

FACTORS AFFECTING CONTACT TRACING OF GONORRHOEA

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Abstract. In the Uppsala area about 9% of the 17- to 18-year-old non-university women and 7% of the 19- to 20-year-old non-university men had gonorrhoea. Of the university students, 1.5% in the age group 21 to 24 years had gonorrhoea. In an attempt to improve contact tracing of gonorrhoea, several interview sessions were held with 167 women and 155 men from the Uppsala area undergoing treatment for gonorrhoea. The results were compared with those from a retrospective study of 166 women and 181 men with gonorrhoea. On the basis of information concerning the partners and their contacts, obtained from records of these patients, an estimation was made of the probability that the real source of infection was found. The probability of having found the source of infection in the retrospective material was 61% for the women and 42% for the men. Repeated interviews increased the probability to 64% for men, but the level was the same for the women. The increase was especially marked after the re-interviews with men who named no or only one partner and with university students. In the group of patients who requested an examination because they suspected that they had gonorrhoea, the probability of finding the source of infection was 50%, whereas patients referred to the clinic by the Public Health Officer or by a partner with gonorrhoea showed a probability value of about 80%. The results obtained indicate that to combat gonorrhoea, re-interviews might only be of value in special target groups.

Gonorrhoea is showing a world-wide increase (13) and the Swedish statistics have also indicated a steady and alarming rise during the last decade (16). Factors which have influenced this increase are the changes in sexual attitudes together with an earlier sexual debut (1, 3, 11, 16, 19), the increased availability of the new contraceptives, including the pill (7, 12), and increased travelling, both nationally and internationally (8, 17). The manifestations of gonorrhoea have also changed, with an increased number of asymptomatic cases. When symptoms are present, they are often not

characteristic, which causes the patient to postpone consulting a physician (9).

The importance of contact-tracing and prompt examination of all partners of a patient with venereal disease is universally recognized. The value of re-interviews has recently been found to improve the tracing of contacts (6, 14). In Sweden the law requires that persons with a diagnosed venereal disease must name all sexual partners from whom they might have acquired the disease and those they might have infected. The patient's physician submits this information to the Public Health Officer in his county who, in turn, demands that the named persons have an examination for venereal disease. Sometimes the police are authorized to help the officer to trace a reported person. The following investigation was made to evaluate the contact-tracing program in our clinic and the effects of intensifying the activities of the social worker by increasing the number and length of interview sessions.

MATERIAL AND METHODS

Two different materials were collected from the records of the venereal disease clinic at the University Hospital in Uppsala. The first material, A, comprised a retrospective study of consecutive cases with gonorrhoea from January 31, 1970, back to January, 1969 for women and to June, 1969 for men. In this way, 214 women and 297 men with records of gonorrhoea were obtained. Data were collected from the records about the probable time of infection, the time of the last intercourse, symptoms such as discharge, pain in the urethral orifice or abdomen or other complaints concerning the genital area, and the reason which had caused the patient to visit the clinic.

The records of the patients also contained names of their partners during the period immediately prior to their initial visit. This information was obtained during a short

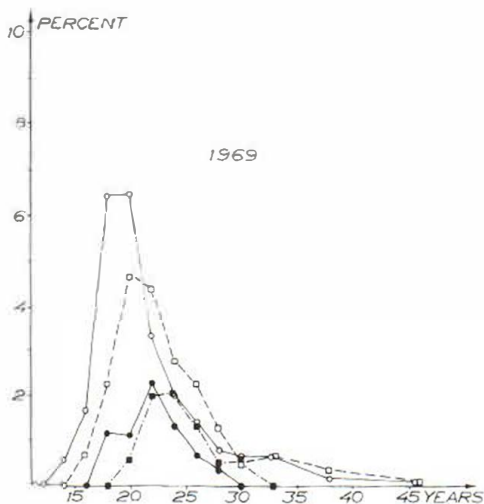


Fig. 1. Percentage of population in Uppsala area with gonorrhoea according to age, occupational status (students = ● and ■, non-student = ○ and □), sex (women = ○, men = □). Values obtained from time of collection of material A and recalculated as annual rates.

interview on the same occasion as the patient was examined for diagnosis and treatment. For convenience the following nomenclature was used: those who had had intercourse with the patients originally registered in the records were called partners and those who had had intercourse with these partners were called contacts. The partners who were named were also checked in the records of the clinic and information was collected about their medical examinations. If the information about a partner was incomplete in the clinic records, the archives of the Public Health Officer were checked for complementary information. If the partners had gonorrhoea, all of the sexual contacts they named were also noted. It was found that 48 women and 116 men had been infected by partners outside the Uppsala area. These patients were excluded because the information about the partners was not obtainable. Thus, material A consisted of 166 women and 181 men together with available data on sexual partners and contacts.

