

# Utilizing Quality Improvement Methods to Improve Patient Care Outcomes in a Pediatric Residency Program

RALITSA B. AKINS, MD, PhD  
GILBERT A. HANDAL, MD

## Abstract

**Objective** Although there is an expectation for outcomes-oriented training in residency programs, the reality is that few guidelines and examples exist as to how to provide this type of education and training. We aimed to improve patient care outcomes in our pediatric residency program by using quality improvement (QI) methods, tools, and approaches.

**Methods** A series of QI projects were implemented over a 3-year period in a pediatric residency program to improve patient care outcomes and teach the residents how to use QI methods, tools, and approaches. Residents experienced practice-based learning and systems-based assessment through group projects and review of their own patient outcomes. Resident QI experiences were reviewed quarterly by the program director and were a mandatory part of resident training portfolios.

**Results** Using QI methodology, we were able to improve management of children with obesity, to achieve high compliance with the national patient safety goals, improve the pediatric hotline service, and implement better patient flow in resident continuity clinic.

**Conclusion** Based on our experiences, we conclude that to successfully implement QI projects in residency programs, QI techniques must be formally taught, the opportunities for resident participation must be multiple and diverse, and QI outcomes should be incorporated in resident training and assessment so that they experience the benefits of the QI intervention. The lessons learned from our experiences, as well as the projects we describe, can be easily deployed and implemented in other residency programs.

## Introduction

The Accreditation Council for Graduate Medical Education requirements should not be the only reason for residency programs to pay close attention to teaching quality improvement (QI) to residents. Regulatory burdens, such as the Joint Commission requirements, increased expectations for data-driven hospital management, and leadership approaches relying on operations analysis augment the need for residents to be familiar with and proficient in the knowledge base of performance and QI.<sup>1</sup> Although there is an expectation for outcomes-oriented training in residency programs, the reality is that few guidelines and examples exist as to how to provide this type of education and training.<sup>2,3</sup>

**Ralitsa B. Akins, MD, PhD**, is Associate Director of the Pediatric Residency Program and Associate Director of the Clinical Skills and Clinical Simulation Center at the Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center; and **Gilbert A. Handal, MD**, is Professor at the Department of Pediatrics, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center.

Corresponding author: Ralitsa B. Akins, MD, PhD, Clinical Skills and Clinical Simulation Center, 5001 El Paso Drive, El Paso, TX 79905, 915.783.6221, ralitsa.akins@ttuhsc.edu

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Residents are usually taught about and expected to follow practice guidelines, which is in the tradition of quality assurance and yet far from the proactive nature of QI.<sup>3</sup>

Residency programs have the unique opportunity to significantly contribute to improving patient safety and health care outcomes by training residents in the methodology of patient safety and QI.<sup>4</sup> However, the development and implementation of a QI curriculum in residency training might be a pricey undertaking, requiring significant resource support and external or internal funding.<sup>4</sup> Locating funding, ensuring faculty and resident time commitment, having faculty on staff with QI training and experience, as well as developing well-functioning faculty-resident QI teams and choosing appropriate measures to document the effects of QI projects, have been identified as the major challenges in teaching and implementing QI in residency programs.<sup>2</sup>

There is a paucity of published examples of teaching QI to residents. In one internal medicine residency program, implementing a curriculum in QI improved residents' perceptions of workload, improved rotation education ratings, and strengthened the culture of safety.<sup>3</sup> Incorporating a longitudinal QI curriculum within 2 block rotations in the second year of training in another internal medicine residency program led to an improved resident continuity clinic.<sup>2</sup> A continuous QI curriculum used the

Plan-Do-Study-Act (PDSA) approach to help surgery residents implement improvements to their training.<sup>5</sup> A radiology residency program implemented a block-rotation elective to expose its residents to the spectrum of quality-related problems.<sup>6</sup>

Although the published experiences with QI curricula appear to be limited, it has been noted that residents are generally eager to introduce positive change in their own program.<sup>5,6</sup> As a means of teaching QI to residents, it has been recommended to require residents to construct a flow map of a process or operation and design a change intervention to eliminate process waste.<sup>1</sup> The existing literature supports the notion that for a QI curriculum to succeed, it has to be related to the institutions' goals for improvement, and any change and success should be measured, so the residents feel they have a real contribution to the improvement in patient care outcomes.<sup>4</sup>

## Methods

### Description of QI Project Implementation

We aimed to improve patient care outcomes in our pediatric residency program by using QI methods, tools, and approaches. Pediatric residents are taught about QI methods, and QI projects are a continuous part of their residency training. Residents experience practice-based learning and systems-based assessment through group projects and review of their own patient outcomes.

