ORIGINAL ARTICLE

https://doi.org/10.1590/1806-9282.20230108

Perception of newly graduated physicians toward ethical education in medical schools: a Brazilian cross-sectional nationwide study

Gustavo Rosa Gameiro[1,2*], Giovana Rosa Gameiro[3], Bruno Alonso Miotto[4], Aline Gil Alves Guilloux[5], Alex Jones Flores Cassenote[5], Mario César Scheffer[5]

SUMMARY

OBJECTIVE: The objective of this study was to evaluate fresh medical graduates' perceptions regarding the general aspects of ethics teaching in Brazilian medical schools.

METHODS: A structured questionnaire was applied to 4,601 participants among the 16,323 physicians who registered in one of the 27 Regional Medical Councils of Brazil in 2015. Answers to four questions regarding general aspects of ethics education in medical school were analyzed. Sampling procedures involved two stratification variables: legal nature (public vs. private) of medical schools and monthly household income higher than 10 minimum wages.

RESULTS: A large percentage of the participants had witnessed unethical behaviors during contact with patients (62.0%), toward coworkers (51.5%), and in relationships with patients' families (34.4%) over the course of their medical training. Even though most of the responders (72.0%) totally agreed that patient-physician relationship and humanities education were part of their medical school curriculum, important topics such as conflicts of interest and end-of-life education were not satisfactorily addressed in the participants' medical training. Statistically significant differences were found between the answers of public and private school graduates.

CONCLUSION: Despite great efforts to improve medical ethics education, our findings suggest the persistence of deficits and inadequacies in the ethics training currently given in medical schools in Brazil. Further modifications in ethics training must be made to address the deficiencies shown in this study. This process should be accompanied by continuous evaluation.

KEYWORDS: Medical education. Ethics. Curriculum. Physicians. Demographics.

INTRODUCTION

The evolution of society has created an increasing demand for the development of an integrated and holistic curriculum in medical school. The main objective is to train technically skilled physicians who care for the patients considering their biopsychosocial and humanistic dimensions[1,2].

In many countries, ethics and human rights are an integral part of the medical curriculum, but this is not universal. The World Medical Association (WMA), since its 51st General Assembly in Tel Aviv, Israel, in 1999, already recommended that "medical ethics and human rights should be taught at every medical school as obligatory and examined parts of the curriculum[3]." This important resolution was posteriorly reaffirmed by the 217th WMA Council Session in Seoul, in April 2021.

In Brazil, the 2014 National Medical School Curriculum Guidelines (NCD) included ethics education, but the ethics course curriculum is not standardized. A study conducted recently found that, among the federal universities with medical courses in Brazil, 94.44% offered the discipline of bioethics. At the same time, however, 16.67% of the universities offered the subject in an elective manner, and in 67.93% of the institutions, bioethics was taught in a shared course with other subjects, with no isolated workload[1].

In Brazil, the current Code of Medical Ethics (CME) was enacted on April 30, 2019, reviewing the previous version published in 2009. It incorporates approaches relevant to the contemporary world, addressing topics such as technological innovations, mass communication, and social relationships[4].

[1]Universidade de São Paulo, Faculty of Medicine, Medical Education Development Center, Health Education – São Paulo (SP), Brazil.
[2]Universidade Federal de São Paulo, Paulista School of Medicine, Department of Ophthalmology and Visual Sciences – São Paulo (SP), Brazil.
[3]Universidade Estadual de Londrina, Faculty of Medicine – Londrina (PR), Brazil.
[4]Universidade Santo Amaro – São Paulo (SP), Brazil.
[5]Universidade de São Paulo, Department of Preventive Medicine – São Paulo (SP), Brazil.
*Corresponding author: gustavo.gameiro@fm.usp.br

Conflicts of interest: the authors declare there is no conflicts of interest. Funding: Agreement No. 0075/2015 between Faculty of Medicine of Universidade de São Paulo, Fundação Faculdade de Medicina, Conselho Regional de Medicina do Estado de São Paulo, and Conselho Federal de Medicina.
Received on January 13, 2023. Accepted on February 26, 2023.

The CME is important not only because it covers scientific advances and their implications for the medical practice but most importantly because it seeks to promote medical assistance based on values, duties, and virtues that guarantee dignified and equitable assistance for all citizens, while also encouraging the prestige and union of the medical category[4]. Despite the significance of the topic, there is a lack of studies in the literature concerning the current scenario of ethics education in medical schools in Brazil and the prevalence of unethical situations observed by students during their medical training.

