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Editorial

**Attracting Outstanding Students
(Premedical and Medical) to a
Career in Cardiothoracic Surgery**

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► **Introduction**

Over the last few years, there have been a number of articles about the problems facing our specialty, particularly with regard to attracting the best individuals into our cardiothoracic training programs. In an excellent article entitled *Why Become a Cardiothoracic Surgeon* [1],

Nicholas Kouchoukos commences the paper with: "These are trying times for the specialty of cardiothoracic surgery." He goes on to enumerate some of the factors contributing to these difficult times: six to nine years of surgical training after medical school; difficulty in finding suitable jobs at the completion of training and then the dual factors of increased malpractice

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payments in combination with diminishing annual incomes. Several thoracic society presidential addresses in the last two years have also presented the foregoing problems related to attracting "the best and brightest" medical students to our specialty. The supply/demand issue in our specialty was a major topic considered in the 2003 Society of Thoracic Surgeons' presidential address by one of us (WAB) [2]. We pointed out that the current semi-crisis in the cardiothoracic job market appears to be transient and we could be facing a shortage of cardiothoracic surgeons in 10 to 12 years. This prediction is based on a 2002 *Cardiothoracic Manpower Study* reported by Dr Richard Shemin that indicates that one-half of the current cardiothoracic surgeons will be retired in 13 years; this corresponds to a median calendar year of 2011 [3].

More recently, Irving Kron discussed the current supply/demand issue in cardiothoracic surgery in his presidential address at the Southern Thoracic Surgical Association meeting in November 2005 [4]. In his insightful presentation, Dr Kron indicated that because of our aging baby-boomer population, the US Medicare population will double between 2000 and 2030, and this dramatic increase in our aged population will no doubt provide many new patients who will require surgical procedures for ventricular dysfunction, valvular pathology, and coronary and pulmonary disease processes. Dr Kron also predicted a shortage of cardiothoracic surgeons within the next 5 to 10 years. Certainly a shortage of cardiothoracic surgeons, even in the next 10 years, makes it imperative that we try to attract at this time, a large number of highly qualified medical (and premedical) students to our specialty.

Those of us in the Divisions of Cardiac and Thoracic Surgery at the Johns Hopkins Hospital have made a concerted effort to attract Johns Hopkins medical and premedical students to the field of surgery in general, and more specifically to the specialty of cardiothoracic surgery. In this presentation, we would like to share our experience in two of these student areas; they are: 1) a clinical program specifically designed for Johns Hopkins premedical students and; 2) a program to introduce premedical and medical students to cardiothoracic surgical research.

▶ **Clinical Program Specifically Designed for Johns Hopkins Premedical Students**

Each year, the Johns Hopkins undergraduate campus designates the student vacation month of January as the *Intersession Month*; during this period, a number of students take elective courses off of the undergraduate campus. In 2002, one of us (WAB) established with our Johns Hopkins University Premedical Advisory Office, a three-week rotation on our Cardiac and Thoracic Surgical Services for four or five students during the *Intersession Month*. Both premedical, and bioengineering students considering medical school, could apply for this rotation and the Premedical Office would make the final selection. It is estimated that approximately one-third of the 4400 Johns Hopkins undergraduate students are in one or the other of the above categories.

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In the last four years, we have had a total of 18 undergraduate students on our two clinical services. Basically, they were integrated into our services much as our medical students. They even completed the necessary HIPAA compliance training required of our medical students. Each day began with a cardiothoracic faculty person reviewing the operative cases for the day. Catheterization cines were reviewed for all cardiac cases for the day and critical x-rays, cardiothoracic and magnetic resonance imaging scans were reviewed when appropriate. The students were able to observe any of the cardiac and thoracic operations each day. Their daily schedule also provided the opportunity to participate in morning and afternoon rounds in our cardiac and thoracic intensive care units. The students attended all clinical and teaching conferences on both of our services. The clinical conferences included our weekly Pulmonary, Esophageal and Thoracic Transplant Conferences. They also attended our weekly teaching conferences including General Surgery Grand Rounds and our Cardiac Resident Teaching Conference.

