

1
2
3 **Medical student career choice: a qualitative study of factors influencing medical**
4 **student specialty selection**
5

6
7 Kiersten Pianosi¹ BSc
8 Cheri Bethune² MD, MCISc.
9 Katrina F. Hurley³ MD, MHI
10

- 11
12 1. Bachelor of Medicine Class of 2016, Dalhousie University
13
14 2. Clinical Professor, Department of Family Medicine, Memorial University
15
16 3. Department of Emergency Medicine, Dalhousie University
17

18
19 **Address all correspondences to:**

20 Dr. Katrina Hurley
21 Department of Emergency Medicine
22 IWK Health Centre
23 5850/5980 University Avenue, PO Box 9700
24 Halifax, NS, Canada B3K 6R8
25 Fax: 902 470-8859
26 Email: kfhurley@dal.ca
27

28
29 Conflict of Interest: None
30 Financial Disclosure: None
31

32
33 **Acknowledgements**
34

35 We would like to acknowledge the Career Choices research team at Memorial University
36 in St. John's, NL who helped conceive this project and collected the data. This data
37 analysis was supported by a \$2500 grant from the IWK Emergency Department
38 Research.
39

40
41 **Contributors**
42

43 KFH and CB conceived and designed this study. KP and KFH analyzed the data. KP,
44 KFH and CB interpreted the data. Each author contributed substantively to the written
45 manuscript and participated in manuscript revisions. All authors have given final
46 approval of this manuscript.
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Abstract

Background. Specialty career choice is a critical decision for medical students and research has examined factors influencing particular specialties or assessed it from a demographic perspective. The purpose of this study was to explore and describe influential factors in students' decision-making, irrespective of their particular specialty in a Canadian medical school.

Methods. Sixteen focus groups (n=70) were led by a non-faculty facilitator to uncover factors affecting medical student career choice. Guided by principles of grounded theory, the focus group transcripts were coded based on recurring topics/themes that arose in the students' discussions. A set of key themes emerged and sentinel quotes for each theme were tracked.

Results. 20 themes were identified from the focus group discussions: 7 major, 3 intermediate, and 10 minor themes. The major themes included: undergraduate experience, exposure, public perception and recruitment, teacher influence, family/outside influences, residency issues, and personal philosophy.

Interpretation. Exposure to specialties and the timing of this exposure appears to be crucial to career choice, as does the context of any particular rotation. Residency program directors can use the study findings to better frame recruitment and training. A better understanding of the factors influencing students' career decisions may provide undergraduate medical educators with a more informed approach to the shaping of career choices, reaffirming their obligation to be effective stewards in medical workforce planning.

Introduction

Specialty career choice is a critical decision for medical students. For most, this decision is an ongoing process throughout their undergraduate schooling.¹ Although some students know what specialty they want to pursue at the time of entrance, most are influenced by internal and external factors throughout their schooling.^{2,3,4}

Selection of a particular medical specialty impacts the composition of the physician workforce nationwide.⁵ For example, prior to 2008 the proportion of graduates selecting family medicine in Canada had been declining.^{6,7,8} Despite a steadily increasing trend of Canadian medical graduates (CMG) pursuing a career in family medicine since 2008,^{9,10} there are still not enough family medicine trainees to satisfy demand and projections for healthcare workforce planning.⁵ Other reports have highlighted graduate underemployment in some specialties.¹¹ A better understanding of factors affecting career choice may provide postgraduate program directors with better direction for framing their training and practice in the shift toward training to meet physician workforce demands. More importantly, this information can help to recognize the urgent need to optimize general medical education to meet the nation's changing health needs and direct future medical workforce planning.¹²

Factors that influence medical students' career pursuits range from personality and personal attributes,^{13,14} to gender differences,¹⁵ to issues of prestige and income.¹⁶⁻²³

Studies in other countries highlight lifestyle issues¹⁶ and role models^{24,25} as prominent factors influencing medical students. Few studies have addressed career choice on a broad scope. The purpose of this study was to explore and describe what factors are most

1
2
3 influential to medical students' career choice, irrespective of their particular specialty in a
4
5 Canadian medical school.
6

7 8 **Methods** 9

10
11 This is a qualitative study using focus groups to determine what factors influence medical
12
13 students' career choice. Graduating medical students at Memorial University of
14
15 Newfoundland in the classes of 2002, 2006, 2007 and 2008 were invited to participate in
16
17 focus groups. This study was reviewed and approved by the Human Investigations
18
19 Committee as the second part of a project that also used longitudinal surveys.⁶
20
21

22
23 A semi-structured guide²⁶ was constructed to explore the factors that influenced medical
24
25 students' career choice, and how well they felt their schooling prepared them to make this
26
27 choice. The questions and prompts were informed by the longitudinal survey of these
28
29 student cohorts.⁶ Data were obtained using standard focus group methodology for clinical
30
31 research.²⁶ Sixteen focus groups with 70 students were led by a non-faculty facilitator.
32
33

34
35 The focus groups were audio-recorded and subsequently transcribed and de-identified.
36
37

38
39 The qualitative analysis was guided by the principles of grounded theory, which builds
40
41 understanding of a subject from "the ground up," i.e., from the individuals experiencing
42
43 the phenomenon.²⁷ In this case, those individuals were medical students who recently
44
45 completed their undergraduate program, and the focus groups were used to explore their
46
47 perspectives and rationale for career choices. Two authors (KP, KFH) independently
48
49 reviewed the transcripts several times and coded them based on recurring topics/themes
50
51 that arose in the students' discussions; this allowed the authors to compare and contrast
52
53 themes arising from different groups and explore incongruous ideas. Together, they met
54
55 to ensure consistency and compare relationships amongst the themes. The coding was
56
57
58
59
60

done systematically by hand in conjunction with spreadsheets to manage coding categories and track sentinel quotes. Through this analysis, a set of key themes emerged.