The second material, B, was collected during June to October, 1970. A more intensive investigation was now made by our social worker, Lars Ljungberg. Interviews were often made in several sessions during the regular follow-up period, i.e. 2 to 4 weeks after the day of treatment. The results of the examinations of the partners were often used in order to motivate the patient to disclose the person who was probably the true source of infection. In material B, information was obtained from 222 women and 217 men with gonorrhoea, and this material now also included cases diagnosed in other departments of the hospital. Only patients who were infected within the Uppsala area were included in the study, which thus finally comprised 167 women and 155 men together with available data on sexual partners and contacts.

Calculation of rates of gonorrhoea within the population

The Office of Public Statistics supplied data on the population of the city of Uppsala and its district classified according to age, sex, marital status, and income as recorded in January, 1970 and 1971. The number of active university students classified by age, sex, and marital status as recorded in January and October, 1970, was obtained through the student association and from the University of Uppsala. These data, however, did not separate students registered in Uppsala from those registered in other districts. The number of inhabitants and university students for an age group when combined gave too high a value; therefore, by utilizing tables of incomes in Uppsala and assuming that active students belong to a group without income as recorded by the public statistics, corrections were made. At the end of 1970 about 23 000 active university students lived in Uppsala and the total population within this age group, i.e. 17 to 40 years of age, was 66 000. The total population of Uppsala, including university students, was 145 000.

In the retrospective study A, 59% of the women and 88% of the men out of all cases reported to the Public Health Officer from Uppsala were examined and treated in the venereal diseases clinic. In material B, the corresponding figures were 74 and 82%, respectively. During the periods for A and B, the age distribution of the patients at the venereal diseases clinic was almost the same and, since most of the cases were seen at the clinic, it was assumed that they were representative of the reported cases from Uppsala. These percentages given above were therefore used to raise the number of cases within the different age groups to include all of the reported cases. For convenience, the total number of cases obtained in this way during the two periods when materials A and B were collected was expressed as annual rates. Utilizing these figures, the percentages of gonorrhoea in different age groups according to occupation were calculated and given as the annual rates in Figs. 1 and 2.

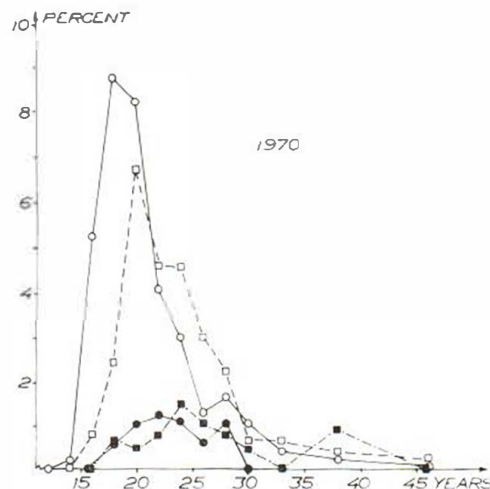


Fig. 2. Percentage of population in Uppsala area with gonorrhoea. Values obtained from time of collection of material B. Conversion as in Fig. 1.

Calculation of the probability of finding the source of infection

One aim of the study was to determine the true source of the patient's gonorrhoea. The information obtained from the patient was checked against the records for the named partners. The partners were accepted as a probable source of infection if the time they gave for intercourse agreed with the possible time of incubation, i.e. within 1 month before the onset of symptoms, or, in asymptomatic cases, within the 2 months preceding the initial visit. The patients were then divided into three groups.

The first group comprised patients who had had one or several partners with gonorrhoea who named more than one sexual contact. Here, the source of infection was considered to have been found. If this was true, by definition the probability of this occurrence is 1. These patients were therefore given a weight of 1.

