



The Effect of the COVID-19 Pandemic on the Factors Influencing Iranian Medical Residents' Specialty Selection: A Qualitative Study

Yaser Sarikhani¹, PhD;  Seyedeh Maryam Najibi², PhD;  Rahil Mosallanejad³, MD; Ali Rayatinejad³, MD; Mohammad Reza Sanjabi⁴, MD; Fereshteh Gholami³, MD; Shahidul Islam⁵, PhD; Peivand Bastani⁶, PhD

¹Research Center for Social Determinants of Health, Jahrom University of Medical Sciences, Jahrom, Iran;

²Department of Health Services Management, School of Management and Medical Informatics, Shiraz University of Medical Sciences, Shiraz, Iran;

³Student Research Committee, Jahrom University of Medical Sciences, Jahrom, Iran;

⁴Student Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran;

⁵Faculty of Medicine and Health, School of Health, University of New England, Armidale, NSW 2351, Australia;

⁶Faculty of Health and Behavioral Sciences, School of Dentistry, University of Queensland, Brisbane, QLD 4072, Australia

Correspondence:

Seyedeh Maryam Najibi, PhD;
School of Management and Medical Informatics, Ghasrodasht St.,
Postal code: 71336-54361, Shiraz, Iran

Tel: +98 71 32340774

Email: m.najibi90@gmail.com

Received: 02 January 2023

Revised: 17 March 2023

Accepted: 18 May 2023

What's Known

- The COVID-19 pandemic has had a significant impact on various aspects of medical education.
- Factors such as the balance between personal life and professional requirements, as well as external issues that have emerged after the COVID-19 pandemic, can influence medical students' specialty selection.

What's New

- The COVID-19 pandemic influenced the determinants of general practitioners' choice of specialty, which are classified into four themes: educational determinants, work-related hazards, personal and professional lifestyle, and experiences and beliefs.
- Pandemics have had a significant impact on various aspects of medical students' specialty selection.

Abstract

Background: Medical students' specialty selection influences the composition of the physician workforce and the effectiveness of health systems. Therefore, the identification of factors that influence the choice of specialty is critical for an evidence-based health policy. This study aimed to investigate the effect of the Coronavirus Disease 2019 (COVID-19) pandemic on the determinants of specialty choice among Iranian medical residents.

Methods: In early 2022, this qualitative study was conducted among Iranian medical residents in seven provinces, including Tehran, Isfahan, Fars, Khorasan Razavi, Kerman, Kermanshah, and Khuzestan. The participants were selected using a purposeful sampling method. Data were collected using 74 semi-structured in-depth face-to-face interviews. Finally, a thematic content analysis (conventional content analysis) method was applied for data synthesis.

Results: The participant's mean age was 28.7±2.5 years, and more than 52% (N=39) were men. Following data synthesis, 10 sub-themes and four main themes were identified, including educational aspects affected by the pandemic, career-related hazards, personal and professional lifestyles affected by the disease, and experiences and beliefs regarding the pandemic.

Conclusion: The COVID-19 pandemic has had a significant impact on medical students' educational, professional, and personal aspects of specialty choices. This study demonstrated how the disease affected the choice of specialty. Therefore, the findings could be used for developing national health policy and planning.

Please cite this article as: Sarikhani Y, Najibi SM, Mosallanejad R, Rayatinejad A, Sanjabi MR, Gholami F, Islam S, Bastani P. The Effect of the COVID-19 Pandemic on the Factors Influencing Iranian Medical Residents' Specialty Selection: A Qualitative Study. *Iran J Med Sci.* 2024;49(4):259-267. doi: 10.30476/ijms.2023.97637.2943.

Keywords • COVID-19 • Pandemics • Medical specialty • Career choice • Iran

Introduction

Choosing a medical specialty is a very important decision for physicians because it determines their professional career and medical performance.¹ For many physicians, the field of specialization is not only a career option but also a chance to enhance their social life and the availability of new job opportunities.² Medical students choose their medical specialty based on the influence of role models and instructors, personality traits, personal interests, academic performance, and the

skills developed during their education.³ The importance of evidence on the determinants of preferences in specialty selection is that it can be utilized as a foundation for various planning and policies, such as medical education, physician workforce, and successful health care delivery.⁴

The future composition of the health workforce depends on medical students' choices of specialty. Therefore, the factors influencing this choice have become a topic of interest for many healthcare planners. Understanding the factors that influence the choice of specialty is essential to ensure an equal distribution of physicians by specialty.⁴ During the Coronavirus Disease 2019 (COVID-19) pandemic, little information was available on these influential factors. However, developments in the education system during the COVID-19 pandemic necessitate an examination of the consequences of this pandemic on the choice of medical specialty.⁵

