

Doxycycline for Post-Exposure Prophylaxis (Doxy-PEP)

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Disclosures

I have NO financial disclosures or conflicts of interest with the following presented material.

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Definitions

- PEP – Post-Exposure Prophylaxis
- PREP – Pre-Exposure Prophylaxis
- DOH – Department of Health
- Doxy – Doxycycline
- MRSA – Methicillin Resistant *Staphylococcus Aureus*
- MSM – Men who have Sex with Men
- PLWH (PWH) – Persons Living with HIV (People with HIV)
- HIV – Human Immunodeficiency Virus
- STI – Sexually Transmitted Infection
- IPERGAY – Intervention Préventive de l'Exposition aux Risques avec et pour les Gays
- Gonorrhea, GC – *Neisseria gonorrhoea*
- Chlamydia, CT – *Chlamydia trachomatis*
- FDA – United States Food and Drug Administration
- CDC – United States Centers for Disease Control
- RCT – Randomized Clinical Trial

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Pharmacist Learning Objectives

- Identify patients indicated for doxy-PEP.
- Utilize available data to effectively counsel patients how to take doxy-PEP and what adverse effects they may experience.
- Know the risks of potential acquired antimicrobial resistance when prescribing doxy-PEP.
- Differentiate between doxy-PEP and doxy-PrEP.

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Pharmacy Technician Learning Objectives

- Describe the purpose of doxy-PEP.
- Recognize which patients could benefit from doxy-PEP.
- Know which resources are available for patients regarding STI treatment and prophylaxis.
- Differentiate between doxy-PEP and doxy-PrEP.

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Post-Exposure Prophylaxis (PEP) is a short course of medication taken after exposure to potential infection.

- HIV PEP
 - Should be started within 72 hours of exposure and is a 28 day course
 - Three drug regimen consisting of Truvada (2 drugs) or its generic equivalent + isentress (1 drug) or Tivicay (1 drug).
 - Pharmacists Can prescribe HIV PEP with proper certification in New Mexico

Doxycycline was chosen for several reasons, including its safety profile.

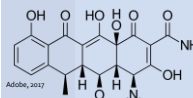


- Effective treatment for chlamydia and syphilis
- Safety profile
- Low-cost formulations
- Limited drug-drug interactions

Reference: DoxyPEP 2023, Lexicomp 2023


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DOXYCYCLINE



Reference: Lexicomp, 2023

- Tetracycline antibiotic
- Protein synthesis inhibitor
- Time-dependent
- Bacteriostatic
- Almost completely absorbed from the GI tract



Shutterstock, 2023

Common Dosage Forms	
Doxycycline Hyclate 50mg, 100mg	Doxycycline Monohydrate 50mg, 100mg
Tablets and Capsules	Tablets and Capsules

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Which of the following is **NOT** a use for doxycycline?

- A.) Rosacea
- B.) Plague due to *Yersenia pestis*
- C.) Varicella virus infection
- D.) MRSA Skin and Soft Tissue Infections
- E.) Rocky Mountain Spotted Fever

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Many organisms are susceptible to doxycycline, including common STI pathogens.



N. gonorrhoea



T. pallidum



C. trachomatis

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IPERGAY and Sub-study showed Doxy-PEP was effective in reducing both chlamydia and syphilis infections

- IPERGAY – On-Demand Preexposure Prophylaxis in Men at High Risk for HIV-1 Infection
- PrEP 2-1-1 method
- Post-exposure prophylaxis with doxycycline to prevent sexually transmitted infections in men who have sex with men: an open-label randomised substudy of the ARMS IPERGAY trial (IPEx Trial)
- Doxy-PEP
- Primary Endpoint – First Occurrence of STI within 10 months of follow-up
- 232 Patients randomised 1:1

	Gonorrhea	Chlamydia	Syphilis
PEP	22	7	3
No PEP	25	21	10

Reference: IPERGAY Sub-study, 2018

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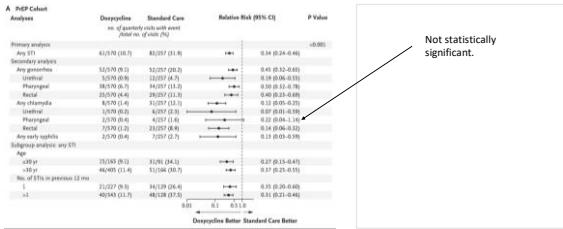
The Doxy-PEP study showed reduced risk of chlamydia, gonorrhoea, and syphilis infections per study quarter.

