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ORIGINAL ARTICLE

Doxycycline postexposure prophylaxis: a cross-sectional survey on knowledge, attitudes and prescribing practices among Italian dermatologists of sexually transmitted infection centers

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ABSTRACT

BACKGROUND: Postexposure prophylaxis with doxycycline (Doxy-PEP) significantly reduces incidence of certain bacterial STIs in men who have sex with men (MSM) and individuals with recurrent STIs. We assessed knowledge, attitudes, and clinical experience regarding Doxy-PEP of dermatologists specialized in STI prevention, diagnosis, and treatment in Italy.

METHODS: A cross-sectional survey was conducted in March 2025 using a questionnaire to investigate knowledge of Doxy-PEP prescribing protocols and patient eligibility, perceptions of its efficacy against several STIs, personal experience in Doxy-PEP prescription and drawbacks, opinions on its future use.

RESULTS: Thirty-six dermatologists participated. All knew about Doxy-PEP. The population most frequently considered eligible for Doxy-PEP was represented by MSM (69.4%). Respondents would prescribe Doxy-PEP after recent exposure (<72 hours) to chlamydia (58.3%), syphilis (50.0%), gonorrhea (25.0%), or multiple partnership (55.6%). Chemsex was indicated as the main risky behavior worth prescribing Doxy-PEP (69.4%). Approximately half of the respondents considered Doxy-PEP effective against chlamydia (47.2%), whereas only 14.3% and 2.8% were convinced of its efficacy against syphilis and gonorrhea, respectively. Only 19.4% of the respondents had prescribed Doxy-PEP, with no adverse events reported. Doxy-PEP failure was observed by 36.1% of the dermatologists. The main concerns included *Neisseria gonorrhoeae* resistance (91.7%), methicillin-resistant *Staphylococcus aureus* (MRSA) selection (91.7%), and microbiota alterations (86.1%). A progressive increase in Doxy-PEP use is anticipated, driven by patient demand, community influences, and international guidelines.

CONCLUSIONS: Dermatologists of Italian STI centers demonstrate appropriate awareness of Doxy-PEP but maintain cautious attitudes toward efficacy and show a substantial concern about antibiotic resistance.

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KEY WORDS: Dermatologists; Doxycycline; Health knowledge, attitudes, practice; Post-exposure prophylaxis; Sexually transmitted diseases.

Doxycycline, a well-established tetracycline antibiotic, inhibits bacterial protein synthesis and demonstrates broad-spectrum antimicrobial activity.[1] This makes it a promising candidate for postexposure prophylaxis (PEP) following high-risk sexual exposures.[2] Early studies conducted in high-risk cohorts, particularly men who have sex with men (MSM) and individuals with recurrent sexually transmitted infections (STIs), have shown that timely doxycycline administration significantly reduces the incidence of selected bacterial STIs.[3, 4]

The potential impact of Doxy-PEP extends beyond its immediate antimicrobial effects. Its integration into STI prevention strategies symbolizes a broader and more adaptive approach to public health.[5] While traditional preventive measures have predominantly been behavioral or vaccine-based, Doxy-PEP introduces an active pharmacological intervention aimed at preventing infection before establishment. Preliminary recommendations emerged from pioneering studies showing significant reductions in STI incidence, notably among MSM, following doxycycline postexposure administration. Despite promising results, European health authorities adopt a cautious approach, recommending its use mainly in experimental settings or specific populations until further evidence confirms a favorable risk-benefit balance.[6] European guidelines emphasize monitoring emerging antibiotic resistance patterns, contrasting with Centers for Disease Control and Prevention (CDC) guidelines that, since 2024, has endorsed Doxy-PEP as a standard STI prevention practice.[7] Protocols generally recommend 200 mg doxycycline within 24-72 hours postrisk exposure, followed by monitoring for effectiveness and antibiotic resistance.[8, 9]

In this scenario, our aim was to assess the knowledge, attitudes, and clinical practice regarding Doxy-PEP of dermatologists who carry out their activity in the field of STI prevention, diagnosis, and treatment in Italy.

