

Awareness and acceptability of doxycycline post-exposure prophylaxis among men who have sex with men

Conhecimento e aceitabilidade da profilaxia pós-exposição com doxiciclina em homens que têm sexo com homens

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Abstract

Objectives: Doxycycline post-exposure prophylaxis (Doxy-PEP) has emerged as a complementary strategy for the prevention of bacterial sexually transmitted infections (STIs). In Portugal, data regarding awareness and acceptability of Doxy-PEP among men who have sex with men (MSM) are scarce. This study aimed to assess awareness and acceptability of Doxy-PEP among MSM attending a hospital-based STI clinic, describe sexual and preventive practices, and explore the relationship between human immunodeficiency virus (HIV) pre-exposure prophylaxis (HIV-PrEP), previous bacterial STIs, and willingness to use Doxy-PEP. **Methods:** A cross-sectional single-center study was conducted using an anonymous questionnaire administered to MSM attending a hospital-based STIs clinic between April and September 2025. Statistical analysis was performed using the Statistical Package for the Social Sciences version 29.0.1. **Results:** Fifty-four valid questionnaires were included. Participants had a median age of 31.5 years (range: 19-57 years). HIV infection was present in 20.4% (11/54) of participants. Among HIV-negative participants, 44.2% (19/43) were using HIV-PrEP. Overall, 66.7% (36/54) reported at least one bacterial STI episode in the previous 12 months. Previous awareness of Doxy-PEP was reported by 57.4% (31/54), mainly through peers (51.6%). After a brief explanation regarding Doxy-PEP, 83.3% (45/54) stated that they would be willing to use it if available. A statistically significant association was found between the number of sexual partners during the previous 6 months and Doxy-PEP acceptability (Spearman's correlation coefficient = 0.395; $p = 0.0054$). Among HIV-negative participants, bacterial STI burden and Doxy-PEP acceptability were higher among HIV-PrEP users compared with non-users. **Conclusion:** Doxy-PEP acceptability among MSM attending an STI clinic was high, despite limited baseline awareness. HIV-PrEP users represented a subgroup with higher STI burden and greater acceptability of Doxy-PEP, suggesting that implementation strategies may be particularly relevant within HIV-PrEP clinics. Educational interventions, regular STI screening, antimicrobial stewardship, and antimicrobial resistance surveillance should accompany this prophylactic strategy.

Keywords: Doxycycline. Doxy-post-exposure prophylaxis. Sexually transmitted infections. Men who have sex with men. Sexually transmitted infections prevention.

Resumo

Objetivo: A profilaxia pós-exposição com doxiciclina (Doxi-PEP) emergiu como uma estratégia complementar para a prevenção de infeções sexualmente transmissíveis (IST) bacterianas. Em Portugal, os dados relativos ao conhecimento e aceit-

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abilidade da Doxi-PEP entre homens que têm sexo com homens (HSH) permanecem escassos. Este estudo teve como objetivo avaliar o conhecimento e a aceitabilidade da Doxi-PEP entre HSH, descrever comportamentos sexuais, e explorar a relação entre a profilaxia pré-exposição para o VIH (VIH-PrEP), antecedentes de IST bacterianas e a predisposição para utilizar Doxi-PEP. **Métodos:** Foi realizado um estudo transversal e unicêntrico, através da aplicação de um questionário anónimo a HSH observados numa consulta hospitalar de IST entre abril e setembro de 2025. **Resultados:** Foram incluídos 54 questionários. Os participantes apresentaram uma mediana de idade de 31,5 anos (intervalo: 19–57 anos). A infeção por VIH estava presente em 20,4% (11/54) dos participantes. Entre os participantes VIH-negativos, 44,2% (19/43) encontravam-se sob VIH-PrEP. Globalmente, 66,7% (36/54) relataram pelo menos um episódio de IST bacteriana nos 12 meses prévios. O conhecimento prévio da Doxi-PEP foi reportado por 57,4% (31/54) dos participantes, sobretudo através de pares (51,6%). Após explicação acerca da Doxi-PEP, 83,3% (45/54) referiram disponibilidade para a utilizar caso estivesse disponível. Verificou-se uma associação entre o número de parceiros sexuais nos seis meses prévios e a aceitabilidade da Doxi-PEP (correlação de Spearman = 0,395; $p = 0,0054$). Entre os participantes VIH-negativos, a carga de IST bacterianas e a aceitabilidade da Doxi-PEP foram superiores entre utilizadores de VIH-PrEP comparativamente aos não utilizadores. **Conclusões:** A aceitabilidade da Doxi-PEP entre HSH observados numa consulta de IST foi elevada, apesar do conhecimento basal limitado. Os utilizadores de VIH-PrEP representaram um subgrupo com maior carga de IST e maior predisposição para utilizar Doxi-PEP, sugerindo que futuras estratégias de implementação poderão ser particularmente relevantes em consultas de VIH-PrEP.

