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Relative and seasonal incidences of the sexually transmitted diseases

A two-year statistical review

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SUMMARY In the United States statistics on sexually transmitted diseases (STDs), other than gonorrhoea and syphilis, are meagre. In this study the relative and seasonal incidences of most STDs in an American clinic where 34 938 patient visits were recorded over a two-year period (1975–76) are assessed. Gonorrhoea was the most common STD in male and female patients combined (18%), while nongonococcal urethritis (NGU) was most common in men (23%), and vaginitis (trichomonal 7·5%, yeast 7·1%, and non-specific 7·1%) was the most common in women. A significantly higher incidence of NGU occurred in Caucasian (63%) than in black (42%) men ($P<0.005$). No other STD was diagnosed in more than 5% of patients, and 31% had normal findings on clinical examination and investigation, and could be described as the 'worried well'. Two or more STDs co-existed in 4·2% of patients. In 1976 the incidence of genital herpes and scabies decreased in contrast to other STDs and total patient visits, which increased. A seasonal peak in late summer and early autumn was observed for most STDs. These observations indicate the importance of a comprehensive approach when attempting to compile accurate statistics on selected epidemiological aspects of sexually transmitted diseases.

Introduction

Principles and methods of epidemiology form a basis for effective disease control. Peter Panum's observations of epidemic measles in the Faroe Islands and John Snow's investigations of cholera outbreaks are landmarks in the history of epidemiology and preventive medicine. The application of statistical methods by Wade Hampton Frost and others (Maxcy, 1941) initiated an epoch of epidemiology as an analytical discipline. In short, a statistical assessment of a disease is often necessary before resources can be allocated to its control.

Although venereal diseases exert a major adverse effect on society and rank among the most prevalent of communicable diseases, statistical assessment in the United States has been lamentably incomplete. This partly follows from the difficulty in compiling accurate statistics on reportable diseases such as gonorrhoea and syphilis (Armstrong and Wiesner, 1974) as well as on the many other venereal diseases for which no reporting mechanism exists. The reporting system in Britain, however, allows the chief medical officer to compile and report annually accurate venereal disease statistics.

The first sign of improvement in this state of affairs is the growing professional disenchantment with the familiar term, 'venereal disease', and its acronym 'VD'. 'VD' has long carried a pejorative connotation in the public's mind and is historically limited to the 'traditional' venereal diseases, that is, syphilis, gonorrhoea, lymphogranuloma venereum, chancroid, and granuloma inguinale. At present, these traditional venereal diseases actually comprise less than 20% of diagnoses made in some venereal disease clinics. Consequently, sexually transmitted disease—and its acronym, 'STD'—has become the preferred term, because it logically unites all those diseases which stem from viruses through to insects and share a common mode of transmission through sexual contact. Furthermore, some health departments are currently adding various other STDs to their lists of reportable diseases, and the

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US Center for Disease Control has initiated a multi-clinic STD surveillance study.

On 1 January 1975 the Denver Metro Health Clinic, using a problem-oriented data base, began to keep comprehensive records on most sexually transmitted diseases, including gonorrhoea, syphilis, nongonococcal urethritis, vaginitis (trichomonal, yeast, and non-specific), genital herpes, pediculosis pubis, scabies, genital warts, molluscum contagiosum, lymphogranuloma venereum, chancroid, granuloma inguinale, and pelvic inflammatory disease. Based on data analysis for the years 1975 and 1976, this paper discusses the relative and seasonal incidences of sexually transmitted diseases in our young, self-selected population.

Materials and methods

CLINIC SERVICES

The Denver Metro Health Clinic provides walk-in diagnostic and treatment services for STD to residents of the Denver metropolitan area, which includes five counties (1976 population approximately 1·5 million). Services are available seven hours a day on five days a week and are free and confidential. During 1975 and 1976 the clinic recorded 34 938 patient visits. As an approximate estimate of the proportion of STD morbidity seen at the clinic, it is noted that in 1976 45% of cases of gonorrhoea in the metropolitan area were reported by the clinic.

DIAGNOSTIC METHODS

Any patient with a new problem underwent a Venereal Disease Research Laboratory (VDRL) test for syphilis; when the VDRL test was reactive or syphilis was suspected or both a fluorescent treponemal antibody absorption (FTA–ABS) test was also performed. In addition, a genital examination was carried out by a clinician trained by the authors.

