

Rosabel Roig-Vila (Ed.)

# La docencia en la Enseñanza Superior

Nuevas  
aportaciones  
desde la  
investigación  
e innovación  
educativas

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**Octaedro**   
Editorial

*La docencia en la Enseñanza Superior. Nuevas aportaciones desde la investigación e innovación educativas*

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NOTA EDITORIAL: Las opiniones y contenidos de los textos publicados en esta obra son de responsabilidad exclusiva de los autores.

## 78. Teaching interventions in a clinical degree programme to help address the UNAIDS HIV elimination targets

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### ABSTRACT

General awareness in chemoprophylactic preventive methods amongst undergraduate students enrolled in our two clinical science programmes at De Montfort University (DMU, Leicester, UK) was found to be very poor. To tackle this we delivered a highly dynamic workshop in our level 4 module of Basic Microbiology in 2019/20 (n=230), BSc Biomedical Science (BMS), aimed at facilitating student acquisition of the following skills/knowledge: a) correct use of sexual barriers and available HIV chemoprophylaxis methods; b) frequency of sexual checks and use of available vaccines according to sexual behaviour and sex life; and c) tailor evidence-based public health interventions to avoid people living with HIV (PLHIV) from developing AIDS. Qualitative and quantitative (validated feedback-questionnaire) methods were used to evaluate our teaching intervention. Ninety BMS students voluntarily provided comprehensive feedback. A large majority highlighted that they learnt how to establish public health interventions to reduce HIV transmission. The workshop seemed to facilitate acquisition of knowledge on the appropriate use of condoms/barriers, as students unveiled important errors and gaps in their knowledge of the use of barriers in a preliminary test in form of a quiz. In conclusion, the improved workshop would seem to be effective for promoting sexual and public health education, acquisition of knowledge of HIV chemoprophylaxis tools available and how to minimise opportunistic pathogen infections in PLHIV.

**KEY WORDS:** HIV/AIDS, preventive education, sexual education, teaching intervention, HIV chemoprophylaxis.

### 1. INTRODUCTION

The combination of sexual education with early diagnosis, consistent and appropriate use of sexual barriers and access to chemoprophylactic preventive methods, pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) is an important tool and strategy to reduce human immunodeficiency virus (HIV) transmission, reducing the development of the life-threatening condition of acquired immunodeficiency syndrome (AIDS), and contributing to the achievement of the ambitious target set by the Joint United Nations Programme on HIV/AIDS (UNAIDS) of 90-90-90. In 2014 the UNAIDS Programme set global targets whereby 90% of people living with HIV (PLHIV) should know their HIV status, 90% of them should be on treatment, and 90% of those on treatment should be virally suppressed by 2020 (Chappell et al., 2019; Desai et al., 2020).

In the United Kingdom (UK), Public Health England (PHE) has recorded a decline in the number of annual new HIV diagnoses since 2014, which has been particularly relevant for gay and bisexual men (GBM), albeit with variance according to residency (areas/regions), ethnicity, age and background (O'Halloran et al., 2019a). Despite the decline in new HIV diagnoses and the fact that, as of 2018, the UK exceeds the UNAIDS 90:90:90 targets, the latest report also highlighted

areas that require further intervention, such as late HIV diagnoses rates (PLHIV take 3-5 years to know their HIV status) and targeting specific groups, such as black African adults and heterosexual men and women.

The recent decline in the recording of new HIV diagnoses in GBM in the UK has been attributed to a combination of different initiatives. These include the use of PrEP and PEP, incremental increases in HIV testing and immediate access to anti-retroviral treatment (ART) in new HIV diagnosis (White et al., 2019). However, the awareness for oral chemoprophylactic preventive methods, specifically for PrEP, despite showing conferral of high protection against HIV infection (McCormack et al., 2016; White et al., 2019), is low (Dolezal et al., 2015). Of specific concern is the identification of a knowledge gap regarding PrEP among some healthcare professionals, highlighted by a survey of UK residents that had used or tried from 2017 onwards (O'Halloran et al., 2019b).