Materials and methods

A cross-sectional survey was conducted in March 2025 through the administration of a detailed and structured questionnaire that investigated several areas of Doxy-PEP knowledge and attitudes, through the inclusion of four sections. The first one collected data on geographic location, years of experience of participants since dermatology and venereology specialization, and length of experience in managing STIs. It also included questions about the adopted STI patient follow-up in their respective STI center. The second section assessed knowledge of available prescribing protocols and perceptions of Doxy-PEP eligibility (who should receive it, under what circumstances, and for which infections). In a third section, dermatologists were also asked to rate the perceived efficacy of Doxy-PEP for various STIs. Finally, the questionnaire explored clinical practice patterns (*e.g.*, previous prescription of Doxy-PEP and doxycycline for pre-exposure prophylaxis, Doxy-PrEP), observed use of Doxy-PEP (self-initiated or prescribed by other physicians or specialists), and opinions on the future evolution and role of Doxy-PEP.

The questionnaire was shared with the clinical centers belonging to the Italian STI Sentinel System through a clinical referee. The referee then invited the respective clinical team and other dermatologists actively involved in STI prevention, diagnosis, and treatment to participate in the survey. The questionnaire was completed and sent back online, with the request to respond according to clinical experience and activity.

Statistical analysis

Descriptive statistics were used, *i.e.*, proportions for qualitative variables, median and interquartile range (IQR) for the quantitative ones.

Results

Participant characteristics

All 36 dermatologists reached by the survey completed the questionnaire. They mainly were from the north of Italy (19, 52.8%, specifically the northeast 36.1%), followed by the center (7, 19.4%), islands (6, 16.7%) and the south of the country (4, 11.1%). Participants had a median time since specialization in dermatology and venereology of 15 years (IQR 7-28) and a median STI management experience of 16 years (IQR 9-25). All respondents reported to work in STI centers providing routine follow-up (FU) to their patients, with the time interval being three months for 36.1% of the respondents and over three months for the remaining ones. FU resulted intensified for HIV PrEP users, with 86.1% performing FU every three months. Half of the participants expressed a desire to reduce FU intervals due to patient load concerns.

Doxy-PEP knowledge and prescription

All participants knew about Doxy-PEP approval; however, 30.6% reported a superficial knowledge (Table I). Main information sources included clinical studies (69.4%), personal experience, CDC guidelines, and International

Union Against Sexually Transmitted Infections (IUSTI) guidelines.

Populations considered eligible for Doxy-PEP prescription most frequently included MSM (69.4%), followed by transgender women (TGW), cisgender women, and HIV-PrEP users. Respondents would prescribe Doxy-PEP after recent exposure (<72h) to chlamydia (58.3%), syphilis (50.0%), and gonorrhea (25.0%), or multiple partners (>5 in 72 hours, 55.6%). Chemsex was considered as the main risky behavior in order to prescribe Doxy-PEP (69.4%), but also a high number of partners, inconsistent condom use, recent STI diagnosis and HIV-PrEP (Table I).

Clinical efficacy evaluation

Doxy-PEP efficacy as judged by the respondents was considered the highest against chlamydia (47.2% effective, 27.8% partially effective) and lower for syphilis (14.3% effective, 50.0% partially effective) and gonorrhea (only 2.8% effective, 36.1% partially effective) (Table II). A considerable proportion of respondents (approximately 25%) could not evaluate Doxy-PEP efficacy for these pathogens. A few participants indicated efficacy against *Ureaplasma* spp., *Mycoplasma genitalium*, other mycoplasmas, and lymphogranuloma venereum.

TABLE I.—*Knowledge of Doxy-PEP and prescription elements.*

Question	N. (%)
Knowledge of Doxy-PEP	
Detailed	25 (69.4)
Superficial	11 (30.6)
Source used	
CDC guidelines	14 (38.9)
IUSTI guidelines	8 (22.2)
Clinical studies	25 (69.4)
Personal experience	10 (27.8)
Populations to prescribe Doxy-PEP to	
MSM	25 (69.4)
TGW	22 (61.1)
Cisgender women	17 (47.2)
Individuals on HIV PrEP	16 (44.4)
Other populations	14 (38.9)
Contact type for prescription of Doxy-PEP	
Syphilis (<72 h)	18 (50.0)
Chlamydia (<72 h)	21 (58.3)
Gonorrhea (<72 h)	9 (25.0)
>5 partners (<72 h)	20 (55.6)
Any contact at risk (<72 h)	12 (33.3)
Risk factors to consider for Doxy-PEP	
STIs last 12 months	10 (27.8)
STIs last 72 h	22 (58.9)
Partner number	21 (58.9)
Inconsistent condom use	19 (52.9)
HIV PrEP use	18 (50.0)
Chemsex	25 (69.4)

Doxy-PEP: doxycycline postexposure prophylaxis; CDC: Centers for Disease Control and Prevention; IUSTI: International Union Against Sexually Transmitted Infections; MSM: men who have sex with men; TGW: transgender women; PrEP: pre-exposure prophylaxis; STIs: sexually transmitted infections; HIV: human immunodeficiency virus.