The second group consisted of those patients whose source of infection was not found with certainty. The partners of these patients had gonorrhoea, but they indicated only the patient as the sexual contact or, in some cases, were able to give no information about the contacts. The weight given to this group was 0.5 since it was assumed that half of the patients named the real source and the rest did not.

The third group comprised those patients whose contacts were healthy and those whose partners were not identified. The weight given to this group was 0.

The mean value of the weights given to a specific group of patients was then calculated. This was taken as a measure of the probability of finding the source of infection for this group of patients.

Statistical treatment

The statistical treatment was carried out according to Snedecor & Cochran (15). Differences were analysed with the aid of Student's *t*-test or, in calculations on proportions χ^2 -tests were mainly used for the contingency tables. Interval estimates on proportions were calculated, using the binomial tables of Weber (18).

Diagnosis of gonorrhoea

In the venereal diseases clinic the diagnosis of gonorrhoea was made from the finding of either a positive smear or a positive culture of gonococci. The smears were considered positive if there was a collection of monomorphic diplococci within a neutrophil granulocyte stained with methylene blue according to Loeffler from material taken from the urethral orifice or cervix. Material taken from the urethra and, in women, also from the cervix and rectum was transported in Stuart's medium to the microbiological laboratory for culture.

The diagnosis made in 103 consecutive male patients in 1969 shows that in 80% both direct microscopy of smears and culture gave positive results. Ten per cent showed a positive culture and 10% a positive direct-microscopic examination. In 254 women the corresponding figures were 45%, 54% and 1%, respectively. In 4% of the women a positive culture was found only in the material taken from the rectum.

Table I. Number of patients and partners studied

Material A was collected during 1969; B during 1970 when an intense effort at contact tracing was made

Material	Women		Men	
	A	B	A	B
(a) Period of study (months)	12	5	9	5
Number of patients	180	167	211	155
Number of partners named	264	314	304	423
Numbers of partners with gonorrhoea	156	136	154	145
(b) Percentage of patients with some partners examined	86	86	71	84
Percentage of patients with all partners examined	63	49	53	46
(c) Percentage of patients with one or several partners with gonorrhoea	78	68	63	74
1 partner with gonorrhoea	69	56	55	58
2 partners with gonorrhoea	9	11	6	11
3 partners with gonorrhoea	—	1	2	5
(d) Percentage of patients with one or two partners healthy and others unknown	8	18	9	10
1 partner healthy	7	16	8	8
2 partners healthy	1	2	1	2
(e) Percentage of partners with gonorrhoea where partner and patient named each other	28	27	29	23
partner named others together with the patient	58	61	29	57
partner's sexual contacts were unknown	14	12	42	20

RESULTS

The trend of gonorrhoea in Uppsala in 1969 and 1970 showed an increase of about 80% in women and 40% in men when calculations were made on the figures reported from the public health authorities during the months covered by the present studies. Figs. 1 and 2 give the calculated annual rates of gonorrhoea for the different age groups. Taking into consideration the approximations made, these figures amply indicate the increase of gonorrhoea. The rates demonstrate gonorrhoea as a fairly common infectious disease especially among teenagers. Comparing the peak age groups, about 9% of the women aged 17 to 18 years not studying at the university had gonorrhoea once during 1970. Nearly 7% of the 19- to 20-year-old non-university men revealed the same risk. In the 21- to 24-year-old university students of both sexes about 1.5% had gonorrhoea once during 1970.

Table II. Number of patients and probability of finding the source of infection expressed in per cent

P-values refer to significant differences between material A and B

Material ... Number of partners named	A			B			Totals or averages	
	0-1	2	≥3	1	2	≥3	A	B
<i>Women</i>								
Source of infection:								
found	41	33	7	32	36	15	81	83
not found								
with certainty	32	22	4	9	19	5	58	33
not found	30	7	4	22	23	6	41	51
Probability of finding the source	55	71	60	58	58	68	61	60
<i>P</i> -value				—	—	—		—
<i>Men</i>								
Source of infection:								
found	22	16	8	32	30	22	46	84
not found								
with certainty	49	30	7	9	12	9	86	30
not found	62	14	3	19	13	9	79	41
Probability of finding the source	35	52	64	61	65	66	42	64
<i>P</i> -value				<0.001	—	—		<0.05

In 1970, 74% of the women reported to have gonorrhoea in Uppsala were treated in the venereal diseases clinic. This proportion was significantly higher than that recorded in 1969, which was 59% ($P < 0.005$). The proportion of males was not statistically changed from the 1969 value (82 and 88% respectively).

