Clinical Research

Türk Fen ve Sağlık Dergisi
Turkish Journal of Science and Health

Volume 6
Number 1
Year 2025
Pages 1-7

e-ISSN: 2717-7173 https://dergipark.org.tr/tr/pub/tfsd

Received: 08.10.2024 *Accepted:* 07.01.2025 https://doi.org/10.51972/tfsd.1563191

Assessment of Medical Students' Knowledge Levels on HIV/AIDS: A Single-Center Study**

Serife Ozlem Genc [1]*, Esra Akaydin Gulturk [2], Gürkan Karaca [3]

[1]Sivas Cumhuriyet University, Faculty of Medicine, Obstetrics and Gynecology, 58000, Sivas, Türkiye
[2]Sivas Cumhuriyet University, Faculty of Medicine, Medical Biostatistics, 58000, Sivas, Türkiye
[3]Sivas Cumhuriyet University, Faculty of Medicine, 58000, Sivas, Türkiye

ABSTRACT:
Purpose: Medical and dental students in various countries have demonstrated varying levels of knowledge and attitudes towards HIV/AIDS. Although many students are aware of HIV/AIDS, studies show significant gaps in knowledge about transmission modes and prevention techniques. This study assesses the knowledge of HIV/AIDS among medical students at a single institution in Turkey. The aim of the study is to evaluate the knowledge levels and awareness of medical students regarding HIV/AIDS.
Material and Methods: The study included 172 students from Sivas Cumhuriyet University. A questionnaire with 26 questions, including 23 knowledge-based and 3 demographic questions, was administered via Google Forms. Statistical analysis was performed using chi-square tests to evaluate associations between class years and correct responses.
Results: The majority of students demonstrated gaps in knowledge, particularly in the modes of transmission and prevention. For instance, 61% of participants believed incorrectly that mosquitoes can transmit HIV. Only 50% correctly identified that HIV can be transmitted from mother to child. Students in the third year had higher correct response rates compared to other years.
Conclusion: Despite overall awareness of HIV/AIDS, medical students showed significant gaps in their understanding. The medical curriculum should include more extensive education on HIV/AIDS, particularly in terms of transmission, prevention, and treatment.
Keywords: *HIV/AIDS; medical students; knowledge assessment; public health; medical education*

**Corresponding author: Serife Ozlem Genc, email: serifeozlemgenc@cumhuriyet.edu.tr*

***This study was presented as an oral presentation at the 16th International Medicine and Heath Sciences Researches Congress (UTSAK) held in Ankara between 06-07 July 2024*

INTRODUCTION

The Human Immunodeficiency Virus (HIV) is a retroviral agent that specifically infects helper T cells and macrophages inside the immune system. Transmission primarily occurs through the interchange of specific body fluids, particularly blood and semen (Calado et al., 2023). The immune system weakness resulting from HIV is referred to as Acquired Immunodeficiency Syndrome (AIDS). Despite a decline in new infections, the overall population living with HIV has reached 36.9 million individuals (Patel et al., 2021). The main role in preventing AIDS is education, and physicians and other healthcare employees also play a significant role in this education (Health Organization, 2020; Verrastro et al.2020). Healthcare professionals, particularly medical students, significantly contribute to the prevention and management of HIV and AIDS. Consequently, it is essential to provide accurate knowledge regarding HIV transmission, prevention, and appropriate attitudes towards HIV patients among medical student. Medical and dental students' knowledge and attitudes towards HIV/AIDS vary significantly across countries. Studies in Pakistan, Iraq, and Saudi Arabia suggest that while awareness is generally high, gaps exist in

understanding transmission modes and prevention techniques (Ali et al., 2018; Hamid et al 2015; Alwafi et al., 2018). These gaps can have implications for future healthcare professionals, especially those who will provide care to HIV-positive individuals. The study addresses the following two questions: To what extent do our students possess knowledge about HIV/AIDS? How does this knowledge vary across classes or divisions? The objective of this study is to evaluate the knowledge levels of medical students at Sivas Cumhuriyet University regarding HIV/AIDS, to identify areas of misinformation, and to suggest improvements in the medical curriculum.

MATERIAL and METHODS

Purpose and Type of the Study

This study is a single-center, cross-sectional study aimed at evaluating the knowledge levels of medical students regarding HIV/AIDS.

