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Attitudes of Dental Students Towards HIV+ Patients: A Multi-Center Survey Among Italian Universities

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ABSTRACT

Aims: To evaluate the attitudes of Italian dental students towards HIV-infected patients and explore factors influencing discriminatory behaviour.

Methods: This observational, multicentric survey analysed responses from dental students across Italian Dental Schools. The questionnaire covered demographic data, interactions with HIV-positive patients, knowledge of HIV infection, and adherence to preventive protocols.

Results: A total of 470 questionnaires were analysed. Thirty two students (6.8%) reported discriminatory attitudes, with the highest prevalence in Northern Italy (9.8%), compared to 6.5% in Central Italy and 0.9% in Southern Italy ($p=0.006$). Nearly half of the respondents (231/470) had been asked to treat HIV-positive patients, with requests significantly more frequent in Northern Italy (65.4%) than in Central (43.8%) and Southern Italy (22.7%) ($p=0.001$). Students who treated HIV-positive patients as first operators demonstrated a higher likelihood of discriminatory behaviour (OR = 43.9, 95% CI: 5.9–327.8, $p=0.009$) compared to second operators (OR = 13.4, 95% CI: 1.47–121.7, $p=0.02$). Stress perception during these treatments correlated with discriminatory attitudes (ANOVA test, $p=0.008$). Despite these findings, most students showed strong knowledge about HIV, with 99.8% identifying correct transmission routes and 85.6% aware of post-exposure prophylaxis. Additionally, 91.8% expressed interest in further education on HIV-dentistry topics.

Conclusions: The findings suggest that Italian dental students are generally well-prepared to treat HIV-positive patients without discrimination. Practical training fosters confidence, as evidenced by the high willingness to provide care even among students with no prior experience in treating HIV-positive individuals. However, geographic disparities and the influence of stress on discriminatory behaviour highlight areas for improvement in dental education.

1 | Introduction

The estimated annual number of new HIV infections in 2022 was significantly lower than in 2000: 1.3 million versus 2.8 million. Nevertheless, in the last decade, the number of people living with HIV has increased, reaching 39 million in 2022 compared to 24.9 million in 2000 [1].

Significant advancements have been made in managing the biomedical complications associated with HIV since the beginning of the epidemic, primarily due to the introduction of highly active antiretroviral therapy (HAART, now simply ART) [2]. As a result, life expectancy has increased, leading to a greater demand for health treatment not directly related to HIV, such as dental care. Oral health problems and unmet dental needs are common among People Living with HIV (PLHIV). Several studies have reported a high prevalence of unmet dental treatment needs among PLHIV, attributed to low accessibility, financial constraints, and discrimination by dental professionals [2].

In addition to common dental diseases such as caries and periodontitis, HIV-related oral lesions affect approximately one third or more of PLHIV and can serve as early signs of HIV infection and disease progression [3].

However, due to the widespread use of ART, these lesions are now less frequent, and PLHIV increasingly seek routine dental treatments [4].

The rising number of dental procedures performed on HIV+ individuals increases the risk of occupational contagion for dental workers due to procedural accidents. Fear of interacting with HIV+ patients has led to cases of discrimination by healthcare workers, including refusal to treat these individuals. Beyond the ethical concerns, such behaviour discourages patients from disclosing their health status, increasing the risk of transmission

to practitioners and potentially compromising treatment quality [5].

Several studies have examined dental students' training concerning bloodborne diseases, particularly HIV and Hepatitis B and C, aiming to improve their knowledge and reduce discriminatory behaviours. However, these studies have not investigated the situation in Italy [6, 7].

Therefore, the objective of this multicentre study was to assess Italian dental students' attitudes towards HIV-infected patients. Specifically, it aimed to evaluate their level of discomfort during treatment, any discriminatory behaviours, their knowledge of HIV, and their adherence to sterilization protocols to prevent professional exposure and cross-infections.

2 | Materials and Methods

The study was designed as an observational multicentric survey conducted among dental students from various Italian dental schools across Northern, Central and Southern Italy (Data S1).

The study was approved by the local Ethical Committee (Prot. 7757/2025).

An anonymous questionnaire, accompanied by an informative letter, was developed for this purpose, explaining the study's objective (Data S2). Informed consent was not required, as it was considered implicitly given when participants completed and returned the questionnaire.

The questionnaire comprised four sections:

1. Demographic Data: Collected information on gender, age, enrollment date, academic year, previous education (e.g.,

scientific high school, classical high school, linguistic high school, dental hygiene degree, dental technician training, social sciences, professional school, commercial school, etc.) and university location (Northern Italy, Central Italy, Southern Italy). Notably, data from the Italian islands (Sicily and Sardinia) were grouped within the 'Southern Italy' category.

