



HEALTH PROMOTION

What do young people know about HIV? Results of a cross sectional study on 18-24-year-old students

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Keywords

Students • HIV knowledge • HIV perception • HIV prevention

Summary

Introduction. Increasing people's knowledge of transmission, prevention, early diagnosis, and available treatments is a key step toward HIV control; it means setting the conditions for empowerment and enabling individuals to make aware choices about the prevention strategy best suited to their needs. This study aims to identify unmet needs on HIV knowledge among freshman students.

Methods. A cross sectional study was carried out at the University of Cagliari, which is an Italian public state university. Data were collected by means of an anonymous questionnaire; the final sample included 801 students.

Results. Results offer a detailed picture of students' knowledge and perceptions of HIV. Several topics deserve to be better understood by students, but the main gaps relate to the pre-exposure

prophylaxis and the decreased likelihood of sexually transmitting HIV due to early treatments. Students' vision of the quality of life of people living with HIV was negatively affected by perceiving as relevant the effects of HIV on physical health or on sexual/affective domains, while conversely, it seemed positively affected by knowing that current treatments are useful for counteracting physical symptoms and decreasing the possibility of transmitting HIV.

Conclusion. Being aware of the potential benefits of current therapies could favour a less negative view, in line with the current state of the beneficial effects of HIV treatment. Universities are a valuable setting to bridge the HIV knowledge gap and thus also contribute to tackling stigma and actively promoting HIV testing.

Introduction

Currently, in the field of HIV, numerous benefits are ensured from the diagnostic and therapeutic advancements. Since 2000, the epidemiological trend suggests a positive evolution of HIV management. The global incidence decreased from 2.7 million in 2000 to 1.5 million in 2020, while AIDS related death decreased from 1.4 million in 2000 to 680.000 in 2020, and the prevalence of people living with HIV increased from 25.5 million in 2000 to 37.7 million in 2020 [1].

Although progress in HIV testing and treatment has reduced the disease's spread and improve affected people's health and well-being, HIV is still a serious public health issue, at the foreground of the public health agenda. Further reducing the possibility of transmission, promoting the early diagnosis, improving the access and coverage of effective HIV antiretroviral therapy, and contrasting stigma are the milestones to achieve HIV control [2-7].

At the community level, the lack of knowledge and the subsequent misconceptions about HIV not only foster stigma and discrimination but are also among the main barriers to primary and secondary HIV prevention. Low perceived risk of HIV and fear of HIV diagnosis are frequent reasons for late testing [8,9]. Other barriers can

be related to difficulties accessing health care services, specifically for migrants and black and minority ethnic populations and for those who are socioeconomically underprivileged. Language and religion, as well as taboos about discussing sexual behaviors and identities further highlight the cultural barriers, along with racism, discrimination, and isolation [10, 11]. Although knowledge is not the only factor that affects an individual's behaviour, it is certainly an important part of making conscious choices [12]. People should be able to identify potentially risky behaviours, and they should know all existing opportunities to manage the risk in those situations; they also should be aware of the benefits of early diagnosis which, in combination with current treatments, allows people living with HIV to have a good quality of life [12-15]. Some studies indicate that the 15-24 age group is the most at risk of contracting HIV and the least worried about incurring risky behaviour [16-19]. Monitoring young people's knowledge of transmission, prevention, early diagnosis, and available treatments is a key step toward HIV control [12, 14-24].

In the context of Italy, it is reasonable to assume that young people's knowledge about HIV is limited. In fact, ministerial teaching programs for secondary schools do not include sex education, and institutional communication on this topic is occasional and mainly

