

Surveillance and outbreak reports

SYPHILIS EPIDEMIOLOGY IN SWEDEN: RE-EMERGENCE SINCE 2000 PRIMARILY DUE TO SPREAD AMONG MEN WHO HAVE SEX WITH MEN

I Veľicko (inga.veľicko.smi.se)^{1,2}, M Arneborn¹, A Blaxhult¹

1. Department of Epidemiology, Swedish Institute for Infectious Disease Control, Solna, Sweden

2. Current affiliation: Department of Infectious Disease Epidemiology, Norwegian Institute of Public Health, Oslo, Norway

Syphilis has re-emerged in western Europe since 2000. Changes in sexual behaviour have facilitated the spread of syphilis especially among men who have sex with men (MSM) and improved surveillance systems and case detection have led to an increase in the reported numbers of cases. This report describes recent trends (2000-2007) of syphilis in Sweden, where the spread among MSM, particularly in the big cities, has been a major contributor to an increase in cases. Estimated syphilis incidence among MSM was up to twenty-eight times higher than in the general Swedish male population. The most affected age group among males was 25-44 years of age. The majority of infections in men and women through heterosexual contacts were acquired abroad whereas the majority of infections attributed to sex between men were acquired in Sweden. Appropriate prevention activities are needed to reach vulnerable populations in Sweden.

Introduction

Syphilis is a bacterial sexually transmitted infection which has several stages. Primary, or early syphilis lasts on average about three months. During this stage syphilis is very infectious. The symptoms may vary, but the first symptom of primary syphilis is often a small, painless sore (a chancre) on the genitals. It is easy to overlook the chancre and not to seek the specialist help and receive treatment. In such cases the sore heals and the infection progresses to the secondary stage which often starts with a rash that may last several weeks or even months as the most common symptom. Transmission can occur during this stage as well, especially if there is contact with mucous membranes or skin. The symptoms of secondary syphilis resolve with or without treatment. If treatment is not received, the infection progresses to the latent and late stages of syphilis. If in the late latent stage of syphilis the patient still does not receive treatment, the tertiary stage of syphilis starts, during which almost all organs can be affected. Neurosyphilis and cardiovascular syphilis are possible sequelae [1].

The World Health Organization (WHO) estimates 12 million new cases worldwide annually, of which 140,000 are estimated to occur in western Europe [2]. Syphilis can be successfully controlled by early detection and effective treatment of cases, contact tracing and effective preventive measures such as condom use [3]. The successful control of syphilis in adults also prevents congenital syphilis, which is a serious neonatal disorder leading to deformities and delayed development of a newborn if untreated [4].

Between the 1980s up to the 1990s, the incidence of sexually transmitted infections (STIs) such as syphilis and gonorrhoea decreased substantially in the western part of the World Health Organisation (WHO) European Region [5]. Increased high risk sexual behaviour and migration have contributed to the rise in the incidence of STIs since 2000; furthermore, improvements in surveillance systems and case detection have led to higher number of reported cases [5,6]. In western Europe the resurgence of syphilis was mostly due to outbreaks among men who have sex with men (MSM) with increasing risk sexual behaviour and novel sexual networks [6-8]. This pattern was also observed in Sweden [9] where, after a decrease in reported syphilis incidence from 5.8 cases per 100,000 population in 1982 to 0.4 cases per 100,000 population in 1999, the number of reported cases increased in 2000 to 1.1 cases per 100,000 population and the rise has continued since then. This paper presents syphilis trends in Sweden from 1970 and provides a descriptive epidemiology for the years 2000-2007.

