



The Pediatric Resident Teaching Group: the Development and Evaluation of a Longitudinal Resident as Teacher Program

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Abstract

Introduction Residents serve as teachers in both formal and informal settings in medicine. As a result, the Accreditation Council for Graduate Medical Education (ACGME) requires the development of teaching competency. However, many residency programs lack Resident as Teacher (RAT) curricula; those that do have variable content and structure.

Methods Based on established conceptual frameworks, we created a longitudinal pediatric resident teaching group (PRTG). The members were self-selected pediatric residents who participated in faculty-led interactive didactic sessions focused on teaching skill development and were linked with resident-led teaching and mentoring of preclinical medical students in pediatrics. To assess program efficacy, residents completed a self-assessment of teaching skills prior to and at the end of each year of the program, and students completed evaluations of the residents' teaching abilities.

Results PRTG residents reported a significantly increased usage of teaching skills, as well as increased confidence and comfort teaching. Students assessed the residents to be “good” or “above average” teachers and found their learning “equivalent to” or “better than” when taught by an attending. PRTG residents found the program to be a feasible time commitment with the didactic skills session content useful and easily integrated into their teaching practice.

Conclusion The PRTG curriculum provides a consistent longitudinal framework for teaching skill acquisition that can enhance existing RAT programs to foster residents' comfort teaching and skill usage.

Keywords Residents · Resident as teacher · Curriculum · Teaching

Introduction

Residents across all fields serve as teachers for interns and medical students in both formal and informal settings [1]. Compared with faculty, residents spend more time interacting with medical students [2–4] and, given their role as frontline clinicians, often have more opportunities to supervise students who are providing patient care. As a result, they are optimally positioned as “near peers” to assume the role of teachers [5, 6]. The ACGME includes the development and observation of resident teaching skills among its required competencies [7]. Yet throughout residency, the majority of residents assess their teaching skills to be average or poor [8–10], and programs aimed at developing residents as teachers are often limited in time and scope [11].

Although the evidence shows that residents may benefit from formal education to improve their teaching skills [11], many residencies lack such programs [12, 13]. The published curricular structure and content to developing “Residents as Teachers” (RAT) are variable; programs typically are

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structured in the form of occasional workshops or 2–4 week rotations [1]. While RAT programs have been shown to improve resident self-assessed teaching behaviors and confidence, outcomes of multiple studies suggest that short or isolated rotations and workshops may be insufficient to produce sustained improvements in comfort and skills [11]. Additionally, a “confusion effect” has been described when teaching abilities decline in the period of time following discrete skills training while residents attempt to implement these new strategies [14]. The authors theorized that this effect may have been mitigated if they had been able to establish follow-up sessions [14]. While other programs have published their similar findings, little has been added to the literature on RAT in recent years. Pilot studies utilizing longitudinal didactic RAT curricula, with monthly sessions for half a year demonstrated significantly increased subjective and objective teaching scores in residents that participated in the curriculum [15–17]. To date, the feasibility and efficacy of utilizing this strategy to enhance resident teaching skills has not been assessed over a period of time longer than 6 months. We hypothesized that extending a curriculum throughout the academic year further improves teaching comfort, skills, and abilities.

Prior to the development of this longitudinal pediatrics resident teaching skills program, the pediatric RAT program at Mount Sinai combined both a yearly 4-h workshop and a 1-month teaching rotation for third year residents which they completed at different times during the year depending on their block schedule. The workshop and teaching rotation were initiated during the 2002–03 and 2001–11 academic years, respectively. The largest portion of teaching skill development occurred during a mandatory 1-month-long teaching rotation for all residents in the final year of residency that included a variety of teaching experiences with medical students and junior residents, spanning presenting lectures/didactics, small group sessions, and bedside teaching. All graduating residents were surveyed at the completion of residency as regards to their comfort and use of selected teaching skills. Despite having an established RAT curriculum, 50% of graduating residents reported feeling only “slightly or moderately comfortable” with their teaching skills, indicating that this high intensity, low frequency method of skills development may be insufficient. This study aims to demonstrate the feasibility and efficacy of a yearlong resident teaching skills initiative.

Methods

Curriculum Development

In an effort to enhance resident comfort with teaching, as well as resident teaching skills, a team consisting of three junior to

mid-career faculty and two residents created a Pediatric Resident Teaching Group (PRTG) in 2013. The group is open to all interested residents in any year of training. The curriculum consists of monthly hour-long, faculty-lead workshop sessions over the course of a year and monthly hands-on medical student teaching/mentoring to provide a residency-long longitudinal approach to developing and utilizing teaching skills.

The curriculum for the PRTG was developed using Davis’ conceptual framework for curriculum development [18–21] with the goal of enhancing the existing RAT curriculum. The framework as applied to the PRTG curriculum is listed in Table 1. The starting point of the framework was a needs assessment, which indicated a lack of comfort with teaching skills among a majority of the graduating residents. Based on the needs assessment, the PRTG was created and the curriculum consists of interactive, monthly didactic, and applied teaching sessions.

