

Relationship Between Residency Placement and Clerkship Site Enrollment: A Retrospective Analysis

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Context: Osteopathic medical students frequently engage in clinical clerkships away from their home teaching institution, which can help them decide on a residency program, gain additional experience in a new environment, and further their professional contacts. Conventional wisdom states that these *audition clerkships* are an important factor in residency placement, but the educational literature concerning the topic is lacking.

Objective: To determine the relationship between clerkship site enrollment and residency placement so that empirical guidelines can be established for osteopathic medical students in the process of making informed decisions about their clerkships, particularly during the fourth year.

Methods: A retrospective analysis was conducted. Data on clerkship and residency placement were compiled for the classes of 2008, 2009, and 2010 at the New York Institute of Technology College of Osteopathic Medicine, and χ^2 goodness-of-fit analysis and χ^2 tests of independence were used to explore relationships between clerkship and residency placement.

Results: Of 862 graduates, data were available for 812 (94.2%). Statistically significant relationships were noted between residency program status (osteopathic, allopathic, and military) and audition clerkship, with fewer graduates completing audition clerkships in allopathic programs and with more graduates completing audition clerkships in osteopathic and military residency programs than expected from an independent relationship. A total of 416 graduates (51.2%) did not enroll in the residency program where they completed their audition clerkship. A total of 352 graduates (43.3%) enrolled in the residency program where they completed their audition clerkship. An additional 44 graduates (5.4%) did not complete an audition clerkship in the discipline of their residency program but rotated at a hospital. A total of 364 graduates (44.8%) enrolled in osteopathic residency programs, 425 (52.3%) enrolled in allopathic programs, and 23 (2.8%) enrolled in military programs.

Conclusion: Although the results of this study are specific to 1 medical school, they provide evidence to counter long-held beliefs that audition clerkships determine residency placement.

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During the fourth year of medical school, students are often expected to enroll in audition clerkships, in which they complete their clinical rotations at other institutions to gain experience in a specific specialty at a specific institution, to gain exposure to a residency program of interest, to impress faculty at a program of interest, and to increase their professional network. These clerkships also offer students the chance to showcase skills and qualities that are not easily judged by residency program application materials.

According to McGraw-Hill's *Concise Dictionary of Modern Medicine*,¹ an *audition rotation* is "a clinical rotation by a fourth-year medical student interested in a specific residency program and/or target specialty in a location other than his/her medical school." These clerkships have customarily been viewed as an important factor in residency placement. Although this belief drives many students to plan for audition clerkships to be completed before the residency match in late winter,² the educational literature on the topic is scarce, particularly as it addresses the phenomenon from a broad perspective. With the exception of orthopaedic surgery residencies, it seems that no consensus exists among medical education directors regarding the importance of or necessity for this type of clerkship.³ Further, the current literature approaches the question by studying the subjective rankings of resident selection criteria by program directors, not by performing retrospective analyses of the selection process.

The disadvantages of performing audition clerkships during year 4 of medical school are numerous. In addition to the financial burden, these clerkships may interfere with opportunities for a broader education or may preclude students from taking other electives of interest. Furthermore, poor performance in an audition clerkship can hurt students' chances of matching.⁴ Alternatively, most osteopathic medical schools have a "traveling model" of clerkship that involves rotating to different sites every 2 to 12 weeks, which could be used to students' advantage during the fourth year to impress

faculty at students' preferred residency programs.⁵ Third-year clerkships are usually assigned randomly to students and are limited to affiliate programs. For the purpose of developing empirical guidelines and allowing medical students to make more informed decisions when they plan their fourth-year electives and third-year clerkship requests, we sought to explore the relationship between clerkship site enrollment and residency placement of students who graduated from the New York Institute of Technology College of Osteopathic Medicine (NYIT-COM) in 2008, 2009, and 2010.

Methods

Data Extraction and Compilation

After the NYIT-COM Institutional Review Board found the current study to be exempt, data related to residency placement, fourth-year clinical clerkship enrollment, and third-year clinical clerkship assignments for students who graduated from NYIT-COM in 2008, 2009, and 2010 were obtained from the Office of Clinical Education for retrospective analysis. All confidential data, including social security numbers, school identification numbers, clinical clerkship grades, clerkship examination grades, and national medical board scores were removed from any data files before they were made available for coding and analysis by the researchers (L.B.G., D.M., and A.M.J.).

Variables studied were site of audition clerkship, site of third-year clerkship, third-year regional clerkship (all core clerkships performed at 1 hospital or a group of hospitals in 1 geographic location) vs nonregional clerkship (any of the NYIT-COM affiliated hospitals in New York or New Jersey), status of residency program (osteopathic, allopathic, or military) as defined by the American Osteopathic Association (AOA) and the Accreditation Council for Graduate Medical Education (ACGME), and were coded in Microsoft Excel (*Table*). A graduate was considered to have completed a fourth-year audition clerkship if a subinternship or

elective clerkship was completed before the formal match (December for military residency programs, February for osteopathic programs, and March for allopathic programs).

