

SURGERY NIGHT FLOAT TEAM: SHOULD MEDICAL STUDENTS HAVE A SPOT ON THE ROSTER?

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Abstract

Background: Following the trend of residency programs, more medical schools are offering night float (NF) schedules for clerkships and sub-internship rotations. The efficacy of this structure to educate students and prepare them for residency was evaluated.

Research Question: Is a night float surgical rotation an effective educational experience for 4th year medical students to prepare for internship in that it matches or exceeds day-shift rotations in operative and procedural opportunities, autonomy, and instructive interactions with attending physicians and residents?

Methods: Twenty individuals were surveyed after a month-long 4th year NF rotation in Trauma and Emergency Surgery.

Results: Thirteen participants responded (65%), reporting more bedside procedures (84.7%) and one-on-one teaching with residents (84.7%), when compared to daytime shifts. All participants (100%) reported: increased autonomy; that this elective better prepared them for their surgical residencies; and that they would recommend this type of program to other students considering a career in surgery.

Conclusions: Overall the NF surgical sub-internship effective and well-received, with increased autonomy, more frequent procedures, and added resident-led education, when compared to a traditional daytime surgical clerkship/sub-internship. A NF schedule can be a valuable learning experience that prepares medical students for surgical residency.

Table of Contents

Introduction	1
Materials and Methods.....	2
Results	4
Discussion.....	9
Future Directions	13
Conclusions	14
References	15

List of Figures and Tables

Figure 1: Survey “Medical Student Experience on a Night Float versus a Daytime
Surgical Sub-Internship” 3

Table 1: Survey Characteristics 5

Table 2: Subjective Comments from Survey..... 6

Table 3: Stratification of Survey Results by Likelihood to Apply to a Surgical Residency 7

Table 4: Analysis of Correlation Between Survey Questions..... 8

Introduction:

Since the enactment of resident work-hour restrictions mandated by the Accreditation Council for Graduate Medical Education (ACGME) in July 2003, a night float (NF) system has been implemented in approximately 70% of residency programs.^{1,2} To accommodate the 80-hour work week, as well as the first-year resident limit of 16 consecutive work hours, added in 2011, a NF system splits patient care between separate day and night teams.³ The NF model allows residents to work strictly day or night shifts, providing up to 12 hours off within every 24 hours, rather than the typical “call schedule” that consisted of daily shifts, with a 24-hour call shift up to every 3rd night and a 10-hour post-call window free of educational and clinical work. Beginning in July 2017, interns may work more than 16 consecutive hours, but residents will require at least 14 hours free of clinical work and education after a 24-hour shift.⁴ Though these guidelines do not currently apply to medical students, the desire to design cohesive, compliant programs, coupled with the duty to educate residents and medical students, has encouraged both residency and clerkship/sub-internship programs to adopt NF scheduling. Numerous studies have examined resident opinions regarding NF programs.⁵⁻¹⁰ Several have demonstrated positive views, referencing the model’s focus on autonomy, clinical skills, a more consistent schedule, and less resident fatigue.^{5,6,9,10} On the other hand, residents across multiple specialties have criticized a lack of educational or instructional opportunities.⁵⁻⁸ Few investigators have addressed medical student opinions of 3rd and 4th year NF rotations, even though previous papers have noted that the addition of medical students could encourage an educational focus and remedy a common flaw in the current model.^{7,8}

Our institution implemented a 4-week NF elective in Trauma and Emergency Surgery during the 4th year in 2015. We hypothesize that a night float surgical rotation is an effective educational experience for 4th year medical students to prepare for internship and exceeds day-shift rotations in operative and procedural opportunities, autonomy, and instructive interactions with attending physicians and residents.

