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IFMSA Policy Document Sexually Transmitted Infections

Proposed by SfGH U.K and DENEM-Brazil

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Policy Statement

Introduction:

Over 30 pathogens are known to be transmitted sexually, with eight identified internationally as being associated with the highest incidence globally. Of these eight sexually transmitted infections (STIs), four are curable: syphilis, chlamydia, gonorrhoea and trichomoniasis, whilst the other four are currently incurable: hepatitis B virus (HBV), herpes simplex virus (HSV), human immunodeficiency virus (HIV) and human papillomavirus (HPV). Preventative measures including vaccinations for HBV and HPV, and pre-exposure prophylaxis for HIV also exist. The physical, mental and social health outcomes vary dramatically between different STIs, often with catastrophic impacts on the infected individuals, families and wider communities.

IFMSA position:

The International Federation of Medical Students' Associations (IFMSA) recognize STIs as a serious global public health concern. The IFMSA stands in solidarity with populations burdened by the stigma of STIs. The IFMSA have identified high risk populations who, although not personally responsible for their risk, would benefit from targeted support by means of psychosocial and biomedical intervention. Moreover, improved monitoring and evaluation of STIs in these populations will ensure clinicians can apply evidence-based medicine and work towards reducing transmission and achieving timely treatment of STIs. The IFMSA advocates for the use of evidence-based knowledge in creating public policies regarding STIs and encourages the adoption of World Health Organization (WHO) strategies for combating their spread. In addition, the IFMSA believes that Universal Health Coverage should be the main approach for reducing the prevalence of STIs worldwide.

Call to Action:

Therefore, the IFMSA calls on

Governments and policy makers to:

- Improve surveillance and increase data collection on STI prevalence and incidence with an emphasis on behavioural surveillance.
- Adopt comprehensive, evidence-based STI prevention and treatment programmes based on local data and WHO recommendations accounting for regional variation in antibiotic sensitivity.
- Invest in Sexual and Reproductive Health and Rights research across the board, with particular focus on understudied groups including Roma and other traveller communities, indigenous people from low and middle income countries, imprisoned women, refugees, migrants and homeless people.
- Ensure that all STI testing and treatment is free or affordable at the point of care.
- Prioritise implementing universal antenatal STI screening and treatment by funding increased laboratory capacity and securing antibiotic and antiretroviral drug supply chains.
- Invest in the development and validation of alternative treatment regimens for syphilis, chlamydia and gonorrhoea to improve management options of penicillin-allergic patients and combat antimicrobial resistant infections.
- Involve communities with high STI prevalence in the design, implementation and evaluation of interventions to combat the spread of STIs within these communities.
- Continue supporting and advocating programmes and policies targeting Mother to Child Transmission (MTCT) of HIV to avoid losing momentum of the already achieved improvements.
Invest in research surrounding HSV in pregnant women, including reducing the synergistic effect with HIV infections, better diagnostic tools for evaluating maternal skin lesions and preventative measures for neonatal HSV
- Ensure reduction of stigma against sex workers and LGBTQIA+ groups by enforcing anti discrimination laws and implementing inclusive, age appropriate, comprehensive sex and relationship education in all schools.

Non-Governmental organisations to:

- Sponsor academic prizes for medical students and clinical trainees to reward student selected components, essays and projects in sexual health.



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- Provide grants for student and sexual health trainee research projects and electives.
- Continue to organize care of patients with STIs in low and middle income countries where STI services are not readily available or not available to a high standard.
- Provide a service for those in sexually abusive relationships to receive free sexual healthcare and counselling.

Healthcare providers to:

- Actively screen for mental illness in patients with STIs and refer them to appropriate mental health services.
- Offer pre-test and post-test counselling for all patients.
- Counsel HIV positive women regarding breastfeeding and reducing MTCT of HIV.
- Keep up to date with education on current best practice and evidence-based management of STIs in focused populations such as pregnant women.
- Make a conscious effort to adhere to the principles of Antibiotic Stewardship to combat antimicrobial resistance among pathogens responsible for STIs.
- Identify those in sexually abusive relationships, ensure they have access to care and refer them onto specialist charities or support groups.

