Pediatric Residents' Reports of Quality Improvement Training and Experiences: Time for an Improvement Cycle?

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Abstract

Objective: Explore pediatric residents' experiences and confidence with quality improvement (QI).

Methods: Pediatric residents were surveyed nationally in July 2017 about their demographic characteristics, experiences with QI projects over the previous year, and confidence with QI skills. Descriptive statistics and distributions of each individual demographic and QI variable, as well as training program size, were calculated for each variable. QI question responses were compared to demographic characteristics of the respondents, and chi-square statistics were calculated.

Results: In total, 11,137 out of 11,304 (98.5%) residents completed the survey. Half of residents had participated in a QI project over the previous academic year, and 78% of third-year residents reported having done so. However, few of these residents self-reported moderate or high confidence in their ability to design a QI project (28.9%), use QI tools (23.1%), use QI methodologies (24.0%), or use data to track changes in their personal practice over time (28.9%). Residents in small or medium programs were statistically more likely to rate their confidence in certain QI abilities higher than those in large programs.

Conclusions: Although recent pediatric residents appear to be participating in QI activities during training, their self-perception of their QI skills development remains low. Residents in small and medium programs provide more favorable reports.

Keywords: graduate medical education; quality improvement

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What's New

Quality improvement (QI) training is essential to preparing residents to provide optimal patient care. This study, which includes most pediatric residents during 1 academic year, demonstrates that residents are participating in QI activities but their self-perception of QI skills is low.

Quality improvement (QI) training and experiences are essential components of pediatric residency to prepare residents to provide optimal care to patients both during training and beyond. Some have even argued that QI should be an integral part of all clinical encounters during training.[1] Accordingly, the Accreditation Council on Graduate Medical Education (ACGME) requires residents to receive training and experiences in QI processes, participate in QI activities, and be given data on quality metrics during training.[2] However, despite these requirements, in site visits with institutions they accredit the ACGME has found that few residents have a functional working knowledge of QI and most are not active participants in institutional QI efforts.[3−5] Even worse, this dial has moved little, if at all, between when the ACGME first reported outcomes of these site visits in 2016 and their most recent report in 2018.[6] One theme that persisted across these years may summarize the problem well: "A limited number of clinical learning environments ... ensure that all [faculty and program directors] have the knowledge, skills, and attitudes necessary for ... training residents and fellows in patient safety and quality improvement."[6] In a multi-specialty study that excluded pediatrics and was conducted at a single institution, Butler and colleagues[7] noted similar findings, as well as possible explanations for why residents are not active participants in QI work. These include residents failing to adequately understand the vision of QI, not being valued or valuable in QI efforts, and having difficulty balancing QI responsibilities with other responsibilities they hold.

Although evidence regarding the quality of resident QI training and experiences is concerning, data from the ACGME include all specialties combined, whereas the

work of Butler et al[7] did not include pediatrics in its scope. Thus, these trends may or may not hold true in pediatrics, and little is known about the QI experiences of pediatric residents during training. The purpose of this study was to explore pediatric residents' experiences and confidence with QI.

METHODS

The American Board of Pediatrics (ABP) conducted a workforce census survey of all pediatric resident physicians, including categorical, combined training program, and chief residents, taking the General Pediatrics In-Training Examination (ITE) in July 2017 (ie, the beginning of the academic year). The survey was given following administration of the ITE.

Three demographic variables were included in the dataset provided by the ABP: gender, residency year, and whether the resident was an American medical graduate (AMG) or international medical graduate (IMG). Residency program size was estimated based on the number of survey respondents from each program. Programs were classified into 3 sizes: small (1 to 30 respondents), medium (31 to 60 respondents), and large (more than 60 respondents).

Two QI questions were the focus of the analyses. These questions were modifications of survey questions employed with pediatricians re-enrolling in Maintenance of Certification.[8] The first was multiple choice: "Over the past academic year (July to June), have you participated in any quality improvement (QI) projects?" The second was a 4-part question asking respondents to rate their confidence in the following QI skills: 1) ability to design a QI project, 2) use of QI tools, 3) use of QI methodologies, and 4) use of data to track changes in the resident's personal practice over time. Scale options included no confidence, low confidence, some confidence, moderate confidence, and high confidence. For purposes of analyses, the responses of no, low, and some confidence were combined, and moderate and high confidence responses were combined as a second group.

The University of Michigan Child Health Evaluation and Research Center received an aggregate, de-identified dataset from the ABP for analytic purposes. Data were analyzed using SAS 9.4 software (SAS Institute Inc, Cary, NC). Descriptive statistics and distributions of each individual demographic and QI variable were calculated for each variable. We compared QI question responses to demographic characteristics of the respondents and program size and calculated chi-square statistics. P values $< .05$ were considered significant. This study was deemed exempt by the Committee on the Protection of Human Subjects at the University of Michigan.