Methods

Surveillance system

Reporting of syphilis cases has a long history in Sweden. The first law (Lex veneris) in Sweden requiring mandatory reporting of venereal diseases, contact tracing and treatment of cases and their contacts came into force on 1 January 1919 [10]. Today the Communicable Diseases Act requires mandatory notification of syphilis cases by any health care professional e.g., general practitioner, gynaecologist, STI specialist, etc. when diagnosing an STI [11]. Contact tracing is also a mandatory activity [11]. Health care professionals electronically report notifications of STIs to the national surveillance database SmiNet (www.sminet.se), which is maintained by the Swedish Institute for Infectious Disease Control (Smittskyddsinstitutet - SMI). In the national population-based surveillance system the notification of syphilis cases (as any other notifiable STI in Sweden) includes case-based clinical notification from the health care professional and a case-based laboratory notification from the diagnostic laboratory. All notifications for STIs in the surveillance system are coded and therefore do not contain the patient's name or address. The coding is based on social security number (*personnummer*) which is a unique key for merging clinical and laboratory notification in the surveillance system. This unique code prevents double reporting of the same

FIGURE 1

Incidence of syphilis, notified cases in Sweden, 1970-2007

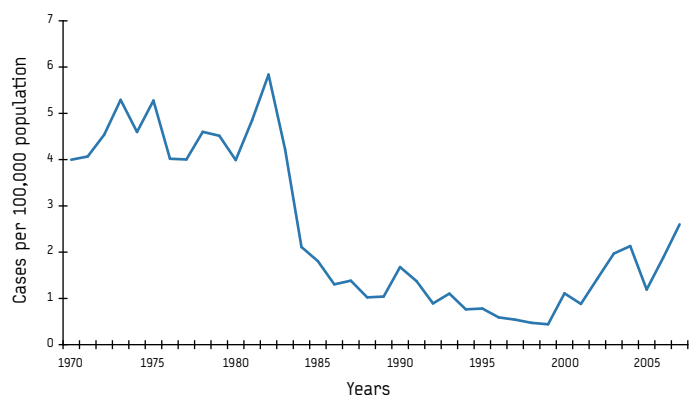


FIGURE 2

Incidence of syphilis by sex and male-to-female-ratio, notified cases in Sweden, 1990-2007

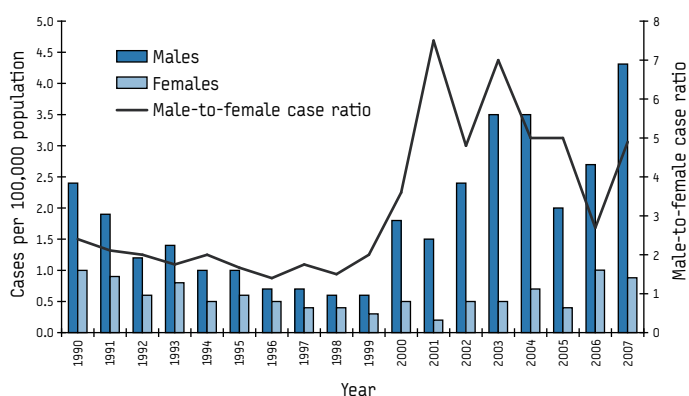
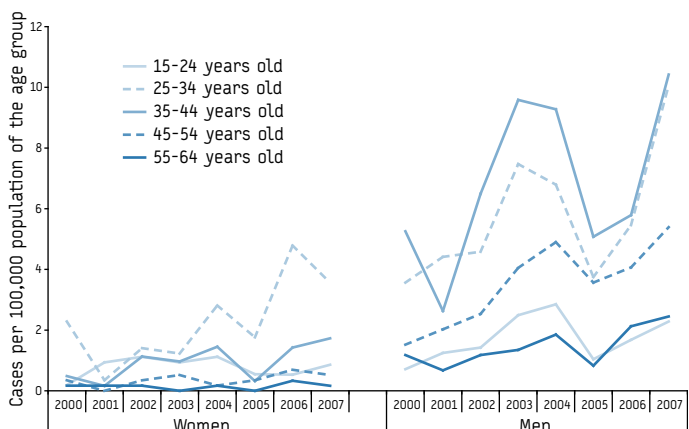


FIGURE 3

Syphilis incidence in females and males by age group, notified cases in Sweden, 2000-2007



case. Additional check for double reporting is done at the regional level where the staff has access to the personal data of the patient in the clinics and from laboratories.

Syphilis notifications and incidence

Notifications are based on the following syphilis case definition used since 1997: laboratory confirmed case with clinical picture corresponding to infectious syphilis (primary, secondary and early latent syphilis with less than two years after infection) [12]. Tertiary syphilis and late latent syphilis with more than two years after infection are not notifiable in Sweden.

