

Smart-Phone Based Geofencing: A Novel Approach to Monitoring Clinical Work Hours in Surgery Residency

Purpose

The Accreditation Council for Graduate Medical Education specifies strict requirements for clinical work hours during residency training, with serious consequences for violations. Self-reporting of work hours by trainees can be inaccurate due to recall bias and underreporting, giving program directors limited data to influence change. We aimed to assess the impact of a smart-phone based geofencing application on submission rates for work hours and reported violations in a general surgery residency program at an academic medical center. We also examined resident perceptions surrounding implementation and use of the application.

Methods

We compared clinical work hours submitted and violations reported during the pilot period (October-November 2019) with the months prior to the launch of the application (July-August 2019). PGY1 and PGY2 residents were eligible to use the application during and after this pilot period. Semi-structured interviews were used to assess resident perceptions. A retrospective review was conducted to compare reporting during the same time period from the prior academic year (2018-2019) for historical reference. Paired t-tests were used to analyze the data.

Results

Twenty-six residents (15 PGY1, 11 PGY2) were eligible for the intervention and 23 residents (88%) used the application. The mean number of violations reported decreased significantly during the pilot period compared with the months prior to the intervention (4.5 vs. 11, $p=0.04$). The total rate of submissions was not significantly different after the intervention (85% vs. 82%, $p=0.42$). The PGY1 mean submission rate decreased during the pilot period (91% to 75%, $p = 0.21$) while the PGY2 submission rate increased (77% to 91%, $p=0.07$). Compared with historical data, there was an increase in overall total submission rates between academic years 2018/2019 and 2019/2020 (74% vs. 79%, $p=0.047$) and an associated decrease in the mean number of monthly violations (14 vs. 6.25, $p=0.004$). Thirteen (50%) residents (8 PGY1, 5 PGY2) volunteered for semi-structured interviews. Most participants found the application useful for recording and reporting clinical work hours. They noted an ease in the administrative burden as well as more accurate reporting associated with automated logging. Use of the application was not perceived to limit engagement with patient care; however, there were privacy concerns and some technical barriers were identified. The messaging regarding the application's use was identified as critical for implementation.

Conclusions

The "real-time" data provided by a geofencing application in our program helped to reduce the number of work-hour violations reported and did not diminish resident engagement with patient care. Decreasing the administrative burden of recording work hours coupled with improving transparency and accuracy of submissions may be important mechanisms.