Material and Methods:

Twenty medical students and graduates of the University of Arizona College of Medicine – Phoenix (UACOM-P) who have completed an elective Trauma Emergency Surgery Service sub-internship 4th year elective between 2014-2017 were surveyed. The elective consisted of a 4-week night float rotation at Banner University Medical Center (BUMC) in Phoenix, Arizona, with regular hours of 5:00pm-7:00am, 6 days/week. The fourth-year students were assigned to a Chief Resident, though duties and experiences varied greatly based on patient flow and team needs. Students functioned as a hands-on component of the night float team, which covered the entire hospital, and presented patients at morning report prior to leaving each day.

An online survey was created using Google Forms to examine the overall impression of the experience, as well as compare specific aspects of the program to their daytime surgical sub-internships. Anonymous survey links were sent via email, and participants were given a 3-month period to submit responses. The questionnaire asked for basic demographics information, specialty preference before the NF experience, and contained a free-text space for any additional comments. The bulk of the survey was 9 questions requiring the participants to compare a variety of characteristics between their NF and daytime surgical sub-internships (Figure 1). They were asked to select 1 of 5 choices from a Likert-like scale for each question: much more, more, same, less, or much less.^{11,12} All questions were required for survey completion.

Statistical Analysis: Survey characteristics were assessed using frequencies and proportions due to all survey responses being categorical. Furthermore, the characteristics were stratified by the likelihood to apply to a surgical residency; “much less likely, less likely or same” versus “more or much more likely”. The Fisher’s Exact Test was used to compare proportions of the survey characteristics between the two groups. Finally, Spearman’s Correlation was implemented to determine the percent agreement between any of the survey questionnaires to ascertain any correlations. All P-values were 2-sided and $P < 0.05$ was considered statistically significant. All data analyses were conducted using STATA Version 14 “College Station Texas”.

Figure 1. Survey

Medical Student Experience on a Night Float versus a Daytime Surgical Sub-Internship

This survey pertains to your experiences during the Trauma Emergency Surgery Service Night Float Elective. The aim is to compare specific measures to your other surgical sub-internships with traditional daytime shifts. Participation is optional and your responses are anonymous.

Gender: Male Female

1. What was your specialty preference before completing the night float elective?

- | | | |
|---|--|-------------------------------------|
| <input type="checkbox"/> Anesthesiology | <input type="checkbox"/> Neurology | <input type="checkbox"/> Psychiatry |
| <input type="checkbox"/> Dermatology | <input type="checkbox"/> Neurosurgery | <input type="checkbox"/> Radiology |
| <input type="checkbox"/> Emergency Medicine | <input type="checkbox"/> Obstetrics and Gynecology | <input type="checkbox"/> Urology |
| <input type="checkbox"/> Family Medicine | <input type="checkbox"/> Orthopaedic Surgery | <input type="checkbox"/> Other |
| <input type="checkbox"/> General Surgery | <input type="checkbox"/> Pathology | |
| <input type="checkbox"/> Internal Medicine | <input type="checkbox"/> Plastic Surgery | |

For Questions 2-8: Compared to your daytime surgical sub-internship(s)...

2. Were your night float shifts more or less busy than your daytime shifts?

- Much More More Same Less Much Less

3. Did your night float shifts provide you with more or less operative experiences?

- Much More More Same Less Much Less

4. Did your night float shifts provide you with more or less bedside procedures (catheters, sutures, LP, etc.)?

- Much More More Same Less Much Less

5. Did the night float experience provide you with more or less autonomy in patient care?

- Much More More Same Less Much Less

6. Do you feel you had more or less contact with your attending(s) throughout the night float experience?

- Much More More Same Less Much Less

7. Did night float shifts facilitate more or less one-on-one teaching opportunities with a resident?

- Much More More Same Less Much Less

8. Did night float shifts facilitate more or less one-on-one teaching opportunities with an attending?

- Much More More Same Less Much Less

9. After completing the night float elective, were you more or less likely to apply to a surgical residency?

- Much More More Same Less Much Less

10. If you are an intern or resident: Did the night float experience make you feel more or less prepared for your internship/residency?

