

014.2 HIGH INCIDENCE OF NON-URETHRAL *NEISSERIA GONORRHOEA*E AND *CHLAMYDIA TRACHOMATIS* INFECTIONS AMONG MEN WHO HAVE SEX WITH MEN AND TRANSGENDER WOMEN IN LIMA, PERU

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Introduction Non-urethral *N. gonorrhoeae* infections have been associated with antimicrobial resistance as well as increased HIV transmission and acquisition, however, incidence data from low and middle-income countries are lacking.

Methods We collected anal and pharyngeal specimens from MSM and transgender women seeking sexually transmitted disease clinical services quarterly for 2 years. Incident infection was defined as having a positive nucleic acid test among those with no prior infection or prior treatment. We used generalised estimating equations to calculate adjusted incident rate ratios (aIRR). We grouped infections by anatomic site. All models included any condomless sex and number of male sex partners in prior 3 months.

Results Of 401 participants, 22% identified as transgender and 31% had HIV infection at baseline. Incidence of anal infection was 30 and 40 cases per 100 person-years with *N. gonorrhoeae* and *C. trachomatis*, respectively, while incidence of pharyngeal infection was 22 and 12 cases per 100 person-years with *N. gonorrhoeae* and *C. trachomatis*, respectively. In the pharyngeal infection model with either organism, transgender identification was positively associated (aIRR=2.1; 95% CI 1.4–3.0) compared with MSM, whereas each decade increase in age was negatively associated (aIRR=0.7; 95% CI 0.6–0.9). In the anal infection model with either organism, HIV infection was positively associated (aIRR=1.6; 95% CI 1.2–2.1), whereas each decade increase in age was negatively associated (aIRR=0.7; 95% CI 0.6–0.9). Anal infection incidence was increased in those reporting receptive (aIRR=2.7; 95% CI 1.5–4.9) and both receptive/insertive (aIRR=2.6; 95% CI 1.5–4.6) sex versus reporting exclusively insertive sex.

Conclusion Incident non-urethral *N. gonorrhoeae* and *C. trachomatis* infections were common among MSM and transgender women in Lima, Peru, adding to the paucity of data from Latin America, especially among transgender women. Our findings support World Health Organisation recommendations for anal screening and argue for the addition of pharyngeal screening.

014.3 HOW WAR AND RISKY SEXUAL BEHAVIOURS SHAPE THE UKRAINIAN HIV EPIDEMIC: A PHYLOGEOGRAPHIC ANALYSIS

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Introduction Ukraine has one of the largest HIV epidemics in Europe that was historically driven by people who inject drugs (PWID). The epidemic showed signs of stabilisation since 2012, but the recent war in the East of the country might be reinforcing the virus spread. We have studied HIV flow within Ukraine in recent years and explored factors that might explain it.

Methods We used HIV subtype-A pol nucleotide sequences sampled in 2012–2015 from 427 patients of 24 regional AIDS Centres along with 40 publicly available reference sequences sampled between 1986–2010. We used phylogeographic analysis in BEAST to reconstruct viral spread among different geographic regions of Ukraine. We further used data from an Integrated Bio-Behavioural survey of PWID conducted in Ukraine in 2013. We built logistic regression model to test for an association between the virus flow and the reported risky sexual and injecting behaviours of PWID, the number of internally displaced persons, and HIV prevalence per region.

Results Infections in the Centre, East, and Crimea were 3.9, 3.6, and 3.3 times, respectively, more likely to originate from Donetsk (the biggest city in the occupied East), suggesting that the epidemic is spreading westwards. Additionally, multivariable regression analyses showed that regions with a higher proportion of PWID practicing risky sexual behaviours were more likely to both be a source of infection to other regions and a recipient of infection from them. No such association was found for risky injecting behaviours.

Conclusion We show that in recent years HIV has been spreading westwards in Ukraine at a higher than expected rate. This may be a consequence of the war that has led to over a million people migrating from the East to other regions of Ukraine. Risky sexual practices that involve PWID may be facilitating this spread. The estimated patterns of HIV-1 migration within Ukraine suggest that an effective prevention response should involve PWID, their sexual partners, and internally displaced people.

014.4 OROPHARYNGEAL TRANSMISSION OF *NEISSERIA GONORRHOEA*E AMONG MEN WHO HAVE SEX WITH MEN AND POTENTIAL IMPACTS OF MOUTHWASH

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Introduction Gonorrhoea notifications are rapidly rising in men who have sex with men (MSM). We developed a model to assess mouthwash as a novel intervention for gonorrhoea control.

Methods We developed a model of *Neisseria gonorrhoeae* (NG) transmission to explain anatomic site-specific prevalence of gonorrhoea among MSM. The model was calibrated to available epidemiological and behavioural data. We estimated the contribution of various sexual acts to gonorrhoea incidence and evaluate the potential impacts of screening scale-up and utilisation of mouthwash on the gonorrhoea epidemic.