PEP awareness is also relatively limited but is increasing over time (Prati et al., 2016). A recent study carried out in London on GBM, utilising geosocial-networking smartphone apps, recorded a higher awareness of this biomedical prevention method than those reported in similar studies in other European countries, such as Italy and Spain (Goedel et al., 2017). However, these authors also found that the highest level of unawareness of PEP was in young men that have sex with men (18-24 years old) than in the other age segments. Moreover, despite the limited number of studies reporting PEP awareness within the general population, studies have highlighted different population groups with only limited awareness of PEP, in particular women and men who have sex exclusively with women (Fernández-Balbuena et al., 2013; Koblin et al., 2018).

In line with these studies, we detected a very poor general awareness on PEP and PrEP in the undergraduate students enrolled in the clinical science programmes at De Montfort University (DMU, Leicester, UK) during the delivery of a short pilot teaching intervention to enhance the awareness of these biomedical preventive methods and tackle the high proportion of new HIV infections globally recorded in young adults (18-24 years-old) (Kim et al., 2014). This short intervention was first delivered in 2016/17 to students in the second year of a BMedSci Medical Science degree program (Peña-Fernández et al., 2017a). The following year the intervention was expanded to include first year BSc Biomedical Science (BMS) students (Peña-Fernández et al., 2018). The training content (research-led workshop) included in our teaching intervention in 2018/19 promoted the development of public health skills within the cohort designed to prevent HIV positive patients from developing AIDS (Peña-Fernández et al., 2019). However, poor student engagement in providing feedback, comments and impressions (46 out of 203) limited the conclusions of our study.

We found that our teaching intervention was limited by time constraints (1 x 2 hour lecture and 1 hour workshop), and therefore not ambitious enough to contribute to the UNAIDS 90:90:90 efforts. Thus, we reviewed the curriculum of the first year module, expanding it to include enhanced and longer training, additionally covering factors that may facilitate HIV eradication by 2030 (2030 Agenda for Sustainable Development, named UNAIDS 95:95:95; Gleeson et al., 2018), relevant sexual education, appropriate and consistent use of sexual barriers, the promotion of HIV testing, the availability of vaccines and strategies to prevent other sexual transmitted infections in young adults. This latter topic cover sexually transmitted infections that are being increasingly reported in the UK, such as gonorrhoea, antimicrobial-resistant gonorrhoea and syphilis in GBM as well as heterosexual men and women (Foster et al., 2016, 2019; Mohammed et al., 2018).

The objectives of this paper were to determine if the enhanced teaching intervention and training created met its immediate goals to impart knowledge and facilitate acquisition of public health skills

and biomedical knowledge to contribute to the UNAIDS 95:95:95 efforts to tackle HIV/AIDS pandemic and to assess the impact on students following changes in the curriculum.

## **2. METHODS**

### **2.1. Context and participants**

The teaching intervention and training was delivered in the first term of the academic year 2019/20. Participants involved in this study were undergraduate students enrolled in the compulsory level 4 BMS module of Basic Microbiology and Medical Microbiology of the BMS programme at DMU, which has been recently re-accredited by the UK Institute of Biomedical Sciences (<https://careers.ibms.org/students/accredited-degree-courses/undergraduate-uk-courses/>). A total of 230 students are enrolled in this module. It is important to note that for most of our students this module covers a completely brand-new knowledge making it particularly challenging. Moreover, our BMS programme recruits students from a variety of sources, including from non-traditional routes such as Business and Technology Education Council (BTEC) routes, who require basic support in STEM subjects (biology, chemistry and mathematics) as previously observed (Peña-Fernández et al., 2017b).

### **2.2. Instruments**

A quantitative study was performed to determine the success of this training in facilitating students' acquisition of the skills mentioned above and enhance awareness on chemoprophylactic preventive methods to tackle the HIV/AIDS pandemic. To do this, we used a previously validated feedback-questionnaire, which has been successfully used in similar evaluations (Peña-Fernández 2017a, 2018, 2019), but was appropriately updated to include questions to evaluate the three sections of the enhanced new training. The questionnaire was voluntarily completed by students at the end of the training; they could select a different degree of agreement (Likert scale) and indicate their impressions, opinions and suggestions for improving in two open-questions (free-response) provided at the end of the questionnaire, regarding what participants would add or remove from the training and suggestions to improve it. Written approval from participants was obtained in the questionnaires, which were completely anonymous. Data provided in the questionnaires was analysed as a whole group and students' feedback will also be used to make appropriate modifications to our intervention in subsequent years. Ethical approval was provided by the Research Ethics Committee at De Montfort University (Ref. 1729).