In countries severely affected by COVID-19, the medical staff is exhausted.³ COVID-19 has had a significant impact on medical students' educational programs and has become a major concern for them.⁶ Aside from the various occupational, educational, and psychological effects of COVID-19 on medical students, studies conducted in Canada,⁷ China,^{3, 8} and the United States⁵ showed that the COVID-19 pandemic had an impact on medical students' choice of specialty. In fact, by eliminating clinical rotations, this disease generated new challenges for students, which might influence their career beliefs and their choice of specialty.⁸

With the spread of COVID-19 and the utilization of different educational methods, medical students' acquaintance with various specialties has changed.^{9, 10} Factors such as the balance between personal life and the occupational environment, as well as external issues caused by the pandemic, can also influence students' choice of specialty.¹⁰ A study found that during the pandemic, limitations such as reduced contact between students and patients, not attending various surgeries, and limited familiarity with different specialties led to an increased desire for medical specialties with less clinical contact among medical students.¹¹

Although the COVID-19 pandemic has had a significant impact on public health, its effects on medical specialty selection are less obvious. Therefore, it is crucial to identify the impact of the pandemic on specialty selection as a phenomenon influencing the health service delivery function. While some studies indicated that the COVID-19 pandemic had little impact on specialty selection,^{12, 13} another study suggested that this disease had a major impact on specialty

selection as a profession.¹⁴ Due to the existing controversies regarding the impact of the COVID-19 pandemic on specialty selection and the lack of a comprehensive national study, it was necessary to investigate the impact of the pandemic on the components of specialty selection in the specific context of the country. Therefore, this study aimed to investigate the impact of the COVID-19 pandemic on the determinants of specialty choice among Iranian medical residents.

Materials and Methods

Study Setting

From January 2022 to March 2022, this qualitative study was conducted in seven provinces of Iran, including Tehran, Isfahan, Fars, Razavi Khorasan, Kerman, Kermanshah, and Khuzestan. These provinces were selected based on their geographic distribution and socioeconomic status. The utilization of geographical diversity in the selection of participants on the one hand, and the employment of a qualitative approach on the other, provide the opportunity to establish a comprehensive understanding of the issue.

Sampling

To ensure the quality of the data synthesis, a purposeful sampling method was applied to select the participants. The study population was first-year medical residents (MRs). All first-year residents were eligible to participate in the study, regardless of their previous practice experience. This group of physicians was considered because of their previous experience in choosing a specialty during the COVID-19 outbreak. The reluctance of physicians to participate at any stage of the study was considered as the exclusion criterion. The sampling was performed based on a list of MRs obtained from the medical universities in the regional capitals. Although data saturation is the leading determinant of sample size in qualitative studies, we attempted to recruit samples from MRs of all disciplines from various provinces to strengthen the validity of the results. Although theoretical saturation was achieved after 31 interviews, 74 MRs participated in the study after signing an informed consent form. We called the participants and informed them of the aims and the procedures of the study. All the physicians who consented to take part in the study continued their participation without any withdrawal.

Data Collection

To provide a more in-depth understanding of

the issue, we conducted in-depth face-to-face interviews to collect the data. The results of two open interviews with key informants were used to create a semi-structured interview guide. The interview guide was divided into four sections: the key determinants of specialty selection, the impact of epidemics on specialty selection, the impact of the COVID-19 pandemic on specialty selection, and the participants' experience in choosing a specialized field during the COVID-19 outbreak.

All interviews were conducted by two researchers experienced in qualitative research at the most convenient time and place for the participants. Before the interviews, the two researchers held a collaborative meeting to discuss the research methodology and protocols. The interviews lasted 35 ± 5 min on average. All the participants were initially instructed on the objectives of the study and the interview process. They were allowed to stop the interview at any time and could also request that particular information not be published. All interviews were digitally recorded and verbatim transcribed. To confirm the accuracy of the content, all transcripts were matched to the audio files by a third researcher.

Trustworthiness and Rigor of the Study

To improve the validity and quality of the study results, we used Guba and Lincoln's four criteria, which included credibility, dependability, confirmability, and transferability.^{15, 16} We attempted to ensure the credibility of the results by engaging with the data for an extended period of time, applying the participant check approach in the data analysis phase, and providing the possibility of external checks at all phases of the study by two colleagues outside the project as a peer debriefing method. The results of 10 interviews were reviewed by the participants to validate the themes, get further details, and investigate contradictory content. Moreover, we used a peer-check technique as a triangulation method. Two researchers independently analyzed the interviews and compared the findings to determine similarities and discrepancies. Accordingly, a joint meeting was organized with all researchers to review the sub-themes and themes. We attempted to accurately document all phases of the study to improve its dependability. In this regard, two external reviewers verified the protocol as well as the methodology of the study. We aimed to improve the confirmability of the results by requesting two external qualitative researchers to verify the accuracy of the study protocol procedure

and data synthesis. To ensure transferability, we detailed the research procedure. Finally, to ensure reflexivity, a bracketing approach was applied. In this regard, all researchers used reflective journals to minimize the impact of their attitudes, ideas, and expectations on the results. Moreover, none of the authors had prior experience in selecting a specialty throughout the study.

