Title
Opportunities for Mitigating Bias in the Process and Priorities for Pediatric Chief Resident Selection.

Permalink
https://escholarship.org/uc/item/8309q4t9

Journal
Academic pediatrics, 22(2)

ISSN
1876-2859

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Publication Date
2022-03-01

DOI
10.1016/j.acap.2021.12.004

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Peer reviewed
Opportunities for mitigating bias in the process and priorities for pediatric chief resident selection

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Declarations of interest: none

Word Count for abstract: 171    Word Count for manuscript: 2207
Abstract

Objective
To describe the current processes and priorities for pediatric CR selection, to characterize pediatric CR demographics in the past five years nationally, and to identify opportunities for addressing bias in the process of pediatric CR selection.

Methods
We used a cross-sectional study design with an anonymous national survey of pediatric program directors (PDs) through a web-based platform in January 2020.

Results
92 of 200 (46%) of PDs responded. 16% of CR are underrepresented in medicine (UIM) by race/ethnicity. The influential factors most commonly cited in selection were nominations from faculty (84%) and peers (77%), followed by fit with other co-chiefs (68%). Only 17% reported having a specific method to mitigate bias in CR selection, most commonly involving multiple stakeholders in the process.

Conclusions
Current CR selection relies on processes with the potential to introduce bias. Programs have opportunities to address bias in the CR selection process by reevaluating methods vulnerable to bias, including peer/faculty nominations, fit with peers, ITE scores, and assessments through the use of more objective selection tools.

Abbreviations: PD (program director), APD (associate program director), CR (chief resident), APPD (Association of Pediatric Program Directors), UIM (underrepresented in medicine), AAMC (Association of American Medical Colleges), LOR (letter of recommendation)
Introduction

It is known that multiple forms of bias affect both the selection of residents and faculty\(^1\), but little data exists on chief resident (CR) selection. There is limited information on the priorities of pediatric PDs or other stakeholders in the selection process. Strategies used to select CRs are also unknown, including whether processes or priorities in CR selection examine the potential introduction of bias.

The lack of diversity in the physician workforce is an injustice for both patients and physicians-in-training. Physician diversity is important as it has been associated with improved patient care outcomes, increased likelihood to serve the medically underserved, and enhanced educational experiences\(^2\)–\(^4\). Despite valuing diversity, there remains a low level of underrepresented in medicine (UIM) representation at advanced levels of training or academic appointments, with only 8.6% of academic pediatric faculty identifying as UIM\(^5\).

Chief residency can be an entrée into academic medicine due to the intense mentorship and sponsorship of chief residents. Chief residents in pediatrics are most commonly selected to serve an additional year beyond the completion of their training, in an administrative and educational leadership capacity with the training program. Due to the importance of their role, the selection process can be competitive, and the position is often a springboard for future involvement in academic medicine and medical education. Yet little is known about the demographics of CR and the processes that are used in CR selection. Understanding these processes better could lead to diversifying the CR workforce and ultimately the academic workforce.
In the pursuit of representation that better matches the diversity of the communities that we serve, there have been efforts within medical school and residency recruitment to identify potential sources of bias in the selection process. The AAMC recommends holistic review of applicants as a method to remedy the systemic factors that lead to discrimination. Consistent evaluation methods with holistic review can help deemphasize or remove items that may introduce more bias, such as Alpha Omega Alpha (AOA) status or USMLE scores. Standardized test scores are known to introduce bias, and it has been shown that they do not predict clinical performance during residency. It is unknown whether efforts to remove bias have been utilized in the process of CR selection.

The aims of this study are to explore pediatric PD priorities for and process of CR selection, to assess the current diversity of the pediatric CR workforce, and to identify opportunities for addressing bias in the process of pediatric CR selection.