As a result of the intensified control program during 1970, the number of named partners increased, as can be seen in Table I *a*. This was due to the fact that the number of patients naming two or more partners was greater in material B than in material A (Table II). Despite the fact that there was an increase in the number of partners named, this did not obviously change the proportion of patients who gave sufficient information about their partners to enable tracing and examining of one or several of them. This occurred in about 85% of the patients in materials A and B. In about 70% of the patients at least one sexual contact had gonorrhoea. As indicated

in Table I *c*, only small deviations were noted between material A and B and between the sexes in this respect. Eight to eighteen per cent of the patients named only partners found to be healthy (Table I *d*).

In Table I *e* a summary of the sexual histories of the partners is given. In about 25% of the cases, the patient and the partner named only each other. This figure was almost the same in both material A and B. In material B no information was available about the partner's sexual contacts in 12 to 20% of the cases.

The age distribution of the patients and their partners in material A is given in Figs. 3 and 4. In some cases information was lacking concerning the age of the partner and these patients were omitted from the figure. Good correlations between the ages of the patients and their partners were obtained; the correlation coefficient for female patients and their partners was 0.73, and the corresponding value for the male patients was 0.63, both significant ($P < 0.001$). The mean age for women was 22 years, whether they appeared as a patient or as a partner. For the male patients the mean age was 23 years; for male partners 24 years. The age dependence between the patient and the partners was less clear in the age groups over 30. The age distribution of the patients in material B showed no changes when compared with material A. When the patients in material A were classified according to the number of sexual partners indicated, they showed the same cumulative age distributions.

The probabilities of finding the source of the infection are summarized in Table II, where a division of the materials is made according to the number of partners named. The calculated values from material A indicate that for 61% of the female patients a source was found and the corresponding figure for men was 42%. In the male patients the source was more often found when more than one sexual partner was given. During the prospective study B, the measures taken to increase the knowledge about the sexual partners resulted in a higher probability of finding the source of infection for male patients who gave only one sexual partner. A probability of 61% was thus achieved. No significant improvements were found in the other groups.

In Table III the reason why the patient came for an examination was broken down further ac-

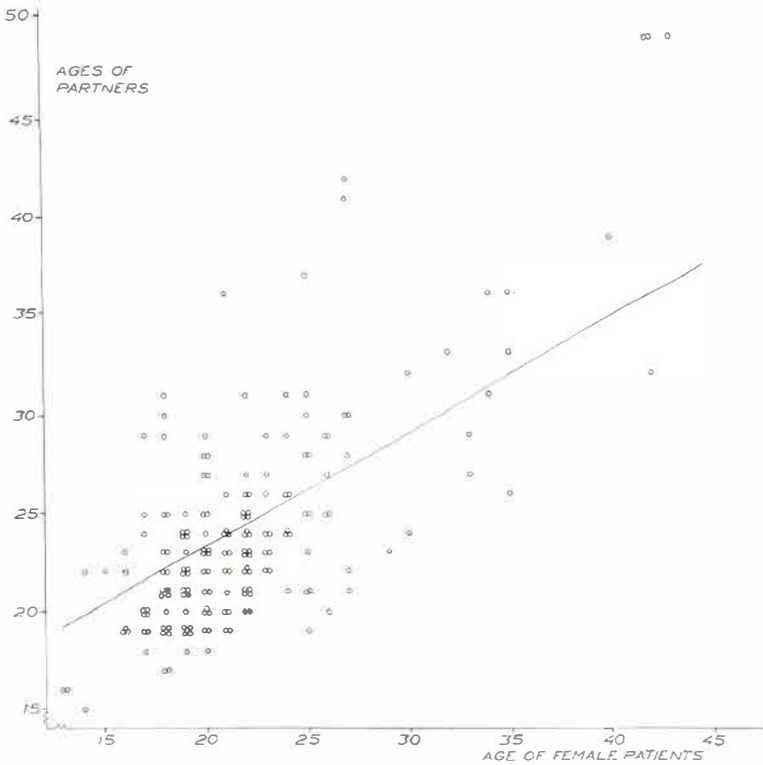


Fig. 3. Ages of female patients and their partners.

ording to the presence or absence of symptoms and whether there had been a reference from the Public Health Officer and/or a sexual partner or not. In the groups referred by the Public Health Officer or by a partner with gonorrhoea, higher probability values were obtained than in the group attending of their own volition. This pattern was the same in both materials. In material B the probability level was almost the same in the two groups of referred patients irrespective of sex and presence of symptoms or not. The probability obtained when the groups were combined was 81% which may be compared with 50% for the group of patients attending of their own free will. This difference was significant ($P < 0.001$). In Table III it can also be seen that improvements after the intensified program were evident mostly in the men.