focused on condom use. This study aims to identify unmet needs on HIV knowledge among Italian students aged between 18 and 24 years, a crucial target for HIV control. In Italy, the incidence of new diagnoses of HIV infection, had increased until the second half of the 1980s, gradually declined in the 1990s, stabilised from 2000 to 2010, and since 2010 it has shown a decreasing trend again. Currently, Italy has an incidence of newly diagnosed with HIV of 4.2 per 100,000 residents, ranking among the nations that are slightly below the average value of European Union countries, which is equal to 4.7 cases per 100,000 residents. In 2019 the highest incidence of HIV was observed among people aged 25-29 (10.4 new cases per 100,000 residents) and 30-39 (9.8 new cases per 100,000 residents). However, the analysis of time trends suggests that the 15-24 age group should be given careful consideration. In fact, temporal trend data disaggregated by age group highlight that the incidence decrease is clear in the age groups above 25, while in the 15-24 age group, substantial stability was observed from 2012 to 2017. Additionally, Italian data show that in 2019, 58.7% of people newly diagnosed with HIV were diagnosed late ($CD4 < 350$ cells/ μ L) [25]. In line with these observations, the present study aims to achieve the following objectives:

- assessing knowledge of HIV transmission, prevention and testing;
- assessing the perceived benefits of early diagnosis and current treatments;
- exploring students' conception of HIV, perceived quality of life of early diagnosed people, and beliefs about the consequences of HIV in daily life;
- exploring the association between the envisioned quality of life of early diagnosed people and knowledge/misconceptions of HIV.

Methods

This study was carried out in 2019 at the University of Cagliari, which is an Italian public state university with six faculties: medicine, biology, science, engineering, economics and law, and humanistic/humanities. The study was carried out through the administration of a questionnaire to freshman students in the 18-24 age group of the different faculties; it involved 18-24-year-old freshman students to ensure that their knowledge and perceptions of HIV were not influenced by the subjects studied during the university classes or affected by other experiences. The investigation was authorised by the Vice Rector for Training Programs and by the deans of the six faculties of the university. The University Ethics Committee assessed the questionnaire and concluded that formal approval was not necessary because only non-sensitive data were collected.

Data were collected by means of an anonymous questionnaire administered by the researchers in the classrooms at the beginning of the lectures, through a previous agreement with tutors and lecturers. To guarantee students total anonymity, tutors and lecturers

were not involved in the questionnaire administration or subsequent collection. Before administering the questionnaires, the researchers specified that the survey would focus on HIV knowledge and perceptions, no identifying data would be collected, the results of the survey would be published only in aggregate form, and participation in the survey was voluntary (those who did not wish to participate could return the questionnaire not completed). To minimise the risk of potential bias, students were not notified in advance of the study.

Knowledge of transmission, prevention, and consequences of being diagnosed with HIV, the perception of implications of early diagnosis and current therapies, and the envisioned quality of life of a person with an early HIV diagnosis were explored through an ad hoc questionnaire. The questionnaire, available on request, included questions on the main sociodemographic data (age, gender, attending biological/medical courses vs other courses), one open-ended question asking respondents to write the first word that comes to mind when they hear the term HIV, and subsequently, several closed questions on the following topics:

- knowledge of the main biological outcome of HIV: sporadic immune deficiency crises (*yes or no*), high fever (*yes or no*), infertility (*yes or no*), chronic loss of immune defences (*yes or no*);
- knowledge of infection transmission routes: handshake (*yes or no*), sweat (*yes or no*), shared use of needles for injections, piercings or tattoos (*yes or no*), breastfeeding (*yes or no*), semen (*yes or no*), saliva (*yes or no*), vaginal secretions (*yes or no*), tears (*yes or no*), coughing (*yes or no*), blood (*yes or no*);
- knowledge of protection from HIV: condom (*yes or no*), birth control pills (*yes or no*), oral sex (*yes or no*), pre-exposure prophylaxis (*yes or no*);
- knowledge of the minimum time required for diagnostic testing after possible/suspected exposure to HIV: 16 days (*yes or no*), 30 days (*yes or no*), 90 days (*yes or no*);
- knowledge of services to carry out the test in the shortest possible time: general practitioner (*yes or no*), emergency department (*yes or no*), diagnosis centre without a general practitioner's prescription (*yes or no*), pharmacy (*yes or no*);
- perceived consequences of early HIV diagnosis: improving the effectiveness of therapy (*yes or no*), worsening quality of life because it provides awareness of the disease before the symptoms (*yes or no*);
- perception of potential benefits of current HIV therapies: counteracting symptoms (*yes or no*), decrease in the likelihood of sexually transmitting HIV (*yes or no*), increase in life expectancy (*yes or no*), possibility of undergoing post-exposure prophylaxis (*yes or no*);
- envisioned quality of life of a person with HIV diagnosed at an early stage: worse than people without HIV (from here defined as poor) or comparable to that of people without HIV (from here defined as good) (*only one answer*);

