ABSTRACT

Recent reports of changes in the epidemiology of syphilis prompted a review of syphilis in our urban community. All records of positive syphilis serology reported to the City of Scarborough Health Department between 1990-94 were reviewed for key epidemiological variables. While infectious stages of syphilis were reported more often among young adults, incidence for all stages increased among successive age groups, with a male/female ratio of 1.0. One in five cases were identified during immigration screening, with a disproportionate number of cases immigrating from the Caribbean, Africa and Subcontinental India. Overall, the incidence of syphilis decreased during the study. However, a correlation of 0.95 was found between the provincial incidence of syphilis and number of tests ordered. The observed decrease in syphilis, therefore, may represent a decrease in detection owing to lack of testing.

ABRÉGÉ

De récents rapports relatifs à l'évolution de l'épidémiologie de la syphilis ont motivé un examen de la syphilis dans notre communauté urbaine. Toutes les déclarations de sérologie positive à la syphilis faites au service de santé de la ville de Scarborough entre 1990 et 1994 ont été examinées en fonction des principales variables épidémiologiques de la maladie. Si la syphilis au stade infectieux est plus prévalente chez les jeunes adultes, l'incidence de la maladie à tous les stades a augmenté dans les catégories d'âge successives, le rapport homme-femme s'établissant à 1,0. Un cas sur cinq a été détecté au cours du dépistage pour l'immigration, avec un nombre disproportionné de cas chez les immigrants originaires des Caraïbes, de l'Afrique et du sous-continent indien. Dans l'ensemble, l'incidence de la syphilis a baissé au cours de l'étude. Toutefois, on a relevé une corrélation de 0,95 entre l'incidence de la syphilis au niveau provincial et le nombre de tests de dépistage demandés. En conséquence, la baisse observée dans le nombre de cas de syphilis pourrait correspondre à une diminution du nombre de cas détectés faute de dépistage.

Syphilis in an Urban Community

Donna L. Reynolds, MD, CCFP, MSc,¹ Franca Evangelista, RN, BScN,²
B. Megan Ward, MD, CCFP, FRCPC, MHS,² Robert H. Notenboom, PhD,^{3,4}
Eric R. Young, MD, CCFP, FRCPC, MHS,^{2,5,6} Colin O. D'Cunha, MBBS, FRCPC, MHS,^{2,5}

The resurgence of syphilis worldwide has again brought this "disease of historical interest" to public health attention, primarily in its association with concomitant HIV infection.¹⁻⁴ In the United States, the epidemiology of syphilis during the past decade has changed as demonstrated by alterations in the distribution of syphilis experienced by homosexual and heterosexual populations, decreases in the male-female ratio, decreases in some ethnoracial groups (e.g., white men), and increases among others (e.g., Blacks, Hispanics, women).^{1,2} In Ontario, syphilis rates have been decreasing over the past 25 years with sporadic increases noted in the early 1980s and 1990s.^{5,6} The most recent reported increase of infectious syphilis (i.e., primary and secondary stages of syphilis) was found among residents of Metro-Toronto and areas adjacent to the US, with a male-female ratio of 2.9, and a postulated homosexual preponderance.⁶ Increases in the syphilis rate, particularly infectious syphilis, demonstrate a continued failure of the sexually transmitted diseases (STD)/HIV prevention message.¹⁻⁴ To better target health promotion and disease prevention efforts, changes in the epidemiology of syphilis must be identified.

Given recent demographic changes in syphilis, as well as concern about potential

increases in the incidence of syphilis in our community, the Scarborough Health Department initiated a study to describe the current epidemiology of syphilis. Using data originally collected for public health case-management purposes, this paper describes the epidemiology of syphilis in an urban community. Concerns identified during the study regarding the management of this reportable disease will be discussed. It is likely that the epidemiology of syphilis in Scarborough represents the Canadian experience, particularly urban centres receiving significant numbers of immigrants. This study, therefore, should assist public health practitioners within similar centres to better plan and deliver programs to control this disease.

METHODS

The City of Scarborough is an urban community, comprising a heterogeneous population of approximately 525,000 (as per the 1991 census) within the eastern boundary of Metropolitan Toronto.⁷ More than half of the population is less than 35 years of age; 10% of residents are 65 years of age or older. Nearly 44% of residents are immigrants to Canada with the most frequent geographic areas of origin being Europe and the United Kingdom (26%), Asia (26%), Caribbean (9%), Central and South America (7%), India (3%), and Africa (1%).

