

## A Brief Note on Ergonomics in Surgery

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### DESCRIPTION

Every surgeon knows a co-worker who is affected by surgical pain or injuries to the musculoskeletal system. It may be the orthopedic surgeon who finally underwent spinal surgery after years of pain from a herniated disc. Or it could be the experienced laparoscopic surgeon who, due to the intense physical demands of conventional laparoscopy, has changed his practice in favour of other surgical modalities. It may be the surgical oncologist who has reluctantly stopped kneeling on the operating table for years due to chronic back pain, or the gynecologist who has finally decided that he can no longer operate due to the high stress caused by the operation on the body. However, these are more than just warning stories—they are a serious, if largely unspoken, daily reality faced by surgeons in all surgical specialties and modalities. Musculoskeletal disorders associated with surgery are surprisingly common [1,2]. Each surgical modality presents unique ergonomic risks to the surgeon, and while surgeons recognize these risks and the resulting pain and discomfort that experience. Having undergone surgery, surgeons will rarely report violations to their facilities. Also, while there are some ergonomic guidelines, few surgeons are aware of them and almost none receive special training in ergonomics. Finally, the study of ergonomics in surgery is limited by logistical difficulties, such as the use of motion tracking devices by surgeons in the sterile operating room

The word "ergonomics" is derived from the Greek words *ergon* (work) and *nomia* (arrangement) away. According to the definition of the CIEA (Council of the International Ergonomics Association), "Ergonomics is the scientific discipline which deals with indulgent interactions between human beings and additional essentials of a system [3]." In short, ergonomics is "the concept of designing the work environment to suit the worker rather than forcing him to adapt the working environment [4]."

The ergonomics research in surgery is very limited. Szeto, et al has evaluated surface electromyography in anterior deltoid muscle, upper trapezius as well as the erector spinae muscles of 25 surgeons. The authors found advanced muscle action

throughout the open surgery when compared with laparoscopic method and endovascular. Surgeons retained more neckline flexion throughout exposed measures related through laparoscopic surgery [5].

Surgeons face a variety of ergonomic challenges in the operating room, leading to a high prevalence of WMSDs (Work-related Musculoskeletal Disorders) in all surgical modalities. In addition to lead surgeons, those participating in training and operating room assistants may also be exposed to particular ergonomic risk. Ergonomic interventions have been performed with excellent results in many other industries, surgeons lack ergonomic training. Additionally, WMSDs create significant disabilities and changes in surgeon practice; Work-related injuries are not reported to institutions, likely contributing to a lack of awareness and training on surgical ergonomics. Currently available research tools to study surgical ergonomics are limited by subjective data, cumbersome recording equipment, and the lack of a validated correlation between subjective injury reports and objective findings. The goal of future research should be to develop instruments for measuring and improving ergonomics in surgery that are reproducible, easy to use and objective. Interventions should be aimed at surgeons of all levels of training and should also take into account the ergonomic burden for the surgical assistant [6]. Efforts should be made to correlate symptoms of pain or discomfort, results of ergonomic evaluations, and evidence of tissue damage in surgeons and surgical assistants affected by MMS. Given the success of ergonomics programs in other disciplines, institutions should prioritize research to clearly define surgical ergonomic risk factors and perform interventions to reduce the vulnerability of treating surgeons and surgeons-in-training. Hospitals and specialist training programs must develop and enforce evidence-based ergonomic training protocols to protect surgeons from preventable, career-changing or career-ending injuries.

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**Received:** October 07, 2021; **Accepted:** October 21, 2021; **Published:** October 28, 2021

**Citation:** Pranay B (2021) A Brief Note on Ergonomics in Surgery. *J Ergonomics*. 11:e202.

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