- perceived HIV impact on different domains of the life of a person living with HIV: effects of the disease on physical health (*very relevant, quite, a little, not at all*), effects on the sexual/affective domain (*very relevant, quite, a little, not at all*), effects on the emotional/psychological domain (*very relevant, quite, a little, not at all*), social stigma (*very relevant, quite, a little, not at all*), discrimination in the workplace (*very relevant, quite, a little, not at all*).

Data were analysed using descriptive analysis and are expressed as relative frequencies with 95% confidence intervals. Gender differences, as well as differences between students attending biological/medical courses and those attending other courses, were assessed through chi square tests. A multivariate logistic regression analysis was performed to explore factors that affect the students' envisioned quality of life of people with an early diagnosis of HIV. An envisioned good quality of life vs a poor one was the dependent variable. The following factors were included as independent variables: gender, being aware that current therapies counteract symptoms (*yes vs no*), being aware that current therapies decrease the possibility of transmission (*yes vs no*), being aware that current therapies increase life expectancy (*yes vs no*), being aware that early diagnosis improves the effectiveness of therapy (*yes or no*), thinking that early diagnosis worsens quality of life due to awareness of the disease before the symptoms (*yes or no*), perceiving very relevant effects of HIV on physical health (*very relevant vs quite/a little/not at all*), perceiving very relevant effects of HIV on the sexual/affective domain (*very relevant vs quite/a little/not at all*), perceiving very relevant effects of HIV on the emotional/psychological domain (*very relevant vs quite/a little/not at all*), perceiving it as a very relevant social stigma (*very relevant vs quite/a little/not at all*), perceiving it as very relevant to discrimination in the workplace (*very relevant vs quite/a little/not at all*). Non-significant associated variables ($p \text{ value} \geq 0.05$) were consecutively deleted from the logistic model, and at each round the goodness of fit of the model was assessed through the likelihood statistic. The final regression model includes only significantly associated variables.

Results

A total of 871 questionnaires were administered, but 10 were excluded from the analysis because they were not completed, and additional 60 were excluded because the respondents' age was greater than 24 years old. The final sample included 801 university freshmen aged between 18 and 24; 48.3% (95% CI 44.9-51.8%) were attending the first year of a biological/medical course. Regarding gender, 57.6% of the respondents defined themselves as women, 41.9% defined themselves as men, and 0.5% indicated "undefined gender".

Regarding knowledge about the main biological outcome of HIV, respondents had to give a yes/no answer for each of four listed possibilities. The results revealed students' uncertainty on this item: the chronic loss of immune defences was indicated by 85.4% (95% CI 82.9-87.8%) of interviewees, the sporadic immune deficiency crises by 68.3% (95% CI 65.1-71.5%), the high fever by 53.8% (95% CI 50.4-57.3%), and infertility by 10.9% (95% CI 8.7-13.0%). Only 7.0% of respondents properly (95% CI 5.2-8.8%) indicated yes for "chronic loss of immune defences" and no for the other listed possibilities.

Knowledge of the transmission routes of HIV is illustrated in Table I.

Most students recognised the role that blood (96.1%), shared use of needles (94.4%), semen (91.4%), and vaginal secretions (85.0%) can play in the transmission of infection. Conversely, the possibility of virus transmission through breastfeeding, indicated by 30.6% of respondents, appears considerably less well known. Regarding the ways in which HIV cannot be transmitted, most students were aware that transmission cannot occur through handshake (95.0%), tears (92.1%), sweat (84.3%), and cough (82.6%), but only 64.2% know that saliva cannot transmit the virus. Overall, 14.0% of respondents (95% CI 11.6-16.4%) correctly identified all the ways in which the virus can be transmitted and all the ways in which it cannot be transmitted.

