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Procedia Manufacturing 3 (2015) 67 – 73

**Procedia**  
MANUFACTURING

6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the  
Affiliated Conferences, AHFE 2015

## Ergonomic risks in operating rooms: An unexplored area in Mexico

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### Abstract

On November 13<sup>th</sup> 2014, Mexico issued revised normative regarding issues of health and safety at work. For the very first time, consideration is given to the existence of work risks of ergonomic nature. These are formally defined as “the presence of physical overexertion, repetitive movements or unnatural postures, during the performance of a job, that may lead to fatigue, error, accident or occupational illness, and which is due to improper design of facilities, machinery, equipment, tools or work posts”. The normative calls for the identification and solution of those risks, and places the main responsibility on the employer and their representatives. It is enforceable on every single work area in the country as a whole. Operating rooms are a work environment where to date ergonomics has had little consideration, even though it is widely known the extent and severity of situations that fall clearly under the definition of ergonomic risks cited above. We have started an effort to do as mandated, considering the demands placed on surgeons of a variety of specialties. A proposal was put forward to the management committee and the ethics committee at a private hospital in Leon, Guanajuato. We requested the opportunity to review video recordings from surgical procedures completed in the operating rooms of the hospital, in order to first identify ergonomic risks for the personnel involved, and then propose solutions based mainly in a rearrangement of facilities and work procedures. The management committee has already pledged their support to the initiative. It is very likely that the same will happen at the ethics committee. Thus, at AHFE 2015 we shall be delivering a very interesting report on this so far unexplored facet of a most relevant work situation in Mexico.

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Peer-review under responsibility of AHFE Conference

**Keywords:** Ergonomics; Operating room; Surgeon

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## **1. Introduction**

Ergonomics issues in operating rooms have been addressed extensively, for a long time now. Thus, Berguer [1] published in 1999 an excellent compilation of the published material up to that moment, regarding both the main concerns in that respect, and the proposed solutions to the problems thus far identified.

The author points to the fact that open surgery is a realm with a number of ergonomics concerns which at the time had not been adequately solved. And he goes on to remark the enormous influence that the on the extent and complexity of those ergonomic issues has had the development of microsurgery procedures.

Unfortunately, it is well apparent that in Mexico there is very little interest on the matter of ergonomics and how it may improve the work conditions in the operating room. This is evidenced by the fact that out of the 111 references included by Berguer, only one was originated in the Mexican realm. Furthermore, that work looked not on an ergonomic matter properly, but on the extent of the stress reactions experienced by both the surgical team and the patient undergoing the procedure [2].

This situation of apparent disregard to the matter of ergonomics in the Mexican surgical environment, however, should be changing in a drastic way in the near future. This, because on November 2014, the Secretaria del Trabajo y Prevision Social (Ministry of Labour Affairs) has issued the reviewed version of the Reglamento Federal de Seguridad y Salud en el Trabajo (Federal Ordinance on Work Safety and Health) [3]. For the first time ever, the ordinance takes into account the existence of ergonomic risks, and places on the employer the responsibility for identifying and addressing them.

This fact prompted us to start the work in order to develop a practical approach to assessing the nature and measure of the ergonomic risks faced by surgeons operating in Mexico. The results of the very first step in that direction are presented here.

## **2. Methodology**

Taking advantage of the fact that one of the authors is a surgeon himself, a proposal was put forward to the management of a privately run hospital in the city of Leon, asking for the opportunity to evaluate the working conditions in their operating rooms. Even though the video recording of surgeries is a standard procedure in the hospital, access to that material was not granted, on the grounds of ethical considerations. Photographs were supplied instead and, in some cases, our colleague contributed with some photos of his private collection.

We proceeded then to study the materials at hand, looking for the presence of ergonomics risks as defined in the Federal Ordinance on Work Safety and Health.

## **3. Results**

Our main findings are shown in the figures that follow.



Fig. 1. Surgeons appear looking at the monitor in a laparoscopic procedure. This places both visual and postural demands on them. For the person at the left in front position, there is a strong radial deviation for both hands.