Results

Sixteen focus groups with 70 students, were conducted from 2002 to 2008. Analysis of these focus groups revealed 20 recurring themes, which can be grouped into 7 major, 3 intermediate, and 10 minor themes (Table 1). The themes represent factors that influenced medical students' career choice. Major themes are those that appeared both consistently and frequently throughout the different classes and are represented by sentinel quotes (Table 2). Intermediate themes are those that appeared consistently but not as frequently throughout the classes; minor themes are those that recurred but not consistently.

Table 1. Themes identified in the focus group (FG) data.

Themes		
Major	Intermediate	Minor
Undergraduate experience <i>Curriculum/program</i> <i>Timing/scheduling</i>	Lifestyle	Critical incidents/experiences
Exposure	Bad mouthing/negative perceptions	Information gaps <i>Null curriculum</i>
Public perception and recruitment	Context	Uncertainty
Teacher influence <i>Feedback</i> <i>Encouragement</i> <i>Modelling</i>		Nature of the work

Family/outside influences <i>Partner influence</i>		Extracurricular programs
Residency issues <i>Training & duration</i> <i>Rotating internship</i> <i>CaRMS</i>		Timing of decision-making <i>Early/pre-med choices</i>
Personal philosophy <i>Passion</i> <i>Self-assessment</i>		Financial issues
		Prestige
		Fit with colleagues
		Gender issues

Table 2. Sentinel quotes from each of the major themes identified.

Major theme	Representative participant quote
Undergraduate experience <i>Curriculum/program</i> <i>Timing/scheduling</i> <i>Hidden curriculum</i>	“It’s like they so devalue the academics of family medicine that we don’t even have an exam at the end of it. It’s like there is no material to test you on in family medicine.” (2002, FG1)
Exposure	“...I think the fact that half of our class has switched what they want to do during the clinical years kind of speaks to the fact that clinical exposure is a strong factor in making that decision.” (2002, FG 2) “I was ranking internal medicine all the way... but on match day I wanted to do Anesthesia, and I think that’s because my last couple weeks of medical school clinical rotations was in Anesthesia and I absolutely loved it and... I wish I had done this earlier because I would have probably gone for it.” (2002, FG 3)
Public perception and recruitment	“You know, it’s a deep rooted problem within the public: are you going to be a specialist or <i>just</i> a family doctor, <i>just</i> a GP.” (2006, FG 3) “After four years of working hard, you kind of want to feel like you’re wanted.” (2008, FG 1)
Teacher influence <i>Feedback</i> <i>Encouragement</i> <i>Modelling/career trajectory</i>	“I think the biggest thing in medical school that influences your decision...is the feedback you get from people that you work with... You look at physicians and say who do I want to be like in ten years? Do I want to be like him, who enjoys work and having a good time or like that person who's just cranky and nobody likes.” (2002, FG 3)

Family/outside influences <i>Partner influence</i>	"...Coming into med school, with or without a significant other, or meeting a significant other while you're here. And then you have to take into account where they're going with their life, and if you're going to have kids, and what you're kids are going to do and where they're going to live and those kinds of things...that's a big factor." (2007, FG 2)
Residency issues <i>Training & duration</i> <i>Rotating internship</i> <i>CaRMS</i>	"One of the things that we used to have [in Canada] is that rotating internship for the year, before we actually had to make a choice of a specialty. And that year... you actually had real responsibilities... Everyone said that that year really helped define what they wanted to do with their careers." (2006, FG 2) "I think the other problem too is that you're applying to competitive programs. What if you don't get in? Will you be happy with that? So you're kind of required to pick a couple of things and you know you pick things that you really don't want to do but you just kind of pick... it's pretty tough to decide right now." (2002, FG 5)
Personal philosophy <i>Passion</i> <i>Self-assessment</i>	"Don't worry about the money, and don't worry about how long it'll take to do it. At the end of the day you need to be happy with what you're doing. And that's what I went with." (2007, FG 2)

Major themes

Most medical students felt that exposure and the undergraduate experience significantly influenced their decisions. More often than not, these two influencing factors appeared together in the transcripts.

Many students felt as though they were not exposed to particular specialties until the end of their undergraduate training, if at all. Those students that chose specialties outside of general medicine often commented on the positive role of early exposure in their decision.

