

Sexually-transmitted Diseases in Singapore-Trends in the Last Two Decades

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Abstract

*We review the epidemiology and trends of sexually transmitted diseases (STDs) in Singapore from 1977 to 1996. There has been a progressive decline in the incidence of bacterial STDs over the period of observation. However, viral STDs have not shown the same trends, remaining at a relatively constant level. Early detection and treatment of STDs, and health education and prevention measures targeting sex workers have been a major factor in controlling STDs. Vigilant monitoring of antibiotic resistance patterns in *Neisseria gonorrhoeae* has allowed timely changes to recommended treatment regimens. The advent of the human immunodeficiency virus (HIV) infection pandemic in the 1980s and public education campaigns have contributed to the success of the STDs control programme. In view of the incurable nature of many viral STDs, prevention and counselling have become a cornerstone of STD control. Surveillance and monitoring of STD trends will continue to provide important information regarding the effectiveness of existing health programmes and help us formulate new plans for the future.*

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Introduction

There has been a change in the trends of sexually transmitted diseases (STDs) in Singapore.¹ Important advances in medicine, particularly the development of antibiotics, have resulted in effective treatment for many bacterial STDs. Increasing public awareness and health education programmes have been introduced to prevent STD transmission. In addition, the human immunodeficiency virus (HIV) pandemic has influenced social and sexual behaviour to a certain extent.² On the other hand, increasing affluence and globalisation of the economy result in increased travel and high-risk behaviour.

STDs result in unnecessary human suffering and financial cost. Some STDs can be cured, but for others there is no effective treatment. All STDs, however, can be prevented and therefore health education and prevention programmes play a very important role in STD control. To be able to implement effective policies and programmes, it is necessary to monitor trends in STDs.

We present the epidemiology and trends of STDs in Singapore from 1977 to 1996. A detailed discussion of the epidemiology of HIV infection is beyond the scope of this article.

Methods

Under the Infectious Disease Act, acquired immunodeficiency syndrome (AIDS), HIV infection, chancroid,

syphilis (all types), gonorrhoea and non-gonococcal urethritis must be notified in Singapore. The notifications are pooled from several sources: medical practitioners in private and institutional practice, and the public STD clinic, which was formerly in the Middle Road Hospital but, since 1988, has moved to Kelantan Road. STD notifications are collated by the Department of STD Control (DSC), which is run by the National Skin Centre for the Ministry of Health. Since 1992, STD statistics have been entered into a computerised database in the DSC. Our findings in this article are derived from collated data from August 1977 to 1996; however, complete annual notifications are available only from 1978. Some of the data concerning non-notifiable STDs e.g. genital herpes and genital warts were collated mainly from the public STD clinic and not necessarily representative of the general population at large.

Results

Figure 1 shows the declining number of all STDs notified in Singapore, from 22 427 in 1978 to 5570 in 1996. Figure 2 shows the incidence of STDs expressed in cases per 100 000 population, which was 953 in 1978 and 183 per 100 000 in 1996. Figure 3 categorises the STDs according to age groups. Since 1977, the highest proportion of STDs has consistently been in the 20 to 29 years age group.

Figure 4 shows the steady decline of gonorrhoea over the last two decades from 15 098 in 1978 to 1419 cases in

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1996. There has also been a steady decline in the number of cases of gonococcal ophthalmia neonatorum, with only one case reported in 1996.

Though the incidence of all types of syphilis has declined over the years, there has been an upward trend recently (Fig. 5). A total of 1445 cases were reported in 1978 and this decreased to 731 in 1991. Since then, the numbers increased gradually to 1172 cases last year. However, Figure 6 indicates that the incidence of *infectious* syphilis has fallen dramatically from 345 cases (279 males + 66 females) in 1978 to 126 cases (92 males + 34 females) in 1996. This was accompanied by an increase in the incidence of *non-infectious* syphilis from 1992 (Fig. 7) which contributed to the overall increase in all cases of syphilis since that year. There were 1080 cases (560 males + 520 females) of non-infectious syphilis detected in 1978 and this fell to 344 cases (210 males + 134 females) in 1991. The figures have been increasing ever since, reaching a total of 1045 cases (718 males + 327 females)

in 1996. Infectious syphilis is defined as primary or secondary syphilis, whereas non-infectious syphilis is defined as latent or tertiary syphilis. Congenital syphilis has also shown a dramatic drop in incidence, from 20 cases in 1978 to only one in 1996.

