THE OTOLARYNGOLOGY SIGNALING EXPERIENCE

Tamara N. Chambers, MD, FACS
Associate Program Director
USC Caruso Department of Otolaryngology-Head & Neck Surgery

Otolaryngology Program Directors Organization (OPDO)
Steve Pletcher, Sonya Malekzadeh, David Chang, Marc Thorne, Eric Dobratz, Barry Schaitkin,
Rosemary Stocks, Emily Maurer, Katie Fitzgerald

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Otolaryngology

- bars represent applications per program
- line graph shows applications per person

*US/Canadian grads only 2011-2015; MDs only 2016-
Mean residency applications submitted per applicant, by specialty
MD applicants; ERAS® 2022-2023 season

- Hematology: 91.6
- Urology: 90.8
- Otolaryngology: 86.0
- Orthopedics: 83.9
- Neurosurgery: 77.8
- Radiology: 74.2
- OB/GYN: 72.9
- Surgery: 66.1
- Psychiatry: 62.1
- Anesthesiology: 61.7
- Plastic Surgery: 60.5
- Emergency Medicine: 49.1
- Vascular Surgery: 48.4
- PM&R: 47.3
- Neurology: 42.6
- Radiation Oncology: 40.6
- Internal Medicine: 35.2
- Family Medicine: 33.7
- Pathology: 31.5
- Pediatrics: 31.4
- Child Neurology: 29.5

(Data from ERAS® Submission Reports as of 12/25/2022)
The Problem

• Programs struggle to identify interested applicants
• Applicants struggle to stand out to programs of interest
Goals of Signaling

• Improve ability of applicants to obtain interview offers from programs of particular interest
• Improve ability of residencies to identify applicants with particular interest in their program
• Innovate in an area of stagnation
What is Preference Signaling?

• System that provides applicants with a defined number of signals to send to programs of interest
• Programs receive a list of applicants who have sent them a signal
  • No access to other programs applicants choose to signal & queries of students about signaling choices prohibited
• Credible method for applicants to inform programs of their interest
Approach: Preference Signaling

2021 Match Cycle

• 5 Signals per applicant
• All signals with equal weight
• Programs only see list of applicants that have sent them signals
• Cannot signal home program (or visiting SubI program)

2022 Match Cycle

• 4 Signals per applicant
• All signals with equal weight
• Programs only see list of applicants that have sent them signals
• Cannot signal home program or visiting SubI program(s)
Drivers to Initiate Preference Signaling

- Strategy to manage increasing application numbers
- Desire to improve distribution of interview offers
  - Concerns regarding “Interview Hoarding” with virtual interviews
- Equitably align applicant/program interests at interview offer phase
  - Most applicants eliminated from consideration during interview selection phase
  - Informal signals likely exacerbate inequities
- Innovate in an area of stagnation
OTO MATCH 2022

643 applicants
574 applicants in Match
559 applicants who signaled
463 US MD Srs in Match
361 positions
0 unfilled
Impact of Signaling

Interview Offer Rates

- Overall
- Non Signal (Home/SubI)
- Comp non-Signal
- Signal
- SubI
- Home Prog

2022
2021

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Interview offer rate by quartiles

**2021**

- **Non-Signal**
  - 1st Quartile: 0.1x
  - 2nd Quartile: 0.2x
  - 3rd Quartile: 0.3x
  - 4th Quartile: 0.3x

- **Comp non-signal**
  - 1st Quartile: 0.1x
  - 2nd Quartile: 0.2x
  - 3rd Quartile: 0.3x
  - 4th Quartile: 0.3x

- **Signal**
  - 1st Quartile: 0.2x
  - 2nd Quartile: 0.3x
  - 3rd Quartile: 0.4x
  - 4th Quartile: 0.4x

**2022**

- **Non-signal / sub-I / home**
  - 1st Quartile: 0.1x
  - 2nd Quartile: 0.2x
  - 3rd Quartile: 0.3x
  - 4th Quartile: 0.4x