Women were examined by means of a vaginal speculum. Endocervical and rectal swab specimens for culture for gonococci were plated directly on to Thayer-Martin medium and placed in a CO_2 incubator. Women who complained of vaginal discharge or in whom excessive discharge was noted by the clinician had posterior vaginal swab specimens tested for pH with nitrazine paper and viewed microscopically for 'clue cells' (epithelial cells studded with coccobacilli), trichomonads (wet preparation in saline), and yeasts (10% potassium hydroxide mount). Women with lower abdominal pain underwent an abdominal and bimanual pelvic examination.

All men had culture specimens taken from the urethra and, for those with homosexual preferences, from the pharynx and rectum as well. Standard sugar fermentation reactions were used to confirm pharyngeal isolates as *Neisseria gonorrhoeae*. In men with urethral discharge Gram-stained smears were also made.

Other diagnostic tests performed when clinically indicated were darkfield examination (syphilis), herpesvirus culture (genital herpes), oil preparations (scabies), and blood was taken in the acute and convalescent stages for LGV-group serum antibodies (lymphogranuloma venereum).

DIAGNOSTIC CRITERIA

Sexually transmitted diseases were diagnosed by the following criteria, which—with the exception of non-specific vaginitis—remained constant throughout the study:

1. Gonococcal infection was diagnosed in men by the presence of Gram-negative intracellular diplococci on urethral smear or by positive urethral culture results or both and by positive rectal or pharyngeal culture results. In women positive cervical or rectal culture results were diagnostic.
2. Syphilis was diagnosed by darkfield positive lesions or a reactive VDRL test together with a reactive FTA–ABS test in the absence of a history of previously treated syphilis. Staging was determined by a combination of clinical, serological, and epidemiological information.
3. Nongonococcal urethritis (NGU) was diagnosed when symptoms of urethral discharge or dysuria were present together with a discharge on clinical examination. Smears showed polymorphonuclear leucocytes without Gram-negative intracellular diplococci on Gram-staining and gave negative results on culture.
4. Trichomoniasis was demonstrated by typical motile, pear-shaped, flagellated protozoa.
5. Candidosis (yeast infestation) was diagnosed when symptoms of vaginitis or balanitis were present together with mycelia or budding yeasts on 10% KOH mount.
6. Non-specific vaginitis (NSV) was diagnosed when symptoms of vaginitis were present together with excessive discharge or vaginal erythema on vaginal examination, and investigations for gonorrhoea, trichomoniasis, and candidosis gave negative results. An abnormal vaginal pH (>4·5) supported the diagnosis and was a deciding factor when there was minimal clinical evidence of

vaginitis. (Clinic use of this criterion began in the autumn of 1975.)

7. Genital herpes was diagnosed in the presence of small, clustered vesicles or small ulcers on a tender, non-indurated erythematous base. In doubtful cases, syphilis was excluded by negative darkfield examination and negative results to the VDRL test and by the finding of positive herpesvirus culture results.

8. Pediculosis pubis was diagnosed when the louse or its eggs (nits) were demonstrated attached to pubic hairs.

9. Sarcoptes scabiei (scabies) was diagnosed in the presence of asymmetric pruritic vesicles, papules, nodules, or linear burrows, which usually appeared in the genital area, on the wrists, and between the fingers; these responded to gamma benzene hexachloride, (Lindane lotion, Kwell®) within two to six days. The demonstration of parasites, eggs, or faeces in oil scrapings of burrows was difficult, but it confirmed the diagnosis.

10. Condylomata acuminata (venereal warts) were diagnosed when typical, non-tender, raised, irregular lesions occurred on the genitalia or in the perianal region.

11. Molluscum contagiosum was diagnosed in the presence of non-tender, pearly, umbilicated papules, from which a white, firm nodule could be expressed after pricking the dome with a needle.

12. For the diagnosis of lymphogranuloma venereum, chancroid, and granuloma inguinale (where the occasional genital sore was not attributable to trauma, genital herpesvirus, fusospirochaetal balanoposthitis, folliculitis, or other self-limited [2 weeks] cutaneous infections) numerous other tests were performed, including acute and convalescent serum tests for LGV-group complement-fixing antibodies, smears from lesions, and cultures on chocolate agar and in inactivated rabbit blood clots for *Haemophilus ducreyi*.

13. Pelvic inflammatory disease (PID) was diagnosed when there were symptoms of lower abdominal pain, tenderness on cervical movement, and adnexal tenderness with or without adnexal masses. The onset of pain during or just after menustration, the presence of a purulent, endocervical discharge, a temperature higher than 38°C, and a history of PID confirmed this diagnosis.