Figure 8 shows the dramatic decline in the incidence of chancroid over the years. The trend for non-gonococcal urethritis (NGU) has however been less remarkable (Fig. 9). There was a steady decline from the peak in 1982 (2342 cases) to 1989 (890 cases). However, this trend has since reversed and levelled off with 1198 cases notified in 1996. The low figure in 1989 is probably artefactual; it was in 1989 that the STD clinic moved to Kelantan Lane, and in the process many patients were probably seen in private clinics and therefore not reported.

A steep upward trend is seen for vaginal discharge (moniliasis, trichomoniasis and chlamydial infections)

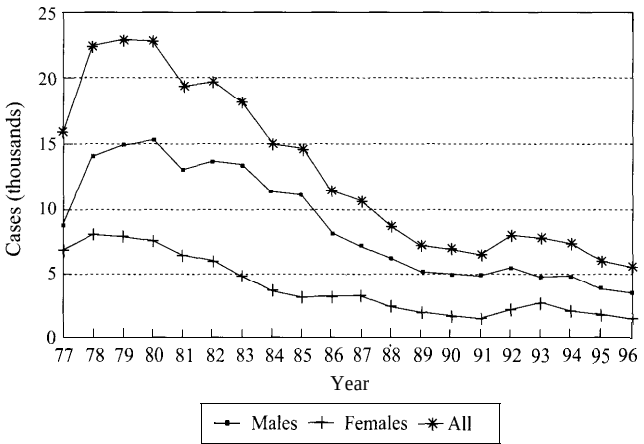


Fig. 1. Sexually-transmitted disease incidence

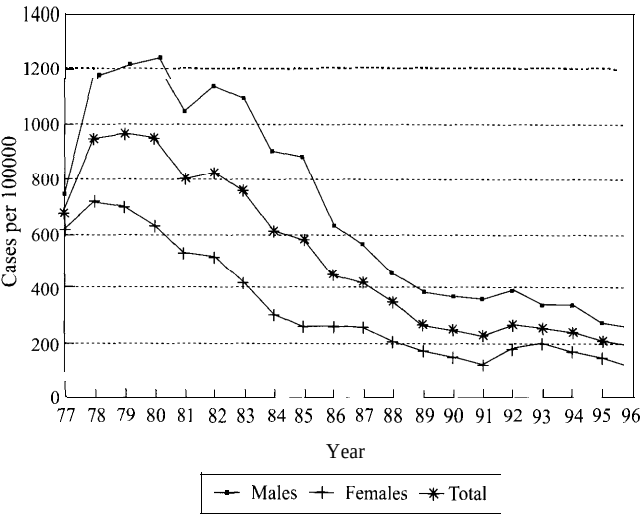


Fig. 2. Sexually-transmitted disease incidence.

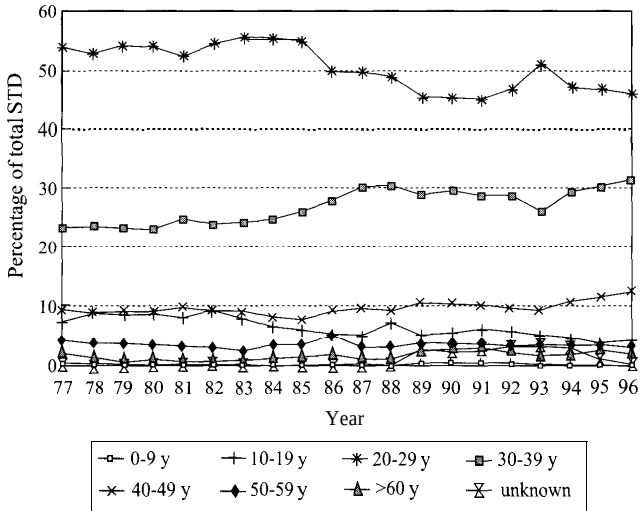


Fig. 3. Age specific sexually-transmitted disease incidence.

