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Research Letter

# Surgeon factors and their association with operating room turnover time

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Operating room (OR) turnover time is a key metric of an institution's OR efficiency[1]. The role of surgeon-specific factors in OR turnover time remains underexplored. The aim of this study was to fill this gap by examining the association of surgeon-specific factors with OR turnover time.

The proposal for the present study was approved by the University of California San Diego's Aligning and Coordinating Quality Improvement, Research, and Evaluation (ACQUIRE) Committee, which is a dedicated ethics oversight body and approves all quality-improvement projects that do not require institutional review board approval.

A retrospective analysis of 12 820 operations performed by 268 surgeons at a tertiary academic centre was conducted. The variables captured were ethnicity, sex, experience (recorded as a binary variable: greater than or equal to 10 years of experience or less than 10 years of experience), residency or fellowship training at the University of California San Diego, academic rank, and administrative position (*Table 1*). Administrative positions were Department Chair or Vice Chair, Division Chief, or a leadership role, such as Chief Executive Officer, in the health administration system.

Surgeons with administrative roles were significantly associated with shorter turnover times compared with non-administrators (27 *versus* 35 min; $P < 0.001$). The turnover times for professors, associate professors, and assistant professors in administrative positions were 27, 24.5, and 27 min respectively; in comparison, surgeons not in administrative positions demonstrated turnover times of 36, 35, and 38 min respectively for the same academic ranks ($P < 0.001$). Surgeons with greater than or equal to 10 years of experience were also significantly associated with shorter turnover times (31 *versus* 37 min; $P < 0.001$) (*Table S1*). Multivariable linear regression

**Table 1 Surgeon demographics**

| | No academic rank ($n = 839$) | Assistant professor ($n = 2147$) | Associate professor ($n = 2827$) | Professor ($n = 3862$) | Assistant professor + administrator ($n = 49$) | Associate professor + administrator ($n = 52$) | Professor + administrator ($n = 3044$) |
|---|---|---|---|---|---|---|---|
| **Sex** | | | | | | | |
| Male | 576 (69) | 1110 (52) | 2222 (79) | 2863 (74) | 49 (100) | 52 (100) | 2209 (73) |
| Female | 263 (31) | 1037 (48) | 605 (21) | 999 (26) | 0 (0) | 0 (0) | 835 (27) |
| **Greater than or equal to 10 years since finishing training** | 273 (33) | 272 (13) | 1646 (58) | 3825 (99) | 0 (0) | 52 (100) | 3044 (100) |
| **Less than 10 years since finishing training** | 566 (67) | 1875 (87) | 1181 (42) | 37 (1) | 49 (100) | 0 (0) | 0 (0) |
| **Residency or fellowship training at UCSD** | 281 (33) | 1104 (51) | 1055 (37) | 2124 (55) | 0 (0) | 0 (0) | 393 (13) |
| **No training at UCSD** | 558 (67) | 1043 (49) | 1772 (63) | 1738 (45) | 49 (100) | 52 (100) | 2651 (87) |
| **Ethnicity** | | | | | | | |
| White | 472 (56) | 1064 (50) | 1729 (61) | 2675 (69) | 0 (0) | 52 (100) | 1239 (41) |
| Black | 0 (0) | 41 (1.9) | 0 (0) | 0 (0) | 49 (100) | 0 (0) | 0 (0) |
| Asian | 114 (14) | 580 (27) | 208 (7.4) | 928 (24) | 0 (0) | 0 (0) | 800 (26) |
| Indian | 144 (17) | 111 (5.2) | 164 (5.8) | 52 (1.3) | 0 (0) | 0 (0) | 119 (3.9) |
| Hispanic | 97 (12) | 225 (10) | 544 (19) | 105 (2.7) | 0 (0) | 0 (0) | 512 (17) |
| Other | 12 (1.4) | 126 (5.9) | 182 (6.4) | 102 (2.6) | 0 (0) | 0 (0) | 374 (12) |

Values are *n* (%). UCSD, University of California San Diego.

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confirmed these associations, with significant reductions in turnover time linked to administrative roles (β −7.2 (95% c.i. −8.2 to −6.2); $P < 0.001$) and surgeon experience (β −4.7 (95% c.i. −5.9 to −3.5); $P < 0.001$). Other factors (sex, ethnicity, and residency or fellowship training at the University of California San Diego) were not associated with significant differences in turnover times.

The present study distinguishes itself by providing a comprehensive analysis of the association of surgeon-specific factors with OR turnover time. Readers are encouraged to consider the findings in the context of daily operations; it is highlighted that, although a difference of 6–8 min in turnover time might seem trivial, it can accumulate over multiple operations, leading to significant time savings.

It is hypothesized that multiple factors contribute to surgeons with leadership roles being associated with shorter turnover times. Surgeons in administrative positions often have more control over implementing policies, choosing surgical teams, and the scheduling of operations, leading to more streamlined turnover practices. It was found that the presence of a fixed nurse team in the OR was associated with a shorter turnover time[2]. The shorter turnover times of surgeons in administrative positions could also be attributed to their understanding of logistics and better execution of these practices from the surgical team. Although it has been established that surgical experience is positively correlated with improved surgical outcomes[3], there are sparse data on its impact on OR turnover time. The finding of the present study of surgeons with greater than or equal to 10 years of experience being associated with shorter turnover times suggests that experience accumulated over the years is a contributing factor. The findings of the present study of non-significant associations of sex and ethnicity with turnover time are encouraging, as they suggest equity within the University of California San Diego.

The present study is not without its limitations. Due to the nature of the data available, it was not possible to control for the inherent differences that come with various procedure types and the time of day that surgery is performed, which could have potentially altered the findings. Future studies could benefit from incorporating these clinical factors to provide additional understanding of turnover time determinants.

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## Disclosure

The authors declare no conflict of interest.

## Supplementary material

Supplementary material is available at *BJS* online.

## Data availability

Data are available upon request.

## Author contributions

Kshitij Pandit (Data curation, Formal analysis, Investigation, Methodology, Writing—original draft), Luke Wang (Formal analysis, Writing—review & editing), Joel Rosenberg (Conceptualization, Data curation), Nicole Goldhaber (Conceptualization, Data curation), Jill C. Buckley (Project administration, Writing—review & editing), Sonia Ramamoorthy (Project administration), Kristin L. Mekeel (Conceptualization, Methodology, Project administration), and Aditya Bagrodia (Conceptualization, Project administration, Supervision, Validation, Writing—review & editing)

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