

# The Impact of Previous Cardiology Electives on Canadian Medical Student Interest and Understanding of Cardiology

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## Abstract

**Background:** Most Canadian medical schools do not have mandatory cardiology rotations. This study investigates whether prior elective experiences affect medical student interest as well as understanding of cardiology before clerkship rotation selections. **Methods:** An online evidence-based cross-sectional survey was distributed to 122 second-year medical students at a Canadian medical school. Students were assessed on their interest and understanding of cardiology practice using a 5-point Likert Scale. Descriptive statistics, Chi-Square analysis and Cramer's V were used to assess the relationship between previous elective experience, medical student interest, and understanding of career-related factors pertaining to cardiology. **Results:** Fifty-three of 122 (43%) students responded to the survey. Overall, 26 (49.1%) students reported cardiology interest, while it was a preferred specialty for 9 (17.0%). Medical students reported low understanding of duration of patient relationships (n=14, 26.4%), spectrum of disorders (n=13, 24.5%), and in-patient care (n=11, 20.8%) associated with cardiology practice. Students with prior cardiology electives had increased understanding of in-patient care ( $\chi^2 = 4.688$ , Cramer's V = 0.297,  $p = 0.030$ ) and were more likely to select cardiology as a top specialty choice ( $\chi^2 = 7.983$ , Cramer's V = 0.388,  $p = 0.005$ ); however, cardiology electives prior to clerkship did not increase subjective student interest in cardiology ( $\chi^2 = 1.345$ , Cramer's V = 0.159,  $p = 0.685$ ). **Conclusion:** Pre-clerkship medical students have a low understanding of cardiology practice. Increasing pre-clerkship exposure to cardiology may help students confirm cardiology as a top career choice before clerkship selectives are chosen.

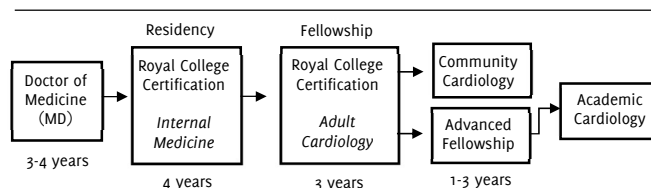
**Key Words:** Cardiology; Career Choice; Medical Education; Medical Students (Source: MeSH-NLM).

## Introduction

Career choices made in medical school have long-term consequences. Up to 14% of physicians report regret with their career choice.<sup>1,2</sup> This is particularly salient for Canadian medical students interested in pursuing a career in cardiology, as they must complete 4 years of internal medicine residency training before further cardiology subspecialty training.<sup>3</sup> While other subspecialties in internal medicine also require the completion of this initial phase of training, it is increasingly common for cardiologists to pursue subspecialty fellowship training after residency to adapt to the increasing complexity of patient care and the newest procedural approaches (Figure 1).<sup>4,5</sup> The pursuit of a career in cardiology can represent a long and arduous path which medical students must recognize when making career decisions.<sup>4</sup>

Choosing a career path is a difficult decision for medical students.<sup>6,7</sup> Although some students initially have ideas about specialties, these change for most students throughout their undergraduate medical education due to preferences for lifestyle, perceived competence, and clinical exposure.<sup>8-10</sup> Canadian undergraduate medical education consists of a pre-clerkship phase with a larger emphasis on didactic teaching, followed by clerkship training in various clinical settings. In pre-clerkship, formal clinical experience is acquired through electives, in which students have weekly protected time with a selected preceptor to explore a specialty of their choosing. Students then enter clerkship rotations and begin selectives, in which students experience a select number of specialties in a fixed number of weeks. For instance, for a mandatory clerkship rotation such as internal medicine, students can request selectives in medical specialties of their interest.

Figure 1. Training path to becoming a cardiologist in Canada.