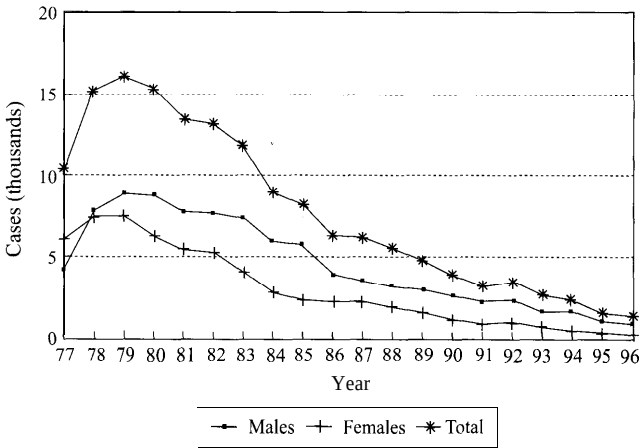


Fig. 4. Gonorrhoea (all notifications)

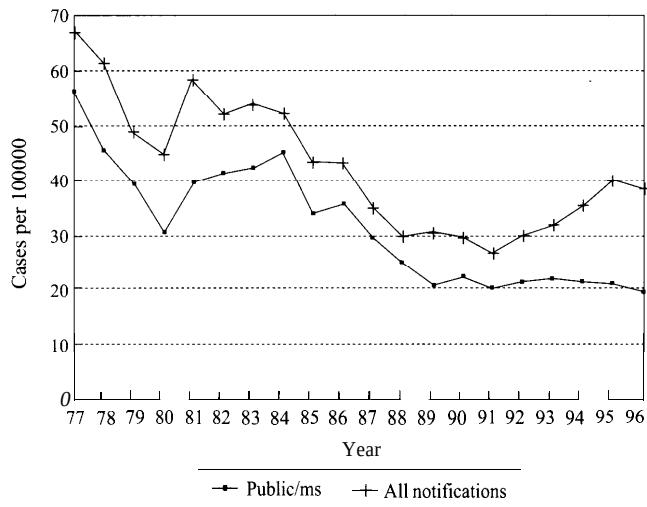


Fig. 5. Syphilis (all notifications)



Fig. 6. Syphilis-infectious (all notifications).



Fig. 7. Syphilis-non-infectious (all notifications).

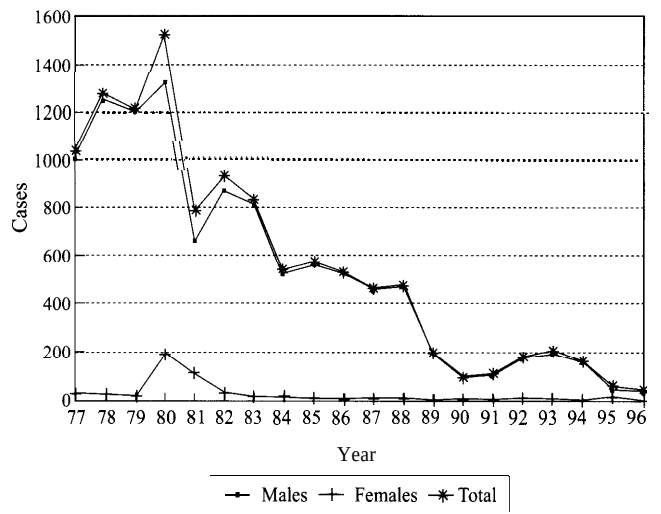


Fig. 8. Chancroid (all notifications).

