## ACS 2025 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

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## **Research In-Progress**

## Evolving Ergonomics: Musculoskeletal Complaints Begin During Surgical Training, Continue into Practice

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**Introduction:** Musculoskeletal injuries (MSKI) are prevalent across all surgical specialties and modalities. Previous studies focusing on surgical ergonomics investigated MSKI based on surgical specialty, surgical procedure, and surgeon demographics. However, there is limited data evaluating the significance of career stage on surgery-related MSKI.

**Methods:** A questionnaire was distributed to trainees (residents and fellows) and attendings across five surgical subspecialties within a single institution. Data collected included surgeon demographics, practice characteristics, training level or career stage, experience with instruments, and presence and frequency of localized symptoms. Statistical analysis was performed using two-tailed t-tests assuming unequal variances and Fisher's exact tests, with a p-value of 0.05 determining significance.

**Preliminary Results:** Of the 21 surgical trainees and 11 attendings who completed the questionnaire, all attendings reported pain and stiffness, seen in the table. 95.2% of trainees reported pain, and 85.7% reported stiffness. However, the difference in pain and stiffness reported between attendings and trainees was not statistically significant (p > 0.05). Of reported pain, location in the neck was most common, with 45.5% of attendings and 61.9% of trainees affected (p=0.465). Neck stiffness was reported by 63.6% of attendings and 42.9% of trainees (p=0.458). Numbness, localized to the fingers and arms, was significantly increased in attendings (36.4%), compared to trainees (4.8%) (p=0.037). Despite 96.9% of surgeons attempting exercises and stretching, 75% still experienced persistent symptoms.

**Next Steps:** The survey findings show that surgeon participants experienced musculoskeletal discomfort regardless of training level. Neck pain was more prevalent in residents, while neck stiffness was more common in attendings. Limitations include a small number of respondents, limiting the power and significance of the study. However, these preliminary results demonstrate the need for further research on ergonomics during surgical training and practice.

Demographics and Musculoskeletal Injuries Experienced by Surgical Attendings and Trainees				
	Total Population (n = 32)	Attendings (n = 11)	Trainees (n = 21)	P values
Average age	35.7	47.9	29.8	<u>&lt; 0.001</u>
Gender (% female)	37.5	36.4	38.1	1
Average inner glove size	6.9	7.1	6.8	0.129
Individuals with pain (%)	31 (96.9)	11 (100.0)	20 (95.2)	1
Individuals with stiffness (%)	29 (90.6)	11 (100.0)	18 (85.7)	0.534
Individuals with numbness (%)	5 (15.6)	4 (36.4)	1 (4.8)	<u>0.037</u>
Individuals with neck pain (%)	18 (56.3)	5 (45.5)	13 (61.9)	0.465
Individuals with neck stiffness (%)	16 (50)	7 (63.6)	9 (42.9)	0.458