Qualitative methods were also used to determine the success of our intervention and to identify gaps in sexual knowledge and potential sexual behaviours and myths that could put them in risk of contracting HIV or any other sexually transmitted disease. To do this, we recorded and analysed the students' performance during the workshop (research-led evidence-based training) and their level of interaction and engagement in the different activities related with the three sections of the training. These qualitative methods were also used to identify any gaps in sexual knowledge and potential sexual behaviours and myths that could put them at risk of contracting HIV or any other sexually transmitted disease, so they could be tackled appropriately.

### **2.3. Process**

A complete description of previous curriculum modifications undertaken in the level 4 module "Basic Microbiology for Biomedical Science", including methods and resources used to deliver this teaching intervention, is collected in Peña-Fernández et al., 2019. Later modifications were undertaken in Sum-

mer 2019, including revision and update of two lectures to facilitate acquisition of basic knowledge regarding viruses and HIV/AIDS, taking into account the Subject Benchmark Statement for Biomedical Sciences, as described by the Quality Assurance Agency for Higher Education (QAA, 2019).

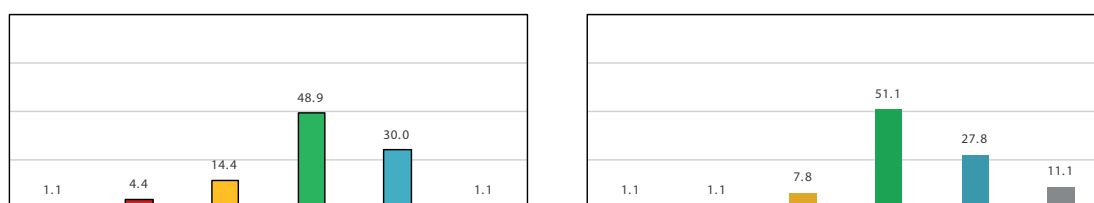
The revised two-hour enhanced workshop implemented in 2019/20 was divided into three sections to facilitate students acquiring the following skills/knowledge: a) test background knowledge and behaviour around the correct use of condoms and other sexual barriers, healthy sexual life/behaviours and available HIV chemoprophylaxis methods, which students were able to test their knowledge by completing a mini-quiz and reviewing the evidence (CDC, 2016); b) enhance awareness of risk of infection of other sexually transmitted diseases when using PrEP and frequency of sexual checks and use of available vaccines according to sexual behaviour and sex life (NIH, 2020a); and c) tailor public health interventions to minimise the risks of PLHIV developing AIDS by following evidence-based public health methodology (NIH, 2020b).

The enhanced workshop was delivered in very small groups to facilitate collaborative work and interaction, a factor necessitated by the large number of students enrolled within the cohort group (n=230). Mini-groups were provided with the latest peer-reviewed articles, fact sheets and guidelines published in the literature and by relevant public health organisations (key evidence used is indicated in brackets above) to develop public health strategies and interventions to respond to each section of the workshop using evidence-based public health methodology (Brownson et al., 1999).

### 3. RESULTS

The rapid quiz/text completed at the beginning of the workshop revealed some gaps in the knowledge and limitations, in line with our previous experience. Most students were not aware of other sexual barriers beyond male condoms; where, when and how to be HIV tested in Leicester and/or in England, and which groups should be regularly tested for different sexually transmitted diseases (STIs). Most of the students tested had never heard about chemoprophylaxis methods, specifically PrEP. Conversely, students showed a good level of knowledge about male condoms and how to use and manage them consistently and appropriately.