Dalhousie students participate in three term-long electives during pre-clerkship. However, the timing and availability of pre-clerkship electives vary across Canadian medical schools, and some institutions do not offer formal electives. Yet, all Canadian medical students must choose their medical clerkship selectives during their last pre-clerkship year of training. This bears considerable implications on defining their clinical exposure and the opportunities to obtain reference letters for residency applications.<sup>11</sup> Despite the nuances of career planning, most Canadian medical schools do not provide mandatory rotations in cardiology, leaving potentially interested students with a lack of exposure to the specialty. Additionally, 40% of the ~1,500 cardiologists in Canada are 55 years of age or older, highlighting the importance of maintaining student interest in cardiology as a career to mitigate future physician shortages.<sup>12</sup> To further this issue, cardiology is a rapidly evolving field leading to insufficient medical student understanding of the specialty.<sup>13,14</sup>

Despite the complex advancements in cardiology, there is limited research surrounding medical students' understanding and interest in

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the specialty.<sup>15-17</sup> Existing literature suggests that students are interested in cardiology due to factors such as high income potential and status among colleagues.<sup>14</sup> However, no studies have been conducted to examine these factors among Canadian medical students. To address this gap, a survey was developed to examine the interest and understanding of cardiology as a specialty among second-year medical students.

## Methods

### Study Design

A literature search was performed using PubMed, Google Scholar and Embase to guide the creation of an evidence-based questionnaire between December 7<sup>th</sup>, 2019 to January 3<sup>rd</sup>, 2020. Reference lists of included studies were manually searched. Keywords are listed in Figure 2. Articles entered a first round of screening by the primary investigator and two co-investigators independently. They were screened by title and abstract to capture studies that investigated student perceptions of cardiology. Studies were included if they examined undergraduate medical student interest or understanding of cardiology. Non-English studies and those examining postgraduate medical trainee perceptions were excluded. Conflicts were resolved by the supervising investigator (Figure 2).

The second round of screening was completed by the primary investigator and co-investigators independently by performing full text reviews of remaining articles. Conflicts were resolved by the supervising investigator. Similar inclusion and exclusion criteria were applied, yielding a total of 3 articles (Figure 2). In addition to studies investigating the general career-related factors which medical students consider when exploring specialties, these articles were used to create a survey. All investigators collaborated to generate a final list of career factors.

### Setting & Participants

Medical student interest and understanding of cardiology was analyzed using a cross-sectional approach by surveying second-year medical students at Dalhousie University in Halifax, Nova Scotia, Canada. Respondents had experienced three mandatory electives prior to completing the survey. All students who wished to pursue cardiology electives were able to secure one. Participants of the study were applicants to a 2-week elective summer program at Dalhousie Medicine designed to improve transition to clerkship through a combination of specialty and skills exposure.

Electronic surveys were distributed via email and administered using *Opinio* (Object Plant, Oslo, Norway). Data was collected anonymously through a secure web browser during a four-week study period from January 13<sup>th</sup> to February 9<sup>th</sup>, 2020. Participation in the study was voluntary with no exclusion criteria applied. Students submitted their informed consent with survey completion.