In that sense, this study aimed to identify fresh medical graduates' demographic profiles and their perceptions toward ethics teaching in Brazilian medical schools concerning general medical ethics topics that were supposed to be covered by the medical curriculum. Moreover, this study assessed if there is any difference in the students' perceptions regarding sociodemographic and training-related aspects.

METHODS

Primary data were obtained using a 104-structured multiple-choice question survey divided into 11 thematic blocks. This study focused on the medical ethics domain, and it extends previous reports using the same survey instrument[5,6].

Out of the 104 questions, 12 referred to the general and socioeconomic data of the participants. Four questions, one of them with six subtopics, addressed general aspects of bioethics with emphasis on whether the interviewee had witnessed any ethical infraction during their time in medical school, in addition to considering if their medical training sufficiently addressed subjects such as end-of-life care, conflicts of interest, and humanities teaching. The graduates were invited to answer whether they totally agreed, partially agreed, disagreed, or preferred not to manifest their opinion on the matter.

The survey was electronically distributed to 16,323 fresh medical school graduates previously registered in one of the 27 Regional Medical Councils (CRMs) of Brazil in 2015. Data were collected in two stages, first in São Paulo and then in other Brazilian states, at the time of registration of new physicians at the CRMs. After careful processing of data, 4,601 participants were included in this study. Distribution methods, survey development, inclusion and exclusion criteria, the survey instrument, adjustments, and validation methods have been previously described elsewhere[5,6].

Sampling procedures involved two stratification variables: legal nature (public vs. private) of medical schools and family's monthly income greater than 10 minimum wages. The participants' number varied between questions and within each stratum. Hence, a complex sample was preferred considering the strata effects (the percentage of different strata in the target population) to ensure the correct representation of each analyzed stratum. A 95% confidence interval for each answer frequency was calculated by bootstrapping with 1,000 repetitions.

RESULTS

Out of the 4.601 participants, 52.9% were women and 47.1% were men. The majority (43.4%) had recently completed their medical training in a medical school from the southeast Brazilian region; 23.0% had graduated from schools in the Northeast region; 19.2% had graduated from the South region; 9.0% had graduated from the North region; and 5.4% had graduated from the Midwest region. When considering the legal nature of the medical school, 45.0% of the participants graduated from public medical schools whereas 55.0% studied in private schools. A more detailed analysis of the sociodemographic characteristics of the studied population has already been reported[6].

Table 1 shows the percentage and confidence intervals for each of the four questions and subtopics concerning general medical ethics. Table 2 explores the differences in the frequency of answers when analyzing responses from private vs. public schools for each answer. Finally, Table 3 depicts significant differences in the results divided by familiar income.

Regarding whether the following statement was true: "humanities and doctor-patient relationship training were part of my medical school curriculum," 72.0% of the subjects who answered completely agreed with the statement, 25.8% partially agreed, and 2.2% completely disagreed with the statement (Table 1). Statistically significant differences were also depicted comparing the legal nature (public vs. private) of the medical school: graduates from private schools tend to completely agree more with the statement ($p<0.001$; Table 2).

When asked whether their medical training appropriately taught them "how to deal with death," 24.0% completely agreed with the statement, 55.0% partially agreed, and 20.9% completely disagreed (Table 1). Graduates from private schools completely disagree more frequently (20.9%) with the statement than the ones who graduated from public universities (15.3%; Table 2). The group with familiar income greater than 10 minimum wages also had a trend to totally agree with the affirmation ($p=0.001$).

Out of the responders, only 12.3% stated that they had not witnessed unethical attitudes during their medical training; 62.0% stated that such unethical attitudes occurred during contact with patients; 51.5% witnessed inadequate attitudes toward work colleagues, multidisciplinary teams, and

Table 1. Fresh graduate physicians' opinions about general medical ethics themes.

