calibrated to 1.1% population-level MG prevalence. We modelled the potential impact of using the ResistancePlus MG test (SpeeDx; Sydney, Australia) for symptomatic patients. We conducted sensitivity analyses varying the clearance rate (23–44 days) and percent of infections that are symptomatic in women (0%–11.7%).

Results The model estimated a per-partner MG transmission probability of 0.042. The model predicted that implementing the ResistancePlus test for symptomatic patients would increase the percent of MG infections that are macrolide-susceptible from 50% to 85% in 2 years. In sensitivity analyses, transmission probability estimates and 2 year percent of MG infections that are macrolide-susceptible varied from 0.032–0.047 and 82%–92%, respectively.

Conclusion Directing treatment based on aetiology and known macrolide resistance may preserve the ability to treat MG with azithromycin. Moxifloxacin therapy could be limited to patients with known macrolide-resistant MG infection and prevent treatment failure for those patients.

P3.131 AN EMPIRIC RISK SCORE TO GUIDE PRESUMPTIVE TREATMENT OF ASYMPTOMATIC ANORECTAL INFECTIONS IN MEN WHO HAVE SEX WITH MEN IN KISUMU, KENYA

[1]Laura Quilter, [2]Eve Obondi, [3]Colin Kunzweiler, [2]Duncan Okall, [3]Robert Bailey, [2]Fredrick Otieno, [1]Susan Graham. *[1]University of Washington, Seattle, USA; [2]Nyanza Reproductive Health Society, Kisumu, Kenya; [3]University of Illinois at Chicago, Chicago, USA*

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Introduction The World Health Organisation (WHO) recommends presumptive therapy (PT) for *Neisseria gonorrhoeae* (GC) and *Chlamydia trachomatis* (CT) in asymptomatic MSM who report unprotected receptive anal intercourse in the past 6 months and either multiple sex partners or a partner with an STI. We aimed to identify predictors of asymptomatic anorectal infection in Kenyan MSM and compare performance of an empiric, model-based risk score to that of the WHO PT algorithm.

Methods Anorectal GC/CT infections were diagnosed at baseline among 698 MSM enrolled in the *Anza Mapema* study in Kisumu, Kenya. Multivariable logistic regression was used to identify associations with asymptomatic GC/CT anorectal infection. We derived a total risk score (range: 0–5) for each participant using the coefficients of the final multivariable model. Risk score algorithm performance was compared to WHO algorithm performance with respect to sensitivity, specificity, and number needed to treat (NNT).

Results Asymptomatic GC/CT anorectal infection prevalence was 4.2%. Predictors and corresponding risk scores were: HIV infection (2), age 18–24 years (2), and unprotected anal sex (1). A risk score $\geq$3 was 83% sensitive and 65% specific in detecting asymptomatic GC/CT anorectal infection. In contrast, the WHO PT algorithm had low sensitivity (25%), but was 84% specific. While 37% of asymptomatic participants met PT eligibility criteria using a risk score $\geq$3, only 17% met eligibility by WHO PT criteria. Using our risk score algorithm, 12 participants would need PT to treat one GC/CT anorectal infection, compared to 38 participants by WHO criteria.

Conclusion An empiric risk score based on age, HIV status, and unprotected anal sex improved both sensitivity and efficiency (i.e., NNT) of identification of asymptomatic GC/CT anorectal infection, compared to the WHO PT algorithm. If validated in other settings, this risk score could improve the management of asymptomatic GC/CT anorectal infections in settings where diagnostic testing is not available.

P3.132 PROJECTING THE EPIDEMIOLOGICAL EFFECT, COST-EFFECTIVENESS AND TRANSMISSION OF HIV DRUG RESISTANCE IN VIETNAM ASSOCIATED WITH VIRAL LOAD MONITORING STRATEGIES

Lei Zhang. *Melbourne Sexual Health Centre, Melbourne, Australia*

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Introduction Objectives: The objective of this study was to investigate the potential epidemiological impact of viral load (VL) monitoring and its cost-effectiveness in Vietnam, where transmitted HIV drug resistance (TDR) prevalence has increased from 5% to 5%–15% in the past decade.