Methods
A survey was developed by the authors, including current pediatric PDs and APDs with expertise and collectively over 40 years of experience in residency recruitment and leadership. It was initially developed through an iterative process, utilizing prior studies and experience to inform the questions. For demographics questions, PDs were asked to report demographics for chief residents and residents over the last five years to provide a longer lookback period and account for the possibility that any single year might not be representative of general demographics. We defined underrepresented in medicine by the AAMC definition: racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general
population. The survey was then pilot tested with cognitive think-aloud at 3 institutions and questions were refined with expert consensus of APDs and PDs. The APPD Research and Scholarship Learning Community reviewed and approved the survey for dissemination to the APPD listserv of pediatric program directors. The survey was built on LimeSurvey Professional and was distributed to 200 pediatric US PDs in January 2020 via email with 3 subsequent reminder emails.

Additional demographic data were obtained through APPD survey administrators and were fully deidentified prior to the team’s review. Non-responder demographic data, including program size and region, were obtained in order to compare the sample of responders to non-responders using Fisher’s exact tests for analysis.

Descriptive statistics were used to describe demographic items. Content analysis of free responses was performed to identify common methods for mitigating bias in chief resident selection. Data analysis was performed in MS Excel version 16.37 and R version 3.6.3.

Our study received an exempt determination through the University of Chicago IRB.

Results

Nearly half of all PDs responded, 92 of 200 (46.0%). Table 1 shows a comparison of those residency programs in our sample with all residency programs, which we found to be similar in region and program type compared to the population.

Based on a lookback period of five years, chief resident demographic information showed that CRs are largely female and not from underrepresented groups in terms of race/ethnicity. Data
was not available for resident and CR representation for 3 programs and program leadership representation for 4 programs. It was found that 16.2% of residents, 16.1% of CRs, and 15.5% of program leadership (as defined by PDs and APDs at each program) were UIM in terms of race/ethnicity (Table 2). Few CRs were identified as part of other underrepresented groups, such as LGBTQIA (4.2%), transgender or nonbinary (0.1%), or with disability (0.5%). Some of the 89 programs who responded with their UIM representation responded “I don’t know” for other representation: nine with respect to LGBTQIA, eight with respect to transgender or nonbinary, and six with respect disability representation.

Questions about the logistical considerations for the CR year revealed that recruitment season mirrors resident recruitment with 83.1% of programs completing CR recruitment between October and February. 90.2% of programs complete selection during the second year (or third year for medicine-pediatrics residents), and 84.3% of CR years are after completion of residency rather than embedded in the third year. 68.5% of CR continue in academic medicine, with fellowship being the most frequent destination for graduating CRs (48.5%), while 20.0% go on directly to university-based jobs.

For CR selection, responding programs reported that the people who were influential in CR selection include PDs (98.9%), APDs (87.0%), current chiefs (66.3%), coordinators (63.0%), and the chair (38.0%), with other faculty, resident, and nursing representatives less commonly having influence (Table 3). Nominations from faculty (83.7%), nominations from peers (77.2%), and fit with other co-chiefs (68.5%) were the most commonly cited influential factors in CR selection. 25.0% of PDs reported that in-service training exams (ITEs) played a role in CR selection. However, Step 1 and Step 2 scores were not considered, and only one program named Step 3
scores as influential. When asked what word would best describe a chief resident, leader or leadership (36.8%) were most common, followed by organized (11.5%).

Only 17.4% of PDs reported having a specific method to mitigate bias in CR selection, with the most common method being involvement of multiple stakeholders in the process. Tied for second most common were having an interview or a standardized process. Responses varied widely, including one program with a formal bias checklist and one program citing that the PD being the sole decider was their method to mitigate bias.

**Discussion**

This study is the first to our knowledge that identifies the diversity of pediatric CR, processes for CR selection, and potential sources of bias in selection. The finding that less than 1 in 5 residency programs in this representative sample have a method to mitigate bias in CR selection suggests that there is an opportunity to implement a more equitable and inclusive selection process. There are multiple findings from our study that could be considered in the development of a standardized process such as to consider exclusion of standardized testing, address the issue of in-group bias, and address use of any behavioral descriptors vulnerable to bias. PDs who are not already including others in the process of CR selection could consider the development of a selection committee to minimize the magnitude of any individual’s in-group bias.