In the two materials the group of university students was separated from the group of other patients. About 15% of the female patients and 25% of the male patients were university students. The probability values obtained for the female students were almost the same as the averages given in Table III for both materials A and

B. For the male students in material A, the probability values were the same as the averages shown in Table III. In material B a higher value, 75%, was found when compared with material A, where the corresponding value was 37% in university students with symptoms ($P < 0.01$). The male patients with symptoms who were not university students comprised 68% of material B and displayed a probability value of 54%. The corresponding figures in material A were 60% and 42%, respectively. The difference between the probability values was not significant. The male patients who were not university students and had no symptoms displayed a probability value of 80% in material B, which was significantly increased when compared with 47%, the corresponding value in material A ($P < 0.01$).

DISCUSSION

The efficiency of contact-tracing in venereal diseases varies considerably in different reports, values between 10 and 90% being given. The lower figures often refer to gonorrhoea and the higher to syphilis (1, 2, 3, 5, 6, 8, 14, 17, 20). It also

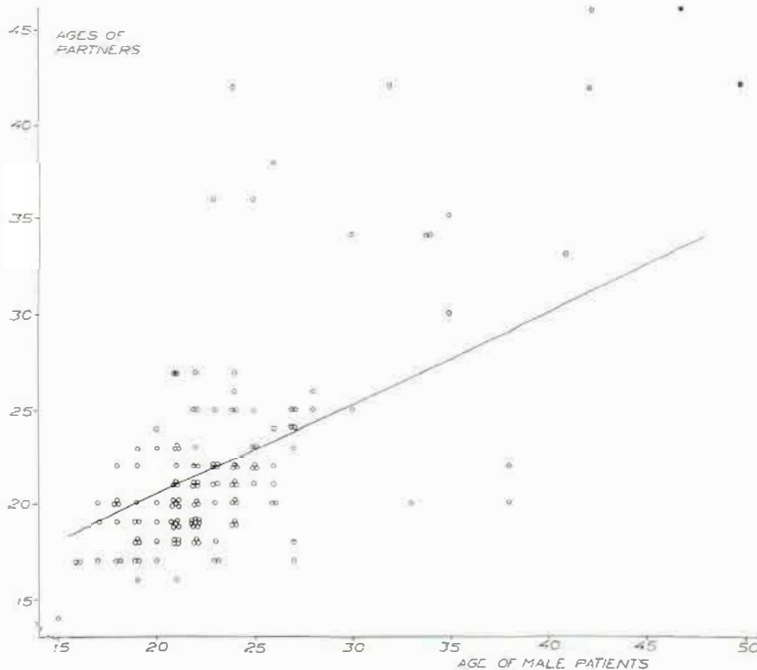


Fig. 4. Ages of male patients and their partners.

varies according to the type of society from which the results are obtained. The lowest figures are found in large cities or tourist areas (8, 14). In contrast, high values are obtained for special communities; for example, in the study by Bartschies & Jung on soldiers (2), 89% of the sources of gonorrhoea were located even though 66% of the

contacts were stated to be strangers. Similar results were found in Bergen, Norway, by Svindland (17). In London an improved interview technique together with a working scheme for inter-clinical communication increased the number of traced sources from 18 to 36% (14).

