MICROBIOLOGICAL SURVEILLANCE OF SEXUALLY TRANSMITTED INFECTIONS IN JOHANNESBURG, GAUTENG PROVINCE, 2013-2014

Frans Radebe, Gloria de Gita, Melt Ndlovu, Alex Vezi, Valentia Kekana, Vanessa Maseko, Simbarashe Takuva

Centre for HIV and STIs, NICD

Introduction

According to 2008 WHO estimates, 499 million new cases of curable sexually transmitted infections (STIs) occur annually throughout the world in adults aged 15-49 years.[1] In developing countries, STIs and their complications rank in the top five disease categories for which adults seek health care. Surveillance of the prevalence of STIs is as a key priority in public health. Accurately monitoring the incidence and prevalence of STIs among the population and particularly STI patients is important in terms of measuring the effects of disease control and prevention.

The syndromic approach to the treatment of STIs has been vital in rationalizing and improving the management of these infections.[2] STI control in low-income countries is shaped by case management guidelines promoting syndromic management. The syndromic approach does not require identification of the underlying aetiology. Instead, it is based on the identification of a syndrome ie., a group of symptoms and easily recognizable signs associated with a number of well-defined aetiologies. Treatment is provided locally for the majority of the organisms responsible for each syndrome.[2,3]

The common STI syndromes are vaginal discharge syndrome (VDS) – women presenting with genital discharge, male urethritis syndrome (MUS) – males presenting with penile discharge, and genital ulcer syndrome (GUS) in both men and women. Syndromic management is simple, assures rapid, same-day treatment, and avoids the expensive diagnostic tests that are often unavailable in resource-limited settings. Periodic aetiological surveillance of STI syndromes is a critical component of the syndromic management approach of STIs as it validates existing algorithms and ensures that all major pathogens are covered in treatment algorithms.

The aim of this survey in Johannesburg, South Africa, was to determine a) the aetiology of the male urethritis syndrome (MUS), vaginal discharge syndrome (VDS) and genital ulcer syndrome (GUS); b) the prevalence of HIV co-infection in patients with these STI syndromes; and c) the antimicrobial susceptibility of Neisseria gonorrhoeae isolates to cefixime, ceftriaxone and ciprofloxacin. A total of 437 consecutive STI patients were recruited (186 VDS, 196 MUS and 55 GUS). Pathogens were detected by multiplex polymerase chain reaction (M-PCR) on swabs collected from these cases. Smears from VDS cases were examined for the presence of bacterial vaginosis (BV) and candidiasis by microscopy.

Aetiology of common STI syndromes

During the 2013 and 2014 surveys, *Neisseria gonorrhoeae* remained the most common aetiological agent detected (80.1%, 157/196) followed by *Chlamydia trachomatis* (28.6%, 56/196) among males with male urethritis syndrome, and among females with vaginal discharge syndrome, bacterial vaginosis was the most common aetiological agent followed by *Candida* sp. and *Trichomonas vaginalis* (102/184 - 55.4%; 41/184 - 22.3%; and 37/186 - 19.9%, respectively). These data are shown in tables 1 and 2. In both the 2013 and 2014 surveys, herpes remained the most frequent cause of genital ulceration, accounting for 68.1% (32/47) and

61.8% (34/55) of GUS cases detected by M-PCR respectively. Syphilis was the second most frequent cause of genital ulceration. No lymphogranuloma venereum (LGV), chancroid and donovanosis cases were detected in 2014 (table 3). There was a statistically significant decrease in the relative prevalence of *Trichomonas vaginalis* (TV) in women between 2013 and 2014. Syphilis remained an infrequent but important cause of genital ulceration and no cases of lymphogranuloma venereum were observed.

HIV co-infection amongst STI patients remained relatively high in 2014. In 2014, HIV co-infection was 30.1% among those with male urethritis syndrome, 40.3% among those with vaginal discharge syndrome and 46.3% among those with genital ulcer syndrome. HIV co-infection rates in 2014 were not significantly different from those in 2013 (table 4).

Table 1: The prevalence (%) of STI pathogens in patients presenting with male urethritis syndrome in Johannesburg during 2013 and 2014.

Pathogen	2013 (n=111)	2014 (n=196)	*P value
Neisseria gonorrhoeae	83.9	80.1	0.45
Chlamydia trachomatis	28.8	28.6	1.00
Mycoplasma genitalium	7.2	6.1	0.53
Trichomonas vaginalis	4.5	3.1	0.81

* P values reflect significance of difference between 2013 and 2014 data based on Fischer's exact tests.

Table 2: The prevalence (%) of STI pathogens and bacterial infections in patients presenting with vaginal discharge syndrome in Johannesburg during 2013 and 2014.