Didactic or andragogic teaching occurs via monthly workshops taught by pediatric faculty members. The monthly faculty led workshops focus on one topic/skill per session based on adult learning theory with topics outlined in Table 1. Many of the sessions build upon each other, allowing for review of prior topics to reinforce skills and concepts taught. The sessions run for an hour and are scheduled based on resident-specified availability via their call schedules or monthly polls of preferred timing. Residents participate in the faculty-guided, interactive workshops and are given opportunity to practice their skills with the group via role playing exercises.

Applied teaching is geared toward preclinical medical students in subsequent monthly hands-on teaching and mentoring sessions to practice skills learned during the workshops. Teaching is done via a unique 6-month preclinical pediatrics program for first-year medical students at our institution, developed with the goal of introducing early pediatric exposures to interested medical students, consisting of a didactic component aligned with complementary patient experiences, all developed and led by PRTG residents. Residents develop interactive teaching sessions on general pediatric topics and present them in monthly group sessions to the students. The resident-led didactics are supervised, and they receive immediate verbal feedback on their presentation by one of the PRTG faculty mentors who directly observes the didactic session. After the monthly hour-long didactic session for the students, residents supervise and teach hands on patient-centered activities with their one or two medical student mentees during hour-long sessions at a mutually convenient time during the following month, reinforcing the teaching skills they have learned. Figure 1 demonstrates an example of the curricula used for resident teaching preparation and delivery. The purpose of the study is to demonstrate the feasibility and efficacy of the year-long program.

Table 1 Use of Davis’ Conceptual Framework for PRTG curriculum development The PRTG program was developed using Davis’ conceptual framework strategies. As shown above, each framework was utilized as the educational basis for building another layer of the curriculum and program. The framework strategies are presented with their corresponding aspects of the PRTG program.

Davis’ conceptual frameworks	PRTG curricular application
Needs assessment	Graduating resident’s exit survey indicating low levels of self-reported confidence in teaching
Focused initiative	Creation of PRTG
Interactive instructions methods	Faculty lead teaching skill workshop sessions
Multiple sessions	Year-long monthly curriculum with topics including: learning climate, providing effective feedback, using questioning as a teaching tool, mentoring, teaching clinical reasoning, bedside teaching, creating effective presentations, and developing an educator’s portfolio
Opportunity for practice and feedback	Monthly teaching with pre-clinical medical students in large group didactic and bedside teaching settings
Enabling social and organizational support	PRTG group environment
Reinforcement techniques	Routine follow-up emails with workshop highlights and materials

Feasibility of the Program

Feasibility of the program was assessed via resident surveys regarding logistics of the program. Surveys were constructed using a 5-point Likert scale (5-Strongly Agree to 1-Strongly Disagree) for attitudes and were analyzed via a collapsed model of 4/5 versus 3/2/1 analyzed dichotomously. Residents were surveyed regarding perception of time spend teaching and in didactics and the usefulness of the faculty teaching sessions.

Efficacy of the Program

Efficacy of the program was primarily assessed via residents’ self-reported skill usage and comfort teaching. In order to assess skills learned and comfort level in teaching, residents completed a self-assessment of their usage of teaching skills and a survey measuring their comfort level teaching prior to participating in the program and at completion of the first and second years. The survey included three demographic questions followed by one question related to comfort and two

Fig. 1 Curriculum for PRTG and corresponding preclinical program PRTG teaching skill workshops topics are integrated into the practical application of teaching medical students with a corresponding schedule. This schedule allows for residents to take skills learned in the workshops and apply them when teaching students. An example schedule is provided above, where residents learn about adult-learning theory which they incorporate into their presentation on the newborn exam and bedside-teaching experience in the nursery

	RTG Faculty Led Teaching Skill Workshop Topic	Resident Didactic Teaching Topic	Resident Applied Teaching Experience
Month 1	Adult Learning Theory	Newborn Exam	Nursery Experience Performing Newborn Exam
Month 2	Diagnosing the Learner	Developmental Milestones	Administering Denver II Developmental Screening Tool in clinic
Month 3	Using Questioning as a Teaching Tool	Infectious Diseases	HEENT and Respiratory Exams, Performing throat cultures/DFAs
Month 4	Bedside Teaching	Dermatology	Identifying rashes, doing a thorough skin exam
Month 5	Giving Effective Feedback	Nutrition/Growth	Reviewing growth charts, nutrition counseling
Month 6	Mentoring	Pediatric Resident Panel	
Month 7	Clinical Reasoning		
Month 8	Setting Goals		
Month 9	Giving a Great Lecture		
Month 10	Review of Adult Learning Theory and Teaching Skills Learned		

related to teaching skill usage. The survey was constructed using a 5-point Likert scale (5-Strongly Agree to 1-Strongly Disagree for attitudes, 5- Completely to 1- Not at all for comfort/confidence, and 5-Always to 1-Never for teaching skills frequency). Survey results were analyzed via a collapsed model of 4/5 versus 3/2/1 analyzed dichotomously.