Results and discussion

GENERAL

Visits by male patients outnumbered those by female patients by two to one and in 1976 increased by 18·3% and 9·1% respectively (Table 1). While the reason for this predominance of male patients is unknown, a similar observation might be expected if female patients, for preference, attended gynaecological or family planning clinics for treatment of STDs. The racial distribution of our study population was very similar to that in the Denver area: Caucasians 69%; blacks 16%; hispanics 13%; and other ethnic groups 2%.

Table 1 *Characteristics of patient visits during two-year study period*

	1975	1976	*Total*	*Increase* (%)
Total visits	16 237	18 701	34 938	15·2
Men	10 764	12 731	23 495	18·3
Women	5473	5970	11 443	9·1
Normal findings on clinical examination	4663	6038	10 701	29·5
STD episodes	8890	9844	18 734	10·7

The total number of episodes of sexually transmitted diseases was 18 134 with a 10·7% increase in 1976 (Table 1); regardless of the sex of the patient, this meant approximately one episode for every two patient visits. About 31% (10 701) of patient visits resulted in completely normal findings on clinical and laboratory examination; these patients were known as the 'worried well'. These visits increased by 29·5% in 1976.

Our patient population was similar to that seen in an Atlanta clinic for STDs where 61% of patients were male; one STD was diagnosed for each two clinic visits and 40% of patients were the worried well (Armstrong and Wiesner, 1974). Monitoring of these latter patients can be helpful in indicating the appropriate use of the clinic.

TRENDS IN DISEASE INCIDENCE

Gonorrhoea and syphilis are both still of epidemic proportions in the 1970s. During a six-year period (1971–76) we noted an increasing incidence of both gonorrhoea and syphilis together with a corresponding increase in the number of clinic visits (Table 2). National data from 1976, however, showed that the number of reported cases of primary and secondary syphilis actually declined by 7·4% (US Center for Disease Control, 1977). In our clinic population we observed a reduced rate of increase in syphilis in 1973 and in gonorrhoea in 1974 but a 36·5% increase in syphilis during 1976.

Table 2 *Number of and percentage increase in patient visits and cases of syphilis and gonorrhoea during 1971–76*

	Syphilis		*Gonorrhoea*		*Patient visits*	
Year	*No.*	%*	*No.*	%*	*No.*	%*
1971	52	—	1190	—	6244	—
1972	79	51·9	1391	16·9	9524	52·5
1973	100	26·6	2125	52·8	12 771	33·5
1974	112	12·0	2584	21·6	14 543	14·4
1975	107	4·5	3015	16·8	16 237	11·6
1976	146	36·5	3291	9·2	18 701	15·2

*Percentage increase over previous year

Cautious interpretation of these statistics, however, is advisable since a number of variables, including local STD control endeavours and clinic use, may be responsible for differences between our clinic figures and state or national trends. For example, the recent rise in the incidence of syphilis may have resulted from increased clinic attendance, since the entire metropolitan area experienced only a corresponding 7·3% increase during the same period.

RELATIVE INCIDENCE OF STD

The incidence of STDs is influenced by a number of variables, including demography and changes in diagnostic criteria. The relative incidence of STDs diagnosed in our clinic during 1975–76 appears in Table 3. Uncomplicated, anogenital gonococcal infections were identified in 18% of all patients; this was the single most common STD in men and women combined. A higher incidence of 29% was observed in a STD clinic in Atlanta (Armstrong and Wiesner, 1974) and of 37·8% in Stockholm (Eriksson and Wanger, 1975); these figures were probably the result of population differences since diagnostic methods were comparable.

The relatively low incidence (0·44%) of pelvic inflammatory disease (PID), despite careful surveillance of this disorder, is noteworthy. While this incidence is similar to that seen in the Atlanta clinic (Armstrong and Wiesner, 1974), it contrasts with the rate of 10·6% in patients attending the Liverpool Infirmary clinic for venereal diseases (Rees and Annels, 1969). The reason for our low incidence is unknown, but it may be due to the artificial selection mechanism which results from the clinic's proximity to an active 24-hour emergency room where women with pain and fever can go. Similarly, Wallin (1974) identified a 10% incidence of PID in a university health clinic, but all cases were initially diagnosed in a nearby hospital. In our study cervical gonorrhoea was found in 23 (46%) of 50 cases of PID, which agrees with the results reported by Eschenbach *et al* (1975) and indicates the important role *N. gonorrhoeae* plays in the pathogenesis of acute salpingitis.

In contrast to gonorrhoea, early infectious syphilis was diagnosed in only 201 (0·58%) patients or in one case for every 32 cases of gonorrhoea. As a cause of genital sores syphilis ranks third to sex trauma and herpesvirus. Nevertheless, the potential long-term consequences of syphilis are severe, and clinic staffs should be on the alert for this disease, particularly in male homosexuals, who now account for nearly 65% of all new cases of early syphilis in the Denver metropolitan area (Colorado Department of Health, personal communication).