- I am not an intern or resident
 Much More More Same Less Much Less

11. When discussing the night float rotation with other medical students considering a surgical career, I would:

- Highly Recommend Recommend Neutral Discourage Strongly Discourage

Any comments about your experience during the Night Float Elective? _____

Results:

Of the 20 individuals to whom the survey link was emailed, 13 (4 males and 9 females) responded; giving a response rate of 65%. Prior to completing the NF elective, 8 individuals were interested in General Surgery, 2 in Emergency Medicine, 2 in Orthopaedic Surgery, and 1 in Plastic Surgery.

Many participants found their NF shifts to be equally as busy as their daytime shifts (69.2%). Most (84.7%) reported increased bedside procedures and one-on-one teaching opportunities with residents; with no responses indicating that they received less of these procedural or teaching experiences. Operative experience varied greatly (46.2% more or much more, 23.1% same, 30.8% less), as did contact and teaching opportunities with an attending physician (Contact: 46.2% more or much more, 30.8% same, 23.1% less or much less; Teaching: 38.5% more or much more, 30.8% same, 30.8% less). All surveyed individuals felt they were provided more autonomy in patient care and would recommend the NF elective to other students considering a career in surgery. The 11 alumni currently working as interns and residents unanimously felt that this program made them better prepared for their residency programs. Overall survey characteristics and all responses were reported in the form of frequencies and proportions, as seen in Table 1. Nine participants shared optional comments at the end of their survey, all of which were positive (Table 2).

Responses to each survey question were further stratified to assess any correlation between increased or decreased likelihood to apply to a surgical residency (Table 3). Of the 9 students (69.2%) that indicated increased likelihood of surgical residency application, 8 (88.9%) performed more bedside procedures and 7 (77.8%) had more resident teaching while on their NF rotation, when compared to their daytime surgical sub-internship experiences. None of the p-values comparing the responses of these two groups were found to be statistically significant. Table 4 depicts the correlations between individual survey questions. Both contact, and one-on-one teaching opportunities, with attending physicians were positively correlated with operative experiences (Spearman's $Rho=0.57$; $P=0.04$ and Spearman's $Rho=0.49$; $P=0.08$, respectively). A 53% correlation was also found between the amount of autonomy in patient care and the likelihood of applying to a surgical residency program (Spearman's $Rho=0.53$; $P=0.06$).

Table 1. Overall Survey Characteristics

Survey Questions	Values (N, %)
	N=13
Gender (male, %)	4 (30.8)
Specialty Preference	
General Surgery	8 (61.5)
Emergency Medicine	2 (15.4)
Plastic Surgery/Orthopedic Surgery	3 (23.1)
Were your night float shifts more or less busy than your daytime shifts?	
Much Less, Less, or the Same	10 (76.9)
More, Much More	3 (23.1)
Did your night float shifts provide you with more or less operative experiences?	
Much Less, Less, or the Same	7 (53.9)
More, Much More	6 (46.2)
Did your night float shifts provide you with more or less bedside procedures (catheters, sutures, LP, etc.)?	
Much Less, Less, or the Same	2 (15.4)
More, Much More	11 (84.6)
Did the night float experience provide you with more or less autonomy in patient care?	
Much Less, Less, or the Same	0 (0.0)
More, Much More	13 (100.0)
Do you feel you had more or less contact with your attending(s) throughout the night float experience?	
Much Less, Less, or the Same	7 (53.9)
More, Much More	6 (46.2)
Did night float shifts facilitate more or less one-on-one teaching opportunities with a resident?	
Much Less, Less, or the Same	2 (15.4)
More, Much More	11 (84.6)
Did night float shifts facilitate more or less one-on-one teaching opportunities with an attending?	
Much Less, Less, or the Same	8 (61.5)
More, Much More	5 (38.5)
After the completing the night float elective, were you more or less likely to apply to a surgical residency?	
Much Less, Less, or the Same	4 (30.7)
More, Much More	9 (69.2)
If you are an intern or resident: Did the night float experience make you feel more or less prepared for your internship/residency?	
I am not an intern or resident	3 (23.1)
More, Much More	10 (76.9)
When discussing the night float rotation with other medical students considering a surgical career, I would:	
Strongly Discourage, Discourage, Neutral	0 (0.0)
Recommend, Strongly Recommend	13 (100.0)

