Do Medical Students in the Operating Room Affect Patient Care? An Analysis of One Institution's Experience Over the Past Five Years

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BACKGROUND: Medical students are active learners in operating rooms during medical school. This observational study seeks to investigate the effect of medical students on operative time and complications.

METHODS: Data from the American College of Surgeons National Surgical Quality Improvement Program was linked to operative records for nonemergent, inpatient general surgery cases at our institution from 1 January 2009 to 1 January 2013. Cases were grouped into 13 distinct procedure groups. Hospital records provided information on the presence of medical students. Demographics, comorbidities, intraoperative variables, and postoperative complications were analyzed.

RESULTS: Overall, 2481 cases were included. Controlling for wound class, procedure group, and surgeon, medical students were associated with an additional 14 minutes of operative time. No association between medical students and postoperative complications was observed.

CONCLUSIONS: The educational benefits gained by the presence of medical students do not appear to jeopardize the quality of patient care. (J Surg 71:817-824. © 2014 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: medical students, operating rooms, operative time, postoperative complications, university hospitals

COMPETENCIES: Patient Care, Systems-Based Practice, Practice-Based Learning and Improvement

INTRODUCTION AND BACKGROUND INFORMATION

In 2013, according to the National Resident Matching Program, 17,487 U.S. allopathic medical school seniors participated in the Match vying for 26,392 available first-year postgraduate positions.[1] As a necessary part of medical school education, all medical students at various stages of training will observe and participate in the operating rooms of large academic medical centers all over the country. Given the comparatively large number of students to number of operating rooms, it is not uncommon for 2 or 3 medical students to be in one operating room at a time. Medical students often serve as a part of the surgical team, assisting in surgical closures and observed patient care, and for most medical training programs, students on their surgical clerkship are evaluated in the operating room by observed surgical participation and mentoring by the attending surgeon.[2] Although necessary and altogether important to the training of competent physicians, these practices are likely distracting to the surgical team. In addition to their immense numbers, medical students are arguably the least trained and most inexperienced individuals in the operating room. These factors question how student participators influence the quality of patient care.

As health care moves forward in America, more emphasis is being placed on the quality of care delivery and cost-effectiveness. Insurance companies and government payers are placing evermore pressure on hospitals and providers to prove they can deliver this care efficiently.[3] Academic medical centers also have the additional responsibility to educate and train America's future surgeons and to ensure that these 2 goals can be accomplished simultaneously in the surgical learning environment. The data are insufficient regarding what effect medical students might have in this environment; however, resident participation has been extensively studied. Previous studies have shown that

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residents pose little additional risk to the patients depending on their level of experience[3-6] in properly supervised environments. However, increased operative times have been attributed to resident inexperience and, indirectly, to more postoperative complications.[3,7-12] In comparison of hospitals with regular participation by medical students and residents (so-called teaching hospitals) with medical centers unaffiliated with academic institutions, patient outcomes are largely similar, with wound infections being the largest difference reported in a large study comparing Veterans Administration hospitals. Yet, the authors concluded that the differences may be owing to the highly complex system of care and not necessarily to the operations being performed by residents.[13]

Additionally, the total number of people in the operating room has been shown to increase contaminants and the overall microbial level in the room.[14-17] In conjunction with increased opening of the operating room door, increased microbial levels have been shown to be associated with an increased risk of surgical site infections.[8,18,19] These data have led to the Centers for Disease Control and Prevention to recommend limiting the number of people in the operating room.[19]

In light of these correlations, it is necessary to examine the role of medical students in the learning environment. The aim of this study is to explore the influence medical students' participation in operating room has on the quality of patient care including operative time and complication rates.

METHODS

Operative records for all general surgery cases conducted at our institution from January 2009 to January 2013 were obtained from electronic medical records. Using these data, the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database was examined for demographic information, comorbidities, intraoperative variables, and postoperative complications. Emergent cases and ambulatory surgery cases were excluded, as these cases were much less likely to have medical students participating. Cases that were not sampled by NSQIP were also excluded. To accurately measure the effect the primary surgeon had on outcomes, surgeons with fewer than 50 cases in this database were excluded.

