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ORIGINAL PAPER

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# Factors Influencing Saudi Medical Student's Decision Towards Cardiothoracic Surgery as a Future Career, a Cross Sectional Study

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## ABSTRACT

**Introduction:** There has been a progressive decline in students' interest to consider cardiothoracic surgery as future career in the distant regions in the world. There are many factors could explain declining interest in cardiothoracic surgery including diminished caseloads due to the expansive growth of interventional cardiology; length of training programs that influences medical student's perception. King Abdulaziz University student's interest to join the speciality explored in our study. We determined some factors that influence their decision making toward their cardiothoracic career.

**Aim:** We aimed to estimate the current interests of medical students at King Abdulaziz University to pursue a career in Cardiothoracic surgery and to determine the factors that positively or negatively affect their decision. **Material and Methods:** A self-administered online survey designed on Google form was distributed through email to fourth, fifth, and sixth-year medical students. Five domains; demographics, current career intentions, previous exposure to surgery, experiences and perceptions of cardiothoracic surgery were covered in the questionnaire to identify factors affecting student decision to choose cardiothoracic surgery as a future career. **Results:** Among 486 students at our institution, 179 (36, 83%) medical students completed the questionnaire more than half of them 91 (50.8%) were males. The percentage of students who considered cardiothoracic surgery as a future career was (4.5%); when asked if they were serious in pursuing a career in cardiothoracic surgery, (14.5%) of the student were affirmative. Of those participated in the survey, Twenty-four students

believed they had adequate introduction to the cardiothoracic surgery during their undergraduate program. **Conclusion:** cardiothoracic surgery is falling away behind other specialties as career of choice for many future physicians. It is believed mainly related to inadequate introduction to the field. Increasing exposure and close mentorship is needed to attract more students to pursue a career in cardiothoracic surgery.

**Keywords:** cardiothoracic surgery, career choice, medical students, Saudi Arabia.

## 1. INTRODUCTION

There has been a progressive decline in recruitment to cardiothoracic surgery specialty in the United States, the United Kingdom, and distant regions. (1) The unpopularity of this specialty among junior surgical trainees has been increasingly reported in recent surveys (1).

Only (15.8%) of United Kingdom medical graduates who were interested in cardiothoracic surgery, chose to pursue further specialized training. This isn't different from recruitment issues recently observed into residency programs in the United States where graduating medical students are showing a much higher preference for other surgical subspecialties in comparison to cardiothoracic surgery (1-3).

Declining interest to join the field is concerning. It signals probability of shortage of cardiothoracic surgeon in upcoming decade (3, 4).

Multiple factors could explain this declining interest such as diminished caseloads due to the expansive growth of interventional cardiology,

Selected specialty	Overall students (%)	4 <sup>th</sup> year students (%)	5 <sup>th</sup> year students (%)	6 <sup>th</sup> year students (%)	Males (%)	Females (%)
Cardiothoracic surgery	4.5	7.8	3.8	1.6	6.6	2.3
General surgery	12.8	15.6	9.6	12.7	16.5	9.1
Obstetrics and Gynaecology	6.1	3.1	7.7	7.9	5.5	6.8
Paediatrics	10.6	6.3	13.5	12.7	6.6	14.8
Medicine	16.2	14.1	15.4	19.0	14.3	18.2
Plastic surgery	3.9	6.3	1.9	3.2	5.5	2.3
Ear, Nose and Throat surgery	4.5	7.8	0.0	4.8	2.2	6.8
Neurosurgery	7.8	15.6	5.8	1.6	12.1	3.4
Neurology	3.4	3.1	5.8	1.6	3.3	1.7
Pathology	0.6	1.6	0.0	0.0	1.1	0.0
Urology	2.2	1.6	0.0	4.8	3.3	1.1
Psychiatry	1.7	0.0	5.8	0.0	1.1	2.3
Vascular surgery	1.7	0.0	0.0	4.8	2.2	1.1
Radiology	2.2	4.7	1.9	0.0	1.1	3.4
Anesthesiology	0.6	0.0	1.9	0.0	0.0	1.1
Ophthalmology	3.9	3.1	3.8	4.8	2.2	5.7
Trauma and orthopaedics	4.5	3.1	9.6	1.6	7.7	1.1
Emergency medicine	3.9	3.1	1.9	6.3	2.2	5.7
Family medicine	3.9	0.0	1.9	9.5	4.4	3.4
Paediatrics surgery	3.4	3.1	5.8	1.6	1.1	5.7
Neuropediatrics	1.1	0.0	3.8	0.0	0.0	2.3
University tutor	0.6	0.0	0.0	1.6	1.1	0.0

Table 1. Proportions of student responses to ‘What career path do you currently believe you are most likely to pursue?’

length of training programs and a lack of available jobs. All of these factors resulted in “graying” of the field, which influences medical student’s perception (5, 6).