2. **Student-Patient Relationship:** Examined students' experiences and attitudes towards treating HIV-positive patients through three subsections:
 - Subsection A: For students who had treated an HIV+ patient.
 - Subsection B: For students who refused to treat an HIV+ patient.
 - Subsection C: For students who had never been asked to treat an HIV+ patient. Each subsection assessed students' perceived necessity of knowing a patient's HIV status and whether they exhibited discriminatory behaviours.
3. **HIV Knowledge Assessment:** Evaluated students' knowledge of HIV and their sources of information.
4. **Preventive Protocols:** Investigated the application of preventive operative protocols to avoid cross-infection and the perceived need for further training on HIV and bloodborne infections.

The questionnaire was administered and collected during the 2019 academic year, with responses compiled in a customized Excel sheet for analysis.

2.1 | Statistical Analysis

Qualitative variables were described using absolute and percentage frequencies, while quantitative variables were summarized as mean and standard deviation (SD) for normally distributed data or as median and percentiles for non-normally distributed data. The Kolmogorov-Smirnov test was performed to evaluate the normal distribution of quantitative variables.

To analyse discriminatory attitudes, participants were divided into two groups.

Group 1: Students who admitted to discriminatory behaviour (answering 'yes' to 'Have you ever adopted discriminatory behaviour towards HIV-positive patients?' or 'Do you think it is right not to treat an HIV-positive patient?').

Group 2: Students who did not exhibit discriminatory behaviour or attitudes.

Correlation analyses were performed between discriminatory attitude and questionnaire response. The Mann-Whitney *U* test and Kruskal-Wallis test were used for nonparametric continuous variables, while ANOVA was applied for parametric variables. Pearson's χ^2 test and Fisher's exact test were employed to compare categorical variables.

Univariate analysis identified significant predictors of discrimination, which were then incorporated into a stepwise logistic regression model to determine independent predictors of discrimination towards HIV+ patients. Statistical analyses were conducted using IBM SPSS Statistics (IBM Corp. Released 2017. IBM SPSS Statistics for Apple, Version 25.0 Armonk, NY: IBM Corp).

3 | Results

A total of 520 questionnaires were administered and 470 were returned, accounting for a total response rate of 90.4%. Since not all participants completed every domain of the questionnaire, the percentages were calculated by adjusting the denominator for each response accordingly.

3.1 | Demographic Data

The demographic and educational background of the participants, stratified according to discriminatory behaviour, is summarized in Table 1. A total of 32 students reported having discriminatory attitudes towards HIV-positive patients. The majority of these discriminatory episodes were observed in Northern Italy. Specifically, 22/223 (9.8%) of students from Northern Italian universities demonstrated discriminatory attitudes, compared to 9/137 (6.5%) in Central Italy and 1/110 (0.9%) in Southern Italy (χ^2 test, $p = 0.006$).

3.2 | Experience in Treating HIV+ Patients

Students were asked whether they had ever been requested to treat an HIV-positive patient. Based on their response, they were directed to different sections of the questionnaire. If they answered 'Yes, as a first or second operator,' they proceeded to Section A. Those who answered 'Yes, but I refused to do it' were directed to Section B, while those who responded 'No' completed Section C.

Nearly half of the students (231 out of 470) had been asked to treat HIV-positive patients, with only three refusing to do so. The remaining 239 students had never been asked to treat such patients. The frequency of being asked to treat an HIV-positive patient was significantly higher in Northern Italian universities, where 65.4% (146 out of 223) reported having received such a request. This percentage was significantly lower in Central (43.8%) and Southern Italy (22.7%) (χ^2 test, $p = 0.001$).

3.2.1 | Students Who Treated HIV+ Patients (Section A)

Among the 228 students who treated HIV-positive patients, a Likert scale was used to assess their emotional response. The majority (85.5%) reported feeling calm and neither afraid nor embarrassed. Regarding their perceived adequacy of training, 82.7% (186 out of 225) believed they had sufficient expertise to manage these patients. When asked whether they considered it necessary to know a patient's HIV status before treatment, 96% (216 out of 225) responded affirmatively.

TABLE 1 | Demographic and instruction data (number of students on 470 participants).