Sampling and participant

This study was conducted among medical students at Sivas Cumhuriyet University. A total of 172 students from the first to fourth years participated in the study. Fifth and sixth-year students were excluded to avoid potential biases due to their more advanced clinical training and experience.

Inclusion Criteria

- Medical students from the first to fourth years.
- Voluntary participation in the survey.

Exclusion Criteria

- Fifth and sixth-year students.
- Incomplete or partially filled surveys.

Data Collection Tools

Data were collected using a 26-question survey distributed via Google Forms. The survey included 23 questions about HIV/AIDS knowledge and 3 demographic questions.

Statistical Analysis

The data has been entered into the SPSS 23 software package. Descriptive statistics such as frequencies and percentages have been provided. For continuous variables, the mean and standard deviation values have been reported. For the comparison of categorical variables, Pearson Chi-Square and Monte Carlo Chi-Square tests were used. A significance level of $p<0.05$ was considered significant for all results.

Ethical Approval

This study was conducted in accordance with the ethical standards of Sivas Cumhuriyet University. Ethical approval was obtained from the Sivas Cumhuriyet University Ethics Committee with approval number 2024/06-23. Informed consent was obtained from all participants, and participation in the survey was voluntary and anonymous.

RESULTS

Out of 172 participants, 49.1% were male and 50.9% were female (Table 1). The average age was 21.19 ± 1.53 years.

Key findings included

Misconceptions about HIV transmission:

A significant portion of students (61%) believed that HIV could be transmitted by mosquitoes. The misconception was consistent across all academic years, with 1st-year students showing the highest percentage (55.6%) of incorrect responses, compared to 4th-year students (65.1%). The p-value for this misconception across academic years was not statistically significant ($p=0.840$)(Table 2). Regarding blood transmission, the vast majority of students (98%) correctly identified it as a mode of transmission, although only a few students incorrectly believed that HIV could not be transmitted this way (2.3%).

Understanding of HIV Prevention Methods:

Knowledge about pre-exposure prophylaxis was particularly low across all academic years, with only 6.4% of students correctly identifying it as a preventive measure. The percentage of correct responses ranged from 19.4% among 1st-year students to just 2.3% among 4th-year students, showing a significant gap in understanding. This difference was statistically significant ($p=0.001$)(Table 2).

Table 1. Gender and Academic Year Distribution of Medical Students

Characteristics	n(%)
Gender	
Male	85 (49.1%)
Female	88 (50.9%)
Year of the study	
1st year	36 (20.9%)
2nd year	40 (23.3%)
3rd year	53 (30.8%)
4th year	43 (25.0%)

Table 2. Comparison of Medical Students' Knowledge and Misconceptions About HIV/AIDS Vaccines, Transmission, and Prevention Across Academic Years

Questions	1.	2.	3.	4.	N	p
Is There a Vaccine for AIDS?						
Yes	13(%36,1)	6(%15,0)	4(%7,5)	5(%11,6)	28(%16,3)	0,003**a
No	23(%63,9)	34(%85,0)	49(%92,5)	38(%88,4)	144(%83,7)	
Can The HIV Virus Be Transmitted From Mother To Child?						
Right	20(%55,6)	24(%60,0)	24(%45,3)	18(%41,9)	86(%50,0)	
Wrong	11(%30,6)	13(%32,5)	26(%49,1)	22(%51,2)	72(%41,9)	0,297*a
Undecided	5(%13,9)	3(%7,5)	3(%5,7)	3(%7,0)	14(%8,1)	
Which of the Following Is Not a Preventive Measure for HIV?						
Pre-Exposure Prophylaxis	7 (%19,4)	1 (%2,5)	2 (%3,8)	1 (%2,3)	11 (%6,4)	
Post-Exposure Prophylaxis	10 (%27,8)	9 (%22,5)	2 (%3,8)	10 (%23,3)	31 (%18,0)	0,001***a
Vaccine	13 (%36,1)	28(%70,0)	46(%86,8)	29 (%67,4)	116(%67,4)	
Condom	6 (%16,7)	2 (%5,0)	3 (%5,7)	3 (%7,0)	14 (%8,1)	
Which Is Not a Mode of Transmission for HIV?						
Mosquitoes	20 (%55,6)	23(%57,5)	34 (%64,2)	28 (%65,1)	105 (%61,0)	
Blood	2 (%5,6)	1 (%2,5)	1 (%1,9)	0 (%0,0)	4 (%2,3	0,840b
Breast Milk	13 (%36,1)	16(%40,0)	17 (%32,1)	15 (%34,9)	61 (%35,5)	
Sexual Transmission	1 (%2,8)	0 (%0,0)	1 (%1,9)	0 (%0,0)	2 (%1,2)	