TABLE II.—*Perceived efficacy of Doxy-PEP against specific STIs.*

STI	Effective	Partially effective	Not effective	Unknown
Chlamydia	17 (47.2)	10 (27.8)	0 (0)	9 (25.0)
Syphilis	5 (14.3)	18 (50.0)	5 (13.9)	8 (22.2)
Gonorrhea	1 (2.8)	13 (36.1)	13 (36.1)	9 (25.0)
Other STIs	1 (2.8)	4 (11.1)	2 (5.6)	29 (80.6)

Values are expressed as N. (%).
STIs: sexually transmitted infections.

Clinical practice

Only 19.4% of the respondents had prescribed Doxy-PEP, mostly after CDC approval (June 2024) (Table III). Adverse effects were not observed by any of the prescribers. Other antibiotics (azithromycin, IM penicillin, ceftriaxone, metronidazole) were also prescribed as PEP. Failures of Doxy-PEP were observed by 36.1% of the dermatologists, irrespective of the fact that they were the actual prescribers. Overall, the main concerns regarding Doxy-PEP included resistance in *Neisseria gonorrhoeae* (91.7%), methicillin-resistant *Staphylococcus aureus* (MRSA) selection (91.7%), and microbiota alterations (86.1%). Commonly recommended complementary interventions to employ along with Doxy-PEP were vaccinations (human papillomavirus [HPV], meningococcal, Mpox), counseling, and consistent condom use. Psychological support was infrequently recommended (22.2%), differing from CDC guidelines that recommend specific counselling. Contraindications included allergy to antibiotics, retinoid usage, and pregnancy. A significant proportion of respondents (47.2%) reported patients using Doxy-PEP prescribed by other specialists (*i.e.*, non-dermatologists) or self-administered at their own initiative or that of their partner(s). Doxy-PrEP was prescribed by 16.9% of the participating dermatologists. A majority (88.9%) anticipated increased Doxy-PEP use, raising concerns about uncontrolled expansion and antibiotic resistance.

Discussion

Following the recent approval of Doxy-PEP and literature data demonstrating its efficacy in preventing some bacterial STIs, we aimed to investigate the knowledge and attitudes toward the use of this new prevention tool among Italian dermatologists employed at STI centers. Their clinical practice in this regard was also explored.

TABLE III.—*Clinical practices related to Doxy-PEP.*

Question	N. (%)
Ever prescribed Doxy-PEP	
Yes	7 (19.4)
No	29 (80.6)
Ever observed side effects[a]	
Yes	0 (0)
No	7 (100)
Other antibiotics ever used for PEP[a]	
Azithromycin	7 (100)
Intramuscolar penicillin	7 (100)
Cefalosporins (ceftriaxone)	6 (85.7)
Metronidazole	2 (28.6)
Doxy-PEP observed failures	
Yes	13 (36.1)
No	23 (63.9)
Doxy-PEP concerns	
Gonococcal resistance	33 (91.7)
MRSA selection	33 (91.7)
Microbiota alterations	31 (86.1)
Other bacterial resistances	18 (50.0)
Other STI prevention interventions	
Vaccines	27 (75.0)
Counselling	23 (63.9)
Regular condom use promotion	25 (69.4)
Psychological support	8 (22.2)
Doxy-PEP contraindications	
Antibiotics allergy reported	30 (83.9)
Retinoid usage	27 (75.0)
Pregnancy	31 (86.1)
Other Doxy-PEP prescribers	
Specialist physician	17 (47.2)
General practitioner	5 (13.9)
Sexual partner	9 (25.0)
Own initiative	14 (38.9)
Ever prescribed Doxy-PrEP	
Yes	6 (16.9)
No	30 (83.9)
Overall Doxy-PEP use evolution in next future	
Increase	32 (88.9)
Unchanged	1 (2.8)
Decrease	3 (8.3)

Doxy-PEP: doxycycline postexposure prophylaxis; MRSA: methicillin-resistant *Staphylococcus aureus*; Doxy-PrEP: doxycycline pre-exposure prophylaxis; STI: sexually transmitted infections.
[a]Among the seven prescribers.