This study was approved by the Ethics Committee of Jahrom University of Medical Sciences (code: IR.JUMS.REC.1400.013).

Statistical Analysis

For data synthesis, a thematic content analysis method (conventional content analysis) was applied. Accordingly, the six-step methodology proposed by Graneheim and Lundman was used.¹⁷ It included getting familiar with data, extracting initial codes, developing themes, reviewing themes, defining themes, and reporting results.¹⁷ In this approach, instead of using a predetermined framework for interpreting the data, the themes and their sub-themes arose from the present data. This method is recommended in cases where little information is available about the issue.¹⁸ We became familiar with the data by reading each interview several times. Following each interview, the researchers synthesized the data immediately. Therefore, each interviewee was informed of the data from the preceding phase.

The analysis and interpretation of the data were carried out by researchers who had no conflict of interest regarding the subject of the study. To organize the qualitative data, Microsoft Office 2013 (Microsoft Corporation, Redmond, Washington, USA) was used.

Results

We interviewed 74 first-year MRs. The participant's mean age was 28.7 ± 2.5 years, and 31% (N=23) of them were married. More than 52% (N=39) of the participants were men, and 47% (N=35) lived in big cities. The data synthesis resulted in the development of 24 categories, 10 sub-themes, and four main themes, including educational aspects affected by the pandemic, career-related hazards, personal and professional lifestyles affected by the disease, and pandemic experiences and beliefs. The results of the thematic analysis are shown in detail in table 1. Finally, the conceptual map resulting from the data synthesis is presented in figure 1.

Table 1: Themes and sub-themes on the effect of COVID-19 pandemic on the choice of specialty

Main Themes	Sub-themes	Categories
Educational aspects affected by the pandemic	Hidden curriculum	Atmosphere of academic environments
		Atmosphere of clinical environments
	Clinical educational experiences about the disease	Educational experience in COVID-19 wards
		Unsuccessful experiences in the treatment of COVID-19 patients
Career-related hazards	Job safety	Fear of encountering infected patients
		The probability of getting the disease
	Concerns for the safety of family and relatives	Concerns about the family members' health
		Concerns about transmitting the disease to people outside the workplace
	Mental health concerns	Stress from dealing with patients
		Psychological resilience
Personal and professional lifestyles affected by the disease	Comfort of personal life	Mental comfort in the home environment
		Cost-benefit attitudes
	Quality of working life	Working hours
		Emergency cases and on-call schedules
Experiences and beliefs regarding the pandemic	Attitudes and beliefs	Professional accountability
		Social accountability
		Sense of sympathy
	Experience of the illness	Personal experience of the disease,
		Experience of the illness by family members
		Experience the disease by acquaintances
	Advice and suggestions	Educators' opinions
		Comments of other students
		Suggestions from family members