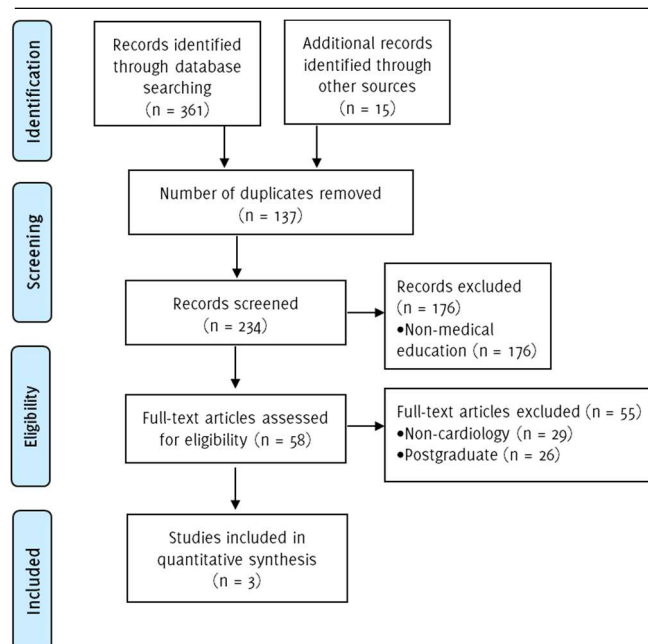
### Variables & Assessment

The primary objective of this study was to establish student interest towards and understanding of cardiology prior to clerkship. The secondary objectives were to determine relationships between student demographic factors, career factor preference and prior elective exposure with interest in cardiology to identify trends within students interested in the specialty.

The survey was designed to include demographic questions such as age, gender, education, desired practice location, and rural versus urban upbringing (Supplementary Material). Previous clinical elective exposure and specialty interest were also assessed. Using a 5-point Likert scale, students reported their understanding of career factors pertaining to cardiology such as the spectrum of medical issues treated, common procedures performed, income potential (for Canadian cardiologists), and other features associated with the general practice of cardiology and the patient population served. The following scale for

understanding of career factors pertaining to cardiology was used: 1 – Very Low, 2 – Low, 3 – Neutral, 4 – High, 5 – Very High.

**Figure 2.** Literature Search. Keywords included “medical student”, “medical students”, “cardiology”, “career choice”, “career choices” and “career navigation”. “cardiology service”, “decision making”, “career planning”, “career mobility”, and “medical student.”



### Bias

The survey was purposefully worded to mitigate bias and all data collected was anonymous. The survey questionnaire was evaluated using the instrument provided by Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). Research ethics approval was provided by the Nova Scotia Health Authority Research Ethics Board (File No. 1023087). This study investigates medical student interest and understanding of cardiology practice and is part of a larger study aimed at quality improvement of a two-week elective program through procedural skills exposure, elective experience and simulation training.

### Data Analysis

With a response rate of 44%, a total of 122 students were surveyed to attain a sample size of 53 responses to identify pre-clerkship student interest and understanding of cardiology with a 10% margin of error. Incomplete or missing responses were not included in statistical analysis.

Survey data was exported into IBM Statistical Package for the Social Sciences (SPSS) software (Version 25, IBM, New York, United States) and demographic characteristics were expressed using descriptive analysis as frequencies and percentages. Participant ratings of their understanding of career-related factors pertaining to cardiology practice were considered high for Likert-scale values of 4 and 5. Ratings of 1, 2, or 3 were considered low.

Chi-squared tests were used to analyze the relationship between demographic factors and interest in cardiology using Cramer's V, as well as for analysis between previous elective experience and understanding of career factors associated with cardiology. A reliability analysis was performed using Cronbach's alpha to assess the internal consistency of the cardiology perception factors scale using all 9 items with a minimum acceptable alpha of 0.7. A 90% confidence interval was used for determining statistical significance, set at  $p < 0.10$ .

Results

Demographics

A total of 53 (45.7%) Canadian second-year medical students from Dalhousie University responded to the survey (Table 1). Of all respondents, 32 (60.3%) were female, 27 (50.9%) were between 20-24 years of age, and 37 (69.8%) indicated that a Bachelor's degree was their highest level of education. Cronbach's alpha demonstrated that the questionnaire met acceptable reliability, = 0.852. All items were worthy for retention as was reduced when any single item was removed.

Table 1. Demographic Characteristics of Respondents (n = 53).