The students also met several times during their three-week rotation with members of our cardiac and thoracic faculty. These meetings included several "Recap Sessions" with each of the division chiefs and power-point presentations by faculty members on topics such as thoracic transplantation, ventricular assist devices, congenital cardiac surgery, and the history of cardiothoracic surgery. In addition to those experiences, students were able to observe large animal preps in our Cardiac Surgery Research Laboratory and attend our weekly laboratory meetings. Over the course of the last four years, we have been able to add new opportunities and experiences for our undergraduate students. This past January, for example, they were able to observe a mitral valve repair with the DaVinci robotic system and then, in the laboratory, use the system to perform simple operative maneuvers. Several of the students indicated that their involvement with the DaVinci robot was one of their most exciting experiences during their three-week rotation.

This program, over the past four years, has been remarkably successful with more and more students applying each year. In fact, because of "word of mouth" praise for the program on the undergraduate campus, approximately 100 premedical and/or bioengineering students applied for the four positions in January 2005.

The material in this summary has been obtained from a survey form containing 16 questions about the Intersession rotation. This questionnaire form was sent to 17 of the 18 students; one student from 2003 could not be located but the remaining 17 completed and returned their questionnaire.

Of our 17 undergraduate students, 8 considered themselves premedical and 9 indicated a joint interest in premedical science and bioengineering; six in this latter group were undecided about medical school before the Intersession rotation. One of our questions asked: "What were the main benefits of the cardiothoracic surgical rotation for you in making future decisions in your career?" Surprisingly, at the completion of the rotation, all 6 students who were undecided between bioengineering and medical school made a decision to go to medical school. Four of the 17

students indicated in their questionnaire that they definitely plan to complete training in a surgical specialty; two of these in cardiothoracic surgery. Eleven students were undecided about a future specialty but eight of the 11 have a strong interest in a surgical specialty, including cardiothoracic.

Overall, all 17 intersession students were extremely enthusiastic about their three-week rotation on our Cardiothoracic Surgical Services. Remarkably, 7 of the students indicated that their rotation on our services was the most rewarding experience that they have had in their three years of college. Their unsolicited comments included: "The single greatest opportunity given me at Hopkins"; "One of the most wonderful and rewarding medical experiences I've ever had"; "It was one of the greatest experiences that I've had in college"; "It was the most significant experience I've had while an undergrad"; and "The experience was incredible and I don't know how the cardiothoracic division could make it any better."

All of the 13 students in the first three years of the program have applied to medical school. All indicated that they had cited their Intersession experience in their *Applicant essay* and during their medical school interviews. Several indicated that their Intersession experience was the basis for much of their discussion during medical school interviews. All of these 13 students during the first three Intersession years are currently in, or have been accepted for medical school. The four students who participated in our January 2005 Intersession are currently senior undergraduate students at Johns Hopkins and all are in the process of applying to medical school.

In summary, our three week Intersession Program set up for Johns Hopkins undergraduate students in 2002 has become exceedingly popular. It is encouraging that all 17 students are either in medical school or are currently applying to medical school (2005 students). It is also gratifying that a high percentage of these students have developed a strong interest in surgery and in several instances, in cardiothoracic surgery.

▶ **Program to Introduce Premedical and Medical Students to Cardiothoracic Surgical Research**

Over the past 10 years, we have had the occasional Johns Hopkins medical student working in our Cardiac Surgery Research Laboratory during the summer months. In 2003, stimulated and organized by one of our residents, Dr Torin Fitton, we made a more concerted effort to accept students, both medical and undergraduate, for a summer experience in our laboratory. In the summer of 2003 for example, we had three Johns Hopkins undergraduate students and three medical students. All three medical students were subsequently coauthors on basic research or clinical research papers. Two of the three premedical students are coauthors on clinical research papers which are currently in press.

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In the summer of 2004, we had three medical and two premedical students in our research laboratory. All three medical students are coauthors on clinical papers; two of these students presented posters at the Student Section of the American Medical Association meeting in 2004. The third student is a coauthor on a paper presented at the Southern Thoracic Surgical Association Meeting in November, 2005. The two premedical students who were in the laboratory in the summer of 2004 are also coauthors on a clinical paper.