Methods Using a population-based mathematical model driven by data from Vietnam, we simulated scenarios of various combinations of VL testing coverage, VL thresholds for second-line ART initiation and availability of HIV drug-resistance tests. We assessed the cost per disability-adjusted life year (DALY) averted for each scenario.

Results Projecting expected ART scale-up levels, to approximately double the number of people on ART by 2030, will lead to an estimated 18 510 cases (95% CI: 9120–34 600 cases) of TDR and 55 180 cases (95% CI: 40540–65 900 cases) of acquired drug resistance (ADR) in the absence of VL monitoring. This projection corresponds to a TDR prevalence of 16% (95% CI: 11%–24%) and ADR of 18% (95% CI: 15%–20%). Annual or biennial VL monitoring with 30% coverage is expected to relieve 12%–31% of TDR (2260–5860 cases), 25%–59% of ADR (9620–22 650 cases), 2%–6% of HIV-related deaths (360–880 cases) and 19270–51400 DALYs during 2015–30. The 30% coverage of VL monitoring is estimated to cost US$4848–5154 per DALY averted. The projected additional cost for implementing this strategy is US $105–268 million over 2015–30.

Conclusion Our study suggests that a programmatically achievable 30% coverage of VL monitoring can have considerable benefits for individuals and leads to population health benefits by reducing the overall national burden of HIV drug resistance. It is marginally cost-effective according to common willingness-to-pay thresholds.

P3.133 EVALUATION OF PRODUCTION AND LYTIC CAPACITY OF VAGINOLYSIN PRODUCED BY BIOTYPES OF *GARDNERELLA VAGINALIS*

Lesli Keila Dimas Lopez, Alma Delia Nicolas Morales, Ana Karen Estrada Moreno, Karen Cortés Sarabia, Arturo Ramírez Peralta, Carlos Ortuño Pineda, Amalia Vences Velázquez. *Autonomous University of Guerrero, Chilpancingo, Mexico*

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Introduction: *Gardnerella* vaginalis is the main etiological agent of bacterial vaginosis (BV), this bacteria has been classified in eight biotypes based on the production of beta-galactosidase, hydrolysis of hippurate and lipase, additionally produces several virulence factors, among them vaginolysin (VLY) is the most important. VLY is a pore-forming cytolysin that damages cells structurally and functionally through the

binding with the human receptor CD59 and cholesterol. To date there are no studies linking the production of VLY with the biotypes of these bacteria, which was the main objective of this study.

Methodology 90 strains of *G. vaginalis* were analysed, of which 60 were associated with normal flora and 30 with BV, biotyping was performed according to the scheme proposed by Piot et al. 1984. Dot Blot and haemagglutination evaluated VLY production and lytic capacity. The *Dot Blot* results were analysed densitometrically and classified as low, moderate and abundant. The lytic capacity was expressed in percentage.

Results We identified in the analysed population biotypes 1, 2, 5 and 6 of *G. vaginalis*. In the group with normal flora: biotype 1 was identified in 22%, biotype 2 in 12%, biotype 5 in 32% and biotype 6 in 35%, while in the group associated with BV biotype 1 was identified in 33%, biotype 2 in 10%, biotype 5 in 10% and biotype 6 in 47%. Low production of VLY was observed in 48%, moderate in 37% and abundant in 15% of the cases in the group with normal flora. While in the group with BV low production was observed in 30%, moderate in 43% and abundant in 27% of the cases. Additionally, we observed that the biotype 6 (normal flora) and 2 (BV) have the highest lytic capacity, without finding significant differences between both groups.

Conclusion We isolated the biotypes 1, 2, 5, and 6 in both study groups. The biotypes associated with VB showed higher production of vaginolysin and a greater lytic capacity. These results suggest that VLY produced by biotypes of *G. vaginalis* could be a key factor in the establishment and maintenance of BV.