Table 2. Subjective Comments

Excellent
I absolutely loved the night float elective. It was one of my favorite electives during medical school. I learned a lot that month and got to do a lot of hands on procedures. I also felt much more autonomous than I had previously even though it was my first month of fourth year. I actually ended up switching into a surgical specialty from emergency medicine after the night float elective. I've recommended it to many classmates, especially those who are looking to applying to surgical specialties but I found that it was a great elective even for students applying to other specialties. Hope it gets to stay!
Greatly enjoyed my experience on the rotation. I recommend it highly. The experiences I gained has smoothed my experience transitioning to a intern and now as a PGY 2.
My night float surgery rotation was the pinnacle of my medical school education. I felt as though I learned more about surgery, patient care, and balancing life with work during this rotation than any other rotation that I had.
The trauma night float rotation was a fantastic learning experience. I have already recommended it to numerous students, and I would highly recommend it to anyone interested in surgery or emergency medicine. Throughout the rotation, I felt like a valued member of the team. I was also given ample opportunities to perform or assist with procedures.
I liked having the experience of the night float rotation as an MS4 because it most similarly resembles your role as an intern. There are much fewer residents at the hospital, so you can be of more assistance if you choose to take more autonomy. Because there were fewer people around for traumas, I was allowed to do primary surveys on level B traumas. Additionally, the 'day team' for traumas typically do a lot more floor management and dealing with dispo issues, which is a reality of trauma surgery, but not very conducive for learning the medical side of acute care surgery. I liked night float because you learn much more about the immediate management of the trauma patient, rather than the later issues that come up. In my opinion, they should keep the MS4 rotation as a night float experience.
During my time on TESS nights I also rounded in the ICU with the R3 and did a lot of Alines as well as other bedside procedures in TB with little assistance and no competition from other Med students. I also helped the intern with floor work, saw all consults and developed plans presenting to attendings occasionally. I thought the experience allowed me to be more independent and prepared me to work on an intern level
It was a great experience! I had an amazing team! I learned a lot, improved my technical skills and was able to feel increase my confidence in areas that will be extremely useful as I become an intern.
My trauma rotation was amazing. I thought it was very educational and with a lot of hands on.

Table 3. Stratification of Survey Characteristics by Likelihood to Apply to a Surgical Residency

Predictors	Less likely/Same likelihood to apply to a Surgical Residency. (n=4)	More/Much More likely to apply to a Surgical Residency. (n=9)	P-value*
Gender (male, %)	1 (25.0)	3 (33.3)	1.0
Specialty Preference			
General Surgery	2 (50.0)	6 (66.7)	0.37
Emergency Medicine	0 (0.0)	2 (22.2)	
Plastic Surgery/Orthopedic Surgery	2 (50.0)	1 (11.1)	
Were your night float shifts more or less busy than your daytime shifts?			
Much Less, Less, or the Same	3 (75.0)	7 (77.8)	1.0
More, Much More	1 (25.0)	2 (22.2)	
Did your night float shifts provide you with more or less operative experiences?			
Much Less, Less, or the Same	2 (50.0)	5 (55.6)	1.0
More, Much More	2 (50.0)	4 (44.4)	
Did your night float shifts provide you with more or less bedside procedures (catheters, sutures, LP, etc.)?			
Much Less, Less, or the Same	1 (25.0)	1 (11.1)	1.0
More, Much More	3 (75.0)	8 (88.9)	
Did the night float experience provide you with more or less autonomy in patient care?			
Much Less, Less, or the Same	0 (0.0)	0 (0.0)	N/A
More, Much More.	4 (100.0)	9 (100.0)	
Do you feel you had more or less contact with your attending(s) throughout the night float experience?			
Much Less, Less, or the Same	2 (50.0)	5 (55.6)	1.0
More, Much More	2 (50.0)	4 (44.4)	
Did night float shifts facilitate more or less one-on-one teaching opportunities with a resident?			
Much Less, Less, or the Same	0 (0.0)	2 (22.2)	1.0
More, Much More	4 (100.0)	7 (77.8)	
Did night float shifts facilitate more or less one-on-one teaching opportunities with an attending?			
Much Less, Less, or the Same	2 (50.0)	6 (66.7)	1.0
More, Much More	2 (50.0)	3 (33.3)	
Did the night float experience make you feel more or less prepared for your internship/residency?			
Much Less, Less, or the Same	1 (50.0)	2 (25.0)	1.0
More, Much More	1 (50.0)	6 (75.0)	