Syphilis is a reportable disease in Ontario.⁸ All physicians, laboratories, hospitals and institutions must report to the local public health department any individual who "has or may have" syphilis. Syphilis testing is carried out by the Ontario Public Health Laboratory using anti-cardiolipin testing as per North

1. Community Medicine Residency, University of Toronto
2. Scarborough Health Department
3. Ontario Public Health Laboratory, Ministry of Health
4. Department of Medicine, University of Toronto
5. Department of Preventive Medicine and Biostatistics, University of Toronto

Correspondence and reprint requests: Dr. Colin D'Cunha, Toronto Health Department, Scarborough Office, 160 Borough Drive, Scarborough, Ontario M1P 4N8, E-mail: donna.reynolds@utoronto.ca.

American practice.⁹ Positive sera, and negative sera accompanied by relevant clinical information, are confirmed by a treponemal test. Positive confirmatory tests are taken as presumptive evidence of syphilis and reported to local health departments. Seropositive blood donors are also identified by the Red Cross through mandatory syphilis testing. Confirmation is conducted by the Public Health Laboratory. All positive confirmatory tests are sent to the health department where an investigation is initiated. The health care provider who ordered the test is contacted and the clinical classification of the individual is determined as follows:

- **case:** Includes new incident cases of syphilis, and confirmed re-infected cases.
- **previously treated case:** Includes individuals who have been treated in the past for syphilis. The laboratory investigation is typically a part of routine monitoring of the individual's response to treatment. Those shown to be "treatment failures" (i.e., no evidence of reinfection but fail to respond to treatment, or reactivation of the infection following adequate treatment) are classified here.
- **pending:** More information is required before classification can be accurately determined.
- **other:** Include false positives (e.g., pregnancy, collagen vascular diseases), or those with a history of a non-syphilitic treponemal infection (e.g., yaws, pinta, non-venereal syphilis). The differentiation between a case of syphilis, a false positive, and a non-syphilis treponemal infection is complex and is beyond the scope of this paper (see references 3,9-11). Persons classified as "other" are excluded from these analyses.

Since a single test to diagnose syphilis does not exist, the determination of classification relies on clinical history, physical examination and laboratory investigation.

The management and follow-up of persons with syphilis is based on 1995 Canadian Guidelines.¹² All cases are reviewed and followed to determine stage (see Appendix 1),¹³ ensure adequate treatment¹⁴ and notify contacts as appropriate.¹² Medication for curative treatment is available free of charge from local health departments.

Appendix 1 Case Definitions for Stages of Syphilis, Ontario, 1996*

- a) **Primary Stage**
An individual with clinically compatible signs and symptoms and:
 - i) detection of *T. pallidum* by darkfield microscopy or by direct fluorescent antibody technique in material from a chancre or in aspirated material from a regional lymph node;
 OR
 - ii) the presence of one or more typical lesions and one or more of the following conditions:
 - reactive non-treponemal (e.g., VDRL, RPR) and treponemal tests (e.g., MHA-TP, FTA-Abs, TPI) but no previous history of syphilis;
 - reactive treponemal tests alone;
 - a 4-fold or greater increase in the titre over the last known non-treponemal test in individuals with a past history of syphilis treatment.
- b) **Secondary Stage**
An individual with clinically compatible signs and symptoms and:
 - i) detection of *T. pallidum* by darkfield microscopy or by direct fluorescent antibody technique in material from skin or mucosal lesions and reactive non-treponemal and treponemal serology;
 OR
 - ii) reactive syphilis serology (non-treponemal and treponemal tests) or a 4-fold or greater increase in titre over the last known non-treponemal tests.
- c) **Early Latent Stage**
An asymptomatic individual with reactive non-treponemal and treponemal tests, known to have had within the previous 24 months at least one of the following:
 - i) a non-reactive serologic test;
 - ii) symptoms highly suggestive of primary or secondary syphilis;
 - iii) exposure to a sexual partner with confirmed primary, secondary or early latent syphilis.
- d) **Late Latent Stage**
An asymptomatic individual with stable, reactive non-treponemal and treponemal tests who does not meet the criteria for early latent syphilis and who has not been previously treated adequately for syphilis.
- e) **Neurosyphilis**
 - i) The findings of pleocytosis (particularly lymphocytes), elevated protein and reactive non-treponemal tests in non-bloody cerebrospinal fluid;
 AND
 - ii) reactive (treponemal $\pm$ non-treponemal) syphilis tests in the peripheral blood.
- f) **Congenital Stage**
A newborn or infant with:
 - i) *T. pallidum* demonstrated by darkfield microscopy or by direct fluorescent antibody technique in material from nasal discharges, skin lesions or tissues;
 OR
 - ii) signs of congenital syphilis and positive non-treponemal and treponemal serology;
 OR
 - iii) positive non-treponemal and treponemal serology who remains positive at three and/or six months follow-up.