	Frequency (n)	Percentage (%)
<b>Gender</b>		
Male	21	40
Female	32	60
Undisclosed	0	0
<b>Age</b>		
20-24	27	51
25-26	15	28
27+	11	21
<b>Education</b>		
Bachelor's	37	70
Graduate	16	30
<b>Marital Status</b>		
Single	40	75
Common Law	5	9
Married	7	13
Other	1	2
<b>Upbringing</b>		
*Urban	46	87
**Rural	7	13
<b>Desired Practice Location</b>		
*Urban	46	87
**Rural	7	13
<b>Desired Practice Setting</b>		
Community	13	25
Hospital	21	40
Academic	17	32
Other	2	4
<b>Prior Elective in Cardiology</b>		
Yes	7	13
No	46	87
<b>Considering Cardiology as a Career</b>		
Yes	9	17
No	44	83

Legend: \*Urban: Population >1000. \*\*Rural: Population <1000

Student Interest in Cardiology

Student interest in cardiology was moderate at a mean of 3.34/5.00 (90% CI, 3.08 - 3.59) ± (SD, 1.108). Overall, 26 (49.1%) students had an interest in cardiology, with cardiology being a top career choice among 9 (17%) participants (Table 1). Seven (13%) students participated in a previous clinical elective in cardiology with over half of these students also ranking their interest in cardiology as "High" or "Very High". Previous cardiology electives did not increase student interest in the specialty ( $\chi^2 = 1.345$ , *Cramer's V* = 0.159, *p* = 0.685; Table 2). However, students with previous cardiology electives were more likely to select cardiology as a top specialty choice compared to those without a prior elective experience ( $\chi^2 = 7.983$ , *Cramer's V* = 0.388, *p* = 0.005).

When analyzing the impact of student demographics on cardiology interest, there was a significant increase in cardiology interest in those with an urban upbringing compared to those that were from a rural setting (*p* = 0.037; Table 2). Students ≥27 years of age also had an increased interest in cardiology (*p* = 0.027). Of the students who indicated a "High" or "Very High" interest in cardiology, 20 (76.9%) students desired to work in a hospital/academic-based practice

compared to a community-based career (*p* = 0.016; (Table 2). Factors such as education obtained, marital status, having children, or desired practice location had no effect on cardiology interest (Table 2).

Career Influencing Factors and Cardiology Interest

Students that valued high interest in the medical conditions treated by a specialty (*p* = 0.009), having a strong relationship with a cardiologist mentor (*p* = 0.088) and long-term patient relationships (*p* = 0.072) were more likely to report increased interest in cardiology (Table 2). Students valuing other factors such as acceptable weekly hours, high income potential, status among colleagues and long-term patient relationships did not have an increased interest in cardiology (Table 2).

Table 2. The Impact of Demographic, Career Factors and Previous Cardiology Electives on Interest in Cardiology.

Factor	$\chi^2$	Cramer's V	p-value
<b>Demographics</b>			
Gender	0.154	0.054	0.695
Age	0.468	0.094	0.494
Education	0.475	0.095	0.491
Marital Status	0.774	0.121	0.379
*Upbringing	4.337	0.286	*0.037
Desired Practice Location	0.124	0.048	0.725
Desired Practice Setting	12.177	0.479	*0.016
<b>Career Factors</b>			
Acceptable Weekly Hours	0.167	0.056	0.682
High Income Potential	0.034	0.025	0.854
Status Among Colleagues	1.615	0.175	0.204
Urgency of Care	0.475	0.095	0.491
Medical Conditions Treated	6.839	0.359	*0.009
Strong Relationship with Mentor	2.908	0.234	0.088
Patient Population	0.339	0.080	0.560
Long-Term Patient Relationships	3.228	0.247	0.072
Previous Cardiology Elective	1.345	0.159	0.685

Legend: \*Urban upbringing. Cramer's V scores were considered as follows: 0-0.25 (weak), 0.25-0.5 (moderate), 0.5-1 (strong).

Student Understanding of Cardiology as a Career

Students were most confident in their understanding of the higher status among colleagues (Mean ± SD: 3.66 ± 0.96) and income potential (3.53 ± 1.05) associated with cardiology practice (Table 3). Students indicated low levels of understanding of the duration of patient relationships (2.92 ± 0.76), urgency of care (2.92 ± 0.87), the spectrum of disorders in the field (2.96 ± 0.73) and the proportion of in-patient care (3.08 ± 0.83).