Forms for notifications of clinical syphilis cases contain information on age, sex, reporting county of Sweden, possible country of acquisition, as indicated through a consistent incubation period and the patient's history, type of infection (symptomatic or asymptomatic), reason for diagnosis (having symptoms, routine diagnostic, contact tracing, etc.), stage of infection (primary, secondary, early latent syphilis, late syphilis, tertiary, unknown). Information on non-notifiable late latent and tertiary syphilis is included in order to know the stage of the infection reported by the clinicians. If cases of non-notifiable stages (late latent and tertiary) of syphilis are reported, the county medical officers are in charge of eliminating them, thus only notifiable stages of syphilis are kept in the surveillance system. Also information on route of transmission is collected. If the "route of transmission", according to the information from the patient, is sexual, the patient is then asked if this was through a heterosexual or a homosexual contact. Other options such as vertical transmission from mother to child or transmission via blood products are available. Laboratory notification forms contain information on age, sex, reporting county of Sweden, type of specimen (urine, anal or pharyngeal swabs, etc.), diagnostic method used and test results.

We calculated incidence using all reported syphilis cases per 100,000 population (total, female or male, age group-specific). Data on population in Sweden and counties, for the respective years, were taken from Statistics Sweden (www.scb.se).

Data analysis

We performed descriptive analysis by:

- person (sex and age),
- place (reporting county of Sweden and country where the infection was acquired),
- time (between 2000-2007),
- and behavioural aspects (reported route of transmission).

All analyses (proportions, incidence, male-to-female ratio) were calculated in Excel.

The incidence of syphilis among MSM in Sweden was calculated based on estimates of the proportion of men reporting sex with men from studies in the United Kingdom and Sweden, which were 2.5% [13,14]. The mentioned estimates were applied for 16-44 years old male population in UK. We used the above mentioned estimate for the rough estimate of MSM population among all male age groups in Sweden.

Results

Overall trends

Syphilis incidence decreased significantly in the 1980s, from a high of six per 100,000 population in 1982, and continued to decline during 1990s to 0.4 cases per 100,000 (38 cases) in 1999 (Figure 1). From 2000, the incidence of syphilis began to

rise, culminating in 2.1 cases per 100,000 population (99 cases) in 2004. In 2007, an incidence of 2.6 was reported, an increase of 136% compared with the year 2000 (1.1/100,000).

Sex

Syphilis incidence was three to seven times higher among males than females during 2000-2007. The male-to-female ratio increased to 7.5 in 2001, being the highest since the 1990s (Figure 2). Between 2000 and 2007, 80-88% of syphilis cases were in men.

Age

During 2000-2007 the median age for females was on average 33 years (median age range between 2000-2007: 31-35 years), for men infected through heterosexual contacts it was 38 years (median age range between 2000-2007: 32-43 years) and for men infected through sex between men the median age was 39 years (median age range between 2000-2007: 37-41 years). Among females, age-specific syphilis incidence was highest and increased most in the age group 25-34 years (from 0.4 in 2001 to 4.8 cases

per 100,000 women in 2006); a substantial increase was also seen in the age group 35-44 years in 2006 (from 0.3 in 2005 to 1.7 in 2007) (Figure 3).

Among men, during 2000-2007 the age-specific syphilis incidence was highest and increased most in the age groups 35-44 years (from 2.6 in 2001 to 10.4 in 2007), 25-34 years (from 3.6 in 2000 to 10.1 in 2007) and 45-54 years (from 1.5 in 2000 to 5.4 in 2007) (Figure 3).

Reported route of transmission

During 2000-2007, 51-70% of males acquired syphilis through sex between men (Figure 4). In 2006 the proportion of males who acquired syphilis via sex between men decreased to 51%, whereas the proportion of males with unknown route of transmission increased.

Two counties in Sweden (Skåne and Stockholm County) with two big cities (Malmö and Stockholm) reported the majority of syphilis cases among MSM during 2000-2007. Estimated syphilis incidence among MSM in Sweden was 20-28 times higher than that of the Swedish male population (Figure 5).