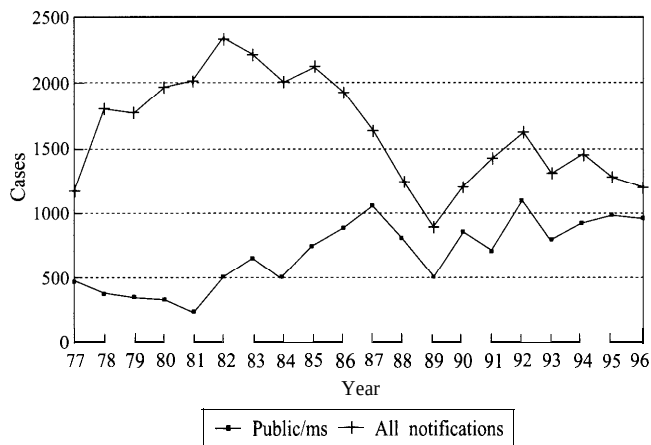


Fig. 9. Non-gonococcal urethritis.

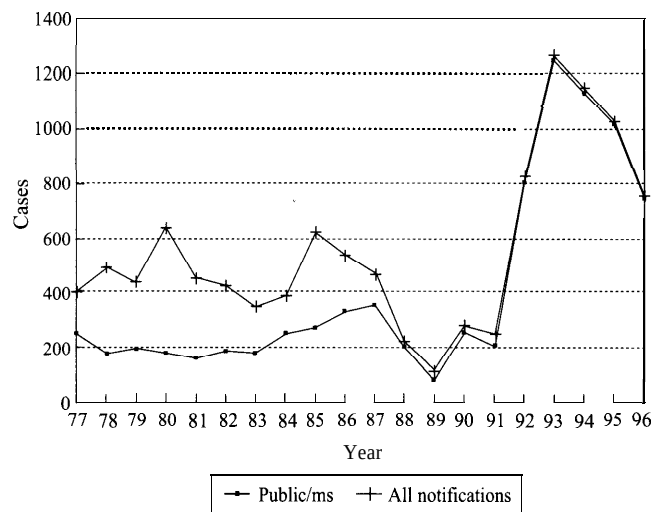


Fig. 10. Vaginal discharge.

in 1992 and 1993 (Fig. 10). The bulk of this is due to chlamydial infections. This coincided with the introduction of monthly cervical smears for *chlamydia trachomatis* for sex workers under the Medical Surveillance Scheme (MSS) in September 1992. There were 245 cases detected in 1991, increasing to 1272 in 1993, but subsequently falling to 754 cases in 1996.

In contrast, viral STDs do not appear to be decreasing. The incidence of genital warts has fluctuated over the last two decades (Fig. 11). It reached a peak of 578 cases in 1979 and a trough of 137 cases in 1988. Subsequently there has been an upward trend to 561 cases in 1993 and levelling off at 379 cases last year. There has been a slow increase in the incidence of genital herpes (Fig. 12) from 175 cases in 1977 to 700 in 1993, the last three years have shown a decline, there were 429 cases in 1996. However, genital herpes is the only STD which is clearly more common now than when data were initially collected in 1977.

In 1976, the Ministry of Health introduced the Medical Surveillance Scheme (MSS). This is a disease control programme for sex workers with the purpose of screening and early treatment of STDs. Sex workers were initially required to undergo fortnightly cervical tests for gonorrhoea and three-monthly serological tests for syphilis. Three-monthly serological tests for HIV antibody were added since 1985. In September 1992, monthly cervical smears for chlamydia antigen detection using EIA were introduced. The MSS is administered by the DSC. Figure 13 shows the declining rates of positive gonococcal cultures in sex workers from 1977 to 1996 (inclusive of all types of gonorrhoea). Gonorrhoea is a good marker of other STDs and unprotected intercourse, this is because it has a short incubation period, can be confirmed quickly by cultures and is curable.