* Adapted from: Ontario Ministry of Health. Reportable Disease Information System Guidelines and Procedures, Communicable Disease Control. Mandatory Health Programs and Services, Public Health Branch, 1996.

All reports of positive syphilis serology received by the Scarborough Public Health Department between 1990-94 were reviewed to ensure the following key fields were completed:

- demographic data (name, birthdate, gender, address)
- responsible physician
- reporting source (lab report, immigration notification letter, Red Cross blood donor notification letter)
- method of detection (i.e., indication for the test: symptoms, routine, contact tracing, immigration screening, other)
- stage
- treatment and compliance
- contact notification

For those identified through immigration screening, country of origin was sought from the attending physician or from available immigration records.

Information on "previously treated" cases was completed when available. Since treatment records of many of these individuals could not be confirmed, particularly for immigrants from developing countries, key fields were inconsistently available.

Completed data were entered onto the Reportable Disease Information System (RDIS)¹³ computerized database, where they were transmitted weekly to the provincial Ministry of Health. Only records for the five-year period 1990-94 were examined. Changes in reporting and

TABLE I
Reported Incidence of Syphilis by Classification, Age Group and Sex, Scarborough, 1990-94

Classification	Age Group (Years)*												Sex								Total		
	0-29			30-49			50-69			70+			Male			Female							
	N	%	Rate†	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate		
Case	146	66.7	12.7	147	50.2	18.3	114	44.5	23.6	54	44.6	29.1	226	48.5	17.8	235	55.4	17.4	461	51.8	17.6		
Previously treated	59	26.9	5.1	129	44.0	16.0	122	47.7	25.3	48	39.7	25.8	205	44.0	16.1	154	36.3	11.4	359	40.3	13.7		
Pending	14	6.4	1.2	17	5.8	2.1	20	7.8	4.1	19	15.7	10.2	35	7.5	2.8	35	8.3	2.6	70	7.9	2.7		
Total	219	100.0	19.0	293	100.0	36.4	256	100.0	53.1	121	100.0	65.1	466	100.0	36.6	424	100.0	31.4	890	100.0	33.9		

* Age was not available for 2 persons.

† Average annual age-specific rates are per 100,000 population based on the 1991 Census for Scarborough.⁶

TABLE II
Reported Incidence of Syphilis by Classification and Year of Detection, Scarborough, 1990-94

Classification	Year											
	1990		1991		1992		1993		1994		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Case	108	56.0	108	57.1	102	49.0	88	48.1	55	47.0	461	51.8
Previously Treated	62	32.1	63	33.3	97	46.6	82	44.8	55	47.0	359	40.3
Pending	23	11.9	18	9.5	9	4.3	13	7.1	7	6.0	70	7.9
Total	193	100.0	189	100.0	208	100.0	183	100.0	117	100.0	890	100.0
Percent Total	21.7		21.2		23.4		20.6		13.1		100.0	

TABLE III
Reported Incidence of New Cases of Syphilis by Stage, Sex and Age Group, Scarborough, 1990-94

