

# Residency Program Alert

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## Outranked

### How college hockey can improve your rank order list

**David A. Ross, MD, PhD**, had two major concerns during the 2010–2011 academic year, his second year as associate program director for the psychiatry program at Yale University in New Haven, Conn.

The first was what he calls “the Bob Effect.” Two faculty members, both named Bob, were skewing the resident selection process. One Bob was temperamentally cheerful and tended to rank candidates more highly than other faculty members. The other Bob tended to rank candidates lower than other interviewers. A candidate could move up or down 40 positions on the program's list of more than 100 candidates depending on which Bob had conducted the interview.

The second was Yale's hockey team. Ross, who watches a lot of hockey, admittedly spent “inordinate amounts of time” considering how Yale's top-ranked team would perform in the playoffs.

He thought college sports ranking might have a solution to a problem many residency programs face—after meeting with candidates over the course of the interview season, the preliminary list programs compile to rank candidates just doesn't seem right.

“They feel there's something arbitrary about it, because there is,” Ross says.

The way residency programs manage recruitment season often distorts preliminary rank order lists, he notes. Inaccurate lists can lead to haggling at the final resident selection meeting that programs have before agreeing on a rank order list to submit to the National Resident

## TRENDSPOTTING

482

Number of attending physicians surveyed about their workload and time for teaching.

3

Median (middle) number of hours physicians surveyed said they spent on didactic teaching each week.

43%

Of attending physicians surveyed felt they had enough time to teach.

65%

Of survey respondents spent more than three hours teaching.

SOURCE: *Academic Medicine*, September 2013

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# QUICK HITS

## ONLINE

### The iPhone app for interview season

The National Residency Matching Program (NRMP) released an iPhone app that lets applicants in the Main Residency Match develop ratings to generate rank order lists. The app also gives applicants the Main Match schedule of events, a directory of all residency programs participating in the Match, and a calendar to track applications and interviews. It's available for free at the Apple iTunes store. The NRMP expects to release an Android version later this year.

### Program applicants alter their online profiles

Residency program applicants don't think it's appropriate for program directors to screen their social media profiles during recruitment, but many change their profiles to present a more professional image during interview season anyway, a survey from Indiana University School of Medicine suggests. More than 60% of third- and fourth-year medical students surveyed said they would (or did) alter their online profiles for residency program matching, according to a research preview posted at [academicmedicineblog.org](http://academicmedicineblog.org).

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## Questions? Comments? Ideas?

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## FROM THE FIELD

"You can't advise or support or encourage someone unless you talk to someone. And you can't seek encouragement or advisement unless you talk to someone. So if there is no contact between both parties, then there is no mentoring going on."

—Ruth Nawotniak

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Matching Program (NRMP). These inaccuracies can also cause programs to pass over candidates who should have ranked higher on their lists.

Working with **Edward Z. Moore, PhD**, assistant professor in the Department of Engineering at Central Connecticut State University in New Britain, Conn., Ross developed an algorithm, a set of rules used to calculate rank order lists. The algorithm, called the Moore Optimized Ordinal Rank Estimator (MOORE), ranks candidates with a methodology similar to ones used to rank college sports teams.

This year, Ross is conducting a study to compare traditional rank order lists with lists generated by a software program that uses the MOORE algorithm. He believes the software-generated lists will more closely resemble the final lists that programs submit to the NRMP.

“Our hypothesis is that programs will look at the two lists and one of them will feel—if I may use a [Stephen] Colbert term—*truthier* than the other and it will feel like a more accurate representation,” Ross says. “We also think it’s going to be easier for programs and they’re going to be happier with it.”

### Why your rank order list isn’t working

The reason most rank order lists feel wrong is a result of the way residency programs structure recruitment season. Typically, programs divide interviews among a group of program directors and a few faculty members. Interviewers use scales to rate applicants. Then, programs calculate a score for each candidate by averaging interviewers’ ratings and rank candidates based on their score. Several aspects of this process lead to flawed rank order lists, including:

- **Broken scales.** The scales programs use to rate applicants, such as those which ask users to rate a candidate on a scale of 1 to 5, often aren’t valid, Ross says. Some interviewers may not know how to use scales, or may use a scale differently over the course of the interview season as they become more comfortable with it. And even the best scales can’t completely capture a user’s perception of a candidate or indicate how one candidate compares to others.
- **Differences between interviewers.** While using multiple interviewers may be necessary to manage large numbers of applicants, the practice limits a program’s ability to compare candidates

## Doing the math

**David A. Ross, MD, PhD**, and **Edward Z. Moore, PhD**, looked to college sports ranking methodology to help residency programs more accurately rank candidates.