Palavras-chave: Doxiciclina. Doxi-PEP. Infecções sexualmente transmissíveis. Homens que têm sexo com homens. Prevenção de IST.

Introduction

Bacterial sexually transmitted infections (STIs), particularly syphilis, gonorrhea, and chlamydia, have increased substantially in recent years both in Portugal and across Europe. According to data from the European Centre for Disease Prevention and Control, Portugal experienced a marked increase in confirmed cases of these infections between 2019 and 2023 (Fig. 1).¹⁻³

Given this epidemiological trend, additional preventive strategies are increasingly needed to control STI transmission.

Doxycycline post-exposure prophylaxis (Doxi-PEP) has recently emerged as a complementary prevention strategy for bacterial STIs. It consists of a single 200 mg oral dose of doxycycline administered within 72 h after condomless sexual exposure. In 2024, the United States Centers for Disease Control and Prevention published clinical guidelines recommending Doxy-PEP for men who have sex with men (MSM) and transgender women with at least one episode of bacterial STI – particularly syphilis, gonorrhea, or chlamydia – during the previous 12 months.⁴

Several clinical trials have consistently demonstrated marked reductions in syphilis and chlamydia incidence among MSM and transgender women using Doxy-PEP, whereas effectiveness against gonorrhea appears more modest and variable, likely reflecting regional tetracycline resistance patterns in *Neisseria gonorrhoeae*. Nevertheless, concerns regarding antimicrobial

resistance, microbiome alterations, and behavioral risk compensation remain under discussion.⁵⁻⁷

Despite increasing international interest, Portuguese data regarding awareness, perceptions, and acceptability of Doxy-PEP among MSM are still lacking. Understanding these aspects is important for the potential implementation of this preventive strategy within STI and human immunodeficiency virus-pre-exposure prophylaxis (HIV-PrEP) clinics.

The objectives of this study were (1) to evaluate awareness and acceptability of Doxy-PEP among MSM; (2) to describe sexual and preventive practices among participants; and (3) to explore the relationship between HIV-PrEP use, bacterial STI burden, and Doxy-PEP acceptability.

Methods

Study design and participants

A cross-sectional single-center study was conducted at an STIs outpatient consultation unit of a tertiary hospital in Portugal.

An anonymous two-part questionnaire was administered to MSM aged ≥ 18 years attending the outpatient STI consultation unit between April and September 2025. The first section assessed demographic characteristics, sexual behaviors, HIV/PrEP status, and previous knowledge regarding Doxy-PEP. Between both sections, participants received a brief informational statement describing Doxy-PEP, including its potential

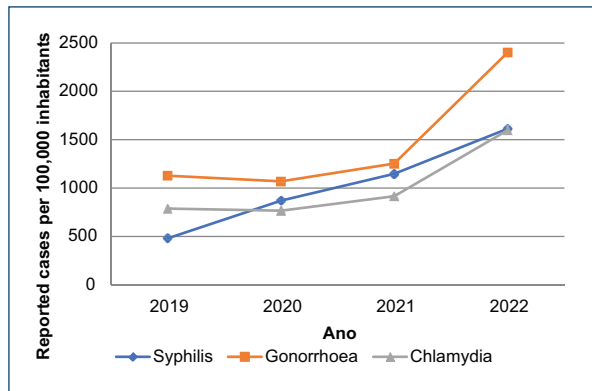


Figure 1. Trends in reported cases of syphilis, gonorrhea, and chlamydia in Portugal from 2019 to 2023. Data obtained from the European Centre for Disease Prevention and Control.

benefits and risks. The second section evaluated participants' perceptions, concerns, and acceptability regarding Doxy-PEP following exposure to the informational material. Questionnaires were distributed after medical consultation and participation was voluntary. A total of 67 individuals were invited to participate; 55 agreed, while 12 declined. One partially completed questionnaire was excluded, resulting in 54 valid questionnaires being included in the final analysis.