Ninety BMS students voluntarily completed the comprehensive feedback-questionnaire provided at the end of the workshop. Participants reported high levels of enjoyment/satisfaction in our workshop. Only 7.8% indicated that they did not enjoy the different exercises included in the workshop and 3.3% were dissatisfied with the workshop provided overall. Moreover, students highlighted that the duration of the workshop was appropriate (84.5%; 55.6% agreed, 28.9% strongly agreed) and found the content highly relevant (96.7%). Only 1.1% of returnees disagreed with the relevance of the workshop and its content.



**Figure 1:** Students' opinion (%) regarding acquisition of knowledge/skills after completing the workshop

Regarding the first section of the training, participants highlighted acquisition of knowledge on how to use condoms and dental dams appropriately (78.9%; only 5.6% disagreed; Fig 1), despite students showing a gap of knowledge of barriers during the completion of the quiz and 22.3% reported that they did not know the existence of female condoms, data that will support the gap in knowledge detected during the preliminary quiz. In a similar trend, 78.9% participants highlighted that they learnt about PEP/PrEP, and who and how these biomedical preventive methods should be used (Fig 1).

Questions related to the second section of the training showed the following results. A large majority (92.2%; Table 1) indicated awareness of a need for local and global preventive interventions and highlighted that they had learnt how to establish public health interventions to reduce HIV transmission (83.4%). Moreover, participants considered that the training enhanced their knowledge in public and sexual health (only 1.1% disagreed).

**Table 1.** Responses (%) to the feedback-questionnaire to evaluate the teaching intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Not answered
The workshop on HIV helped me to understand the need for local and global intervention	0.0	1.1	6.7	53.3	38.9	0.0
I understand how to carry out an Evidence Based Public Health study to identify public health interventions	0.0	7.8	20.0	54.4	17.8	0.0
I would be able to establish some public health interventions to reduce the transmission of HIV	0.0	1.1	14.4	57.8	25.6	1.1
I have learnt what an opportunistic pathogen is	1.1	1.1	5.6	55.6	25.6	11.1
I have learnt some species of opportunistic human parasites	0.0	4.4	15.6	52.2	16.7	11.1
My knowledge in public health has improved	0.0	1.1	10.0	47.8	30.0	11.1
I think that the knowledge learnt in the workshops will help me in my future career	1.1	3.3	22.2	38.9	23.3	11.1
I would recommend the incorporation of more similar workshops within the BMSprogramme	0.0	4.4	16.7	40.0	26.7	12.2

Regarding the third section, 72.2% (only 7.8% disagreed) students indicated that they learnt to identify relevant public health interventions to prevent PLHIV from developing AIDS. Finally, 81.1% participants indicated acquisition of knowledge regarding what opportunistic pathogens are (only 2.2% disagreed); and 68.9% of responders indicated that they learnt some species of opportunistic human parasites (4.4% disagreed), as well as measures to minimise their exposure.

#### 4. DISCUSSION AND CONCLUSIONS

A small but relevant proportion of students did not engage in the training. This was most notable among female students within the cohort, potentially due to social gender roles and gender differenc-



es (Ruan et al., 2019). Although we did not record religious affiliation, cultural or religious beliefs and affiliations may have influenced engagement with the training. Our results are in line with a previous study observing adolescent students from London, in which the authors also reported significant variation in sexual attitudes and sexual knowledge according to religious affiliation (Coleman and Testa, 2008). Due to the large diversity within the student cohorts, religious affiliations will need to be considered when designing and delivering our teaching intervention in the future to enhance engagement. Some authors have highlighted the necessity of engaging young adults to tailor and design teaching interventions aimed to promote healthy sexual lifestyles and prevent STIs, so they are appropriate for these audiences, as well as considering wider personal and external barriers to design a culturally sensitive and inclusive sexual health education programme (Alomair et al., 2020; Askari et al., 2020).