FIGURE 4

Reported route of transmission (in percent) most likely associated with acquisition of syphilis in men, notified cases in Sweden, 2000-2007 (n=974)

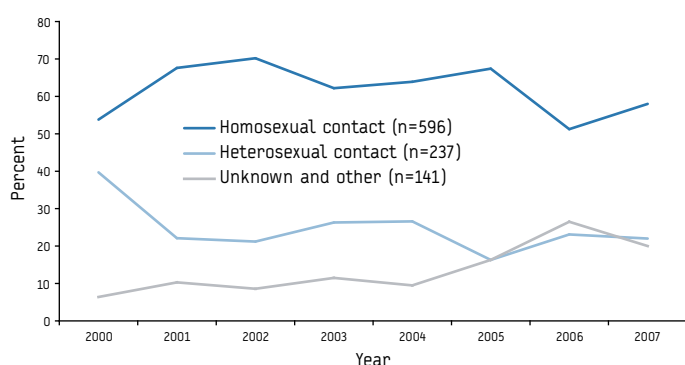
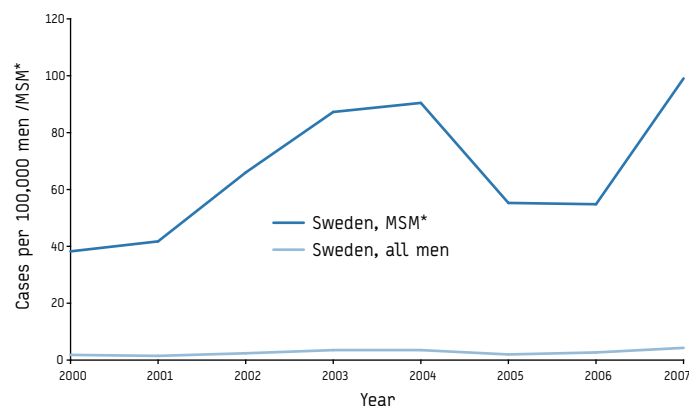


FIGURE 5

Estimated syphilis incidence among men who have sex with men (MSM) and observed syphilis incidence among all males, notified cases in Sweden, 2000-2007



TABLE

Reported country of acquisition (%) of syphilis by sex and type of sexual contact 2000-2007 (n=1,047)

		2000	2001	2002	2003	2004	2005	2006	2007
Females (all sexual contacts)	Sweden	33.3	20.0	20.8	23.8	26.5	23.5	15.2	34.1
	Abroad	57.1	70.0	66.7	57.1	61.8	64.7	45.7	56.1
	Unknown	9.5	10.0	12.5	19.0	11.8	11.8	39.1	9.8
	Total number	21	10	24	21	34	17	46	41
Males with heterosexual contacts	Sweden	12.9	26.7	27.3	31.7	21.4	6.7	29.6	38.6
	Abroad	71.0	73.3	72.7	58.5	76.2	80.0	66.7	56.8
	Unknown	16.1	0	0	9.8	2.4	13.3	3.7	4.5
	Total number	31	15	22	41	42	15	27	44
Males with homosexual contacts (MSM)	Sweden	66.7	60.9	68.5	76.3	64.4	61.3	56.5	78.8
	Abroad	26.2	39.1	27.4	16.5	27.7	32.3	37.1	19.5
	Unknown	7.1	0	4.1	7.2	7.9	6.5	6.5	1.8
	Total number	42	46	73	97	101	62	62	113

Geographic spread

Syphilis incidence varied by county and year with a constantly higher incidence in Stockholm county. During 2000-2007, on average 46% of all syphilis cases were reported from Stockholm county which accounts for 21% of Sweden's population. Other counties with large cities are Västra Götaland with Göteborg and Skåne with Malmö. On average 10% of all syphilis cases were reported from Västra Götaland county (17% of Sweden's population) and on average 14% of cases were reported from Skåne county (13% of Sweden's population). Some counties, such as Värmland, Västerbotten and Gotland, did not report any cases of syphilis for several years.

Country of acquisition of the infection

During 2000-2007, the majority of females and heterosexual males acquired syphilis abroad while the majority of MSM acquired the infection in Sweden (Table). However, in some years data on country of acquisition were lacking.

