Educational Experience Impacts Wellness More than Hours Worked

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OBJECTIVE: The Accreditation Council for Graduate Medical Education has focused its interests on resident wellbeing and the clinical work environment in recent years. Concerns regarding both duty hours as well as service obligations versus education resulted in programs nationwide receiving citations, including ours. This study aimed to evaluate the impact of those 2 factors on surgical residents' general wellbeing, hypothesizing that service obligations would be a stronger predictor.

DESIGN: We have previously reported on the use of a "Fuel Gauge" tool developed at our institution for monitoring resident wellbeing. We performed a retrospective comparison of prospectively collected cross-sectional survey data comparing the Fuel Gauge to a bimonthly "Service Versus Education" (SVE) report. This report used similar scaling and allowed residents to provide feedback on the balance of the educational quality of their current rotation in comparison to their perception of service obligation. Pearson's correlation was then used to compare those scores with duty hour logs to determine if a relationship could be identified between the 3 measurements.

SETTING: Academic institution of the University of Texas Southwestern in Dallas, Texas.

PARTICIPANTS: Active general surgery residents (n = 73).

RESULTS: During the study period, 73 residents filled out both a Fuel Gauge assessment and a SVE assessment at least once, with 273 complete data points available for analysis. Our program's Fuel Gauge median was 4, and our program's median SVE score was 4. Fuel Gauge assessment scores demonstrated a moderate positive correlation with SVE ($r = 0.65$, $p < 0.001$), while only a weakly negative association with increasing hours worked ($r = -0.15$, $p = 0.015$). SVE also demonstrated a weak negative correlation with hours logged ($r = -0.225$, $p = 0.001$).

CONCLUSIONS: While the Accreditation Council for Graduate Medical Education recognizes that multiple factors contribute to resident wellbeing issues, early efforts were focused on limiting excessive duty hours. Examining our institutional data regarding the previously understudied factor of SVE, we indeed found a stronger correlation with resident perception of low educational value rather than excessive work hours contributing to lower Fuel Gauge scores. These data, if verified, should guide program directors in identifying other institutional factors that may more strongly contribute to their own culture of resident wellness. (J Surg Ed 79:e137–e142. © 2022 Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery.)

KEY WORDS: Clinical Learning Environment, Resident Wellbeing, Duty Hours, Service Obligations

COMPETENCIES: Professionalism Interpersonal and Communication Skills

INTRODUCTION

Concerns regarding the physician wellness, burnout, suicide rates, sleep deprivation, and effects on patient outcomes led to the Accreditation Council for Graduate Medical Education (ACGME) emphasis on common program requirements for duty-hour restrictions and wellness initiatives.[1,2] Early evidence supported the need for strict adherence to the duty-hour restrictions resulting in the delivery of citations to multiple programs based off of residents' complaints and the denial of multiple requests for duty-hour exceptions.[1,3] The results of the subsequent FIRST trial demonstrated, however, no significant impact on patient outcomes and physician wellness.[4] Thus, a current movement has been prompted

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toward understanding and combatting the multifactorial aspects of trainee wellness.[5-8]

Our program was given citations for both duty hours as well as service versus education. We sought to evaluate the impact of duty hours on wellness in our program using a cross-sectional study design of resident evaluations. We hypothesized that the service versus education balance will have a greater impact compared to duty hours on the wellness of surgical residents in a large, urban, academic medical center.

MATERIAL AND METHODS

After the 2019 academic year, our program had 2 citations by the ACGME: one for duty hour violations, and the other for service obligations taking precedence over educational activities. In order to monitor our status on both of these issues and as a means to provide data for improving the quality of educational environment, we implemented a novel weekly screening tool to determine if residents perceived the rotation they were on as being "service oriented" or "education oriented". This was then correlated with data that has been a part of our normal monitoring processes, namely duty hour reports and our wellness monitoring tool.

Study Design

This study utilized a cross-sectional observational study design with prospectively collected data evaluated in a retrospective manner. Resident evaluations were obtained over a 24-week period from their online self-reporting system, MedHub. Residents included all 73 active clinical residents in the University of Texas Southwestern (UTSW) general surgery program. Within their MedHub reporting system, residents were prompted to fill out mandatory weekly duty hour reports (logging system marking the hours worked by day and time), as well as voluntary weekly Likert scale assessments on wellness and service versus education (SVE).

