

Correlation Between Self-Reported Resident Duty Hours and Time-Stamped Parking Data

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Abstract

Background Failure to comply with Accreditation Council for Graduate Medical Education-mandated resident work hour limitations can result in citations and shortened accreditation cycles. Many programs assess compliance by collecting self-reports of work hours from each resident.

Objectives To examine residents' self-reported assessment of work hours recorded on a daily basis using a Web-based product with electronically recorded times collected as residents entered and exited the parking garage.

Methods Study participants consisted of 62 University of Colorado Denver internal medicine residents rotating at Denver Health Medical Center on a monthly basis over

a 4-month period. Self-reported data submitted by 60 residents were compared with the times these residents entered and exited from the parking garage at Denver Health Medical Center, as assessed by an electronic badge reader.

Results A high level of agreement was found between these two data sets. No significant difference was found between the time-stamped parking data and self-reported Web-based data for resident work hours.

Conclusions Residents accurately self-reported their work hours, using a daily Web-based duty hours log when compared to an independent, objective and blinded assessment of work hours.

Introduction

In 2003 the Accreditation Council for Graduate Medical Education (ACGME) limited resident duty hours to 80 hours per week, capped continuous work at 24 plus up to 6 hours, required a minimum of 10 hours off between duty periods and 1 day in 7 free from all program responsibilities.¹ The standards were updated and further refined in 2011.²

Because failure to comply can result in citations and a shortened accreditation cycle,³ the data used by the ACGME to assess compliance must be accurate. Presently, the ACGME assesses compliance based on a program's responses to an annual 34-question survey, the first 10 questions of which address duty hours. The ACGME requires residency programs and their sponsoring

institutions to monitor resident work hours to ensure compliance but does not specify how monitoring and tracking of hours should be handled. Many programs monitor by collecting self-reports from their residents.⁴

While data from hand-written time cards compare favorably with automated reports of residents interacting with an electronic medical record system,⁵ monthly recording of work hours does not correlate with the same work reported daily.⁶ We compared residents' self-reported duty hours recorded on a daily basis using a Web-based product with electronically recorded times collected as residents entered and exited the parking garage at our institution. Our hypothesis was that residents overestimated the number of hours they worked.

Methods

The internal medicine residency at University of Colorado Denver rotates its 156 residents through 12-month-long blocks at University of Colorado Hospital, Denver Veterans' Affairs Medical Center, Presbyterian Saint Luke's Hospital, and Denver Health Medical Center (Denver Health). This study took place at Denver Health only. From January 1, 2010, until April 30, 2010, work hour data were collected from 62 internal medicine residents working in either the intensive care unit or the general medical floors of Denver Health. Individual residents'

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TABLE 1 PARKING AND GMEOne SHIFT DATA

Data collected	Parking	GMEOne
No. of residents	60	62
No. of shifts (parking data required both an entrance and exit entry)	1064	1386
No. of non-matching shifts (%) (shifts recorded in one dataset but not the other)	83 (8)	405 (29)
Proportion of shifts in agreement (%) (difference is less than 1 hour)	74	

identities were kept anonymous. The study was approved by the Colorado Multiple Institution Review Board.

Starting on January 1, 2010, residents in the Internal Medicine program at University of Colorado Denver were required to enter their work hours on a daily basis, using a Web-based duty hour log (GMEOne, San Antonio, Texas). We compared the self-reported data submitted by 62 residents over this 4-month period with the times these residents entered and exited from the parking garage at Denver Health, as assessed by an electronic badge reader. Residents were blinded to the study protocol (ie, they were unaware that their entry and exit times from the parking garage were being recorded).

Residents were considered working if they entered and exited the parking garage in accordance with their scheduled shift. These data along with self-reported data downloaded from GMEOne were transcribed into an Excel (Microsoft Corp, Redmond, WA) spreadsheet, and the total number of hours on duty recorded was calculated using both methods.

Data were reported, and calculations were carried out only for those days on which both GMEOne and parking data were available.

Transit to and from the parking garage to either the general medical floors or the medical intensive care unit at Denver Health was estimated to be 15 minutes. Accordingly, we assumed a work hour violation occurred if parking entry and exit data showed that a resident was at the hospital for greater than 30.5 consecutive hours, for more than 83.5 hours in a 7-day period, or if they returned

to the hospital in fewer than 10.5 hours after leaving the previous day (ie, allotting 30 minutes for walking to and from the garage for each period).

Parking data and self-reported data were compared in a paired, de-identified fashion. The number of shifts for each resident varied. Accordingly, the level of agreement between the methods was analyzed by first calculating a mean difference in hours for each resident ($N = 60$) and then calculating a mean of the mean differences in hours for all residents along with a 95% confidence interval (CI). These proportions were compared using a paired *t*-test. Because more than one outcome (shift duration, hours off between shifts, and hours per week) was analyzed using the same data, a *P* value of $<.017$ was considered significant on the basis of a Bonferroni correction for multiple comparisons. All analyses were performed using SAS Enterprise Guide version 4.1 software (SAS Institute, Inc., Cary, NC).

Results

Data were obtained from 62 residents (TABLE 1). Data from 2 residents were excluded as their Web-based data had no corresponding time-stamped parking data at any time during their month-long rotation. The method of transportation for these two residents was not discernible due to the de-identification of the data. Data from the remaining 60 residents were analyzed. The total number of matching shifts was 981. The mean difference in hours worked as assessed by the two methods was $-0:04:36$ (95% CI, $-0:20:00, 0:10:48$). In 61% of comparisons, the

TABLE 2 DUTY HOUR VIOLATIONS ASSESSED BY TWO INDEPENDENT METHODS (MEAN PROPORTION ACROSS RESIDENTS OF VIOLATIONS)

Violation	Parking (%)	GMEOne (%)	<i>P</i> value
Shifts ≥ 30.5 hours	3 ± 8	2 ± 5	NS
<10.5 hours off between shifts	3 ± 5	1 ± 2	NS
≥ 83.5 hours per week (averaged per rotation)	0 ± 0	4 ± 19	NS

Abbreviation: NS, Not statistically significant.

duration of the shift was longer in the parking data than the GMEOne data.

No significant differences were found between the time-stamped parking data and self-reported Web-based data for working over 30.5 hour per shift, having less than 10.5 hours off between shifts, or working over 83.5 hours per week (TABLE 2).

Conclusion

The important finding of our study was that residents accurately self-reported their work hours using a daily Web-based duty hours log when compared to an independent, objective, and blinded assessment of work hours.

Our results are consistent with those reported by Shine et al.⁵ However, their methodology measured resident work hours on the basis of the first and last time residents interacted with an electronic medical record each day. While this allowed the residents to remain blinded as to when they started and stopped their work day, it may have underestimated the time residents were actually at work as it assumed that the residents' first and last daily activity involved interacting with the computer.

The major limitation to our study is that time-stamped parking data may overestimate duty hours as residents could be at the hospital for reasons other than attending to the work associated with their shifts (eg, trips to the library, visits to facility gyms, socializing after arriving or prior to

departing). This would bias the data in favor of there being more rather than fewer work hour violations.

The results of our study validate the use of Web-based duty hour logs that require daily work hour reporting. We are not aware of any similar validation of the yearly ACGME work hour survey. The high level of agreement between self-reported work hours and the time-stamped parking data suggests that automated systems such as time-stamped parking data might not be necessary to achieve accurate work hour reporting. Alternatively, automated systems could be beneficial because they eliminate time-consuming self-reporting.

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