

The Undergraduate Surgical Clerkship

A Cutting Edge Which Separates the Clinical from the Nonclinical Medical Specialists

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The role of the surgical clerkship in the curriculum has often been debated. This study highlights its function in the students' decision making process. Junior students (N = 164) were measured on interest in surgery before and after the clerkship and divided into groups that changed significantly in a positive or negative direction, or that remained essentially unchanged. Background factors, learning styles of the students, and their evaluations of the clerkship showed that students who changed negatively (12%), compared with those who changed positively (44%), did not learn as well from clinical experiences and evaluated certain aspects of the clerkship, related to time and clinical demands, less positively. The unchanged group resembled the positive change students. Performance in the clerkship did not differ significantly among the three groups. The group that changed positively had none interested in surgery as a career before the clerkship, 15% who chose surgery afterward, and who later entered a surgical residency. The negative change group entered with high, perhaps unrealistic, levels of interest, left with none selecting surgery, and a third entering nonclinical type residencies. The surgical clerkship appears to have a unique role to help students make decisions about future careers based on their underlying personalities and learning styles.

“ACADEMIC SURGERY REMAINS a delicate hot-house plant in the groves of academe; there is no ground for complacency about its future.”⁷ The appropriateness of including surgery as part of the medical school curriculum is an extremely important issue that is by no means resolved. There is consideration on the part of medical educators, which include some surgical departmental chairpersons, about de-

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creasing the time allotted to surgery as an obligatory part of the undergraduate experience. This issue is reflected in the wide variations in the number of weeks designated for the clerkship by different medical schools.

A number of excellent reasons have been cited for requiring an undergraduate surgical clerkship. At the 1976 meeting of the American College of Surgeons, Anlyan² pointed out the need for surgeons to be seen as diagnostic and therapeutic decision-makers, rather than just as technicians responding to internists, pediatricians, family practitioners. Drucker,⁶ who had witnessed the omission of surgery from the required curriculum at Western Reserve University, noted the importance of removing the mystique of surgery by bringing an understanding of surgery's role in total patient care to the undergraduate, as well as the value of undergraduate surgery in helping students to sharpen their clinical decision making skills. Anderson¹ mentioned the importance of understanding student attitudes in planning present and future surgical educational programs. In line with student attitudes, Mueller,¹³ at the American College of Surgeons meeting in 1975, emphasized, what has since been the most frequently cited justification of the clerkship, its role in providing students with further perspective that is so vital for later career choices.

Impressive as these arguments are, they do not provide concrete data that are needed in order to justify a mandatory undergraduate experience in surgery. For example, studies dealing with the reasons for career choices of medical students have been contradictory. Williams,¹⁹ concluded the reasons were, therefore, largely unknown. Even now, some three years later, no hard data exist in regard to what it is, if

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anything, that is uniquely provided by the surgical clerkship. Somewhat serendipitously, perhaps, in the course of comparing students whose interests in surgery increased or decreased as a result of the clerkship, these comparisons shed new light on how the clerkship served to separate students on the basis of their learning styles, which in turn clarified their own future career choices in relationship to clinical patient oriented practice modalities. The purpose of this paper is to report these findings.

Over the years, one of the major objectives of the junior surgical clerkship at the University of Miami School of Medicine has been to present the essentials of surgery that all physicians should know whether or not they became surgeons. The ultimate goal was not to make all students like surgery to the point of selecting the field as their career, but rather to try to improve the clerkship so that students understood the relationship of surgery to the other medical specialties and felt positively about their experiences. The rationale behind this approach was built on Mager's comment that "whatever else we do in the way of influencing the student, the *least* we must strive to achieve is to send him away with favorable rather than unfavorable feelings about the subject and activity we teach."¹²

In order to evaluate students' reactions to the clerkship, questions about interest in surgery were included as part of the pre- and postclerkship questionnaires which all students complete. The idea was to look at students who underwent significant changes in interest during the clerkship in order to assess which students were likely to change and what experiences in the clerkship were associated with attitude change.

