

# Orthopedic Resident Work-Shift Analysis: Are We Making the Best Use of Resident Work Hours?

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**BACKGROUND:** Surgery programs have been tasked to meet rising demands in patient surgical care while simultaneously providing adequate resident training in the midst of increasing resident work-hour restrictions. The purpose of this study was to quantify orthopedic surgery resident workflow and identify areas needing improved resident efficiency. We hypothesize that residents spend a disproportionate amount of time involved in activities that do not relate directly to patient care or maximize resident education.

**METHODS:** We observed 4 orthopedic surgery residents on the orthopedic consult service at a major tertiary care center for 72 consecutive hours (6 consecutive shifts). We collected minute-by-minute data using predefined work-task criteria: direct new patient contact, direct existing patient contact, communications with other providers, documentation/administrative time, transit time, and basic human needs. A seventh category comprised remaining less-productive work was termed as *standby*.

**RESULTS:** In a 720-minute shift, residents spent on an average: 191 minutes (26.5%) performing documentation/administrative duties, 167.0 minutes (23.2%) in direct contact with new patient consults, 129.6 minutes (17.1%) in communication with other providers regarding patients, 116.2 (16.1%) minutes in standby, 63.7 minutes (8.8%) in transit, 32.6 minutes (4.5%) with existing patients, and 20 minutes (2.7%) attending to basic human needs. Residents performed an additional 130 minutes of administrative work off duty. Secondary analysis revealed residents were more likely to perform administrative work rather than

directly interact with existing patients ( $p = 0.006$ ) or attend to basic human needs ( $p = 0.003$ ).

**CONCLUSIONS:** Orthopedic surgery residents spend a large proportion of their time performing documentation/administrative-type work and their workday can be operationally optimized to minimize nonvalue-adding tasks. Formal workflow analysis may aid program directors in systematic process improvements to better align resident skills with tasks.

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**KEYWORDS:** orthopedic, resident, workflow, value, analysis, surgery, documentation

**COMPETENCIES:** Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Systems-Based Practice

## INTRODUCTION

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) limited resident work hours to no more than 80 hours per week.<sup>1</sup> The changes were implemented largely to reduce resident fatigue, thereby creating an environment for safe patient care and optimal educational performance.<sup>2</sup> Despite these changes, resident fatigue has continued to be an issue.<sup>3,4</sup> In 2010, the ACGME published results from an investigative task force established to perform a systematic review of its policies. The task force evaluated reports from the medical community, public, and an Institute of Medicine report calling for further work-hour restrictions.<sup>5</sup> The 2010 ACGME report led to a

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revised policy and further residency work-hour restrictions that became effective July 1, 2011.<sup>6</sup> Despite these revisions, some legislators and academic organizations have continued to call for further restrictions in work hours to bring the United States more in alignment with countries such as the United Kingdom, France, and New Zealand where residents work between 37 and 70 hours per week.<sup>7,8</sup>

The orthopedic community faces the challenge of providing adequate resident training in the face of decreasing resident work hours, growth in the demand for surgery, greater specialization within the field, and increased complexity of patient care.<sup>9</sup> To meet these challenges, orthopedic surgery residents must engage in clinical duties and self-directed learning with increased efficiency. As understood through business practices, efficient care involves optimizing time, human resources, and productivity while minimizing waste.<sup>10</sup> This concept applied to orthopedic residency training implies high-quality care delivered efficiently while maximizing the opportunities for education.

Given the mounting need for improved efficiency in orthopedic surgical training, we conducted an orthopedic resident workflow analysis to understand the components of a typical resident workday and to identify inefficient practices in the postgraduate surgical setting. To date, there is no reported formal work-shift analysis of orthopedic residents. Our hypothesis was that orthopedic surgery residents spend a disproportionate amount of time involved in activities that do not relate directly to patient care or maximize resident education.

## MATERIALS AND METHODS

We selected residents engaged in work on an orthopedic resident consultation service at a major tertiary care center as our subjects. Junior residents from 11 outside medical centers were polled at an orthopedic conference before undertaking the study to assess for generalizability of our potential results. Based on the residents' responses, we found that this consult service highly approximates the time constraints placed on orthopedic residents at each of the other large multidisciplinary institutions. As did the other centers, our site had a fully integrated electronic medical record which the residents were proficient in. Under an Internal Review Board-approved protocol, we conducted a prospective observational evaluation of residents on this service. We observed 4 Postgraduate Year 3 (PGY-3) residents during alternating 12-hour shifts for 72 consecutive hours (6 consecutive shifts) using 2 trained observers per shift. PGY-3 residents were selected as subjects as they are the most senior residents taking primary call and theoretically will have the least variation in practice as a group with resultant increased precision of results. Each observer was pretrained in shadowing the resident without disrupting resident workflow and independently recorded

minute-by-minute data on resident activities during each 12-hour shift. Study data were collected on standardized log sheets. In recording resident activity, observers were required to assign each recorded activity and its duration to 1 of 6 predefined resident activity categories (defined later). We used Student *t* tests to determine whether there were any significant differences in the activities that residents were more likely to perform during their call shift.

## Consult Service

The orthopedic surgery consult service at our institution comprises alternating 12-hour shifts among 10 junior orthopedic residents with supervision from chief residents and attending surgeons. Orthopedic surgery residents are consulted by emergency department and inpatient physicians seeking expert musculoskeletal evaluation of patients. These patients are seen and assessed by the orthopedic surgery resident who subsequently discusses patient care with a chief resident and supervising staff physician to arrive at a disposition.

## Measures

A priori, we defined 6 major categories comprising a resident's workflow, as follows: (1) direct patient contact time with new consults, (2) direct patient contact time with existing patients, (3) time spent communicating with other providers regarding patients, (4) documentation/administrative time, (5) transit time, and (6) basic human needs. Secondly we defined a seventh category for resident duties not fitting within these "necessary" categories, we termed this seventh category as *standby*. Owing to the lack of a formalized didactic structure on this consult service during the weekend, we did not have a separate category for *education*, which is obviously a necessary part of every resident's daily workflow. On most consult services, learning is often built into the workup and diagnosis of the consult patient.

*Direct patient contact time* was defined as time spent directly in the presence of patients—this time could be spent either with a newly consulted patient or with an existing patient. *Communications regarding patients* was defined as communication with other physicians or health care providers regarding patient care. This category included all forms of verbal communication such as telephone calls and direct communications with nurses and ancillary staff. *Documentation/administrative time* was defined as time spent performing duties including history and physical examination documentation, any form of electronic or paper patient note writing, preparing discharge paperwork, updating of patient lists, prescription writing, reviewing documentation from other providers, or physician order entry. *Transit time* was defined as time spent in commute and encompassed time spent walking between specific destinations and duties. *Basic human needs* were defined as time spent eating,

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