	Completely agreed			Partially agreed			Completely disagreed		
	Freq. %	95%CI	n	Freq. %	95%CI	n	Freq. %	95%CI	n
My medical school training appropriately covered the topic "how to deal with death"	24.0	22.9–32.2	884	55.0	54.6–56.1	2023	20.9	13.3–22.4	770
My medical school training sufficiently addressed the topic of conflicts of interest, particularly between physicians and the pharmaceutical and medical device industry	23.1	21.2–29.4	826	48.5	47.1–49.7	1736	28.4	23–30.4	1016
Humanities and doctor-patient relationship training were part of my medical school curriculum	72.0	69.7–79.2	2662	25.8	19.7–27.4	956	2.2	1.2–3.2	80
	Yes			-			No		
Subjects answered the question that they experienced or witnessed inadequate ethical attitudes	80.1	79.1–86.1	3685				19.9	13.9–20.9	916
(A) I have experienced or witnessed inadequate ethical attitudes, especially during contact with patients (i.e., clinical visits, wards, and emergencies)	62.0	52.6–62.9	2286				38.0	37.1–47.4	1399
(B) I have experienced or witnessed inadequate ethical attitudes, especially in relationships with patients' families	34.4	25–37.1	1268				65.6	62.9–75	2417
(C) I have experienced or witnessed inadequate ethical attitudes, especially in relationships with the community and general public	16.9	12.7–17.3	624				83.1	82.7–87.3	3061
(D) I have experienced or witnessed inadequate ethical attitudes, especially toward work colleagues, multidisciplinary teams, and administrative personnel	51.5	41.4–55.1	1896				48.5	44.9–58.6	1789
(E) I have experienced or witnessed inadequate ethical attitudes, especially in decision-making in the classroom	20.2	14.4–22.2	744				79.8	77.8–85.6	2941
(F) I have not experienced or witnessed any unethical attitude	12.3	11.8–17.8	452				87.7	82.2–88.2	3233

The percentages were obtained through weighing of individuals, so the direct division of cells by the totals in this table will yield incorrect results and therefore are discouraged.

administrative personnel; 34.4% in relationships with patients' families; 20.2% in classrooms' decisions; and 16.9% in relationships with the community and general public (Table 1). The percentage of graduates who witnessed those inadequate situations was higher among the physicians who graduated from public medical schools (Table 2).

DISCUSSION

Ethics curriculum in medical school must go beyond the classroom and didactic teaching, as clinical internships present an important opportunity to enable students' discussions with faculty about practical cases and ethical challenges they will eventually face in their medical practice[3,7]. Following this line of thought, the importance of the hidden curriculum in ethics teaching becomes clear[3]. Students' experiences in clerkship rotations may shape their future attitudes and professionalism in medical practice. During their learning process, medical students' approaches to dealing with ethical issues are for the most part influenced by role models[8,9]. Therefore, observing unethical behavior in clinical settings can have very negative effects on the students' systems of values, contributing to a decline in empathy and the phenomenon of ethical erosion[8].

In this context, it is especially relevant to note that the results of this study have demonstrated a very alarming reality: a high percentage of the participants had witnessed unethical behaviors during their medical training, particularly during contact

Table 2. Fresh graduate physicians' significantly different opinions about general medical ethics themes stratified by the legal nature of the medical school.