Pathogen or condition	2013 (n=190)	2014 (n=186)	*P value
Neisseria gonorrhoeae	17.9	17.7	1.00
Chlamydia trachomatis	16.8	19.9	0.51
Trichomonas vaginalis	31.6	16.1	**0.001**
Mycoplasma genitalium	13.8	11.3	0.53
Bacterial vaginosis	55.3	55.4	0.16
Candidiasis	18.9	22.3	0.90

* P values reflect significance of difference between 2013 and 2014 data based on Fischer's exact tests.

Table 3: The prevalence (%) of STI pathogens amongst patients with genital ulcer syndrome in Johannesburg during 2013 and 2014.

Pathogen	2013 (n=47)	2014 (n=55)	P value
Herpes simplex virus	68.1	61.8	0.54
Treponema pallidum	4.3	3.6	1.00
Haemophilus ducreyi	0.0	0.0	-
Chlamydia trachomatis L1-L3	2.1	0.0	0.46
Klebsiella granulomatis	0.0	0.0	-
No pathogens detected	27.7	34.6	0.52

* P values reflect significance of difference between 2013 and 2014 data based on Fischer's exact tests.

Table 4: HIV seroprevalence (%) amongst patients presenting with male urethritis syndrome (MUS), vaginal discharge syndrome (VDS) and genital ulcer syndrome (GUS) in Johannesburg during 2013 and 2014.

Syndrome	2013	2014	P value
MUS	31.5	30.1	0.80
VDS	41.8	40.3	0.06
GUS	57.5	46.3	0.32

* P values reflect significance of difference between 2013 and 2014 data based on Fischer's exact tests.

Antimicrobial Susceptibility

All isolates of *Neisseria gonorrhoeae* were susceptible to the cephalosporin antibiotics cefixime and ceftriaxone. Above forty percent of *Neisseria gonorrhoeae* isolates (41.7%, 71 /151) were resistant to ciprofloxacin. This was similar to data from 2013 (43.9%, 40/92).

Conclusions

Gonorrhoea remained the commonest cause of male urethritis syndrome whereas bacterial vaginosis showed the highest prevalence among females with vaginal discharge syndrome. Amongst females, *Neisseria gonorrhoeae*, *chlamydia trachomatis*, *trichomonas vaginalis* and *mycoplasma genitalium* all showed a prevalence range of 11-20%. These findings support current STI syndrome treatment algorithms for each pathogen.[4]

Oral cefixime is the current first line antibiotic of choice in South Africa for the treatment of gonorrhoea. Intramascular ceftriaxone is the recommended alternative. In this survey, all *Neisseria gonorrhoeae* isolates (100%) were susceptible to these cephalosporins. Conversely, above 40% of *Neisseria gonorrhoeae* isolates (41.7%) were resistant to the oral flouroquinolone ciprofloxacin. Ciprofloxacin is no longer recommended in South Africa as part of the treatment regimen for any genital discharge syndrome.

HIV co-infection was high amongst the survey participants. Sexually transmitted infections facilitate the transmission and acquisition of HIV-1.[5] In addition, HIV-1 infected persons with STIs are at increased risk of transmitting HIV-1 because genital tract shedding of HIV -1 is elevated in the presence of genital tract inflammation.[6,7] STI control programmes need to be embedded in HIV care and treatment programmes and vice-versa in order to achieve optimal benefit in ameliorating the impact of HIV/AIDS and STIs.

Acknowledgements

Special thanks to the STI Unit surveillance clinical team: Melt Ndlovu, Alex Vezi, Valentia Kekana and Mr. Maluleke as well as staff at the Alexandra Health Centre and Laboratory staff at the STI Unit. This surveillance programme is funded by the Centre for HIV & STIs, NICD/NHLS and the National Department of Health.

References

1. Global incidence and prevalence of selected curable sexually transmitted infections – 2008. World Health Organization, Dept. of Reproductive Health and Research. Available: http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/. Accessed 30 0ctober 2014.
2. World Health Organization. Guidelines for the management of sexually transmitted infections. Available at: http://www.who.int/reproductive-health/publications/mngt_stis/index.html Accessed 30 0ctober 2014

3. Vuylsteke B. Current status of syndromic management of sexually transmitted infections in developing countries. *Sex Transm Infect* 2004; 80:333-334 doi:10.1136/sti.2004.009407.
4. National Department of Health. First line comprehensive management and control of sexually transmitted infections (STIs): protocol for the management of a person with a sexually transmitted infection according to the Essential Drug List. Pretoria: National Department of Health, 2008: 1-18.
5. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect* 1999; 75(1):3-17.
6. Cohen MS, Hoffman IF, Royce RA, Kazembe P, Dyer JR, Daly CC, et al. Reduction of concentration of HIV-1 in semen after treatment of urethritis: implications for prevention of sexual transmission of HIV-1. AIDSCAP Malawi Research Group. *Lancet* 1997; 349(9096):1868-73.
7. Johnson LF, Lewis DA. The effect of genital tract infections on HIV-1 shedding in the genital tract: a systematic review and meta-analysis. *Sex Transm Dis* 2008; 35(11):946-59.