	Age Group (Years)												Total		
	0-29			30-49			50-69			70+					
	N	%	Rate†	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate
Males															
Primary	13	23.2	2.2	12	13.2	3.1	0	0.0	0.0	0	0.0	0.0	25	11.1	2.0
Secondary	10	17.9	1.7	7	7.7	1.8	4	8.3	1.8	0	0.0	0.0	21	9.3	1.7
Early latent	3	5.4	0.5	6	6.6	1.6	1	2.1	0.4	0	0.0	0.0	10	4.4	0.8
Late latent	30	53.6	5.1	66	72.5	17.1	43	89.6	18.8	31	100.0	42.9	170	75.2	13.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Total	56	100.0	9.6	91	100.0	23.6	48	100.0	21.0	31	100.0	42.9	226	100.0	17.8
Females															
Primary	11	12.2	1.9	2	3.6	0.5	0	0.0	0.0	0	0.0	0.0	13	5.5	1.0
Secondary	17	18.9	3.0	2	3.6	0.5	0	0.0	0.0	0	0.0	0.0	19	8.1	1.4
Early latent	13	14.4	2.3	6	10.7	1.4	2	3.0	0.8	0	0.0	0.0	21	8.9	1.6
Late latent	49	54.4	8.7	46	82.1	11.0	63	95.5	24.8	23	1.0	20.2	181	77.0	13.4
Other	0	0.0	0.0	0	0.0	0.0	1	1.5	0.4	0	0.0	0.0	1	0.4	0.0
Total	90	100.0	15.9	56	100.0	13.4	66	100.0	26.0	23	1.0	20.2	235	100.0	17.4
Total															
Primary	24	16.4	2.1	14	9.5	1.7	0	0.0	0.0	0	0.0	0.0	38	8.2	1.4
Secondary	27	18.5	2.3	9	6.1	1.1	4	3.5	0.8	0	0.0	0.0	40	8.7	1.5
Early latent	16	11.0	1.4	12	8.2	1.5	3	2.6	0.6	0	0.0	0.0	31	6.7	1.2
Late latent	79	54.1	6.9	112	76.2	13.9	106	93.0	22.0	54	100.0	29.1	351	76.1	13.4
Other	0	0.0	0.0	0	0.0	0.0	1	0.9	0.2	0	0.0	0.0	1	0.2	0.0
Total	146	100.0	12.7	147	100.0	18.3	114	100.0	23.6	54	100.0	29.1	461	100.0	17.6

† Average annual age-specific rates are per 100,000 population based on the 1991 Census for Scarborough.⁶

recording of data limited completeness outside this period. Average annual rates were calculated using the 1991 Census population⁷ and are expressed per 100,000 population.

RESULTS

During the five-year period 1990-94, 1,000 residents of Scarborough were newly

identified as having positive syphilis serology. Of these, 890 were classified as positive for syphilis (110 were excluded with a classification of "other"). Of 890, 52% were confirmed as new cases of syphilis (rate=17.6 (all rates are reported per 100,000)) (Table I). Approximately 40% reported previous treatment for syphilis (rate=13.7). A diagnosis had not yet been confirmed for 8% (rate=2.7). While the

number of cases was highest among those less than 50 years of age (n=293), incidence rates of syphilis increased with successive age groups. Similarly, the rate of previously treated cases was highest among the 70 and older age group (rate=25.8). The male-female ratio was one for cases (0.96), and greater than one for previously treated individuals (1.3). The number of positive syphilis tests received by the

TABLE IV
Reported Incidence of New Cases of Syphilis by Method of Detection, Age Group and Sex, Scarborough, 1990-94

Method of Detection	Age Group (Years)												Sex						Total		
	0-29			30-49			50-69			70+			Male			Female					
	N	%	Rate†	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate	N	%	Rate
Symptoms	34	23.3	3.0	17	11.6	2.1	4	3.5	0.8	1	1.9	0.5	40	17.7	3.1	16	6.8	1.2	56	12.1	2.1
Contact tracing	10	6.8	0.9	6	4.1	0.7	2	1.8	0.4	0	0.0	0.0	7	3.1	0.6	11	4.7	0.8	18	3.9	0.7
Routine screen	74	50.7	6.4	91	61.9	11.3	70	61.4	14.5	35	64.8	18.8	130	57.5	10.2	140	59.6	10.4	270	58.6	10.3
Immigration screen	14	9.6	1.2	29	19.7	3.6	37	32.5	7.7	18	33.3	9.7	47	20.8	3.7	51	21.7	3.8	98	21.3	3.7
Other*	14	9.6	1.2	4	2.7	0.5	1	0.9	0.2	0	0.0	0.0	2	0.9	0.2	17	7.2	1.3	19	4.1	0.7
Total	146	100.0	12.7	147	100.0	18.3	114	100.0	23.6	54	100.0	29.1	226	100.0	17.8	235	100.0	17.4	461	100.0	17.6

* Includes prenatal screening and notifications from Red Cross blood donations.

† Average annual age-specific rates are per 100,000 population based on the 1991 Census for Scarborough.⁶

TABLE V
Geographic Area of Origin for Syphilis Cases and Previously Treated Cases Identified from Immigration Screening, Scarborough, 1990-94

Country	Case		Previously Treated		% New Cases for Each Area	% Immigrants in Scarborough§
	N	%	N	%		
Asia*	17	18.5	59	43.7	22.4	27
Caribbean	14	15.2	39	28.9	26.4	9
Africa	10	10.9	5	3.7	66.7	3
Subcontinental India†	17	18.5	2	1.5	89.5	3
Central and South America	7	7.6	16	11.9	30.4	7
Other‡	3	3.3	9	6.7	25.0	
Unknown	24	26.1	5	3.7	82.8	
Total¶	92	100.0	135	100.0	40.5	

* Asia includes Cambodia, China, Hong Kong, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, and Vietnam.