Nongonococcal (non-specific) urethritis (NGU) is a disease which may have multiple causes. Although *Chlamydia trachomatis* has been isolated from 42% of female patients with NGU and from 68% of their consorts (Holmes *et al*, 1975) the practical diagnosis of NGU in most clinics depends on the exclusion of gonorrhoea in men with urethritis. In our clinic population NGU was the most frequently diagnosed STD (23·3%) in men and accounted for 57·1% of cases of urethritis in men. This finding is consistent with that in Britain (Department of Health and Social Security, 1977).

Table 3 *Relative incidence of sexually transmitted diseases during two-year study period*

	Men		*Women*		*Total*	
Disease	*No.*	%	*No.*	%	*No.*	%
Gonorrhoea	4233	18·02	2073	18·12	6306	18·05
Early syphilis (less than one year's duration)	170	0·73	31	0·27	201	0·58
Nongonococcal urethritis	5472	23·29	—*	—*	—*	—*
Trichomoniasis	21	0·09	863	7·54	883	2·50
Moniliasis	—*	—*	815	7·12	—*	—*
Non-specific vaginitis	—*	—*	857	7·49	—*	—*
Pediculosis pubis	773	3·29	276	2·41	1049	3·00
Scabies	393	1·67	51	0·45	444	1·27
Herpes genitalis	845	3·60	299	2·61	1144	3·27
Venereal warts	1034	4·40	362	3·16	1396	4·00
Molluscum contagiosum	169	0·72	49	0·43	218	0·62
Pelvic inflammatory disease	—*	—*	50	0·44	—*	—*
Chancroid, granuloma inguinale, lymphogranuloma venereum	0	0·0	0	0·0	0	0·0

*Not recorded or not applicable

In the United States, a comparably high incidence of NGU has been found in men who attend venereal disease (Holmes *et al*, 1975; Volk and Kraus, 1974), university health (McChesney *et al*, 1973), and military personnel clinics (Melton, 1976).

Although factors leading to this relatively high incidence of NGU are unknown the ethnic composition of our clinic population was an important variable (Table 4). In Caucasian men urethritis

Table 4 *Racial incidence of non-specific and gonococcal urethritis for* 1976

	Gonococcal urethritis		*Non-specific urethritis*		
Race	*No.*	%*	*No.*	%	*Total*
Caucasian	1232†	36·58	2136†	63·42	3368
Black	654†	58·45	465†	41·55	1119
Hispanic	240	49·32	298	50·68	588
Other	57	44·53	71	55·47	128
Total	2233	42·92	2970	57·08	5203

*Percentage of total urethritis
†$\chi_1^2 = 166{\cdot}26$ $P < 0{\cdot}005$

was most often diagnosed as NGU (63·4%), while in black men gonococcal infection was the most common cause (58·5%; $P < {\cdot}005$). Although a similar ethnic difference in aetiology of male urethritis was identified by Volk and Kraus (1974) and Darrow (1976), it is still unclear whether or not this disparity results from an ethnic difference in susceptibility to *N. gonorrhoeae* and the NGU agent(s) or because fewer members of minority groups seek medical care for salient manifestations of NGU. The latter hypothesis is supported by the findings of Darrow (1976), who discovered that symptomatic black men were more likely than hispanic men, who, in turn, were more likely than Caucasian men to delay seeking medical care at a public health venereal diseases clinic.

In female patients vaginitis (22·6%) was the most common diagnostic category (trichonomal 7·5%, yeast 7·1%, and non-specific vaginitis (NSV) 7·5%). The increased incidence of trichomonal and yeast vaginitis (30% and 15% respectively) in 1976 was disproportionate to the increase in clinic visits; the reasons for this are unknown but may be the result of revised criteria for obtaining wet preparations and KOH mounts, which have become routine. In contrast, the decrease of 34% in the incidence of NSV during 1976 was primarily due to the institution of a new protocol in the autumn of 1975 that refined the diagnostic criteria. Although trichomonal vaginitis is almost always sexually acquired, it is noteworthy that trichomonal urethritis was an infrequent cause of male urethral discharge (0·09%). In Britain only 8·2% of trichomoniasis occurred in men (Department of Health and Social Security, 1977). This apparent resistance of the male urethra to trichomonads does not lessen the epidemiological importance of the asymptomatic male carrier. Indeed, failure to treat male consorts of infected women concurrently has been associated with a substantial risk of reinfection (Burmeister and Gardner, 1970). Although candidosis can occasionally be sexually transmitted, we believe that candidal vaginitis usually results from an overgrowth of yeasts following disruption of normal vaginal flora.