Medical schools and other teaching settings to:

- Make STI education a compulsory part of public health teaching, including education on STI pathogenesis, stigma, prevention programmes and prevalence.
- Create a safe and supportive environment on campus for all students regardless of their STI status.
- Promote uptake of student selected components in the field of sexual health using academic awards and other incentives.
- Carry out audits on the quality and uptake of antenatal STI testing, performance of STI diagnostics in pregnant and non-pregnant populations, provision of STI treatment and educational needs in their local health care facilities.

IFMSA National Member Organisations (NMOs) and students to:

- Deepen their understanding of the biopsychosocial issues related to STIs, including stigma and discrimination.
- Undertake research related to STIs, including on prevention, treatment and stigma.
- Advocate for comprehensive medical education on STIs.
- Design and engage in campaigns and programmes aimed at increasing STI awareness and uptake of testing and challenging the stereotypes and stigma around STIs.
- Ensure that every interaction with people seeking help for or living with STIs is conducted sensitively, with respect and without judgement



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Position Paper

Background information:

Sexually transmitted infections (STIs) are caused by pathogens transmitted through sexual contact, including vaginal, anal and oral sex. In some cases, these infections can be transmitted through non sexual routes such as mother to child transmission (MTCT), blood or blood products. There are over 30 different pathogens known to be transmitted sexually, eight of which have been identified by the World Health Organisation (WHO) as being associated with the highest incidence of STIs globally. Four of these infections are curable: syphilis, gonorrhoea, chlamydia and trichomoniasis, whilst the other four are currently incurable: hepatitis B virus (HBV), herpes simplex virus (HSV), human immunodeficiency virus (HIV) and human papillomavirus (HPV). Although STIs are not isolated to a single region, ethnicity, gender or class, some groups are at greater risk of developing STIs and experience worse outcomes than others (1).

Beyond the clinically and socially apparent impact of the infection, STIs pose a serious risk to systemic health. Syphilis and HSV potentially more than triple the likelihood of HIV acquisition. MTCT of STIs can cause adverse outcomes including stillbirth and neonatal deaths. HPV infection leads to approximately 570,000 instances of cervical cancer and 300,000 cervical cancer deaths per year. Furthermore, gonorrhoea and chlamydia, which are often asymptomatic in people with uteruses, are leading causes of infertility and pelvic inflammatory disease (PID) (1).

In 2016, the WHO formed a strategy aiming to radically decrease the number of new cases of STIs, stating that the response to STI epidemics is essential to achieving Universal Health Coverage (UHC), one of the major targets of the Sustainable Development Goals for 2030 (2). It is recognised, however, that there are major barriers to reducing the number of STIs globally. Structural inequality and the marginalisation of various populations has resulted in inadequate STI surveillance and the unequal provision of healthcare services and interventions. Discrimination and the stigma around STIs, acts as a major barrier to providing comprehensive sex education as it prevents individuals from accessing services and negatively impacts the lives of individuals living with STIs. Furthermore, STIs are becoming increasingly difficult to treat as a consequence of the emergence of antimicrobial resistance (AMR) (3).

Discussion:

Incidence, Prevalence and the Burden of Epidemics

Sexually transmitted infections contribute a significant global burden of morbidity and mortality, with the World Health Organisation estimating a combined total of 376 million new infections of curable STIs annually in people aged 15-49 years (4). This estimation is likely to be inaccurate, however, as the true rates are difficult to assess due to limited available data. Moreover, incidence and prevalence in the general population may be extrapolated from data which excludes populations where these figures are assumed to be higher such as patients seeking care for an STI and so may underestimate the extent of infections (5). Additionally, the prevalence of these infections can vary by region, gender and race (5, 6). Disparities in the prevalence between populations have been shown to exist due to factors including limited access to good quality care and a lack of symptom recognition by both healthcare professionals and patients. Furthermore, the asymptomatic nature of certain infections results in substantial under-detection and under-reporting (6).

The epidemiology of sexually transmitted infections is complex, continuing to evolve in line with significant global societal changes. Enhancements in communication technologies and transportation networks, increasing inequality within and between countries, increased movement between populations and altering family structures are all thought to influence epidemics of STIs (7). Each individual's risk of acquiring an STI is dependent on their own sexual practices, the number of sexual encounters they have and the location of that individual within a larger network of sexual partners (8). Epidemics of STIs represent a significant healthcare burden beyond the immediate clinical consequences of primary infection in each patient. The sequelae of these infections can have long term impacts on the health and quality of life of the infected individual. The potential consequences of infection include PID, infertility, tubal or ectopic pregnancy and cervical cancer. Perinatal or congenital infections by MTCT are another risk, propagating the disease within the population and creating worse health outcomes for the infected neonates (9).