**2. AIM**

Aim of article was elucidate the current interests of medical students at King Abdulaziz University to pursue a career in cardiothoracic surgery and to study the factors that positively or negatively affect this decision.

**3. MATERIAL AND METHODS**

We designed cross sectional study approved by Institutional review board (IRB) of King Abdulaziz University. Consent was taken from all participants; they were notified about the study objectives and response confidentiality. A self-administered online survey designed on Google form was emailed to fourth, fifth, and sixth-year medical students. Students who did not took cardiothoracic surgery rotation were excluded. We obtained permission to use the questionnaire used by Preece et al (7).

The survey covered 28-items and included two forms of questions: multiple choice questions and Likert scale. One answer was permitted for each question. The questionnaire covered five domains; demographics, current career intentions, previous exposure to surgery, experiences and perceptions of cardiothoracic surgery and factors affecting student interest in cardiothoracic surgery. There were 17 factors believed affecting the choice of cardiothoracic surgery as a career. They were scored following a Likert ranking scale: a) strongly deterring; b) deterring; c) neither deter-

ring nor attractive; d) Attractive; e) strongly attractive.

We used SPSS (version 21) to perform the statistical analysis, frequencies and percentages to come up with descriptive analytic study.

**4. RESULTS**

**Demographics data**

Among 486 students at our institution, 179 (36, 83%) medical students from fourth, fifth and sixth academic year completed our questionnaire; 91 (50.8%) of them were males, the mean age of students was 22.8±1.147 years. Response distribution across the academic year: 64 (35.8%)

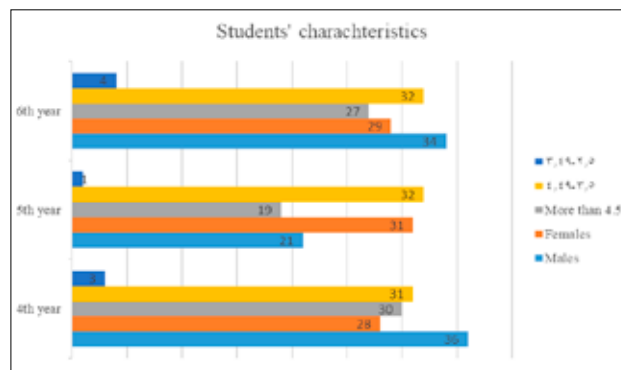


Figure 1. Demographics of the participants (N=179). in the 4<sup>th</sup> year, 52 (29.1%) in the 5<sup>th</sup> year, and 63(35.2%) in the 6<sup>th</sup> year. Students’ characteristics shown in Figure 1.

**Current career ambition**

Most of the students considered medicine as a career (16.2%), followed by general surgery (12.8%). The major-

Specific factor relating to cardiothoracic surgery	Strongly deterring (%)	Deterring (%)	Neither deterring nor attractive (%)	Attractive (%)	Strongly attractive (%)
Intellectual challenge <sup>a</sup>	9.5	15.6	38.5	26.3	10.1
Skillful/artistic nature of the surgery <sup>a</sup>	10.1	15.1	19.6	31.8	23.5
High intensity/pressure	23.5	31.3	26.3	12.3	6.7
Prestige associated with the specialty	7.3	8.9	32.4	33	18.4
Job satisfaction (ability to influence/save lives) <sup>a</sup>	7.3	10.6	16.2	36.3	29.6
Length of training (>8 years)	27.4	36.3	28.5	3.9	3.9
Increasing sub-specialization to either practice cardiac or thoracic surgery	5.6	15.6	45.8	25.7	7.3
Opportunity for innovation and research <sup>a</sup>	5	11.7	43	30.2	10.1
Competition for jobs/training posts <sup>b</sup>	11.7	29.1	39.7	13.4	6.1
Opportunity for meaningful work/life balance	8.9	14.5	30.2	36.3	10.1
Publication of SSMD	6.7	19.6	58.1	12.3	3.4
Previous scandals (e.g. Bristol Heart)	7.3	16.8	66.5	8.9	0.6
Opportunity to practice across the world <sup>a</sup>	7.8	8.4	24.6	36.9	22.3
Limited geographical locations of cardiothoracic centers in KSA <sup>b</sup>	10.6	36.9	28.5	14	10.1
Perception of cardiothoracics to be a male-dominated specialty	8.9	20.1	50.8	14	6.1
Perception that cardiothoracic surgeons are arrogant/narcissistic	7.3	17.9	63.7	9.5	1.7
Pay/financial reward	5	11.2	27.4	38	18.4