In our study the incidence of NSV has little relevance, since the diagnosis was based solely on the exclusion of the other two forms of vaginitis. Because the aetiology and epidemiology of this condition are unclear—and in order to save time and money—vaginal cultures were not routinely plated on specialised media for the identification of *Corynebacterium vaginalis*. In contrast to the finding of Gardner and Dukes (1959) saline slide preparations of vaginal discharge rarely showed 'clue cells'.

The incidence of venereal warts (4·0%), pediculosis pubis (3·0%), and molluscum contagiosum (0·62%) is noteworthy for future comparison, since few reports on these diseases exist in the United States; in England, however, the reported incidence rate of these STDs in hospital clinics was 21·0, 2·8, and 0·8 per 100 000 population respectively (Department of Health and Social Security, 1977). A review of the literature is of some help in defining the incidence of scabies. Sehgal *et al* (1972) reported an incidence of 24% for scabies in dermatology patients in India, and Svartman *et al* (1972) observed an incidence of 13–18% in an urban and rural population in Trinidad. In the United States a survey by dermatologists showed that 2·4% of their patients had scabies (Shaw and Juranek, 1976), a finding similar to the incidence of 1·3% found in our STD clinic despite the very obvious population differences. This survey also identified epidemic rates in the early 1970s with the peak occurring in 1975; this pattern is consistent with the decrease of 24% in incidence found in our clinic during 1976.

The incidence of 3·3% for genital herpes (or one case for every five cases of gonorrhoea) is comparable to the incidence reported in other surveys in venereal disease clinics (Beilby *et al*, 1968; Nahmias *et al*, 1973). In view of the association of genital herpes with fatal neonatal infections (Nahmias and Roizman, 1973) and cervical cancer (Aurelian, 1976) the decline of 17% in cases in 1976 is encouraging, even though the expected yearly periodicity in incidence of viral disease is a more reasonable explanation. Lymphogranuloma venereum, chan-

croid, and granuloma inguinale have traditionally been considered the minor venereal diseases. In terms of incidence 'minor' seems justified, as not one case was diagnosed during the two-year period.

The sex-specific incidence of gonorrhoea, herpes, warts, pediculosis pubis, and molluscum contagiosum was only slightly higher in men than in women. In contrast the sex-specific incidence for scabies and syphilis was at least three times higher in men than in women. This difference is probably due to the higher incidence of both diseases in homosexual men, who comprised 25% of our male patients.

SEASONAL VARIATION IN STDS

Seasonal variation in human behaviour has a major effect on disease incidence. For example, in temperate climates living indoors predisposes to respiratory infections during the winter, while outdoor activities in summer promote the spread of various enteric diseases from a common source. Not surprisingly, we observed a seasonal pattern in the number of patient visits and the various STDs. Figure 1 shows a pronounced increase in late summer and early autumn in total patient visits, in normal findings on clinical examination, and in total episodes of STDs. Except for genital herpes, this pattern occurred for gonorrhoea, nonspecific urethritis, all forms of vaginitis, pediculosis, scabies, and venereal warts (Figures 2, 3, 4). There were too few cases of syphilis and molluscum contagiosum to establish seasonal patterns. Unfortunately, there are few comparative reports in the literature. In England, Willmott (1975) observed a late-summer, early-autumn increase both in monilial vaginitis and clinic visits. In India, Sehgal *et al* (1972) observed a similar pattern for scabies; and, in Britain, an increase in nongonococcal urethritis has been observed in summer (Csonka, 1965).

The factors leading to this seasonal pattern are conjectural but may in part depend on those variables which directly affect sexual behaviour and clinic attendance. For example, weather conditions make winter transportation difficult in some areas, and thus cause difficulty for patients in finding sexual partners and in using clinic facilities; however, Denver's mild winters would seem to preclude this as an important factor. Substantial seasonal variation in degree of sexual exposure could also determine the observed patterns, in that summertime weather could be a favourable catalyst for sexual promiscuity. The increase in use of