Results We calibrated the model to prevalence of oropharyngeal, anal and urethral gonorrhoea of 8.6% (7.7%–9.5%), 8.3% (7.4%–10.4%) and 0.20% (0.04%–0.35%), respectively,

among MSM. Oropharynx to oropharynx transmission through kissing is estimated to account for nearly three quarters of all incident cases (71.6% [64.4–80.5%]) of gonorrhoea in MSM. Substantially increasing annual oropharynx screening for gonorrhoea from the current 40% to 100% may only halve the prevalence of gonorrhoea in MSM. In contrast, the use of mouthwash with moderate efficacy (additional 1% clearance per daily use) would further reduce the corresponding prevalence rates to 3.1% (2.2%–4.4%), 3.8% (2.3%–4.9%) and 0.10% (0.06%–0.11%), and a high efficacy mouthwash (additional 1.5% clearance per daily use) may further halve the gonorrhoea prevalence. Without oropharynx to oropharynx transmission, we could not replicate current prevalence data.

Conclusion Our model suggests that kissing may play a key role in NG transmission among MSM. Focusing on STI screening alone is not sufficient to control the rising epidemic. Promotion of regular mouthwash may achieve near elimination of gonorrhoea in MSM.

014.5 CONTINUOUS DECLINE OF HIV PREVALENCE AND INCIDENCE AMONG FEMALE SEX WORKERS IN BENIN OVER 22 YEARS OF TARGETED INTERVENTION, BUT RESURGENCE OF GONORRHOEA IN THE CONTEXT OF INADEQUATE TREATMENT POLICIES

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Background An HIV preventive intervention aimed at female sex workers (FSW) and involving structural interventions, condom promotion and care for sexually transmitted infections (STI) is ongoing in Benin since 1993 [antiretroviral treatment (ART) available since 2005]. No routine surveillance of *Neisseria gonorrhoeae* (NG) resistance is carried out in Benin and, despite evidence of emerging ciprofloxacin resistance in surrounding countries, this antibiotic remained the recommended treatment till 2015. We estimated time trends in HIV/STI prevalence among FSW from 1993 to 2015.

Methods 8 integrated biological and behavioural surveys were conducted among FSW using cluster sampling procedures. HIV antibodies were detected on serum or dried blood spots using standard assays. Cervical (1993–99) or self-administered vaginal swabs (2002–15) were tested for NG and *Chlamydia trachomatis* (CT) using nucleic acid amplification tests. Time trend analysis controlled for potential socio-demographic confounders using log-binomial regression. HIV incidence data were available from 4 FSW cohort studies (1997–2000, 2005–07, 2009–12 and 2014–16).

Results HIV prevalence declined from 53.3% in 1993 to 49.4% in 1996, 40.7% in 1999, 46.5% in 2002, 30.1% in 2005, 26.8% in 2008, 20.5% in 2012 and 15.8% in 2015 ($p < 0.0001$). During the same period, condom use with all clients in the last month increased from 13.9% in 1993 to 77.1% ($p < 0.0001$) in 2015 (93% at last sex with a client in 2015). HIV incidence declined steadily, from 9.6 per 100

person-years in the 1997–2000 period to 5.9 in the 2005–07 period, 1.4 in the 2009–12 period and 0.9 per 100 person-years in the 2014–16 period. Following a sharp decline during the 1993–2005 period, from 43.2% in 1993 to 30.7% in 1996, 23.7% in 1999, 20.4% in 2002 and 3.4% in 2005 ($p < 0.0001$), NG increased progressively to 6.2% in 2008, 6.8% in 2012 and 8.4% in 2015 ($p < 0.0001$). CT also declined from 9.4% to 5.4% (1993–2005), but then stabilised at 4%–6%.

Conclusion Our results suggest a significant impact of this intervention aimed at FSW in Benin, where HIV prevalence in the general population is stable at 1.1% since 2006, despite increased survival due to ART scale-up (current ART coverage >50%). However, NG has steadily increased in the last decade likely due to inadequate treatment policies. Setting up NG resistance surveillance is of paramount importance in African countries, most of them not currently having such programs on a regular basis.

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014.6 SEXUAL TRANSMISSION OF FLAVIVIRUSES – A LIVING SYSTEMATIC REVIEW

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Introduction Flaviviruses, such as Zika virus (ZIKV), are primarily transmitted by infected arthropods. Evidence indicates that some of these viruses can be transmitted between persons through sexual intercourse. Sexual transmission of ZIKV is of special interest because of the risk of congenital abnormalities such as microcephaly. Several health agencies have produced guidelines on the prevention of sexual transmission of ZIKV, but there are many uncertainties. A systematic approach to assessment of the risk and epidemic potential of sexual transmission of flaviviruses is therefore crucial.

Methods We conducted a systematic review with questions derived from a conceptual framework of the key parameters that drive infection transmission. We searched multiple databases and websites for studies of any design and in any language. Because of the rapid increase in publications, we have developed the review as a living systematic review, allowing continual updating of the findings.

Results By January 10th 2017, we identified 28 unique reported cases of likely sexual transmission of ZIKV in 9 countries; 20 male to female, three female to male, one male to male, four unknown. In the US, 1% (36/4,310) of reported travel-associated ZIKV cases likely resulted from sexual contact. ZIKV has been detected by PCR for up to 188 days in semen and 14 days in vaginal secretions. Two of three included modelling studies quantified the contribution of the sexual transmission route, two studies estimated the