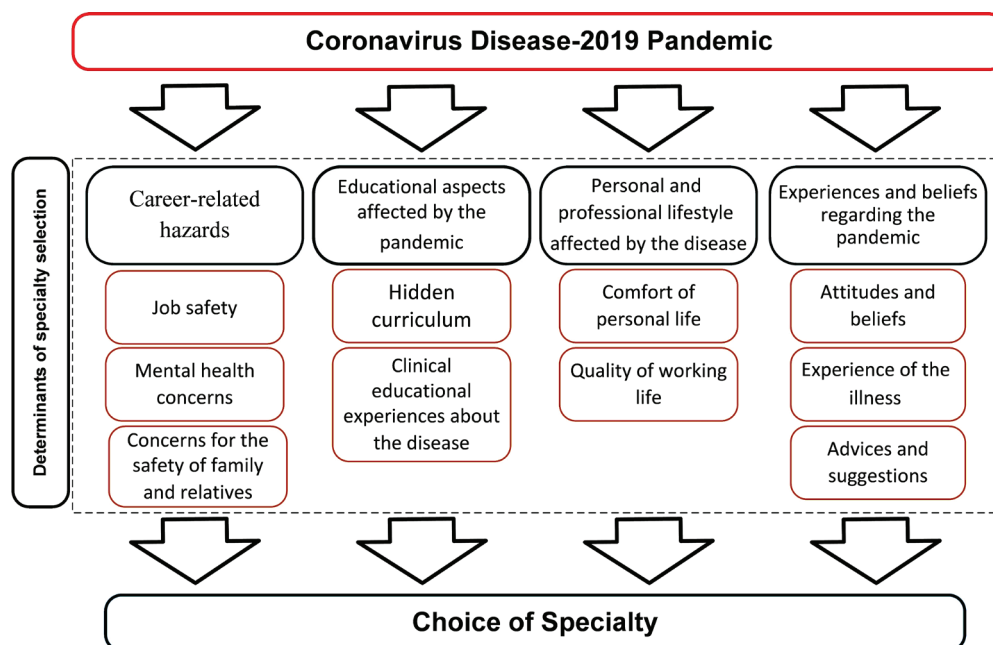


Figure 1: The conceptual framework, resulting from the results of the study, shows the effects of the COVID-19 pandemic on the determinants of specialty selection by medical residents.

Educational Aspects Affected by the Pandemic

The first theme includes educational determinants that are affected by the COVID-19 pandemic. These factors are categorized into two sub-themes, including hidden curriculum and clinical educational experiences about the disease.

Hidden Curriculum

The hidden curriculum is considered an

influential component in the educational process and decisions related to graduate education. This study found that the COVID-19 pandemic had an impact on the ambiance of academic and clinical environment wards, which was a component of the hidden curriculum. One of the MRs pointed this out and stated:

“There were no positive reflections of the disease in the college. Therefore, there was a

prevailing atmosphere against the disease that influenced my decision not to pursue disciplines that were directly related to COVID-19 patients.” [MR24]

Clinical Educational Experiences about the Disease

The clinical educational experiences about the disease were another educational determinant of specialty choice that was found to be influenced by the COVID-19 pandemic. These findings indicated that the educational experience of medical students in COVID-19 wards was an important factor in their choice of specialty.

Career-Related Hazards

The theme “Career-related hazards” explains those determinants of specialty selection that are related to the physical and psychological hazards of a particular career. Although the impact of these determinants in choosing a profession has long been considered, the outbreak of COVID-19 has affected these factors in different ways.

Job Safety

Fear of contracting the disease and confronting COVID-19 patients was a major concern recognized by many participants. For instance, a participant expressed:

“You know, at the beginning of the pandemic, there was a lot of fear of this disease among the people. For me, such emotional reactions really had a significant impact on my career choice.” [MR17]

Concern for the Safety of Family and Relatives

Concern about the safety and health of family members and other acquaintances appeared to be another contributing factor in the specialty selection during the COVID-19 outbreak. One of the female participants gave an example, stating:

“I was fully aware of what happened to my classmate. She transmitted the disease to her family from the hospital.” [MR41]

Mental Health Concerns

The findings revealed that another aspect of occupational hazards was related to psychological well-being issues as a result of professional exposure during the disease outbreak. Among the factors identified in this regard were job stress and the possibility of psychological resilience. A physician said:

“It was obvious that this disease was causing great stress to my older colleagues. I wasn’t sure if I could handle this amount of stress and

anxiety. ... I preferred to choose a less stressful career.” [MR7]

Personal and Professional Lifestyles Affected by the Disease

This theme discusses aspects that influence an individual's comfort and overall well-being. These factors are among the leading determinants of personal and professional lifestyle. The present study indicated that the COVID-19 pandemic had overshadowed some aspects of physicians' lifestyles.

Comfort of Personal Life

A high proportion of the participants underlined the relevance of personal comfort in choosing a career. One of them pointed to the impact of the pandemic on these factors:

“I think the outbreak of COVID-19 has had a negative impact on many professional aspects, such as the personal lifestyle. ... For example, since the beginning of the pandemic, I have not had that previous mental comfort at home.” [MR11]

Quality of Working Life

Some physicians also mentioned the quality of their working lives. For example, a female doctor explained the impact of the outbreak on her profession, emphasizing her professional lifestyle and explaining:

“... It was clear to me that treating COVID-19 patients involves many emergencies and unforeseen circumstances, and as a result, will demand a lot of on-call schedules. This is a difficult issue for me.” [MR55]

Experiences and Beliefs Regarding the Pandemic

The last theme that emerged from data synthesis was “experiences and beliefs regarding the pandemic”, which was divided into three sub-themes: remarks from others, attitudes and beliefs, and disease experience.