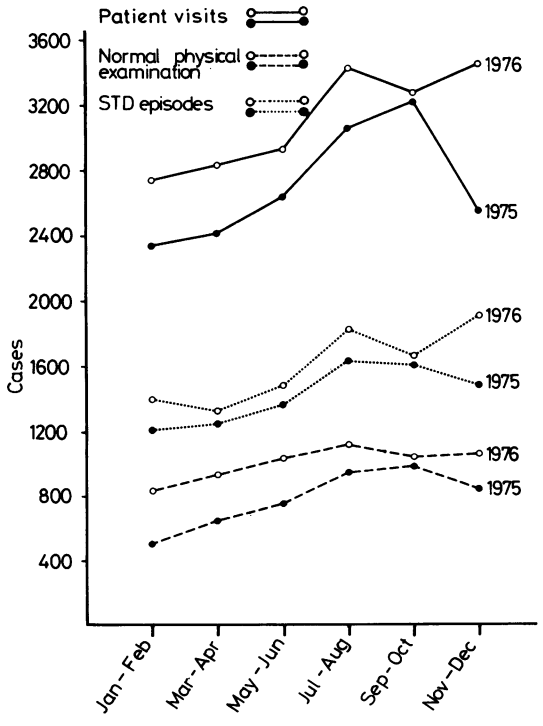

Fig. 1 *Seasonal incidence of patient visits, STD episodes, and normal findings on clinical examination by two-month periods in* 1975 *and* 1976

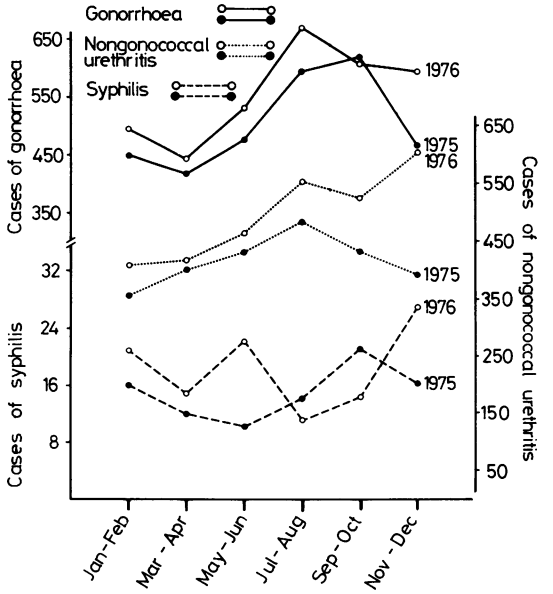

Fig. 2 *Seasonal incidence of gonorrhoea, nongonococcal urethritis, and syphilis by two-month periods in* 1975 *and* 1976

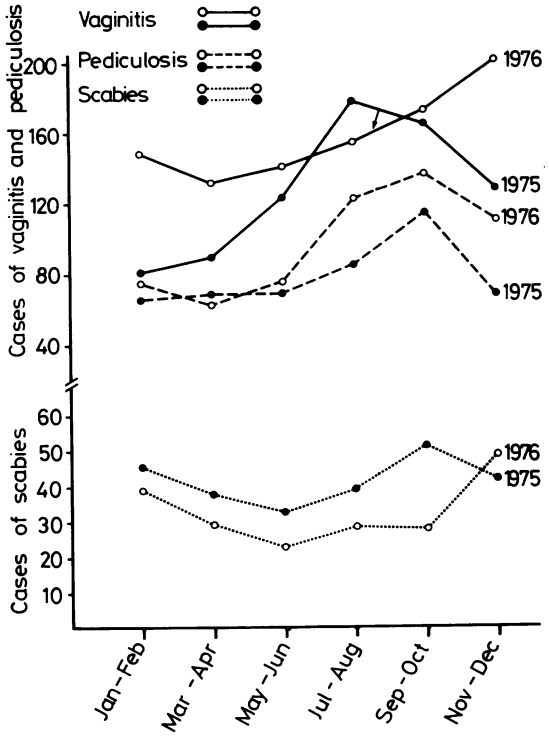

Fig. 3 *Seasonal incidence of vaginitis, scabies, and pediculosis by two-month periods in* 1975 *and* 1976

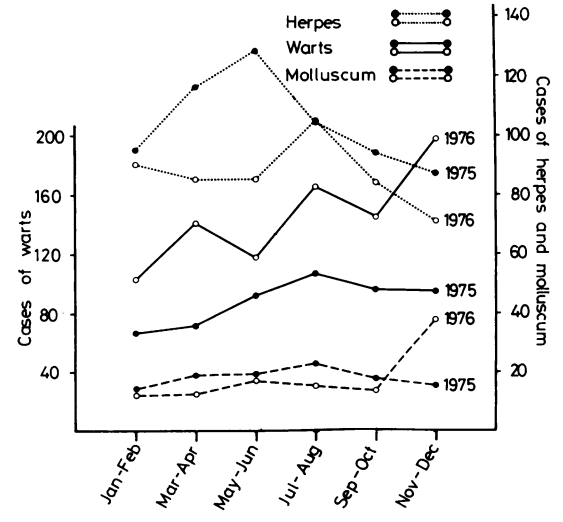

Fig. 4 *Seasonal incidence of warts, herpes, and molluscum by two-month periods in* 1975 *and* 1976