From the remaining cohort of cases, data from hospital electronic medical records were gathered including all data pertaining to number of people present for an operation, the time each person entered and left the operating room, their role during the case, the time the patient entered the operating room and left the operating room (operative time), the primary surgeon, secondary surgeons, residents, anesthesia, and any students or observers along with the type of student or observer. Cases with at least one medical student present for any amount of time were recorded as cases with a medical student present.

Basic demographic and operative characteristics were summarized in a table. Univariate analyses comparing cases with medical students with those without medical students were performed to identify variables that were statistically different between the groups. Categorical variables were compared with Chi-square tests (or Fisher exact test where appropriate) and continuous variables (like operative time) were compared with 2 sample t tests. Differences in operative time between medical students cases and non-medical students cases were tabulated by procedure and by surgeon to understand how the effect of medical students presence varied.

Significant variables were then added as an additional independent variable to a linear regression model with the dependent linear variable operative time and the independent dichotomous variable medical student present. Any variable that was found to change the parameter estimate of the medical student present variable by greater than 10% when added were included in the final linear regression model. Interaction variables between medical students presence and both procedure group and primary surgeon were tested in the final regression model.

Determination of possible association between medical student presence in the operating room and complication rates used NSQIP recorded complication data that was analyzed after excluding postoperative transfusion. This was excluded owing to potential inaccuracy[20] and a change in the NSQIP criteria during the study period. Chi-squared analysis compared medical student presence with each complication individually and all complications combined. p Values less than 0.05 were considered significant. Logistic regression models were used to check for confounding. All statistical calculations were performed using JMP 10.0 for OSX.

RESULTS

Overall, 2481 cases were identified as those meeting inclusion criteria. Using Current Procedural Terminology codes, cases were grouped into 13 distinct procedure categories (Table 1).

Patients in the current study had an average age of 57 years, most were white, and slightly more than half were women. Colectomy and ostomy cases were the most commonly performed procedure group, followed by the pancreatectomy group and "other" group. The mean operative time for all cases was 264 minutes. Medical students were present for 1024 (41%) cases, with most cases only having one medical student present. After exclusion of postoperative blood transfusion, 21% of all cases had at least 1 NSQIP recorded complication (Table 2).

TABLE 1. Procedure Categories and Corresponding Current Procedural Terminology Codes

Procedure Category	Current Procedural Terminology Codes
All fistula repairs	35870, 44640, 44650, 44661, 45820, 46710, 46712, 57200, 57300
Appendectomy	44955, 44960, 44970
Bariatric	39502, 43644, 43659, 43770, 43774, 43775, 43800, 43843, 43848
Cholecystectomy	47420, 47425, 47460, 47562, 47563, 47564, 47600, 47605, 47610, 47612, 47711, 47715, 47760, 47765, 47780, 47785, 47999
Colectomy and ostomy	43870, 44140, 44141, 44143, 44144, 44145, 44146, 44150, 44151, 44155, 44158, 44160, 44188, 44204, 44205, 44206, 44207, 44208, 44210, 44211, 44212, 44227, 44238, 44310, 44312, 44314, 44320, 44340, 44345, 44346, 44604, 44620, 44625, 44626, 45110, 45111, 45112, 45113, 45119, 45126, 45130, 45397, 45400, 45505
Gastrectomy	43340, 43500, 43501, 43610, 43611, 43621, 43631, 43632, 43633, 43999
Hernia repairs	49505, 49507, 49521, 49553, 49560, 49561, 49565, 49566, 49570, 49585, 49587, 49652, 49653, 49654, 49655, 49656, 49657, 49659
Liver resection	47120, 47122, 47125, 47130, 47379, 47380, 47382, 47399
Other	10121, 10140, 10160, 10180, 11004, 11005, 11042, 11043, 15240, 15738, 15830, 15931, 20103, 24077, 27049, 27301, 35221, 37181, 38100, 38120, 38129, 38562, 38589, 38724, 38745, 38765, 38770, 39502, 43107, 43117, 43279, 43280, 43281, 43282, 43289, 43644, 43659, 43770, 43774, 43775, 43800, 43840, 43843, 43848, 44020, 44050, 44055, 44615, 46040, 46060, 46940, 49000, 49002, 49010, 49020, 49021, 49024, 49025, 49040, 49060, 49061, 49203, 49204, 49205, 49255, 49321, 49322, 49329, 49422, 49426, 49572, 49905, 49999, 50220, 50240, 58210, 58957, 60540, 60545, 60650
Pancreatectomy	48100, 48105, 48120, 48140, 48145, 48146, 48148, 48150, 48153, 48155, 48510, 48520, 48540, 48548, 48999
Small bowel resection	43820, 43860, 43865, 44110, 44120, 44125, 44130, 44202, 44603, 44799
Thyroidectomy and parathyroidectomy	60210, 60220, 60225, 60240, 60252, 60254, 60260, 60270, 60271, 60500, 60502, 60505, 60512
Ventral hernia repair	15734, 44005, 44180