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Stigma, Mental Health and Education

Stigma is defined as a mark of disgrace or strong feeling of disapproval against a particular person, quality or circumstance (10). STI-related stigma is widespread, contributing to prejudice and discrimination against those with STIs on individual, institutional and societal levels. All sexually active people are at risk of contracting STIs, with some groups being at greater risk than others (1, 11). Many people, however, hold stereotypical beliefs that only those considered 'dirty', 'promiscuous' or 'risk taking' are at risk of contracting STIs. Consequently, patients have expressed that before their STI diagnosis they did not perceive STIs to be personally relevant (12).

STI-related stigma is incredibly damaging, posing a major barrier for patients seeking STI treatment and contributing to poor mental health outcomes (13). STI-related stigma leads to patients experiencing shame, embarrassment, anxiety, depression, isolation and a perceived loss of social status (14, 15). As a result, stigma contributes to delays in STI screening and treatment, as people are unwilling to be tested out of fear of a positive diagnosis (13). Many who avoid screening consider the potential outcomes of STI-related stigma to be worse than the perceived threat to their physical health. This not only indicates a lack of knowledge about the diseases and potential health outcomes, but also increases susceptibility to morbidity as a result of STI contraction (15).

In low and middle income countries, the most frequently reported barrier of youths accessing sexual health services was the acceptability of the services themselves. Youths reported avoiding services over fears surrounding confidentiality, stigma, judgement from service providers and shame. Crucially, some service providers admitted to judging those who sought STI services and felt uncomfortable and incompetent providing care (16). Therefore, it is essential to retrain service providers and establish a network of confidential, non-judgmental clinics with well trained staff, using the input of NGOs, as youths reported feeling comfortable and being treated well by NGO workers (17).

STI-related stigma needs to be eradicated in order to reduce psychiatric co-morbidity and ensure better health outcomes for those with an STI diagnosis. Despite the high numbers of cases worldwide, STI stigma persists and the diagnosis is not normalised. Strategies to combat STI stigma should build on widespread education on STIs, their transmission, use of barrier methods and contraceptives, access to sexual health clinics and safe sexual practices. Ideally this should be delivered in schools, starting from the youngest appropriate age, using a standardised program to ensure adequate coverage nationally and internationally. WHO states that sexual health education needs to be comprehensive and should also encompass pre-and post-test counselling (1). Support groups and community based interventions have been shown to be effective in tackling the stigma of STIs and increasing condom use (18). Screening and assessing mental health within sexual health clinics can also help identify those at risk of mental illness associated with their STI and offering appropriate support (19).

High Risk Groups

Sex Workers

WHO defines sex workers (SWs) as "female, male and transgender adults (18 years of age or above) who receive money or goods in exchange for sexual services, either regularly or occasionally". Sex work takes place between consenting adults, differentiating it from "sexual exploitation" (20).

SWs are at an increased risk of contracting STIs due to factors associated with their work, including multiple, non-regular partners, inconsistent condom use and more frequent sexual intercourse (21). Despite being considered a high-risk group, the prevalence of STIs in SWs is largely unknown, as studies often fail to report demographic data or rely on self-reported data. Of the data that is available, Global AIDS monitoring found that in 2017-18, the median syphilis prevalence in 38 reporting countries was 3.2% in female sex workers, with the figure as high as 13.3% in the African region. Furthermore, it was also estimated that in many cases the prevalence of HIV among SWs is more than twice the prevalence among the general population (22).

Although the barriers faced by SWs to accessing sexual health services vary dramatically between regions, common barriers include cost, lack of confidentiality and discrimination by healthcare providers, stigma,



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shame, poor sexual health literacy and fear of being exposed to the public as a sex worker (23, 24). In order to improve sexual health outcomes for SWs, therefore, it is essential that governments establish anti-discrimination and rights-respecting laws. In addition, affordable, appropriate sexual health services must be made available for all SWs (20). Finally, it is crucial that all interventions and programmes are empowering and educational, addressing both the physical health needs and the psychosocial needs of SWs (25).