	Legal nature of the medical school					
	Public		Private		Total	
	Freq. %	95%CI	Freq. %	95%CI	Freq. %	95%CI
[a]My medical school training appropriately covered the topic "how to deal with death"						
Completely agreed	10.5	9.8–11.4	15.5	14.6–16.5	25.5	22.9–32.2
Partially agreed	19.4	18.4–20.5	35.5	34.3–36.8	55.4	54.6–56.1
Completely disagreed	5.4	4.9–6.0	13.5	12.7–14.4	17.4	13.3–22.4
[a]My medical school training sufficiently addressed the topic of conflicts of interest, particularly between physicians and the pharmaceutical and medical device industry						
Completely agreed	4.6	1.4–14.3	20.5	12.7–31.3	25.1	21.2–29.4
Partially agreed	13.2	3.7–37.7	35.2	21.7–51.5	48.4	47.1–49.7
Completely disagreed	8.9	2.5–27	17.7	11.4–26.3	26.5	23–30.4
[a]Humanities and doctor-patient relationship training were part of my medical school curriculum						
Completely agreed	17.7	4.7–48.4	57.0	32–78.9	74.7	69.7–79.2
Partially agreed	7.8	2.3–23.5	15.5	10–23.3	23.3	19.7–27.4
Completely disagreed	0.9	0.2–3.3	1.1	0.6–1.8	1.9	1.2–3.2
[a](A) I have experienced or witnessed inadequate ethical attitudes, especially during contact with patients (i.e., clinical visits, wards, and emergencies)						
No	8.1	2.2–25.5	34.1	21–50.1	42.2	37.1–47.4
Yes	18.2	4.9–48.9	39.7	24.6–57.1	57.8	52.6–62.9
[a](B) I have experienced or witnessed inadequate ethical attitudes, especially in relationships with patients' families						
No	15.5	4.2–43.8	53.7	30.4–75.6	69.3	62.9–75
Yes	10.7	3.1–31.2	20.0	13.1–29.4	30.7	25–37.1
[a](C) I have experienced or witnessed inadequate ethical attitudes, especially in relationships with the community and general public						
No	21.2	5.5–55.7	63.9	34.6–85.5	85.1	82.7–87.3
Yes	5.0	1.5–15.5	9.9	6.6–14.5	14.9	12.7–17.3
[a](D) I have experienced or witnessed inadequate ethical attitudes, especially toward work colleagues, multidisciplinary teams, and administrative personnel						
No	10.9	3–32.3	40.9	23.8–60.4	51.8	44.9–58.6
Yes	15.3	4.2–42.9	32.9	21–47.6	48.2	41.4–55.1
[b](E) I have experienced or witnessed inadequate ethical attitudes, especially in decision-making in the classroom						
No	20.3	5.2–54	61.8	33.5–83.8	82.0	77.8–85.6
Yes	6.0	1.8–18.4	12.0	7.9–17.9	18.0	14.4–22.2
[a](F) I have not experienced or witnessed any unethical attitude						
No	24.3	6.1–61.2	61.2	34.2–82.7	85.5	82.2–88.2
Yes	1.9	0.5–6.7	12.6	8.1–19	14.5	11.8–17.8
Total	**26.2**	**6.5–64.6**	**73.8**	**35.4–93.5**	**100.0**	**100–100**
Total (n)	**1676**		**2009**		**3685**	

[a]p<0.001; [b]p=0.030.

Table 3. Fresh graduate physicians' significantly different opinions about general medical ethics themes are stratified by familiar income.

	Household income higher than 10 minimum wages					
	Yes		No		Total	
	Freq. %	95%CI	Freq. %	95%CI	Freq. %	95%CI
[a]My medical school training appropriately covered the topic "how to deal with death"						
Completely agreed	17.2	14.5–20.2	10.2	8–12.9	27.4	23–32.2
Partially agreed	30.8	29.5–32.1	24.4	22.6–26.2	55.2	54.1–56.3
Completely disagreed	9.4	7.4–11.9	8.1	5.9–10.9	17.4	13.3–22.5
[b]I have experienced or witnessed inadequate ethical attitudes, especially in relationships with patients' families						
No	39.1	35.4–43	30.1	26.5–34	69.2	62.8–74.9
Yes	18.4	15.2–22	12.4	9.8–15.6	30.8	25.1–37.2
[c]I have experienced or witnessed inadequate ethical attitudes, especially toward work colleagues, multidisciplinary teams, and administrative personnel						
No	30.9	27–35	21.0	17–25.6	51.8	44.7–58.8
Yes	26.6	22.7–31	21.6	18.5–25	48.2	41.2–55.3
Total	**57.5**	**49.7–66**	**42.5**	**35.5–50.6**	**100**	**100–100**
Total (n)	**2018**		**1592**		**3610**	

[a]p=0.001; [b]p=0.009; [c]p=0.014.

with patients (62.0%), toward coworkers (51.5%), and in relationships with patients' families (34.4%). These findings are consistent with a study conducted in the United States which found that, of the respondents, 35% of the first-year and 90% of the fourth-year medical students had been exposed to unethical conduct by residents or attending physicians[10].

On the other hand, it is heartening to note that most responders graduated from medical schools whose curriculum covered vital topics for the development of their professional and personal values, such as humanities and doctor-patient relationships[12]. These findings are supported by previously published international studies: out of the analyzed schools in a recent study by Howick et al., medical ethics was offered as part of the curriculum in all schools in Canada, in 78% of the schools in the United Kingdom (UK), and in 87.6% of the schools in the United States (US). Excluding medical ethics, a humanities course was offered by 56% of the Canadian medical schools, 73% of the schools in the UK, and 80% of the schools in the US[12]. In another study regarding the presence of humanities subjects in the medical curriculum of Italian and Spanish schools, it was found that all analyzed schools included at least one subject with humanities content[13].