Although a number of studies have focused on the relationship between attitudes and career choice, few have looked at changes in attitudes and its implications. Boverman³ found that one-third of the seniors had changed in career choices, with those who had selected family practice, basic science, and pediatrics being the ones who changed most often. Kritzer and Zimet¹⁰ also reported that students who had chosen certain fields were more likely than others to change. Donovan et al.⁵ found that sophomore students who were interested in general practice changed to other areas more frequently by the time they were seniors. Bruhn and Parson⁴ and Livingston and Zimet¹¹ confirmed a high degree of change in career preferences over the four years of medical school. Although these studies tend to confirm that students go through a series of changes in career preferences, the reasons for these were not as clearly identified. On the other hand, there have been studies which have related final career choice or career preference, at one point in time, to personality factors,¹⁵ premedical scientific orientation,⁸

sex,⁹ research and educational experiences,¹⁸ and styles of learning.^{14,16,21} These studies, however, concentrated on predicting career choice and not in predicting changes in interest *per se*.

Interest was defined here as an attitude, which measured the degree of positive or negative attraction which the student felt toward surgery. Although attitudes are often associated with actions, there is no perfect one to one relationship between the two. It seemed likely that students who became more interested in surgery as a result of the clerkship, or those who maintained consistently high interest, would be those students who later selected surgery as a career. Of more interest here were those students who said they had interest in surgery but who were turned off after the clerkship. One might either conclude that the clerkship itself did not meet their educational needs, in that it was poorly designed, or that in some way the clerkship served to help those students better appraise their attitude and possibly make a more realistic career choice. The focus was not on students whose attitudes remained essentially unchanged, in that the clerkship did not significantly alter their levels of interest, but rather on those students for whom the clerkship appeared to serve some definite function in attracting or repelling them in terms of their interest. For these students, it might be asked what factors in the clerkship seemed responsible for this change in attitude? Did these factors indicate something about the type of students who changed? Were these changes in attitude associated with their performance in the clerkship? And finally, did the changes in attitude seem to have any relationship to the students' later choice of a residency?

Method

The only course in surgery required for graduation at the University of Miami School of Medicine is the 12 week junior surgical clerkship. The student spends four weeks on a general surgery ward, two weeks on a trauma ward, two weeks in the surgical emergency room, and four weeks on specialty surgery wards which they select. All ward assignments place students on a surgical team with both responsibility and accountability for patient care, as well as designated places on the team's call schedule. Daily lectures and conferences are presented for students which they may attend or not. These daily presentations focus on the core of surgical information essential for all physicians and stress the philosophy that all clinical decisions should be based on an understanding of underlying pathophysiology rather than a list of empirical routines.

Evaluation is an ongoing two way process (*of* the student by the faculty and *by* the student of the clerk-

ship). Half of the students' final grade comes from evaluations of clinical performance on each ward rotation; the other half comes from four cognitive type examinations, two oral and two written, with one of the written being the surgical section of the National Board Medical Examination purchased by the department. Biweekly evaluations are done during the clerkship by the students of the educational value to them of all parts of the clerkship. Furthermore, each students' attitudes about themselves and their education are formally obtained before and after the clerkship, as well as informally solicited during the clerkship by surgical faculty who meet weekly with small groups of three or four students assigned to them for the 12 weeks.

For this study, 164 junior medical students who graduated in June 1978 were measured at the beginning of their surgical clerkship concerning their degree of interest in surgery on a 1-100 scale. The same question was repeated at the end of the clerkship. Students were divided into a group who changed positively and a group who changed negatively by the following method. One-half of a standard deviation difference was calculated to be a sufficient amount of change for this size sample to represent a statistically significant difference between pre- and postinterest scores.¹⁷ The average standard deviation on interest was 28 points. Those students who changed more than 14 points were classified by the direction of their change into positive and negative change groups. Those students who changed less than 14 points were considered essentially unchanged by the clerkship and were not considered in the primary analyses of data related to change, but their data were used to help clarify some of the findings.

Characteristics of the students such as age, sex, having a Ph.D. degree, having an interest and/or experience in research or teaching, and a preferred style of learning such as lecture, informal or formal discussion, written examinations, personal (tutorial) method, self-study, and clinical experience were collected on entering the clerkship.