Ethnic Minorities

The term ethnic minority encompasses all the ethnic or racial groups in a given country in which they are in a non-dominant position to the dominant ethnic population (26). Accessing healthcare is more difficult for members of ethnic minorities (27) which is worsened by the income disparity with the dominant ethnic population. Therefore, ethnic minorities are often invisible and face discrimination when considering healthcare interventions for STIs, although they are no less vulnerable (28). Indeed, propagation of STIs has been shown to have a higher rate in marginalized populations. For example, in the US African American women are 20 times more likely to contract HIV than White women (29) and in Brazil, of the total registered new HIV cases between 2007 and 2019, 49.3% were among Afro Brazilians, with 8.4% of the case records not containing information about race (30). Similarly, in the UK the rates of gonorrhoea and chlamydia are higher in black communities (27).

Prevalence differences among groups can even overwhelm the effects of individual sexual behaviour manifesting as high rates of STIs even among normative young black women (31). Police brutality is another important and often overlooked factor that can potentially increase STI prevalence through creating psychological stress that results in riskier sexual behaviours. The subsequent distrust in government institutions and experiences of racism among healthcare providers only add to the barriers to receiving appropriate treatment that would reduce STI propagation within these communities (32).

Prevalence of STIs is also a growing public health concern among indigenous populations. Most of the currently available literature only acknowledges the indigenous community within developed countries therefore showing a disproportionate lack of data on the majority of indigenous populations dwelling in developing countries. This is an urgent issue, as some estimates show that the spread of STIs might be even higher among indigenous communities than the general population, potentially attributable to age, use of alcohol and tobacco and the structure of the health services offered (33).

To combat the spread of STIs within ethnic minority groups a targeted approach with culturally tailored behavioural interventions is most likely to be successful (34), considering and respecting the cultural particularities involved. More studies on STI prevalence and consequences among ethnic minority populations are also necessary (35).

Men Who Have Sex With Men

The term "men who have sex with men" (MSM) refers to a man of any age who engages in sexual or romantic intercourse with other men. As the terms "men" and "sex" vary through time and cultures, MSM encompasses a wide variety of sexual orientations and gender identities, involving people who identify as homosexual, bisexual, transgender and heterosexual among others. Data from Global AIDS monitoring found that of 41 responding countries, median syphilis prevalence was 6.0% in MSM in 2016-2017 and as high as 12.4% in the Americas (21).

MSM are more likely than the rest of the male population to participate in chemsex which is associated with increased STI incidence (36). Chemsex is the use of recreational drugs to heighten sexual experience and commonly includes use of G-gammahydroxybutyrate, gamma-butyrolactone and Mephedrone. Other recreational drugs include crystal methamphetamine, ketamine, cocaine, ecstasy and viagra. Sexualised drug use can lead to increased confidence, heightened arousal and sexual disinhibition (37).

It has been repeatedly demonstrated that well designed sexual health education can reduce sexually transmitted infection rates and that LGBTQ+ inclusivity is essential to address existing inequalities in sexual health outcomes (37). Oppressive legislation and social attitudes regarding homosexuality present obstacles to delivering comprehensive sex education and providing appropriate STI testing, such as rectal and throat swabs. It also leads to healthcare avoiding behaviours in the MSM population (38).



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Youth (15-24 year olds)

The United Nations defines youth as persons between the ages of 15-24 (39). Youth are recognised worldwide as having unique sexual health needs. They hold the highest reported incidence of STIs of all age groups (40) and globally, adolescents likely represent at least one third of cases of chlamydia infection (41). Funding efforts have focused on preventative measures, education and counselling prior to engagement in sexual activity. However, healthcare services have faced cuts reducing their ability to manage the results of unprotected sex including pregnancy, STIs and sexual violence (40).

Youth are at risk of poorer outcomes as a result of reduced access to treatment, due to difficulty travelling to the location of clinics, inconvenient opening times and unaffordability. Risk factors are not uniform across the demographic; therefore, youth cannot be considered a subpopulation. Inevitably, concurrence of young age with the above risk factors, namely adolescent sex workers and young men who have sex with men, is also associated with heightened risk. Generally, STI incidence is greater in those who do not attend school. However, in regions where STI prevalence is high, most adolescents including those attending rural schools are at risk (40).