a: Pearson Chisquare, b: Monte Carlo Chi square, *p<0,05, **p<0,01, ***p<0,001

Post-exposure prophylaxis was somewhat better understood, with 18% of students identifying it as a preventive measure, although correct responses varied widely between academic years (p=0.001). For instance, 27.8% of 1st-year students correctly recognized PEP, compared to only 3.8% of 3rd-year students. A surprising 67.4% of students incorrectly believed that a vaccine for HIV exists. The proportion of students holding this belief was notably higher among more senior students, with 86.8% of 3rd-year students and 67.4% of 4th-year students incorrectly identifying a vaccine as a preventive measure (p=0.001).

Mother-to-Child Transmission:

Only 50% of the students correctly identified that HIV can be transmitted from mother to child. The correct response rate decreased as students advanced in their academic years, from 60% in 2nd-year students to just 41.9% in 4th-year students. The difference in knowledge between academic years was not statistically significant (p=0.297)(Table 2).

HIV Treatment and AIDS Progression:

When asked whether HIV could progress to AIDS if untreated, 50.9% of students correctly identified that it could. However, knowledge about preventive treatments, such as pre-exposure prophylaxis and post-exposure prophylaxis, was limited. For instance, while 82% of students knew about post-exposure prophylaxis, only 35.5% of students were aware of pre-exposure prophylaxis, showing a notable gap in understanding of HIV prevention strategies. As seen in Table 3, this lack of knowledge was most pronounced in the earlier years of study, with only 19.4% of 1st-year students identifying PrEP

as a prevention method, and it worsened by the 4th year, where only 2.3% of students knew about it. This difference was statistically significant (p=0.001)(Table 2).

Vaccine Misconception:

A significant misconception was the belief that there is a vaccine for HIV. Across all academic years, 67.4% of students incorrectly believed that a vaccine exists for HIV, with the highest incorrect response rates observed among 3rd-year students (86.8%). This widespread misconception highlights a critical area for educational improvement, especially since more senior students were more likely to hold this erroneous belief (p=0.001)(Table 2).

Attitudes Toward HIV Transmission Modes:

Regarding the mosquito transmission misconception, 61% of students believed that HIV could be transmitted by mosquitoes, a misconception that did not show significant variance across academic years (p=0.840). This highlights a persistent misunderstanding about the basic biology of HIV transmission, even as students progressed through their medical education. Blood transmission was correctly identified by 98% of students, with only a small percentage (2%) failing to recognize it as a mode of HIV transmission. This knowledge appeared consistent across academic years.

Comparative Knowledge Levels by Year (Table 3):

Year 1: Students in the 1st year scored the lowest in terms of overall knowledge, particularly with regard to HIV prevention and transmission. For instance, only 55.6% correctly identified that HIV could not be transmitted by mosquitoes, and only 63.9% knew that there was no vaccine for AIDS. Year 2: Students showed a slight improvement in knowledge, with 70% correctly identifying that there is no HIV vaccine. However, misconceptions persisted, particularly regarding HIV prevention methods like pre-exposure prophylaxis and post-exposure prophylaxis. Year 3: Students in the 3rd year demonstrated the highest level of knowledge, with an average knowledge score of 85 out of 100. However, even among this group, significant gaps remained, especially concerning the existence of an HIV vaccine and mother-to-child transmission. Year 4: Fourth-year students showed slight declines in certain areas of knowledge compared to 3rd-year students. For example, 67.4% incorrectly believed that there was a vaccine for HIV, and only 41.9% correctly identified mother-to-child transmission as a mode of HIV transmission.

Table 3. Distribution of Average HIV/AIDS Knowledge Scores by Academic Year

Year of Study	Average Knowledge Score (Out of 100)
1st Year	65
2nd Year	70
3rd Year	85
4th Year	80

DISCUSSION

It is evident that AIDS remains a crucial health concern globally, having a prevalence rate of 0.64%, and the incidence of the disease is constantly increasing (de et al., 2020). Major modes of transmission of HIV include blood transfusions, organ transplants, contaminated needles and syringes, riskier sexual behaviors, vertical transmission from mother to child, and breastfeeding (Shaw et al., 2012). Despite these well-established mechanisms, misconceptions related to modes of transmission such as shared utensils, meals, handshaking, kisses, or talking persist both among medical students and the general population. Parcaoglu et al. (2017).