Comparison of cases with at least one medical student present to cases where no medical student was present revealed statistically significant differences in body mass index, chronic obstructive pulmonary disease, weight loss before surgery, procedure type, wound class, operative time, and primary surgeon. No other variable was found to be significant (Table 3).

Univariable analysis of medical student association with operative time by individual procedure groups revealed increased operative times when medical students were present among all procedure groups except fistula repairs and gastrectomies (Table 4). Medical student presence was universally associated with increased operative time on univariable analysis when stratified according to primary surgeon (Table 5).

Body mass index, chronic obstructive pulmonary disease, and weight loss before surgery were shown to have little effect on the association between medical students and operative time, indicating they would not be a significant source of confounding and thus were not included in the final model. Interaction variables between medical student presence and procedure group and between medical student presence and primary surgeon were shown to be nonsignificant, and therefore not included. A multivariable linear regression model taking into account the procedure category, wound classification, and primary surgeon found medical student presence to be statistically significant and associated with an additional 14 minutes of operative time (Table 6).

Univariable analysis of medical student presence vs individual complications and overall complication rates showed no significant associations. Logistic regression of preoperative variables and comorbidities was performed, and no variable was found to statistically change the effect of medical students on complication rates (Table 7).

DISCUSSION

The purpose of this study was to investigate the effect of medical student presence in the operating room and the subsequent operative time and complication rate. Using our own institution's medical record and a prospective standardized national database, we found medical student presence in the operating room resulted in an additional 14 minutes of operative time. A trend toward lower postoperative complications in procedures with medical students was detected but was not statistically significant.

The standard across many of our country's large academic medical centers is to have medical students routinely present in the operating room for a significant majority of procedures. These include many complex general surgery cases such as liver resections or pancreatectomies. Although the effect or level of medical student involvement in patient care and operating room procedures was not analyzed, the sheer number of students and amount of procedures they were involved in makes it highly likely that their presence has the

TABLE 2. Selected Characteristics of the Study Sample

	All Cases ($n = 2481$)	
Mean age, y (SD)	57 (15)	
Sex	*N*	% of total
Male	1139	46
Female	1341	54
Race		
White	1714	71
Non-white	705	29
Procedure group		
All Fistula repairs	49	2
Appendectomy	40	2
Bariatric	68	3
Cholecystectomy	228	9
Colectomy and ostomy	493	20
Gastrectomy	75	3
Hernia repairs	163	7
Liver resection	241	10
Other	339	14
Pancreatectomy	423	17
Small bowel resection	161	6
Thyroidectomy and parathyroidectomy	123	5
Ventral hernia repair	78	3
Wound class		
Clean	506	20
Clean/contaminated	1399	56
Contaminated	304	12
Dirty/infected	272	11
Mean Op time, min (SD)	264 (153)	
Medical student present	1024	41
Number of MS in case		
0	1457	59
1	875	35
2	139	6
3	7	0
4	3	0
Any complication excluding transfusion	531	21

MS = medical students, SD = standard deviation.
Percentages may not add up to 100% in some cases owing to rounding.

potential to influence patients' experience beyond the operating room. Surprisingly, this large variable in patient care has rarely been studied. Very few reports analyze the activities of medical students in the learning environments of America's teaching hospitals. Considering medical students were present in greater than 40% of general surgery cases at our institution, the authors feel they do likely alter the patient's hospital experience.

In our analysis, medical student presence in the operating room was associated with an increase in operative time. Hopefully this is a result of using the operating room as a teaching environment. Extra time might be devoted to teaching a medical student by the primary surgeon or demonstrating anatomy to a student during the procedure. Another possibility is that medical students choose to attend cases with the least number of residents in the hope that they will be given more opportunity to directly assist the primary surgeon instead of simply observing or holding a retractor. This might increase operative time as a result of having a more inexperienced assistant to the primary surgeon.

