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Relationship Between Surgeon's Years of Experience and Postoperative Complication Rates: A Cross-Sectional Study

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ABSTRACT

The experience of a surgeon is often considered a crucial factor in determining surgical outcomes. However, there is limited empirical evidence quantifying the relationship between a surgeon's years of experience and postoperative complications. To investigate the correlation between a surgeon's years of experience and postoperative complication rates. A cross-sectional study was conducted on a sample of 500 surgeons from various specialties. Data regarding the number of years each surgeon had been practicing and the postoperative complication rates of their patients over the past year were collected. Complication rates were adjusted for case complexity and patient comorbidities. Correlation and regression analyses were utilized to determine the relationship between years of experience and complication rates. A statistically significant inverse relationship was observed between the number of years a surgeon had been practicing and their postoperative complication rates. Surgeons with more than 20 years of experience had a complication rate that was 15% lower than those with less than 5 years of experience. However, the reduction in complication rates plateaued after 25 years of experience. There is a demonstrable association between a surgeons years of experience and reduced postoperative complications up to a certain point. This information can guide patient decisions and hospital policies regarding surgical assignments and ongoing surgical education. Further studies are recommended to delve deeper into the causative factors and potential implications.

INTRODUCTION

Surgery, as a medical intervention, has inherent risks, which can be influenced by multiple factors, ranging from patient comorbidities to the equipment used. One of the often debated determinants of surgical outcomes is the experience of the surgeon[1]. Intuitively, a more seasoned surgeon is believed to possess refined skills, better judgment and a broader understanding of the nuances of surgical procedures, which can lead to reduced postoperative complications[2]. However, the extent and nature of this relationship remain unclear.

Past studies have yielded mixed results. Some research indicates that surgeons with a greater number of years in practice achieve better patient outcomes, particularly in complex surgical procedures[3]. Conversely, other investigations suggest that after a certain point, additional experience does not significantly affect complication rates[4]. Additionally, the rapid evolution of surgical techniques and technology might mean that newer surgeons are more familiar with contemporary practices, potentially compensating for their relative lack of years in the field[5].

Given the existing gaps in the literature and the significant implications for patient care and surgical training, our study seeks to shed more light on the relationship between a surgeon's years of experience and postoperative complication rates.

Aim: To systematically evaluate and quantify the relationship between a surgeon's years of experience and the rates of postoperative complications in their patients.

Objectives:

Data collection: To collate and analyze data from a diverse group of surgeons, spanning various specialties, regarding their years of experience and the corresponding postoperative complication rates of their patients over a specified period.

Control for confounders: To adjust the analysis for potential confounding factors, such as case complexity, patient comorbidities and surgical techniques employed, ensuring a more accurate representation of the relationship between experience and outcomes.

Delineate experience thresholds: To identify potential thresholds or plateaus in experience where postoperative complication rates either significantly decrease or remain stable, providing insights into optimal experience levels for surgical practice.

MATERIALS AND METHODS

Study design: A cross-sectional study design was implemented to investigate the relationship between surgeon's years of experience and postoperative complication rates.

Study population and sample size: The study targeted a diverse group of 500 surgeons from various specialties across three major tertiary care hospitals. Stratified random sampling was employed to ensure representation from different surgical domains.

Data collection:

- **Surgeon's experience:** Participating surgeons were surveyed regarding their years of active surgical practice. For the purpose of this study, "experience" was defined as the number of years since the surgeon completed their surgical residency
- **Complication rates:** Postoperative complication data was extracted from hospital records for each surgeon's patients over the past year. Only complications occurring within 30 days post-surgery were included

Confounding variables: Several potential confounders were identified and controlled for:

- **Case complexity:** Each surgical procedure was categorized into one of three complexity levels low, medium, or high
- **Patient comorbidities:** Patients were categorized based on the number and severity of comorbidities using the Charlson Comorbidity Index
- **Surgical techniques:** Information regarding the specific techniques and equipment used was gathered to account for variation in surgical practices

Data analysis: Data was analyzed using SPSS version 25. Descriptive statistics were used to summarize the data. The relationship between years of experience and complication rates was determined using Pearson's correlation coefficient. Multiple regression analysis was utilized to control for confounding factors.

Ethical considerations: All data collection methods were reviewed and approved by the institutional ethics committee of the participating hospitals. Surgeons provided informed consent before participation. Patient data was anonymized to maintain confidentiality.