	Total	Discriminatory	Non discriminatory	Statistical significance
Age	25.7 ± 3.2	25.7 ± 1.8	25.7 ± 3.2	ANOVA test, p : 0.99
Sex				
Female	234	15	219	χ^2 test p = 0.7
Male	236	17	219	
Previous school attendance				
Scientific high school	315	22	293	χ^2 test p = 0.5
Classic high school	113	8	105	
Linguistic high school	11	0	11	
Dental hygiene	3	0	3	
Others	28	2	26	
University location				
Northern Italy	223	22	201	χ^2 test p = 0.006
Central Italy	137	9	128	
Southern Italy	110	1	109	
Year of attendance				
Fourth	9	0	9	χ^2 test p = 0.1
Fifth	53	0	53	
Sixth	408	32	376	

Note: Bold value indicate statistically significant.

3.2.2 | Students Who Refused to Treat HIV+ Patients (Section B)

Only three students reported refusing to treat an HIV-positive patient. Their reasons included fear of infection, concern for other students' safety, and the potential risk of transmitting the infection to other patients. Among them, only one student believed that refusing treatment was justified, citing the perception that HIV-positive patients engage in riskier behaviours. Additionally, only one student considered it essential to know the patient's serological status before initiating treatment.

3.2.3 | Students Who Were Not Asked to Treat an HIV+ Patient (Section C)

Of the 239 students who had never been asked to treat an HIV-positive patient, 97% (232 out of 239) stated that they would not refuse treatment if given the opportunity. Participants were also asked to rate their fear of treating an HIV-positive patient on a scale from 0 to 10, yielding a weighted average of 6.08 (SD: 2.58). Among these students, 91.2% (209 out of 229) believed it was necessary to know the patient's HIV status before treatment. The primary reason cited by the seven students who would refuse treatment was fear of contagion. When asked how they would justify their refusal to tutors, responses varied: one student stated they would outright refuse treatment, three said they were not competent enough, and one claimed they lacked the necessary equipment.

Regarding the types of treatments students were willing to perform on HIV-positive patients, 80.3% (184 out of 229) reported they would provide any necessary treatment, while others indicated limitations, such as performing only preventive care (9.2%), emergency treatments (7.9%), or oral hygiene procedures (1.3%). A small minority (1.3%) stated they would not perform any treatment.

3.3 | Students' Knowledge About HIV

Following these sections, all participants were asked about their knowledge of HIV. A total of 452 students (96.2%) responded to these questions. The majority (89.8%) considered their scientific knowledge of HIV to be adequate (χ^2 test, p = 0.532). Most reported acquiring their knowledge from university studies (79.8%), followed by books (9.5%), the internet (8.4%), and other sources (2.2%) (χ^2 test, p = 0.132). Almost all students (99.8%) correctly identified the primary mode of HIV transmission as sexual or parenteral routes. Additionally, 85.6% were aware of post-exposure prophylaxis (PEP) as a preventive measure after accidental exposure to HIV (χ^2 test, p = 0.218). The vast majority (91.8%) expressed a desire for further education on the topic (χ^2 test, p = 0.72).

3.4 | Preventive Operative Protocols

Table 2 summarizes the responses regarding preventive operative protocols. Again, 452 students (96.2%) answered these questions. No significant differences were found between students exhibiting

discriminatory behaviour and those who did not in terms of their adopted clinical protocols. However, it was noted that students with discriminatory behaviour were more likely to wear specialized protective clothing when treating HIV-positive patients (96.67%) compared to their non-discriminatory peers (83.2%), although this difference did not reach statistical significance.

3.5 | Risk Factors for Discriminatory Behaviour

As previously mentioned, discriminatory behaviour was more prevalent in Northern Italy, where 9.8% of students exhibited such attitudes, compared to 6.5% in Central Italy and 0.9% in

Southern Italy. This difference was statistically significant (χ^2 test, $p=0.006$). A significant correlation emerged between discriminatory attitudes and the experience of being asked to treat HIV-positive patients. Among students who had been requested to treat an HIV-positive patient as the first operator, 16.9% (27 out of 159) exhibited discriminatory behaviours, compared to 5.5% (4 out of 72) of those who had been asked to assist as a second operator and only 0.42% (1 out of 239) of students who had never been asked to treat such a patient (χ^2 test, $p=0.001$). Furthermore, discriminatory behaviours were significantly associated with the belief that knowing a patient's serological status was necessary before treatment (χ^2 test, $p=0.04$).

TABLE 2 | Answers regarding the hygienic protocols.