	Doxycycline Group	Standard of Care	Relative Risk	Number Needed to Treat
PrEP	10.7%	31.9%	0.34	5
PLWH	11.8%	30.5%	0.38	6

- MSM and Transgender Women
- Taking PrEP or PLWH
- At least 1 chlamydia, gonorrhoea, or syphilis infection in past year
- 317 Patients included in primary efficacy analysis from PrEP cohort and 156 from PLWH cohort

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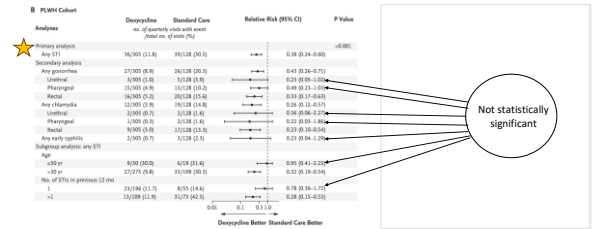
Figure 2: Primary, Secondary, and Subgroup Analyses of Effectiveness against Incident Sexually Transmitted Infections (STIs).



Reference: DoxyPEP, 2023

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Figure 2: Primary, Secondary, and Subgroup Analyses of Effectiveness against Incident Sexually Transmitted Infections (STIs).



Reference: DoxyPEP, 2023

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A Doxy-PEP study among cisgender women in Kenya showed no statistically significant differences in incidences of chlamydia, gonorrhea, or syphilis infections.

STI	All STIs	Chlamydia	Gonorrhea
Relative Risk	0.88	0.73	1.64
95% Confidence Interval	0.6-1.29	0.47-1.13	0.78-3.47

Reference: dPEP, 2023

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Waiting for guidelines from the CDC after opening the document for public comment, but current recommendations are given the Grade A1.

Doxy as STI PEP when offered should be implemented in the context of a comprehensive sexual health approach.

Current efficacy data only applies to gay and bisexual MSM and transgender women.

Doxycycline 200mg administered within 24-72 hours of condomless sex was the regimen evaluated. Other antibiotics should not be considered.

In addition to informing patients about the potential STI prevention benefits of doxy as PEP, providers should also counsel patients about potential adverse effects.

Providers should continue to screen, test, and treat for bacterial STIs in accordance with CDC's STI Treatment Guidelines, even among people using Doxycycline as PEP or PrEP.

Reference: CDC, 2023

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New Mexico DOH has current recommendations for clinicians

Recommend doxy-PEP to MSM and TGW who have had one or more bacterial STIs in the past 12 months.

Offer doxy-PEP using shared clinical decision-making to all non-pregnant individuals at increased risk for bacterial STIs and to those requesting doxy-PEP, even if these individuals have not been previously diagnosed with an STI or have not disclosed their risk status.

For all sexually active individuals, provide comprehensive sexual health counseling and education, including HIV/STI screening, HIV PrEP and PEP, immunizations, condoms, and contraception as appropriate.

Reference: New Mexico DOH, 2023

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New Mexico DOH endorses use of the California Department of Public Health's guidelines to providers

Prescribe 200mg of doxycycline to be taken within 72 hours (ideally within 24 hours) after condomless oral, anal, or vaginal sex. It can be taken daily depending on sexual activity, but no more than 200mg in 24 hours.

Clinicians can prescribe an amount of doxycycline to meet a patient's anticipated use for 1-3 months.

Either immediate release or delayed release doxycycline may be prescribed. Immediate release may be less expensive and should be equivalently bioavailable. The delayed release formulation has an enteric coating which delays release until further down the GI tract which prevents nausea but doesn't change the pharmacokinetics.

Screen for GC and CT at all anatomic sites of exposure (urinary, pharyngeal, and/or rectal), syphilis and HIV (if not a known PLWH) at initiation of doxy-PEP and every three months. If diagnosed with an STI, treat according to CDC STI Treatment Guidelines (cdc.gov).

Counsel persons who can become pregnant that doxycycline should not be taken during pregnancy. Rule out pregnancy prior to prescribing doxy-PEP.