- **Comp non-signal**
  - 1st Quartile: 0.1x
  - 2nd Quartile: 0.2x
  - 3rd Quartile: 0.3x
  - 4th Quartile: 0.4x

- **Signal**
  - 1st Quartile: 0.2x
  - 2nd Quartile: 0.3x
  - 3rd Quartile: 0.4x
  - 4th Quartile: 0.4x

**Multipliers**

- 2021: 3.5x
- 2022: 8.9x

**References**

- Chang, Thorne, Malekzadeh, Pletcher. Oto-HNS 2022 Aug 30 PMID: 36040808
Redistribution of Interviews with Signaling

Standiford, Chang, Thorne, Malekzadeh, Pletcher. Accepted for Publication: *Journal of Surgical Education*
Probability of Interview Invitation by Gender

- Did not send signal (female): 0.19
- Did not send signal (male): 0.13
- Sent signal (female): 0.82
- Sent signal (male): 0.73

- Predicted Probability of Interview Offer
  - 0.00
  - 0.10
  - 0.20
  - 0.30
  - 0.40
  - 0.50
  - 0.60
  - 0.70
  - 0.80
  - 0.90
  - 1.00
Probability of Interview Invitation by URM Status
# Signaling 2023

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<thead>
<tr>
<th>Specialty</th>
<th>Experiences</th>
<th>Geographic Preferences</th>
<th># of Program Signals</th>
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<tbody>
<tr>
<td>Adult Neurology</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
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<tr>
<td>Anesthesiology</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Dermatology</td>
<td>Yes</td>
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<tr>
<td>Diagnostic Radiology and Interventional Radiology</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Emergency Medicine</td>
<td>No</td>
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<tr>
<td>General Surgery</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Internal Medicine (Categorical)</td>
<td>Yes</td>
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<tr>
<td>Internal Medicine/Psychiatry</td>
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<td></td>
<td></td>
<td></td>
<td>15 (silver)</td>
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<td>Pediatrics</td>
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<td>Yes</td>
<td>5</td>
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<tr>
<td>Physical Medicine and Rehabilitation</td>
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<td>Yes</td>
<td>4</td>
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<tr>
<td>Preventive Medicine</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Psychiatry</td>
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<td>Yes</td>
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</table>
Signaling Outcomes by USMLE Score

Predicted Probability of Interview Offer

- USMLE Step 1 Score ≤ 241
- USMLE Step 1 Score 242-252
- USMLE Step 1 Score >252

- Did not send signal
- Sent signal
Signaling Outcomes by Demographic Group

Interview Offer Rate by Gender

USMLE Step 1 Score ≤ 241
USMLE Step 1 Score 242-252
USMLE Step 1 Score >252
Signaling Outcomes by Demographic Group

Interview Offer Rate by URiM Status

- **USMLE Step 1 Score ≤ 241**:
  - Did not send signal (non-URiM): 0.01 (0.00; 0.08)
  - Did not send signal (URiM): 0.14 (0.02; 0.52)
  - Sent signal (non-URiM): 0.07 (0.02; 0.21)
  - Sent signal (URiM): 0.04 (0.02; 0.09)

- **USMLE Step 1 Score 242-252**:
  - Did not send signal (non-URiM): 0.14 (0.01; 0.80)
  - Did not send signal (URiM): 0.14 (0.02; 0.52)
  - Sent signal (non-URiM): 0.31 (0.12; 0.58)
  - Sent signal (URiM): 0.07 (0.02; 0.21)

- **USMLE Step 1 Score >252**:
  - Did not send signal (non-URiM): 0.44 (0.09; 0.87)
  - Did not send signal (URiM): 0.74 (0.24; 0.97)
  - Sent signal (non-URiM): 0.26 (0.11; 0.46)
  - Sent signal (URiM): 0.58 (0.36; 0.80)

**Predicted Probability of Interview Offer**

- There are four categories of predicted probability for interview offers based on USMLE Step 1 scores and whether the signal was sent.