



## KEY POINT SUMMARY

### OBJECTIVES

The objective of this study was to investigate the prevalence of laparoscopic surgeon injury/illness symptoms and evaluate associations between symptoms and operating room ergonomics. The study also sought to investigate the relevance of the surgeon's awareness, knowledge, and utilization of ergonomic principles in the operating room.

## Ergonomics Principles Associated with Laparoscopic Surgeon Injury/Illness

Miller, K., Benden, M., Pickens, A., Shipp, A., & Zheng, Q. 2012 | *Human Factors Volume 54, Issue 6, Pages 1087-1092*

### Key Concepts/Context

Although laparoscopic procedures significantly benefit patients in terms of decreased recovery times and improved outcomes, they contribute to mental fatigue and musculoskeletal problems among surgeons. A variety of ergonomic interventions and applications are implemented by surgeons to reduce health problems. Currently, there is a gap in knowledge regarding a surgeon's individual assessment of the operating room and their ergonomic needs during surgery.

### Methods

This cross-sectional study recruited laparoscopic surgeons from the Central Texas area. Brazos County and the surrounding 100-mile radius was chosen so that the study could draw from both urban and rural populations. The authors created a new survey instrument to solicit information from surgeons (N = 61) regarding surgeon demographics, perception, frequency of operating room equipment adjustment, and self-reported symptoms. Their questionnaire was based in part on the Society of American Gastrointestinal Endoscopic Surgeons (SAGES) Task Force on Ergonomics Questionnaire and the Safety Attitudes Questionnaire (SAQ). Surgeons responded to questions addressing safety, ergonomics, and fatigue in the operating room, using a 5-point Likert-type scale that included the option 'undecided.' Data were analyzed using statistical software Stata/IC 11.0 (Stata, College Station, Texas).

### Findings

All of the laparoscopic surgeons (100%) who responded to the questionnaire reported experiencing at least one injury/illness symptom as a result of performing laparoscopic surgery. The average number of self-reported symptomatic areas was 8.4. The most prevalent injury/illness symptoms reported as 'frequently' were neck stiffness (26%), back stiffness (26%), and back pain (23%). Symptoms most reported



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as ‘occasionally’ included neck stiffness (66%), irritability (64%), back pain (64%), and back stiffness (61%).

Agreement with the statement, “The equipment and overall layout of my operating room is designed for and encourages surgeon comfort,” respondents who were decided in their answer were less likely to experience neck pain, shoulder/arm pain, and shoulder/arm stiffness. Regarding agreement with the statement, “The equipment and overall layout of my operating room reduces my occupational risk of cumulative injury,” respondents who were decided in the answer were less likely to experience shoulder/arm pain, shoulder/arm stiffness, and headaches. In addition, there was an association between less shoulder/arm pain and respondents who were able to assess fatigue and the ergonomic conditions of their operating rooms.

### Design Implications

Designers need to be aware of the ergonomic issues related to all aspects of medical procedures. Designers should consider using some of these questions during the programming phase and/or provide operating room mock-ups and conduct laparoscopic surgical simulations to understand the interaction of the operating team and their environment, including equipment placement.

### Limitations

The authors noted that the sample size was small, limiting generalizability. They also noted that the survey is a subjective tool used to assess self-reported surgeon injury. There is traditionally an underreporting of symptoms in the surgical community, and this respondent bias may have affected the results.