Previous Elective Exposure and Understanding of Career-Related Aspects of Cardiology

Previous elective experiences in cardiology increased student understanding of the proportion of in-patient care (*p* = 0.030). However, the understanding of weekly work hours, income potential, spectrum of disorders, common procedures, patient population, and duration of patient relationships associated with cardiology was unaffected by elective experience (Table 4).

Table 3. Student Understanding of Career-Related Factors in Canadian Cardiology Practice using a 5-point Likert Scale.

Aspects of Cardiology	Mean (90% *CI)	Standard Deviation
Quantity of Weekly Hours	3.36 (3.15 - 3.57)	0.901
Income Potential	3.53 (3.29 - 3.77)	1.049
Status Among Colleagues	3.66 (3.44 - 3.88)	0.960
Urgency of Care	2.92 (2.72 - 3.13)	0.874
Proportion of In-Patient Care	3.08 (2.88 - 3.27)	0.829
Spectrum of Disorders	3.19 (2.98 - 3.40)	0.900
Common Procedures	3.32 (3.07 - 3.57)	1.070
Patient Population	3.23 (3.03 - 3.42)	0.847
Duration of Patient Relationships	2.92 (2.75 - 3.10)	0.756

Legend: \*CI - Confidence Interval

**Table 4.** The Impact of Previous Electives on Understanding of Career-Related Aspects of Cardiology.

Aspects of Cardiology	$\chi^2$	Cramer's V	p-value
Quantity of Weekly Hours	0.183	0.059	0.669
Income Potential	0.092	0.042	0.761
Status Among Colleagues	0.030	0.024	0.863
Urgency of Care	1.306	0.157	0.253
Proportion of In-Patient Care	4.688	0.297	*0.030
Spectrum of Disorders	0.001	0.005	0.974
Common Procedures	0.089	0.041	0.765
Patient Population	0.008	0.012	0.929
Duration of Patient Relationships	0.426	0.090	0.514

Legend: Cramer's V scores were considered as follows: 0-0.25 (weak), 0.25-0.5 (moderate), 0.5-1 (strong).

### Career Interest in Cardiology and Understanding of Career-Related Aspects of Cardiology

Students with career interests in cardiology also reported a greater understanding of the proportion of in-patient care ( $p = 0.021$ ) as well as the patient population associated with cardiology practice ( $p = 0.011$ ). Career interest in cardiology otherwise did not impact student-reported understanding of a cardiologist's weekly work hours, income potential, spectrum of disorders managed, nor common procedures performed (Table 5).

**Table 5.** The Impact of Career Interest in Cardiology on Understanding of Career-Related Aspects of Cardiology.

Aspects of Cardiology	$\chi^2$	Cramer's V	p-value
Quantity of Weekly Hours	0.018	0.019	0.893
Income Potential	0.468	0.094	0.494
Status Among Colleagues	0.151	0.053	0.697
Urgency of Care	1.355	0.160	0.244
Proportion of In-Patient Care	5.307	0.316	*0.021
Spectrum of Disorders	0.006	0.010	0.941
Common Procedures	0.454	0.093	0.500
Patient Population	6.526	0.351	*0.011
Duration of Patient Relationships	0.004	0.009	0.947

Legend: Cramer's V scores were considered as follows: 0-0.25 (weak), 0.25-0.5 (moderate), 0.5-1 (strong).

## Discussion

This study examined the perceptions of Canadian undergraduate medical students in their second year of training at Dalhousie University. Students generally demonstrated a low understanding of cardiology practice. Students with an interest in cardiology were moderately more likely to value having an interest in the medical conditions treated in a given specialty, compared to those without cardiology interest. Students with prior electives in cardiology were more likely to select cardiology as a top career choice compared to those without previous clinical time in cardiology. Elective exposure has been previously shown to increase student interest in that specialty.<sup>18,19</sup> However, to our knowledge this is the first Canadian study demonstrating that elective exposure is associated with increased likelihood of medical student selection of cardiology as a top career choice. This is pertinent for Canadian medical students as clerkship selectives are chosen during pre-clerkship training.

