Incorporating Holistic Review in Recruitment in a Physical Medicine and Rehabilitation Residency Program

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Abstract: Traditional residency recruitment practices are vulnerable to unconscious biases, inequity, lack of diversity, and have limited ability to predict future clinical competency. Holistic review and evidence-based strategies, such as structured interviews and situational judgment tests, can mitigate these limitations. A physical medicine and rehabilitation residency program restructured its residency recruitment process using holistic review principles and evidence-based strategies during the 2020–2021 academic year. A subcommittee developed a weighted screening rubric based on Association of American Medical Colleges core competencies and semistructured interview questions targeting specific domains. Formal implicit bias training was provided. Screening scores determined interview invitations. Applicants participated in three different domain-focused semistructured interviews. Screening and interview scores were combined to form the program rank list. A postinterview anonymous questionnaire was sent to interviewees to obtain feedback. Four hundred eighty-nine applicants were screened (82 interview invitations, 80 interviewed, 8 matched). The respondents to the postinterview questionnaire found that interviews evaluated them objectively (90%) and improved their impression of the program (90%). The program's match was consistent with previous matches. Interviewed applicants represented a racially diverse group. Most questionnaire respondents had a positive impression of the interview process. This article demonstrates incorporating holistic review into residency recruitment and provides specific resources to aid other institutions pursuing similar goals.

Key Words: Graduate Medical Education, Personnel Selection, Cultural Diversity, Prejudice

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Resident recruitment requires consideration of applicant characteristics, institutional needs, and societal imperatives to recruit applicants who will be successful trainees and become physicians who provide competent and compassionate care. Given the competitive nature of the residency application process, program directors frequently review substantially more applications than available training positions. The resident recruitment process is often simplified to finding the best "fit," a concept which is loosely defined and highly subjective on both individual and institutional levels and relies on cognitive metrics that are easy to compare between applicants, such as US Medical Licensing Examination Step 1 scores.

While relying on subjective fit can expedite the recruitment process for residency programs, without a considered shared mental model of program priorities for recruitment, "fit" can act as a proxy for unconscious bias and a threat to diversity.[1] Use of the US Medical Licensing Examination Step 1 score as a screening tool also has potential pitfalls. The examination does not meet validity criteria for use in postgraduate applicant selection.[2,3] While US Medical Licensing Examination Step 1 scores might predict future in-training examination or board examination performance, they are not predictive of other competencies that are important to be a successful resident, such as acquisition of clinical skills, professionalism, or faculty evaluations.[2,4–6] These issues have been shown to impact fundamental aspects of the resident recruitment process including screening, interviewing, and ranking applicants.

The Association of American Medical Colleges (AAMC) has recommended the use of holistic review, defined as "a flexible, individualized way of assessing an applicant's capabilities by which balanced consideration is given to experiences, attributes, and academic metrics."[7] Recommended approaches, such as structured interviews, have been shown to improve reliability, validity, and fairness in recruitment.[8] Furthermore, use of specific strategies including behavioral interviewing and situational judgment tests mitigate implicit bias and can limit overreliance on traditional criteria that systematically disadvantage certain applicants.[9,10] Using a holistic approach also allows for comprehensive evaluation of each applicants' AAMC core competencies and valued characteristics in a program-specific, mission-driven manner. Finally, this approach aligns with applicant priorities.[11]

Historically, medical school admissions more widely used these recommendations compared with graduate medical education.[12] More recently, the holistic review process has been implemented by residency programs to successfully address some of these concerns, particularly with regard to underrepresented minorities and sex diversity.[12–14] With a transition to new residency program directors and the COVID-19 pandemic, the Baylor College of Medicine Physical Medicine and Rehabilitation (PM&R) Residency Program had the opportunity to examine and revise recruitment practices during the 2020–2021 academic year. This resulted in adaptations for a virtual recruitment season while aiming to improve the equity of our resident recruitment practices and selection for applicant characteristics that align with the program's missions and priorities. We describe our residency program's approach to comprehensively restructure the resident recruitment process to a holistic review model using evidence-based and best practice

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recommendations, as well as relevant findings found through the restructuring process.

METHODS

Prior Recruitment Process

Briefly, the program's previous recruitment process involved initially prescreening all applicants using predefined criteria including a US Medical Licensing Examination cutoff score of 230, no failed grades, and inclusion of a letter of recommendation written by a PM&R physician. Applicants that met prescreening requirements were then formally screened by program faculty and invited to interview based on subjective criteria. Interviews with faculty and residents were not structured. Interviewers subjectively rated applicants on knowledge of the field of PM&R, perceived interest in our program, and whether there were any outstanding qualities. Program leadership ranked applicants based on subjective quality of applicants and overall program "fit."