Statistical Analysis

Frequencies were calculated with respect to the numerous variables examined. The χ^2 goodness-of-fit model was used to determine whether a difference existed in the proportion of graduates whose residency programs were at the site of their clerkships relative to the clerkship enrollment or assignment criteria (eg, regional vs nonregional). In addition, χ^2 tests of independence were used to determine whether statistically significant relationships existed between the audition clerkship discipline and the residency program discipline. Standardized residuals were then examined to determine the factors strongly contributing to any statistically significant relationship. For all tests, the level of significance was set at .05, so a *P* value less than .05 was considered statistically significant. Based on a *P* value of less than .05, standardized residuals plus or minus 1.96 were considered statistically significant. Statistical analyses were calculated using SPSS statistical software (SPSS Inc).

Hypotheses

Hypothesis A

The null hypothesis stated that no difference exists between the proportion of graduates who enrolled in residency programs where they completed their fourth-year audition clerkship and the proportion of graduates who did not enroll in the residency program where they completed their audition clerkships. The alternative hypothesis stated that a difference exists between the proportion of graduates who enrolled in the residency programs where they completed their fourth-year audition clerkships and the proportion of graduates who did not enroll in residency programs where they completed their fourth-year audition clerkships.

Hypothesis B

The null hypothesis stated that no difference exists between the proportion of graduates who enrolled in residency programs where they completed a third-year clerkship and the proportion of graduates who did not enroll in the residency programs where they completed third-year clerkships. The alternative hypothesis stated that a difference exists between the proportion of graduates who enrolled in a residency program where they completed third-year clerkships and the proportion of graduates who did not enroll in the residency programs where they completed third-year clerkships.

Hypothesis C

The null hypothesis stated that no difference exists between the proportion of graduates who enrolled in residency programs where they completed their third-year regional clerkships and the proportion of graduates who did not enroll in residency programs where they completed their third-year regional clerkships. The alternative hypothesis stated that a difference exists between the proportion of graduates who enrolled in residency programs where they completed third-year regional clerkships and the proportion of graduates who did not enroll in residency programs where they completed third-year regional clerkships.

Results

Relationship Between Residency Placement and Fourth-Year Audition Clerkship

Of 862 students who graduated in 2008, 2009, and 2010, data related to fourth-year audition clerkship site and residency placement were available for 812 (94.2%). A total of 416 graduates (51.2%) did not enroll in the residency programs where they completed their fourth-year audition clerkship. A total of 352 (43.3%) enrolled in the residency programs where they com-

pleted their fourth-year audition clerkship, and 44 graduates (5.4%) did not complete an audition clerkship in the discipline of their residency program but rotated at a hospital. A total of 364 graduates (44.8%) enrolled in osteopathic residency programs, 425 (52.3%) enrolled in allopathic residency programs, and 23 (2.8%) enrolled in military programs.

Fourth-year audition clerkships and residency placement outcomes were analyzed using a χ^2 goodness-of-fit model, with the assumption that if no relationship between the audition clerkship site and residency placement site existed, then expected frequencies would be equal, as anticipated by chance. The test statistic ($\chi^2_1=5.333$; $P=.021$) indicated that the null hypothesis A can be rejected in favor of the alternative hypothesis A. The results demonstrated that fewer graduates than expected enrolled in the residency programs where they completed their fourth-year audition clerkships and more graduates than expected did not enroll in residency programs where they completed their audition clerkships.

The relationship between fourth-year audition clerkships and residency program status (osteopathic, allopathic, and military) was analyzed using a χ^2 test of independence. A statistically significant relationship was found between fourth-year audition clerkships status at the residency program where one enrolled and residency program status ($\chi^2_4=31.52$, $P<.05$). The effect size was 0.139, which is a small to moderate effect. Post hoc tests were performed to examine standardized residuals. Results showed that statistically significantly more graduates did not complete audition clerkships in allopathic programs ($P=.05$), and statistically significantly fewer graduates did not complete audition clerkships in osteopathic and military residency programs than expected from an independent relationship ($P=.05$). Significantly fewer graduates completed audition clerkships in allopathic programs than expected from an independent relationship ($P=.05$).