P3.134 MODELLING THE DYNAMICS OF ANTIBIOTIC RESISTANCE IN GONORRHOEA TO DETERMINE FITNESS BENEFITS AND COSTS

[1]Lilith K Whittles, [2]Peter J White, [1]Xavier Didelot. *[1]NIHR Health Protection Research Unit In Modelling Methodology, Imperial College London, London, UK; [2]NIHR HPRU In Modelling Methodology, Imperial College London; National Infection Service, Phe, London, UK*

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Introduction Gonorrhoea is one of the most common bacterial STI in the UK. Incidence has increased since 2008 culminating in over 41 000 cases in 2015, over 50% of which are among men who have sex with men (MSM). The bacterium has developed resistance to each frontline antibiotic in turn. Resistance to cefixime grew rapidly between its recommendation as a single-dose treatment in 2005 and removal in 2010, reaching 33% among MSM. Since prescribing has fallen, however, so has resistance. We hypothesise there is a net fitness-benefit to resistance when cefixime is widely prescribed but a net fitness-cost when prescriptions decline.

Methods A compartmental stochastic model incorporating latent, asymptomatic and symptomatic infection, with both cefixime-susceptible and resistant strains, was fitted to UK MSM incidence and prescription data over 2008–15 using particle Markov Chain Monte Carlo (pMCMC) methods. The fitness-cost of resistance was modelled as an increased natural-recovery rate from asymptomatic resistant infection; the fitness-benefit was conferred when a proportion of treatment-failures are undetected and become asymptomatic. The hypothesis was tested via 99% credible intervals and posterior-predictive testing.

Results We were able to replicate the data using model parameters based on literature-review. Our model suggests that natural-recovery from resistant gonorrhoea occurs 1.75x (99% CI: 1.57–1.87) faster than from cefixime-susceptible infection, giving resistance a fitness-cost; and 91% (99% CI: 65%–100%) of treatments of resistant cases with cefixime fail, conferring a fitness-benefit when cefixime is highly-prescribed.

Conclusion The use of state-of-the-art pMCMC methods provided significant evidence in favour of our hypothesis and insights into the dynamics of cefixime-resistance in gonorrhoea. Our findings have important implications for antibiotic stewardship and public health policies, such as targeted prescriptions and combination therapy; as well as emerging resistance through similar mechanisms to the current frontline treatment, ceftriaxone.

P3.135 PREDICTORS OF SEXUALLY TRANSMITTED CO-INFECTIONS IN WOMEN PRESENTING WITH BACTERIAL VAGINOSIS TO PRIMARY HEALTHCARE FACILITIES IN SOUTH AFRICA

[1]Lindy Gumede, [2]T Kufa-Chakezha, [1]V Maseko, [2]R Kularatne. *[1]National Institute for Communicable Diseases, Johannesburg, South African Republic; [2]National Institute for Communicable Diseases and University of The Witwatersrand, Johannesburg, South African Republic*

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Introduction Bacterial vaginosis (BV) is the most common cause of non-specific vaginal discharge syndrome (VDS) in South African women. BV has been implicated in the acquisition of STIs and HIV. We sought to determine STI co-infection rates and associated factors in women presenting with BV-associated VDS to primary healthcare facilities (PHCs) in South Africa.

Methods Consenting adult women, presenting with VDS to PHCs in five South African provinces, were recruited in 2015–2016. Vaginal swabs were assessed for BV using Nugent scoring; and endocervical swab-extracted DNA was tested by multiplex real-time PCR for *Neisseria gonorrhoeae* (GC), *Chlamydia trachomatis* (CT), *Trichomonas vaginalis* (TV) and *Mycoplasma genitalium*. Serum specimens were tested for HIV. Data were analysed using Stata version14 using descriptive statistics and binomial regression.

Results From 717 women enrolled, 403 (56.2%) had BV. Of the 403 women with BV (median age 26[IQR 22–32], 201 [52.1%] HIV positive), 215 (53.4%) were co-infected with non-ulcerative STIs, the most common being *CT* [96 (23.8%)] followed by *GC* [86 (21.3%)].Univariable analysis for factors associated with STI co-infection showed a significant association with HIV infection, and a protective effect for condom use at last sex and attending a rural facility. In a multivariable model adjusting for the age, condom use at last sex, previous STI syndrome, HIV positivity and residence only age <35 years [relative risk (RR) 1.40 (95% CI 1.04–1.90)] and HIV infection [RR 1.27 (95% CI 1.06–1.52)] were independently associated with STI co-infection.

Conclusion A significant proportion of BV infected women had STI co-infections and associated risk factors. This has implications for syndromic management of VDS, and suggests that the strategy of stratification into STI and non-STI treatment groups should be reviewed.