antibiotics for winter respiratory infections may prevent or cure many gonococcal infections caused by susceptible strains and may be the reason for the observed winter peak in gonococcal antibiotic resistance (Reynolds *et al*, 1976; Renkonen *et al*, 1970). Finally, the lack of seasonality for genital herpes agrees with our conjectures, since most of our cases were recurrent episodes and, therefore, not related to recent sexual contact.

COINCIDENCE OF STDS

Sexual contact is a broad common denominator, and thus it is expected that occasionally more than one STD would coexist in the same patient. During the study period 1471 (4·2%) patients had more than one STD diagnosed at a single visit. Because gonococcal infection was the most common STD in this group (45·6%), the degree of coexistence of gonorrhoea with other STDs was reviewed (non-specific genital infections were excluded) (Table 5). Six hundred and seventy-one (10·6%) patients with gonorrhoea had at least one other STD, a percentage twice that reported by Armstrong and Wiesner (1974). In their survey, however, molluscum contagiosum was not included, and cases of scabies and pediculosis were not observed.

The coexistence of gonorrhoea with each STD in order of frequency is shown in Table 5. The frequent coexistence of gonorrhoea and trichomoniasis has been observed in other studies (Armstrong and Wiesner, 1974; Eriksson and Wanger, 1975; Tsao, 1969) and is primarily due to a relatively high incidence of each infection and not to a cause-and-effect relationship (Odegaard, 1972).

Gonorrhoea coexisted less often with candidosis than with trichomoniasis, even though the incidence of these two forms of vaginitis was the same. This observation has been made before (Armstrong and Wiesner, 1974; Eriksson and Wanger, 1975) and is possibly due to a difference in pH growth requirements between these organisms (Peeters *et al*, 1972) or to the production of gonococcal inhibitory substances by *Candida albicans* (Hipp *et al*, 1975).

The frequency with which different STDs coexist has varied. Armstrong and Wiesner (1974) identified a frequency of 20% for gonorrhoea in patients with venereal warts, while Tsoa (1969) and Fischer and Morton (1970) observed a frequency of 28% and 50% for gonorrhoea in patients with pediculosis and scabies respectively. These frequency rates depend largely on the diagnostic criteria used, and on the multiple factors that affect disease incidence in the study population. Despite this, the common coexistence of these diseases emphasises the diagnostic dilemma faced by clinicians who see patients

Table 5 *Coexistence of gonorrhoea with other STDs during two-year study period*

STD	Total no. of cases	With gonorrhoea	
		No.	%
Trichomoniasis	883	210	23·9
Venereal warts	1396	149	10·7
Moniliasis	815	75	9·2
Syphilis	201	17	8·5
Pediculosis pubis	1049	86	8·2
Scabies	444	33	7·4
Molluscum contagiosum	218	14	6·4
Herpes genitalis	1144	58	5·1

with STDs, and it argues for a comprehensive diagnostic approach.

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References

Armstrong, J. H., and Wiesner, P. J. (1974). The need for problem-oriented venereal disease clinics. *Journal of the American Venereal Disease Association*, **1**, 23–28.

Aurelian, L. (1976). Sexually transmitted cancers? The case for genital herpes. *Journal of the American Venereal Disease Association*, **2**, 10–19.

Beilby, J. O. W., Cameron, C. H., Catterall, R. D., and Davison, D. (1968). Herpes virus hominus infection of the cervix associated with gonorrhoea. *Lancet*, **1**, 1065–1066.

Burmeister, R. E., and Gardner, H. L. (1970). Vaginitis: diagnosis and treatment. *Postgraduate Medicine*, **48**, 159–163.

Csonka, G. W. (1965). Non-gonococcal urethritis. *British Journal of Venereal Diseases*, **41**, 1–8.

Darrow, W. W. (1976). Venereal infections in three ethnic groups in Sacramento. *American Journal of Public Health*, **60**, 446–450.

Department of Health and Social Security (1977). Sexually transmitted diseases. *British Journal of Venereal Diseases*, **53**, 68–71.

Eriksson, G., and Wanger, L. (1975). Frequency of *N. gonorrhoeae*, *T. vaginalis*, and *C. albicans* in female venereological patients: One-year study. *British Journal of Venereal Diseases*, **51**, 192–197.