Demographic factor analysis demonstrated that age .27 years was associated with greater interest in cardiology which align with studies showing that cardiology applicants tend to be of increased age compared to other medical specialties.<sup>20</sup> Although an interesting finding, due to the relatively low sample size of this study, further investigations are required to fully determine the reasons why cardiology attracts older students. Furthermore, students with an urban upbringing were more interested in pursuing cardiology than their rural counterparts, which to our knowledge has yet to be reported. This may reflect decreased exposure to specialty cardiology practice in rural

settings secondary to either expanded scope of general internists, or decreased access to cardiology care for these populations.<sup>21-25</sup> As students tend to return to the communities that they were raised in, undergraduate medical schools may increase admissions to students from rural communities to improve rural physician recruitment. While our results do not support that elective experience increases medical student interest in cardiology as a specialty, rural medical students may be a unique group due to differences in exposure to medical specialties. Future studies may examine whether elective experience impacts rural students differently compared to urban students, as the latter group comprised the majority of our study population.

Cardiology was a specialty with substantial cohort interest as almost half of the students were interested in cardiology. However, less than one fifth of students ranked cardiology in their top three career choices. A similar discrepancy between interest in cardiology practice and desire to pursue the specialty has been described previously. The perceived competitiveness and inflexible hours may be a deterrent to medical students choosing cardiology as a career despite high interest.<sup>15</sup> This high baseline interest may further explain why having an elective in cardiology had minimal impact on career interest in the specialty, but significantly increased student selection of cardiology as a top career choice. Other studies demonstrate a slightly lower rate of medical students selecting cardiology as a top career choice, though geographical differences in upbringing and training may account for this difference.<sup>26</sup>

Students valuing personal interest in the medical conditions managed by a specialty were more likely to be interested in cardiology. Participants who valued high income potential, high status, and acceptable work hours had no correlation with cardiology interest. This suggests that medical students are not primarily attracted to cardiology for the lifestyle-related factors of the profession, but because of sincere interest in the medicine and pathology associated with cardiovascular disease. Furthermore, students valuing long-term patient relationships were more likely to be interested in cardiology, a result which to our knowledge has yet to be reported.

Students were most confident in their understanding of the status and income potential associated with cardiology yet reported lower levels of understanding of the range of medical conditions seen by cardiology. As this cohort of students had already submitted their medicine subspecialty selections for clerkship rotations, some students may not have had sufficient cardiology exposure before determining their rotation preferences, which may have career implications. To improve early career navigation among medical students, increasing early clinical exposure to cardiology in pre-clerkship training may help students discern whether they simply find cardiology interesting as a specialty, or if they would select it as a top career choice. This is supported by the finding that students with a previous elective in cardiology were more likely to choose cardiology as a career, and as such clinical electives may help students gain a deeper understanding of the pathology associated with cardiology practice.

Student understanding of in-patient cardiology care was low. Since these students had already received their formal classroom teaching on the diagnosis and management of cardiovascular diseases, it may indicate that didactic teaching may not sufficiently teach students how much in-patient care is involved in cardiology practice, as well as what conditions would be managed on an in-patient ward. Furthermore, students with previous cardiology electives had a higher understanding of in-patient cardiology care compared to those without electives. As students with prior cardiology electives were more likely to choose cardiology as a career, and this suggests that a greater understanding of in-patient cardiology care may entice students toward choosing a career in cardiology. Qualitative studies should be conducted to distinguish whether this finding is better explained by a pre-existing inclination toward cardiology as a specialty among medical students



with prior cardiology electives. To support early career navigation among medical students, undergraduate medical schools may look toward promoting student-led programs that enable students to gain clinical exposure to medical specialties outside of traditional undergraduate medical curricula, as these initiatives may increase student interest in these specialties.<sup>18,19,27</sup>