Students also evaluated aspects of the clerkship experience at the end of 12 weeks. These ratings reflected their assessment of the educational experience. On a 1-100 scale, they rated the adequacy of the supervision they received on patient work-ups, time they had for study, degree of responsibility they had been given, and the quality of the teaching in six areas (the operating room, on rounds, in the emergency room, on elective surgery, by housestaff, and by attendings). Furthermore, they assessed on the same scale the value of specialty surgery and the value of time spent in three areas (operating room, wards, and emergency room). Lastly, they provided a global rating of the clerkship experience and answered open-ended questions about

achievement of their goals, strong and weak features of the clerkship, recommended changes, and their career preferences.

Data on all components of the surgical grade, the final grade in surgery, and other medical school grades were available for study. Students were followed-up at the end of their senior year and their choice of residency was determined.

Data were analyzed, for the most part, by analysis of variance. One analysis focused on the differences between high and low interest change groups in terms of their characteristics at the time they entered the clerkship. Another analysis focused on the differences between these same groups in their evaluations of their clerkship experiences. Later, these same analyses were repeated to determine whether the group that remained essentially the same in interest resembled more the positive or negative change group. Grades and later choice of residency were analyzed for all three groups. Responses to the open-ended questions were compared among the groups by content analysis.

Results

When students were divided into groups that changed significantly in a positive or negative direction, 44% of the class was found to have changed positively; 44% to have remained essentially the same, in that they had changed less than 14 points; and 12% to have changed in a negative direction. Overall, the average change was positive for the entire class at a .01 level of significance. Students in the positive change group entered their clerkship with an average score of 50 for interest in surgery (significantly below the other two groups) and ended with an average interest score of 79. The group that remained essentially unchanged entered the clerkship with a score of 70 and left with a score of 71. The group that changed negatively entered with an average score of 63 and left with a score of 28 (significantly lower than the other two groups).

Table 1 shows the positive and negative change group on the variables collected at the time the students entered their surgical rotation. There were no significant differences in demographic and background characteristics such as age, sex, whether they had a Ph.D. degree, or whether they had interest or experience in research or teaching. Furthermore, students in the four quarters of the academic year did not differ from each other. Although students who changed positively tended to rank most styles of learning more helpful to them than those who changed negatively, the only significantly different variable between the groups was learning by clinical experience. Those students in the positive group said that they learned more through

clinical experience than did those in the negative change group ($p < .01$).

Table 2 shows how these two groups rated their clerkship experiences. Some variables differed between the groups at a statistically significant level, with scores of the negative change group in the less favorable direction. At the .01 level, time spent on the wards, time in the operating room, and adequacy of supervision of workups were rated less favorably by students who changed negatively in their interest in surgery. Furthermore, ratings on lectures, teaching in elective surgery, teaching in the emergency room, and teaching on rounds were less favorable at the .05 level of significance. Lastly, the overall global rating of the clerkship differed at $p < .01$, with those who changed more negatively evaluating the experience about 12 points lower.

In terms of the relationship between interest change and performance, as measured by either the eight components of the surgical grade or the final grade itself, degree of interest change was not significantly associated with performance. There were no significant correlations between any of the parts of the grade or the final grade and interest change. Grades did not differ significantly among the positive, negative, and no change groups, when tested by analysis of variance. Furthermore, other medical school grades were also not significantly different among these groups.

Seventeen per cent of the class entered a surgical residency at the end of their fourth year of medical

TABLE 2. Comparison of Positive and Negative Change Groups in Terms of Students' Evaluation of Clerkship Experiences

Clerkship Experiences	Interest Change		F-Ratio
	Positive	Negative	
Feedback on work-ups (supervision)	61.00	40.50	6.19**
Value of time in operating room	77.00	64.41	7.11**
Value of time on ward	77.25	64.65	7.65**
Value of time in emergency room	93.07	94.88	1.30
Time for study	6.98	51.38	2.90
Degree of responsibility	71.62	67.50	.53
Teaching by housestaff	68.34	60.63	1.60
Teaching in operating room	69.50	61.69	1.81
Teaching on rounds	60.83	47.63	3.35*
Teaching by attendings	63.12	54.05	1.95
Teaching in emergency room	47.25	25.27	3.57*
Teaching on elective surgery	64.27	46.23	3.74*
Lectures	80.72	70.29	5.36*
Personal tutorial experience	85.25	82.94	.26
Rotation on specialty surgery	87.68	82.76	2.78
Overall evaluation of clerkship	81.68	69.06	11.80**

* $p < .05$, ** $p < .01$.