Attitudes and Beliefs

Some participants noted the effects of the disease on their beliefs and attitudes. They explained how they were influenced by moral and altruistic cultural values due to the disease outbreak. In this regard, a participant stated:

“I really wanted to be able to help my community in this situation. Because I felt responsible for the health of the community. I tried to make my choice based on this belief.” [MR70]

Experience of the Illness

Some interviewees stated that their personal

experience of the disease or that of their relatives influenced their choice of specialty. A male MR described his personal experience with the sickness, saying:

"It was only when I became ill that I was able to understand the condition of the patients. This encounter altered my mindset. ... Therefore, I decided to choose this specialty to help individuals suffering from the disease." [MR33]

Advice and Suggestions

A significant number of participants stated that during the disease outbreak, they received suggestions and recommendations from various people not to pursue certain postgraduate fields. For example, an MRs said:

"In addition to some of my older colleagues, my family has encouraged me to choose this specialty. They believed that it would be better to choose a field that has little to do with the disease." [MR27]

Discussion

The results of the present study, which was established based on 74 in-depth interviews with Iranian MRs, identified four main themes regarding the effects of COVID-19 on the determinants of specialty selection, including educational aspects affected by the pandemic, career-related hazards, personal and professional lifestyle affected by the disease, as well as experiences and beliefs regarding the pandemic.

This study indicated that the COVID-19 pandemic had an impact on two educational components of specialty selection, including clinical educational experiences about the disease and hidden curriculum. The findings of this study, which were in line with the results of other studies, indicated that educational experiences such as clinical rotations during the COVID-19 period were influential in the choice of specialty.⁵ In addition, the lack of holding in-person theory findings due to the pandemic was mentioned as another formal educational aspect that has affected the opportunity for students to gather necessary information and become acquainted with different specialty fields.⁷ In terms of informal educational factors, it was reported that strict COVID-19 preventive protocols and how students deal with them in clinical wards could affect their choice of specialty and career.¹⁹ In general, it seems that the educational challenges posed by the COVID-19 pandemic have limited the opportunity for adequate exposure to different specialty fields. This has limited the medical

students' opportunity to gain a comprehensive understanding of the pros and cons of each specialty and has influenced the finding of aptitudes, the formation establishment of career beliefs, and the preferences of medical students in choosing a specialty. These facts necessitate a revision and probably a redesign of medical educational programs to better adapt them to conditions such as the COVID-19 pandemic.

Career-related hazards are other determinants of specialty selection. According to the findings of this study, these factors include concern for the safety of family and relatives, job safety, and mental health concerns. The risk of infection was one of the influential factors in the choice of specialty, which was also extensively explained before the outbreak of COVID-19.^{20, 21} Similarly, studies conducted after the COVID-19 pandemic suggested that medical students' preferences for medical specialties were influenced by their fear of contracting the disease by themselves or family members.²² Studies showed that major health events, such as the COVID-19 pandemic, affect the mental health status of medical students.^{23, 24} Increased stress, anxiety, depression, insomnia, and job burnout were reported as the most important psychological consequences of the COVID-19 pandemic.^{24, 25} So far, we found that occupational concerns caused by the spread of COVID-19 have not only affected the learning and educational aspects,²³ but also influenced the tendency to continue education,^{26, 27} the desire to work in the clinical environment,²⁸ career progression,²⁹ and physicians' preferences in choosing specialty.^{22, 26}

The findings of this study revealed that another group of factors influencing the choice of specialty during the COVID-19 pandemic were experiences and beliefs, which included attitude and beliefs, disease experience, as well as advice and suggestions. The impact of personal interests and personality type on specialty selection during the COVID-19 pandemic was confirmed.⁸ On the other hand, various studies reported that some cultural and belief determinants such as empathy,^{30, 31} altruism,^{32, 33} and social accountability,^{34, 35} influenced the physicians' career and specialization choices. In addition, the effects of having experienced various diseases, as well as the effects of suggestions and advice,³⁶ on the physicians' choice of specialty were well documented. The role of determinants such as disease experience and other people's suggestions in the selection of COVID-19-related specializations varied among different individuals. The impacts of pandemics and major health events on attitudes, beliefs,

advice, and experiences related to the choice of specialty by physicians remain an area for further investigation.

Based on data analysis, personal and professional lifestyle was the last group of components of the specialty selection to be affected by this pandemic. The two main categories of this theme were the comfort of personal life and the quality of working life. The impacts of COVID-19 on career-related psychological aspects were investigated in several studies.^{22, 26, 27} It was also obvious that career-related psychological factors were among the main determinants of physician's quality of work and personal life. On the other hand, the role of the COVID-19 pandemic on clinical job features such as the number of shifts, on-call schedules, and emergency cases was well explained in this study. Despite the absence of comparable studies on the effects of COVID-19 on these determinants, several studies highlighted the impact of lifestyle^{37, 38} and occupational components^{39, 40} on medical specialty choice.

Although this study used a qualitative approach to provide a comprehensive understanding of the impact of COVID-19 on medical specialty choice, it was conducted only in one country. Nevertheless, since the process of selecting a specialty by physicians was greatly influenced by the socioeconomic conditions of countries, the findings of this study should be evaluated and generalized considering all these conditions.