Data collection

The questionnaire included demographic information, sexual behavior, condom use, HIV infection status, HIV-PrEP use, previous bacterial STI diagnoses (syphilis, gonorrhea, or chlamydia), awareness regarding Doxy-PEP, and willingness to use this preventive strategy.

Participants were additionally asked whether they believed that Doxy-PEP could increase sexual risk behaviors or reduce condom use and whether additional information regarding Doxy-PEP should be provided during STI consultations.

Before answering questions regarding acceptability, participants received a brief explanation concerning the concept, benefits, and potential risks associated with Doxy-PEP.

Statistical analysis

Descriptive statistics were used to characterize the sample. Continuous variables were described using medians, while categorical variables were summarized using absolute and relative frequencies.

Inferential statistical analysis was performed using the Statistical Package for the Social Sciences version 29.0.1. Associations between variables were analyzed using Spearman correlation coefficients. Statistical significance was defined as $p < 0.05$.

Results

Participant characteristics

A total of 54 valid questionnaires were included. Participants had a median age of 31.5 years (range, 19-57 years). HIV infection was present in 20.4% (11/54) of participants, whereas 79.6% (43/54) were HIV-negative. Among HIV-negative participants, 44.2% (19/43) reported current HIV-PrEP use (Table 1).

Previous bacterial STIs

Overall, 66.7% (36/54) of participants reported at least one episode of bacterial STI (syphilis, gonorrhea, or chlamydia) during the previous 12 months. A total of 68 bacterial STI episodes were reported, including 32 episodes of gonorrhea, 22 of syphilis, and 14 of chlamydia. Gonorrhea was the most frequently reported infection. These findings support the characterization of this cohort as a population at increased sexual health risk.

Sexual behavior and preventive practices

Most participants reported multiple sexual partners during the previous 6 months, with a substantial proportion reporting more than eight partners (Fig. 2).

Half of the participants reported never, rarely, or only sometimes using condoms during sexual intercourse.

Awareness regarding doxy-PEP

Previous awareness of Doxy-PEP was reported by 57.4% (31/54) of participants. Among aware participants, the most common source of information was peers (51.6%), followed by healthcare professionals (25.8%) (Table 2).

Acceptability of doxy-PEP

Following exposure to a brief informational statement regarding Doxy-PEP, 83.3% (45/54) of participants reported willingness to use this preventive strategy if available (Fig. 3). A statistically significant positive

Table 1. Demographic and clinical characteristics of the study population

Characteristic	n (%) / median (range)
Number of participants	54
Median age (range)	31.5 years (19-57)
HIV-positive participants	11/54 (20.4)
HIV-PrEP use among HIV-negative participants	19/43 (44.2)
Previous awareness of Doxy-PEP	31/54 (57.4)
Willingness to use Doxy-PEP	45/54 (83.3)

HIV: Human immunodeficiency virus, PrEP: Pre-exposure prophylaxis, PEP: Post-exposure prophylaxis.

Table 2. Sources of information regarding Doxy-PEP among participants previously aware of the strategy

Source of information	n (%)
Peers	16 (51.6)
Social media	5 (16.1)
Medical information platforms	2 (6.5)
Healthcare professionals	8 (25.8)
Other	0

PEP: Post-exposure prophylaxis.

association was observed between the number of sexual partners during the previous 6 months and Doxy-PEP acceptability (Spearman's correlation coefficient = 0.395; $p = 0.0054$).

Regarding the potential impact of Doxy-PEP on sexual risk behaviors, 63% (34/54) of participants believed that this strategy could contribute to reduced condom use, whereas 20% (11/54) disagreed and 17% (9/54) were uncertain.

Importantly, all participants considered that additional information regarding Doxy-PEP should be provided during STI consultations.

Comparison between HIV-PrEP users and non-users

Among HIV-negative participants, the proportion reporting at least one bacterial STI episode during the previous 12 months was higher among HIV-PrEP users compared with non-users (78.9% vs. 54.2%).