The three most common influential selection factors of faculty nominations, peer nominations, and “fit” with other co-chiefs expose the selection process to potential vulnerability to the issue of in-group bias. Those with power to select candidates for a position may have pleasant feelings
when they encounter candidates who mirror their own traits, including ethnicity and gender\textsuperscript{10},
and unconsciously choose candidates in ways that unfairly disadvantages UIM candidates. With
only 15.5\% of our responding program leadership identifying as UIM, an individual’s in-group
bias will rarely favor UIM nominees. Without a standardized rubric to identify competency-
based criteria for a position, leaders in the selection process may discriminate against applicants
who are most qualified, instead choosing what is comfortable or familiar.

Though the majority of residency programs reported that standardized testing was not an
influential factor in their selection process, 25.0\% of PDs still report in-training exams (ITEs) as
influential. It is important to note that the first-year or second-year ITE results available at the
time of CR selection would not be as predictive of performance on the Pediatric Board Exams\textsuperscript{11}. Given the bias introduced by including standardized testing, excluding it as a selection factor
together would be beneficial.

For programs who use written comments or letters of recommendation (LOR) in their selection
process, it would be important to evaluate for sources of bias in the text. The most common
words to describe the defining characteristic of a chief resident were competency-based terms:
“leader,” “leadership,” and “organized.” Studies have found racial and gender bias in the use of
competency-based descriptors within LOR for residency\textsuperscript{12,13}. If other assessment criteria such as
ITE scores are removed from the decision-making process, it is possible that LOR or written
assessments may become more influential in the process and therefore need to be critically
appraised for bias.

Since multiple methods of selection can be flawed, PDs may consider using a holistic review
process for chief resident selection, which has been successfully used in residency recruitment\textsuperscript{14}.
One of the programs in our study mentioned using a bias checklist, which could be incorporated into a holistic review process. Other frameworks that have been used for addressing bias in medical school and residency recruitment may also be useful.

The representation of UIM residents, CRs, and residency program leadership (PDs and APDs) was very similar across the three levels of training, without the decrease between residents and program leadership that was previously reported by Mendoza et al. The representation for UIM pediatric residents matches the cross-sectional study by Montez et al, which found 16.5% to be UIM in 2019. This indicates that the UIM representation in pediatric PD and APDs is better relative to the population of academic pediatric faculty, although it still falls short of being representative of the general population of the United States. Based on our study, it is encouraging that there is a retention of UIM residents as CR. Further study of UIM CR recruitment and retention may provide valuable insight into the promising practices of these programs. In addition, in our study, LGBTQIA and those with disabilities were also poorly represented in CRs, indicating a need for further studies on these groups and additional reflection on what sources of bias may contribute to this decreased representation. Since some programs reported that they were not sure about the representation at their program, gathering data consistently at a program level would be a good first step.

Our results suggest that CRs are important in the pipeline of academic pediatric leadership, with more than half of CRs remaining in academic pediatrics after their chief year. This reaffirms the necessity for addressing bias in CR selection, to do further work to implement the processes to mitigate bias, and to study the selection process of CRs in other specialties.
Our study finds that the timing of the selection process for CR mirrors that of the residency selection cycle. Given that PDs are also devoting time to prioritizing a thoughtful, holistic recruitment process, it could be a consideration to move the timing of CR recruitment to before or after the residency recruitment season to avoiding competing priorities.

Our study has several limitations. The response rate was slightly less than half, although the responders and non-responders were not significantly different in terms of program type and geographic location. In addition, the response rate is comparable to other APPD surveys. Although we addressed validity through expert review, the survey instrument was not validated through other methods, and respondents may have interpreted questions in a different manner than intended. Another important limitation is that we relied on the PD’s report of resident and CR demographics. It is possible that PDs overestimated their UIM representation, given that the representation was higher than expected. Due to selection bias, it is possible that PDs who responded to the survey could be more likely to have methods of addressing bias in chief resident selection. Although PDs will know their CRs well and are familiar with their initial ERAS application with demographic characteristics, it is possible that they would not know some CR characteristics, including sexual orientation and abilities.