The strengths of this study include the assessment of career-related factors of cardiology used in previous literature.<sup>16,17</sup> Additionally, the decision to assess the interest and understanding of students at the end of their pre-clerkship curriculum addresses the fact that medical students make career-impacting decisions early in their training without being fully informed. Using a cross-sectional approach, this study provides insight into medical student understanding at the pre-clerkship level which reflects clinical pre-clerkship exposure. Moreover, medical student interest in cardiology and understanding of the profession is under-represented in the literature in general. Limitations of this study include the small sample size, as student respondents were a subgroup from a single institution in Canada, which may affect the generalizability of the results. Furthermore, although the proportion aligns with those in previous studies, the use of a survey presents the potential for volunteer bias which would have resulted in a

misrepresentation of students interested in cardiology in our sample.<sup>15-17</sup> Due to the nature of this study, it is possible that the experiences of clerkship may be more impactful on cardiology interest compared to interest at the pre-clerkship level. Additionally, student interest in cardiology at the pre-clerkship level may not directly translate to a future pursuit of cardiology. To address this limitation, further longitudinal studies should be performed to follow pre-clerkship students into residency. In addition, larger-scale studies conducted at institutions in other areas of Canada may improve the generalizability of these findings.

Pre-clerkship medical students generally have a low understanding of cardiology practice, though have a high interest in the specialty. Although cardiology interest was not increased through elective experiences, students were more likely to rate cardiology as a top specialty with prior cardiology electives. Canadian medical students who wish to confirm whether cardiology is their top career choice may consider pursuing a cardiology elective in pre-clerkship, given the timing of clerkship selectives. Canadian undergraduate medical schools may consider the incorporation of pre-clerkship electives to ensure the availability of this opportunity for career navigation among their students.