*P-values calculated using the Fisher's Exact Test.

Table 4. Analysis of Correlation Between Survey Questions

	A	B	C	D	E	F	G	H
	**	**	**	**	**	**	**	**
A	1.00							
B	-0.15 (0.62)	1.00						
C	0.002 (0.99)	0.06 (0.85)	1.00					
D	0.53 (0.06)	-0.08 (0.78)	-0.04 (0.88)	1.00				
E	-0.03 (0.93)	-0.07 (0.83)	0.31 (0.29)	-0.07 (0.80)	1.00			
F	0.05 (0.87)	0.57 (0.04)	-0.26 (0.38)	-0.36 (0.22)	-0.07 (0.81)	1.00		
G	0.03 (0.92)	-0.02 (0.93)	-0.46 (0.10)	-0.16 (0.61)	0.08 (0.79)	0.15 (0.61)	1.00	
H	0.14 (0.64)	0.49 (0.08)	-0.02 (0.94)	0.09 (0.78)	0.39 (0.17)	0.52 (0.06)	0.24 (0.42)	1.00

**** Spearman’s Rho (p-value)**

- A. After the completing the night float elective, were you more or less likely to apply to a surgical residency?
- B. Did your night float shifts provide you with more or less operative experiences?
- C. Did your night float shifts provide you with more or less bedside procedures?
- D. Did the night float experience provide you with more or less autonomy in patient care?
- E. Were your night float shifts more or less busy than your daytime shifts?
- F. Do you feel you had more or less contact with your attending(s) throughout the night float experience?
- G. Did night float shifts facilitate more or less one-on-one teaching opportunities with a resident?
- H. Did night float shifts facilitate more or less one-on-one teaching opportunities with an attending?

Discussion:

The results of this study demonstrate that medical students rated their experience on the night-float rotation positively relative to standard rotations. All the physicians who answered the survey unanimously agreed that the experience better prepared them for their residency program.

Our data is consistent with previous studies. Talib *et al.* found that students experienced a significantly higher quality of resident teaching time and had more opportunities for new-admit history and physicals during their overnight shifts as compared to daytime shifts.¹³ The 2013 study by Farkas *et al.* also reported high student satisfaction.¹⁴ Surveys compared between traditional night call and NF groups showed that students had a much more positive perception of their night call experience when on NF (89% positive rating) than on traditional call (35% rating).¹⁴ Connelly *et al.* further demonstrated increased clerkship student morale and overall treatment team cohesion, without a perceived loss of educational opportunities.² Both studies by Connelly *et al.* and McLean *et al.* found a marked increase in NBME scores after NF rotations; indicating that NF services may not only improve student satisfaction, but provide an environment for efficient clinical education that produces higher averages on standardized tests.^{2,15}