<sup>a</sup>Attractive factor., <sup>b</sup>Deterring factor., SSMD: surgeon-specific mortality data.

Table 2. Extent to which students rated factors to either attract or deter them from a career in cardiothoracic surgery.

ity of females preferred medicine, while males preferred general surgery (Table 2).

The percentage of students who considered cardiothoracic surgery as a future career was 4.5%; when asked if they were serious in pursuing a career in cardiothoracic surgery, 14.5% of the student were affirmative. Moreover, (82.1%) of the students chose Saudi Arabia as training center while (10.6%) and (5.6%) of them preferred North America and Europe, respectively. Of the students who decided to pursue cardiothoracic training in the future, (10.1%) have selected adult cardiac, (4.5%) selected thoracic, and (3.9%) of them chose pediatrics cardiothoracic surgery. However, (34.6%) of the students have not decided yet.

#### Previous exposure to surgical specialties

Overall medical students that reported spending 2-8 weeks on surgical placement were 41.9%, from them, 43% exposed to cardiothoracic surgery and 30.2% of them were in their final year. However, most of them spent less than two weeks in cardiothoracic placement (25.7%). Total students who reported active participation in cardiothoracic procedure were 8.4%, 7.3% of them were final year students. Eventually, 88.3% of all students and 74.6% of the final year students felt they had not received enough exposure to cardiothoracic surgery during their medical curriculum. Indeed, 70.9% of the students pointed to the importance of duration of their placement in their undergraduate years to influence their future career ambitions.

#### Experience and perceptions of cardiothoracic surgery

The participants who were assigned to a mentor in cardiothoracic surgery were (7.8%) of the students; 24% of them reported availability a cardiothoracic surgeon contact information should they consider the specialty or get

involved in research; and 8.4% of the students reported attendance of a cardiothoracic surgery conference or a career day. The rest who have not attended a conferences or career day, 56.4% of them revealed that they are not interested in cardiothoracic, 28.5% were not aware of the courses being run for students, 3.4% do not have available conferences in their location, and 2.2% prohibited by course cost. In fact, 70.4% of the students were unaware of the current training pathway for cardiothoracic surgery.

Overall, 92.2% were unaware that cardiothoracic surgeons have their published Surgeon-Specific Mortality Data (SSMD), and 64.3% of those who were aware declared that this did not deter them from a career in cardiothoracic. A minority of the students (4.5%) was aware of previous scandals in cardiothoracic surgery (Bristol Heart Scandal), and 84.9% was not disappointed by this. When asked whether they were aware of the opinion that 'cardiothoracic surgery is a dying specialty', 61.5% have not heard about it, while 10.1% have heard and agree with it and (28.5% disagreeing

#### Factors affecting interest in cardiothoracic surgery

Only 5 out of 17 factors we assessed consider as attractive characteristics, two were considered as deterring and the remaining factors were equivocal (Table 2).

Of the five attractive factors, ability to save or influence people's lives came first, with 65.9% students reporting this as either attractive/strongly attractive. Other positive influences were the skillful and artistic nature of the surgeries (55.3%), and the opportunity to practice across the world (59.2%).

The two factors that deterred the pursuit of a career in cardiothoracic surgery were competition for jobs and training posts (19.5%), and limited geographical locations of cardiothoracic centers in Saudi Arabia (24.1%). The other

factors that were not significantly attractive or deterring detailed in Table 2.

## 5. DISCUSSION

In this study males prefer surgical specialties while their female peers prefer internal medicine. This in contrary to previous published data from Saudi Arabia, were 590 medical students revealed surgery as the most preferred specialty among both male and female medical students (8).