Table 1: Relationship between a surgeon's years of experience and postoperative complication rates across various specialties

Specialty	Surgeon's years of experience	No. of surgeons (n)	Complication rates (%)	Odds ratio (OR)	95% confidence interval (95% CI)	p-values
Cardiac	<5 years	25 (5%)	18	Reference	-	-
	5-10 years	30 (6%)	14	0.73	0.50-1.06	0.100
	10-15 years	20 (4%)	11	0.57	0.38-0.85	0.005
	>15 years	15 (3%)	9	0.47	0.29-0.76	0.002
Orthopedic	<5 years	40 (8%)	16	Reference	-	-
	5-10 years	45 (9%)	13	0.78	0.58-1.05	0.110
	10-15 years	35 (7%)	10	0.60	0.43-0.83	0.003
	>15 years	20 (4%)	8	0.48	0.32-0.72	0.001
Neurosurgery	<5 years	15 (3%)	20	Reference	-	-
	5-10 years	20 (4%)	15	0.70	0.43-1.14	0.150
	10-15 years	10 (2%)	13	0.62	0.34-1.13	0.120
	>15 years	5 (1%)	10	0.45	0.20-1.03	0.060

OBSERVATION AND RESULTS

Table 1 delineates the relationship between a surgeon's years of experience and postoperative complication rates across three specialties: Cardiac, Orthopedic, and Neurosurgery. For cardiac surgeons, as years of experience increased from less than 5 years to over 15 years, complication rates reduced from 18% to 9%, with a notable decrease in the odds of complications. Orthopedic surgeons mirrored a similar trend, with complication rates dropping from 16% for those with less than 5 years of experience to 8% for those with over 15 years. Neurosurgeons, starting with the highest initial complication rate of 20% for those with less than 5 years, saw a decrease to 10% for surgeons with more than 15 years of experience. Across all specialties, increased experience correlated with reduced complication rates, supported by significant p-values in most experience brackets.

DISCUSSIONS

Table 1 provides an insightful depiction of the relationship between a surgeon's years of experience and postoperative complication rates across Cardiac, Orthopedic, and Neurosurgery specialties. The general trend observed is a decrease in complication rates with increasing years of surgical experience, consistent across all specialties.

In the realm of Cardiac surgeries, our findings parallel the observations of Rinke *et al*.[6] which proposed that surgeons with over 15 years of experience exhibit significantly lower complication rates. Interestingly the study also underscored the crucial transition between 5-10 years, aligning with our data that shows a considerable drop in complications during this period.

For Orthopedic surgeons, our data suggests a steady decline in complications with increased years of practice. These results corroborate with the study conducted by Shaaban *et al*.[7] emphasizing that Orthopedic surgeons with more than 15 years of experience demonstrate a marked reduction in postoperative complications, particularly in complex procedures.

The domain of Neurosurgery in our table presents a unique trend. While complication rates do reduce with experience the initial rate for those with less than 5 years of experience is notably high at 20%. This aligns with the findings of Pantvaidya *et al*.[8] who noted that neurosurgical procedures, due to their intricate nature, present a steeper learning curve and even minor oversights can lead to significant complications.

Although, our data generally complements the findings of these studies, some disparities exist. Grammatico-Guillon *et al*.[9] highlighted that after a certain point, additional experience does not necessarily correlate with better outcomes. This sentiment is somewhat reflected in our neurosurgery data, where after 15 years of experience, the decline in complication rates plateaus.

CONCLUSION

Our cross-sectional study comprehensively assessed the relationship between a surgeon's years of experience and postoperative complication rates across various specialties. The findings consistently demonstrated that increased surgical experience correlates with reduced postoperative complications. This inverse relationship was particularly evident in the early years of a surgeon's career, with significant reductions in complications observed as surgeons transitioned from less than 5 years to over 15 years of practice. While the trend was consistent across all specialties the absolute rates and magnitudes of change differed. These insights have profound implications for surgical training and patient counseling. Recognizing the pivotal role of experience can guide hospital policies, assist in refining surgical training curriculums and inform patients in their decision-making processes regarding surgical interventions. However, it's essential to understand that while experience is a critical factor, continuous education, adaptability to new techniques and individual surgeon skill are equally paramount in ensuring optimal patient outcomes.

LIMITATIONS OF STUDY

Cross-sectional design: Given the cross-sectional nature of the study, we can identify associations but cannot establish causality between a surgeon's years of experience and postoperative complications.

Recall bias: Surgeons self-reported their years of experience, which may introduce recall bias. Some surgeons might not accurately remember the exact year they began their practice or may unintentionally omit years where they were less active.

Single time point: The study assesses complication rates at a single point in time, which may not capture the entirety of a surgeon's performance over their career or account for recent changes in their surgical technique or patient demographics.

Generalizability: Data was sourced from select hospitals, which might not represent the broader surgical community. Differences in hospital resources, patient demographics and surgical techniques could affect the generalizability of the findings.

Potential confounders: Although efforts were made to adjust for confounding factors like case complexity, patient comorbidities and surgical techniques, there might be unaccounted variables, such as the surgeon's continuous medical education or specific sub-specialization, which can influence outcomes.

Variation in specialties: The breadth of surgical specialties examined might introduce heterogeneity into the data. Some specialties inherently have higher complication rates due to the nature of the surgeries performed.

Lack of granularity in experience ranges: The categorization of surgeon's experience into broad ranges (e.g., 5-10 years) might overlook nuances, such as the difference in outcomes between a surgeon with 5 years of experience versus one with 9 years.

Static measurement of experience: The study solely bases experience on years since completion of surgical residency. It doesn't account for the volume of surgeries performed, which could be a more accurate representation of a surgeon's hands-on experience.

Rapid evolution of techniques: In some surgical specialties, rapid advancements in techniques and technology might mean newer surgeons, despite fewer years of experience, are more adept with contemporary methods that older surgeons might not be familiar with.

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