

Study of musculoskeletal risks of the office-based surgeries

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Abstract. Due to the cost and time benefits associated with patients and physicians, outpatient surgeries continue to become more and more popular over time. With the increase in the number of office-based surgical procedures, the prevalence of work-related musculoskeletal disorders (WMSDs) associated with office-based surgeries has been reported. The purpose of this pilot study is to ergonomically evaluate the risk of work-related musculoskeletal disorders of physicians/surgeons performing office-based surgery (OBS). Ergonomic assessment tools included Questionnaire, the BodyMap and the Rapid Upper Limb Assessment for measuring potential ergonomic concerns. The findings have shown that the ergonomic issues of greatest concerns were the discomforts in the neck, shoulders, arms/wrists, and back. Some additional comments were provided by the participants regarding the duration of discomfort or clarification on the frequency of their body discomfort. This study suggests that there is a considerable risk of musculoskeletal injuries of physicians/surgeons performing the OBS tasks. By properly using the ergonomic assessment techniques, valuable information on ergonomic OBS workplace design and selection could assist in the early interventions of WMSD prevention.

Keywords: ergonomic assessment, body discomfort, work posture, musculoskeletal disorders, healthcare

1. Introduction

According to the Institute for Safety in Office-based Surgery (2010), more than 10 million office-based surgeries were performed by family physicians, dermatologists, plastic surgeons, and numerous other surgical sub-specialists. With the continued advancements in medical technology and rising cost of health care, the volume of outpatient surgeries will continue to grow. Due to the nature of work associated with office-based surgeries, physicians are exposed to work-related musculoskeletal disorders (WMSDs) risks including static and awkward postures, repetitive motions, and extended durations. As the volume of office-based surgical procedures increases, the symptoms of work-related musculoskeletal injuries are common in office-based surgery and may begin early in a physician's career (Esser et al., 2007). The purpose of this pilot study is to ergonomically evaluate the risk of work-related musculoskeletal injuries and illnesses of the physicians performing office-based surgeries.

2. Method

Both observational and subjective ergonomic analytical methods were used to assess the occupational risk factors of physicians performing office-based surgeries. Subjective data was collected using a questionnaire combined with a modified form of the musculoskeletal discomfort assessment tool BodyMap (Marley and Kumar, 1996). The BodyMap and questionnaire were combined into one single sided form. This was to increase participation within the research study. With the first four questions looking at demographic data such as, age, sex, hand dominance, and whether or not the physician required any type of vision assistance. The remaining 26 questions focused on each participant's level of frequency and intensity of discomfort, along with a range of surgeries performed each week from within an office setting. The Rapid Upper Limb Assessment (RULA) tool represents the objective aspect of the analysis,

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and was used to help determine the amount of exposure to the occupational risk factors associated with physicians performing OBS.

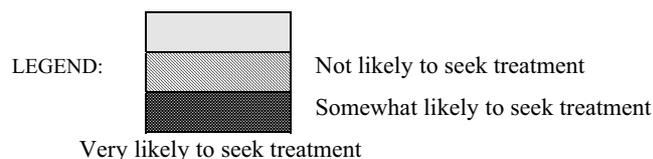
3. Results

A total of six participants participated in this study with a mean age of 37.5 years. Six right-handed volunteers (four male and two female) participated in

this study. Three of the participants ranged in age between 25-34 and three of the participants ranged in age of 40 and up. Specialty areas of the participants included: plastic surgeon, dermatologist, and four family practitioners. Two of the four family practitioners performed their duties at outreach clinics, each with populations of 5,000, whereas the other two practitioners performed their duties from hospital setting, with a population of 59,000.

Table 1
The Summary of BodyMap Assessment

Body Region	Subject 1	Subject 2*	Subject 3*	Subject 4	Subject 5	Subject 6*
Eyes			Very likely to seek treatment			Very likely to seek treatment
Neck	Not likely to seek treatment	Not likely to seek treatment			Not likely to seek treatment	Very likely to seek treatment
Right shoulder	Not likely to seek treatment			Not likely to seek treatment		Very likely to seek treatment
Left shoulder	Not likely to seek treatment					Very likely to seek treatment
Right upper arm	Not likely to seek treatment			Not likely to seek treatment		Very likely to seek treatment
Left upper arm	Not likely to seek treatment					Very likely to seek treatment
Right elbow						
Left elbow						
Right forearm						
Left forearm						
Right wrist					Very likely to seek treatment	
Left wrist						
Right hand						
Left hand						
Upper back		Not likely to seek treatment				Very likely to seek treatment
Buttocks						
Mid-To-Lower back	Not likely to seek treatment	Not likely to seek treatment	Very likely to seek treatment			Not likely to seek treatment
Right thigh						
Left thigh						
Right knee						
Left knee						
Right lower leg						
Left lower leg						
Right ankle or foot						
Left ankle or foot						



The use of vision assistance such as glasses or contacts was divided equally among the participants with two male and one female requiring aid and the other three participants requiring none. In addition physicians were asked how many surgeries they performed on average each week, 1-5, 6-10, 11-15, 16-20, or 20-above. Thus far the results in this on going investigation indicate that physicians are being exposed to the occupational risk factors associated with WMSD's in office-based surgeries.