Public perception and recruitment

Recruitment and public perception appeared to be major influencing factors in medical students' career choice. Many students identified incidences where the views of the general public were heavily biased towards or against a particular specialty. Students

1
2
3 expressed concern that the general public posted family physicians at the bottom of the
4
5 hierarchy in medicine.
6
7

8
9 Public perceptions were also mirrored in the media, as some students entered school with
10
11 skewed ideas of a particular specialty based on television or movies. Recruitment,
12
13 however, had a greater influencing role towards the end of their program. Students felt
14
15 that few specialists tried to actively recruit them to their programs making positive
16
17 recruitment efforts enticing.
18
19

20 21 *Teacher, Family, and Partner Influences* 22

23
24 Medical students' career choices were heavily influenced by physician/teacher feedback,
25
26 encouragement, and modelling. This reflected what physicians said directly to students
27
28 during rotations, as well as how much they appeared to enjoy their chosen specialty.
29
30 These interactions framed their possible career trajectory should they choose that
31
32 specialty, and had a major role in swaying their choices.
33
34
35
36

37
38 People closest to the students, such as family and partners, also had major influences on
39
40 career choices. They influenced students both by their opinions of specific career paths,
41
42 where they felt the student would best fit based on their behaviours at home during their
43
44 clinical rotations, and by their attachment to the student. Many students felt like their
45
46 career choice was not simply their own decision to make when they were in a
47
48 partnership/relationship.
49
50

51 52 *Personal philosophy* 53 54 55 56 57 58 59 60

1
2
3 Passion towards a specific specialty swayed decisions, regardless of identified drawbacks
4 or advice against a specific specialty — many students pursued the specialty about which
5 they felt the most passion.
6
7
8
9

10
11 In addition, the capacity to reflect and self-assess appeared to have a positive impact on
12 the career choice process for those students who expressed a sense of self-evaluation.
13
14 Students who were interested in a competitive program when entering medical school
15 stayed focused on that specialty throughout their undergraduate schooling; students who
16 reflected on their experience after every specialty exposure then pursued the specialty
17 that was the best fit and about which they were most passionate.
18
19
20
21
22
23
24

25 26 *Intermediate themes*

27 28 29 *Bad mouthing/negative perceptions*

30
31
32 Medical students consistently indicated that bad mouthing of particular specialties
33 occurred in the professional setting, and that it had the ability to impact their career
34 choices. Many students felt as though the bad mouthing was mostly directed towards
35 family medicine, although negative perceptions could be seen in regards to any specialty:
36
37
38
39
40
41

42 I don't know if...I felt that family medicine got any more trashed than any other
43 area... the internal medicine doctors say lots of bad things about the surgeons,
44 everybody trashes everybody else. (2007, FG 3)
45

46 47 *Context*

48 Context refers not necessarily to what the medical student was doing at the time, but
49 more so to where, and with whom they were doing it. These factors, when combined,
50 provided students with a positive or negative overall experience. Career choices were
51
52
53
54
55
56
57
58
59
60

1
2
3 influenced by the context of certain rotations or electives because they felt it illustrated
4
5 the overall picture of a given specialty and provided the most memorable experience:
6
7

8
9 Working in different hospitals really kind of helped me make my decision.
10 Because doing internal medicine here it seemed like the staff had no life outside
11 of the hospital, but at other hospitals I felt it was a bit more balanced...That kind
12 of made me realize that this hospital is not necessarily the case throughout. (2006,
13 FG 3)
14

15 ***Minor themes***

16 *Information gaps*

17
18
19 Some medical students felt as though their career choice was influenced by a lack of
20 information provided about specialties and the residency match. This lack of information
21 can be classified as the “null curriculum.” Of note, what is *not* talked about is as
22 important as what is included.²⁸ Despite being exposed to a particular specialty, these
23 students found it challenging to obtain information on practical aspects of a career in that
24 area.
25
26
27
28
29
30
31
32
33
34
35
36

37 Even simple information of what the daily lives of different specialties are like
38 and what they make and how many hours they work and so on, not only is it not
39 presented to us but there was an instance in our first couple of years when that
40 sort of information was sought by people...and we were specifically told it was
41 information we shouldn't want to know about. (2007, Focus Group 3)
42
43
44

45 *Timing of decision-making*

46
47
48 Some medical students started their schooling with an idea of what specialty area they
49 wanted to pursue, or made decisions quite early on. Making early or pre-medical school
50 career choices narrowed their options significantly, and made their elective choices more
51
52
53
54
55
56
57
58
59
60

1
2
3 targeted. Some medical students believed this type of decision-making process was
4
5
6 beneficial, others believed it to be disadvantageous.
7

8
9 I had a lot of trouble because...I came into medical school with an open mind,
10 which was a bad decision. But I thought that I could do that, and I did have some
11 inkling that you had to, needed to, decide early. (2008, Focus Group 2)
12

13 Some people come in because they want to do something very competitive and
14 then they're focused on that the entire way through, which you have to be, if you
15 want to do something very competitive. And so you kind of have to have tunnel
16 vision the whole time. (2002, Focus Group 4)
17