Note: All items were scored on a 1-100 scale with the higher score indicating a more favorable rating of the experience.

school. The group who changed negatively had no one who entered surgery. The group who changed positively had 15% enter a surgical residency, and the group who remained unchanged had 23% go into a residency in surgery.

Although the original intent had been to analyze only the students who changed significantly in interest, the question arose as to whether the students in the group who remained essentially unchanged resembled the positive or negative change group more in their learning styles and evaluation of the clerkship. Data were analyzed by comparing the unchanged group with each of the change groups. The unchanged students were not significantly different from either the positive or negative change students in terms of their background characteristics. Their scores on learning styles and evaluations of the clerkship almost exactly paralleled the positive change group. The unchanged group, therefore, were significantly different from the negative change group on the same variables that had discriminated the negative group from the positive group in the first place.

In an attempt to better understand the reasons for significant change, answers to the open-ended questions concerning achievement of goals, descriptions of positive and negative features of the clerkship, and suggestions for improvement of the clerkship were reviewed by content analysis for all three groups. Reviews were done blindly in that the two reviewers were unaware of the interest change groups. Students in all groups were similar in praising the emergency room experience, and in complaining about the amount of

TABLE 1. Comparison of the Positive and Negative Change Groups in Terms of Their Backgrounds and Preferred Styles of Learning Before the Clerkship

Baseline Variables	Interest Change		F-Ratios
	Positive	Negative	
Background			
Age	27.11	26.41	.54
Sex (females)	.12	.18	.52
PhD	.10	.18	.39
Research experience (past)	.50	.71	2.04
Teaching experience (past)	.33	.21	.65
Research interest (current)	37.11	49.64	1.85
Teaching interest (current)	59.08	61.29	.08
Learning Styles			
Lecture	.53	.36	1.43
Informal discussion	.69	.50	1.79
Formal discussion	.29	.14	1.20
Tutorial (personal)	.38	.21	1.39
Formal examinations	.12	.14	.07
Self-study	.81	.78	.03
Clinical experiences	.90	.57	9.81**

* $p < .05$, ** $p < .01$.

Note: All variables except age and interests were scored so that numbers can be read as per cent of the group. Age is in years and interest is scored on a 1-100 scale with higher being more interest.

“scut” work, lack of enough teaching on the wards, negative “surgical” attitudes, and insufficient faculty role modeling. The negative change group complained much more often about “too much time on the clinical service,” and “too little time off for studying.” Almost half of the negative group changed their career preference from surgery at the beginning of the clerkship, none were interested in surgery at the end of the clerkship, and none entered a surgical residency later. One-third changed preferences between the end of the clerkship and the end of the fourth year, with a third choosing a “nonclinical” type residency. Nonclinical was defined here as specialties which minimized direct doctor-patient relationships such as radiology, pathology, anesthesiology, and research. Students in the positive change group had no one who was interested in a surgical career at the beginning of the clerkship, almost one-fourth changed to an interest in surgery by the end of the clerkship, and all those who changed to a career preference of surgery at the end of the clerkship chose a residency in surgery. Only 7% of the positive group entered a nonclinical type residency. The group that remained unchanged more often set higher goals, praised faculty as role models more often, and had the most students who entered with an interest in surgery, stayed with that career preference at the end of the clerkship and also entered a surgical residency later. In fact, only 6% of the no change group selected any different residency program than they indicated at the end of the clerkship. About 15% selected a nonclinical type program.