The doctor-patient relationship is a powerful part of medical care and can alter the health outcomes of patients[14]. The finding that the vast majority of the new graduates agreed that the patient-physician relationship was part of their medical training is in harmony with the current focus given to "patient-centered medicine." Over the years, multiple educational strategies have been adopted in the process of medical training to improve the doctor-patient relationship[15].

Our results showed that efforts appear to be necessary to improve end-of-life training in medical education: only 24.0% of the survey participants totally agreed that they were appropriately taught in medical school about "how to deal with death." Other international studies also exposed deficiencies in the education of end-of-life care in both the formal and hidden curricula[16,17].

When comparing private medical school and public medical school graduates' answers, an interesting association was found: percentages of witnessing inadequate medical attitudes during their clinical training were lower among graduates from private medical schools. Physicians who graduated from private schools also agreed more with the statements regarding the presence of humanities and doctor-patient relationship training in their medical school curriculum and regarding the topic of conflicts of interest being addressed in their training. However, there was a lower rate of disagreement with the statement "medical training appropriately taught how to deal with death" among public school graduates, when compared with private school graduates.

There is only one study in the literature comparing medical clerkships in public and private medical schools in Brazil[18]. Access to high-complexity university hospitals was predominantly offered by public medical schools. However, the infrastructure of private schools, considering the physical space, equipment, and human resources, was considered more satisfactory. The number of patients for students was considered

adequate by 87% in private schools and 67% in public schools. It should also be taken into consideration the possibility of public-school graduates expressing a more critical opinion regarding the topics evaluated, given the fact that this study has assessed graduates' perceptions rather than the real occurrence of unethical behavior.

Overall, these results show that there is still room for change in the medical curriculum in Brazilian medical schools. Modifying the ethics course workload and methodologies of teaching, promoting bioethics education throughout the whole duration of medical school, integrating theory with clinical practice, changing the medical culture through positive role models and institutional values, and adequate assessment of the quality of clerkship rotations regarding the ethical domain are some points that might represent important steps toward the improvement of medical education and healthcare systems.

Although this is the first Brazilian study to address most of these topics, and the large sample size provides a more accurate representation of the graduates' perceptions; some limitations should be highlighted. This study did not address methodologies of ethics teaching, evaluation strategies, and different curriculum characteristics of the responders' medical schools, which could help with further investigation and explanation of our findings. Moreover, this study was based on the physicians' own perceptions about their ethical education in medical school, and no practical test to evaluate their knowledge was completed.

CONCLUSIONS

Only a small percentage of the participants stated that they had not witnessed unethical attitudes during their medical training, and the rates of witnessing unethical behavior were higher among students from public medical schools. There are still many challenges to be overcome in the ethical training currently given in medical schools in Brazil. This study can be used to guide possible changes in the medical curriculum and methodologies of teaching to improve medical students' experience and to help bridge the gap between classroom teaching and the reality of clinical ethics. Future studies should be conducted to further investigate current deficits in bioethics education with more detail.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the University of Sao Paulo Medical School's Research Ethics Committee under the number 797.424. Consent of participants was implied upon voluntary completion of the questionnaire.

AUTHORS' CONTRIBUTIONS

GuRG: Formal Analysis, Investigation, Writing – original draft, Writing – review & editing. **GiRG:** Formal Analysis, Investigation, Writing – original draft, Writing – review & editing. **BAM:** Conceptualization, Data curation, Formal Analysis, Writing – review & editing. **AGAG:** Conceptualization, Data curation, Formal Analysis, Writing – review & editing. **AJFC:** Conceptualization, Data curation, Project administration, Writing – review & editing. **MCS:** Conceptualization, Funding acquisition, Project administration, Resources, Writing – review & editing