18 19 **Discussion**

20
21
22 Studies have examined influencing factors towards a particular specialty, such as
23
24 surgery²⁹ or family medicine.²⁵ Others have assessed the demographics of medical
25
26 students selecting a particular specialty, such as emergency medicine and surgery, in an
27
28 attempt to ascertain a character profile for each specialty.^{8,29} Much of the previous
29
30 research on career choices of medical students has been conducted through surveys.^{13,29}
31
32 Although some studies have explored the attitudes of Canadian medical students,³⁰ most
33
34 studies on career choice have been outside Canada.¹³
35
36
37
38
39

40 The study yielded 20 recurring influences over medical student career choice, with seven
41
42 themes dominating the data. In particular, exposure to different fields and the timing of
43
44 the exposure during the undergraduate experience were prominent throughout the data.
45
46 Although medical schools across Canada share a degree of similarity in their curricula,
47
48 the clinical experiences and the timing of these differ significantly. It was evident
49
50 throughout the focus groups that students felt that lack of exposure to specific specialties
51
52 influenced their decisions. Knowledge of this upon entering medical school may be
53
54
55
56
57
58
59
60

1
2
3 important for medical students when scheduling extra-curricular physician shadowing
4
5 and clerkship electives.
6
7

8
9 Although context was determined to be an intermediate theme, it is difficult to assess just
10
11 how influential it is in career choice decisions, particularly when linked with limited
12
13 exposure. With limited exposure to a particular specialty, a single highly positive or
14
15 highly negative experience, i.e. one that is *likely out of context* of the norm, may have
16
17 more impact than our analysis would lead us to believe. Since medical students do not
18
19 have the time to experience each specialty for extended periods, the context of any given
20
21 clinical experience can be paramount.
22
23

24
25
26 Context also extends beyond what was explicitly discussed by the focus group
27
28 participants. Closely linked to context, as well as modelling and the undergraduate
29
30 curriculum/experience is the concept of the hidden curriculum. The hidden curriculum is
31
32 “lessons that are learned but not openly intended”³¹ often through cultural norms, values,
33
34 and expectations. Hafferty & Franks (1994) argue that much of the determinants of who a
35
36 physician is and how they practice are determined by the hidden curriculum, as opposed
37
38 to formal curriculum.²⁸ Not including particular specialties in core rotations, or not
39
40 including material related to a particular specialty on exams (Table 2, sentinel quote for
41
42 the undergraduate experience) portrays the message that those specialties are of less
43
44 value. There is substantial research into the hidden curriculum in medical teaching and
45
46 practice related to ethics,^{28,32,33} but less research to assess the impact hidden curriculum
47
48 has on career choice.
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Previous research into career choice has highlighted the importance of work/life balance
4
5 in the decision-making process. Since Schwartz et al.³⁴ grouped specialties based on work
6
7 hours – what they called ‘controllable lifestyle’ – other researchers have investigated the
8
9 significance of lifestyle factors on career choice.^{2,9,29} Many of these studies demonstrated
10
11 that medical students do put an emphasis on expected work/life balance.¹⁶ Our analysis
12
13 found that lifestyle was an intermediate influence.
14
15
16

17 18 **Limitations** 19

20
21 The career choices focus group data used for analysis is from students in the classes of
22
23 2002-2008 at a single Canadian medical school. However, student engagement with this
24
25 project was significant. The students were interviewed at the end of their training, which
26
27 yielded retrospective data based on their final career choices and may be affected by
28
29 recall bias.
30
31
32

33
34 Other studies document gender differences in decision-making related to lifestyle and
35
36 life-balance.³⁵ Now that enrolment in Canadian faculties of medicine is favouring women
37
38 the impact of career choice, gender, and work/life balance becomes increasingly relevant.
39
40 We did not specifically analyze the focus group discussions based on gender in the de-
41
42 identified transcripts.
43
44
45

46 47 **Future research** 48

49
50 Our findings demonstrated that personal philosophy (passion and self-assessment) is a
51
52 major influencing factor towards career choice. Future research to examine students’
53
54 level of self-assessment and self-reflection as related to their decision-making processes
55
56 and level of certainty towards their selected specialty would be revealing. Some students
57
58
59
60

1
2
3 enter medical school having already decided on a specialty, whereas others enter without
4 predilections, and it is likely that their level of self-reflection, certainty and possibly
5
6 career satisfaction would differ.
7
8

9
10
11 It is important to note that despite the timing of the focus groups at the end of
12 undergraduate training, uncertainty was still was a minor theme. Investigating what
13 factors play a role in uncertainty could shed light on ways in which both undergraduate
14 and postgraduate programs could address it. Further, a qualitative study following a
15 cohort of students over their educational trajectory would improve understanding as to
16 how influences evolve over time, impacting the timing of curricular interventions.
17
18
19
20
21
22
23
24

25 26 **Conclusions**

27
28
29 This study provides a qualitative approach to exploring factors that affect medical
30 students' career choices. This methodology promotes in-depth discussion and deeper
31 understanding of these influences. Overall, influences on medical student career choice
32 were grouped into 20 themes, most significantly: the undergraduate curricular experience,
33 exposure, public perception, teacher influences, family/outside influences, residency
34 issues, and personal philosophy. Using this knowledge to tailor undergraduate curriculum
35 (explicit, hidden and null), extra-curricular programs and student counselling may
36 decrease student anxiety about the process, as well as, uncertainty. Student interests must
37 be balanced with the need to secure an appropriate mix of specialties/trainees for
38 healthcare workforce planning and projected population needs.
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