Women

Girls and women are at an increased risk of acquiring STIs due to higher likelihood of early marriage and therefore early first sex (40). In adulthood, although women and men are at equal risk of STIs women more frequently experience complications such as PID and cervical cancer. The efforts to respond to this issue are hindered by lack of data stratified by sex (3).

Gender-based inequalities and sexual violence also add to the higher STI risk among girls and women. The inflammation of female genital mucosa resulting from STIs together with damage to the epithelial barrier cause lesions in the genital tract that increase the risk of acquiring subsequent STIs, especially HIV (42). Damage to the genital mucosa can also occur when women are subjected to sexual violence, as physical abrasion of the mucosa increases pathogenic penetration. Women who are in physically and sexually abusive relationships have limited control over condom usage and men who abuse their female partners are more likely to exhibit STI associated risk behaviours, such as multiple sexual partners and engaging in sexual activities with sex workers. Women living with violent partners may also have reduced access to STI care and prevention services, as they may not know of the STI status of their abusive partner and may avoid seeking care themselves in fear of punishment from their abusers if an STI diagnosis provoked questions about infidelity (43).

STIs in older adults

Globally, people aged 15-49 years old have the greatest prevalence of STIs (3) but STI incidence among adults over 50 years old is increasing rapidly, particularly in high income regions such as North America (44), Europe (45, 46) and Australia (47), although data are limited. People are remaining sexually active for longer and engaging in sexual activity with multiple partners as a result of longer life expectancy, the widespread availability of erectile dysfunction medication and high divorce rates (48, 49). Older adults may be at increased risk of engaging in risky sexual behaviours, such as unprotected sex, due to a lack of knowledge and awareness of STIs, absence of targeted sexual health campaigns and commonly held misconceptions, including the belief that the use of barrier methods is no longer necessary after menopause (49-51). Moreover, perceived stigma around discussing sex and sexual health, and fear of age-related discrimination, have been highlighted as causes of the low levels of sexual health related help-seeking behaviour exhibited by older adults (49). Finally, the desexualisation of older adults increases the likelihood of missed or late STI diagnoses, as symptoms may be misdiagnosed by clinicians as common illnesses or age-related conditions (52).

STIs in understudied groups

To date, there is limited data describing STIs in refugee and migrant populations, the Roma and other traveller communities, incarcerated women, homeless people and other marginalised groups (53-55). Failure to study and assess the needs of these populations is not only discriminatory but also hinders the provision and uptake of essential STI care and prevention services, and addressing this is essential to align with the strategies proposed by international organizations to ensure appropriate provision of STI services (56).



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Many Roma communities live in poverty with limited access healthcare (53, 54). Without specific research, it is impossible to analyse how different measures affect the rates of STIs within these communities, reducing the incentive for governing bodies to introduce policies and programmes tailored to the group's specific needs. Homeless people is another neglected group in STI healthcare provision. Studies comparing homeless youth with housed youth demonstrate increased likelihood of risky behaviours including inconsistent condom use, multiple sexual partners, survival sex and alcohol or drug use among members of the latter group, putting them at increased STI risk. Variation in the definition of homelessness also poses a barrier to estimating the prevalence of STIs in this group (57). Finally, incarcerated women are consistently underrepresented in research worldwide although STIs are on the rise within this population group due to multiple sexual partners, inconsistent condom use and previous STIs. This is in combination with prison systems that often cannot provide appropriate health care for women, making them even more vulnerable (55).