RESULTS

A total of 11,304 residents took the 2017 ITE, and 11,137 completed the survey, for a response rate of 98.5%. Based on ABP Workforce Data, 11,760 residents were eligible to take the ITE in July 2017, demonstrating that the survey captured the majority of eligible residents.[9] Demographic analysis demonstrated that respondents were predominantly female (70.4%) and AMGs (82.6%), and they were roughly equally distributed across year of training (Table 1). A majority (53.2%) were in small residency programs.

Table 1. Demographics of Sample (N = 11,137)

Demographic	n	%
Gender		
Female	7845	70.4
Male	3292	29.6
Medical education		
American medical graduate	9201	82.6
International medical graduate	1936	17.4
Residency year		
1	3624	32.5
2	3562	32.0
3	3347	30.0
4	565	5.1
5	39	0.4
Program size		
Small	5921	53.2
Medium	3762	33.8
Large	1454	13.0

Overall, half of residents had participated in a QI project over the past academic year, and 78% of third-year residents reported having done so (Table 2). However, as shown in Table 3, few self-reported moderate or high confidence in their ability to design a QI project (28.9%), use QI tools (23.1%), use QI methodologies (24.0%), or use data to track changes in their personal practice over time (28.9%).

When examining confidence in the use of QI skills stratified by the demographic variables, we found only small differences between groups (Figure). Generally, men were more likely than women to report confidence in all of the QI components; however, fewer than one-third were at least moderately confident in any one arena.

Table 2. Self-Reported Participation in Any Quality Improvement Project in Previous Year: Those Responding Yes (N = 5503)

Demographic	n	% Responding Yes	*P* Value
Gender			.0001
Female	3786	48.4	
Male	1717	52.3	
Medical education			.04
American medical graduate	4505	49.1	
International medical graduate	998	51.7	
Residency year			<.0001
1	540	14.9	
2	1855	52.3	
3	2622	78.5	
4	458	81.2	
5	28	71.8	
Program size			<.0001
Small	706	48.8	
Medium	1982	52.8	
Large	2815	47.7	

Table 3. Self-Reported Confidence in Quality Improvement Skills: Those Responding Moderate or High Confidence (N = 11,107)

	Gender			Medical Education			Residency Year						Program Size			
Survey Item	Male% (n)	Female% (n)	*P* Value	AMG% (n)	IMG% (n)	*P* Value	1, % (n)	2, % (n)	3, % (n)	4, % (n)	5, % (n)	*P* Value	Small% (n)	Medium% (n)	Large% (n)	*P* Value
Design QI project	31.4 (1029)	27.9 (2187)	.0003	27.7 (2544)	34.8 (672)	<.0001	16.0 (577)	26.6 (944)	42.0 (1401)	48.1 (271)	59.0 (23)	<.0001	31.0 (448)	30.9 (1161)	27.2 (1607)	<.0001
Use QI tools	26.1 (857)	21.8 (1709)	<.0001	21.6 (1981)	30.3 (585)	<.0001	12.4 (450)	22.0 (779)	33.2 (1109)	36.7 (207)	53.9 (21)	<.0001	25.2 (365)	25.3 (949)	21.2 (1252)	<.0001
Use QI methodologies	27.8 (912)	22.4 (1752)	<.0001	23.0 (2106)	28.9 (558)	<.0001	12.1 (439)	22.6 (802)	34.8 (1161)	42.6 (240)	56.4 (22)	<.0001	25.9 (374)	25.3 (949)	22.7 (1341)	.003
Use data to track changes in personal practice	33.6 (1100)	26.9 (2108)	<.0001	27.5 (2526)	35.3 (682)	<.0001	18.0 (651)	27.3 (968)	39.7 (1324)	43.3 (244)	53.9 (21)	<.0001	32.1 (465)	31.4 (1177)	26.5 (1566)	<.0001

AMG indicates American medical graduate; IMG, international medical graduate; QI, quality improvement.

Similar results were seen for AMGs compared to IMGs. Residents in small or medium compared to large programs were statistically more likely to rate their confidence in their ability to design a QI project, use of QI tools, and use of data to track changes in their practice over time as at least moderately high. Postgraduate year 1 (PGY1) residents, compared to all other training years, had the lowest levels of participating in QI projects over the previous year, as well as lowest levels of confidence for all of the QI components.

