Effect of Home-Call on Otolaryngology Resident Education: A Pilot Study☆,☆☆

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OBJECTIVE: To inform institutional policies regarding call encounters through an evaluation of the effect of home-call on academic experience and fatigue among surgical residents. This study conducted an assessment of the nature of resident call encounters premidnight and postmidnight and a comparative analysis of sleep deprivation and efficiency in residents during home-call and off call.

DESIGN, SETTING, AND PARTICIPANTS: All Otolaryngology—Head and Neck Surgery residents ($n = 9$) at single Canadian institution were asked to establish the time and nature of call encounters during home-call. Residents completed the Stanford Sleepiness Scale precall and postcall to measure sleepiness and wore an Actigraph device to measure sleep efficiency to establish fatigue in the setting of home-call as compared with residents off call. Home-call and off call patterns were studied using a random computer-generated selection of days for participants in both study groups. Analysis was conducted from December 1, 2013 to December 30, 2014.

RESULTS: Residents received on average 7 pages per night, of which 78.5% of pages were for nonurgent issues. On an average, change in sleep deprivation scores postcall was 3.0 points higher (95% CI: 2.48–3.57, $p < 0.0001$) in residents who were qualified for a postcall day compared with residents who did not qualify for a postcall day and residents off call according to the Stanford Sleepiness Scale. Postcall sleep deprivation was significantly associated with number of encounters managed after midnight, regardless of management through telephone or in-hospital ($p = 0.01$). The Actigraph device identified a significant decrease in sleep efficiency in residents who were qualified for a postcall day compared with residents off call (mean = −31.1; 95% CI: −38.9, −23.4; $p < 0.001$).

CONCLUSIONS: This is the first study to evaluate surgical residents' home-call experience. We identified a high proportion of nonurgent encounters that residents managed on call and increased postcall fatigue associated with postmidnight telephone encounters. This study highlights the detrimental effects of frequent sleep interruptions because of encounters on call and suggests the need for institutional guidelines to help minimize these interruptions. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2016 Association of Program Directors in Surgery Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical education, home-call, duty-hour restrictions

COMPETENCIES: Medical Knowledge, Practice Based Learning, System Based Practice

INTRODUCTION

The negative effects of sleep deprivation and fatigue on neurocognitive performance are well documented.[1-7] In the United States and in Canada, resident duty hour restrictions (DHRs) were recently implemented with an intent of limiting long resident work hours to improve patient care

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and decrease adverse events, while having a simultaneous positive effect on resident well-being.[8-12] However, since their implementation, studies that have examined the efficacy of DHRs to achieve these objectives have not uniformly demonstrated positive effects in either domain.[13-28] Furthermore, the widespread implementation of DHRs has led to increasing concern over resident educational outcomes.[17,20,29-31] These concerns are particularly pronounced among surgical residency programs, likely because of a perceived negative effect of limiting work hours on surgical residents' abilities to achieve procedural competencies.[32-37]

Various strategies have been implemented by residency programs to maximize resident educational experience within the context of DHRs. These include day-, night-float, and home-call systems.[38-41] However, the current literature demonstrates a lack of objective data assessing the efficacy of these measures to meet program objectives. This raises the question of whether there are other areas to be addressed to furthermore improve resident education within the framework of DHRs.

The present study is the first to objectively evaluate the home-call structure of an Otolaryngology—Head and Neck Surgery (OTO-HNS) program. The primary objective was to analyze the current home-call experience of residents at 1 institution and its effect on resident education, as measured by missed clinical duties in the postcall setting, and on resident well being, as measured by sleep deprivation and sleep efficiency postcall.

MATERIALS AND METHODS

In this study, residents were asked to complete an electronic log while they were on overnight home-call in OTO-HNS. In this program, residents take call in a solo capacity with supervision provided by a faculty member (after a 3 month transition period during which they have a formal buddy call system with a senior resident). Individuals on call cover citywide call including 1 major adult hospital (The Ottawa Hospital) with 3 campuses, and 1 tertiary care pediatric hospital (the Children's Hospital of Eastern Ontario). Residents complete call on average once every 7 days, with no consecutive nights of home-call. The inclusion criteria for the study were as follows: (1) OTO-HNS residents (R2 to R5) at the University of Ottawa, Canada ($n = 9$) and (2) OTO-HNS residents permissible to complete first call in a solo capacity. The study design was reviewed and approved by the research ethics board before the commencement of the study. A total of 3 outcome measures were assessed and they are as follows: (1) resident home-call experience including the level of urgency of encounters residents were called for during their night on call; (2) resultant academic activities that were missed by residents who qualified for a postcall day; and (3) subjective and objective measures of residents' sleep deprivation on the day following call, as a proxy for resident well being.

Study Design

This was a prospective cohort study. A computer program was used to randomly select nights for the study from December 2013 to April 2015 (GraphPad Software Inc., La Jolla, CA), where residents could potentially qualify for a postcall day (Sunday to Thursday). Residents were asked to log the time at which they managed an encounter on call between 5 PM and 7 AM, as well as the nature of the encounter. To ensure accuracy of responses, the residents were provided verbal and written guidelines regarding encounters on call that qualified as urgent (i.e., requiring OTO-HNS assessment in hospital within 12-24 h) as compared with nonurgent encounters (Table 1). The guideline was established based on a consensus among the study investigators. Most encounters complied with the aforementioned guidelines; however, residents were cautioned that the list of examples were not exhaustive and that the categorization could be modified if the clinical situation changed. On the rare occasion that the encounter did not explicitly appear on the list of examples, it was at the discretion of the resident to categorize the encounters as urgent or nonurgent based directly on the list provided.

Residents were also asked to identify whether or not they qualified for a postcall day (in which situation the resident would be permitted to go home after morning rounds). Residents who qualified for a postcall day were referred to as "Qualifiers" whereas residents who did not qualify for a postcall day were referred to as "Non-Qualifiers." If residents qualified for a postcall day, the effect on clinical activities was assessed (i.e., missed operating experience, clinics, or academic time). A residents' qualification for a postcall day was established based on the Professional Association of Residents' of Ontario (PARO) guidelines. According to Professional Association of Residents' of Ontario contract, residents who were on a service where they were scheduled for home-call may qualify for a postcall day under 2 circumstances and they are: (1) a resident was called into the hospital to perform duties between the hours of midnight and 6 AM and (2) a resident was called into the hospital to perform duties for at least 4 consecutive hours, at least 1 hour of which extended past midnight. The program director and program administrator were blinded to resident qualification for postcall days during the study period to ensure that resident activities were not biased.

Short-term fatigue postcall was assessed through subjective and objective measures. A subjective assessment was completed through an analysis of scores from the Stanford Sleepiness scale (SSS). The SSS is a validated sleep deprivation scale that quantifies progressive steps in sleepiness at a certain point in time. The scale quantifies level of sleepiness from a level of 1, where an individual is classified