To further evaluate the efficacy, PRTG residents' self-assessments of their teaching abilities and confidence teaching were compared to the baseline graduating resident responses. Graduating residents completed the same survey assessing their comfort and assessing their teaching skills as did PRTG residents.

Medical student mentees were surveyed at the end of the preclinical program regarding their perceptions of their resident teacher/mentors' teaching abilities, assessing them on a 5-point Likert scale as educators, with 5 being "above average." Additionally, teaching abilities were assessed by comparing perceptions of learning from residents versus from attending physicians.

Survey responses were compared before and after the curriculum and were analyzed by Chi-squared tests, with $p \leq 0.05$ considered significant. Statistical analysis was performed using Microsoft Excel. This study was deemed exempt from the Mount Sinai IRB.

Results

Demographics

Sixteen residents out of 60 (26% of residency program) participated in year 1 of PRTG (the 2013–14 academic year) and 18 residents out of 60 (30% of residency program) participated in year 2 (the 2014–15 academic year). Survey response rates are shown in Table 2.

Feasibility of the Program

All participating residents felt that the teaching sessions were useful and that they were able to incorporate them into their own teaching. The majority, 65–75%, felt that the time required to participate in the program was appropriate and feasible.

Table 2 PRTG resident survey responses by training year

	Pre	Post year 1	Post year 2
PGY 1	3	8	3
PGY 2	5	3	6
PGY3	8	1	0

Efficacy of the Program

Resident assessment of their use of specific teaching skills "most" or "all of the time" is presented in Fig. 2. PRTG resident reported skill usage after year 1 and year 2 of the program were compared with pre-program reported skills as well as reported skills of all graduating residents.

PRTG resident's perceptions of their skills improved along with their usage. PRTG residents' confidence in their ability to teach "moderately" or "completely" doubled at the end of year 1, from 18 to 30% (mean 3.2) and increased fourfold by the end of year 2 to 77% (mean 3.8) ($p \leq 0.05$ for both).

Eighty-four percent of residents in year 1 (mean 4.4) and 89% of residents in year 2 (mean 3.9) "Agree" or "Strongly Agree" that their comfort in teaching improved since starting the PRTG. Ninety-two percent of residents in year 1 (mean 4.2) and 89% (mean 3.9) of residents in year 2 "Agree" or "Strongly Agree" that their teaching skills improved since starting the PRTG.

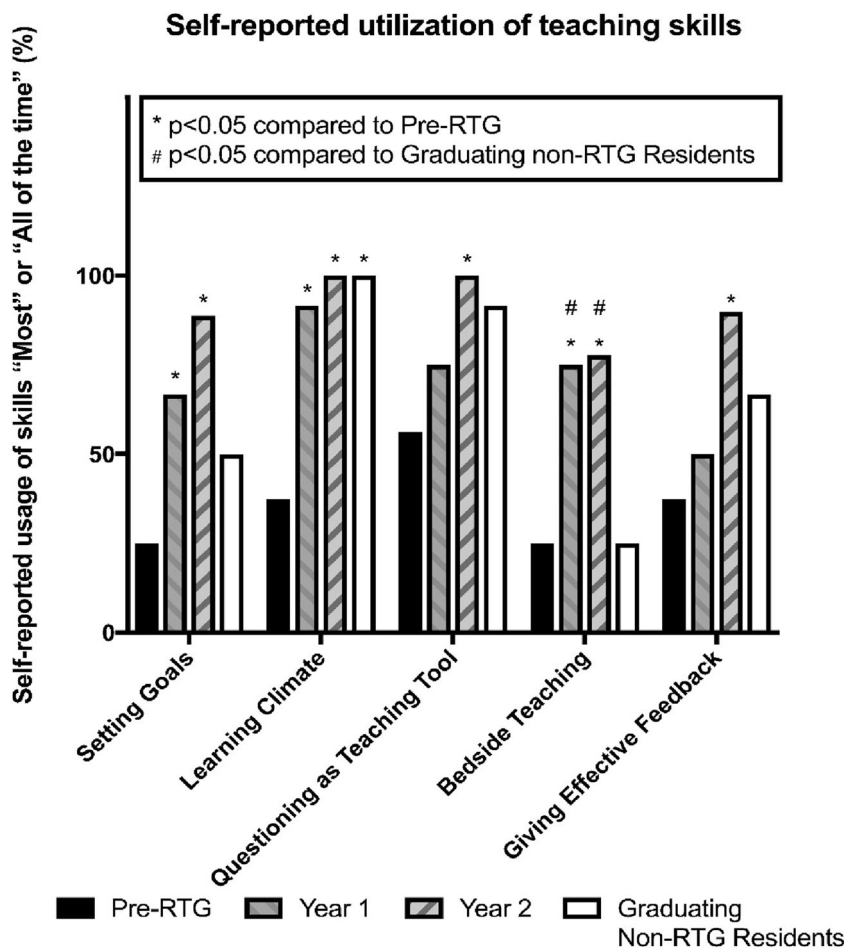
In a survey of the first-year medical students who worked with the residents in the preclinical pediatrics program, 96% of medical students assessed their residents to be "good" or "above average" educators (mean 4.5), and 91% felt learning from residents was "comparable" or "better than" learning from their experience with faculty.

