

primary drug. However, in Greenland where chlamydial infections are extremely common and azithromycin is used liberally, mutations have been found in nearly 100% of the specimens tested.

At present, moxifloxacin is the only second line antibiotic that has a proven high efficacy against macrolide resistant *M. genitalium*. However, price and safety profile as well as the emergence of multi-drug resistant strains emphasises the urgent need for clinical trials with alternative drugs.

## S.10 - HIV treatment as prevention

### S10.1 PREDICTING THE SOCIAL AND BEHAVIOURAL CONSEQUENCES

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Recent data from HIV prevention trials conducted with sero-discordant couples suggest that HIV transmission drops when the infected individual is taking anti-retroviral medications (ARV). However, there is potential for unintended social and behavioural consequences of this and other interventions. Using the HIV treatment cascade as a lens, the review will cover individual and population-level data in HIV and STD prevention research with a view to identifying such consequences of intervention. Although the focus will be upon risk compensation as a potential consequence of HIV treatment, the review will also attend to potential positive social and behavioural consequences.

With respect to data from which to predict social and behavioural consequences, the majority of HIV and STD prevention interventions are conducted through small groups or on a one-to-one basis (e.g., in clinical settings), rather than at the population level. Most are concerned explicitly with risk reduction behaviours or address the behaviours essential to successful biomedical intervention. Population-level interventions are rarer, but do include communication campaigns and efforts to affect HIV or STD through social determinants. With respect to risk compensation, some studies explicitly address risk compensation, while others have sufficient behavioural follow-up data from which to measure it - the unintended measurement of unintended consequences. Fewer studies permit one to attribute effects to different potential *causes* of risk compensation, including risk homeostasis, overestimation of protection, or the intentional resumption of previous behaviour patterns.

The final part of the review is devoted to approaches that seek to minimise negative consequences or to maximise positive consequences, the latter arising when an intervention gives people hope where they once had little or none, and leading to further individual efforts to protect themselves and others (including changes in risk homeostasis). Positively-framed communication campaigns in particular may accelerate efforts and further population-level protective action and health promotion.

### S10.2 DETERMINING UPTAKE, ADHERENCE, & PATTERNS OF ART USE AS PREVENTION

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Selected antiretroviral treatment (ART) of HIV reduces the concentration of virus in genital secretions. In one randomised controlled trial and most (but not all) observational studies ART reduced the sexual transmission of HIV. Some (but not all) ecologic studies suggests that broader, earlier antiviral treatment of HIV may reduce incidence of HIV in some (but not all) at risk populations. A compelling long-term study from South Africa demonstrated a direct relationship between

increased availability of ART in communities and decreased incidence of HIV. However, the maximal benefit of HIV "treatment for prevention" will likely require a programme of universal "test and treat", where most HIV infected patients are identified, linked to care, and treated very early in disease and for life. It seems likely that for maximal public health benefit ART must be started immediately regardless of CD4 count, and so the personal benefit and safety of immediate ART must be transparent. In some settings (especially where MSM are most likely to be infected) it may be necessary to find and treat people with acute and early HIV infection, a difficult challenge. To better understand the maximal benefits of this approach the early treatment of IDU and sex workers are also being studied, since these populations contribute to the spread of HIV. Community randomised trials designed to examine the feasibility of the implementation of treatment for prevention are underway. Treatment of a far greater number of people early in disease will be cost effective or cost saving in most settings, and can offer macroeconomic benefit as well. The mass treatment of HIV-the current centrepiece of HIV prevention-is best seen as a bridge to ever simpler therapy or a cure.

### S10.3 MODELING THE EFFECT OF TAP ON THE HIV/AIDS EPIDEMIC

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**Background** The efficacy of ARV treatment that achieves viral suppression in dramatically reducing HIV infectiousness is proven. What is less clear is the implications for the best use of treatment in programmes, how treatment should and could be scaled up and what the effectiveness of treatment use in programmes will be across populations.

**Methods** Review of observational data on the impact of treatment programmes on HIV incidence and deaths and mathematical models exploring the impact of existing and proposed programmes.

**Results** Mathematical models show that HIV treatment can reduce HIV incidence, but this reduction depends upon who is treated, the success of the programme maintaining viral suppression in those treated and on patterns of risk behaviour. Observations of the impact of treatment programmes on the spread of HIV at a population level show mixed impacts with competing interpretations and implications for future programmatic development. Treatment guidelines emphasise the treatment of those who probably contribute least to onward transmission of HIV and more work is required to understand local epidemiology and design treatment programmes accordingly.

**Conclusions** Future, studies of the impact of treatment as prevention should concentrate on how to implement at scale treatment programmes and maximise reductions in incidence. Using HIV treatment as an HIV prevention intervention promises a major step forward in responding to the HIV pandemic, but taking success for granted could generate unsustainable programmes with perverse outcomes.

## S.11 - National trends in sexual behaviour: USA, UK and Switzerland

### S11.1 SEXUAL BEHAVIOUR IN BRITAIN IN THE NEW MILLENNIUM: A NEW ERA?

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**Background** In 2001, Britain's second National Survey of Sexual Attitudes and Lifestyles (Natsal-2) demonstrated increased sexual risk behaviour in contrast to Natsal-1, undertaken a decade earlier. STI diagnoses also increased between the mid-1990s and the

mid-2000s, but since then, increases have been more modest. These trends coincided with changes in sexual health policy and practise in Britain, resulting in greater STI testing and the use of more sensitive diagnostic tests, making STI surveillance data less indicative of risk behaviour. This paper reviews a range of evidence to examine whether, and if so how, sexual behaviour has changed in Britain since the start of the millennium.