DISCUSSION

This study, which included almost all pediatric residents in training in July 2017, demonstrated that the over half of residents had participated in a QI project over the previous year. Resident participation in QI projects also increased over the years of training (rising to 78% at the beginning of PGY3), as did confidence in all 4 QI skills rated. This is somewhat reassuring when considering pediatric residency as a continuum, as one would expect curriculum for QI skill development to be covered over the entire 3 years of residency and skills to increase over time. However, less than half of PGY3 residents reported being at least moderately confident in any of 4 QI skills, underscoring suboptimal learning experiences in current pediatric residency training.

POTENTIAL GAPS IN TRAINING

Given the timing of this survey in the month of July, the PGY1 data likely reflect a low baseline for participating in QI projects and confidence in QI skills for interns as they leave medical school. It is possible that respondents were only thinking about their QI experiences in the context of residency, and not medical school, when they answered these questions; however, the questions were not phrased in that manner. As such, we posit these responses do reflect experiences in medical school, and the apparent need to address deficiencies in QI training during residency may extend back to medical school as well. The alignment with priorities of the undergraduate medical education community is strong, as QI is identified as one of the core entrustable professional activities for entering residency.[10]

Respondents also completed the surveys at the beginning of the academic year, and it is possible that many residency programs provide additional QI training, participation, and skill building in the final year of training. Thus, more adequate training and skill development may be achieved by the end of residency training. Although PGY4 and PGY5 respondents were limited in number, further QI skills development would be expected to be represented in the data for these respondents in the study. However, although the PGY4 residents in this study did report higher levels of confidence across all QI skills compared to earlier training years, the majority still reported less than moderately high confidence for all skills. Only PGY5 residents had a majority reporting QI skill confidence, but this group was likely comprised

Figure. *Self-reported confidence in quality improvement (QI) skills based on gender, medical education, residency year, and program size.*

entirely of chief residents and/or combined training program residents. Furthermore, QI skills, like most skills, are likely something that are best learned experientially and over time rather than consolidated later in training.[11,12]

Taken together, these findings are concerning because QI training is not only an overall ACGME training requirement but also an every 6-month ACGME reporting requirement for all trainees in pediatric residency programs (ie, programs must report biannually on resident performance in the area of QI).[2,13] Furthermore, the ABP, in conjunction with the pediatric educational community, has highlighted the high priority of QI skill development among residents by focusing 1 of only 17 entrustable professional activities for general pediatrics training on QI. With both of these national organizations defining QI as a critical component of general pediatric residency training, our findings regarding pediatric residents' self-perceptions of their QI skills signal a need to improve QI training in pediatric residency.

Challenges to providing a robust QI training experience that have been identified in the literature include the following: 1) lack of institutional support, 2) lack of faculty skilled to mentor or supervise residents or fellows, 3) difficulty integrating trainees on typical monthly rotation schedules into hospital-based QI projects that may last 90 to 120 days, and 4) competing time demands for residents, faculty, and hospital staff.[14–16] Addressing these barriers remains critical for identifying training opportunities that are feasible and meaningful educational experiences.

Potential Role of Program Size

About half of residents in each program size reported participating in a QI project over the previous year; however, compared to large programs, residents in small and medium programs were statistically more likely to rate their confidence in most QI skills at least moderately high. Similar differences based on pediatric residency program size have been demonstrated previously, highlighting the importance of residency program leaders being conscious of relative strengths and weaknesses that program size can potentially present.[17] Although statistically significant differences in program size were found, it should be noted that the absolute differences were small (the largest difference was less than 6 percentage points from small to large programs). Finally, this study did not explore the reasons for differences based on program size, which should be the focus of future study.

Limitations

This study has limitations to consider. First, surveys were administered at the beginning of the academic year, meaning that data from individuals who completed their PGY3 training are limited to data available from only those PGY4 individuals who completed the survey. For this reason, our data may not provide an accurate reflection of QI participation and skill development that happens in PGY3. Second, although the inclusion of residents beyond PGY3 does reflect experiences within PGY3, given the survey timing, the results also include combined training program residents who may have received QI training outside of pediatrics and included this in their responses. Third, all data were self-reported without objective measures of QI involvement or skills at a single point in time. Fourth, this study was conducted in a single specialty and may not be generalizable to other specialties.

Conclusions

Recent pediatric residents appear to be participating in QI activities during training, but their self-perception of their QI skills development remains poor. Continuing to track data such as those presented in this study will be

important in continuing to gauge residents' QI preparation. Barriers to meaningful QI experiences during pediatric training have been described previously; however, these barriers must be overcome, given the national focus on the triple aim in health care[18]—namely, improve care quality and safety, improve population health, and decrease costs while placing a focus on value-based care.[19] Ideally, with the recent work to implement core entrustable professional activities into undergraduate medical education and general pediatrics entrustable professional activities into graduate medical education, both of which address QI, the community will take this opportunity to collaborate on the creation of a QI curriculum that transcends the transition from undergraduate medical education to graduate medical education.[10,20]

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