### Participants and Setting

Our program is a 45-resident pediatric training program located in the US-Mexico border region, in El Paso, Texas. The residents in our program have 2 didactic sessions on QI methodology every academic year to learn about QI approaches and tools (such as run chart, histogram, control chart, PDSA cycle). These didactics are led by faculty trained in QI methodology. All residents complete a mandatory QI review of their own patient panels annually, measuring the diagnosis-related group distribution of their patients in individual rotations and how their patient numbers and diversity correspond with the requirements and recommendations specified by the Residency Review Committee for Pediatrics, patient admission/discharge distribution over time, and most frequent reasons for patient readmission. Also annually, each resident participates in QI "group" projects led by faculty experienced in QI approaches. The group projects are selected based on identified QI needs within the hospital pediatric service line. Residents are given multiple opportunities to take leadership roles, participate in the development of project review forms, participate in patient care QI teams and committees, and conduct chart reviews to assess the clinical performance of their peers. Every resident completes at least 1 individual QI activity and participates

in at least 1 group QI project annually. Resident QI experiences are reviewed quarterly by the program director and are a mandatory part of resident training portfolios.

### Resident QI Projects: May 2006–May 2009

Seven concurrent group QI projects were carried out in a pediatric residency program from 2006 to 2009. Through utilization of QI methodology, residents acquired hands-on experience in implementing practice-based learning and improvement as based on their own patient panels, and they have the opportunity to have an impact on their residency training by introducing meaningful changes in the pediatric service line. They can see the results of the QI approaches by the immediate implementation of PDSA cycles into patient care.

## Results

Using QI methodology, we were able to improve management of children with obesity to achieve high compliance with the national patient safety goals, improve the pediatric hotline service, and implement better patient flow in resident continuity clinic. We report the results obtained during a 3-year period between May 2006 and May 2009.

### QI Project No. 1: Peer Chart Review to Improve Resident Compliance With Guidelines for Management of Pediatric Patients With Obesity

This project involves resident peer review of patient charts with a checklist to improve the compliance with guidelines established by the Texas Pediatric Society for the care of pediatric patients with obesity. Annual workshops on management of pediatric patients with obesity serve as continued interventions to educate the residents on the issue and augment the effects of the peer chart review. Resident teams consisting of 2 residents per team conduct review of randomly selected charts of fellow residents under the supervision of a faculty member.

Chart reviews are completed quarterly, and on average, 5 charts per resident are reviewed. The review is completed using a checklist, which is an Institutional Review Board–approved data collection tool.

Each resident receives written feedback on his or her performance and copies of the checklists of his or her reviewed charts. Resident compliance with the guidelines improved from 19% to 77% during the observation period.

### QI Project No. 2: Quality of Resident Performance in Managing a 24/7 Pediatric Hotline Service

Pediatric residents manage a 24/7 pediatric hotline telephone service as a part of their ambulatory experience. Residents are taught about telephone triage protocols and are supplied with personal copies of the guideline handbook. Resident training for this service includes scenario reviews and role plays. All telephone calls are

recorded, and pediatric faculty review random samples of calls each month using a checklist for documentation of service quality. Each resident is given one-on-one feedback from the faculty on their performance and reviews together with the faculty the problem areas of the call recordings.

On average, 3 to 5 telephone calls per resident per month of hotline service are reviewed. Data showed that 95% of the reviewed calls adhered to the protocols. We implemented QI techniques in selected areas that needed improvement, such as use of medical jargon, failure to introduce self to patient, and tendency to make a diagnosis over the phone rather than orient, reassure parents, and triage patient.