1. Laurence C, Elliott T. When, what and how South Australian pre-registration junior medical officers' career choices are made. *Medical Education*. 2007 May;41(5):467–75.
2. Barshes NR, Vavra AK, Miller A, Brunicardi FC, Goss JA, Sweeney JF. General surgery as a career: a contemporary review of factors central to medical student specialty choice. *J Am Coll Surg*. 2004 Nov;199(5):792–9.
3. Dorsey ER, Jarjoura D, Rutecki GW. The influence of controllable lifestyle and sex on the specialty choices of graduating U.S. medical students, 1996-2003. *Acad Med*. 2005 Sep;80(9):791–6.
4. Leduc N, Vanasse A, Scott I, Scott S, Orzanco M, Maman Dogma J, et al. The Career Decision-Making Process of Medical Students and Residents and the Choice of Specialty and Practice Location: How Does Postgraduate Medical Education Fit In? Members of the FMEC PG consortium; 2011.
5. The Association of Faculties of Medicine of Canada. The Future of Medical Education in Canada: A Collective Vision for MD Education, Postgraduate Project. Ottawa (ON): The Association; 2012.
6. Bethune C, Hansen PA, Deacon D, Hurley K, Kirby A, Godwin M. Family medicine as a career option: how students' attitudes changed during medical school. *Can Fam Physician*. 2007 May;53(5):881–5, 880.
7. Zinn WM, Sullivan AM, Zotov N, Peters AS, Connelly MT, Singer JD, et al. The effect of medical education on primary care orientation: results of two national surveys of students' and residents' perspectives. *Acad Med*. 2001 Apr;76(4):355–65.
8. Scott IM, Abu-Laban RB, Gowans MC, Wright BJ, Brenneis FR. Emergency medicine as a career choice: a descriptive study of Canadian medical students. *CJEM*. 2009 May;11(3):196–206.
9. Canadian Resident Matching Service. Table IX – History of family medicine as the career choice of Canadian graduates. Ottawa (ON): CaRMS; 2014. Available: <http://www.carms.ca/wp-content/uploads/2014/09/9-History-of-Family-Medicine-as-the-Career-Choice-of-Canadian-Graduates1.pdf>.
10. College of Family Physicians of Canada. 2012 CaRMS R-1 Main Residency Match Results. 2012 [18 April 2012]; Available from: <http://www.cfpc.ca/ProjectAssets/Templates/NewsItem.aspx?id=4513>.
11. Fréchette D, Hollenberg D, Shrichand A, Jacob C, Datta I. What's really behind Canada's unemployed specialists: Findings from the Royal College's employment study - 2013. Ottawa (ON): The Royal College of Physicians and Surgeons of Canada; 2013. Available:

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

http://www.royalcollege.ca/portal/page/portal/rc/common/documents/policy/employment_report_2013_e.pdf.

12. The Association of Faculties of Medicine of Canada. Canadian Medical Education Statistics 2014. Ottawa (ON): The Association; 2014. Available: <https://www.afmc.ca/pdf/Cmes2014-Enrolment.pdf>.
13. Takeda Y, Morio K, Snell L, Otaki J, Takahashi M, Kai I. Characteristic profiles among students and junior doctors with specific career preferences. *BMC Medical Education*. 2013;13(1):125.
14. Petrides KV, McManus IC. Mapping medical careers: questionnaire assessment of career preferences in medical school applicants and final-year students. *BMC Med Educ*. 2004 Oct 1;4:18.
15. Scott IM, Matejcek AN, Gowans MC, Wright BJ, Brenneis FR. Choosing a career in surgery: factors that influence Canadian medical students' interest in pursuing a surgical career. *Can J Surg*. 2008 Oct;51(5):371–7.
16. Weissman C, Tandeter H, Zisk-Rony R, Weiss YG, Elchalal U, Avidan A, et al. Israeli medical students' perceptions of six key medical specialties. *Israel Journal of Health Policy Research*. 2013;2(1):19.
17. Kassebaum DG, Szenas PL. Relationship between indebtedness and the specialty choices of graduating medical students. *Acad Med*. 1992 Oct;67(10):700–7.
18. Kibbe MR, Troppmann C, Barnett CC, Nwomeh BC, Olutoye OO, Doria C, et al. Effect of Educational Debt on Career and Quality of Life among Academic Surgeons: *Annals of Surgery*. 2009 Feb;249(2):342–8.
19. DeZee KJ, Maurer D, Colt R, Shimeall W, Mallory R, Powers J, et al. Effect of Financial Remuneration on Specialty Choice of Fourth-Year U.S. Medical Students: *Academic Medicine*. 2011 Feb;86(2):187–93.
20. Vanasse A, Orzanco MG, Courteau J, Scott S. Attractiveness of family medicine for medical students: influence of research and debt. *Can Fam Physician*. 2011 Jun;57(6):e216–227.
21. Grayson MS, Newton DA, Thompson LF. Payback time: the associations of debt and income with medical student career choice. *Med Educ*. 2012 Oct;46(10):983–91.
22. Newton DA, Grayson MS, Thompson LF. The variable influence of lifestyle and income on medical students' career choice. *Med Educ*. 2012 Oct;46(10):983–91. *Medical schools, 1998-2004. Acad Med*. 2005 Sep;80(9):809–14.
23. Greysen SR, Chen C, Mullan F. A History of Medical Student Debt: Observations and Implications for the Future of Medical Education: *Academic Medicine*. 2011 Jul;86(7):840–5.