The present study concerns the city and district

Table III. Grouping of patients in materials A and B according to the reason for undergoing the medical examination, and the probabilities of finding the source of infection for each group

Symptoms include discharge and urethral or abdominal pain

Reason	Number of patients (%)				Probability of finding source of infection (%)			
	Symptoms indicated		No symptoms indicated		Symptoms indicated		No symptoms indicated	
	A	B	A	B	A	B	A	B
<i>Women</i>								
Public Health Officer	12	4	29	11	63	79	70	75
Sexual partner with gonorrhoea	13	10	16	19	52	86	83	82
Other reasons	20	30	11	26	35	43	52	46
Totals, averages	44	44	56	56	47	57	70	66
<i>Men</i>								
Public Health Officer	7	5	9	7	53	75	46	86
Sexual partner with gonorrhoea	1	5	4	6	33	86	55	85
Other reasons	77	73	2	4	38	53	8	57
Totals, averages	85	83	15	17	39	56	43	79

of Uppsala with a population of 145 000 including 23 000 university students in 1970. Most of the venereal cases were referred to the venereal diseases clinic of the University Hospital. They were young adults, and both patients and partners were of similar ages; the women about one to two years younger than the men. Their age distributions were the same during the two periods when the investigations were made. As evident from Table Ia, the interviews with several sessions while the patient was undergoing the control of his gonorrhoea increased the number of partners named. The number of partners with gonorrhoea located and treated, however, was not changed to any appreciable degree. Many names and addresses given were found to be non-existent, which implies that falsification is an easy way out of an embarrassing situation for the patient. The intensified interview program did not prove to be as effective as anticipated when compared with the previous system of the venereal diseases clinic. During the study, however, some target groups were identified, as revealed by the data obtained for the probability of finding the sources of infection, which will be discussed later below.

If the data in Tables Ic, Id and Ie are used to estimate the proportion of primary contacts found according to the definition of Muspratt & Ponting (14), this proportion proves to be about 70%. The primary contacts, however, include two groups. One group comprises about 25% of the patients where the patient and the partner named only each other. The second group comprises another 15% of the patients where the sexual relationship of primary contacts to the patient and others could not be determined, as shown in Table Ie for material B. It may be assumed that 50% of these cases hide the true source of infection. Thus, the figure of 70% naming primary contacts seems to be too high an estimate for finding the true source of the patient's infection. A more accurate figure in this material should be in the range of 50 to 60%.

In the two groups of patients referred by the Public Health Officer and by a partner with gonorrhoea (Table III) it can be taken for granted that at least one partner had gonorrhoea. When these two groups in material B were combined, however, 9 out of 119 patients referred did not name a partner who subsequently was found to have gonorrhoea. In addition, some further pa-

tients submitted information which was insufficient for locating the source of infection with certainty. These circumstances explain why the probability value found in the combined group of referred patients was 81%. The upper 5% confidence limit of this probability due to random error was 88%. This indicates that our methods never disclose the source of all of the patients' infections. The value may be used as a reference for the voluntary group of patients for whom a probability value of only 50% was obtained. This difference may indicate that a person who is informed that he might have gonorrhoea before he comes for an examination will be more prepared and will co-operate during the interview session. At a later point, when treatment has been completed, it would seem to be probably of less importance to the patient that he reveal the actual contacts. Such divergencies were often encountered during the interviews.

The control program influenced some groups of patients. The proportion of male patients who named one or no partner diminished from 64% in material A to 39% in material B (Table II). By this means, the probability of finding the source of infection was levelled at 64% in the men. However, 17% of the patients had partners who after examination were found to be healthy, which implies that a male patient who names only one partner belongs to a target group which should be activated further.

Another target group comprises the men who come to the clinic for slight symptoms and request a "routine" examination. This group displayed a probability value of 54% in material B. If they could be influenced to have checkups more regularly, it could be of value as the patients might obtain a better understanding of the gonorrhoea problem. It is suggested to these patients that they keep a notebook of occasional friends. Some of these patients come with reinfections once or several times and therefore are of special interest for epidemiological reasons. Whether these patients can be influenced to undertake such controls cannot be determined from this study, but this group has been under discussion by others (4, 10).

The results show that in spite of an intensive interview program in a comparable stable society, the efficiency of finding the source of infection was limited to an average of about 60%. One

group of patients, 44% of the women and 23% of the men, were informed by a partner with gonorrhoea, and here a higher efficiency was noted. Whether this group can be expanded further is a matter of uncertainty. A demand for anonymity is often met with during the interviews and will reduce the number of reported partners to be located. Furthermore, a seeming co-operation during the sessions often comes to nothing. Thus, reliable information in such cases was often restricted. Other methods, therefore, must be found and used in conjunction with selected re-interviews in order to achieve better results. A simple diagnostic strip indicating gonorrhoea, given to the layman, might be a fruitful measure.

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