† Subcontinental India includes: Afghanistan, India, Pakistan, and Sri Lanka.

‡ Other includes England, Europe, Fiji, Iran, Iraq, Saudi Arabia and the United States.

¶ Six persons were identified as immigrating from Canada and are excluded.

§ Reported geographic area of origin for immigrants living in Scarborough as reported in the 1991 Census.⁶

Health Department was relatively constant for the 1990-93 period ranging from 183-208, but dropped to 130 in 1994 (Table II).

Table III shows the distribution of new incident cases of syphilis by age, sex and stage. Although numbers are small, an earlier stage of syphilis (i.e., primary, secondary and early latent) was reported among those in younger age groups (22%) and was rare in those 50 years of age and older (2%). Of the earlier stages, the most common stage at diagnosis among males was primary (rate=9.8) followed by secondary (rate=8.3) and early latent (rate=3.9). The reverse order was observed for females (rate=4.8, 7.0 and 7.8, respectively). This is consistent with the finding that more males than females were detected as a result of symptoms (rate=3.1 and 1.2, respectively) (Table IV).

The most common reported indication for testing was routine, followed by immigration screening (Table IV). Table V

summarizes geographic areas of origin for cases and previously treated cases identified through immigration screening. Asia was reported as the most common region of origin for both classifications (33%). Only 22% of Asian immigrants identified through immigration screening were new cases of syphilis; 78% had been previously treated prior to immigrating. More previously treated cases than incident cases were identified among immigrants reporting countries of origin in the Caribbean, South America and Central America. In contrast, those reporting countries of origin from Subcontinental India and Africa were more often reported as new incident cases. Only 4% of previously treated cases did not have a country of origin available compared to 26% of cases.

DISCUSSION

With approximately 100 incident cases annually in a community of 525,000,

syphilis persists as a public health problem. Difficulties identified in the public health management of syphilis included the lack of a specific laboratory test precluding a definitive diagnosis, decreasing familiarity among health care providers with respect to serodiagnosis, treatment and follow-up of syphilis, and long durations of follow-up required for individuals with syphilis. For example, follow-up of individuals diagnosed with syphilis varied from a single lab slip to more than 25 years of data.¹⁵

The data demonstrate that infectious stages of syphilis were detected more often in younger adults yielding a male-female ratio of close to one. This is in contrast to the reported increase in infectious syphilis in Ontario which showed a male preponderance of nearly 3:1.⁶ Although risk factor data were not sufficiently complete for analysis, qualitative review by study personnel suggested that heterosexual contact was the most commonly recalled risk factor. The more equitable sex distribution

could be related to heterosexual transmission since the increase noted in the province was postulated to be related to homosexual transmission.⁶

Only 12% of incident cases were identified because of testing secondary to symptoms. Detection of syphilis through recognition of early symptoms allows rapid diagnosis, treatment and contact notification,¹² and often reversal of the screening test (i.e., VDRL test), and sometimes the treponemal test, to non-reactive. Early detection, therefore, can spare individuals from future investigation by the health care and public health systems.

Immigration screening identified 21% of incident syphilis cases to the Health Department. An ecological comparison of the area of origin in the immigrant population of Scarborough to that of syphilis cases revealed a disproportionate number of cases among immigrants of some geographic areas: the Caribbean (9% of Scarborough immigrant population and 15% of new cases), Africa (3% and 11%, respectively), and Subcontinental India (3% and 18%, respectively). Health care providers who serve these populations should be encouraged to test individuals at risk for syphilis. Immigration screening also appears to benefit persons who have not yet entered Canada: 135 cases were identified, many of whom subsequently underwent treatment for syphilis.