New Recruitment Process

Screening

A screening subcommittee consisting of program leadership, attending physicians from multiple training sites, and resident physicians was formed on a volunteer basis. The subcommittee created screening criteria and a weighted scoring rubric before the application cycle through consensus decision making. Screening categories and scoring rubric were structured on AAMC recommendations for a holistic selection process with modifications to emphasize specific traits valued in physiatry and by the residency program. Each screening category was then weighted based on the subcommittee's consensus. The screening rubric can be found in Appendix A (Supplemental Digital Content 1, http://links.lww.com/PHM/B591).

All members of the recruitment committee and additional volunteer faculty and resident physicians participated in screening applicants' Electronic Residency Application Service (ERAS) application. Before screening, a mandatory training session consisting of a screening rubric walk-through and grading sample applications was completed. In addition, screeners were provided a cover sheet with detailed instructions, including four evidence-based bias mitigation strategies, with encouragement to review immediately before screening applications (Appendix B, Supplemental Digital Content 2, http://links.lww.com/PHM/B592).[15–17] The bias mitigation strategies were modeled after a "implicit bias reduction cheat sheet" created and used by the medical school admissions committee at the Ohio State University and outlined in Table 1.[18] Screening subcommittee members were assigned proportionally more applicants to screen; otherwise, applications were randomly assigned to each screener. Each application was comprehensively reviewed by a single screener. Screening scores were compiled, and the highest scoring 76 applicants were invited to interview. An additional six applicants were extended interviews based on unique circumstances.

Interview

Semistructured Interviews

An interview subcommittee identified six specific domains to assess and subsequently designed three sets of structured interview questions; each set focused on two related domains. The domain pairs identified were (A) teamwork/leadership and critical/system thinking, (B) problem solving/attributes of a good learner and QI/research/scholarly interest, and (C) demonstrated interest in PM&R and qualities of a PM&R physician. All three interview question sets included questions asking the interviewer to rate the applicant's verbal communication/interpersonal skills and the candidate's maturity/self-awareness/emotional intelligence. Each standardized question was graded on a 5-point Likert scale using specific scoring criteria. An example of a structured interview question probing teamwork/leadership is shown in Figure 1. There was time during the interview for applicants to ask questions and for unstructured discussion beyond the structured interview questions. Before the interviews, all interviewers completed mandatory training on the semistructured interview format that included case examples of grading strong and weak responses to the structured interview questions. Additional training included distribution of the AAMC guide for virtual interviewing,[19] interview day logistic, and relevant technology programs.

TABLE 1. Strategies used to reduce implicit bias in the screening and interview process

Strategies	Explanation
Consider the opposite	After initial review of applicant, pause and actively search for evidence of opposite conclusion before making final decision.
Common identity formation	Look for common group identities with applicant to limit perception of applicant as outsider.
Counter stereotypical exemplars	Focus on admired/respected individuals in the same demographic as applicant.
Perspective taking	While reviewing applicant, pause to visualize their life, surrounding circumstances, and future to build empathy.

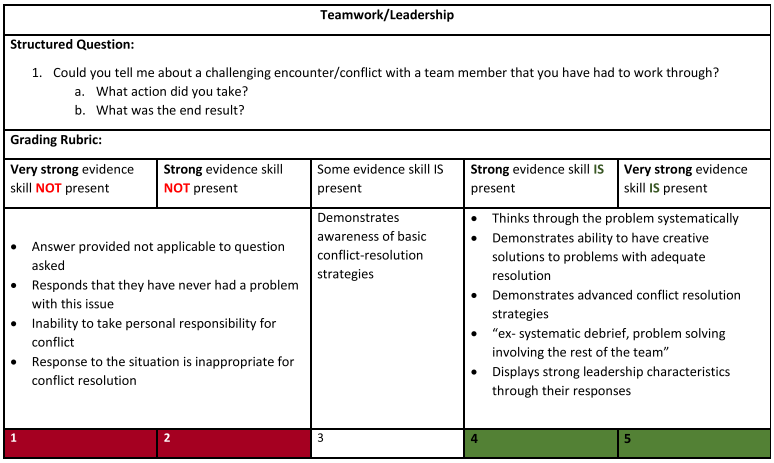
*Adapted from Capers[18] (2020).

Implementation of Implicit Bias Training

All individuals involved in recruitment, including recruitment committee members, volunteer screeners, and volunteer interviewers, were required to participate in the department's inaugural implicit bias training session, held in October 2020. The participants were encouraged to complete the Harvard Implicit Association Test on race before a virtual lecture and discussion session led by a faculty member with previous experience leading implicit bias training at another large academic PM&R department.