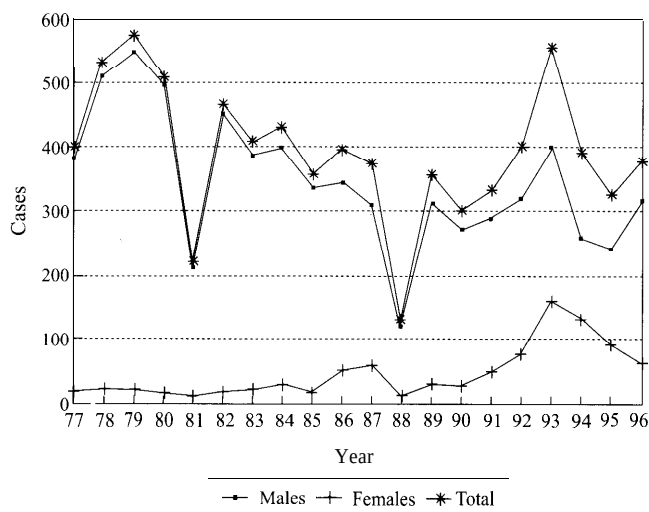


Fig. 11. Genital warts (all notifications).

Since 1993 we have been analysing the effectiveness of the MSS in controlling STD among sex workers.³ Sex workers were divided into three groups: group 1, which consisted of "old" members who are already registered with the MSS; group 2, which consisted of "new" sex workers who have applied to join the scheme and most of whom were already in the trade; and group 3, which consisted of "freelance" workers who were arrested by the anti-vice police for illicit prostitution (AV). All three groups were screened for gonorrhoea, chlamydia, syphilis and HIV infection. Figure 14 shows the cervical gonorrhoea infection rate from 1993 to 1996. The highest infection rates were found in groups 2 and 3 and the lowest in group 1. This pattern is repeated in Figure 15 which shows the infection rates for cervical chlamydia, in Figure 16 which shows the rates for syphilis, and in Figure 17 which shows the rates for HIV. The incidence of new HIV infections was approximately 0.5% among the "old" registrants of the MSS.

In addition to having the lowest infection rates of all the three sex worker categories, "old" registrants in the MSS have also demonstrated a decreasing trend in all STDs monitored over the last 4 years. From the different STD infection rates of the three groups, we can conclude that the MSS is an effective programme in reducing STD infections in sex workers.

The prevalence of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) has been rising over the years (Fig. 18) in tandem with worldwide trends, accounting for 53.9% of all strains isolated by the Department of Pathology, Singapore General Hospital in 1996. We are also seeing a rising incidence of ciprofloxacin resistance. There were no strains resistant to ciprofloxacin in 1991, but this has been increasing steadily, reaching 3.5% last year (Fig. 19). A recent retrospective study done at the

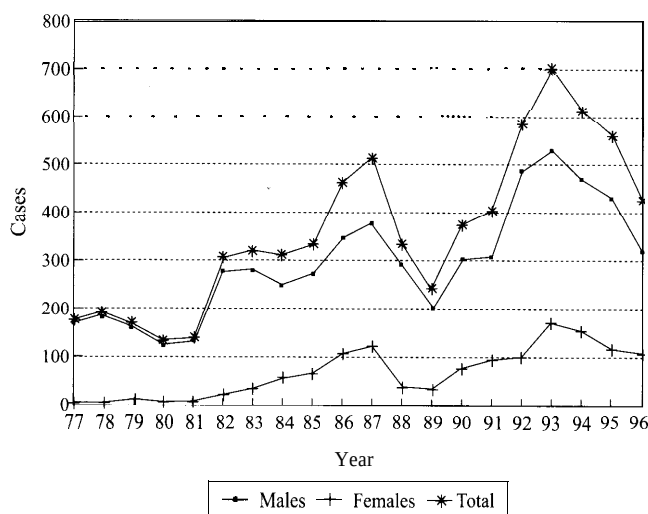


Fig. 12. Genital herpes (all notifications)