About 8% of those with positive serology were pending at the end of the study. On closer review, this group tended to be highly mobile and proved difficult to follow (e.g., prison inmates, homeless, transients, sex-trade workers and their clients). Rapid response to this transient population has been shown to improve case management.¹⁶

It is unclear as to why the final year of study showed a drop in the number of positive tests. This decrease was observed in all classifications and is inconsistent with reductions in the incidence of syphilis alone. No change in syphilis testing policy

was noted by the STD clinic in Scarborough during the study period. A comparison between the volume of tests (n=620,000-870,000 annually) and the number of syphilis cases (n=909-1,759 annually) in the province in the period 1979-1991 yielded a significant correlation of 0.95 (RHN, personal communication). (Data not available in Scarborough.) This raises the question of whether the incidence of syphilis has declined, or whether only the detection of syphilis has declined. This study is limited, therefore, by its reliance on using only those lab tests that are ordered (versus seroprevalence). Once a test is ordered and positive serology is noted, legislation mandates reporting to public health. Thus, the "rate-limiting step" is the ordering of syphilis testing by health care providers. Since serodiagnosis is particularly important for detecting untreated latent and late disease, declines in testing may lead to future increases in the late sequelae of syphilis. Until the question of whether current syphilis rates reflect declines in incidence as opposed to declines in detection is answered, caution is advised when interpreting apparent successes in the control of syphilis. The large proportion of syphilis (treated and untreated) among foreign born as detected by immigration screening has proven an important investment in preventing the spread of this disease, and should be continued. Better follow-up of cases and their contacts, as well as reminding health care providers about syphilis diagnosis and management, will improve the control of syphilis. In urban areas, this may include implementing programs for recent immigrants from endemic countries, those at risk for other STDs, and transient and incarcerated populations.¹⁶

ACKNOWLEDGEMENTS

The authors thank the following people for their important contributions during this project: Gertie D'Silva, Natalie

Fawcett, Bernadette Lee, Suzanne Lombardi, Judith Macatangay, Catherine Mackowski, Tania Mika, Lisa Ng, Shino Philips, and Valerie Wilson.

REFERENCES

1. Hook EW, Marra CM. Acquired syphilis in adults. *N Engl J Med* 1992;326(16):1060-69.
2. Buckley HB. Syphilis: A review and update of this 'new' infection of the 90s. *Nurse Pract* 1992;17(8):25-32.
3. Notenboom RH. Syphilis: Today's tests. *Can J Diag* 1996;13(5):105-19.
4. Wasserheit JN. Epidemiological synergy: Interrelationships between Human Immunodeficiency Virus infection and other sexually transmitted diseases. *Sex Transm Dis* 1992;19(2):61-77.
5. Bangura H. Infectious syphilis in Ontario - The current profile. *Public Health and Epidemiology Report Ontario (PHERO)* 1991;2(21):324-25.
6. Thippahawong J, Wallace E. Update: An increase in infectious syphilis? *PHERO* 1991;2(5):81.
7. Ennis S, Fleischer P. Community Health Status Information Bulletin #1. 1991 Demographic Report. Scarborough, Ontario: Scarborough Health Department, 1996.
8. Revised Statutes of Ontario. Health Protection and Promotion Act 1983. Revised Statutes of Ontario, 1990, Chapter H.7, Ontario Provincial Government, Queen's Printer for Ontario, 1996.
9. Larsen S, Hunter E, Kraus S (Eds.). A Manual of Tests for Syphilis. Washington: American Public Health Association, 1990.
10. Nadwani R, Evans DTP. Are you sure it's syphilis? A review of false positive serology. *Int J STD and AIDS* 1995;6:241-48.
11. Young H, Penn C. Syphilis and related treponematoses. In: Topley, Wilson (Eds.), *Principles of Bacteriology, Virology, and Immunology*, Seventh Edition. London: Williams and Wilkins, 1990.
12. Health Canada, Health Protection Branch. 1995 Canadian Guidelines for the Prevention, Diagnosis, Management and Treatment of Sexually Transmitted Diseases in Neonates, Children, Adolescents and Adults. *Can Commun Dis Rep* 1995;21:S4.
13. Ontario Ministry of Health. Reportable Disease Information System Guidelines and Procedures, Communicable Disease Control. Mandatory Health Programs and Service, Public Health Branch, April 1992.
14. Ontario Ministry of Health. STD Treatment Guidelines. Toronto: Queen's Printer for Ontario, 1996.
15. Ward M, Reynolds D. 1996 Syphilis Audit Final Report. Scarborough Health Department, Scarborough, 1996.
16. Hutcheson D, Tucker T, Mayfield J, et al. Selective screening to augment syphilis case-finding-Dallas, 1991. *MMWR* 1993;42(22):424-27.

Received: May 26, 1997

Accepted: January 20, 1998