The results of our study agree with several studies conducted in many countries that showed that medical students tend to have some information on

HIV/AIDS, though substantial information gaps exist on modes of transmission and prevention. Ali et al., 2018; Hamid Albujeer et al., 2015; Alwafi et al., 2018. In our study, 61% of students believed wrongly that HIV could be passed on through mosquito bites-a myth also observed in previously conducted research (Ali et al., 2018). This reflects the persistence of myths among the public and the failure of education to eradicate such misconceptions. Of paramount importance is the incorporation early and effectively in the curriculum that HIV is only transmitted via a certain few body fluids, which is the biological reality.

Similarly, studies conducted at Atatürk University showed that the final-year students possessed a good overall knowledge but still held misconceptions regarding the modes of transmission, such as mother-to-child and sexual contact (Kesmez Can and Alay, 2021). Our results indicated that 86.8% of third-year students mistakenly believed that there is an HIV vaccine, highlighting that even among advanced students, knowledge gaps persist. These gaps indicate the need to reinforce such topics throughout the curriculum.

Similar trends were also noted in studies at Atatürk University, where medical students had different levels of knowledge. The seniors were generally performing better than the juniors, but there were still misconceptions about HIV transmission, such as mother-to-child and sexual modes of transmission (Kesmez Can and Alay, 2021). In our study, although senior students had higher knowledge levels, as many as 86.8% of third-year students incorrectly believed that a vaccine for HIV exists. This finding identifies the persistent knowledge gaps among even the advanced students and reinforces the need to remind students of these topics throughout the curriculum.

Among students of health sciences in Konya, there was relatively good knowledge regarding modes of transmission of HIV, though misconceptions about methods of testing and treatment prevailed (Maimaiti, Tekin, and Sener, 2018). The study stressed that addressing these persistent gaps in medical education programs is critical, as such misconceptions could impact students' future roles as healthcare providers (Maimaiti et al., 2018). Similarly, other studies in Turkey reported low knowledge levels and substantial misconceptions among university students, particularly dental students. Atas and Yildirim (2020) established a poor level of knowledge on the modes of transmission of HIV among dental students from Fırat and Dicle Universities and their reluctance to treat HIV-positive patients. This situation was further reported to have remained significantly high even after two decades by Yanikoglu et al. (2020) at Atatürk University Dental Faculty (Karalar et al., 2021).

Awareness of new HIV prevention methods, such as pre-exposure prophylaxis, was especially low, with only 6.4% of students in our study aware of it. This suggests that the curriculum does not adequately cover modern prevention strategies. HIV/AIDS education should go beyond mere biological knowledge to include modern treatment and prevention techniques. These gaps are supported by literature to be addressed through the inclusion of effective educational methods, such as interactive workshops and case-based learning, in medical curricula (Maimaiti et al., 2018).

Our findings reflect the global trend. Similar patterns were reported in studies conducted in Croatia, India, and Serbia, indicating misconceptions about HIV transmission and prevention among senior students of medical disciplines (Ljubas, Škornjak, and Boži ević, 2024; Vowa, Jankovic, and Savu, 2015; Patsani et al., 2023). For example, both clinical and preclinical students in Croatia and Serbia had better knowledge, yet misconceptions on transmission, such as through mosquito bites and needlestick injuries, were still at a high level (Ljubas et al., 2024; Vowa et al., 2015). In India, a review underlined that misconceptions about casual contact transmission in young adults were still predominant and underlined the necessity of structured HIV/AIDS education (Patsani et al., 2023). A study conducted in the United Arab Emirates similarly reported that stigmatizing attitudes toward people living with HIV were common, particularly among male students. Haroun, El Saleh, Wood, Mechli, Al Marzouqi, and Anouti (2016).

Our results also showed that third-year students were better informed than other years, reflecting the progressive influence of the medical curriculum.

