Orthopedic Residency: Are Duty Hours Predictive of Performance?

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OBJECTIVE: This study examines the relationship between self-recorded resident work hours and Orthopedic In-training Examination (OITE) scores, resident clinical performance, and American Board of Orthopedic Surgery pass rates. The hypothesis of this study is that increasing duty hours would have a positive correlation with clinical and OITE performance.

DESIGN: Total duty hours and recorded operating room hours from a single orthopedic residency program were extracted from 2006 to 2012. During the same time span, OITE scores, resident clinical scores from the E-Valuation system, and American Board of Orthopedic Surgery pass rates were collected. The correlation between the variables was assessed using the Pearson correlation coefficient's precision statistic.

SETTING: A large public tertiary academic center in the upper Midwestern United States.

PARTICIPANTS: A total of 82 orthopedic surgery residents over 7 years.

RESULTS: A total of 82 residents were matriculated between 2006 and 2012. The average weekly recorded duty hours were as follows: postgraduate year 2 (PGY2) = 60 hours/week (Standard Deviation (SD) $\pm$ 4), PGY3 = 59 hours/week (SD $\pm$ 5), PGY4 = 51 hours/week (SD $\pm$ 4), PGY5 = 49 hours/week (SD $\pm$ 3). There was significant variability in the average number of hours worked among residents (range: 2128-3753 h/y) for the full academic year. The OITE scores and the work hours were found to be independent of each other ($\rho = 0.017$, $p = 0.825$), and no correlation was found between OITE scores and the resident E-value scores ($\rho = 0.071$, $p = 0.34$). Residents spent 36% to 48% of their time in the operating room.

Second year residents logging more hours scored higher on faculty evaluation of overall competency ($\rho = 0.31$, $p = 0.035$). Faculty assessment of technical skills had a positive correlation with operating room duty hours for PGY5 class ($\rho = 0.346$, $p = 0.025$).

CONCLUSIONS: A large variation in duty hours exists between resident-logged duty hours. No correlation exists between in-training scores and duty hours. There is a positive correlation between senior resident operating room hours and technical skill scores. (J Surg Ed 73:281-285. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: resident education, duty hours, resident performance, orthopedic surgery

COMPETENCIES: Medical Knowledge, Professionalism, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

Resident medical education has been evolving since the implementation of duty-hour limits. Contradicting opinions pertaining to resident duty-hour restrictions and the effects they have on surgical training, patient care, quality of life, and academic performance have been reported since the Accreditation Council for Graduate Medical Education instituted the restrictions to limit the number of resident work hours in 2003.[1] More recently, graduate medical education programs have implemented a new set of Accreditation Council for Graduate Medical Education work hour restrictions, which re-ignited discussion about the effect of the policy.[2] These restrictions were initially used to limit the negative effect of resident sleep deprivation on patient safety and improve resident well-being; however, the benefits as they relate specifically to orthopedic surgery

patients remain inconclusive,[3,4] and the effect on surgical resident training is yet to be fully elucidated.

Several studies have reported on the quality of life perceived by residents,[5,6] resident family birth rates,[7] surgical experience,[8,9] and financial burden[10] since the implementation of the restricted duty hours. Many orthopedic program directors are concerned about the effect of decreased work hours on resident education and preparation for life in practice.[11] Since the implementation of the 80-hour work restriction in 2003, the American Board of Orthopedic Surgery (ABOS) part I examination fail rate has nearly doubled, increasing from 12% in 2007 to 21% in 2011. Owing to the reduction in time for resident education and decreasing ABOS part I exam pass rates, orthopedic training programs have been forced to experiment with new strategies in resident education in an attempt to prepare residents for certification examinations and life after residency.[12-14]

Across the United States, orthopedic residents annually participate in the Orthopedic In-Training Examination (OITE) and are evaluated by faculty during their clinical rotations. OITE scores have been shown to correlate with ABOS pass rates among graduates in the past, with Dougherty et al.[15] showing those who averaged in the 27th percentile or lower on the OITE had a 57% chance of failing the ABOS Part I examination. Identification of academically at-risk residents in a program is paramount for the initiation of intervention strategies or the need to modify the academic curriculum. There have been no previous studies focusing on the relationship between resident duty hours and clinical performance evaluations, OITE scores, or ABOS pass rates. The purpose of this study is to examine whether a correlation exists between the resident duty hours and objective measures, such as OITE scores, resident clinical performance scores, and ABOS pass rates. The hypothesis of this study is that increasing duty hours would have a positive correlation with clinical and OITE performance.

MATERIALS AND METHODS

After obtaining Institutional Review Board approval, the resident management system was queried for reported resident work hours between the years 2006 and 2012, when electronic work hour reporting was mandated. The data were gathered from a single orthopedic residency (OR) program, which featured full-time private and academic faculty at multiple education sites and consisted of 5 to 8 residents per year. The RMS is a secure quality management and contract administration program designed by Resident Engineers of the United States Army Corps [https://www.new-innov.com]. In this residency program, work hours are reported in a monitored structured program. Every Friday, every resident is required to submit a work

hours log, detailing total hours and operative room hours. Weekly work-hour data for each resident since 2006 was entered into the electronic database, totaling 82 residents. During the same time span, OITE scores, resident E-value rotation scores, and ABOS pass/fail rates were also collected. The clinical scores obtained from the E-Valuation system were the composite overall competencies and technical skills scores averaged from all faculty members for all rotations during each academic year. All residents in training postgraduate year 2 (PGY2) through PGY5 were included. PGY1 residents were excluded because they participate in a general surgical intern year with a limited 3-month orthopedic curriculum. The duty hours, OITE exam, and clinical rotation scores were stratified by the PGY, as it is assumed that residents consistently learn more as their residency progresses and perform better on the OITE. Duty-hour data were also subdivided into total hours, which include activities such as clinic, rounds and conferences, and operating room hours.

Data from the resident total and OR duty hours, OITE scores, clinical evaluation scores, USMLE scores, and ABOS pass rates were extracted and entered into a database. Sample characteristics were summarized for terms of their mean and standard deviation, with skewed variables for median and interquartile range. Categorical variables were described in terms of the frequency and percentage of the sample. The relationship between the independent variables was assessed using the Pearson correlation coefficient's precision statistic. A high Pearson correlation between variables demonstrates a positive association. A low Pearson correlation implies independence and a negative value implies an inverse relationship. A significant $p = 0.05$ was used for this study.

RESULTS

A total of 82 resident years were available for analysis between 2006 and 2012. Excluding 15 days of allocated personal time off, average weekly duty hours were as follows: PGY2 = 60 hours/week (SD ± 4), PGY3 = 59 hours/week (SD ± 5), PGY4 = 51 hours/week (SD ± 4),
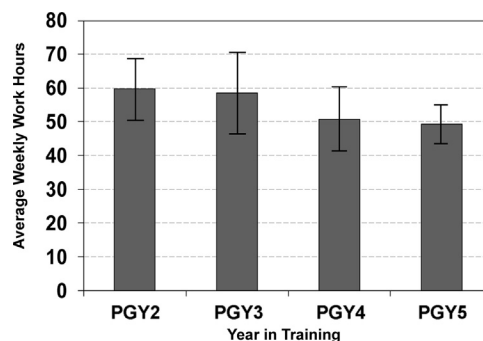

FIGURE 1. Average number of recorded work hours compared with years in training.