STIs in pregnancy and mother to child transmission (MTCT)

The high prevalence of STIs among pregnant women remains a considerable contributor to maternal and neonatal mortality and morbidity worldwide. Curable STIs are associated with a myriad of adverse outcomes including maternal sepsis, neonatal prematurity, birth defects, eye infections, pneumonia, low birth weight, stillbirth and death (58). Therefore universal screening and timely treatment for STIs is recommended as an essential part of routine antenatal care by WHO (59), supported by evidence that antenatal STI testing is feasible and cost-effective (60). Nevertheless, uptake is lacking - only 14 countries had policies recommending antenatal chlamydia, gonorrhoea and trichomoniasis screening in 2015 (61). Furthermore, despite continued efforts to combat the spread of syphilis which have made antenatal tests widely available in most countries, only 23 of 79 are testing more than 95% pregnant women during the 1st trimester and 25 testing less than 50% (62). Even in high income countries like the US, the number of congenital syphilis cases are on the rise (44). Worldwide, syphilis prevalence among pregnant women is 2 million (63). Half of these will lead to adverse neonatal outcomes (64), with an 87% rise in worldwide congenital syphilis cases in the last 5 years (44). The WHO Global STI Strategy has set an ambitious target of less than 50 cases of congenital syphilis per 100,000 live births in 80% countries by 2030 (59). A considerable input from various public sectors is required to ensure the successful fulfilment of this goal.

Availability and delivery of timely interventions is a key continuation of implementing widespread antenatal screening. Trichomoniasis is widespread across pregnant women in Southern Africa and Asia, and when untreated increases the risk of preterm delivery and low birth weight (65). The huge number of stillbirths caused by syphilis could potentially be prevented with a single dose of penicillin to the mother (62) and the rate of MTCT during birth is 50% for untreated chlamydial and gonorrhoeal infections (66). Ophthalmia neonatorum is the major complication of neonatal chlamydia and gonorrhoea, developing in 30-50% of infected infants (67, 68) and risking corneal ulceration, perforation and blindness (69). Additionally, The risk of MTCT of HIV is increased in the presence of untreated curable STIs (70). Further to ensuring availability of treatment, the rising prevalence of antibiotic resistance and limited options for penicillin allergic women are issues that need to be addressed (58).

Although declined in recent years, HIV prevalence remains high among pregnant women in Africa at 5.3% (71) and MTCT accounts for the majority of HIV infections in children. Screening and timely interventions in seropositive mothers can drastically reduce MTCT of HIV, from 15-45% without intervention to <5% with antiretroviral therapy to mother and baby, elective Caesarean-section and avoidance of breast-feeding (62). Preventative programmes have resulted in 1.4 million less HIV infected children between 2010 and 2018 (72). Post-test HIV counselling of HIV positive mothers is crucial for this (62). If initiated early in pregnancy, triple antiretroviral therapy has also been shown to reduce MTCT of HIV by 43% even in breastfeeding HIV positive mothers who cannot safely feed their babies with formula (73), illustrating the need for a continuous supply of antiretroviral agents to poorer communities.

Another sexually transmitted virus, HSV type 2 has been synergistically related with HIV infection (74, 75) and is highly prevalent in poor settings such as sub-Saharan Africa where 75% of women aged >25 are infected (76). Most women are asymptomatic or might present with mild skin lesions, but neonatal herpes, mostly acquired during delivery and affecting 1 in 4 infected neonates, can have serious sequelae or be fatal (77). Although treatment with antiretroviral agents has demonstrated reduction in MTCT during delivery by 75% there is insufficient evidence surrounding the effect this has on neonatal HSV (78). More research is warranted, together with incorporation of routine HSV screening into antenatal care and better diagnostic



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tools to evaluate maternal skin lesions.

HBV is endemic worldwide with 257 million people affected including 65 million women of childbearing age. Southeast Asia, sub-Saharan Africa and China are most severely affected with prevalence as high as 20% (79, 80). As 95% of E-antigen positive mothers transmit HBV to their babies and 95% of neonates infected in this way become chronic HBV carriers, with subsequent health risks related to chronic infection, WHO has identified MTCT as a key target for reducing global HBV prevalence (81). Therefore, antenatal HBV screening is recommended with HBV vaccination offered to all at-risk women (79). The development of a vaccine has been a huge advancement in combating the spread of HBV, with WHO advocating 90% of infant immunization by 2030. The current uptake is at 84%, unchanged between 2015 and 2017 (59, 79).

The burden of curable STIs is particularly high among pregnant women in low- and middle- income countries (82). This is not reflected by the research efforts, however, with disproportionately more published evidence on STIs in pregnancy from developed countries (83). Challenges also exist in implementing the universal provision and uptake of antenatal screening recommended by WHO. For example, dual HIV/syphilis testing uses an inexpensive and rapid test that requires minimal training and is cost-effective (84). Although this has already been implemented in some low-income settings, provision is still lacking and there are high false positive rates in areas where malaria is endemic (59, 85). Barriers to receiving treatment after testing positive in poorer settings include the limited supply of antibiotics and antiretroviral agents and geographical distance from a healthcare facility leading to non or late attendance (82).