Concerning the knowledge on tools and strategies to prevent HIV, almost all interviewees identified condoms (98.5% CI 97.7-99.3%); pre-exposure prophylaxis was indicated by only 20.8% (CI 18.0-23.7%) of respondents. The awareness that the contraceptive pill does not protect

Tab. I. Knowledges on the transmission routes of HIV.

Item: transmission of HIV		Relative frequencies of correct answers %	95% Confidence Interval
Routes through which HIV can be transmitted	Blood	96.1	94.8-97.5
	Shared use of needles (piercings...)	94.4	92.8-96.0
	Semen	91.4	89.4-93.3
	Vaginal Secretions	85.0	82.5-87.5
	Breast milk	30.6	27.4-33.8
Routes through which HIV cannot be transmitted	Handshake	95.0	93.5-96.5
	Tears	92.1	90.3-94.0
	Sweat	84.3	81.7-86.8
	Cough	82.6	80.0-85.3
	Saliva	64.2	60.8-67.5

Tab. II. Knowledge on diagnostic tests for HIV.

Item: test for HIV		Relative frequencies of answers %	95% Confidence Interval
How long a person should wait to get tested for HIV after suspected exposure	16 days	14.2	11.8-16.7
	30 days	28.8	25.7-32.0
	90 days	27.5	24.4-30.6
Where a person should go to get tested for HIV	NHS Diagnostic Centre	56.8	53.4-60.2
	General Practitioner	67.8	64.6-71.0
	Emergency Department	48.7	45.2-52.2
	Pharmacy	18.5	15.8-21.2

against HIV is widespread (90.6% CI 88.6%-92.7%), while understanding that limiting oneself to oral sex does not avoid the risk of HIV infection seems to be slightly less prevalent (70.8% CI 67.6-73.9%). Only 14.0% of the respondents (CI 11.0-16.1%) showed comprehensive knowledge of both the ways to avoid infection and the ways that do not protect against the risk of HIV.

The results of students' knowledge on diagnostic tests are shown in Table II.

Only 14.2% of students believed that it is possible to get tested from 16 days after a potential risky exposure; the possibility to be tested from 30 and 90 days after the risk exposure was known by 28.8% and 27.5% of the students, respectively. Overall, 5.7% of students (CI 4.1-7.4%) correctly indicated all three time intervals.

Regarding HIV testing services to go to in case of need for testing at the earliest possible time, 56.8% of students were aware of the possibility of going to National Health System diagnostic centres without a GP's prescription. General practitioners in Italy do not routinely provide this service, but the possibility was indicated by 67.8% of students; the emergency department was indicated by 48.7% and pharmacies by 18.5%.

Concerning the knowledge/perception of the implications of early HIV diagnosis, the idea that early diagnosis improves the effectiveness of therapy was shared by 78.8% (CI 75.9-81.6%) of students, while the idea that it worsens the quality of life because it provides awareness of the disease before the symptoms was shared by 15.0% (CI 12.5-17.5%).

The analysis of answers given to the question on the knowledge/perception of HIV treatments highlights that 84.4% (CI 81.9-86.9%) of students thought that the current therapies increase life expectancy; 65.3% (CI 62.0-68.6%) knew that treatments are useful for counteracting symptoms, and 53.4% (CI 50.0-56.9%) that treatments decreased the possibility of sexually transmitting HIV. The existence of post-exposure prophylaxis was known by 67.4% (CI 64.2-70.7%).

To explore freshmen's conception of HIV, the questionnaire included an open-ended question asking for the first word/thought that comes to mind when they hear the term HIV.

