Enhancing Residency Transparency: A Comprehensive Methodology for Collecting and Analyzing Data on Orthopedic Surgery Residents in the United States

Omar Shaikh B.S., Freddy Jacome B.S., Hardik Dabas B.S., Mariam Banoub B.S., Will Reiser B.S., Owen Lema, Sia Cho B.A.

INTRODUCTION

Orthopedic surgery is among the most competitive residency specialties, with a **73.1% match rate for U.S. MD seniors in 2024** and significantly lower rates for DO and international medical graduates (IMGs). Following the transition of **USMLE Step 1 to a pass/fail format**, research productivity and other non-exam metrics have gained increasing importance in residency selection. With programs placing more emphasis on factors such as **AOA membership, dual-degree status, and institutional affiliations**, applicants face growing uncertainty in assessing their competitiveness.

Existing tools like **NRMP data, Texas STAR, and Residency Explorer** provide general insights but lack **program-specific benchmarking**, making it difficult for applicants to compare themselves directly to residents at individual programs. To address this gap, we developed a **comprehensive database** that compiles key residency applicant metrics—including **demographics, research output, academic affiliations, and pre-residency achievements.** By offering **objective, program-level insights**, this resource enhances transparency in the match process and equips applicants with data-driven strategies for residency selection.

RESULTS

Database Scope:

- **2,723 orthopedic surgery residents** from **208 ACGME-accredited programs** (2019–2023).
- **Demographic insights:** Gender distribution, medical school affiliations, dual-degree prevalence (MD/PhD, DO), and **AOA membership rates**.
- **Residency program trends:** Differences in research productivity, institutional affiliations, and historical competitiveness.

Research Productivity Analysis:

- **Publications:** Mean number of pre-residency publications per resident, stratified by PGY level and program.
- **Pre-residency H-index:** Distribution across residents, highlighting variation in research impact.
- **Authorship Trends:** Breakdown of first-author vs. co-author publications.
- **Journal Impact Factors:** Frequency of publications in high-impact orthopedic journals.
- **Citation Metrics:** Average citations per resident, identifying trends in research influence.

METHODOLOGY

Resident data was collected from **208 ACGME-accredited orthopedic surgery programs (2019–2023)** using publicly available program websites and social media. The dataset included **name, gender, medical school, residency program, degrees (MD, DO, PhD), postgraduate year (PGY), and AOA membership status.** Bibliometric data was retrieved using the **Elsevier Scopus API**, supplemented by **PubMed and ResearchGate**. A multi-step query process ensured comprehensive research capture:

- **First query:** Searched by name, medical school, and residency program.
- **Second query:** Expanded criteria to include broader institutional affiliations.
- **Third query:** Searched orthopedic publications (2011–2024) for missing resident records.

If no publications were verified, the resident was marked as **"No Publications Verified."** To ensure accuracy, a **publication relevance script** filtered research by journal credibility and orthopedic-specific keywords. Key publication metadata was extracted, including:

- **Publication count, pre-residency H-index, citation metrics, authorship position, and journal impact factor.**

Data was stored in three structured datasets:

- **DF1:** Initial resident-author matches.
- **DF2:** Extracted publication metadata.
- **DF3:** Processed orthopedic-relevant dataset.

A **manual review process** eliminated false positives, validated demographic and research data, and ensured alignment with **NRMP and Residency Explorer records.** The final dataset provides a structured, validated resource for analyzing residency program competitiveness.

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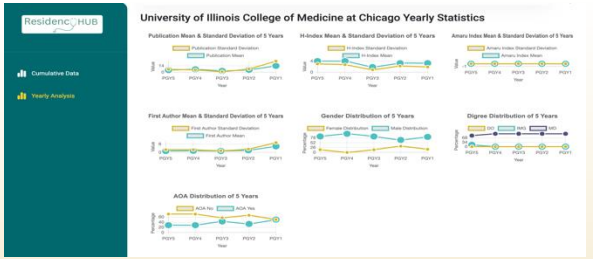

CONCLUSION & FUTURE DIRECTION

Key takeaways:

✓ Program-specific research productivity and application benchmarks.
✓ Objective, validated dataset with real-time updates.
✓ Expansion to other competitive specialties (neurosurgery, plastic surgery, dermatology).

Comparison to Existing Databases:

- **Program-Specific Benchmarking:** Unlike NRMP and Texas STAR, our database provides granular insights tailored to individual residency programs.
- **More Accurate Research Assessment:** Excludes abstracts and presentations, focusing only on peer-reviewed manuscripts.
- **Expanded Metrics:** Includes **AOA status, dual degrees, medical school affiliations, and demographic representation**, filling gaps in traditional residency databases.

Future Integration:

- Interactive online platform will allow applicants to **compare their credentials** to program-specific benchmarks.
- Expansion to **other competitive specialties** (neurosurgery, plastic surgery, dermatology).

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