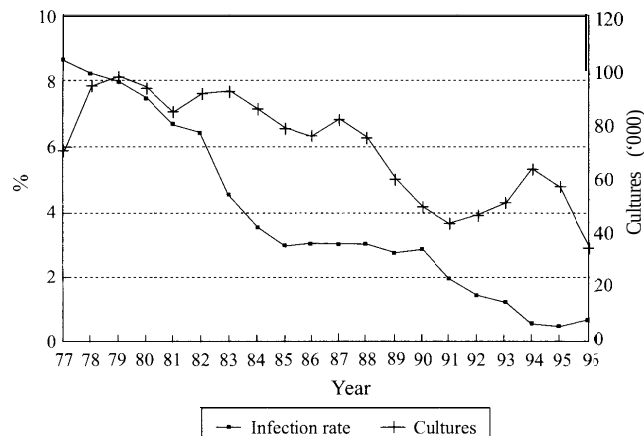


Fig. 13. Gonorrhoea in sex workers* 1977 to 1996.
*cervix, pharynx and rectum

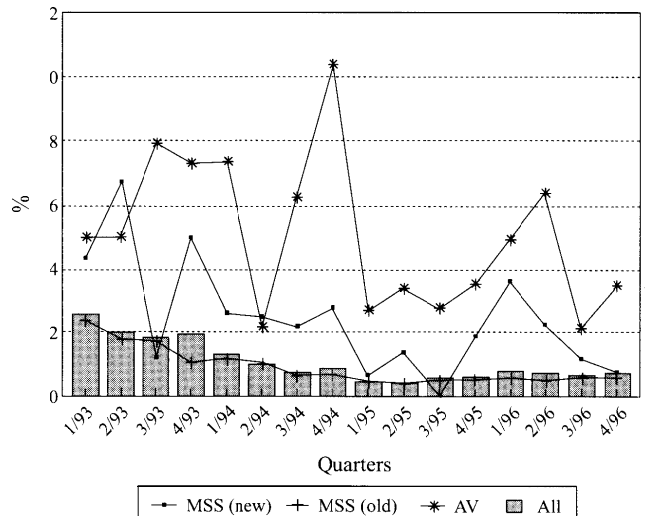


Fig. 14. Cervical gonorrhoea in sex workers.

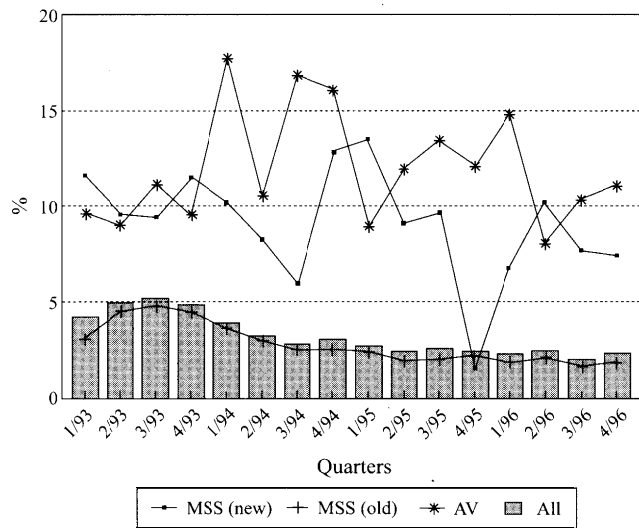


Fig. 15. Cervical chlamydia in sex workers.

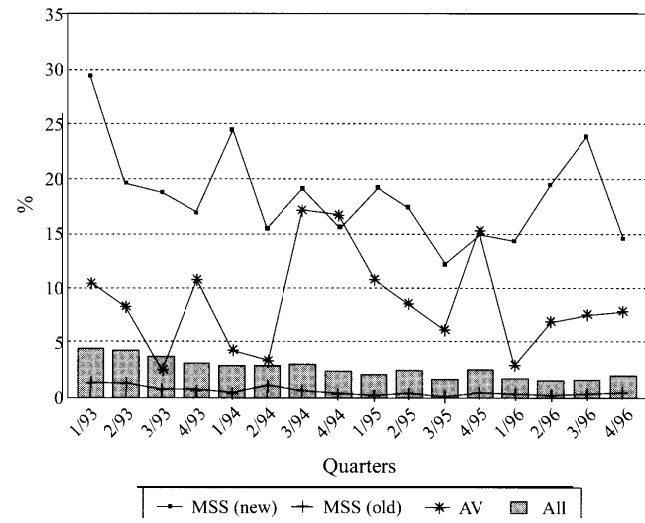


Fig. 16. Syphilis in sex workers.