Antimicrobial Resistance

Antimicrobial resistance (AMR) occurs as a result of microorganisms changing when exposed to antimicrobial drugs, such as antibiotics, resulting in antimicrobials becoming ineffective (86). Common bacterial STIs, including chlamydia, syphilis and gonorrhoea, are generally curable with antibiotics. However, in recent years, resistance of these STIs to antibiotic treatment has increased dramatically (87), causing the STIs to become increasingly difficult to treat or completely untreatable, posing a major threat to global public health (88). Gonorrhoea, caused by the bacteria *Neisseria gonorrhoeae*, has developed the greatest resistance to antibiotics thus far, with multidrug-resistant strains which fail to respond to all available antibiotics already detected (87, 89). The widespread AMR in these bacteria exists, and is likely to worsen, as a consequence of the high number of infections, misuse and overuse of antimicrobials, limited surveillance of AMR and the capacity of the bacteria themselves to develop AMR (88, 90). In order to combat AMR and reduce its impact, these factors must be addressed on a local, national and international level.

Current Strategies

Various measures exist which can effectively reduce the transmission of STIs. Barrier contraception, testing and treatment, partner notification, vaccination, prophylaxis and circumcision have all been shown to reduce transmission rates for different bacterial and viral infections (8). The varying health infrastructure globally and within countries in addition to the disparities in risk which exist between populations necessitate tailored prevention and treatment programmes for STIs.

STI Surveillance is widely recognised as a key aspect of prevention strategies. STI surveillance allows governments and agencies to monitor the scale of epidemics as well as both the demographic and geographic distribution of infections. Case reporting of notifiable diseases and prevalence monitoring can provide useful information contributing to the understanding of STI infections in the general population or specific populations where infections are known to be more common. However, neither measure can adequately determine the reasons underlying the observed disparities between different population groups. Behavioural surveillance which incorporates additional information regarding behavioural risk factors can contextualise local incidence and prevalence data allowing exploration of the factors driving the evolution of epidemics and the identification of higher risk subpopulations (6). Limited workforce capacity for STI prevention does not always support routine data analysis of this nature and so opportunities to tailor prevention programmes are lost (91).

Screening allows for the identification of asymptomatic carriers of infection and is vital within STI prevention as they commonly present without symptoms (92, 93). Specific screening criteria can assist health departments to make more efficient use of limited resources and the data from surveillance can contribute



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to the design of these criteria (6). Once criteria are identified, continuing education of healthcare providers is important to ensure routine screening of at risk populations (94).

Partner notification or partner referral is an important tool for preventing further transmission. Typically the patient or their healthcare professional will contact the patient's sexual partners to notify them of the possibility of infection by an STI and invite the partner for screening (6). A sense of shared responsibility within a romantic relationship can increase likelihood of self-referral whereas in a sex only relation without this shared responsibility, STI stigma may dissuade the patient from informing the partners of their diagnosis (6). Therefore, the professional must understand the nature of the relationship to successfully select a referral strategy.

Expedited partner therapy where a patient is provided with prescriptions or medications for the treatment of their sexual partner without contact between the provider and the partner directly is an option when referral is impractical or unlikely to be successful. This strategy however is controversial in instances where comorbidity is likely such as in the MSM population when HIV may be undiagnosed and the opportunity to do so is lost in the absence of patient contact (6).

Behavioural interventions designed to identify and modify sexual behaviour or healthcare seeking behaviours can be an effective risk reduction strategy in relation to STIs. The interventions must be tailored for the specific social and cultural attributes of their target populations or they risk poor engagement. In communities with high levels of distrust for the medical profession the use of local community leaders can positively influence engagement with the programmes. These intervention programmes can be time and labour intensive and so barriers to this commitment for participants must be addressed for successful engagement. Provision of childcare, transportation and meals can be used to overcome barriers to engagement however the specific challenges may differ between communities. Again, figures embedded within the target community can be best placed to address each community's specific needs (6).



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