Modifications performed in the lectures and enhancement of the training are appropriate and effective, as a higher proportion of our students indicated that they learnt about HIV chemoprophylaxis (78.9%; Fig 1) when compared with our previous training in 2018/19 (63%; Peña-Fernández et al., 2019). Moreover, a lower percentage of students avoided this question on the most recent academic course (11.1% vs. 28.3%). Reasons some students may avoid this question could again be attributed to their background. Some of our students find it challenging when learning about treatment regimens and scientific names of pathogens, which could be related to deficiencies from their previous background and existing knowledge in biology and microbiology, as our programme receives students from different entry routes, as mentioned previously. Therefore, early engagement with biology and (bio) chemistry during the pre-registration process could potentially better facilitate the difficult transition from college to university and reduce the potential deficiencies in background knowledge in sciences. In order to tackle this, our innovation teaching group is building a complete web-based resource for the learning of biology and chemistry, the *DMU e-Biology*<sup>□</sup> package, which will be completed in 2021 and will aid our undergraduate students in gaining significant knowledge in human biology by promoting self-learning (Peña-Fernández et al., 2017).

Our intervention is shown to be successful in promoting awareness of HIV testing and other STIs, as well as regarding available vaccines (e.g. hepatitis and human papillomavirus), and informing students which subgroups of a population and individuals at risk should be frequently tested and when HIV testing is reliable, which were recorded through different questions. Thus, for example 83.3% participants indicated that they would be able to establish interventions to reduce the transmission of HIV (Table 1), including early HIV diagnosis in line to achieve UNAIDS 95-95-95 targets (Desai et al., 2020; Safreed-Harmon et al., 2020), and care of PLHIV, as current ART regimens are highly effective in suppressing the viral load and significantly reduce the risk of HIV transmission (Paschen-Wolff et al., 2020). Students also understood the need for promoting PLHIV to go onto treatment (*i.e.* treatment as prevention or TasP), or taking ART daily and consistently to keep viral load at “undetected” levels and therefore present no risk of HIV transmission (Havliret al., 2020; Paschen-Wolff et al., 2020), as fundamental strategies to reach UNAIDS HIV elimination targets locally and globally, as highlighted by an overwhelming majority of the students involved (92.2%; Table 1).

Moreover, the enhanced teaching intervention and training also addresses some of the limitations previously observed regarding the section of the training to prevent PLHIV developing AIDS (*i.e.* to become infected with an opportunistic pathogen). Thus, most students learnt about opportunistic pathogens (81.1%; only 2.2% disagreed; Table 1) and were able to both name opportunistic human pathogens as well as tailored appropriate public health interventions when discussing their interventions in their mini-groups at the end of the workshop. Surprisingly, a significant percentage of

participants recorded that they did not have a good understanding of how to tailor public health interventions (7.8% disagree and 20% neither agree nor disagree; Table 1). This might be attributed to different factors including: a) poorly developed critical and reflective skills to process high amounts of scientific information in a short time to make evidence-based decisions; b) unawareness of how to work with scientific papers and public health guidelines; and c) unfamiliar with how to work in teams in a research-led workshop, as it was timetabled earlier in the first term, and d) lack of engagement among some students possibly for religious affiliations and backgrounds. Future interventions will need to be appropriately tailored so students that have shown difficulties in tailoring public health interventions to prevent opportunistic infections in HIV patients can acquire those fundamental skills, as PLHIV are a vulnerable group with high levels of multimorbidity (*i.e.* the presence of two or more long-term health conditions) (Safreed-Harmon et al., 2020).

Finally, students found our teaching intervention, in particular the enhanced workshop, was very useful to eliminate commonly held myths and beliefs, such as that HIV can be transmitted by kissing or that there is a HIV vaccine, as indicated in the open-answer questions and observed during the interactions of the preliminary quick quiz. Participants highlighted that the training was appropriate for their course/level (96.7%) and indicated that skills/knowledge learnt could help their future studies and careers (only 4.4% disagreed; Table 1).

In conclusion, our enhanced teaching intervention and training would seem to be effective for promoting the different public health skills focused on in each section, specifically regarding awareness about combining different public health strategies including universal HIV testing, increasing the coverage of HIV testing, and promoting/facilitating access and use of sexual barriers and/or chemoprophylaxis methods (PEP and PrEP), as a global and combined strategy to meet the UNAIDS HIV elimination targets by 2030. Moreover, our training was also shown to be successful in facilitating students' acquisition of some public health knowledge to minimise opportunistic pathogen infections in PLHIV.

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