Question	Discriminatory	Non discriminatory	Total	Statistical significance
	Total: 30	Total: 422	452 (100%)	
Do you use gloves?				
Yes	29 (6.2%)	422 (93.8%)	451 (99.8%)	χ^2 test $p=0.1$
No	1 (100%)	0 (—)	1 (0.2%)	
Do you use a mask?				
Yes	30 (6.6%)	420 (93.4%)	450 (99.6%)	χ^2 test $p=0.88$
No	0 (—)	2 (100%)	2 (0.4%)	
Do you use protective goggles?				
Yes	29 (6.4%)	387 (93.6%)	416 (92.03%)	χ^2 test $p=0.72$
No	1 (2.8%)	35 (97.2%)	36 (7.97%)	
Do you use surgical aspiration?				
Yes	27 (7.7%)	323 (71.5%)	350 (77.4%)	χ^2 test $p=0.12$
No	3 (2.9%)	99 (97.1%)	102 (22.6%)	
Do you use the surgical cap?				
Yes	22 (6.9%)	299 (93.1%)	321 (71.02%)	χ^2 test $p=0.84$
No	8 (6.1%)	123 (93.9%)	131 (28.9%)	
Do you cover the handpieces?				
Yes	19 (5.5%)	328 (94.5%)	347 (76.8%)	χ^2 test $p=0.18$
No	11 (10.5%)	94 (89.5%)	105 (23.2%)	
Do you change gloves between patients?				
Yes	29 (6.5%)	418 (93.5%)	447 (98.9%)	χ^2 test $p=0.28$
No	1 (20%)	4 (80%)	5 (1.1%)	
Do you wash your hands between patients?				
Yes	29 (7.1%)	383 (92.9%)	412 (91.2%)	χ^2 test $p=0.16$
No	1 (2.5%)	39 (97.5%)	40 (8.8%)	
Do you use special clothes when treating HIV+?				
Yes	29 (7.6%)	351 (92.4%)	380 (84.1%)	χ^2 test $p=0.08$
No	1 (1.4%)	71 (98.6%)	72 (15.9%)	

When analysed in a multivariate model, the only variable significantly associated with discriminatory behaviour was having been asked to treat an HIV-positive patient. The odds ratio for first operators exhibiting discriminatory behaviour was 43.9 (95% CI: 5.9–327.8, $p=0.009$), while for second operators, it was 13.4 (95% CI: 1.47–121.7, $p=0.02$).

Lastly, stress perception during treatment correlated with discriminatory attitudes. Among students who had treated HIV-positive patients, those with discriminatory behaviours reported higher stress levels, with an average visual analog scale (VAS) score of 5.53 (SD: 2.3), compared to 4.28 (SD: 2.4) among non-discriminatory students (ANOVA test, $p=0.008$).

4 | Discussion

Previous studies have highlighted the importance of improving knowledge about HIV/AIDS during dental education to enhance access to dental care for people living with HIV (PLHIV) [7].

Indeed, earlier research conducted by some authors of this paper identified the persistence of discriminatory attitudes among dentists towards HIV+ patients. These attitudes were attributed to insufficient training in managing HIV+ individuals and a lack of scientific understanding about the virus. The conclusion was that universities, professional boards, and training institutions must intensify efforts to disseminate accurate knowledge about HIV among dental professionals [8].

When senior professionals—who are often in teaching, mentoring, or leadership positions—display hesitation or discriminatory behaviour, it sends a harmful message to the dental students. In this context, the role of modelling becomes critical. Younger dental students and early-career professionals are highly influenced by the behaviour and attitudes of their mentors. Educational settings must therefore emphasize not only clinical competence but also the responsibility of healthcare professionals to uphold human dignity and equal access to care.

In the current survey, 6.8% (32/470) of the enrolled students exhibited discriminatory behaviour towards HIV+ patients—a percentage even higher than that reported in the aforementioned study involving graduated practitioners. This finding is incompatible with principles of social inclusion and equitable access to care. Notably, the discriminatory attitude was defined not only by a refusal to treat patients but also by responses to specific questions, such as ‘Do you think you have ever exhibited discriminatory behaviour towards seropositive patients?’ and ‘Do you believe it is justifiable not to treat a seropositive patient?’. Furthermore, it might be speculated that this percentage may underestimate the actual incidence of discriminatory behaviour, since a ‘politically correct’ answer might be provided also in case of anonymous questionnaires.

A key aim of this study was to assess whether training across Italian universities had evolved to foster acceptance of HIV+ patients in dental care. Analysis revealed that nearly half of the participants (231/470, 49.15%) had been asked to treat HIV+ patients, with the majority agreeing to do so. Exceptions included three

participants who declined out of fear of infection—either for themselves or others in the facility. Among students not asked to treat HIV+ patients, the willingness to do so was notable: 184 out of 229 (80.35%) indicated readiness to provide necessary care if required. These findings suggest that hands-on training significantly enhances students’ confidence in treating HIV+ patients. Moreover, treatment requests were significantly more frequent in universities in Northern Italy (χ^2 test, $p=0.001$), a trend likely reflecting the North–South gradient in disease prevalence and potentially greater clinical training opportunities in northern regions [9].