However, misconceptions like the belief that HIV can be transmitted by mosquitoes underline the fact that even medical students do not fully understand important aspects of the modes of transmission of HIV. In the same trend, the knowledge level among health-related faculty students was also found to be with significant gaps at Istanbul Aydın University by Altinok, Bayazit, and Agacfidan (2022). This necessitates more comprehensive and focused education on HIV/AIDS at earlier periods in medical training. Interestingly, Balıkesir University students were reported to have adequate knowledge and positive attitudes toward HIV/AIDS, with mass media being the primary source of their information. In contrast to this finding by Avcikurt (2014), our findings suggest that there is no improvement in knowledge with the increase in academic year or age of the students, thus a well-structured and regular approach during the entire medical training is required.

The high prevalence of wrong beliefs on the presence of a vaccine for HIV was from the senior students, since as high as 86.8% of students were third-year students. As was not expected, even knowledge gaps among the first year did not minimize among older students. It means constant and serious HIV/AIDS education is definitely called for throughout all years. Despite global awareness campaigns aimed at improving HIV/AIDS knowledge, the gaps identified in this study suggest that societal stigma and taboos surrounding HIV may inhibit access to accurate information. Particularly in developing countries, HIV/AIDS education programs should adopt a more inclusive and comprehensive approach that addresses societal stigma to enhance understanding (Haroun et al., 2016).

CONCLUSION

Our findings, like those reported in Turkey and elsewhere, emphasize the need to further develop HIV/AIDS education for students. While there is an overall high awareness, very important gaps and misconceptions exist in the areas of transmission, prevention, and treatment. These deficiencies need to be specifically addressed in order to competently prepare future generations of medical professionals to take up effective management of HIV/AIDS. Education needs to be strengthened to ensure these gaps are filled, with provision of accurate and up-to-date knowledge, as well as its systematic inclusion throughout curricula.

Limitations

The study has some limitations. First, it was conducted in a single center, which may limit the generalizability of the findings to other medical schools in Turkey or internationally. Additionally, the exclusion of fifth- and sixth-year students, who have more clinical experience, may have resulted in underestimating overall knowledge levels. Furthermore, the use of self-reported surveys may introduce response bias, where students might overestimate their knowledge or provide socially desirable answers.

Acknowledgment

We would like to express our gratitude to all the students who participated in the study. Additionally, we thank the administration of Sivas Cumhuriyet University for their support in facilitating the distribution of the questionnaire. Special thanks to the Ethics Committee for their guidance throughout the research process.

Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

Ali, A., Ali, N. S., Nasir, U., Aadil, M., Waqas, N., Zil-E-Ali, A., Anwar, M. J., & Anjum, I. (2018). Comparison of knowledge and attitudes of medical and dental students towards HIV/AIDS in Pakistan. Cureus, 10(4), e2426. https://doi.org/10.7759/cureus.2426

Alwafi, H. A., Meer, A. M. T., Shabkah, A., Mehdawi, F. S., El-Haddad, H., Bahabri, N., & Almoallim, H. (2018). Knowledge and attitudes toward HIV/AIDS among the general population of Jeddah, Saudi Arabia. Journal of Infection and Public Health, 11(1), 80-84. https://doi.org/10.1016/j.jiph.2017.04.005

Altınok, Ö., Bayazıt, T. O., & Ağaçfidan, A. (2022). Evaluation of HIV/AIDS awareness levels of health-related faculty students of Istanbul Aydın University. Türk Mikrobiyoloji Cemiyeti Dergisi, 52(3), 192-201. https://doi.org/10.54453/TMCD.2022.82612

Atas, O., & Yildirim, T. T. (2020). Evaluation of the knowledge level and attitudes of pre-clinical students in the faculty of dentistry about HIV/AIDS. Turkiye Klinikleri Journal of Medical Ethics-Law and History,

28(1), 10-18. https://doi.org/10.5336/mdethic.2019-66367

Avcıkurt, A. S. (2014). Evaluation of knowledge and attitudes of students regarding HIV/AIDS at Balıkesir University.

