future work should evaluate whether this finding is reproducible in other settings, the specific aspects of QI training that have the most significant impact on publication success, and the impact of other specialized QI training, such as the opportunity to work through the Lean belt structure.

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