Measurement of Duty Hours

Duty hour reports were collected in standard fashion through our hours-entry software in MedHub in accordance with our institutional policies. If duty hours were not reported within 1 week of the required entry period (weekly), a program coordinator would contact the trainee to ensure accurate duty hour data entry. No adaptation of this was undertaken for the purpose of this study. Weekly duty hour reporting is mandatory in our program, with a 1-week period at the week conclusion to enter the data into our system to maintain compliance with this rule.

Measurement of Wellness

Our program has made use of a weekly wellness monitoring tool called the "Fuel Gauge" which we have previously reported usage and engagement by the trainees.[9] Briefly, the tool is a five-point Likert scale indicating overall mood with reference a hypothetical fuel tank content (5 = "full", 1 = "empty"). This tool is voluntary and administered weekly at our program.

The tool was first implemented in 2017 as a method for program leadership to screen for individuals who may need further assistance with burnout or wellness. Since its implementation, this tool has become widely used in nearly all GME programs in our institution. This report is administered separately from our duty hours reporting form (Fig. 1). The only modification made to this from our previous report was moving from a weekly assessment to bi-monthly in order to reduce the administrative burden on our trainees. This decision was not related to the present study, but rather from the feedback from our trainees in the prior year.

Measurement of Service and Education Perception

In response to a program citation for service obligations outweighing educational benefit, we developed a novel tool which paralleled our wellness monitoring Fuel

Overall, my well-being fuel tank is:	Level 1	Level 2	Level 3	Level 4	Level 5
	Empty	¼	½ full tank	¾	Full
What was the balance between service demands and educational value?:	1	2	3	4	5
	Educational value of this rotation suffered from lack of strong operative or patient care opportunities.	Service demands made this week of very little educational value	Service demands were high, but with good educational content	A balance of service demands and educational content	Service demands were achievable and valuable. The educational content was strong.

FIGURE 1. Fuel Gauge and Service Versus Education Score Submission Form.

Gauge, called the "Service Verses Education" (SVE) tool. The purpose of this form was to be able to track rotations with low educational value in real time, as these reports were monitored over 2-week cycles.

This tool also used a five-point Likert scale in which the trainee is asked to rate the experience on their current rotation from a 1 "completely service-oriented experience with little educational value" to a 5 "completely educational experience with minimal service-type obligations." This tool was administered in the same form as the Fuel Gauge form in MedHub (Fig. 1), and again was not made mandatory to maintain administrative compliance.

Data Analysis

Data for an individual resident-week were considered complete when a duty hour log, Fuel Gauge score, and SVE score were completed all for the same week. As both Fuel Gauge scores and the SVE score were not mandatory, any resident-weeks missing this data were removed from analysis. The study team also elected to remove resident-weeks 1 rotations outside of the department for ease of data access (rotations outside of the department are limited to anesthesia as an intern and data is unattainable when off service). All data were de-identified prior to analysis.

Spearman's rank correlation was used to describe the relationship between duty hours, Fuel Gauge, and SVE. For these analyses, data were stratified into low, middle, and high tertiles (duty hours based on distribution; SVE and Fuel Gauge by low (1-2), medium (3) and high (4-5)). Chi-squared analysis of Fuel Gauge and duty hours, stratified by level of SVE score, were performed, and linear regression to describe the relationship of duty hours and level of SVE on Fuel Gauge. Statistical analysis was performed using Stata 16.1 (StataCorp. 2019. *Stata Statistical Software: Release 16.1*. College Station, TX: StataCorp LLC). After Bonferroni correction was applied, results were considered significant at $p < 0.025$.

RESULTS

Of the 73 clinical residents qualified to provide data, 64% were female, and 85% submitted at least 1 set of complete data. After exclusions, a total of 274 complete sets of data were eligible for analysis.

The median Fuel Gauge score over the duration of the study was 4 (IQR 3-4), the median SVE score was 4 (IQR 4-4), and the median number of reported hours was 68 (IQR 60-73.5). For the data analyzed, there were 24 resident-weeks where the reported duty hours exceeded 80, representing 8.8% of data points analyzed.

TABLE 1. Results of Spearman's Correlation Analysis

Correlates	Spearman's rho	p-value
Fuel Gauge and SVE	0.64	<0.001*
Fuel Gauge and Duty Hours	-0.13	0.035
SVE and Duty Hours	-0.20	<0.001*

* Significant results with Bonferroni correction ($P < 0.017$)

Fuel Gauge assessment scores demonstrated a moderately positive correlation with SVE which reached statistical significance. Duty Hours had a weakly negative correlation with both Fuel Gauge scores and SVE; however, only the relationship with SVE reached statistical significance (Table 1). When expressed as a linear relationship, with Fuel Gauge score as the dependent variable, the coefficient for SVE was 0.646 (95% CI 0.55-0.74), for duty hours (DH) was -0.0000399 (95% CI -0.007 to 0.007, NS), and the constant was 1.34 (95% CI 0.70-1.98).