Our findings showed a certain grade of variability in the key populations identified as potential targets for Doxy-PEP and the risk factors to be considered for the prescription. Over half of the respondents indicated MSM and TGW as receivers of a possible prescription. These are indicated as the populations in whom the Doxy-PEP is mostly effective, even in Italian studies.[10] Other risk groups were indicated less frequently, suggesting that a wide agreement on those that dermatologists would consider for a Doxy-PEP prescription is somehow lacking.[11] However, among risk factors that they would consider, it is worth noting that the highest proportion of positive responses was given for chemsex (around 70% of the respondents), while having had an STI in the previous 12 months got the least (less than 30%). Therefore, in general, dermatologists appear to pay higher attention to recent STIs and their related risk (inconsistent condom use and number of partners). Our findings also highlight the increasing awareness of dermatologists regarding chemsex as a risky behavior for STIs acquisition.[12] HIV-PrEP is also perceived as a risk factor by half of the respondents.[13]

The specialists expressed their positive opinion on Doxy-PEP efficacy mostly against Chlamydia, followed by syphilis and finally gonorrhea, in line with the literature data demonstrating reduction of Chlamydia and syphilis in Doxy-PEP users with an inconsistent effectiveness against gonorrhea,[14] as also observed in MSM in PrEP.[15] Surprisingly, around a quarter of the respondents was unable to provide a certain answer to the question about efficacy against these three STIs, underlining that there is a need for further evidence of efficacy to make STI specialists sure about the utility of this prevention strategy. This uncertainty seems to be reflected by the fact that less than 20% of the respondents have prescribed Doxy-PEP. This suggests that even those who are convinced of its efficacy are hesitant in prescribing it, most likely due to concerns that might outweigh any perceived benefits. Other possible causes might be a limited direct experience with patients eligible for Doxy-PEP, absence of established local guidelines, concerns about medico-legal liability. Almost all the specialists (including those who were actual prescribers) expressed their concern for bacterial resistance. The increase in tetracycline resistance in *N. gonorrhoeae* isolates after doxycycline exposure is indeed well-established.[16] Most importantly, it is emerging a possible effect of Doxy-PEP in terms of selection of *N. gonorrhoeae* cross-resistant to other antimicrobial classes.[17] Potentially, there is a risk of selecting *N. gonorrhoeae* resistant to ceftriaxone, *i.e.*, the mainstay for gonorrhea treatment.[18] There are recent observations on *Chlamydia* resistance,[19] as well as resistance of non-STI bacteria, which has been recently reported as MRSA selection.[20] Moreover, concerns have been expressed about syphilis, an STI that is already complex, and that could become more so due to Doxy-PEP, which may lengthen or mask positive screening tests.[21, 22] Finally, impact of Doxy-PEP on the microbiota also emerged as a significant worry for over 85% of the dermatologist respondents, consistently with a wider concern in this regard.[15] From our survey, it also emerged

a limited experience in the prescription of Doxy-PrEP, the use of which is reported even though is not codified.[23] Importantly, most of the respondents indicated other preventive interventions to be associated with Doxy-PEP use, confirming that novel preventive strategies can provide an opportunity to strengthen the use of traditional strategies, such as vaccination and consistent condom use.[24]

Limitations of the study

The present study has a few limitations. Firstly, it only reflects the opinions and reports the clinical experience of dermatologists, not of other possible Doxy-PEP providers. Respondents were mainly from the north of Italy, while the south and the islands were under-represented. However, it must be noted that only two STI sentinel centers are located in the south/islands, and all the remaining 10 centers are in the center/north of the country. Finally, analysis stratified by age, experience and gender of the dermatologists participating in the study was not performed, since the small sample size has made such stratifications unfeasible.

Conclusions

In conclusion, dermatologists of Italian STI centers demonstrate appropriate awareness of Doxy-PEP, maintaining cautious attitudes toward efficacy and showing a substantial concern about antibiotic resistance risks. Despite these reservations, a progressive increase in Doxy-PEP use is anticipated, driven by patient demand, community influences, and international guidelines.

Further monitoring of clinical outcomes, antibiotic resistance patterns and patient-related factors (adherence and individual pharmacokinetics) is pivotal.[25] A multidisciplinary collaboration between dermatologists, infectious disease specialists, microbiologists and patient associations is also needed to achieve enhanced education and issue clear guidelines that could mitigate risks associated with a wider Doxy-PEP adoption.

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Conflicts of interest
The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Authors' contributions
Alessandra Latini and Mauro Zaccarelli have given substantial contributions to the study conception and design; Mauro Zaccarelli, Maria Gabriella Donà and Eugenia Giuliani contributed to the data acquisition, analysis and interpretation; all authors contributed to the manuscript draft and revised it critically. All authors read and approved the final version of the manuscript.

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