# Comparing Board Examination Scores Between Pediatric Residents in Continuity Clinics at Different Sites

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## ABSTRACT

**Background:** Residency training programs are required to provide adequate continuity clinic experience for all residents.

**Objective:** Determine if there is a difference in medical knowledge between pediatric residents attending continuity clinic at a community-based center versus those attending an academic center, as measured by the American Board of Pediatrics In-Training Exam (in-training exam) and the American Board of Pediatrics Certification Exam (certification exam).

**Methods:** A retrospective evaluation of in-training and certification exam scores of pediatric residents enrolled at the Medical College of Wisconsin and Children's Hospital of Wisconsin was performed. Test scores of the group of residents participating in a community-based continuity clinic were compared to those residents attending an academic center continuity clinic.

**Results:** There were no statistically significant differences in mean test scores for each of the 3 years of residency training on the in-training exam or board certifying exam after graduation. In-training exam scores significantly predicted certification exam scores, and there were significant increases in the in-training exam scores throughout residency, irrespective of clinic location.

**Conclusion:** This study shows no difference between residents participating in a community-based continuity clinic and those participating in an academic center continuity clinic in objective outcomes as measured by scores on the American Board of Pediatrics In-Training Exam and the American Board of Pediatrics Certifying Exam.


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## INTRODUCTION

Pediatric residency training programs should be designed to prepare residents for general pediatric practice in an ambulatory setting. To help accomplish this goal, the Residency Review Committee in Pediatrics of the Accreditation Council for Graduate Medical Education requires training programs to provide adequate continuity clinic experience for all residents.[1] This experience is expected to occur on a weekly basis throughout residency and to provide residents with the opportunity to see an appropriate number of patients and the same patients throughout their years in residency training.

In some training programs, residents are assigned to community-based practices for their continuity clinic experience. The pediatricians serving as preceptors in these practices are often volunteer faculty and not full-time faculty members within the affiliated medical school. Accordingly, these preceptors usually do not have access to faculty development resources, have received no specific training for the role of continuity clinic preceptor, and may not have the same academic and teaching experience as a full-time medical school faculty preceptor.

A previous study showed that over a 5-year period, there was no statistically significant difference in American Board of Pediatrics In-Training Exam (in-training exam) scores between residents who attend an academic center continuity clinic and those that attend a community-based continuity clinic. However, since the in-training exam is administered at the beginning of each year of training,

**Table 1.** Mean ABPCE and ABPITE Scores of Residents in Different Locations for Continuity Clinic, 2002-2011

| Exam | N | Location | Mean (SD) | Δ | *P*-value |
|---|---|---|---|---|---|
| PL-1 ABPITE | 98 | Academic | 159 (109) | 2 | .937 |
| | 75 | Community Based | 161 (106) | | |
| PL-2 ABPITE | 98 | Academic | 275 (116) | 14 | .412 |
| | 70 | Community Based | 289 (100) | | |
| PL-3 ABPITE | 89 | Academic | 341 (98) | -21 | .191 |
| | 71 | Community Based | 320 (104) | | |
| ABPCE | 104 | Academic | 508 (95) | 9 | .545 |
| | 81 | Community Based | 517 (94) | | |

Abbreviations: ABPCE, American Board of Pediatrics Certifying Examination; ABPITE, American Board of Pediatrics In-Training Examination; PL, pediatric level.

**Table 2.** Prediction of ABPCE Scores From ABPITE Scores From Multivariate Linear Regressions, 2002-2011

| Location | ABPITE | Individual Predictor | | Overall Regression Model Coefficients | |
|---|---|---|---|---|---|
| | | Beta | *P*-value | $R^2$ | *P*-value |
| Academic Center and Community-Based Combined | PL-2 | .496 | .001 | .51 | .001 |
| | PL-3 | .280 | .001 | | |
| Academic Center | PL-2 | .591 | .001 | .61 | .001 |
| | PL-1 | .239 | .021 | | |
| Community-Based | PL-3 | .407 | .004 | .39 | .001 |
| | PL-2 | .289 | .036 | | |

Abbreviations: ABPCE, American Board of Pediatrics Certifying Examination; ABPITE, American Board of Pediatrics In-Training Examination.

the study was not designed to evaluate differences in knowledge that might not be apparent until after the completion of training.[2] The objective of this study was to determine if there is a statistically significant difference in medical knowledge at the completion of training, as measured by the scores on the American Board of Pediatrics Certification Examination (certification exam) between residents participating in a community-based continuity clinic and residents participating in an academic center continuity clinic. Secondary objectives were to determine if there are differences in the in-training exam scores between these groups of residents, with analysis of data over an extensive time period to assess any longitudinal differences in the in-training exam mean scores, and how in-training exam scores predict the certification exam scores and measure potential increases in scores independent of location of the continuity clinic.