Table.
Coding Rubric for Clerkship and Residency Data on 2008, 2009, and 2010 Graduates of the New York Institute of Technology College of Osteopathic Medicine (N=812)

| Criteria | Score |
|--|--|
| Residency program placement in the discipline of fourth-year clerkship | 0 = No 1 = Yes |
| Residency program in the discipline of third-year clerkship | 0 = No 1 = Yes |
| Residency program in a different discipline from fourth-year clerkship | 2 = Yes 3 = Regional participant |
| Enrollment in a third-year regional clerkship program | 0 = No 1 = Yes |
| Residency program status | 0 = Osteopathic residency or internship 1 = Allopathic residency or preliminary year 2 = Military residency or transitional year |

Relationship Between Residency Placement and Third-Year Clerkship

In the classes graduating in 2009 and 2010, residency placement data and third-year clerkship data were available for 529 graduates. The residency program discipline differed from third-year clerkship discipline for 430 graduates (81.3%), whereas the residency program discipline was the same as the third-year clerkship discipline for 44 graduates (8.3%). For 24 graduates (4.5%), their residency program site was the same as their third-year clerkship site, but the discipline differed. A total of 31 graduates (5.9%) enrolled in residency programs where they completed their third-year regional clerkship.

With regard to participation in third-year regional clerkships, 344 graduates (65%) did not participate, and 185 graduates (35%) did participate.

Third-year clerkships and residency placement outcomes were analyzed using a χ^2 goodness-of-fit model, with the assumption that if no relationship between third-year clerkship site and residency place-

ment site existed, then expected frequencies would be equal, as anticipated by chance. The test statistic ($\chi^2=249.554$; $P<.001$) indicated that the null hypothesis B can be rejected in favor of the alternative hypothesis B. The results demonstrated that significantly fewer graduates enrolled in residency programs where they completed third-year clerkships than expected ($P<.001$).

Residency placement site and third-year regional clerkship site were also analyzed using a χ^2 goodness-of-fit model, with the assumption that if no relationship between residency placement site and regional clerkship site existed, then expected frequencies would be equal, as anticipated by chance. The statistic ($\chi^2=81.778$, $P<.001$) indicated that the null hypothesis C can be rejected in favor of the alternative hypothesis C. The results demonstrated that significantly fewer graduates enrolled in residency programs where they completed third-year regional clerkships than expected ($P<.001$).

Discussion

As demonstrated by the data, fewer than half of NYIT-COM graduates in the years studied performed audition clerkships at the residency programs in which they ultimately enrolled, and fewer than half of those graduates enrolled in osteopathic residency programs. In addition, most of the graduates' residency programs were not at the sites of their third-year clerkships.

Contrary to conventional beliefs and the subjective reports of directors of medical education on the importance of fourth-year audition clerkships to residency placement,^{6,7} fewer graduates enrolled in the residency programs where they completed their audition clerkships. In addition, because NYIT-COM's third-year clerkship is such that students are exposed to as many as 6 clerkship sites, we hypothesized that more graduates would enroll in the residency programs at one of these sites than by chance; however, we found that fewer

graduates enrolled in residency programs where they completed their third-year clerkships than expected. The same pattern was revealed regarding the number of graduates who enrolled in residency programs where they completed their third-year regional clerkships. Because the regional clerkship allows third-year students to select the clerkship sites, it can be viewed as a prelude to the fourth-year audition clerkships; however, fewer graduates enrolled in the residency programs where they completed their third-year regional clerkship than expected. However, we did not have access to rank lists; therefore, it is impossible to determine whether residency programs rejected or did not highly rank the students who participated in their clerkships or whether students did not apply to the residency programs affiliated with their regional clerkships.

A statistically significant relationship was found between fourth-year audition clerkship and residency program status (osteopathic, allopathic, or military). More graduates than expected from an independent relationship enrolled in osteopathic and military residency programs where they completed audition clerkships, and fewer graduates than expected from an independent relationship enrolled in allopathic residency programs where they completed audition clerkships. With the exception of the relationship between an audition clerkship and the military residency program to which a graduate eventually enrolled, this finding was surprising; allopathic residency programs are often assumed to be more competitive for osteopathic medical students to pursue, and it is generally anticipated that students would need to perform clerkships at the pursued program to increase their chances of gaining placement. Regarding the greater than expected number of graduates placing into osteopathic residency programs, these results could indicate a predilection for osteopathic medical students to take advantage of fourth-year audition clerkships at osteopathic sites affiliated with their home institution's educational consortium.

Conclusion

The current results do not support the value of a fourth-year audition clerkship as a way to gain desired residency placement. The nature of a retrospective analysis of residency placement outcomes that are a matter of public record is such that we cannot make any generalizations regarding the intentions of graduates during their clinical clerkship planning; nor can we assume that they were accepted by their residency program of choice. These results do indicate that, contrary to conventional assumptions, more graduates enrolled in residency programs at which they did not complete audition clerkships than would be expected.

Future research can be aimed in 2 directions. First, it would be useful to expand the analysis of the relationship between clerkship selection and residency placement to more medical schools, both osteopathic and allopathic. Second, after compiling data from this larger sample size, it would be worthwhile to analyze the relationship between audition clerkship selection and residency placement for individual residency specialties. Given the single accreditation system for graduate medical education under the ACGME, replicating this study as the system evolves will be essential to ensure its timeliness and relevance for future graduating classes.

Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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