Conclusions

The selection of chief residents relies on processes with the potential to introduce bias. Programs have opportunities to address bias in the CR selection process by using holistic review, having multiple diverse representatives in the process, open discussions of potential sources of bias, and review for evidence of bias in prior selection. Future studies should measure the effect of
implementation of these bias mitigation strategies on the percentage of UIM residents selected for chief residency.
Table 1. Demographic characteristics of pediatric residency programs.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Our sample</th>
<th>Population of pediatric programs</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N (%)</strong></td>
<td>92 (46.0%)</td>
<td>200 (100.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Program type N (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University-based</td>
<td>43 (46.7%)</td>
<td>84 (42.0%)</td>
<td></td>
</tr>
<tr>
<td>Community-based, university-affiliated</td>
<td>39 (42.4%)</td>
<td>89 (44.5%)</td>
<td></td>
</tr>
<tr>
<td>Community-based</td>
<td>6 (6.5%)</td>
<td>16 (8.0%)</td>
<td></td>
</tr>
<tr>
<td>Military</td>
<td>2 (2.2%)</td>
<td>6 (3.0%)</td>
<td></td>
</tr>
<tr>
<td>Non-profit</td>
<td>0 (0%)</td>
<td>1 (0.5%)</td>
<td></td>
</tr>
<tr>
<td>Hospital-based</td>
<td>1 (1.1%)</td>
<td>2 (1.0%)</td>
<td></td>
</tr>
<tr>
<td>Teaching hospital</td>
<td>1 (1.1%)</td>
<td>1 (0.5%)</td>
<td></td>
</tr>
<tr>
<td><strong>Program location N (%)</strong></td>
<td></td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>Western</td>
<td>16 (17.4%)</td>
<td>29 (15%)</td>
<td></td>
</tr>
<tr>
<td>Mid-Atlantic</td>
<td>15 (16.3%)</td>
<td>31 (16%)</td>
<td></td>
</tr>
<tr>
<td>Southeast</td>
<td>15 (16.3%)</td>
<td>39 (20%)</td>
<td></td>
</tr>
<tr>
<td>Midwest</td>
<td>14 (15.2%)</td>
<td>28 (14%)</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>12 (13.0%)</td>
<td>29 (15%)</td>
<td></td>
</tr>
<tr>
<td>Mid-America</td>
<td>12 (13.0%)</td>
<td>24 (12%)</td>
<td></td>
</tr>
<tr>
<td>New England</td>
<td>6 (6.5%)</td>
<td>9 (5%)</td>
<td></td>
</tr>
<tr>
<td>Southwest</td>
<td>2 (2.2%)</td>
<td>11 (6%)</td>
<td></td>
</tr>
<tr>
<td><strong>Program size, mean</strong></td>
<td></td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td>Total residents</td>
<td>50.8</td>
<td>45.7</td>
<td></td>
</tr>
<tr>
<td>Categorical residents</td>
<td>47.3</td>
<td>42.9</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Resident, Chief Resident and Program Leadership Diversity. The proportion of residents and chief residents UIM was reported from 2016-2020. Current demographics for program leadership was reported.

<table>
<thead>
<tr>
<th>UIM representation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents (%)</td>
<td>(16.2%)</td>
<td></td>
</tr>
<tr>
<td>Chief residents N (%)*</td>
<td>176 (16.1%)</td>
<td></td>
</tr>
<tr>
<td>Program leadership N (%)*</td>
<td>51 (15.5%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chief residents over the last 5 years N (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>740 (69.2%)</td>
</tr>
<tr>
<td>UIM (race/ethnicity)</td>
<td>176 (16.1%)</td>
</tr>
<tr>
<td>LGBTQIA</td>
<td>45 (4.2%)</td>
</tr>
<tr>
<td>Disability</td>
<td>5 (0.5%)</td>
</tr>
<tr>
<td>Transgender or non-binary</td>
<td>1 (0.1%)</td>
</tr>
</tbody>
</table>
Table 3. Influential factors in CR selection.