The resulting relationship can be expressed as: Fuel Gauge score = 0.646 (SVE) - 0.0000399 (DH) + 1.34

For residents with low SVE perception, 50.0% of residents had a low Fuel Gauge (Fuel Gauge score 1-2), compared with 32.1% with medium SVE perception, and 17.9% with high SVE perception ($p < 0.001$). By contrast, there was no identified association between duty hours and Fuel Gauge, even for residents in the highest tertile of duty hours ($p = 0.8$) These data presented in Figure 2 demonstrate that regardless of the hours logged, when separated by tertile (2 (A – lowest tertile, B – middle tertile, and C – highest tertile), the relationship between Fuel Gauge and perception of SVE remained nearly linear, with high education perception consistently resulting in high Fuel Gauge scores.

DISCUSSION

Despite recognizing that trainee wellness is impacted by a variety of factors, the ACGME focus on duty-hour violations has less to multiple issued citations and in some cases a counterintuitive effect.[10,11] After receiving citations for duty hour violations as well as a SVEperception, we recognized the opportunity to examine factors impacting wellness within our institutional culture. Thus, this study intended to analyze the impact of SVE-perceptions on trainee wellness as a distinct confounder for duty hours. The results indicate that indeed, higher service obligation scores led to overall lower wellness scores regardless of the number of hours reported.

Multiple groups have investigated the relationship of duty hour regulations and wellness, with mixed results. Some studies showed a worsening in overall wellness[5],

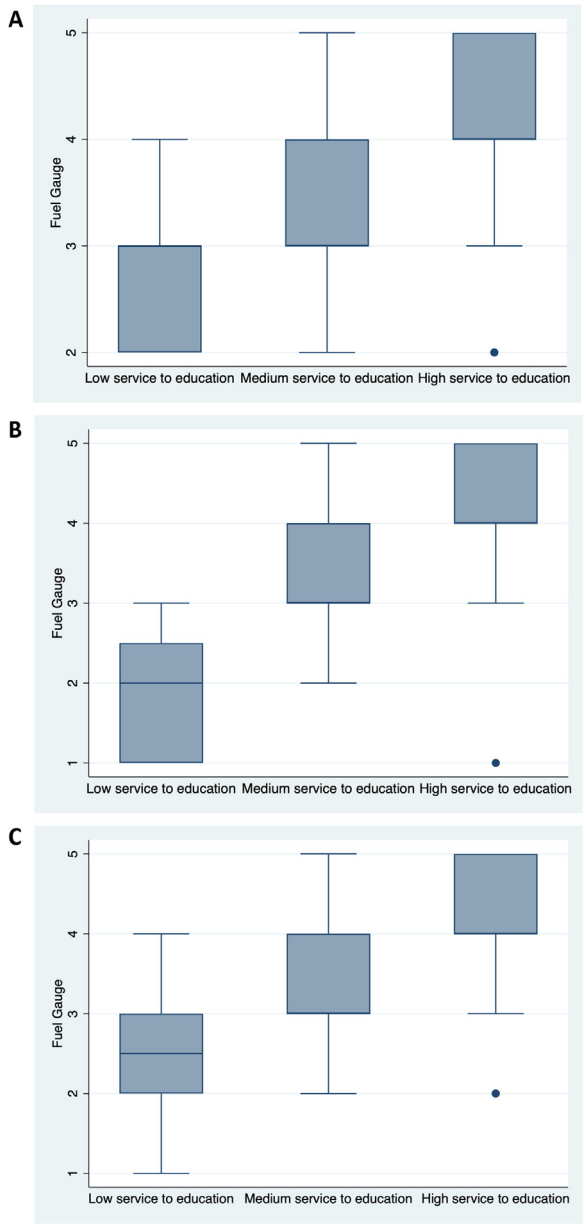

FIGURE 2. Comparison of Fuel Gauge Assessment scores between low (A), middle (B), and high duty-hour (C) tertiles in our cohort.

while others demonstrated an improvement in perceived stress and reductions in burnout[6]. Furthermore, the results of the FIRST trial demonstrated no impact on patient outcomes or overall wellbeing of participating residents with duty hour flexibility, along with no differences in overall wellbeing of participating residents. Indeed, this is consistent with our results which demonstrate that increasing duty hours reported did not actually correlate with lower wellness scores.