Ross and Moore developed a software program that uses an algorithm—a set of rules about how to calculate rank order—called the Moore Optimized Ordinal Rank Estimator (MOORE).

Their system requires each interviewer to rank candidates in order of preference and upload the list into the software program, which calculates the candidate’s position. Here’s how the MOORE algorithm works:

- **Step 1:** The algorithm compares the candidates within the list, calculating a “winning” percentage for each. For example, within a list of five candidates, the winning percentage would be 100% for the first-ranked candidate, 50% for the third-ranked candidate, and 0% for the last-ranked candidate. The algorithm factors in the strength of the opponents, giving more points to candidates who

defeat strong opponents, to estimate a “weighted-win percentage.”

- **Step 2:** The algorithm identifies the strongest candidates for further analysis. (Ross and Moore considered the top 50% of candidates as “top tier,” but users can define the percentage of candidates for the program to analyze.)
- **Step 3:** MOORE conducts “pairwise comparisons” of the top candidates. The algorithm pits candidates against each other, considering each candidate’s weighted-win percentage, wins against other candidates rated by the same interviewer, performance against common opponents, and performance against other top-tier candidates, awarding a point for a win in each category.

The final rank order list is based on the number of pairwise comparisons each top-tier candidate wins. Ties are broken with weighted-win percentage. Candidates who rank below the top tier are ranked in order of weighted-win percentage.

directly. Interviewers may rate candidates differently, based on the number or quality of candidates they interview. The Bob Effect may disadvantage candidates who meet with interviewers who tend to give low ratings.

- **Imperfect interviewers.** All interviewers have some level of personal bias, which will affect how they rate candidates. (Again, think of the Bob Effect.) Some interviewers may judge candidates inconsistently or change how they rate candidates over the course of the interview season.

Having interviewers rank candidates in order of preference rather than with numerical scores alleviates some problems, but this method still has imbalances, Ross explains. For example, interviewers often meet with different numbers of candidates. A program director who interviews 50 candidates may have a different perception of how a candidate compares to his or her peers than a faculty member who only meets with five candidates. One interviewer may end up with an exceptionally strong (or weak) candidate pool.

### Building a better list

The algorithm Ross and Moore developed attempts to provide a more accurate ranking of candidates than

methods traditionally used by residency programs. Specifically, their system requires each faculty member to provide a list ranking the candidates he or she interviewed; this list is input into a software program. The software uses the MOORE algorithm, which considers:

- How often each candidate “won,” or outranked other candidates ranked by the same interviewer
- Each candidate’s “strength of schedule”—the quality of other candidates reviewed by the same interviewer

The system further scrutinizes candidates who have been identified as “top tier.” (For Ross and Moore’s study, which was published in the September issue of *Academic Medicine*, “top tier” candidates were defined as the top 50% of candidates on a preliminary list.)

Next, the algorithm conducts direct comparisons between each top-tier candidate, awarding additional points to candidates who perform better under several measures. (For more details about how the algorithm works, see p. 3.) The algorithm uses all of the data to generate a final list ranking all candidates.

### Real-life lists

Conservative estimates hold that 10%–20% of candidates who end up on a program’s rank list don’t belong there, but Ross believes the actual percentage may be greater. A more accurate rank order list means highly desired candidates are more likely to match into your program.

“That’s the real-world situation that we’re all facing, is that when we open our envelope on March 21, what proportion of people should be there,” Ross says.

To compare the algorithm to traditional ranking methods, Ross and Moore used computer simulation to mimic biases that throw off rank lists in real life, such as the Bob Effect. When high levels of bias were present, the list produced by the algorithm was more accurate, or more closely matched the rater’s intentions. In other words, more candidates ended up in the right place on the list.

While Ross believes that the software can help residency programs create more accurate rank lists, it’s just one part of optimizing recruitment. “There’s a lot of nuance to how you structure your season, to choosing your interviewers, to analyzing your data, to everything,” he says. 📧

## Want to try it?

**David A. Ross, MD, PhD**, associate program director for the psychiatry program at Yale University in New Haven, Conn., is conducting a study to compare traditional rank order lists with those generated by a software program he helped to develop.

To participate, residency programs must provide lists ranking candidates, as well as numerical scores for each candidate. (Candidate data submitted for the study must not include any identifying details.)

Researchers will then provide programs with two lists: a traditionally calculated rank order list and a list generated with their software. Programs will review both and report which one more closely resembles their final list.

Residency programs interested in participating in the study should email [david.a.ross@yale.edu](mailto:david.a.ross@yale.edu) for more details.