Fig. 2. Both surgeons in the second plane exhibit a marked cervical flexion. The person in the first plane shows a strong torsion of trunk and neck.



Fig. 3. Both surgeons at front show a strong flexion and deviation of neck. For the person at the left, all segments in the right arm undergo a serious postural demand.



Fig. 4. Both surgeons exhibit trunk flexion, with strong flexion and lateral deviation of neck as well.



Fig. 5. Surgeon in front, right: marked trunk flexion, strong neck flexion and visual demands. Female person in left position, exhibits ulnar deviation in holding instrumental.



Fig. 6. Surgeon at the back: Lateral deviation in trunk and neck, abduction of right shoulder, ulnar deviation right hand; besides, evident use of force in the action. Surgeon at front, right side, lateral deviation in trunk and neck.



Fig. 7. Surgeon at left hand side, front position: Flexion and lateral deviation in trunk and neck, abduction of right shoulder, flexion in elbow and wrist. Surgeon in first plane, right side: flexion in trunk and neck, abduction of right shoulder, strong deviation in right wrist.

#### 4. Discussion

The Mexican Federal Ordinance on Work Safety and Health refers to ergonomic risks as:

- Physical overexertion
- Repetitive movements
- Forced, unnatural postures

Our results show the presence of at least two of these risks. It is not possible to report on repetitive movements only on the basis of photographs.

Nonetheless, according to Albayrak et al [4] this is a risk factor that surgeons do face in their professional performance. These authors mention “nonergonomic body postures, *frequent awkward repetitive movements of the upper extremities*, and prolonged static head and back postures.” They also refer to the presence of cardiovascular stress during procedures, the magnitude of which is larger than what is expected from the aerobic physical work being performed.

In relation to the ergonomic risks for surgeons in Mexico, there is an aspect worth considering in what the Federal Ordinance on Work Safety and Health states. It places on the employer the obligation to deal with the matters of preventing their presence and, eventually, putting things right in order to suppress them.

It should be rather easy to ascertain who the obliged subject is, in the case of surgeons working in the government-funded public health service. Although in practice this might prove a bit difficult, since the Mexican model of public health encompasses at least three nation-wide organisations, serving to specific segments of the population. There are also a large number of state-wide health systems, as well as organisations set up by special interest groups, such as state-funded universities. The end result is numerous organisations which are run by a mixture of Federal, State and even City officers in some cases. These circumstances make it difficult to establish whether the responsibility lies with the officer closer to the operating level, or it goes up the ladder, to the highest echelon in the scale.

For surgeons working in the privately run hospitals, this will prove far more difficult. On the one hand, the usage is for them to work on a ‘freelance’ basis, so that the surgeon is self-employed rather than in the employment to

somebody else. This scheme also allows for surgeons to operate in more than one site, be it because they are called by the administrators, or because they may go where they find the necessary facilities.

To make matters even more interesting, in many cases the surgeons operate both as part of the government-funded health systems –more than one at times- and as freelance providers of their professional skills to privately run hospitals. Furthermore, if they are successful enough they may own one of these facilities, a circumstance that makes them employers not only to themselves, but to other professionals.

Thus, the Mexican scene poses a number of challenges to the ergonomics practitioner interested in this area. Starting with the invocation of ethical concerns when it comes to gaining access to the operating theatre, which is by no means a minor obstacle. Following with the definition of to whom they will communicate the results of their enquiries, taking account that it must be the person responsible for the working conditions in those settings. One more factor, of a very considerable weight, is the one highlighted by Albayrak et al when they state “The fact that surgeons are performing surgery so concentrated that they tend to neglect their posture increases the need for body support.” Indeed, as our results show, the neglect is not just to postural demands, but to practically any consideration beyond getting the task done in the interest of the patient well-being, forsaking any consideration to the work conditions, in as far as they do not impinge on their main purpose. And this attitude the surgeons expect to find in practically any member of staff in the operating room, a scenario that opens many other interesting areas for the concern of ergonomists.

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