The transmission of the virus through sexual intercourse or by blood, was the first thought that 43.3% (CI 37.4-45.6%) of respondents associated with the term HIV. A further 32.2% (CI 27.0-34.7%) of interviewees thought at first glance about the consequences of the

transmission; among these, approximately one-fifth referred to a general immune system deficit, while the remaining identified HIV with AIDS or wrote words such as "incurable disease", "fear", "suffering" or "death". Only 15.0% (CI 11.4-17.3%) of the students when faced with the term HIV thought about the possibilities of prevention; most of these answers referred exclusively to primary prevention and mentioned condoms, but some were related to secondary/tertiary prevention mentioning "current therapies that prevent HIV from becoming AIDS". In 5.5% (CI 3.4-7.1%) of the responses, the term HIV was associated with famous people who have died of AIDS or with men who have sex with men (quoted as "homosexuals"), sex workers (quoted as "prostitutes"), and people with substance use disorders (quoted as "junkies"). Finally, 1.6% (CI 0.5-2.6%) of the interviewees thought about the misinformation existing on the subject, a further 1.8% (CI 0.7-2.9%) thought about the existing prejudices, and 0.5% (0-1.1%) thought about decreasing the spread of the infection.

The quality of life of a person with early diagnosed HIV was envisioned as potentially good by 57.3% of interviewees (CI 53.9-60.7%).

The perceived impact of HIV on different life domains of people living with HIV are shown in Table III.

A large proportion of students stated that the effects on the affective/sexual domain (83.8%) and on the psychological/emotional domain (79.8%) were very relevant. The rate of students who considered it very relevant to the effects on physical health was 65.7%; social stigma was perceived as a very relevant effect by 47.8%, while discrimination in the workplace was perceived as very relevant by 31.3% of students.

Overall, the knowledge/perception of the explored items showed a substantial overlap between men and women, and between students attending biological/medical courses and students of other courses. The only relevant differences relate to the following: the existence of pre-exposure prophylaxis, which was more known by men (21.6% vs 15.0%, p value 0.02); the impossibility of HIV transmission through sweat, which was more known by women (92.4% vs 86.6% p value 0.01); the possibility of going to the National Health System diagnostic centres without a GP's prescription to be tested for HIV, which was more known by women (66.1% vs 55.5% p value < 0.01) and the existence of post-exposure prophylaxis, which was more known by students attending biological/medical courses (74.6% vs 60.6% p value < 0.01).

Tab. III. Prevalence of students who perceive the impact of HIV in different life domains of people living with HIV as very relevant.

Domains	Prevalence of students who perceive a very relevant impact %	95% Confidence Interval
Sexual/affective domain	83.8	81.2-86.3
Emotional/psychological domain	79.8	77.0-82.6
Physical health	65.7	62.4-69.0
Social stigma	47.8	44.4-51.3
Employment discrimination	31.3	28.1-34.5

With regard to the association between the envisioned quality of life of early-diagnosed people and the knowledge/perception of HIV topics, the multivariable logistic regression analysis revealed that some of the explored independent variables were not significantly associated. More specifically, perceiving as very relevant the effects of HIV on the emotional/psychological domain, the social stigma, and the discrimination in the workplace were not significantly associated with students' envisioned quality of life of people with an early diagnosis of HIV. Additionally, these variables do not show confounding effects; therefore, they were deleted from the model. The final logistic model, highlighting factors significantly affecting the students' perspectives is shown in Table IV. The probability of envisioning a good quality of life 1.45-fold higher in women than in men. It was 1.75-fold higher in students who knew that current treatments are useful for counteracting symptoms than in students who did not know this; it was 1.96-fold higher in students who knew that current treatments decrease the possibility of transmitting HIV than in student who did not know it. Conversely, the probability of envisioning a good quality of life was approximately halved in students thinking that early diagnosis worsens the quality of life because it gives awareness of the disease before the symptoms (OR 0.48), and in students perceiving a relevant effect of HIV on physical health (OR 0.61) or on the sexual/affective domain (OR 0.55).