Discussion

It was gratifying that four times as many students changed positively toward surgery than changed negatively. The original purpose in examining attitude change had been to see if any students were being turned off by the clerkship and if they were, whether reasons for negative change could be identified. The initial thought had been that a good clerkship should leave all students with a positive attitude toward surgery. In comparing the similarities and differences among the three groups, it became apparent that several reasons other than the educational adequacy of the clerkship could account for attitude change. For example, a negative change could occur with a perfectly adequate educational experience for students who may have entered with unrealistic concepts of what surgery was all about. Hence, a student might have associated surgery with glamour and excitement and found instead that it involved long hours and rather routine clinical duties. This might be particularly true if the student’s style of learning was self-study and not based

on a model of clinical experience. A positive change could also mean that a student was unaware of what surgery was all about. But, if these students had a basic learning style of clinical experience, then the same experiences that had turned the other group off may have turned them on. It does not seem unreasonable, therefore, to suggest that learning style preferences of each of the change groups coupled with the realities of the clinical duties involved in the clerkship could have led to attitude change and for some career changes as well.

There seems to be further evidence of this explanation in the fact that the three groups were not significantly different on background characteristics. Therefore, sex, age, and prior experiences did not account for the attitude change. Since findings were the same for each quarter of the academic year, prior clinical rotations did not seem to be implicated in the changes observed. The fact that surgical grades, as well as all other medical grades, failed to distinguish one group from another tends to eliminate cognitive abilities as the reason for attitude change. On the other hand, it must be recognized that medical students are an elite group where grades are concerned. Medical school admission criteria eliminates those with low grade point averages to the extent that there is little variance left in students’ cognitive abilities. Students are so programmed to be high achievers throughout medical school, that a decrease in interest in a course would be no excuse for not performing at a high level for most students. Unfortunately, grades as they exist, have never been found to be good predictors of physician performance after medical school.²⁰ If cognitive abilities were equal among the three groups, reasons for changes in interest would seem to be associated with either the types of experiences of the clerkship or the personalities of the students.

Looking first at the clerkship, it is evident that despite our continuing attention and revision, certain phases of the clerkship “bug” all students. The volume of “scut” work, lack of enough teaching on the wards, negative (sometimes called “surgical”) attitudes of housestaff, and lack of role models in the faculty were mentioned frequently. Such feedback confirms that there is room for improvement even though students later select surgery as one of the best organized and taught clerkships in the curriculum. At the same time, the negative change group did evaluate some aspects of the clerkship significantly lower than did the other groups. The heart of these complaints seemed to reflect their feelings about time spent on the wards and the criticisms of the way surgery was taught.

These lower evaluations are particularly important in

light of the fact that these students were the ones with the highest preclerkship interest, and several factors seem to point to their change being the result of underlying differences in their personality and learning styles rather than a specific deficiency in the clerkship. The fact that this group reported that they met their educational goals more frequently than did the others and that their grades were no different indicates that whatever the clerkship faults might be, this group did at least as well. Hence, the poorer evaluations of the educational process were not accompanied by poorer educational outcomes for this group. On the other hand, it is not difficult to see how their discovery that surgery was, in reality, an almost unending chain of clinical duties conflicted with their earlier impression of surgery and with their preferred self-study style of learning. This disillusionment would be likely to produce a more negative evaluation of the clerkship in those features which they rated significantly more negatively. It would also seem that the discovery of clinical demands could lead to the significantly higher proportion of this group who eventually chose nonclinical type residencies. Conversely, the same factors as those outlined for the negative change group would also apply except in the opposite direction to the large group of students who changed positively. The association found here between learning style of medical students and their choice of medical specialties is in agreement with other studies,^{14,16} but in addition, documents the role played by one particular type of clerkship in the decision process.

As mentioned earlier, several educators in the field of surgery have stressed the fact that the clerkship may help students select their future careers. This study documents this with data that reinforces their impressions and shows the uniqueness of the surgical clerkship, among other undergraduate experiences, in playing a vital and specific role in changing or reinforcing student career preferences and choices. In this regard, the undergraduate surgical clerkship might be regarded as the "cutting edge" which helps a class dissect their true interests, based on their underlying personality

and attitudes, from the encapsulating fog of unreal fears, glamorous delusions, and inaccurate beliefs.

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