Eschenbach, D. A., Buchanan, T. M., Pollock, H. M., Forsyth, P. S., Alexander, E. R., Lin, J. S., Wang, S. P., Wentworth, B. B., McCormack, W., and Holmes, K. K. (1975). Polymicrobial etiology of acute pelvic inflammatory disease. *New England Journal of Medicine*, **293**, 166–171.

Fischer, I., and Morton, R. S. (1970). Phthirus pubis infestation. *British Journal of Venereal Diseases*, **46**, 326–329.

Gardner, H. L., and Dukes, C. D. (1959). Hemophilus vaginalis vaginitis. *Annals of the New York Academy of Science*, **83**, 280–289.

Hipp, S. S., Lawton, W. D., Savage, M. (1975). Selection interaction of *Neisseria gonorrhoeae* and *Candida albicans* and its possible role in clinical specimens. *Journal of Clinical Microbiology*, **1**, 476–477.

Holmes, K. K., Handsfield, H. H., Wang, S. P., Wentworth, B. B., Turck, M., Anderson, J. B., and Alexander, R. E. (1975). Etiology of non-gonococcal urethritis. *New England Journal of Medicine*, **292**, 1199–1205.

Maxcy, K. F. (1941). Papers of Wade Hampton Frost: a contribution to epidemiologic methods. Commonwealth Fund: New York.

McChesney, J. A., Zedd, A., King, H., Russell, C. M., and Hendley, J. O. (1973). Acute urethritis in male college students. *Journal of the American Medical Association*, **226**, 37–39.

Melton, L. J. (1976). Comparative incidences of gonorrhea and non-gonococcal urethritis in the United States Navy. *American Journal of Epidemiology*, **104**, 535–542.

Nahmias, A. J., and Roizman, B. (1973). Infection with herpes-simplex viruses 1 and 2. *New England Journal of Medicine*, **289**, 781–788.

Nahmias, A. J., Von Reyn, C. F., Josey, W. E., Naib, Z. M., and Hutton, R. D. (1973). Genital herpes simplex virus infection and gonorrhoea: Association and analogies. *British Journal of Venereal Diseases*, **49**, 306–309.

Odegaard, K. (1972). Trichomonas vaginalis infection and rectal gonorrhoea in women. *Acta dermato-venereologica* (Stockholm), **52**, 326–328.

Peeters, F., Snauwaert, R., Segers, J., VanCutsam, J., and Amery, W. (1972). Observations on candida vaginitis: vaginal pH, microbiology and cytology. *American Journal of Obstetrics and Gynecology* **112**, 80–86.

Rees, E., and Annels, E. H. (1969). Gonococcal salpingitis, *British Journal of Venereal Diseases*, **45**, 205–215.

Renkonen, O. N., Sivonen, A., Lassus, A., and Salo, O. P. (1970). Current status of the invitro sensitivity of gonococcia to penicillin in Finland. *Acta dermato-venereologica*, **50**, 151–153.

Reynolds, G. H., Jaffe, H. W., Thornsberry, C., Zaidi, A. A., and Wiesner, P. J. (1977). Trends and seasonality of antibiotic resistance of *Neisseria gonorrhoeae*. *Journal of Infectious Diseases*, **136**, 684–688.

Sehgal, V. N., Roa, T. L., Roge, V. L., and Vadiraj, S. M. (1972). Scabies: A study of incidence and a treatment method. *International Journal of Dermatology*, **11**, 106–111.

Shaw, P. K., and Juranek, D. D. (1976). Recent trends in scabies in the United States. *Journal of Infectious Diseases*, **134**, 414–416.

Svartman, M., Finklea, J., Potter, E. V., Poon-King, T., and Earle, D. P. (1972). Epidemic scabies and acute glomerulonephritis. *Lancet*, **1**, 1, 249–251.

Tsao, W. (1969). Trichomoniasis and gonorrhoea. *British Medical Journal*, **1**, 642–643.

US Center for Disease Control (1977). *Morbidity and Mortality Weekly Report*, Vol. 26, No. 1.

Volk, J., and Kraus, S. J. (1974). Non-gonococcal urethritis—a venereal disease as prevalent as epidemic gonorrhea. *Archives of Internal Medicine*, **134**, 511–514.

Wallin, J. (1974). Gonorrhoea in 1972: A one-year study of patients attending the VD unit in Uppsala. *British Journal of Venereal Diseases*, **51**, 41–47.

Willmott, F. E. (1975). Genital yeasts in female patients attending a VD clinic. *British Journal of Venereal Diseases*, **51**, 119–122.