Discussion

Increasing knowledge about HIV protection, testing, and treatments is one of the strategies to support HIV control.

This study provides a snapshot of young students' knowledge and perception of HIV, providing insights to strengthen prevention efforts. The results highlight several topics that deserve to be better understood by young people.

Overall, awareness of the potential consequences of HIV appears to be limited; more than half of the students indicated both chronic and sporadic loss of immune defences as consequences of the infection, showing that they have confused ideas on this aspect. Regarding primary prevention of HIV, our results show that knowledge of the main transmission routes was widely spread among students. The only exception was breastfeeding, which was recognised as a potential virus vector by only one third of the sample, in line with the findings of other studies [15, 16, 23]. This lack of knowledge may be affected by the young age of the respondents, for most of whom breastfeeding is not an issue in their daily lives. In turn, almost all students appeared to be aware of the possibility of transmission through semen, vaginal secretions, and sharing needles. However, the answers given by respondents on HIV protection suggest some shortcomings. All respondents knew that condoms protect against the virus, but approximately 1/3 of them believed that the virus cannot be transmitted during oral sex, a misconception found in other studies focused on students [21-24]. These results are consistent with the institutional information disseminated in Italy in the period preceding our survey [26-29]. Between 2017 and 2019, the campaign "*With HIV you cannot joke, protect yourself and others*" was implemented with the main focus on condom use; it was directed at a young target population and used an ironic style, but did not clarify that condoms use is appropriate in any type of

Tab. IV. Factors affecting the probability of envisioning a good quality of life for people with early diagnosis of HIV.

Factors		Odds Ratio	95% Confidence Interval	p value
Gender	Men	1	-	0.03
	Women	1.45	1.04-2.00	
Knowing that current treatments are useful for counteracting symptoms	No	1	-	0.003
	Yes	1.72	1.21-2.47	
Knowing that current treatments decrease the possibility of transmitting HIV	No	1	-	< 0.0001
	Yes	1.96	1.41-2.72	
Thinking that early diagnosis worsens the quality of life due to awareness of the disease before the symptoms	No	1	-	0.001
	Yes	0.48	0.31-0.74	
Perceiving as very relevant the effects of HIV on physical health	No	1	-	0.01
	Yes	0.61	0.43-0.87	
Perceiving as very relevant the effects of HIV on the sexual/affective domain	No	1	-	0.02

sexual intercourse, whether vaginal, anal, or oral. Future communication should focus on safer sex education and clarify any type of sexual practices and other concomitant factors that could increase the risks of transmission.

The lack of knowledge on the existence of pre-exposure prophylaxis was common in our sample; indeed, only 1/5 of students knew it. Sometimes people choose not to use condoms for various reasons, even though they know that condoms protect against HIV [30-31]. In these circumstances, if people are highly-exposed or generally at higher risk, pre-exposure prophylaxis could be the appropriate strategy to enhance protection, but it is necessary to raise awareness about it [14, 32, 33]. Lack of knowledge is among the barriers that need to be overcome to advocate the implementation of official prophylaxis policies and pre-exposure prophylaxis availability [12, 32-34]. Furthermore, it is important to advocate the availability of post-exposure prophylaxis and its use within the timeframe of 24-hours up to 72-hours following a risk of transmission, as this could prove to be fundamental in preventing the contraction of HIV [35]. Regarding HIV secondary prevention, although the results revealed that most students recognised the role of early diagnosis in improving the effectiveness of therapies, a remarkable lack of knowledge of when and where to get tested emerged. In Italy, the HIV test has rarely been the subject of institutional communication campaigns, and the last campaign, prior to this study, was conducted in 2010 [28, 29]. Obviously, the high percentages of wrong answers on the HIV testing do not necessarily indicate that people would not be able to find this information if they needed it. However, in a context such as Italy, where half of the population has an inadequate level of health literacy, namely, inability to navigate the health care system, this information should be disseminated in an active and approachable way [36]. Concerning the knowledge of benefits from early HIV treatments, the most noteworthy result in terms of unmet information needs was that only half of the students were aware of the decreased likelihood of sexually transmitting HIV. Although this information has spread over time, a knowledge gap still exists, especially at the general community level [37]. To counteract stigma and discrimination, the benefits of "Treatment as Prevention" should be fully recognised, not only by people living with HIV and their potential sexual partners, but also by the general population.