There was no statistically significant association between medical student presence in the operating room and postoperative complications excluding transfusion. In fact, though nonsignificant, there was a trend towards lower complications in the cases where a medical student was present. These results could be due to chance, but it may partly be owing to postoperative follow-up by the medical student. This is evidenced by the rates of individual complications. Medical student presence in the operation was associated with statistically nonsignificant decreases in many complications that are prevented by postoperative care. At our institution, medical students will assist in the care of all the patients on a particular service, but the medical student often follows up very closely with cases they observed. Medical students often take on or are given the tasks of encouraging patients to walk, ensuring the patient is compliant with deep vein thrombosis prophylaxis, and generally adding an additional set of eyes to the patient care team.

Conversely, medical student presence is associated with increased complications that may be considered the product of poor sterility or contamination of the surgical field such as abscess formation and wound dehiscence. Admittedly, these results are difficult to explain and their accuracy is likely tenuous at best. Regardless of reason, it is reassuring no trend towards increased complications was observed.

Perhaps the best way to interpret the results of this current study is to take them qualitatively as opposed to quantitatively. The additional 14 minutes of operative time associated with medical student presence during any procedure are likely specific to the surgeon, the institution, the individual medical student, and the specific operating room. More importantly, this study demonstrates the overall breadth of involvement of medical students in the operating theater. These findings, coupled with an increase in operative time when medical students are present in the operating room, suggests that medical students are not simple observers but play a significant role in patient care.

Payers, government entities, and patients themselves are putting more pressure on providers and hospitals to deliver cost effective quality care. Academic medical centers have the additional burden of training future providers and fostering the learning environment in their operating rooms. These learning environments include trainees at all levels from student to resident, adding to the complexity and cost of providing care.[3] The commitment to training surgical residents increases operative times and costs.[10,21-23] Along with increased op times and cost, complications may also be increased as a result of the increased operative times.[24] It remains uncertain what role medical students have to play in this environment, however the association observed

TABLE 3. Comparison of Cases With at Least One Medical Student Present at Some Point During the Case to Cases Without Any Medical Students Present During Any Portion of the Case

	MS Present in OR ($n = 1024$, 41.27%)		**No MS Present in OR ($n = 1457$, 58.73%)**		
Mean age, y (SD)	57.20 (0.48)		57.78 (0.40)		0.3542
Sex	*n*	%	*n*	%	
Male	459	45	680	47	0.3750
Female	564	55	777	53	
Race					
White	701	70	1013	71	0.5337
Non-white	298	30	407	29	
ASA class 3-5	739	72	1071	74	0.4597
BMI > 30	366	36	458	31	0.0249*
Diabetes	191	19	256	18	0.4900
COPD	32	3	73	5	0.0217*
Smoker	188	18	266	18	0.9481
Independent functional status	944	92	1319	91	0.1507
Hypertension requiring Meds	482	47	712	49	0.3777
Dialysis before surgery	41	4	38	3	0.0512
Disseminated cancer	49	5	975	95	0.7400
Weight loss before surgery	70	7	164	11	0.0002*
Procedure group					
All fistula repairs	23	2	26	2	
Appendectomy	9	1	31	2	
Bariatric	33	3	35	2	
Cholecystectomy	74	7	154	11	
Colectomy and ostomy	212	21	281	19	
Gastrectomy	36	4	39	3	
Hernia repairs	74	7	89	6	<0.0001*
Liver resection	71	7	170	12	
Other	152	15	187	13	
Pancreatectomy	155	15	268	18	
Small bowel resection	74	7	87	6	
Thyroidectomy and parathyroidectomy	71	7	52	4	
Ventral hernia repair	40	4	38	3	
Wound class					
Clean	255	25	251	17	
Clean/contaminated	559	55	840	58	<0.0001*
Contaminated	108	11	196	13	
Dirty/infected	102	10	170	12	
Mean Op time, min (SD)	285 (161)		250 (145)		<0.0001*
Primary surgeon ($n = 15$)†					
Surgeon 1	44	47	49	53	<0.0001*
Surgeon 15	43	59	30	41	

OR = operating room, ASA = American Society of Anesthesiologists physical status classification, BMI = body mass index, COPD = chronic obstructive pulmonary disease.