Our study exhibited an influence of gender on specialty choice. Approximately (6.6%) of male students considered cardiothoracic surgery as their top career while only 2.3% of female participants did, which goes with what Foote and colleagues documented (9). Only (4.5%) of students considered cardiothoracic surgery as one of their choices. The lack of interest among our participants toward the field is alarming as prevalence of Ischemic Heart disease and its effect on mortality is increasing dramatically. Ischemic Heart Diseases remain the most common cause of death worldwide and the fourth leading cause of death in Saudi Arabia (10, 11).

Preece and colleagues presented a study that involved asking the same questions among United Kingdom undergraduate surgical societies with only (11%) identifying cardiothoracic as their number one choice, and more than (30%) showing interest (7).

However, we are not yet capable of discerning whether the interest among medical student at King Abdulaziz University ensures adequate workforce provision in the region. There was little interest from females (2.2%) in cardiothoracic surgery compared to their male (6.6%) counterpart. Reluctance of females' interest was not entirely expected. Lack of mentorship in addition to inadequate exposure to the specialty could explain this gender difference therefore this finding could be explained by the fact of increasing exposure to other specialties progressing through clinical rotation. As students' progress, they abstain from specialized surgical specialties and opting for other fields such as general surgery, internal medicine, and pediatrics.

The majority of all participants accounting for (88.3%) felt they had not sufficient exposure to cardiothoracic surgery during their medical rotations. With more than (90%) of all medical students not scrubbing in a cardiothoracic surgery procedure, lack of interest in cardiothoracic surgery could be explained, as exposure to different technical challenges identified as strong indicator of a choosing a surgical specialty (12). It is important to note that both experience and mentorship were considered as two significant factors in influencing career choice in cardiothoracic surgery (2, 3, 13). Interestingly, about 89% of participants almost have either not heard of or disagreed with following statement.

Cardiothoracic surgery is being replaced by interventional cardiology with the introduction of Percutaneous coronary intervention, which resembles the data presented by Preece and colleagues where (80%) had the same opinions (7).

It was astounding that more than (40%) of participants were found to be interested in opportunities for innovation and research. The two most appealing factors for choosing cardiothoracic surgery as a career is offering both job sat-

isfaction and the chance to practice across the world. The least two attractive elements were the overly lengthy training of more than eight years and also limited geographical locations of cardiothoracic centers in Saudi Arabia. Based on the mentioned factors, it is evident that both exposure and mentorship are instrumental to effectively captivate the interests of more students in pursuing a career in cardiothoracic surgery.

### Limitation of the study

Our study has some limitations. The data were collected from single institution and based on self-report. Additionally, filling the survey was optional which might draw the attention of those interested in cardiothoracic surgery and therefore overestimating the percentage of students considering cardiothoracic surgery as a career.

Another limitation of our study was usage of a questionnaire that was not previously tested in a separate patient sample for reliability and validity; therefore results of the study should be interpreted with caution. However, the results are indicative of certain tendencies and could be considered as a pilot.

## 6. CONCLUSION

This study has shown that medical Students at Saudi Arabia have little interest in choosing cardiothoracic surgery as their future career. There is a decline in desire over the course of medical school, which appears to stem from a lack of engagement with the specialty. The least two attractive factors were Length of training and limited geographical locations of cardiothoracic centers in Saudi Arabia. We are not sure if the interest among medical student at Saudi Arabia ensures adequate workforce provision. We suggest having a basic component in planning strategy to understand and perhaps counteract the observed declining interest in cardiothoracic surgery. More exposure and more mentorship were needed to attract more students in pursuing a career in cardiothoracic surgery

Another limitation of our study was usage of a questionnaire that was not previously tested in a separate patient sample for reliability and validity; therefore results of the study should be interpreted with caution. However, the results are indicative of certain tendencies and could be considered as a pilot.”

- **Authors contributions:** MRA did substantial contribution to conception and design. STB, MAS, GAN, AHG, were involved in substantial contribution to acquisition of data and substantial contribution to analysis and interpretation of data. MRA, HR, HAA were involved in critically revising the article for important intellectual content and final approval of the version to be published. All authors revised and approved the manuscript before submission.
- **Conflicts of interest:** There are no conflicts of interest.
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