Discussion

"Resident as Teacher" programs have become an integral part of resident training programs, but the optimal structure and content remain elusive [1]. Studies evaluating RAT programs have shown that workshops and rotations are often insufficient to acquire and sustain improvement in teaching skills [11]. Our Pediatric Resident Teaching Group (PRTG) is a year-long approach to developing residents as teachers that provides a consistent, longitudinal framework for skill acquisition with direct practical application of skills learned via medical student teaching. As residents are not taught information in intensive sessions but instead short workshops that build on the skills of the previous ones, there is more time for development and implementation of new skills [22]. Furthermore, the program is open to residents of all states of training, allowing them to develop their teaching skills throughout residency, as opposed to solely in their senior years of training.

The PRTG enhances the currently published RAT curricula by pairing interactive didactic learning sessions with hands on teaching sessions, designed to allow residents to utilize and practice their newly acquired skills in real-time teaching encounters [11]. Up to this point, the published literature has not demonstrated the ability of residents to retain skills taught during the resident as teacher programs over a long period of time, most documented results immediately after the

Fig. 2 The teaching skills of both cohorts, year 1 and year 2, were compared to PRTG residents’ self-assessment conducted prior to the start of the program (“vs Pre-RTG”) as well as to graduating residents’ self-assessments (“vs Non-RTG”). Year 1 resulted in statistically significant improvements in setting goals, learning climate, and bedside teaching, whereas year 2 had statistically significant improvements in all teaching skill domains. Both years demonstrated improvements compared to non-RTG graduating residents



intervention and a few up to 1 year post. The longitudinal nature of the program, along with the student pairings, allows residents to develop and retain teaching skills as seen in Fig. 2 with improving skill utilization from year 1 to year 2.

This longitudinal program over its first two pilot years increased residents’ self-reported teaching skill use, as well as comfort in teaching and perception of teaching skills from baseline. When compared to graduating residents prior to the introduction of the PRTG, participants who completed the program reported overall higher levels of confidence and comfort teaching as well as utilization of teaching skills. In addition, there was a significant increase in self-reported bedside teaching skills compared to graduating residents. Furthermore, given the fact that majority of the PRTG residents are interns and second-year residents, the similar responses may indicate an earlier acquisition of skills compared to graduating residents. When students compared the residents to faculty educators, the majority felt their teaching was on par or superior, potentially reflecting some mastery of teaching skill development.

While the PRTG program has improved resident self-reported skill use and teaching perceptions, this evaluation is limited by the lack of objective assessment of teaching skills, both among PRTG and non-PRTG residents, and lack of a

longitudinal comparison control group. The evaluation is also limited by the sample size from the PRTG, and although a large proportion of the residency program participated in the group, not all completed the pre- and post-assessments. Furthermore, due to demanding residency schedules and patient-care responsibilities, we were unable to secure 100% attendance at each session and had uneven survey responses. We did not take attendance at these sessions, and in order to maintain anonymity, resident self-assessments were not paired from year to year, thus preventing paired-analysis of individuals change in skills and perceptions. The resulting small sample size may have led to a type 2 error, not adequately showing the benefit of the PRTG program. However, given the size of the residency program, it would be difficult to retain many more residents in a self-selected program than the one third that joined. Analysis of more years of data would be helpful to further elucidate. These pilot years were well received by the residents involved. The majority of participating residents felt that the time required for the program was appropriate and feasible. As is typical during the ongoing process of curricular evaluation, we have revised the curriculum based on feedback. Most adjustments have addressed the timing of sessions and the focus of the teaching skills development sessions. As a

result of the success of the program, residents now continue to be paired with and teach their student mentees for both of their preclinical years.

Conclusion

The PRTG is an effective, feasible, longitudinal teaching program that has successfully improved resident self-assessment of their teaching skills and comfort teaching. By pairing interactive didactics on adult learning theory with practical hands on teaching, residents were able to improve their self-efficacy with goal setting, bedside teaching, and effective feedback.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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