Interview Process

Each applicant was randomly assigned three interviewers consisting of two department faculty members and one current resident. Interviews were conducted over Zoom, lasting 20 mins each. Interviewers were assigned a single set of structured interview questions, and interviewees were asked all three sets of interview questions by the end of their three interviews. Feedback surveys were administered to applicants via SurveyMonkey, with responses rated on a 5-point Likert scale. Applicants were asked to provide anonymous feedback on their experiences with the interview process including questions regarding whether



Teamwork/Leadership				
Structured Question: 1. Could you tell me about a challenging encounter/conflict with a team member that you have had to work through? a. What action did you take? b. What was the end result?				
Grading Rubric:				
Very strong evidence skill **NOT** present	**Strong** evidence skill **NOT** present	Some evidence skill IS present	**Strong** evidence skill **IS** present	**Very strong** evidence skill **IS** present
• Answer provided not applicable to question asked • Responds that they have never had a problem with this issue • Inability to take personal responsibility for conflict • Response to the situation is inappropriate for conflict resolution		Demonstrates awareness of basic conflict-resolution strategies	• Thinks through the problem systematically • Demonstrates ability to have creative solutions to problems with adequate resolution • Demonstrates advanced conflict resolution strategies • "ex- systematic debrief, problem solving involving the rest of the team" • Displays strong leadership characteristics through their responses	
1	2	3	4	5

FIGURE 1. Example of structured interview question and grading rubric for teamwork/leadership domains.

they felt the interviews allowed them to be evaluated objectively, whether it was difficult to answer the questions, and whether the interview questions allowed applicants to highlight their strengths. They were also asked to compare their preinterview and postinterview impressions of the program.

Ranking

Applicant scores were deidentified before ranking. The adjusted screening and interview scores were averaged to create an aggregate score. Raw scores greater and less than 1.5 standard deviations from the group mean were adjusted up or down by 5% respectively to identify exceptional applicants. The rank list was ordered by aggregate score and submitted to program leadership for approval and submission.

Post Hoc Analysis

Screening scores for each individual screener were compiled, deidentified, and incomplete screening scores were removed. A one-way analysis of variance of screeners' scores was performed to evaluate systematic differences between screener scores. Subsequently, a Tukey-Kramer post hoc test was performed to determine the significance of pairwise comparisons. Similar analysis of interviewer scores could not be completed because of data collection limitations. Recently matched applicants were separated into previous (2017–2020 application cycles) and current (2020–2021 application cycle) groups. A χ^2 test of independence was used to determine association between these groups and either self-reported sex or race.

RESULTS

Screening

A total of 489 completed applications were screened by 22 screeners (median = 21.5, interquartile range = 10–25.8), which led to 82 interview invitations. Screeners spent approximately 15 mins reviewing and scoring each application.

Interview

A total of 80 applicants were interviewed by 24 interviewers over three interview dates. Forty six of the interviewed applicants were self-identified males, while 34 were female. Of the interviewed applicants, seven (8.8%) reported their race to be Black and another 7 (8.8%) reported their race to be Hispanic. There were no applicants who self-identified as American Indian, Alaska Native, Native Hawaiian, or Pacific Islander, which are groups also considered underrepresented minorities in medicine. The distribution of self-reported race of interviewed applicants is reported in Table 2.

Match

Of the program's eight available postgraduate year 2 positions, all matched via the regular match with comparable rank list positions to the previous years. Self-reported demographic information of matched applicants compared with the previous matches is reported in Table 3. No association was found between matched applicant groups and self-reported sex ($P = 0.59$) or self-reported race ($P = 0.53$).

Post Hoc Analysis of Screening

Group comparison of screeners' scores supported differences between screeners ($P < 0.001$). Of the 231 pairwise comparisons, 18 pairs were significant ($P < 0.05$). All significant pairs were accounted for by two screeners.

Applicant Feedback Regarding Interviews

Thirty applicants responded to a postinterview feedback survey across the three interview dates. Of the respondents, 27 (90%) either strongly agreed or agreed that the interviews allowed them to be evaluated objectively. Twenty-four

TABLE 2. Race distribution of the interviewed applicants

Self-reported Race	*n* (%)
Asian	29 (36.2)
Black	7 (8.8)
Hispanic	7 (8.8)
White	26 (32.5)
Multiracial	4 (5.0)
Other	1 (1.3)
No answer	6 (7.5)
Total	80 (100)

TABLE 3. Comparison of self-reported sex and race of the matched applicants from the current (2020–2021) and previous (2017–2020) recruitment cycles

	Previous 3 yrs, *n* (%)	Current Year, *n* (%)	*P*
Self-reported sex			0.59
Male	14 (58)	6 (75)	
Female	8 (33)	2 (25)	
No answer	2 (8)	0	
Self-reported race			0.53
Asian	10 (42)	3 (38)	
Black	2 (8)	1 (13)	
Hispanic	7 (29)	1 (13)	
White	3 (13)	2 (25)	
Multiracial	0	1 (13)	
Other	0	0	
No answer	2 (8)	0	
Total	24 (100)	8 (100)	

respondents (80%) felt that the interviews allowed them to highlight their strengths, while 10 of applicants (33%) found the interview questions difficult to answer. Twenty-seven of the respondents (90%) had a much better or better impression of the program after their interviews, while three (10%) reported that their impression was about the same. No respondents reported a worse or much worse impression.