- 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
 - 11
 - 12
 - 13
 - 14
 - 15
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 22
 - 23
 - 24
 - 25
 - 26
 - 27
 - 28
 - 29
 - 30
 - 31
 - 32
 - 33
 - 34
 - 35
 - 36
 - 37
 - 38
 - 39
 - 40
 - 41
 - 42
 - 43
 - 44
 - 45
 - 46
 - 47
 - 48
 - 49
 - 50
 - 51
 - 52
 - 53
 - 54
 - 55
 - 56
 - 57
 - 58
 - 59
 - 60
24. Wright S, Wong A, Newill C. The impact of role models on medical students. *J Gen Intern Med.* 1997 Jan;12(1):53–6.
25. Parker JE, Hudson B, Wilkinson TJ. Influences on final year medical students' attitudes to general practice as a career. *J Prim Health Care.* 2014 Mar;6(1):56–63.
26. Brown JB. The use of focus groups in clinical research. In Crabtree BF, Miller WL (eds). *Doing Qualitative Research.* Thousand Oaks:Sage, 1999: 109-124.
27. Patton MQ. *Qualitative research and evaluation methods.* 3rd ed. Thousand Oaks, CA: Sage Publications; 2002.
28. Hafferty FW, Franks R. The hidden curriculum, ethics teaching, and the structure of medical education. *Acad Med* 1994 Nov;69(11):861-871.
29. Sanfey HA, Saalwachter-Schulman AR, Nyhof-Young JM, Eidelson B, Mann BD. Influences on medical student career choice: gender or generation? *Arch Surg.* 2006 Nov;141(11):1086–1094; discussion 1094.
30. Scott I, Gowans M, Wright B, Brenneis F. Stability of medical student career interest: a prospective study. *Acad Med.* 2012 Sep;87(9):1260–7.
31. Martin, Jane. "What Should We Do with a Hidden Curriculum When We Find One?" *The Hidden Curriculum and Moral Education.* Ed. Giroux, Henry and David Purpel. Berkeley, California: McCutchan Publishing Corporation, 1983. 122–139.
32. Hafferty FW. Beyond curriculum reform: confronting medicine's hidden curriculum. *Acad Med* 1998;73(4):403-7.
33. Hafferty FW, Gauferberg EH, O'Donnell JF. The Role of the Hidden Curriculum in "On Doctoring" Courses. *Virtual Mentor.* 2015 Feb 1;17(2):130–9.
34. Schwartz RW, Haley JV, Williams C, Jarecky RK, Strodel WE, Young B, et al. The controllable lifestyle factor and students' attitudes about specialty selection. *Acad Med.* 1990 Mar;65(3):207–10.
35. Alers M, van Leerdam L, Dielissen P, Lagro-Janssen A. Gendered specialities during medical education: a literature review. *Perspectives on Medical Education.* 2014 Jun;3(3):163–78.

Table 1. Themes identified in the focus group (FG) data.

Themes		
Major	Intermediate	Minor
Undergraduate experience <i>Curriculum/program</i> <i>Timing/scheduling</i>	Lifestyle	Critical incidents/experiences
Exposure	Bad mouthing/negative perceptions	Information gaps <i>Null curriculum</i>
Public perception and recruitment	Context	Uncertainty
Teacher influence <i>Feedback</i> <i>Encouragement</i> <i>Modelling</i>	Confidential	Nature of the work
Family/outside influences <i>Partner influence</i>		Extracurricular programs
Residency issues <i>Training & duration</i> <i>Rotating internship</i> <i>CaRMS</i>		Timing of decision-making <i>Early/pre-med choices</i>
Personal philosophy <i>Passion</i> <i>Self-assessment</i>		Financial issues
		Prestige
		Fit with colleagues
		Gender issues

Table 2. Sentinel quotes from each of the major themes identified.