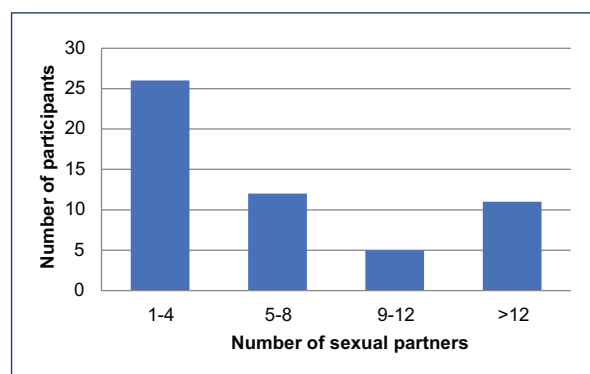


Figure 2. Number of sexual partners during the previous 6 months.

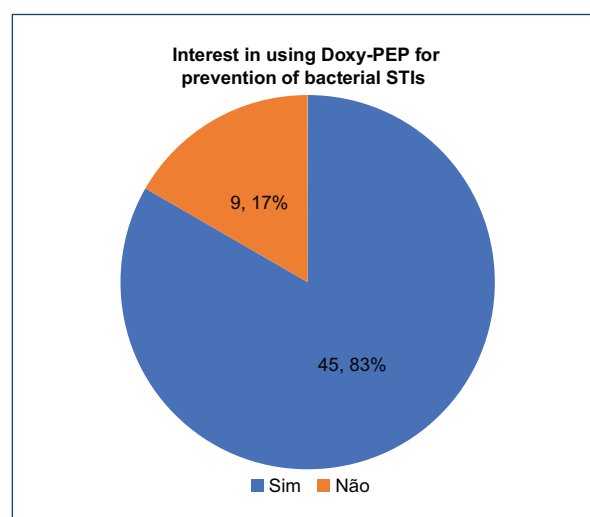


Figure 3. Acceptability of Doxy-post-exposure prophylaxis among study participants.

Doxy-PEP acceptability was also higher among HIV-PrEP users compared with non-users (94.7% vs. 66.7%), although these differences did not reach statistical significance.

Discussion

To our knowledge, this study provides one of the first Portuguese studies regarding awareness and acceptability of Doxy-PEP among MSM attending a hospital-based STI clinic.

Although baseline awareness was limited, acceptability after explanation was remarkably high, with more than 80% of participants reporting willingness to use Doxy-PEP. These findings are consistent with international studies demonstrating substantial interest and

acceptability regarding Doxy-PEP among MSM populations at increased sexual health risk.⁸⁻¹⁰

An important finding was the predominance of informal information sources, particularly peers, whereas only a minority of participants reported receiving information from healthcare professionals. This observation suggests that structured educational interventions regarding Doxy-PEP remain limited within routine clinical practice. Furthermore, the fact that all participants considered additional information regarding Doxy-PEP necessary highlights an important educational gap and suggests substantial unmet demand for counseling within STI consultations.

Participants using HIV-PrEP represented a subgroup with higher bacterial STI burden and greater acceptability of Doxy-PEP. This likely reflects overlapping behavioral and epidemiological profiles between candidates for HIV-PrEP and Doxy-PEP. Consequently, HIV-PrEP users may represent a priority population, and HIV-PrEP consultations may represent an appropriate clinical setting for future Doxy-PEP implementation strategies.

Nevertheless, concerns regarding behavioral risk compensation and antimicrobial resistance should not be overlooked. Most participants acknowledged the possibility that Doxy-PEP could contribute to increased sexual risk behaviors or reduced condom use. Therefore, implementation strategies should emphasize that Doxy-PEP complements rather than replaces barrier methods and regular STI screening.

This study has limitations. Its single-center design and relatively small sample size may limit generalizability. In addition, questionnaire-based data may be subject to recall and reporting bias. Despite these limitations, the study provides relevant preliminary data regarding perceptions and potential uptake of Doxy-PEP among MSM attending STI clinics in Portugal.

Conclusion

Doxy-PEP demonstrated high acceptability among MSM attending an STI consultation unit in Portugal, despite limited baseline awareness.

Participants using HIV-PrEP presented higher bacterial STI burden and greater willingness to use Doxy-PEP, suggesting that this subgroup may represent a priority target population for future implementation strategies. Importantly, all participants considered that additional information regarding Doxy-PEP should be provided during STI consultations.

Educational interventions, regular STI screening, antimicrobial stewardship, and resistance surveillance should accompany any future integration of Doxy-PEP into clinical practice.

Funding

None.

Conflicts of interest

None.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. This study does not involve personal patient data, medical records, or biological samples and does not require ethical approval. SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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