

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

P-B-04

Promoting Technology and Collaboration

The History and Evolution of Ergonomic Risk Assessments for Musculoskeletal Disorders

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Background: In the world of ergonomics, it is widely known that musculoskeletal disorders (MSDs) are among the most common and most costly injuries sustained by employees. In the surgical world, however, this has not always been the case. Over 50% of surgeons (male and female)** report having an injury related to operating due to the high-risk postures that are often maintained for hours at time. Fortunately, awareness has grown over the past few years regarding MSDs in surgeons and more resources are being dedicated towards research and education for preventing these common injuries.

**Tran M, Kortz MW, Johnson B, Janis JE. Operation-related Musculoskeletal Injuries among United States Surgeons: A Gender-stratified National Survey. *Plast Reconstr Surg Glob Open*. 2022 Feb 18;10(2):e4142. doi: 10.1097/GOX.0000000000004142. PMID: 35198358; PMCID: PMC8856129.

Technology Overview: Among these resources are several different technologies that can be applied to more quickly and accurately assess high-risk postures and document objective injury risk scores. This presentation will focus on the recent advances in technology, especially as it relates to ergonomics and assessing surgical tasks. We will go through the history and evolution of these technologies, beginning with the manual assessments (RULA, REBA, etc) that were developed decades ago, ending with assessments that are currently completed leveraging three-dimensional motion capture technology and AI.

Potential Application in Surgical Simulation and Education: •Overview of MSDs - definition, cause, prevalence•Why does this matter to you? (cost, lost productivity, risk of re-injury)•History and evolution of assessment tools and how they are useful for evaluating surgical tasks

Potential Opportunities to Collaborate: •Recent advances in technology especially as it relates to assessing surgical tasks•What does the future state look like? (resources and educational programs focused on prevention, proper equipment and ergonomics)