Balıkesir Health Sciences Journal, 3(2), 79-86. https://doi.org/10.5505/bsbd.2014.83703

Hamid Albujeer, A. N., Shamshiri, A. R., & Taher, A. (2015). HIV/AIDS awareness among Iraqi medical and dental students. Journal of the International Society of Preventive & Community Dentistry, 5(5), 372-376. https://doi.org/10.4103/2231-0762.164788

Cavarelli, M., & Le Grand, R. (2020). The importance of semen leukocytes in HIV-1 transmission and the development of prevention strategies. Human Vaccines & Immunotherapeutics, 16(9), 2018-2032. https://doi.org/10.1080/21645515.2020.1765622

de Los Rios, P., Okoli, C., Punekar, Y., Allan, B., Muchenje, M., Castellanos, E., ... & Van de Velde, N. (2020). Prevalence, determinants, and impact of suboptimal adherence to HIV medication in 25 countries. Preventive Medicine, 139, 106182. sciencedirect.com https://doi.org/10.1016/j.ypmed.2020.106182

Haroun, D., El Saleh, O., Wood, L., Mechli, R., Al Marzouqi, N., & Anouti, S. (2016). Assessing knowledge of, and attitudes to, HIV/AIDS among university students in the United Arab Emirates. PLoS ONE, 11(2), e0149920. https://doi.org/10.1371/journal.pone.0149920

Health Organization, W. (2020). Health policy and system support to optimize community health worker programmes for HIV, TB and malaria services: an evidence guide [Retrieved on: 10 October 2023] Available from: https://www.who.int/publications/i/item/9789240018082

Jakimowicz, S., Levett-Jones, T., & Chambers, S. K. (2020). Distress Screening for Men with Prostate Cancer. Seminars In Oncology Nursing, 36(4), 1-3. https://doi.org/10.1016/j.soncn.2020.151041

Karalar, O., Yanıkoğlu, N., Ceylan, G., Sasany, R., & Çınar Tanrıverdi, E. (2021). Comparison of the knowledge of Atatürk and Ondokuz Mayıs University dental clinical students about HIV/AIDS. Selcuk Dental Journal, 8, 443-452. https://doi.org/10.15311/selcukdentj.690860

Kesmez Can, F., & Alay, H. (2021). What do medical students think about HIV/AIDS? Student thoughts on HIV/AIDS. Dicle Medical Journal, 48(2), 295-301. https://doi.org/10.5798/dicletip.944326

Ljubas, D., Škornjak, H., & Božičević, I. (2024). Knowledge, attitudes and beliefs regarding HIV among medical students in Zagreb, Croatia. BMC Medical Education, 24, 1004. https://doi.org/10.1186/s12909-024-05994-y

Maimaiti, N., Tekin, H. H., & Sener, M. M. (2018). Level of knowledge and attitude towards HIV/AIDS among undergraduate students in Konya, Turkey. Journal of Community Medicine & Health Education, 8, 624. https://doi.org/10.4172/2161-0711.1000624

Panchsheel, S., & Shibly, K. M. (2015). Knowledge and awareness regarding hiv/aids among first year medical undergraduates: across sectional study. International Journal of Medical Research & Health Sciences, 4(4), 868-871. https://doi.org/10.5958/2319-5886.2015.00173.3

Parcaoglu, F., & Gedik, H. (2017). HIV Knowledge and awareness status of the medical faculty students in Romania: an awareness study. Canadian Journal of Infectious Diseases and Medical Microbiology, 2(111), 2. https://doi.org/10.4172/2576-1420.1000111

Patel, K., Zhang, A., Zhang, M. H., Bunachita, S., Baccouche, B. M., Hundal, H., ... & Patel, U. K. (2021). Forty years since the epidemic: modern paradigms in HIV diagnosis and treatment. Cureus, 13(5). https://doi.org/10.7759/cureus.14805

Patsani, P., Parida, J., Panda, A., Jena, S., Behera, S. S., & Pradhan, A. et al. (2023). Knowledge, beliefs and practices towards HIV/AIDS among adolescents in India: A scoping review protocol. PLoS ONE, 18(2), e0280985. https://doi.org/10.1371/journal.pone.0280985

Shaw, G. M., & Hunter, E. (2012). HIV transmission. Cold Spring Harbor perspectives in medicine, 2(11), a006965. https://doi.org/10.1101/cshperspect.a006965

Verrastro, V., Saladino, V., Petruccelli, F., & Eleuteri, S. (2020). Medical and health care professionals' sexuality education: State of the art and recommendations. International journal of environmental research and public health, 17(7), 2186. https://doi.org/10.3390/ijerph17072186

Vowa, E. M., Jankovic, J., & Savu, T. (2015). Knowledge, attitude and behaviour of Belgrade medical students related to HIV/AIDS. European Journal of Public Health, 25(3), ckv176.169. https://doi.org/10.1093/eurpub/ckv176.169