Percentages may not add up to 100% in some cases owing to rounding.

*$p < 0.05$.

†13 Other surgeons hidden for identification purposes.

between medical students and increased operative time in this study should be intriguing, if not worrisome, in light of the increased cost associated with increased operative time caused by resident participation. Further study is needed to determine if medical student participation has similar effects on cost.

Given the highly variable nature of medical school education across the country, even if studies were undertaken to determine the effect of medical students on patient care outcomes it would be difficult to generalize the results to every institution. Possibly, this points to a bigger discussion on the need for standardization of surgical education of medical students. With a more thorough understanding of what role medical students play in this system, a surgical curriculum can be tailored to provide the best possible education with minimal effect on efficient, quality health care delivery.

As in any retrospective study, there are limitations to these results. The data regarding the presence of a medical student in a case comes from intraoperative reports, which may be inaccurate depending on who input them during the case. The study was conducted at an academic medical

TABLE 4. Operative Time for Cases With Medical Students Present Compared With Cases Where No Medical Student Was Present Sorted by Procedure Group. All Procedure Groups Except Fistula Repairs Had Greater Operative Times in Cases With a Medical Student Present, But Only Liver Resections and Pancreatectomies Were Statistically Significant

Procedure Group	Case Op Time (min) With MS	Case Op Time (min) Without MS	MS Effect on Op Time (min)	p Value
All fistula repairs	496	520	−24	0.7306
Appendectomy	169	150	+19	0.7390
Bariatric	228	200	+27	0.1451
Cholecystectomy	204	184	+19	0.0865
Colectomy and ostomy	326	301	+25	0.1229
Gastrectomy	295	301	−7	0.8373
Hernia repairs	253	233	+20	0.2672
Liver resection	316	254	+62	0.0001*
Other	225	202	+23	0.1141
Pancreatectomy	315	254	+61	<0.0001*
Small bowel resection	295	242	+47	0.0785
Thyroidectomy and parathyroidectomy	205	186	+19	0.0962
Ventral hernia repair	410	346	+63	0.2361

Percentages may not add up to 100% in some cases due to rounding.
*p < 0.05.

center, and although we expect medical student participation in the operating room is similar across the country, the hospitals themselves are very different which could affect the external validity of these results.

Researching medical students in the operating room is fraught with difficulty. Owing to a large gap of knowledge in the topic, further study should begin with establishing baseline knowledge of what exactly medical students do in the operating room. It would be helpful to know if medical students in these cases were scrubbed and directly assisting, holding a retractor, or simply observing for example. Further studies should also take into account regional differences in health care delivery, and differences in the medical students themselves, by being multicentered/multi-institutional in nature. It would be useful if NSQIP could include the presence of a medical student in their data recording, similar to how resident participation is recorded. Future research could be retrospective in nature if large enough numbers are available to account for the myriad of confounders that exist when examining outcomes such as operative time or complication rates. Prospective studies could be more narrow in focus and difficult to perform but would greatly limit potential confounders. Eventually, studies of medical student participation could evolve into trials of interventions aimed at reducing the effect of medical students on efficiency or quality.

CONCLUSIONS

This study serves to highlight one potential negative consequence of medical student involvement in the operating room, but, if by sheer numbers alone, medical students

TABLE 5. Operative Time for Cases With Medical Students Present Compared With Cases Where No Medical Student Was Present Sorted by Surgeon. All Surgeons Had Greater Operative Times in Cases With a Medical Student Present

Surgeon #	% of Cases With MS	Case Op Time (min)				MS Effect on Op Time (min)	p Value
		With MS	*n*	No MS	*n*		
1	47	244	44	185	49	+59	0.0054*
2	56	305	32	243	25	+63	0.0775
3	50	441	132	434	132	+7	0.8263
4	44	250	46	206	59	+44	0.1014
5	44	276	135	262	173	+14	0.2845
6	51	202	36	197	34	+5	0.7984
7	51	370	100	362	96	+9	0.6608
8	47	223	25	203	28	+29	0.4955
9	18	204	85	202	392	+2	0.8206
10	48	172	83	159	91	+13	0.1649
11	43	232	24	181	32	+51	0.0234*
12	45	304	101	269	123	+34	0.0482*
13	42	297	80	296	112	+1	0.9557
14	42	232	58	185	81	+47	0.0020*
15	59	229	43	212	30	+17	0.1796

*p < 0.05.