Conclusion

The results of data synthesis in this study indicated that the COVID-19 pandemic influenced various components of specialty selection by Iranian physicians, which are categorized into four themes: educational aspects affected by the pandemic, career-related hazards, personal and professional lifestyle influenced by the disease, as well as experiences and beliefs regarding the pandemic. Although several studies were conducted worldwide to identify the factors influencing medical students' choice of specialty, there is still a lack of accurate and comprehensive evidence on the effects of the COVID-19 pandemic on the determinants of specialty selection. Therefore, further investigations in terms of different socioeconomic conditions are required to strengthen evidence-informed physician workforce planning and policy.

Acknowledgment

The authors would like to express their gratitude to everyone who took part in this study.

Authors' Contribution

Y.S: Study design, data analysis, drafting and reviewing the manuscript; SM.N: Study design, drafting; R.M: Study design, data gathering, drafting; MR.S: Study design, data gathering, drafting; F.Gh: Study design, data gathering, drafting; Sh.I: Study design, drafting; P.B: Study design and reviewing the manuscript, All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

Conflict of Interest: None declared.

References

- 1 Barbosa-Camacho FJ, Miranda-Ackerman RC, Vázquez-Reyna I, Jimenez-Ley VB, Barrera-López FJ, Contreras-Cordero VS, et al. Association between HEXACO personality traits and medical specialty preferences in Mexican medical students: a cross-sectional survey. *BMC Psychol.* 2020;8:1-9. doi: 10.1186/s40359-020-0390-0. PubMed PMID: 32171327; PubMed Central PMCID: PMC7071694.
- 2 Newton DA, Grayson MS, Thompson LF. The variable influence of lifestyle and income on medical students' career specialty choices: data from two U.S. medical schools, 1998-2004. *Acad Med.* 2005;80:809-14. doi: 10.1097/00001888-200509000-00005. PubMed PMID: 16123458.
- 3 Cai CZ, Lin Y, Alias H, Hu Z, Wong LP. Effect of the COVID-19 Pandemic on Medical Student Career Perceptions: Perspectives from Medical Students in China. *Int J Environ Res Public Health.* 2021;18. doi: 10.3390/ijerph18105071. PubMed PMID: 34064814; PubMed Central PMCID: PMC8151743.
- 4 Shakurnia A, Mozaffari A, Ghadiri A. Factors Influencing Choice of Specialty by medical residents in Ahvaz, Iran. *Bangladesh Journal of Medical Science.* 2016;15. doi: 10.3329/bjms.v15i1.20478.
- 5 Byrnes YM, Civantos AM, Go BC, McWilliams TL, Rajasekaran K. Effect of the COVID-19 pandemic on medical student career perceptions: a national survey study. *Med Educ Online.* 2020;25:1798088. doi: 10.1080/10872981.2020.1798088. PubMed PMID: 32706306; PubMed Central PMCID: PMC7482653.
- 6 Kaplan AB, Riedy KN, Grundfast KM. Increasing Competitiveness for an