Counsel patients on standard precautions and warnings while taking doxy-PEP, (e.g., sun sensitivity, pill esophagitis, and rarely intracranial hypertension).

Reference: New Mexico DOH, 2023

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NM DOH Prescription

New Prescription

Patient Name: [REDACTED]
 Address: [REDACTED]
 City/State: [REDACTED] Gender: [REDACTED] Phone: [REDACTED]

Date of Birth: [REDACTED] SSN: [REDACTED]
 Insurance: [REDACTED] ID#1: [REDACTED] ID#2: [REDACTED]

Prescriber: [REDACTED] NPI: [REDACTED]
 Specialty: [REDACTED] NPI: [REDACTED] ID#1: [REDACTED] ID#2: [REDACTED]

Medication: [REDACTED] NDC: [REDACTED]
 Strength: [REDACTED] Quantity: [REDACTED] Days: [REDACTED]

Directions: [REDACTED]
 Refills: [REDACTED] Diagnosis Code: [REDACTED]

Date: [REDACTED] Time: [REDACTED] Pharmacy: [REDACTED] Signature Date: [REDACTED]

Reference: Southwest Care Center, 2023

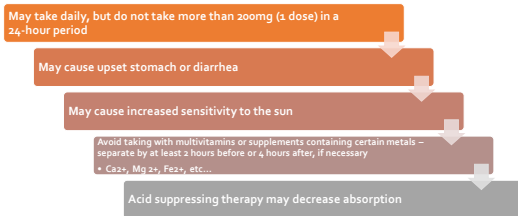
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Which of the following are correct counseling points for Doxycycline-PEP?

- A.) Take with a full glass of milk
- B.) Can cause increased sun sensitivity
- C.) Can cause upset stomach
- D.) Take until all medication is gone
- E.) Taking with proton pump inhibitors can help increase absorption

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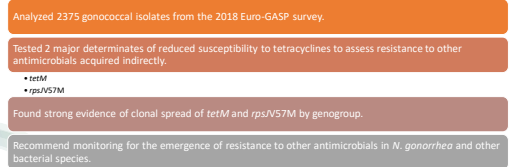
Doxy-PEP Patient Counseling



Reference: Lexicomp, 2023

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Doxycycline Postexposure Prophylaxis Could Induce Cross-Resistance to Other Classes of Antimicrobials in *Neisseria gonorrhoeae*: An In Silico Analysis



Reference: Resistance, 2023

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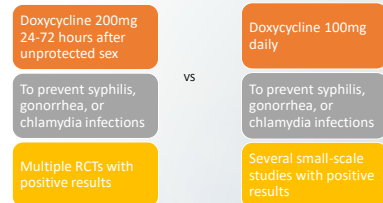
Considerations for Resistance

- Bacterial resistance to antimicrobials should always be considered when prescribing antibiotics.
- Local resistance patterns should be examined when prescribing long-term antibiotics.
- Doxy-PEP is still effective for GC infection prevention even with baseline resistance and high-level resistance to tetracyclines.
- S. aureus* showed some increased resistance in the Doxy-PEP arm, but there were no significant changes when studying MRSA.
- There is a possibility that resistance to tetracyclines will confer resistance to other antimicrobials with similar mechanisms of action.
- Resistance patterns for *Neisseria gonorrhoea* vary by geographical region, the previous study was conducted in Europe, where resistant *N. gonorrhoea* is more prevalent than in the United States.



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Doxycycline Prophylaxis for Bacterial Sexually Transmitted Infections (Doxy-PrEP) has not been studied to the same scale as Doxy-PEP



Reference: CDC, 2023

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Resources for Pharmacies

CDC.gov

NM DOH –
NMHealth.org

NMHIVguide.org

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This is a great resource for clinics in New Mexico and allows you to easily search for testing sites.



Reference: NMHIVGuide.org

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Conclusion

- Doxycycline for PEP is an effective way to help prevent STIs in the MSM and Transgender Women populations who are taking PrEP or who are living with HIV.
- Risks of antimicrobial resistance should be weighed against the benefits of doxy-PEP when prescribing long-term use of doxycycline.
- Doxy-PEP and doxy-PrEP are both used off-label in practice, but studies for doxy-PEP have more data and compelling evidence.



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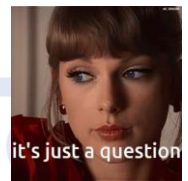
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Questions?

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