Major theme	Representative participant quote
Undergraduate experience <i>Curriculum/program</i> <i>Timing/scheduling</i> <i>Hidden curriculum</i>	“It’s like they so devalue the academics of family medicine that we don’t even have an exam at the end of it. It’s like there is no material to test you on in family medicine.” (2002, FG1)
Exposure	<p>“...I think the fact that half of our class has switched what they want to do during the clinical years kind of speaks to the fact that clinical exposure is a strong factor in making that decision.” (2002, FG 2)</p> <p>“I was ranking internal medicine all the way... but on match day I wanted to do Anesthesia, and I think that’s because my last couple weeks of medical school clinical rotations was in Anesthesia and I absolutely loved it and... I wish I had done this earlier because I would have probably gone for it.” (2002, FG 3)</p>
Public perception and recruitment	<p>“You know, it’s a deep rooted problem within the public: are you going to be a specialist or <i>just</i> a family doctor, <i>just</i> a GP.” (2006, FG 3)</p> <p>“After four years of working hard, you kind of want to feel like you’re wanted.” (2008, FG 1)</p>
Teacher influence <i>Feedback</i> <i>Encouragement</i> <i>Modelling/career trajectory</i>	“I think the biggest thing in medical school that influences your decision...is the feedback you get from people that you work with... You look at physicians and say who do I want to be like in ten years? Do I want to be like him, who enjoys work and having a good time or like that person who’s just cranky and nobody likes.” (2002, FG 3)
Family/outside influences <i>Partner influence</i>	“...Coming into med school, with or without a significant other, or meeting a significant other while you’re here. And then you have to take into account where they’re going with their life, and if you’re going to have kids, and what you’re kids are going to do and where they’re going to live and those kinds of things...that’s a big factor.” (2007, FG 2)
Residency issues <i>Training & duration</i> <i>Rotating internship</i> <i>CaRMS</i>	<p>“One of the things that we used to have [in Canada] is that rotating internship for the year, before we actually had to make a choice of a specialty. And that year... you actually had real responsibilities... Everyone said that that year really helped define what they wanted to do with their careers.” (2006, FG 2)</p> <p>“I think the other problem too is that you’re applying to competitive programs. What if you don’t get in? Will you be happy with that? So you’re kind of required to pick a couple of things and you know you pick things that you really don’t want to do but you just kind of pick... it’s pretty tough to decide right now.” (2002, FG 5)</p>
Personal philosophy <i>Passion</i> <i>Self-assessment</i>	“Don’t worry about the money, and don’t worry about how long it’ll take to do it. At the end of the day you need to be happy with what you’re doing. And that’s what I went with.” (2007, FG 2)

Table 1Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist¹

No	Item	Guide questions/description
Domain 1: Research team and reflexivity		
Personal Characteristics		
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group? <input type="checkbox"/> Focus groups were conducted by paid, non-faulty facilitators.
2.	Credentials	What were the researcher's credentials? <i>E.g. PhD, MD</i> <input type="checkbox"/> Kiersten Pianosi BSc <input type="checkbox"/> Cheri Bethune, MD <input type="checkbox"/> Katrina Hurley MD, MHI
3.	Occupation	What was their occupation at the time of the study? <input type="checkbox"/> Kiersten Pianosi, medical student year 3 <input type="checkbox"/> Cheri Bethune, Family Physician, Professor <input type="checkbox"/> Katrina Hurley, Emergency Physician, Assistant Professor
4.	Gender	Was the researcher male or female? <input type="checkbox"/> The researchers are female

¹Bethune C, Hansen PA, Deacon D, Hurley K, Kirby A, Godwin M. Family medicine as a career option: how students' attitudes changed during medical school. *Can Fam Physician*. 2007 May;53(5):881–5, 880.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

No	Item	Guide questions/description
5.	Experience and training	<p>What experience or training did the researcher have?</p> <ul style="list-style-type: none"> <input type="radio"/> Kiersten Pianosi is a medical student with one prior publication using a mixed-methods approach; informal training on qualitative analysis and grounded theory was provided by the principal investigator prior to initiating data analysis for this study. <input type="radio"/> Cheri Bethune is a family physician with multiple publications. <input type="radio"/> Katrina Hurley has an MHI. She has one publication and a masters thesis that use qualitative methods, specifically grounded theory.
Relationship with participants	Relationship established	<p>Was a relationship established prior to study commencement?</p> <ul style="list-style-type: none"> <input type="radio"/> The focus group transcripts were de-identified prior to analysis. In a small medical school, some familiarity between Dr. Bethune and the students could be expected - hence the need for a non-faculty facilitator and de-identified transcripts. Dr. Hurley would have known students in the cohort from 2002 but not in the 2006-2008 cohorts. K. Pianosi did not know any of the study participants.
7.	Participant knowledge of the interviewer	<p>What did the participants know about the researcher? e.g. <i>personal goals, reasons for doing the research</i></p> <ul style="list-style-type: none"> <input type="radio"/> The participants knew that the purpose of the focus groups were to assess what factors influenced their medical specialty career choices and how their undergraduate schooling prepared them to do so. <input type="radio"/> The participants did not know the focus group facilitators.
8.	Interviewer characteristics	<p>What characteristics were reported about the interviewer/facilitator? e.g. <i>Bias, assumptions, reasons and interests in the research topic</i></p> <ul style="list-style-type: none"> <input type="radio"/> Part of the motivation for the study was to investigate the trend away from family medicine. One of the focus group questions specifically asked students to consider reasons why students have moved away from general medicine and how prepared they felt to make career choice decisions. So students could likely infer some of the underlying motivations of the researchers.