In 2016, Barr and Graffeo surveyed 644 graduating medical students from 17 allopathic medical schools and found that >80% had never placed a central venous line or chest tube, and >50% had never performed a lumbar puncture.¹⁶ Only 60% of those new physicians stated that they would feel comfortable initiating CPR in an emergency; many citing a lack of practical experience prior to residency. The data collected during this survey suggests that a night float schedule may increase exposure to these types of non-operative procedures, as well as increase teaching time with residents. A NF schedule also provided 100% of fourth-year students with increased autonomy within the care team, which has been linked to increased student satisfaction and confidence in clinical skills.¹⁷

As we continue to adapt medical education to produce new physicians equipped for residencies in all specialties, it could be helpful to identify modifiable clerkship/sub-internship characteristics that may increase a student's interest one specialty or another. These potential predictors of specialty preference could aid program directors in tailoring 3rd and 4th year programs to students who are unsure of their career goals. Previous studies have associated both traditional overnight call schedules, and dissatisfaction with clerkship experience, with increased likelihood of student burnout, which can deter them from pursuing the longer residency programs required for surgical specialties.^{17,18} Conversely, specific experiences such as hands-on learning and student autonomy during a surgical rotation increases student satisfaction and interest in surgery as a career.^{17,19,20} The relationship between procedural exposure, independent practice, and interaction with potential role models (residents and attending physicians) has been well-established by previous studies, and re-affirmed in this study.^{17, 19-21} While it is difficult to assign a causal relationship to these variables, evaluation of this data and the available literature certainly advocates for increased practical procedures, student autonomy, and interaction with residents and attending physicians throughout surgical clerkships to promote interest in a surgical residency and career.

The subjective opinion of students' clerkship and sub-internship rotations also plays a major role in the career decision-making process. The open comments regarding the Trauma Emergency Surgical Service elective at our institution mirrored the findings of previous literature with consistently positive opinions of the NF schedule.^{2,13,14} One participant described this rotation as "the pinnacle of [his/her] medical school education" where they "learned more about surgery, patient care, and balancing life with work...than on any other rotation." Another physician shared that prior to the NF elective, he/she had been planning to apply to Emergency Medicine, but switched their application to General Surgery after their experience. It is this type of positive feedback from students, paired with comparable standardized exam scores cited in previous studies, that continue to support a transition to NF schedule options for medical student rotations.^{2,13}

Our study had several limitations, the first being a small sample size (N=13). An acceptable response rate of 65% was achieved, but the number of responses was not sufficient to delineate any statistically significant differences between students more likely to apply to a surgical residency and those who were not.^{22,23} The proportional differences appreciated between the groups may or may not be an exact depiction of the entire population of participants; though previous literature has shown small samples to adequately portray population trends.²⁴

Secondly, this is a single-program study. Without the variation of a multi-center examination, it is difficult to account for confounding factors, including continued affiliation with the facility, that may affect participants' recollection and opinion of their sub-internship experience.

Lastly, this study lacked a distinct control group. Each student directly compared a NF rotation to a traditional sub-internship experience, but it is unlikely that their daytime rotation was also a Trauma Emergency Surgical Service. Students interested in trauma therefore could have a more positive view of the NF experience, simply based on the sub-specialty content. This bias was reasonably limited with the use of closed-ended questions when comparing night float and daytime shifts.

Future Directions:

The findings of this study could be further expanded by continued surveying of students completing the one-month Trauma and Emergency Surgery Night Float elective at BUMC-P. I believe the scope of this study could also extend into other surgical sub-specialties interested in including medical students as a part of their night float teams.

Conclusions:

Medical schools continue to restructure clerkship and sub-internship curricula to better educate and prepare students for residency. Surgical programs, specifically, are tasked with providing adequate clinical and procedural exposure of complex and varied sub-specialties in a narrow timeframe. Our data suggests that a night float rotation optimizes teaching opportunities with residents and attending physicians, encourages hands-on procedural training, increases student satisfaction with the rotation and better prepares them for a surgical residency. Overall, these results support implementation of a NF surgical sub-internship as an effective educational experience for 4th year medical students.

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