According to our subjective assessment in Table 1 (see above) areas not likely to seek treatment are indicated by a 10% shading for each selected rectangle adjacent to the body part in question, somewhat likely to seek treatment is represented by a pattern of downward facing diagonal lines, and very likely to seek treatment is represented by a dark cross etch pattern. Physicians performing as little as 1-5 OBS per week reported BodyMap discomfort level of up to 6 (0 being no discomfort, 10 being extreme discomfort). The frequency ratings were from between 2 to 3 (0 being never, 3 being constantly) in their neck, shoulders, upper arms and back.

Four out of six participants experienced at least some level of discomfort in their necks. In addition four participants experienced pain in their mid-to-lower back area. Some additional comments made by physicians were made of their own accord. Comments were recorded under the frequency section for selected body parts in place of a check mark. These comments provided additional information on the duration of discomfort or clarification on the frequency of their discomfort. Comments varied from "3-4 mos.", "1 year", "every other day", "daily", and "chronic". For example subject 3 identified his discomfort has been ongoing for "1 year". As well subject 6 identified that her neck discomfort occurred "daily" and that it was "chronic".

Another important point to mention is that 3 out of the six participants use the word "daily" to describe the frequency of their discomfort. Frequency of discomfort among all participants either resulted in a "Frequently" (few times/week) or "Constantly" (nearly every day) marking when ever discomfort was indicated among participants. The highest average number of surgeries performed each week was between 11-15 recorded by subject 5 (plastic surgeon). This subject's wrist discomfort could be caused by the similarity in the surgeries performed as well as the increased numbers. Subject 6 was the only family physician to record performing an average of be-

tween 6-10 OBS per week. The remaining subjects all recorded average OBS of between 1-5 per week. Subjects 3 & 6 were two of the three participants that wore glasses (as indicated by an asterisk in table 1) and may be cause by improper lighting, office equipment, or glare from the glasses themselves. Note that all of the participants that wore glasses in this study indicated a greater level of discomfort.

The Rapid Upper Limb Assessment (RULA) was used to assess three different tasks (i.e., cutting, cleaning/inspecting, and finishing inspection/completion) of a Mohs removal procedure. For the cutting task, the RULA final score was 5; indicating that the participant is working with awkward postures (arm & wrist, neck, trunk) and putting oneself at risk of WMSDs. Due to this poor posture this task needs to be investigated and changed soon to prevent injuries. For the cleaning and finishing inspection tasks, the RULA final scores were 4 respectively; indicating the participant is working in a posture that could present some risk of injury. This score most likely is the result of one part of the body being deviated and placed in an awkward position, and should be investigated and corrected. The RULA action levels give the user the urgency about the need to change how a person is working as a function of the degree of injury risk (McAtamney and Corlett, 1993).

4. Discussion

We found similar results in a 2007 survey-guided observational study (Esser et al., 2007), looked at 17 Mohs physicians/surgeons using a questionnaire survey and the RULA assessment tool. Their study used a computer program to determine correlations between symptoms and individual demographics. Video was also used for recording Mohs procedures of six surgeons, allowing for a more detailed analysis of postures, and later reviewed by ergonomists, using the rapid upper limb assessment tool to assess the surgical postures of the practicing physicians. Their findings showed that the most common complaints were pain and stiffness in the neck, shoulders, and lower back. Of the 17 participants in their study, 12 of them required the use of contacts or glasses. It should be noted here that the results of the present study might be different from the other parts of the country when this pilot study is limited to one region. In the future, the authors plan to collect a larger sam-

pling of OBS sites and specialty areas. Overall, we feel that the BodyMap and the RULA ergonomic assessment techniques are very useful for initially assessing risk for work-related musculoskeletal disorders in the OBS work. More awareness and better implementation of *specialty task-specific* ergonomic interventions is needed to reduce physical workload and prevent long lasting injuries (or body discomfort) to the eyes, neck, back and upper extremities of the physicians/surgeons performing office-based surgeries.

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