REFERENCES

1. Timpone LA, Moraes CL, Monteiro AM, Machado LCS, Silva RCD, Naves W. Panorama do estudo da bioética nos cursos de Medicina das universidades federais brasileiras: estudo descritivo Revista Bioética Cremego 2020;01(1). Brazil. https://revistabioetica.cremego.org.br/cremego/article/view/22/5
2. Conselho Federal de Medicina. Código de ética do estudante de medicina. Conselho Federal de Medicina. Brasília, DF: CFM; 2018.
3. Sharma S, Sharma R, Khyalappa RK, Sharma S, Kandoth S. Student perceptions: background to a new ethics curriculum in Indian medical colleges. J Educ Health Promot. 2021;10:284. https://doi.org/10.4103/jehp.jehp_982_20
4. Código de Ética Médica: Resolução CFM no 2.217, de 27 de setembro de 2018, modificada pelas Resoluções CFM no 2.222/2018 e 2.226/2019. Brasília: Conselho Federal de Medicina, 2019.
5. Guilloux AGA, Ramos JA, Citron I, Roa L, Amundson J, Massenburg BB, et al. Profiling recent medical graduates planning to pursue surgery, anesthesia and obstetrics in Brazil. BMC Med Educ. 2019;19(1):136. https://doi.org/10.1186/s12909-019-1562-6
6. Scheffer MC, Guilloux AG, Poz MR, Schraiber LB. Reasons for choosing the profession and profile of newly qualified physicians in Brazil. Rev Assoc Med Bras (1992). 2016;62(9):853-61. https://doi.org/10.1590/1806-9282.62.09.853
7. Myers MF, Herb A. Ethical dilemmas in clerkship rotations. Acad Med. 2013;88(11):1609-11. https://doi.org/10.1097/ACM.0b013e3182a7f919
8. Dos Santos MF, Schoueri JFL, Vidal CT, Hamamoto Filho PT, Fukushima FB, Vidal EIO. Missed opportunities in the way medical schools evaluate the ethical domain in clerkship rotations. PLoS One. 2019;14(5):e0217717. https://doi.org/10.1371/journal.pone.0217717

9. Wright S, Wong A, Newill C. The impact of role models on medical students. J Gen Intern Med. 1997;12(1):53-6. https://doi.org/10.1046/j.1525-1497.1997.12109.x
10. Satterwhite WM, Satterwhite RC, Enarson CE. Medical students' perceptions of unethical conduct at one medical school. Acad Med. 1998;73(5):529-31. https://doi.org/10.1097/00001888-199805000-00021
11. Petrou L, Mittelman E, Osibona O, Panahi M, Harvey JM, Patrick YAA, et al. The role of humanities in the medical curriculum: medical students' perspectives. BMC Med Educ. 2021;21(1):179. https://doi.org/10.1186/s12909-021-02555-5
12. Howick J, Zhao L, McKaig B, Rosa A, Campaner R, Oke J, et al. Do medical schools teach medical humanities? Review of curricula in the United States, Canada and the United Kingdom. J Eval Clin Pract. 2022;28(1):86-92. https://doi.org/10.1111/jep.13589
13. Orefice C, Pérez J, Baños JE. The presence of humanities in the curricula of medical students in Italy and Spain. Educación Médica. 2019;20(1):79-86. https://doi.org/10.1016/j.edumed.2017.10.008
14. Chipidza FE, Wallwork RS, Stern TA. Impact of the doctor-patient relationship. Prim Care Companion CNS Disord. 2015;17(5):10.4088/PCC.15f01840. https://doi.org/10.4088/PCC.15f01840
15. Silva LD, Ribeiro MMF, Nogueira AI, Reis BS, Barbosa IL, Rocha AMC, Diniz LM. Impacto da 'Disciplina Relação Médico-Paciente' sobre Atitudes Centradas no Paciente. Revista brasileira de educacao medica. 2017;2(41)283-9.
16. Sullivan AM, Lakoma MD, Block SD. The status of medical education in end-of-life care: a national report. J Gen Intern Med. 2003;18(9):685-95. https://doi.org/10.1046/j.1525-1497.2003.21215.x
17. Block SD. Medical education in end-of-life care: the status of reform. J Palliat Med. 2002;5(2):243-8. https://doi.org/10.1089/109662102753641214
18. Zanolli MB, Streit DS, Maciel DT, Muraguchi EMO, Martins MA, Fátima Lopes Calvo Tibério I. Differences in clerkship development between public and private Brazilian medical schools: an overview. BMC Med Educ. 2020;20(1):316. https://doi.org/10.1186/s12909-020-02193-3