Impact of surgical role on fatigue: Self-reported fatigue before, during and after surgery over 79 cases

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Introduction

A growing body of literature in surgery has stressed the wide-spread prevalence of musculoskeletal pain, fatigue, and injuries among surgeons in operating rooms across the world (Park et al. 2010); however, research on the prevalence of fatigue among other surgical team members (i.e., certified surgical assistant, certified registered nurse anesthetists, registered nurse, anesthetists, residents, and fellows) is limited. Although the impact of fatigue on surgical team is limited, research focusing on surgeon and residents has shown that high levels or prolonged periods of fatigue can impact both surgeon health and performance (McCormick et al. 2012).

Purpose of this study is to quantify self-reported fatigue before, during, and after each surgical procedures and compare fatigue and discomfort among the surgical roles.

Methods

Participants

This study (Institutional Review Board 13-004027) was conducted with 33 surgeons and their surgical team on one surgical day for each team. Their surgical day consisted of up to three sequential procedures performed at a large non-profit teaching hospital between September, 2013 and February, 2014.

Quantifying Fatigue and Discomfort

To quantify individual’s fatigue and body-part discomfort, surveys containing 10-point visual analogue scales (VAS) were used. Visual analogue scales were anchored as follow: 0=very low and 10=very high. The survey was administered to each surgical team member immediately after every procedure.

Procedures

Procedures were collected across multiple surgical specialties (e.g., general, colorectal, urology, vascular, etc) and no surgeries during the surgical day were excluded. Upon completion of each procedure, the surgeon and each member surgical team members answered the voluntary questionnaire based on their experience during each completed procedure.

Data Analysis

The data was de-identified and aggregated in a Research Electronic Data Capture database (REDCap Consortium). Analysis of the data was completed using MATLAB™ (version 2012b MathWorks Inc.) and Microsoft’s Office Suite.

Results

A total of 79 surgical cases involving 212 surgical team members were collected in this study. Preliminary analysis of fatigue over time among the different surgical roles is shown in Figure 1. Participants used the VAS to indicate their fatigue levels before, during, and after each surgical procedure over the day. Fatigue
trends were fairly consistent for all roles (Figure 1) and mean fatigue for each surgical role, except Anesthetist increased for the duration of the surgical case. Mean pre-surgical case fatigue was lowest for the surgeon and highest for the Anesthetist. Fatigue during the surgery were highest for the Fellow (2.8), followed by Anesthetists, Resident, CSA, and Surgeon (Figure 1). Post-surgery fatigue was highest for the Fellow (3.6), followed by the Resident, Anesthetist, Surgeon, and Certified Surgical Assistant. Overall, the largest change in fatigue between pre-surgery and post-surgery was reported by surgeons (+2.5), fellows (+2.1), and CSA (+1.6) (Figure 1).

**Figure 1:** Fatigue at three distinct points during the procedure stratified by roles, where Anes=Anesthetist, CRNA=Certified Registered Nurse Anesthetist, CSA=Certified Surgical Assistant, CST=Certified Surgical Tech, Fell=Fellow, Resi=Resident, RN=Registered Nurse, and Surg=Surgeon.

Mean body-part discomfort and pain for all participants was highest in the lower back (1.7/10), followed by neck and ankles/feet. Surgeons reported that post-operative pain was highest in Neck (2/10), Back (1.9/10), and shoulder (1.6-1.7). Back and ankles/feet pain were highest for Residents, RNs, CSTs, Anesthetists, and CRNA. However, CSAs and Fellows reported highest pain for the neck and back.

**Discussion**

This demonstrates the high workload leading to fatigue for the surgical team during a surgery, especially for surgeons and fellows. Anesthetists reported fatigue that is sustained from prior to post-surgery; however, it is important to note that only Anesthetist data was only available for eight of the seventy-nine cases. Nonetheless, the sustained fatigue is a trend unique among the roles and warrants further investigation to identify how workload differences between Anesthetists and the other roles impact reported fatigue trends before, during, and after the procedure.

Besides the roles that perform tasks directly on patient (Surgeons, Residents, and Fellows), the Certified Surgical Assistant (CSA) had the highest post-surgery fatigue and the greatest difference between post and pre-surgery fatigue. This suggests that task demands for CSAs (e.g., sustained muscle exertion from retractors, holding laparoscopic cameras in awkward postures) during the procedure may stressful and fatiguing.

Further research into interventions for fatigue and ramifications of repeated fatigue are ongoing.
Keywords: Surgery, Surgical Teams, Fatigue, Workload

References:
