

## Ergonomics in the operating room

### *Ergonomía en el quirófano*

Abilene Cirenia Escamilla-Ortiz,\* Josefina Serrano-Pérez‡

The word ergonomic comes from the Greek *ergos* –work– and *nomos* –laws, and rules–. It follows the natural laws of human work and nature; in short, everything is in the right way and place. Ergonomics is essential for the surgeon, but many do not consider it. The surgeon must adapt to the work environment.

The tasks that the surgeon performs daily not only require mental clarity, hand and eye coordination, concentration, and precision in the execution of movements but also to remain in the same posture for periods ranging from minutes to hours.

In recent years, the patient benefit has been weighted “first, not harm”, but we have forgotten about the surgeon’s care and well-being.<sup>1</sup> Lack of ergonomics training and subsequent implementation during surgical procedures leads to discomfort and pain that results in fatigue, which can affect speed, stamina, and concentration.<sup>1</sup>

Work-related musculoskeletal disorders are repetitive strain injuries that can damage muscles, nerves, and joints (neck, back, waist, wrist, and hands).<sup>2</sup>

In vaginal surgery procedures, injuries are reported from 54 to 87%, laparoscopic surgery from 73 to 100%, robotic surgery from 23 to 80%, and open surgery from 66 to 94%. Surgery is analogous to playing sports; it can be physically and mentally demanding, so good health and nutrition are necessary to prevent injuries.<sup>2</sup> Safe and effective exercises can be done before entering the operating room to improve the

torso and abdomen muscles. A stretching routine should be part of any surgeon’s routine to provide flexibility and decrease musculoskeletal injuries.<sup>2,3</sup>

Before the surgical event, the surgeon must anticipate everything that may be required during the surgery, for example, the adjustment of the lights, how the patient’s arms will be positioned, and other procedures which will allow the surgeon to be comfortable. Likewise, the height of the table should be checked since if it is not adjusted, it can cause back and neck problems, so it is suggested that the neck should be flexed at 20 degrees, minimize trunk torsion, distribute the load and not block the knees, maintain a good position of the arms about the shoulders in laparoscopic surgery, as well as the placement of the monitors to avoid twisting; abduction of the shoulders should be kept at 30 degrees or less.<sup>2,3</sup> When holding the camera in laparoscopic surgery, the wrists should be kept in a neutral position avoiding flexion or extension for a long time. In open surgeries, the way the instruments are taken is also important to avoid injuries, for example, introducing the whole finger in the rings instead of only introducing the tips of the fingers.

The incidence of sprains or muscle strain secondary to maintaining prolonged and uncomfortable postures, as well as remaining static while holding a retractor with manual force, is frequently reported; for example, in the cervical region, it has been reported in 58.1%, dorsal 40.5%, lumbar 52.7%, wrist 27.1% and

\* Editor-in-Chief,  
Cirujano General.  
orcid.org/0000-  
0001-5635-5845

‡ Head of the Center for  
Educational Innovation  
in Medicine and  
Clinical Simulation  
of La Salle. Mexican  
School of Medicine,  
La Salle University  
Mexico. Mexico.



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in the shoulders 24.3%. The percentage may vary depending on the type of surgery and the surgeon's gender; however, it is in the female gender where a higher progression is reported in the upper torso.<sup>4</sup>

Surgeons have challenges in the operating room; there is still much to investigate on this subject since the current tools for the study of ergonomics are limited, so measurement and improvement instruments that can be reproduced and are easy to use should be developed. Hospitals with training programs for residents should implement protocols in which ergonomics is taught to prevent conditions that could put their professional life at risk.

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### *Correspondence:*

**Abilene Cirenia Escamilla-Ortiz**

**E-mail:** [escamillaoa@amcg.org.mx](mailto:escamillaoa@amcg.org.mx)