<table>
<thead>
<tr>
<th>Program report of people who have the most influence on CR selection N (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>91 (98.9%)</td>
</tr>
<tr>
<td>APD</td>
<td>80 (87.0%)</td>
</tr>
<tr>
<td>Current chiefs</td>
<td>61 (66.3%)</td>
</tr>
<tr>
<td>Coordinators</td>
<td>58 (63.0%)</td>
</tr>
<tr>
<td>Chair</td>
<td>35 (38.0%)</td>
</tr>
<tr>
<td>Core faculty</td>
<td>18 (19.6%)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (10.9%)</td>
</tr>
<tr>
<td>Resident representatives</td>
<td>5 (5.4%)</td>
</tr>
<tr>
<td>Nursing</td>
<td>1 (1.1%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Influential factors in CR selection N (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nomination from faculty</td>
<td>77 (83.7%)</td>
</tr>
<tr>
<td>Nomination of peers</td>
<td>71 (77.2%)</td>
</tr>
<tr>
<td>Fit with other co-chiefs</td>
<td>63 (68.5%)</td>
</tr>
<tr>
<td>Progress in CCC/milestones</td>
<td>59 (64.1%)</td>
</tr>
<tr>
<td>Strength of interview for position</td>
<td>56 (60.9%)</td>
</tr>
<tr>
<td>Activities such as councils</td>
<td>56 (60.9%)</td>
</tr>
<tr>
<td>Strength of essay for position</td>
<td>38 (41.3%)</td>
</tr>
<tr>
<td>Life experiences</td>
<td>35 (38.0%)</td>
</tr>
<tr>
<td>Career goal of entering into academic medicine</td>
<td>27 (29.3%)</td>
</tr>
<tr>
<td>Involvement with efforts to promote recruitment</td>
<td>24 (26.1%)</td>
</tr>
<tr>
<td>ITE scores</td>
<td>23 (25%)</td>
</tr>
<tr>
<td>Step 3</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>Step 1 or 2</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>
References


doi:10.1016/j.jacr.2019.08.008


15. Capers Q, McDougle L, Clinchot DM. Strategies for achieving diversity through medical


18. Association of American Medical Colleges. *US Medical School Faculty By Sex, Race/Ethnicity, Rank, and Department, 2018*.; 2020.
Supplemental File (Survey)

Dear APPD community,

We are conducting a research study to understand the process and priorities for chief resident selection in Pediatrics. We know that chief residents can play a large role in residency programs and would like to understand better how they are selected. The survey has been approved by the University of Chicago IRB and the APPD Research and Scholarship Learning Community and will take approximately 5-8 minutes. We have a few questions that will request demographic information about your program and chiefs. Please ask your program coordinators for help to verify information if needed.

Thank you,
Sarah Gustafson, Barrett Fromme, Rhonda Acholonu, Patricia Poitevien, and Becky Blankenburg

Your participation is completely voluntary, and you will not receive any direct benefit from the study, though the knowledge obtained could positively impact your program’s practice in the future. By completing the survey, you are consenting to participate, and you can stop participating at any time by stopping the survey. All responses will be anonymous.

1. How many chief residents do you have each year? (Choose one of the following answers)
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

2. Is your chief position embedded in the 3rd year, or is it an additional year? (Choose one of the following answers)
   a. Embedded in the 3rd year
   b. Additional year

3. Is your chief resident ever recruited from another institution? (Choose one of the following answers)
   a. Yes
   b. No

4. How are chief residents paid? (Choose one of the following answers)
   a. Full junior faculty salary
   b. More than PGY-4 salary, but less than a full junior faculty salary
   c. PGY-4
   d. PGY-3
   e. Other:

5. In their first position post-chief residency, please estimate the PERCENT of chief residents over the last 5 years have gone on to: (Only numbers may be entered in these fields. The sum must equal 100.)
   a. university-based job (%)
b. community-based practice (%)
c. fellowship (%)
d. other (%)

