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Impact of Doxycycline Postexposure Prophylaxis on Antibiotic Use at a Boston Sexual Health Clinic

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BACKGROUND

- Doxycycline postexposure prophylaxis (doxy-PEP), or 200 mg of doxycycline taken within 72 hours of unprotected sex, is highly effective at preventing bacterial sexually transmitted infections (STIs) – especially syphilis and chlamydia – among men who have sex with men and trans women (MSMTW).
- Modeling studies have suggested that doxy-PEP will increase net antibiotic exposure, which could increase antimicrobial resistance (AMR).
- A real-world study has shown that in some patient populations, doxy-PEP decreases total antibiotic exposure by decreasing antibiotics prescribed for bacterial STIs.
- Other studies show that doxy-PEP is associated with increased AMR in some pathogens.
- The **primary objective** of this project is to assess changes in the number of antibiotic prescriptions received by patients at the MGH Sexual Health Clinic (SHC) after doxy-PEP implementation.

METHODS

- **Study Design**: Retrospective cohort
- **Population:** Adults (≥ 18 years old) who identified as MSMTW, took HIV pre-exposure prophylaxis (PrEP), and were followed at the MGH SHC between 1 September 2022 and 30 April 2025
- **Sample Size:** 1337 patients, of whom 855 started doxy-PEP during the period of interest
- **Statistical Model:** Negative binomial regression
- **Explanatory variables:** Any doxy-PEP use in the period of interest, current use of doxy-PEP, the proportion of current doxy-PEP users who had newly started doxy-PEP, cumulative doxy-PEP starts in the clinic, and calendar time
- **Outcomes:** Total number of antibiotic prescriptions (primary); number of non-doxy-PEP doxycycline, ceftriaxone, and penicillin prescriptions (secondary)

MSMTW on HIV PrEP received nearly four times as many weekly antibiotic prescriptions after starting doxy-PEP, even when accounting for decreases in prescriptions used to treat bacterial STIs.

RESULTS

Table 1: Median Fold Change in Weekly Antibiotic Prescription (Rx) Counts Attributable to Doxy-PEP (n = 855)

	Median Fold Change (95% CI)
Total Rx Count, Including Doxy-PEP	3.96 (3.36 – 4.64)
Non-Doxy-PEP Doxycycline Rx Count	0.40 (0.30 – 0.53)
Ceftriaxone Rx Count	0.84 (0.68 – 1.09)
Penicillin Rx Count	0.72 (0.47 – 1.09)

Table 2: Median Fold Change in Weekly Antibiotic Prescription (Rx) Counts Among People NOT Taking Doxy-PEP per 100 Doxy-PEP Starts in the Clinic (n = 482)

	Median Fold Change (95% CI)
Total Rx Count	0.80 (0.75 – 0.87)
Non-Doxy-PEP Doxycycline Rx Count	0.85 (0.77 – 0.94)
Ceftriaxone Rx Count	0.87 (0.79 – 0.97)
Penicillin Rx Count	0.58 (0.45 – 0.80)

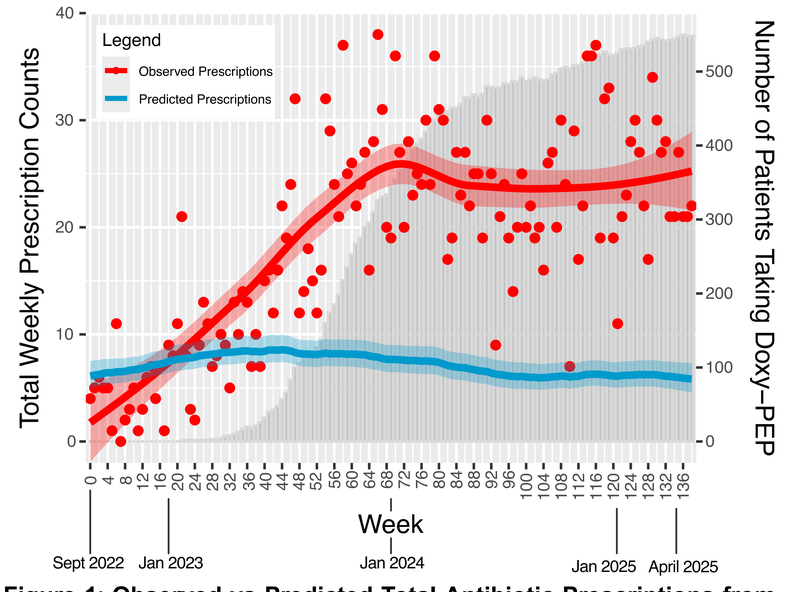


Figure 1: **Observed vs Predicted Total Antibiotic Prescriptions from Sept 2022 – April 2025 Among MSMTW on HIV PrEP Who Started Doxy-PEP.** Observed weekly antibiotic prescriptions in the context of doxy-PEP implementation (red) were compared to predicted weekly antibiotic prescriptions if doxy-PEP had not been introduced in the same group of 855 patients using a Bayesian approach (blue). Doxy-PEP implementation in the clinic was associated with a nearly four-fold increase in the weekly number of prescriptions. This effect became more pronounced as the number of patients on doxy-PEP rose (gray bars).

CONCLUSIONS

Among people prescribed doxy-PEP:

- Non-doxy-PEP doxycycline prescriptions decreased by more than half, likely due to fewer chlamydia and syphilis diagnoses.
- Ceftriaxone prescriptions were unchanged, likely due to limited efficacy of doxy-PEP in preventing gonorrhea.
- Penicillin prescriptions were unchanged, though intermittent shortages of penicillin caused substantial uncertainty in our model.
- Total prescriptions increased by nearly four-fold after doxy-PEP initiation.

Among people NOT prescribed doxy-PEP:

- Antibiotic prescribing for all bacterial STIs decreased as doxy-PEP use increased.
- In the absence of a control group, it is unclear if these decreases are being caused by doxy-PEP versus by other factors.

LIMITATIONS

- We have information about antibiotic prescriptions, but not antibiotic consumption.
- We cannot account for prescriptions outside the Mass General Brigham health system.

ADDITIONAL KEY INFORMATION

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PLAIN LANGUAGE SUMMARY

Among patients taking HIV PrEP at a Boston sexual health clinic, starting doxy-PEP was associated with fewer prescriptions for bacterial STIs but nearly four times the number of total antibiotic prescriptions. Among HIV PrEP patients who were NOT taking doxy-PEP, antibiotic prescribing decreased with doxy-PEP rollout, but it is not clear if this effect is driven by doxy-PEP or other factors.