### **QI Project No. 3: Improving Resident Communication Skills and Professionalism by Ongoing Feedback From a Patient Care Survey**

Residents are taught about the content of the survey form and the expectations for resident performance. The 9 survey questions inquire about resident professionalism and communication skills. The pediatric nurses assist in distributing and collecting the survey forms to ensure no direct or indirect influence from the resident on the patients. Written feedback about the outcomes is given to each resident, and a nonpunitive environment is maintained by the nonjudgmental tone of the letters from the program director to each resident. Residents who have exhibited deficiencies are counseled by the program director or the associate director and are monitored by the chief resident. Furthermore, the results from the 2 surveys during each academic year are a part of the resident annual end-of-year summative evaluation. Usually, improved resident behavior is noted by the time of the next survey.

The patient surveys are completed twice per year, once in spring and once in autumn. A total of 7 surveys were completed between 2006 and 2009. On average, 16 response cards were returned per resident for each survey period. The average patient satisfaction rate is currently 98%. An area identified for further improvement is better explanation of multiple diagnoses to patients and their families.

### **QI Project No. 4: Improving Continuity Clinic Resident Experience**

For this resident-driven project, the residents formed a Quality Improvement Committee, which was supported by faculty participation and by representation from the program and departmental leadership. The committee used QI tools to identify areas for improvement and suggested new patient service protocols in the continuity clinic, as well as a new guideline on resident patient recruitment and retention. The new guideline specified the creation of steady resident-attending physician teams and eligibility of patients for recruitment by residents, suggested ways to work with different insurance plans and social workers for

underinsured or uninsured patients, and suggested best practices in follow-up with patients after sick visits.

After open departmental discussion of the changes suggested by the QI committee, the departmental and residency program leadership implemented the changes recommended by the residents. Each resident now manages a designated patient panel balanced for complexity of patients and variety of diagnoses. Each resident continuity clinic team works with an assigned faculty member for the duration of the academic year and maintains the same continuity clinic day over time, which ensures continuity of patient care as well as faculty oversight. Data showed that most patients on resident panels were seen multiple times during each academic year, as evidence of improved continuity of patient care, and faculty were in an excellent position to provide resident assessment during a long-term contact period.

### **QI Project No. 5: Improving Patient Care in Pediatric Service Line by Systems-Based Review and Utilization of QI Tools—Patient Flowcharts, Fishbone Diagrams, and PDSA Cycles**

In the beginning of each new academic year, after an annual QI refresher training, the residents are assigned into 3 teams, with each team including residents from all 3 training levels (postgraduate years 1, 2, and 3). Each team is tasked to identify areas for improvement in the pediatric service line with the help of QI tools. Residents are instructed to use systems approach and as many QI tools as are applicable to their project.

The areas for improvement identified by each team and the suggested improvement changes are presented to the residency program leadership, further discussed at resident and faculty meetings and, if considered beneficial, implemented with the help of PDSA cycles. Such resident projects led to improved guidelines for patient admission to the ward from the emergency room, and to the intensive care nursery and well-baby nursery from the delivery room.

### **QI Project No. 6: Practice-Based Learning by QI Review of Residents' Own Patient Panel per Diagnosis-Related Group Using Histograms and Pareto Charts**

All residents complete QI review of their own patient panel once every academic year. Faculty experienced in QI methodology supervise the QI resident reviews. These annual reviews of resident patient panels per diagnosis-related group are required and assessed; the results and supporting data are included in resident portfolios and are a part of resident evaluations with the program director and faculty mentor.

### **QI Project No. 7: Improving Compliance With National Patient Safety Goals**

An Institutional Review Board–approved study is conducted to collect data on resident compliance with patient safety goals. For this project, under faculty supervision residents

TABLE 1	ASSESSMENT OF EFFECTIVENESS OF QUALITY IMPROVEMENT (QI) ACTIVITIES USING A 5-POINT LIKERT SCALE <sup>a</sup>		
		Academic Year	
QI Activity Assessment	2006–2007	2007–2008	2008–2009
Achievement of educational objectives	4.00	4.25	4.27
Satisfaction with quality of activity	3.70	4.13	4.18
Relevance (improved knowledge and skills)	3.30	4.00	4.14
Activity changed the way I will practice	3.80	3.75	4.22
Average	3.70	4.03	4.20

<sup>a</sup> For the scale, 1 is “poor” and 5 is “excellent.”

complete observations of peers in various clinical settings within the pediatric service line. A research staff member supports data collection and analysis. For the period December 2007–December 2008, 2 111 observations were completed, with an average compliance of 70% with the 2008 patient safety goals. The data collection and observations continue in 2009; for the first 4 months of 2009, 584 observations were completed, showing 98% average resident compliance with the patient safety.