In the summer of 2005, we had three Johns Hopkins medical students; all three actively participated in gathering data for clinical databases. One of these database papers has been submitted to a surgical journal; two other database summaries have not yet been completed.

We have had a total of 14 medical or premedical students in our laboratory during the past three summers. They have all commented on the unique opportunities they have had as premedical and medical students to assist in all aspects of canine cardiopulmonary bypass; to participate in clinical database studies and in the writing of various research publications. They also have greatly appreciated the opportunity to attend our national cardiothoracic meetings and for a few, the opportunity to present a paper at one of these meetings. A number of the students commented that their "hands-on" experience with the canine surgical preps provided them with an enhanced preparedness for their subsequent clinical surgical clerkships. All of these students are quite interested in cardiothoracic surgery, and we believe most of them will very likely specialize in surgery, possibly in our specialty.

In summary, it has been a pleasure for the four of us to share our thoughts on two of our programs designed to attract highly qualified premedical and medical students to our specialty. We have been particularly gratified with the success of our Intersession Program. Also, our summer cardiac surgery laboratory experience for premedical and medical students has been quite successful. Several students have had the opportunity to initially participate in our Intersession Program and then in our Cardiac Surgical Research Laboratory. Our coauthor (NDP), for example, was in the 2003 Intersession group and then worked in our Cardiac Surgical Research Laboratory during the summers of 2003, 2004, 2005; he currently is a Year II Johns Hopkins Medical student. He has been coauthor on 9 research publications from our Division (first author on five of these publications and presenter of papers at the American Association for Thoracic Surgery and the International Society of Heart and Lung Transplantation). At our upcoming 2006 Society of Thoracic Surgeons meeting, he is the first author on two publications; one will be a podium presentation and the second a poster presentation.

A third student opportunity not previously mentioned is being offered to Year III Hopkins medical students who elect a two-week rotation on our Cardiac Surgical Service. This is an opportunity for the students to accompany our transplant team on a heart and/or lung donor run when there is space available. Such an opportunity has not occurred all that frequently, but during the past years several of our Year III students have gone on donor runs (both ambulance runs within the state of Maryland and jet-flight runs to donor hospitals out of the state). These opportunities to participate

in a donor run have usually been considered as one of the high points in the student's medical school career.

We feel that the various student opportunities that we have presented in this paper will direct a number of talented premedical and medical students into our specialty. As Dr Shemin and Dr Kron and others have indicated in recent publications and presidential addresses, we may well have a shortage of cardiothoracic surgeons in 5 to 10 years. A junior premedical student at Johns Hopkins University, who participated in our January 2005 Intersession Program would, after four years of medical school and six years of residency, not enter the cardiac surgical workforce until 2016. We think that it is advisable to try at this time to recruit the very best premedical students onto this 11-year academic track.

► Acknowledgments

The authors wish to acknowledge the important role of the Johns Hopkins University Premedical Advisory Office in selecting each year the most qualified undergraduate students for our Cardiothoracic Intersession Program. Dr Ronald Fishbein (Assistant Dean of Pre-Professional Programs at Johns Hopkins University) was instrumental in 2001 in helping us establish this rotation and in the selection of students in 2002 and 2003. Dr Jean Kan, currently in the Premedical Advisory Office, was responsible for overseeing the selection of our 2004 and 2005 students. Dr Artin Shoukas, Professor of Biomedical Engineering at Johns Hopkins University, has also been involved from the beginning of this program in the selection of the most qualified undergraduate students. We also appreciate the recommendation of Dr Walter Merrill, Editor of the *New Horizons in Cardiothoracic Surgery Section* of CTSNet, that we summarize the results of these two programs for publication in this journal. These student programs have been supported by a variety of funding sources from within the Johns Hopkins University and the School of Medicine. Additional support was received from the Godfrey Rockefeller, Robert Cinquegrana and Robert Waldrop Gift Funds. Nishant Patel was supported by an Alpha Omega Alpha Carolyn Kuckein Student Research Fellowship.

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