

ACS 2023 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Research In-Progress

Challenges of Ergonomics Encountered by Women in Surgery

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Introduction: Female surgeons may encounter greater ergonomic barriers while operating on patients compared to their male counterparts. Surgical instruments are generally made as a standard size. Past studies have reported as high as an 87% injury rate related to instrument design suited for those with larger and stronger hands in the field of minimally invasive surgery. Tools such as the laparoscopic stapler have been reported as too large by female surgeons who on average are more likely to receive medical attention related to wrist, thumb and finger injuries compared to men. Such findings may deter women from entering the already male dominated surgical specialties. Our study aims to investigate the role gender plays in the required pinch and grip strength associated with the usage of forceps and the Kocher clamp.

Methods: An open-ended pre survey will be sent out to third year medical students at RVU prior to a surgical rotations prep course. The pre-survey will address demographics, average glove size, and engagement in common daily activities in which grip or pinch strength may be improved. After hand measurements are taken, pinching capabilities of forceps without and with simulated tissue (introduction of torque) will be measured using a baseline LITE hydraulic pinch gauge. Grip strength required for the use of the Kocher clamp will be measured using a baseline® electronic Smedley adult hand dynamometer. At the conclusion of the prep course an open-ended post survey assessing perceived level of pinching and gripping difficulty will be sent to students. Following collection of data, a chi square analysis will be performed.

Preliminary Results: *Mock table representing relationship between average glove size & pinch/ grip strength*

Average Glove size	Perceived level of discomfort during pinching activity with simulated tissue	Perceived level of difficulty during pinching activity without simulated tissue	Perceived level of difficulty during gripping activity	Pinch Strength in Kg	Grip Strength in Kg
Small					

Medium					
Large					

Next Steps: Creating ergonomically friendly tools for female surgeons should be of high priority. Such steps can foster an environment in which female surgeons can perform surgery and pursue surgical subspecialties with increased confidence.

References: Sutton, E., Irvin, M., Zeigler, C. *et al.* The ergonomics of women in surgery. *Surg Endosc* 28, 1051-1055 (2014). <https://doi.org/10.1007/s00464-013-3281-0>