No	Item	Guide questions/description
Domain 2: study design		
	Theoretical framework	
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? <i>e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis</i> <input type="radio"/> Grounded theory guided the qualitative analysis
	Participant selection	
		How were participants selected? <i>e.g. purposive, convenience, consecutive, snowball</i>
10.	Sampling	<input type="radio"/> Purposive sampling: medical students were approached to participate in focus groups in the final year of their medical schooling
		How were participants approached? <i>e.g. face-to-face, telephone, mail, email</i>
11.	Method of approach	<input type="radio"/> The class was approached as a whole to describe the focus group and identify it as part of the longitudinal survey in which they had participated. Sign up sheets and consent forms were available.
		How many participants were in the study?
12.	Sample size	<input type="radio"/> 70 participants in 16 focus groups.
		How many people refused to participate or dropped out? Reasons?
13.	Non-participation	<input type="radio"/> We didn't track non-responders or non-participants.
	Setting	

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

No	Item	Guide questions/description
14.	Setting of data collection	<p>Where was the data collected? e.g. <i>home, clinic, workplace</i></p> <p><input type="radio"/> Focus groups occurred at a classroom/conference room at Memorial University in St. John's, NL (the medical school that the participants attended)</p>
15.	Presence of non-participants	<p>Was anyone else present besides the participants and researchers?</p> <p><input type="radio"/> The participants and the non-faculty facilitator were the only individuals present at the focus groups.</p>
16.	Description of sample	<p>What are the important characteristics of the sample? e.g. <i>demographic data, date</i></p> <p><input type="radio"/> Graduating medical students at Memorial University of Newfoundland in the classes of 2002 and 2006-2008</p> <p><input type="radio"/> Male and female participants</p>
Data collection		
17.	Interview guide	<p>Were questions, prompts, guides provided by the authors? Was it pilot tested?</p> <p><input type="radio"/> A semi-structured guide was used to facilitate the focus groups. The questions and prompts were informed based on factors identified in the longitudinal survey.</p> <p><input type="radio"/> It was pilot tested with a cohort of students from a different class.</p>
18.	Repeat interviews	<p>Were repeat interviews carried out? If yes, how many?</p> <p><input type="radio"/> No, each participant only completed one focus group.</p>
19.	Audio/visual recording	<p>Did the research use audio or visual recording to collect the data?</p> <p><input type="radio"/> The focus groups were audio-recorded and subsequently transcribed and de-identified</p>
20.	Field notes	<p>Were field notes made during and/or after the interview or focus group?</p> <p><input type="radio"/> The non-faculty facilitator did not take field notes during the focus groups.</p>

No	Item	Guide questions/description
21.	Duration	<p>What was the duration of the interviews or focus group?</p> <p><input type="radio"/> The focus groups were 35-90 minutes.</p>
22.	Data saturation	<p>Was data saturation discussed?</p> <p><input type="radio"/> The focus groups were executed as scheduled and ongoing participation was not based on iterative data analysis. No new themes were identified after focus group 3 in 2007. There were 3 subsequent focus groups so the data were saturated.</p>
23.	Transcripts returned	<p>Were transcripts returned to participants for comment and/or correction?</p> <p><input type="radio"/> Participants did not receive copies of the transcribed and de-identified focus groups.</p>
Domain 3: analysis and findings		
Data analysis		
24.	Number of data coders	<p>How many data coders coded the data?</p> <p><input type="radio"/> Two researchers, Dr. Katrina Hurley and Kiersten Pianosi, coded the data</p>
25.	Description of the coding tree	<p>Did authors provide a description of the coding tree?</p> <p><input type="radio"/> The two researchers independently reviewed the transcripts several times and coded them based on recurring topics/themes that arose in the students' discussions; this allowed the authors to compare and contrast themes arising from different groups and explore incongruous ideas. Together, they met to ensure consistency and compare relationships amongst the themes.</p> <p><input type="radio"/> Major, intermediate and minor themes are listed in Table 1 of the paper.</p>
26.	Derivation of themes	<p>Were themes identified in advance or derived from the data?</p> <p><input type="radio"/> Themes were derived from the data, based on recurring topics/themes in the students' discussions.</p>

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

No	Item	Guide questions/description
27.	Software	<p>What software, if applicable, was used to manage the data?</p> <p><input type="radio"/> The coding was done systematically by hand in conjunction with Excel spreadsheets to manage coding categories and track sentinel quotes.</p>
28.	Participant checking	<p>Did participants provide feedback on the findings?</p> <p><input type="radio"/> Participants were de-identified in the transcripts and not asked to review the findings of the qualitative analysis.</p>
Reporting		
29.	Quotations presented	<p>Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. <i>participant number</i></p> <p><input type="radio"/> Sentinel quotes were tracked using Excel spreadsheets and used to illustrate the recurring themes</p> <p><input type="radio"/> They were identified in the manuscript by cohort and focus group number, e.g. 2008, Focus Group 1</p>
30.	Data and findings consistent	<p>Was there consistency between the data presented and the findings?</p> <p><input type="radio"/> There was consistency between the data and the 20 recurring themes identified</p>
31.	Clarity of major themes	<p>Were major themes clearly presented in the findings?</p> <p><input type="radio"/> The major themes were identified separately in the results section using a table of sentinel quotes</p>
32.	Clarity of minor themes	<p>Is there a description of diverse cases or discussion of minor themes?</p> <p><input type="radio"/> Minor themes were also identified in the results section, and were classified as those topics/themes that recurred but <i>not</i> consistently.</p> <p><input type="radio"/> Intermediate themes were those that occurred consistently but not as frequently as the major themes.</p>