Comparative Evaluation of Ergonomic Stress of Trainees and Attendings in the Operating Room: A Feasibility Study

Theresa N Wang, MD[1]; Annabella M Hochschild, MD[1]; Ian S Soriano, MD[2]; Nisha Narula, MD[3]; Abhisek D Parmar, MD[4]; Mary Kate Bryant, MD[5]; Andrew S Wright, MD[1]
[1]University of Washington; [2]University of California San Francisco; [3]Rutgers New Jersey Medical School; [4]University of Alabama; [5]Medical University of South Carolina

BACKGROUND

- Surgeon ergonomic stress impacts musculoskeletal health, surgical performance, and career longevity
- Limited data on impact on trainees

Is it feasible to investigate surgical trainee ergonomic stress and compare it to that of attendings during operations?

METHODS

- Prospective observational study
- Cases across general surgery, cardiothoracic surgery, and urology
- Ergonomic assessments on intraoperative video clips
- 3 scoring mechanisms, higher score indicating higher stress
  - VelocityEHS Industrial Ergonomics software
  - Rapid Upper Limb Assessment (RULA)
  - Rapid Entire Body Assessment (REBA)
    - Sample evaluation shown in **Figure 1**
- Surveys administered:
  - Surgical Task Load Index (SURG TLX)
  - Body Part Discomfort Scale

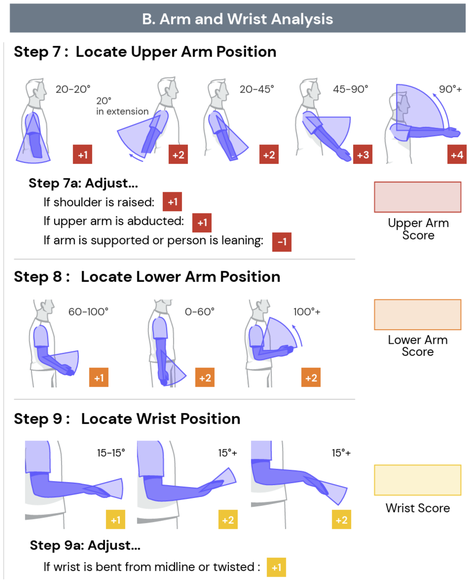

Figure 1. Scoring rubric for upper extremity ergonomic stress on REBA

Original Worksheet Developed by Dr. Alan Hedge. Based on Technical note: Rapid Entire Body Assessment (REBA), Hignett, McAtamney, Applied Ergonomics 31 (2000) 201-205

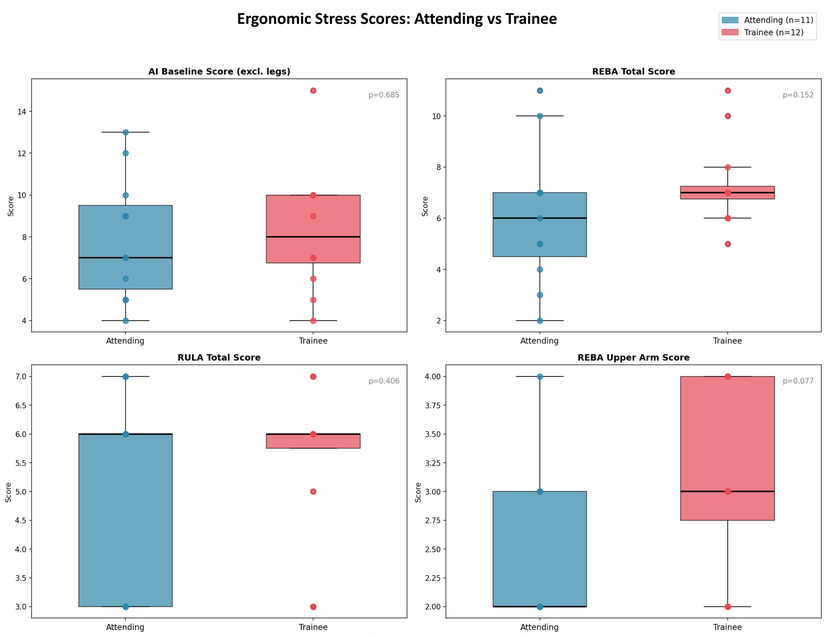

Figure 2. Pairwise comparison of attending and trainee ergonomic stress scores, by scoring mechanism

RESULTS

- 11 cases were filmed with 5 attendings (20% female) and 4 trainees (50% female)
- All trainees were senior (≥PGY4)
- Surgical approaches included 4 open and 7 laparoscopic
- Ergonomic stress found to be highest for right hand/wrist, right elbow, right shoulder, and neck
- Attending and trainee overall ergonomic stress scores similar on pairwise comparison ($p>0.05$) on all three scoring mechanisms (**Figure 2**)
  - Higher upper arm ergonomic stress on REBA ($p=0.077$)
- Mental load: trainees reported mental demands and task complexity were the highest burden
- Discomfort: trainees reported highest discomfort in the arm, shoulder and neck

CONCLUSION

- **Surgical trainees demonstrate similar ergonomic stress as faculty**
  - Noticeable strain in the **right upper extremity and neck**
- Mental demands and task complexity pose the highest cognitive burden
- **Quantitative ergonomic analysis can be performed for trainees in the operating room and compared to attending ergonomic stress**

- Future investigation to reveal targets for education to improve ergonomic habits in trainees

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