Students' overall views and perceptions of HIV confirmed the existence of misconceptions and a lack of knowledge. The word HIV recalls the possibility of prevention for only a minority of students. In approximately a quarter of the interviewees, the term HIV evokes mental associations that suggest the existence of stigma and stereotypes towards the infection or the affected people. It is noteworthy that the term HIV call forth words such as "*homosexuals*" or "*prostitutes*" in students' mind. This suggests that the narrative about HIV is still negative and that people living with HIV are still stigmatized. It seems that for some students, the risk of HIV transmission concerns specific groups of

people rather than behaviour that anyone could engage in. Reducing stigma is crucial to making a difference in the HIV prevention.

Almost half of the respondents believed that the quality of life of a person with an early HIV diagnosis is poor. Their vision of the quality of life of people living with HIV was negatively affected by perceiving as relevant the effects of HIV on physical health or on sexual/affective domains, while conversely, it seemed positively affected by knowing that current treatments are useful for counteracting physical symptoms and decreasing the possibility of transmitting HIV. These findings, therefore, support the hypothesis that being aware of the potential benefits of current therapies could favour a less negative view, in line with the current state of the beneficial effects of HIV treatment. According to the current literature, fear of being diagnosed with HIV is one of the individual barriers to accessing testing; fear, in turn, is influenced by misconceptions that still exist about HIV [37-40].

However, currently, HIV is no longer synonymous with AIDS, and the quality of life in people diagnosed and treated in the early stages, can be comparable to that of the general population. Raising awareness of these topics could contribute to reduce fear and encourage HIV testing, with a positive impact on early diagnosis and, consequently, on the control of HIV [37-40].

The present study offers a detailed picture of unmet needs about HIV information among freshman students attending an Italian public state university. Some limits should be recognised. The study is monocentric, although the students attending the University of Cagliari come from different Italian regions, especially in courses with restricted access because access rankings are nationwide. Only university freshmen were eligible to participate in this study to avoid the risk of information bias due to the subjects studied in biological/medical courses. Referring the results to all university students and more generally to young people who have graduated from college should be done with caution because potential bias cannot be ruled out with certainty. However, the main findings are in line with other HIV knowledge studies, so it is reasonable to assume that the impact of this potential bias is limited.

Conclusion

Information obtained from first-year university students could be useful for implementing prevention interventions tailored to young people. Bridging the knowledge gap is a complex task that requires striking a balance between alerting people about HIV's seriousness and reassurance about the current outcomes of early diagnosis. These two approaches seem to be at odds with each other, but both play a crucial role in HIV control. Future communications in university settings should emphasise that people living with HIV can envision a better life expectancy as it is now a chronic and manageable condition, provided it is diagnosed early

and treatment is started early [41-42]. At the same time, the communications should not diminish the seriousness of HIV, and should continue to promote primary prevention tools. Providing comprehensive knowledge on all these aspects means setting the conditions for empowerment and enabling individuals to make aware choices about the prevention strategy best suited to their needs [12]. Universities are a valuable setting to bridge the HIV knowledge gap and thus also contribute to tackling stigma and actively promoting HIV testing. Health topics, such HIV prevention and control, could be embedded into university culture, processes and policies, and the potential benefits would affect not only students but also the communities to which those students belong and on which they have an impact [43, 44].

Authors' contributions

Conceptualization: CS, MP, LC; study design: CS, PC; Literature search: AL; data collection and management: LF, data analysis: CS, AM; writing original draft: CS, AM. Review and editing: CS, AM, AL, LF, MP, LC, PC. All authors have read and agreed to the published version of the manuscript.

Conflict of interest statement

The authors declare that they have no conflict of interest.

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