Resident satisfaction and perceptions about their QI training and project participation were evaluated by annual activities survey. The results during the 3-year period (2006–2009) are presented in TABLE 1.

In the “comments” portion of the survey tool, the residents often noted that the QI activities were

“interesting” and “challenging,” and that this was “new, helpful knowledge.” When asked what they will most likely continue applying in their practice, the residents related to the evidence-based nature of the QI activities, the experience in translation of QI outcomes to patient care, and the process of identifying and improving problems.

TABLE 2 presents all implemented projects and their outcomes at a glance.

### Discussion

#### Limitations

Common barriers in implementing QI projects are difficulties in obtaining resident and faculty commitment, restrictions of resident duty hours, rotation work overload,

TABLE 2	RESIDENT QUALITY IMPROVEMENT (QI) PROJECTS IMPLEMENTED DURING THE PERIOD 2006–2009 AND THEIR OUTCOMES	
	Project	Outcome
1. Peer chart review to improve resident compliance with guidelines for management of pediatric patients with obesity	Resident compliance with the guidelines improved from 19% to 77%	
2. Quality of resident performance in managing a 24/7 pediatric hotline service	95% of reviewed calls adhere to protocols	
3. Improving resident communication skills and professionalism by an ongoing feedback from patient care survey	Average patient satisfaction rate is 98%	
4. Improving continuity clinic resident experience	Implemented changes in teams and patient recruitment and retention approach resulted in steady faculty-resident teams, diversified patient panels, and improved patient retention	
5. Improving patient care in pediatric service line by systems-based review and utilization of QI tools	Implementation of resident projects by PDSA cycle utilization led to improved guidelines for patient admission to 3 units within the pediatric service line	
6. Practice-based learning by QI Review of resident own patient panel	100% of residents complete QI review of their own patient panels to monitor their own quality of patient care	
7. Improving compliance with national patient safety goals	Overall compliance with the national patient safety goals improved from 70% to 98%	

Abbreviation: PDSA, Plan-Do-Study-Act.

and securing funding. The 7 QI projects we discuss did not require external funding. Resident project time was synchronized with the appropriate rotations on their schedule. For example, residents in outpatient clinic rotations would be involved in peer chart review as a part of their duty hours in clinic, and residents on inpatient rotations would be recruited for the observations related to compliance with the national patient safety goals. The 3 chief residents in our residency program were recruited as project participants and peer leaders, and their involvement was a part of their administrative duty time. In addition, all faculty in our department have 10% protected time for educational, scientific, and administrative purposes. Faculty members involved in the QI projects used part of their protected time for resident project oversight, hotline calls review with residents, and QI meetings. The QI project oversight and implementation were accomplished by the help of faculty with prior training in QI methodology. Implemented improvements were approved at resident and faculty meetings, so they became a new *modus operandi* within the department, and no additional time or monetary commitment was required. The expenses we encountered were mainly related to office supplies and operations (eg, survey copying), which is a small monetary amount. We believe that our resource-sensitive model could be applicable to other educational environments across a variety of training programs.

### Lessons Learned

Our 3-year experience with implementation of diverse resident QI projects in 1 pediatric residency program suggests that teaching pediatric residents about QI methodology and implementing individual and group QI projects improve resident training experiences. Residents learn how to implement continuous QI for the patient care they provide to achieve better outcomes as well as process improvements.

Immediate implementation of changes in work flow and patient care is a powerful tool to demonstrate the importance of continued improvement of physicians' practices. Residents were empowered by the opportunities for assuming leadership roles and making a real impact in the pediatric service line.

The QI projects we discuss in this paper can be easily deployed to other residency programs. We suggest that the successful implementation of QI projects in residency programs depends on the following important conditions:

1. QI tools and techniques should be formally and repeatedly taught throughout residency training.
2. Opportunities for resident participation in QI projects should be diverse and plentiful.
3. QI project outcomes should be incorporated in the formal resident assessment in a nonpunitive manner to encourage continued improvement.
4. Appropriate QI-related changes suggested by residents should be implemented when feasible and appropriate to bring meaning to resident QI project effort investment.

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