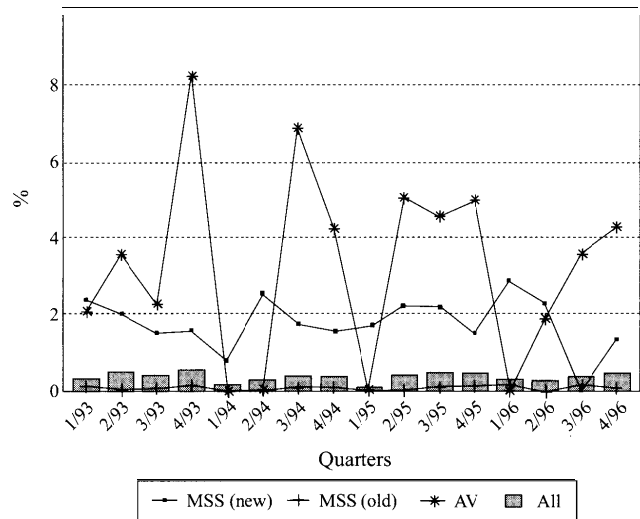


Fig. 17. HIV in sex workers.

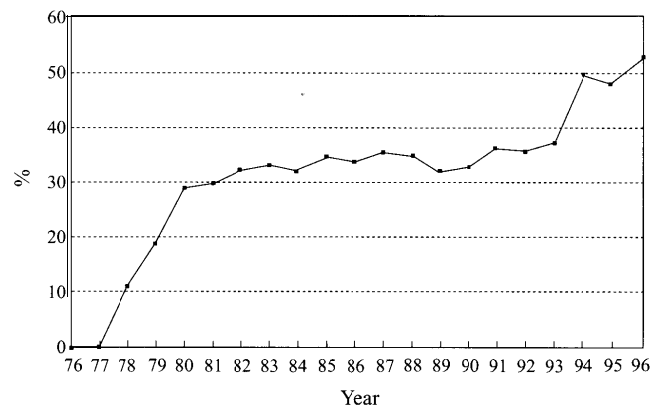
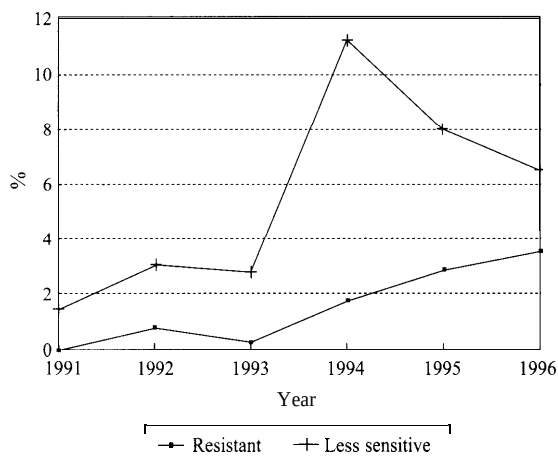


Fig. 18. Prevalences of PPNG.



Resistant ≥ 1.0 ug/ml
Less sensitive 0.5 to 0.125 ug/ml

Fig. 19. Ciprofloxacin resistance.

DSC aimed to correlate treatment failures of gonorrhoea with antimicrobial resistance (Ng and Chan, unpublished data). All cases of gonorrhoea treated at the DSC clinic in 1996 were reviewed. There were 694 cases of gonorrhoea treated at the DSC clinic in 1996, of which 563 were treated with oral ciprofloxacin 500 mg and the rest with intramuscular injections of ceftriaxone 250 or 500 mg. Of those in the ciprofloxacin group, 8 patients failed treatment (1.7%). All 8 patients were infected with PPNG, 6 were resistant to ciprofloxacin (MIC ≥ 1.0 ug/ml) and 2 were less sensitive (0.125 to 0.5 ug/ml). All 8 strains were sensitive to ceftriaxone. These patients were retreated with intramuscular ceftriaxone, and cure was documented in 6 patients. There was one failure with ceftriaxone in a patient complicated by epididymo-orchitis. Two patients defaulted follow-up. This study demonstrated that cases of failed treatment of gonorrhoea are mostly due to ciprofloxacin resistance.