Interestingly, 91.2% of participants not asked to treat HIV+ patients expressed the belief that knowing a patient’s serological status before initiating treatment is necessary. However, without follow-up questions, it remains unclear whether this perception stems from discriminatory attitudes or a desire to mitigate potential risk factors (e.g., granulocytopenia).

However, this finding underscores that universal precautions should be further emphasized in modern dental education, promoting the principle that all patients must be considered potentially infectious regardless of known medical history. Relying on patient disclosure alone may generate a false sense of security and inadvertently contribute to stigmatization or discriminatory attitudes, whereas a universal approach ensures consistent adherence to infection control standards and fosters a more equitable and safety-oriented clinical practice, in line with current Standard Precautions, which apply to all patients irrespective of suspected or confirmed infection status [10].

Further analysis explored the sufficiency of students’ training on the disease. Almost all participants correctly identified the predominant transmission route of HIV (‘parenteral-sexual’), and 361 of 452 students cited university coursework as their primary knowledge source. These findings indicate that HIV and dentistry are comprehensively addressed in curricula. Additionally, most students demonstrated adherence to health protocols and proficiency with protective measures, including post-exposure prophylaxis. However, 415 out of 452 students expressed a desire for further education on HIV-dentistry topics, highlighting the need for more targeted resources such as courses, monographs, or dedicated online platforms.

This desire among Italian students would appear to be confirmed by the results of a recent Italian survey, which showed that 46% of students were unaware of the concept of $U=U$, a cornerstone of modern HIV management, which has been part of university training programs for several years now [11]. Further efforts should be made to fulfil the gaps in knowledge about HIV and sexual health among university students in Italy.

This perceived gap in knowledge may influence discriminatory tendencies, as studies have shown that greater knowledge correlates with reduced discrimination. In regions with high HIV prevalence, research suggests that adequate training equips students to recognize HIV-related oral manifestations and reduces stigma [12]. Lee et al. for instance, reported that while Chinese dental students showed greater acceptance than dentists, discriminatory attitudes persisted, emphasizing the link between knowledge and care willingness [7]. Similarly, a study among Kuwaiti students found that cultural stigma and misinformation

heightened fear and reluctance, underscoring the value of education in dispelling myths and fostering confidence [13].

Overall, our findings align with existing literature showing that knowledge of HIV transmission risk and hygiene protocols correlates with lower discrimination [14]. Although our survey did not reveal a strong correlation between knowledge and attitudes due to the low prevalence of discriminatory behaviour (31/470), the high level of disease-related knowledge across participants remains encouraging.

A potential limitation of the present study lies in the fact that the questionnaires were administered immediately prior to the COVID-19 pandemic. This led to significant delays in returning the completed questionnaires, thereby slowing down the production of the entire manuscript. Furthermore, considering the profound impact that the COVID-19 pandemic has had on the perception of infectious risk, this may have altered students' perceptions of infection control and fear of contagion. In fact, as previously demonstrated [15], the pandemic may influence students' attitudes based on their experience during the internship. On one hand, it might have increased familiarity and confidence in managing infectious risk; on the other, it might have amplified avoidance behaviours and concern towards such risks, potentially heightening fear of contagion. Further studies are warranted to investigate this issue.

5 | Conclusion

This multicentric survey aimed to evaluate the attitudes of dental students towards HIV+ patients and the challenges associated with their treatment. The findings indicate that students' theoretical and practical preparation regarding HIV infection is generally sufficient to enable care without discrimination.

Despite these positive results, further investigations into the perceived role of dentists in HIV prevention and diagnosis are warranted. Topics such as HIV screening, recognition of HIV-induced oral lesions, infection control procedures, safe handling of sharp instruments, and awareness of the statistical risk of infection from contact with infected blood merit deeper exploration, as they were beyond the scope of this study.

Moreover, conducting similar surveys among more recently enrolled students could help determine whether the already low percentage of students unwilling to treat HIV+ patients has further decreased over time. This is particularly relevant given the advancements in antiretroviral therapy (ART), which have drastically reduced the risk of transmission, allowing dental professionals to work with minimal contagion risk—though challenges remain for patients presenting with late-stage HIV [16].

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** eje70302-sup-0001-Supinfo1.docx. **Data S2:** eje70302-sup-0002-SupinfoS2.docx.