- Otolaryngology Residency: Where We Are and Concerns about the Future. *Otolaryngol Head Neck Surg.* 2015;153:699-701. doi: 10.1177/0194599815593734. PubMed PMID: 26187905.
- 7 Dobson JL, Fenwick A, Linehan V, Hartery A. Radiology Interest Groups: A Recipe for Success. *Can Assoc Radiol J.* 2021;72:343-51. doi: 10.1177/0846537119899551. PubMed PMID: 32070110.
 - 8 Deng J, Que J, Wu S, Zhang Y, Liu J, Chen S, et al. Effects of COVID-19 on career and specialty choices among Chinese medical students. *Med Educ Online.* 2021;26:1913785. doi: 10.1080/10872981.2021.1913785. PubMed PMID: 33849405; PubMed Central PMCID: PMCPMC8057072.
 - 9 Darras KE, Patlas MN, Forster BB. Anticipated Challenges for Medical Students Choosing a Career in Radiology During the COVID-19 Pandemic. *Can Assoc Radiol J.* 2021;72:7-8. doi: 10.1177/0846537120940991. PubMed PMID: 32635744.
 - 10 Elsayy F, Malik RB, Kazi M, Ladan Z. A UK perspective on the effect of the COVID-19 pandemic on medical student career perceptions. *Med Educ Online.* 2020;25:1810968. doi: 10.1080/10872981.2020.1810968. PubMed PMID: 32815785; PubMed Central PMCID: PMCPMC7482791.
 - 11 Hussain S, Almas T. Impact of COVID-19 on Medical Students Aspiring Toward a Career in Otolaryngology: A Medical Student's Perspective. *Otolaryngol Head Neck Surg.* 2021;165:385-6. doi: 10.1177/01945998211000387. PubMed PMID: 33685290.
 - 12 Yin Y, Chu X, Han X, Cao Y, Di H, Zhang Y, et al. General practitioner trainees' career perspectives after COVID-19: a qualitative study in China. *BMC Fam Pract.* 2021;22:18. doi: 10.1186/s12875-020-01364-x. PubMed PMID: 33430776; PubMed Central PMCID: PMCPMC7797889.
 - 13 Yun Z, Xinxin H, Yue Y, Xiaotian C, Yu C, Hong D, et al. Impact of COVID-19 epidemic on medical students' career perspectives: a qualitative study. *Chinese Journal of General Practitioners.* 2022;21:471-6.
 - 14 Krier CR, Quinn K, Kaljo K, Farkas AH, Ellinas EH. The Effect of COVID-19 on the Medical School Experience, Specialty Selection, and Career Choice: A Qualitative Study. *J Surg Educ.* 2022;79:661-7. doi: 10.1016/j.jsurg.2021.11.007. PubMed PMID: 34863674; PubMed Central PMCID: PMCPMC8606003.
 - 15 Johnson JL, Adkins D, Chauvin S. A Review of the Quality Indicators of Rigor in Qualitative Research. *Am J Pharm Educ.* 2020;84:7120. doi: 10.5688/ajpe7120. PubMed PMID: 32292186; PubMed Central PMCID: PMCPMC7055404.
 - 16 Guba EG, Lincoln YS. Competing paradigms in qualitative research. *Handbook of qualitative research.* 1994;2:105.
 - 17 Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today.* 2004;24:105-12. doi: 10.1016/j.nedt.2003.10.001. PubMed PMID: 14769454.
 - 18 Wainwright D, Harris M, Wainwright E. How does 'banter' influence trainee doctors' choice of career? A qualitative study. *BMC Med Educ.* 2019;19:104. doi: 10.1186/s12909-019-1531-0. PubMed PMID: 30975136; PubMed Central PMCID: PMCPMC6460642.
 - 19 Daniel M, Gordon M, Patricio M, Hider A, Pawlik C, Bhagdev R, et al. An update on developments in medical education in response to the COVID-19 pandemic: A BEME scoping review: BEME Guide No. 64. *Med Teach.* 2021;43:253-71. doi: 10.1080/0142159X.2020.1864310. PubMed PMID: 33496628.
 - 20 Ocheke AN, Musa J, Ekwempu CC. The impact of HIV/AIDS epidemic on the choice of specialties among medical students and house officers in Jos, Nigeria. *Niger J Med.* 2008;17:201-4. doi: 10.4314/njm.v17i2.37384. PubMed PMID: 18686840.
 - 21 Ness R, Killian CD, Ness DE, Frost JB, McMahon D. Likelihood of contact with AIDS patients as a factor in medical students' residency selections. *Acad Med.* 1989;64:588-94. PubMed PMID: 2789601.
 - 22 Mao Y, Zhang N, Liu J, Zhu B, He R, Wang X. A systematic review of depression and anxiety in medical students in China. *BMC Med Educ.* 2019;19:327. doi: 10.1186/s12909-019-1744-2. PubMed PMID: 31477124; PubMed Central PMCID: PMCPMC6721355.
 - 23 Lyons Z, Wilcox H, Leung L, Dearsley O. COVID-19 and the mental well-being of Australian medical students: impact, concerns and coping strategies used. *Australas Psychiatry.* 2020;28:649-52. doi: 10.1177/1039856220947945. PubMed PMID: 32772729; PubMed Central PMCID: PMCPMC7424607.
 - 24 Lasheras I, Gracia-Garcia P, Lipnicki DM, Bueno-Notivol J, Lopez-Anton R, de la Camara C, et al. Prevalence of Anxiety in Medical Students during the COVID-19 Pandemic: A Rapid Systematic Review