**Methods** Analyses of routine data (including STI surveillance data, census data), general population surveys (including Natsal, Health Survey for England 2010 (HSE-2010), British Social Attitudes surveys), and community surveys of men-who-have-sex-with-men (MSM, including London's Gay Men's Sexual Health Surveys).

**Results** Demographic trends support the limited sexual behaviour data collected experimentally by HSE-2010 suggesting that increases in heterosexual risk behaviour observed between 1990 and 2000 have not been sustained since 2000. At the same time, there has been increasing tolerance in Britain of more diverse sexual lifestyles, with public attitudes towards homosexuality increasingly liberal. While the population prevalence of recent same-sex behaviour in 2010 remains around 2–3%, among MSM, the proportion reporting high-risk sexual practises continues to rise, especially among HIV-positive MSM, as evident from increasing HIV incidence and STI outbreaks among this core-group.

**Conclusions** Increases in sexual risk behaviour among MSM in Britain have clearly been observed since 2000, however, definitive conclusions regarding changes in heterosexual behaviour are limited until methodologically-comparable data are available from Natsal-3. These new data will enable us to better examine hypotheses regarding changes in the British population's sexual behaviour across time and across the life-course.

## S11.2 SEX IN THE UNITED STATES IN THE NEW MILLENNIUM: TEMPORAL TRENDS AMONG MEN AND WOMEN AGED 15–44 YEARS

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**Background** Examining national trends in sexual behaviour can aid in the understanding of STD trends. We examined trends in sexual behaviour, focusing on sub-populations most impacted by STDs in the US.

**Methods** We used data from the 2002 and 2006–10 National Survey of Family Growth (NSFG), a multi-stage survey nationally representative of men and women aged 15–44 years living in the United States (US). The sample sizes and response rates for the surveys were 12, 571 (79%) in 2002 and 22,682 (77%) in 2006–10. Sexual behaviours included in this analysis were predominantly from audio computer assisted self-interview and were compared by several demographics, separately by sex. Data were weighted to represent the US population and data analyses accounted for the multi-staged sampling procedures used by NSFG.

**Results** Sexual behaviours with opposite- and same-sex partners were frequently similar in 2002 and 2006–10. Of women who ever had vaginal sex, there was no change in the average number of partners in the past 12 months (1.21 in 2002, 1.11 in 2006–10); however there was a slight decrease over time for Hispanic and black women and a slight increase among women in the non-Hispanic other category. Findings for men were similar except for a slight increase in partners among white men. Overall, HIV-related risk with opposite-sex partners decreased from 2002 to 2006–10. Specifically, exchanging sex for money or drugs significantly decreased among women (2.0% to 0.7%,  $p < 0.05$ ) and men (2.6% to 1.3%,  $p < 0.05$ ). Finally, the average number of male partners decreased among sexually active men who have sex with men (MSM) from 2.9 in 2002 to 2.3 in 2006–10 ( $p < 0.05$ ). Specific HIV risk also declined among MSM.

**Conclusion** Preliminary findings suggest that behaviours have not changed much during this time; however, we did identify shifts in behaviours among sub-populations.

## S11.3 SWITZERLAND: NATIONAL TRENDS IN SEXUAL BEHAVIOUR IN THE CONTEXT OF HIV/STI BEHAVIOURAL SURVEILLANCE 1987–2012

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**Background** National trends in sexual behaviour have been assessed mainly in the context of the HIV related behavioural surveillance system set up in Switzerland between 1987 and 1992.

**Methods** Several populations are included in the system. Repeated surveys have been regularly conducted among the general population and youth, men having sex with other men (MSM), injecting drug users (IDU). Data on sexual behaviour are regularly recorded among people living with HIV/Aids (PLWHA) included in the Swiss HIV Cohort.

**Results** The main trends observed are :

In young adults (aged 18–20):

- a steady increase in the proportion of sexually active at age 17
- a stable median number of partners with a recent increase in the proportion of multipartners;
- a high and stable level of condom use among multipartners.

Among MSM:

- an increase in the number of partners and a steady increase in unprotected anal intercourse since 1997, after a period of decreasing trends.

Among IDU:

- a low and stable use of condoms with stable partners;
- a high and stable use of condoms with occasional and paying partners (only among women) with a possible recent decreasing trend.

Among PLWHA: a high use of condoms with all types of partners with a recent decrease.

**Conclusions** The behavioural surveillance system in place allowed to assess various trends in sexual behaviour in several populations such as: long term trends regarding sexual debut, stable trends and recent changes regarding different indicators of sexual activity in the general population, IDU and PLWHA, inversion of trends in sexual activity and condom use among MSM.

## S.12 - STD vaccines and correlates of immunity

### S12.1 HUMAN PAPILLOMAVIRUS VACCINES - CORRELATES OF PROTECTION ARE NOT DEFINED

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Specific types of human papillomavirus (HPV) are causally associated with cervical cancer, with at least 99% of cervical cancers having detectable HPV DNA. Other cancers that also have an association with HPV include anogenital and oropharyngeal malignancies affecting both males and females. Over two thirds of these cancers are associated with HPV types 16 and 18, which are the high-risk types targeted by the HPV vaccines Gardasil and Cervarix. Gardasil also protects from infection with HPV-6 and HPV-11, which cause genital warts and recurrent respiratory papillomatosis. The vaccines are