Discussion

Data show a downward trend of STDs in Singapore over the last two decades. This is due mainly to the decrease in bacterial STDs. Several reasons could account for this observation. Early detection, effective antibiotics and treatment guidelines have no doubt been important. However, health education and prevention programmes are also important.

The MSS is one such programme as it targets the high risk groups which have high STD infection rates. It also indicates the source of STD transmission e.g. in 1996, 44% of gonorrhoea were reported to have been contracted from sex workers either locally or abroad. Education of sex workers in the MSS has been developed and implemented in Project Protect I (1992) and II (1995). In the former, all brothel-based sex workers were asked to

attend a 3-hour safe-sex education intervention session which consisted of lectures, video presentations and role-playing. We found that while the programme improved the HIV/STDs knowledge of the sex workers, it did not influence the rates of condom usage or incidence of gonorrhoea.⁴

In Project Protect II, the intervention programme concentrated on developing sex workers' condom negotiating skills, and on gathering support from peers, brothel keepers, and health staff in promoting condom use. The intervention group showed a statistically greater improvement in negotiating skills as compared to controls, and cumulative gonorrhoea incidence declined considerably and significantly compared to the control group." Lessons learned from this study have been adopted and implemented in the Expanded Project Protect (EPP) which is ongoing, and includes all registered sex workers in the MSS.

In order to reach out to part-time sex workers in the entertainment industry, Projects Masseuses and Bar-Nightclub-Lounge (BNL), which targeted management and staff at these venues, were conducted in 1993 and 1995/6, respectively. Owners and managers of these establishments, masseuses, lounge hostesses and bargirls were invited for talks on STDs/AIDS and confidential HIV and syphilis tests were offered for these workers. The prevalence of syphilis was 0.87% and 1.7%, and the prevalence for HIV was 0% and 0.175% in masseuses and bar/lounge hostesses, respectively.⁶

Apart from public health programmes, other factors may influence STD trends. The public is now more educated about STDs and HIV infection and tends to seek treatment early.² The HIV pandemic has most certainly led to some alteration in social and sexual behaviour. The social stigma and mortality associated with AIDS have been used as deterrents to high-risk behaviour. This has been a major message of mass media health campaigns over the years.

In contrast to bacterial STDs, viral STDs have not decreased over the last twenty years. This may continue until more effective antiviral drugs and vaccinations become available. Until then, we will have to rely largely on prevention campaigns and individual counselling to control viral STDs.

The importance of monitoring the antibiotic resistance of *Neisseria gonorrhoeae* is evidenced by the rapid spread of PPNG as well as the emergence of resistance to ciprofloxacin. More than half the strains isolated now are PPNG. Since 1980, penicillin alone has not been recommended for the treatment of gonorrhoea in Singapore, and it was used for a while in combination with augmentin which inhibits the bacterial enzyme. First line treatments for gonorrhoea included kanamycin, spectinomycin and ceftriaxone in the 1980s.⁷

Ciprofloxacin 250 mg became the treatment of choice in 1993; this was increased to 500 mg in 1995 in view of rising ciprofloxacin resistance. Thus, laboratory monitoring of the resistance patterns guides antibiotic policies and implementation of new treatment guidelines. Our review of the antimicrobial minimal inhibitory concentrations indicates that ceftriaxone, spectinomycin and azithromycin are important alternatives for cases of treatment failures with ciprofloxacin.

In conclusion, effective STD control requires an orchestrated effort between clinicians, public health officials, social scientists, policy makers and others. Timely and effective clinical management and preventive measures remain the foundation of STD control. Monitoring of STD trends are necessary for the formulation of effective health programmes and treatment protocols.

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