TABLE 6. Multivariable Analysis of Medical Students and Operative Time. Differences in Operative Time Shown are Compared With the Reference in the Same Category. For Example, Cases With the Wound Class "Contaminated" Have Operative Times That are 28 minutes Longer When Compared With "Clean" Cases (the Reference). The Presence of Medical Students was Associated With an Additional 14 Minutes of Operative Time.

	Estimated Effect on Operative Time (min) [95% CI]
Medical students (Y/N)	+14 [+4, +24]*
Wound class	
Clean	Reference
Clean/contaminated	+3 [−19, +25]
Contaminated	+28 [+3, +53]*
Dirty/infected	−16 [−39, +8]
Procedure group	
Ventral hernia and lysis of adhesions	Reference
All fistula repairs	+111 [+66, −156]*
Appendectomy	−147 [−196, −97]*
Bariatric	−76 [−118, −34]*
Cholecystectomy and biliary tract	−94 [−129, −59]*
Colectomy ± ostomy	−17 [−50, +15]
Gastrectomy	−38 [−79, +4]
Other hernia repairs	−79 [−113, −44]*
Liver resection	−14 [−50, +23]
Other†	−113 [−145, −82]*
Pancreatectomy	+5 [−30, +39]
Parathyroidectomy and thyroidectomy	−67 [−116, −19]*
Small bowel resection	−49 [−85, −14]*
Primary surgeon ($n = 15$)‡	
Surgeon with shortest Op time	Reference
Surgeon with longest Op time	+249 [+222, +276]*

*$p < 0.05$.
†Includes soft tissue excision and reconstruction, exploratory laparotomy, incision and drainage of abdominal abscess, and other general surgery procedures.
‡13 Other surgeons hidden for identification purposes.

have the opportunity to enhance the delivery of quality care. Patients have positive views of medical students' involvement in their care,[25] and medical students come equipped with enthusiasm sometimes lacking among more veteran physicians. We should strive to truly understand what role these future physicians are playing in today's hospitals, in the hopes that this understanding will lead to better outcomes for patients, better education for students, and a

TABLE 7. Univariable Analysis of Medical Student Presence and Postoperative Complications as Reported by NSQIP. No Trend Toward Increased Complication Rates Was Observed Among Cases With a Medical Student Present

	MS Present ($n = 1024$)		No MS Present ($n = 1427$)			
	n	% Of total cases with complication	*n*	% Of total cases with complication	Odds Ratio (95% CI)	p Value
Any complication	200	19.53	331	22.72	0.83 (0.68-1.01)	0.0567
Acute renal failure	10	0.98	16	1.10	0.89 (0.40-1.97)	0.7697
Cardiac arrest	6	0.59	10	0.69	0.85 (0.30-2.35)	0.7584
Deep incisional skin site infection	19	1.68	23	1.58	1.18 (0.64-2.18)	0.5987
Vein thrombosis requiring therapy	6	0.59	13	0.89	0.65 (0.25-1.73)	0.3889
Myocardial infarction	5	0.49	7	0.48	1.02 (0.32-3.21)	0.9779
On ventilation within 48 h	52	5.08	77	5.28	0.96 (0.67-1.38)	0.8194
Pneumonia	28	2.73	30	2.06	1.34 (0.79-2.25)	0.2731
Pulmonary embolism	6	0.59	10	0.69	0.85 (0.30-2.35)	0.7584
Progressive renal insufficiency	16	1.56	33	2.26	0.68 (0.37-1.25)	0.2157
CVA	4	0.39	5	0.34	1.14 (0.31-4.25)	0.8465
Superficial skin site infection	80	7.81	126	8.65	0.90 (0.67-1.20)	0.4578
Unplanned intubation	30	2.93	58	3.98	0.73 (0.47-1.14)	0.1635
UTI	28	2.73	46	3.16	0.86 (0.54-1.39)	0.5422
Wound disruption	14	1.37	10	0.69	2.01 (0.89-4.53)	0.0880
Organ space infection	35	3.42	49	3.36	1.02 (0.65-1.58)	0.9407

future where an academic medical center's mission to educate is not at odds with its mission to deliver affordable, quality health care.

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