Discussion

Syphilis clearly re-emerged in Sweden between 2000 and 2007. During the same period there has also been an increase in other STIs in Sweden and worldwide [6,7,9,15,16]. Data from routine surveillance systems provide important information which is used for public health purposes. The Swedish Surveillance system of syphilis is population-based. All health care specialists have the responsibility to notify diagnosed syphilis (and other notifiable STIs) directly to the national surveillance system SmiNet. Also all laboratories diagnosing syphilis have the responsibility to notify to the SmiNet. This dual notification from clinicians and laboratory minimises the chance of underreporting of syphilis cases and data on syphilis incidence in Sweden are thus largely reliable. Some delays may occur, however, since assessment of the timeliness of notifications for syphilis and other STIs has not been performed in Sweden so far and therefore exact data on delay are not available. Some problems in the surveillance system may arise from duplicates due to coded and anonymous notification of syphilis cases. However, the medical officers in the counties in Sweden have the duty to check for duplicates and erase them from the system as they are able to obtain access to the patient's full identity from the notified clinic and laboratory. As a result we believe that duplicate reporting did not affect the presented syphilis incidence. Some other difficulties are seen in syphilis surveillance, such as, the difficulty in establishing the stage of syphilis (e.g. differentiating between early and late latent syphilis). This might affect the quality of reported cases. The health care professionals have to use their best judgement and follow the case definition (only early infectious syphilis with laboratory confirmation should be reported) to ensure the reported data provide a realistic picture of syphilis epidemiology in Sweden. Data quality in terms of data completeness varies for some variables (e.g. reported country of acquisition) and some conclusions need to be drawn with caution.

From the data obtained through the surveillance system we conclude that the major contributor to the recent rise in syphilis cases in Sweden is infections among MSM. Recently described outbreaks of syphilis and gonorrhoea among MSM showed that unsafe sex practices were more widespread among this population group in many countries and included a growing number of casual sexual partners, non-use of condoms and contact with anonymous sexual partners [6-9,17,18]. Adopted risk reduction strategies against human immunodeficiency virus (HIV) transmission referred

to as "safe(r) sex" such as oral sex and choosing a partner with the same HIV status does not necessarily protect against syphilis. Among MSM who acquired a syphilis infection in Sweden in recent years, the majority acquired it in big cities, especially Stockholm (up to 96% of all reported cases among MSM). According to our estimate syphilis incidence among MSM was 20-28 times that of males in general in Sweden. It can be assumed that MSM to a larger extent choose to live in big cities since they assure more anonymity and less stigmatisation for MSM. Big cities also supply a meeting ground for sexual networks that facilitate the spread of STIs, as has been reported from other European Union countries [17-20]. A study in Sweden on risk factors for syphilis among MSM showed that current syphilis patients are 7.8 times more likely to have had syphilis in the last five years than MSM without current syphilis [21]. Also MSM with current syphilis are 3.8 times more likely to have had more than ten sex-partners in the past 12 months than MSM without current syphilis. The change in sexual behaviour with more risk-taking practices is likely to have contributed to the recent increase in STIs in Europe [9,19,20,22]. This supports the need for improved preventive work with adapted health prevention messages and education for MSM.

Another group of concern is women. Syphilis cases in females are reported mostly from the counties with big cities, such as Stockholm county and Skåne (Malmö). The increased number of infected women is worrying and suggests either novel sexual networks or a change in sexual behaviour or increased sexual contacts with bisexual men. The latter can link MSM sexual networks with heterosexual females and introduce syphilis and other less common STIs into these sexual networks as it was reported in USA [16]. Closer analysis of such behaviours and sexual networks is needed to gain a thorough insight into the matter.

The constant high number of heterosexual males who acquire syphilis abroad suggests that this is an additional group of the population which requires targeted prevention activities.

Conclusions

The described syphilis trends in Sweden over the past eight years give insight into key features of the syphilis epidemiology: the most affected population groups are MSM and heterosexual men (especially when travelling abroad). However, reported numbers in women are rising and a cause for concern. Overall the increased incidence of syphilis and other STIs points to insufficient use of condoms and more risk-taking behaviour and possible lack of knowledge about STIs and their transmission. The findings presented in our study should guide public health professionals in planning targeted preventive campaigns.

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