## METHODS

A retrospective study was conducted of pediatric residents enrolled at the Medical College of Wisconsin and Children's Hospital of Wisconsin from 2002 to 2011. Each resident was assigned to a weekly continuity clinic at a community-based practice or at an academic center practice (Downtown Health Center), based partly on individual resident preference at the start of residency. Residents who did not remain at the same clinic for their entire 3 years of training and those who did not take the certification exam were excluded from analysis. Resident scores were not evaluated after 2011 due to a change in the grading scale for the in-training and certification exams.

Researchers evaluated all eligible residents' test scores during the years 2002 to 2011 for the in-training exam, which is administered yearly for each of the 3 years of training, and the certification exam, which is administered once after completion of the residency program. Test scores of the group of residents participating in a community-based continuity clinic staffed by volunteer preceptors were compared to those residents attending an academic center continuity clinic staffed by full-time general pediatric faculty from the Medical College of Wisconsin using independent *t* tests. Comparison of in-training exam scores were made between the groups for each level of training, and certification exam scores were compared after graduating from residency. In addition, year by year comparisons of the certification exam scores were analyzed. A repeated measures analysis of variance (RM-ANOVA) was used to determine significant differences in mean scores of the in-training exam across the 3 training years for both groups of residents (separately and combined).

The relational strength and predictive strength of certification exam scores (outcome) from the 3 annual in-training exam scores (predictors) was determined with multivariate linear regression analysis.

This study received approval from the institutional review board. Data were obtained independently and stored securely on a protected hard drive by the pediatric residency coordinator. All data were deidentified before being analyzed by an independent analyst outside of the Department of Pediatrics. All statistical analysis was generated by IBM® SPSS® 23.0.

## RESULTS

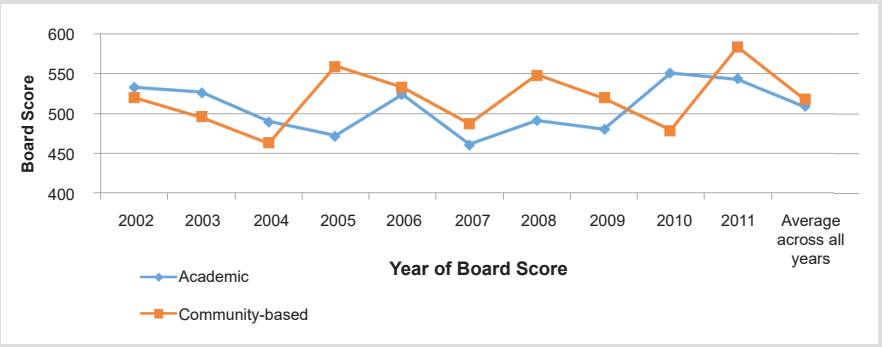
A total of 189 out of a possible 193 (97.9%) resident test scores were evaluated. As reported in Table 1, there were no statistically significant differences in mean scores for the in-training exam from each of the 3 years of residency training or the certification exam when split by location of continuity clinic (academic center vs community-based). Figure 1 illustrates the certification exam scores across 2002 to 2011, split by location of continuity clinic.

As reported in Table 2, the in-training exam scores could significantly predict certification exam scores for both continuity clinic locations. The first-year (beta=.239) and second-year (beta=.591) in-training exam scores were significant predictors for the residents

at an academic center continuity clinic; the second-year (beta = .289) and third-year (beta = .407) in-training exam scores were significant predictors for the residents in a community-based continuity clinic.

There were statistically significant increases in pediatric resident in-training exam scores from Pediatric Level-1 (PL-1) to PL-2, PL-2 to PL-3 and PL-1 to PL-3 years as determined by RM-ANOVA reported in Table 3. These same patterns are observed when the data are split by location of continuity clinic. The largest mean differences were always between PL-1 and PL-3 residents, the second largest mean difference was between PL-1 and PL-2 residents, and the smallest difference was between PL-2 and PL-3 residents.

**Figure 1.** ABPCE Pediatric Board Scores Across Year Split by Practice Location




Abbreviation: ABPCE, American Board of Pediatrics Certifying Examination.