DISCUSSION

A diverse physician work force has been recognized as a critical component in addressing the persistent racial and ethnic disparities in healthcare outcomes in the US healthcare system. Recruitment at the graduate medical education level is an important step in the pipeline of creating a more diverse physician workforce. Beyond diversity, residency program directors have the opportunity to promote inclusivity and equity in their recruitment practices by reflecting on and selecting applicant characteristics that are likely to be fostered, honed, and developed through training in their program, accounting for not only cognitive attributes and academic achievement but also noncognitive attributes and life experiences. While holistic review has been widely adopted at the undergraduate medical education level, with a majority of medical schools self-reporting use of elements of holistic review,[20] holistic recruitment principles have yet to be widely adopted in PM&R residency recruitment. During the 2020 residency recruitment season, our residency program, under a new leadership team, and in the face of the COVID-19 pandemic, had the opportunity to examine our recruitment practices and broadly reframe them in the context of meeting the imperative of recruiting a diverse resident workforce and adopting a radically different recruitment format in the form of virtual recruitment.

This process is presented to demonstrate feasibility and transparency with the hope that more graduate medical education programs adopt holistic recruitment practices. Furthermore, guides for a screening rubric (Appendix A, Supplemental Digital Content 1, http://links.lww.com/PHM/B591) and structured-interview questions (Fig. 1) are provided as examples that could be adapted to fit each program's specific needs. From our program's perspective, the recruitment process and resident match was successful. Despite using a largely blinded and new quantitative ranking process, the rank list position of matched applicants was consistent with the previous matches for our program. Demographic characteristics of matched applicants also remained consistent with the previous matches although interpretation is limited because of the small sample (Table 3). The recruitment process revealed specific challenges, which were further compounded by the necessity for virtual meetings and interviews during this application cycle. Creating a screening rubric and semistructured interview required significant upfront effort but can improve efficiency in subsequent application cycles. Notably, while time needed to screen each applicant increased twofold to threefold, this difference was mitigated by utilization of more screeners, predominantly resident physicians. Standardization of the screening process limits the risk that more screeners may sacrifice screening consistency. Furthermore, inclusion of the current residents may give them a greater sense of involvement, leading to improved resident satisfaction. Steadfast support and interest from program leadership, faculty, residents, and staff were essential in developing and implementing the new recruitment process.

All pairwise differences between screeners were accounted for by 2 of 22 screeners suggesting good screening consistency across most screeners. Strategies that likely contributed to screening consistency included rubric specificity and ease of use, standardized training, and targeted reminders. Mandatory implicit bias training could have also contributed to scoring equity. Interviewers found the structured format easy to implement and beneficial in scoring. Applicants reported satisfaction with the interview questions and did not report excessive burden from the structured interview components. Limitations of the questionnaire findings include participation and response biases. Restructuring residency recruitment to incorporate more holistic review principles within a single recruitment cycle can be done without significant sacrifices to efficiency, applicant experience, or a successful match.

This initial experience revealed ample opportunity for improvement. A major limitation was the ability to formally conduct a post hoc assessment of the screening and interview processes. Furthermore, the unprecedented virtual interview season confounds and limits the ability to draw conclusions. A primary focus for future recruitment seasons is planning an analytic methodology allowing more deliberate data collection. Iterative changes to the screening and interview processes will aim to improve diversity, equity, and holistic review. Planned adjustments to the screening process include increased blinding and adjustments to rubric criteria, content, weighting, and training. Interviews were most impacted by the transition to the virtual setting and will see changes with the transition back to traditional on-site interviewing. In addition, we hope to expand implicit bias training to allow for more in-depth discussion and reflection as well as incorporation of evidence-based strategies for bias mitigation. Because of a transition in program leadership, we had limited access to demographic data of previous years' applicant pools; however, we intend to prospectively track demographic data of applicants to measure the impact of changes to the recruitment processes on the distributions of women and underrepresented minorities in our interviewed and matched applicants.

In conclusion, we demonstrate the feasibility of successfully implementing holistic review elements in graduate medical education recruitment within a single recruitment season and provide templates to assist programs interested in pursuing a similar process.

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