## References

- Maudsley G, Williams L, Taylor D. Medical students' and prospective medical students' uncertainties about career intentions: Cross-sectional and longitudinal studies. *Med Teach*. 2010 Mar 10;32(3):e143-e151.
- Dyrbye LN, Burke SE, Hardeman RR, Herrin J, Wittlin NM, Yeazel M, et al. Association of clinical specialty with symptoms of burnout and career choice regret among US resident physicians. *JAMA*. 2018 Mar 26;320(11):1114-30.
- Horn L, Tzanetos K, Thorpe K, Straus SE. Factors associated with the subspecialty choices of internal medicine residents in Canada. *BMC Med Educ*. 2008 Jun 26;8(37):1-8.
- Ephrem G. A Career of Lifelong Learning, Not Lifelong Training: An Early Cardiologist's Perspective. *J Am Coll Cardiol*. 2015 June 23;65(24):2664-6.
- Goldfarb MJ. The push to subspecialize: Choosing a career in cardiology. *J Am Coll Cardiol*. 2014 Nov 18;64(20):2174-5.
- Walsh S, Arnold B, Pickwell-Smith B, Summers B. What kind of doctor would you like me to be? *Clin Teach*. 2016 Jun 14;13(2):98-101.
- Querido S, van den Broek S, de Rond M, Wigtersma L, Ten Cate O. Factors affecting senior medical students' career choice. *Int J Med Educ*. 2018 Dec 15;9:332-9.
- Cleland J, Johnston PW, French FH, Needham G. Associations between medical school and career preferences in Year 1 medical students in Scotland. *Med Educ*. 2012 May;46(5):473-84.
- Vo A, McLean L, McInnes MDF. Medical specialty preferences in early medical school training in Canada. *Int J Med Educ*. 2017 Oct 28;8:400-7.
- Scott I, Gowans MC, Wright B, Brenneis F. Why medical students switch careers: Changing course during the preclinical years of medical school. *Can Fam Physician*. 2007 Jan;53(1):94-5.
- Ruth Wilson C, Bordman ZN. What to do about the Canadian Resident Matching Service. *Cmaj*. 2017 Nov 27;189(47):E1436-7.
- Canadian Medical Association. Cardiology Profile. Available from: [https://www.cma.ca/sites/default/files/2019-01/cardiology-e\\_o.pdf](https://www.cma.ca/sites/default/files/2019-01/cardiology-e_o.pdf). Last updated Dec 2019; cited Jun 23, 2021.
- Trouton T. So you want to be a Cardiologist. *Ulster Med J*. 2014 Jan;83(1):73.
- Stępień K, Potetek K, Komornik M, Siudak Z, Tokarek T, Dudek D. New methods and techniques in interventional cardiology. Evaluation of the knowledge of medical students of Jagiellonian University Medical College. *Folia Med Cracov*. 2018 Mar 31;58(1):97-106.
- Coyle C, Evans H. A career in cardiology: Why? *Heart*. 2018 Nov 10;105(6):498.
- Azu OO, Naidu E, Naidu J. Choice of speciality amongst first-year medical students in the Nelson R. Mandela School of Medicine, University of KwaZulu-Natal. *African J Prim Heal Care Fam Med*. 2013 Jun 28;5(1):1-7.
- I. Elzain Y, Alawad AAMA, S. Khan W, O. Khalil H, M. Abdelrazig Y, B. Ahmed O, et al. Factors influencing the choice of internal medicine as a career among undergraduate medical students. *Int J Heal*. 2014 Jun;2(2):22-5.
- Sheppard E, Smyth M, Dow T, Haupt TS, McVeigh S. The Effect of a 2-Week Pre-clerkship Residency Exploration Program on Specialty Interest and Understanding of Physical Medicine and Rehabilitation. *Arch Rehabil Res Clin Transl*. 2019 Mar;2(1):1-7.
- Smyth M, Toguri JT, Dow T, Haupt TS, Roberts A, Raju K. Medical student exposure to anesthesiology through the Pre-clerkship Residency Exploration Program: impact on career interest and understanding of anesthesiology. *Can J Anesth*. 2019 May 21;66(9):1126-8.
- Smith F, Lambert TW, Pitcher A, Goldacre MJ. Career choices for cardiology: Cohort studies of UK medical graduates. *BMC Med Educ*. 2013 Jan 25;13(1):1.
- Baldwin L-M, Chan L, Andrilla CHA, Huff ED, Hart LG. Quality of Care for Myocardial Infarction in Rural and Urban Hospitals. *J Rural Heal*. 2012 Aug 23;26(1):51-7.
- Clark RA, Eckert KA, Stewart S, Phillips SM, Yallop JJ, Tonkin AM, et al. Rural and urban differentials in primary care management of chronic heart failure: New data from the CASE study. *Med J Aust*. 2007 May 7;186(9):441-5.
- Lutfiyya MN, Bhat DK, Gandhi SR, Nguyen C, Weidenbacher-Hoper VL, Lipsky MS. A comparison of quality of care indicators in urban acute care hospitals and rural critical access hospitals in the United States. *Int J Qual Heal Care*. 2007 Apr 18;19(3):141-9.
- Rush KL, Burton L, Van Der Merwe F, Hatt L, Galloway C. Atrial fibrillation care in rural communities: A mixed methods study of physician and patient perspectives. *BMC Fam Pract*. 2019 Oct 24;20(1):1-11.
- Gamble JM, Eurich DT, Ezekowitz JA, Kaul P, Quan H, McAlister FA. Patterns of care and outcomes differ for urban versus rural patients with newly diagnosed heart failure, even in a universal healthcare system. *Circ Hear Fail*. 2011 Mar 10;4(3):317-23.
- Kanmounye US, Temgoua M, Endomba FT. Determinants of Residency Program Choice in Two Central African Countries: An Internet Survey of Senior Medical Students. *Int J Med Students*. 2020 Apr 30;8(1):20-5.
- Haupt TS, Dow T, Smyth M, Toguri JT, Roberts A, Raju K, et al. Medical student exposure to Radiation Oncology Through the Pre-clerkship Residency Exploration Program (PREP): Effect on Career Interest and Understanding of Radiation Oncology. *Can J Anesth*. 2019 Jan 23;66(9):1126-8.

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