**Table 3.** Differences in Mean ABPITE Scores Related to Resident Year of Training

| Practice | N | Resident Year | Mean (SD) | Δ | Cohen's *d* | *P*-value |
|---|---|---|---|---|---|---|
| Academic Center and Community-Based Combined | 135 | PL-1<br>PL-2 | 159 (105)<br>282 (110) | 123 | 1.1 | .001 |
| | | PL-2<br>PL-3 | 282 (110)<br>332 (100) | 50 | 0.5 | .001 |
| | | PL-1<br>PL-3 | 159 (105)<br>332 (100) | 173 | 1.7 | .001 |
| Academic Center | 80 | PL-1<br>PL-2 | 158 (107)<br>275 (121) | 117 | 1.1 | .001 |
| | | PL-2<br>PL-3 | 275 (121)<br>339 (95) | 64 | 0.6 | .001 |
| | | PL-1<br>PL-3 | 158 (107)<br>339 (95) | 181 | 1.8 | .001 |
| Community-Based | 55 | PL-1<br>PL-2 | 161 (102)<br>293 (92) | 132 | 1.3 | .001 |
| | | PL-2<br>PL-3 | 293 (92)<br>322 (107) | 29 | 0.3 | .001 |
| | | PL-1<br>PL-3 | 161 (102)<br>322 (107) | 161 | 1.5 | .001 |

Abbreviation: ABPITE, American Board of Pediatrics In-Training Examination.

## DISCUSSION

Studies have compared the advantages and disadvantages of resident continuity clinics at different sites. Rice et al[3] in Houston, Texas found that residents in a private practice setting saw more patients, more acute care patients, observed their preceptor more, and had less continuity and less well-child care than residents in an academic clinic. Osborn et al[4] looked at the continuity experience at the University of Utah Health Sciences Center. Residents in a private community-based clinic saw more patients and more acute care, evaluated a broader range of patient problems, and were more likely to observe and be observed by their preceptor.

This study used objective measures—the American Board of Pediatrics In-Training Exam and the American Board of Pediatrics Certifying Exam—and determined there was not a significant difference in knowledge between residents attending an academic center continuity clinic and those attending a community-based continuity clinic. The data presented show that, independent of continuity clinic location, the in-training exam scores could predict certification exam scores, and independent of location, in-training exam scores improved year to year.

The data show that in-training exam scores from residents that are closer to graduation, the time of certifying exams, are more predictive of the certification exam for the community-based physicians. Conversely, in-training exam scores earlier in residency training are more predictive of the certifying exams for academic center physicians. We are not sure why this is the case and this was not a focus of the study.

There are several limitations to our study. First, in-training exams are administered at the beginning of the residency year and might bias the data against finding a difference in the PL-1 year. The lack of difference of scores in the PL-1 year does minimize potential selection bias by confirming that the baseline knowledge upon entry into the residency program was equivalent for the residents participating in continuity clinics at the 2 different locations. Second, this study design did not allow for the evaluation of responses to individual questions on either the in-training exam or the certification exam. Therefore, we could not evaluate potential specific differences in ambulatory pediatric knowledge, the knowledge that residents would be

expected to obtain through participation in continuity clinic. Third, the design of our study did not control for the differences in elective experiences of the residents throughout their 3 years of training and the possibility that ambulatory pediatric knowledge may have been acquired on other rotations, eliminating any differences in knowledge that potentially are present between residents participating in continuity clinics at the different locations. All residents in the current study participated in a core curriculum consisting of regularly scheduled educational conferences and discussions. All residents experienced month-long block rotations at the same academic center where some residents experienced their continuity clinic. Therefore, the considerable overlap in experience might also have mitigated potential differences in knowledge acquired through participation in continuity clinic. Fourth, this is a retrospective study at a single residency program. The results may not be generalizable to other institutions. Finally, the scoring/grading protocol changed after 2011. Our conclusions may be valid only for the time period of the study.

## CONCLUSION

Many pediatric residency training programs utilize community-based practices for continuity clinic sites with volunteer pediatricians as preceptors for residents at these sites. Studies in the past have shown subjective differences in the experience received in a private practice setting compared to the experience in an academic setting. This study shows that there appears to be no difference in objective outcomes as measured by scores on the American Board of Pediatrics In-Training Exam and the American Board of Pediatrics Certification Exam between residents participating in a community-based continuity clinic and those participating in an academic center continuity clinic. There does not appear to be a detrimental effect on residents participating in continuity clinics at different sites.

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