IMPACT OF DOXYCYCLINE PROPHYLAXIS IN PREVENTING THE SEXUALLY TRANSMITTED INFECTION AMONG MEN WHO HAVE SEX WITH MEN: A MATHEMATICAL MODELLING STUDY

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Background:
Doxycycline postexposure prophylaxis (doxy-PEP) is effective in preventing sexually transmitted infections (STIs) among men who have sex with men (MSM), people with HIV (PWH), and those using pre-exposure prophylaxis (PrEP). This study aimed to evaluate the impact of doxy-PEP among Australian MSM.

Methods:
We developed an agent-based model simulating the transmission of three STIs (gonorrhoea, chlamydia, and syphilis) and the development of gonorrhoea antimicrobial resistance (AMR). The model was calibrated using STI positivity rates from 2012-2023 in the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS) system and gonorrhoea AMR data from 2015-2022 in the Melbourne Sexual Health Centre. Starting in 2024, we simulated the prescription of doxy-PEP using eleven different strategies based on STI history, HIV status, and PrEP use. The study estimated the use of doxy-PEP, the incidence of STIs (including chlamydia, gonorrhoea, and syphilis), and the AMR rate for gonorrhoea under various strategies.

Results:
In the base case from 2024 to 2034, we projected 25,194 incident STIs among 10,000 agents, with AMR rates of 5.4% for ceftriaxone and 32.6% for doxycycline in gonorrhoea diagnoses. Strategies prescribing doxy-PEP (covering 3.4% to 26.5% of MSM) could reduce incident STIs by 3.1-36.6% and require an average of 25.2 to 98.0 doses to avert one incident case, with AMR rates of 0.2-1.4% for ceftriaxone and 41.3-78.1% for doxycycline in gonorrhoea diagnoses. Strategies targeting PrEP users or PWH with repeated

STI diagnoses showed higher efficiency (requiring fewer average doses to avert one incident STI), despite preventing fewer STIs overall.

Conclusions:
Prescribing doxy-PEP to MSM could prevent substantial incident STIs among Australian MSM, decrease the ceftriaxone AMR rate in gonorrhoea diagnoses, but increase the doxycycline AMR rate in gonorrhoea diagnoses. Strategies targeting PWH or PrEP users with repeated STIs could increase the intervention efficiency.

Disclosure of Interest Statement:
No conflict of interest