At our institution, the duty hour citation resulted in a restructuring of the resident workforce and subsequent concerns from the residents due to a loss of autonomy and work satisfaction. Indeed, amongst previously identified institutional factors contributing the trainee burnout, autonomy was one of the top three along with compensation and vacation time.[8] While not directly equivalent, service versus education perceptions is reflective of the resident experience on a service as is in some-part autonomy. Our study data generate the hypothesis that the perception of service over educational value may have a significant impact wellness. Another way to conceptualize the contribution of this single dimension of wellness is that it was the *quality* of time spent in the clinical learning environment that had a larger impact on wellness, rather than the *quantity* of time.

Despite the widespread implementation of wellness programs in surgical residencies, no significant improvements from an overall rate of 40% burnout have been demonstrated. This pattern is true as well at our institution, after monitoring our own wellness programs for 2 years.[12] This that current wellness initiatives are not appropriately addressing the correct major contributing factors. There are likely a multitude of other factors not studied in this data, such as finding meaning and value in the work one is doing, identifying with the community within your work environment, experiencing burnout or harassment/mistreatment, mental health, and monetary and food compensation.[8,13-16] Indeed, in the healthcare setting, given the widely variable practice settings and systems, it is difficult to point to a single factor and suggest that correcting that issue will make a significant impact on such a complex problem. However, we see the strength of our study as a cross-sectional view directly comparing 2 factors, duty hours often discussed and service versus education less so, in a representative group of residents within our institution.

The study team recognize limitations to this study. First, while we and other groups on our campus have reported on use of our Fuel Gauge for monitoring of wellness, this is not a validated measurement tool such as the Maslach Burnout Inventory or the Psychological General Wellbeing Index. As such, this is only a surrogate measure of wellness and burnout and may be imperfect in detecting more subtle issues. Furthermore, we do not mandate the usage of this tool, which limited the number of weeks available for analysis in this study, as well as potentially risks our data being skewed towards those who engage with the tool more often. Whether this would skew the values higher or lower is debatable. Second, as we were relying on accurate input of duty hours worked by the trainees themselves, it is possible that this data is skewed lower than real hours worked. While the authors feel that the culture of our program is one that encourages accuracy in data reporting for continuous improvements to the program, it is possible that

trainees entered hours lower than those actually worked to avoid appearing as though they were violating hours, or simply for ease of entry into our reporting system. Finally, this study was conducted during a period of time in which major modifications were being made to our program, both in terms of ensuring minimal duty hour violations because of an extended citation as well as modifications to schedules because of the ongoing COVID-19 pandemic. In fact, violations of the 80-hour limit are now rare in our program, unfortunately prohibiting further analysis of duty hour violations and overall wellness of trainees. While we are confident that the results demonstrated here would be true regardless of these limitations, we acknowledge that results may have been different had we set this up under different circumstances.

Current thoughts around what impacts surgical trainee well is limited at best. ACGME citations with regards to individual factors has led to restructuring and changes both within our institution and others that has not led to improved wellness as intended.[17] While resident wellness is a critical issue and should not be ignored, the focus of GME programs must be on the training and development of safe, competent physicians. We hope that data generated from this article and others will generate more robust hypotheses as to the drivers of resident wellness and thereby lead to creating and enforcing structural changes in institutions based on individualized needs.

CONCLUSION

Duty hours have been recognized as a component of resident wellness; however, strict enforcement of duty hours has not particularly improved resident wellness. Examining our institution, resident perception of the educational experience of a rotation had a significant impact on wellbeing whereas duty hours worked did not. Our study suggests that wellness is indeed multifactorial and that future efforts examining modifiable institutional aspects should focus on factors that improve the quality of work hours over the absolute quantity.

AUTHOR CONTRIBUTIONS

Dr Abdelfattah had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Abdelfattah

Acquisition, analysis, or interpretation of data: Lefevre, Meier, Nagaraj

Drafting of the manuscript: Meier, Abdelfattah, Nagaraj

Critical revision of the manuscript for important intellectual content: Abdelfattah, Meier, Lefevre, Farr, Nagaraj

Statistical analysis: Abdelfattah, Meier

Administrative, technical, or material support: Lefevre, Farr, Abdelfattah

Study supervision: Abdelfattah

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DECLARATION OF COMPETING INTEREST

None reported.

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