- with Meta-Analysis. *Int J Environ Res Public Health*. 2020;17. doi: 10.3390/ijerph17186603. PubMed PMID: 32927871; PubMed Central PMCID: PMC7560147.
- 25 Li Y, Wang Y, Jiang J, Valdimarsdottir UA, Fall K, Fang F, et al. Psychological distress among health professional students during the COVID-19 outbreak. *Psychol Med*. 2021;51:1952-4. doi: 10.1017/S0033291720001555. PubMed PMID: 32389148; PubMed Central PMCID: PMC7225209.
 - 26 Quek TT, Tam WW, Tran BX, Zhang M, Zhang Z, Ho CS, et al. The Global Prevalence of Anxiety Among Medical Students: A Meta-Analysis. *Int J Environ Res Public Health*. 2019;16. doi: 10.3390/ijerph16152735. PubMed PMID: 31370266; PubMed Central PMCID: PMC6696211.
 - 27 Grace MK. Depressive symptoms, burnout, and declining medical career interest among undergraduate pre-medical students. *Int J Med Educ*. 2018;9:302-8. doi: 10.5116/ijme.5be5.8131. PubMed PMID: 30481160; PubMed Central PMCID: PMC6387778.
 - 28 Conlon TA, Carthy P, Govern R, Slattery S, Yates J, Murphy S. The Impact of Covid-19 on Medical Student Education - Navigating Uncharted Territory. *Ir Med J*. 2020;113:109. PubMed PMID: 32818364.
 - 29 Johnston K, Tyson C, Danny I, Meyer L. Impact of the COVID-19 pandemic on the career of junior doctors. *Med J Aust*. 2021;214:295-6. doi: 10.5694/mja2.50996. PubMed PMID: 33772809; PubMed Central PMCID: PMC8251201.
 - 30 Tariq N, Tayyab A, Jaffery T. Differences in Empathy Levels of Medical Students Based on Gender, Year of Medical School and Career Choice. *J Coll Physicians Surg Pak*. 2018;28:310-3. doi: 10.29271/jcsp.2018.04.310. PubMed PMID: 29615175.
 - 31 Santos MA, Grosseman S, Morelli TC, Giuliano IC, Erdmann TR. Empathy differences by gender and specialty preference in medical students: a study in Brazil. *Int J Med Educ*. 2016;7:149-53. doi: 10.5116/ijme.572f.115f. PubMed PMID: 27213505; PubMed Central PMCID: PMC4885636.
 - 32 Ahmed SM, Majumdar MA, Karim R, Rahman S, Rahman N. Career choices among medical students in Bangladesh. *Adv Med Educ Pract*. 2011;2:51-8. doi: 10.2147/AMEP.S13451. PubMed PMID: 23745076; PubMed Central PMCID: PMC3661246.
 - 33 Hayes BW, Shakya R. Career choices and what influences Nepali medical students and young doctors: a cross-sectional study. *Hum Resour Health*. 2013;11:5. doi: 10.1186/1478-4491-11-5. PubMed PMID: 23394308; PubMed Central PMCID: PMC3599062.
 - 34 Onyemaechi N, Bisi-Onyemaechi AI, Omoke NI, Odetunde OI, Okwesili IC, Okwara BO. Specialty choices: Patterns and determinants among medical undergraduates in Enugu Southeast Nigeria. *Niger J Clin Pract*. 2017;20:1474-80. doi: 10.4103/njcp.njcp_382_16. PubMed PMID: 29303135.
 - 35 Smith V, Bethune C, Hurley KF. Examining Medical Student Specialty Choice Through a Gender Lens: An Orientational Qualitative Study. *Teach Learn Med*. 2018;30:33-44. doi: 10.1080/10401334.2017.1306447. PubMed PMID: 28497985.
 - 36 Sarikhani Y, Ghahramani S, Bayati M, Lotfi F, Bastani P. A thematic network for factors affecting the choice of specialty education by medical students: a scoping study in low- and middle-income countries. *BMC Med Educ*. 2021;21:99. doi: 10.1186/s12909-021-02539-5. PubMed PMID: 33568113; PubMed Central PMCID: PMC7877062.
 - 37 Kumar A, Mitra K, Nagarajan S, Poudel B. Factors influencing medical students' choice of future specialization in medical sciences: a cross-sectional questionnaire survey from medical schools in china, malaysia and regions of South asian association for regional cooperation. *N Am J Med Sci*. 2014;6:119-25. doi: 10.4103/1947-2714.128473. PubMed PMID: 24741550; PubMed Central PMCID: PMC3978934.
 - 38 Adnan S, Khaliq H, Irfan M. A cross sectional study on the choices of female medical students in selection of their future specialties. *Journal of Postgraduate Medical Institute*. 2016;30:230-4.
 - 39 Alawad AA, Khan WS, Abdelrazig YM, Elzain YI, Khalil HO, Ahmed OB, et al. Factors considered by undergraduate medical students when selecting specialty of their future careers. *Pan Afr Med J*. 2015;20:102. doi: 10.11604/pamj.2015.20.102.4715. PubMed PMID: 26090050; PubMed Central PMCID: PMC4458322.
 - 40 Cleland JA, Johnston P, Watson V, Krucien N, Skatun D. What do UK medical students value most in their careers? A discrete choice experiment. *Med Educ*. 2017;51:839-51. doi: 10.1111/medu.13257. PubMed PMID: 28295461.