6. Use one word to describe the defining characteristic for a chief resident. [free response]

7. Briefly explain how you assess the defining characteristic of a chief resident. [free response]

8. What time of year do you recruit and select chief residents? (Choose one of the following answers)
   a. July through September
   b. October through December
   c. December through February
   d. March through June

9. In which year of residency do you recruit and select chief residents? (Choose one of the following answers)
   a. During intern year (or second year for Med-Peds)
   b. During second year (or third year for Med-Peds)
   c. During third year (or for fourth year for Med-Peds)

10. What factors are influential in evaluating and selecting candidates for chief residency? (check all that apply)
    a. Nominations from peers (interns and other residents)
    b. Nominations from faculty members
    c. Step 1 or Step 2 USMLE board scores
    d. Step 3 scores
    e. ITE scores
    f. Participation in extracurricular activities during residency, such as councils
    g. Progress in milestones or CCC discussions
    h. Involvement with efforts to promote recruitment and retention of underrepresented groups
    i. Life experiences and background, including identification of the resident as a protected group
    j. Strength of interview for chief residency position
    k. Strength of application essay for chief residency position
    l. Candidate career goal of entering into academic medicine
    m. Fit with the other co-chiefs selected
    n. Other: [free response]
11. Of the factors you have selected [in question 10], please list the top three most influential factors in evaluating and selecting candidates for chief residency in order of importance.

12. Who is involved in the final decision about which resident(s) will be offered the chief resident position? (Check all that apply)
   a. PD
   b. APDs
   c. Coordinators
   d. Current Chiefs
   e. Resident representatives
   f. Core faculty
   g. Chair
   h. Nursing
   i. Other: [free response]

13. Do you have specific methods or approaches you use to mitigate bias in chief resident selection? (Choose one of the following answers)
   a. Yes
   b. No

14. If you do have methods to mitigate bias in chief resident selection, what are the specific methods? [free response]

15. Over the last 5 years, what NUMBER of chief residents have identified as female? (Choose one of the following answers) [drop-down]
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5
   g. 6
   h. 7
   i. 8
16. Over the last 5 years, what NUMBER of chief residents have identified as underrepresented in medicine (by the AAMC definition*)? *Underrepresented in Medicine by AAMC definition: Underrepresented in medicine means those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population. (Choose one of the following answers)

a. 0
b. 1
c. 2
d. 3
e. 4
f. 5
g. 6
h. 7
i. 8
j. 9
k. 10
l. 11
m. 12
n. 13
o. 14
p. 15
q. 16
r. I don’t know
17. Over the past 5 years, what NUMBER of chief residents have identified as LGBTQIA? (Choose one of the following answers)
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5
   g. 6
   h. 7
   i. 8
   j. 9
   k. 10
   l. 11
   m. 12
   n. 13
   o. 14
   p. 15
   q. 16
   r. I don’t know

18. Over the last 5 years, what NUMBER of chief residents have identified as third gender or non-binary? (Choose one of the following answers)
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5
   g. 6
   h. 7
   i. 8
19. Over the last 5 years, what NUMBER of chief residents were first generation in their family to attend college? (Choose one of the following answers)

   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5
   g. 6
   h. 7
   i. 8
   j. 9
   k. 10
   l. 11
   m. 12
   n. 13
   o. 14
   p. 15
   q. 16
   r. I don’t know

20. Over the last 5 years, what NUMBER of chief residents were disabled? (Choose one of the following answers)

   a. 0
21. How many total residents per year are in your categorical pediatric and categorical medicine-pediatrics (if applicable) residency programs at your institution? (Only numbers may be entered in this field.)

22. What PERCENT of residents in your program identify as underrepresented in medicine*? (Only numbers may be entered in this field.)

23. How many leadership members are there in your program? (include only PD and APDs) (Only numbers may be entered in this field.)

24. How many in this group of program leadership identify as underrepresented in medicine*? (Only numbers may be entered in this field.)