THE PROBLEM OF GONORRHOEA
WITH SPECIAL REFERENCE TO ENGLAND AND WALES*

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(1) INCIDENCE

At the end of the Second World War (1939–45), in spite of great progress in the field of treatment, various factors which operate in wartime had caused a marked increase in the incidence of gonorrhoea. This had occurred both in the Armed Forces and in the civilian population, and the number of cases reported from the clinics increased as demobilization progressed, reaching a new high level in 1946. Subsequently, the numbers declined progressively to a level below that of pre-war years. After 1955, however, this trend was reversed and the numbers of new cases have risen year by year (Figure).

It is important to understand that the official figures indicate trends and not the true incidence of the disease. They do not include cases treated by

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general practitioners, specialists in private practice or medical officers in the Armed Forces. King (1958) drew attention to the fact of the increasing incidence of gonorrhoea and suggested that at least two factors were responsible: the emergence of strains of gonococci with an increased resistance to penicillin, and immigration from the colonies and other parts of the Commonwealth. In an analysis of 2,664 male patients with gonorrhoea attending two Manchester clinics, Laird (1958) found that 53 per cent. had been born outside the United Kingdom.

The number of male immigrants is considerably greater than the number of female immigrants, and many of the men are very limited in their contacts with the opposite sex; the contacts they do make are with prostitutes, leading to the spread of venereal disease (Hall, 1957).

Various other factors are believed to have contributed to the failure to control gonorrhoea, in spite of the high cure rate obtained with penicillin and other antibiotics (Nicol, 1956; King, 1958). The details given in the Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1959 (1960) show that the pattern of disease incidence has changed, but there is evidence that this is not related to decrease in promiscuity. The total number of new cases seen at the clinics in the year 1959 was higher than before the Second World War, and had only been exceeded in the war and post-war years, 1943–50. It seemed likely that habitual promiscuity was more widespread than formerly. According to Nicol (1956), another factor was the "reservoir" of undiscovered gonococcal infection among prostitutes and other promiscuous women. The evidence for this was the ratio of male to female cases diagnosed in the clinics, which varied between 3:1 and 4:1. This had been accepted as a true indication of the relative incidence of promiscuity among men and women, but examination of the numbers of cases of early infectious syphilis in males and females showed a constantly lower ratio. The main reason for the fact that gonorrhoea in women so often remained undiagnosed appeared to be that so many of them had no symptoms of the disease (see Section 4).

Homosexual contact is probably another important factor in the spread of infection.

It was pointed out in the Report of the Chief Medical Officer of the Ministry of Health for the year 1958 (1959) that "new cases" and "new patients" are not synonymous terms, the patient who has two attacks of a disease in the course of a calendar year appearing in the Annual Return as two cases. It was shown that, in seven important clinics (four in London and three in the provinces), the number of cases of gonorrhoea in 1957 was considerably larger than the number of patients suffering from the disease, indicating that re-infection accounted for many of the new cases. Most of these re-infections, though by no means all, occurred among immigrants from overseas and other migrants.

(2) Preventive Measures

(a) Health Education.—In an investigation by the British Federation against Venereal Diseases (1958), 292 patients attending a venereal disease clinic were interviewed. It was found that only 73 had received instruction in sexual matters and only ten remembered seeing leaflets concerning the dangers of venereal disease. In 1959, however, the Central Council for Health Education produced an up-to-date pamphlet entitled "You Should Know the Facts about Venereal Diseases". This has been made available to local health authorities for distribution.

(b) Facilities for Diagnosis and Treatment.—The facilities for the diagnosis and treatment of venereal disease were established by the Public Health (Venereal Diseases) Regulations of 1916, which enjoined the local health authorities to provide free clinics for this purpose by arrangement with local hospitals and other institutions. The National Health Service Act of 1946 brought the clinics under the control of the teaching hospitals or regional boards from the appointed day in July, 1948. Treatment continues to be free and patients are not required to pay for prescriptions. The Local Health Authority continues to be responsible for propaganda against venereal disease and for the tracing of contacts and defaulters. In some hospitals anonymous clinics are conducted on other premises than those of a venereal disease clinic and are not known by the patients to be in association with the venereal disease clinic. This gives the opportunity of examining patients from other departments of the hospital and the contacts of infected patients without disclosing in detail the purpose of the investigation.

(c) Pre-natal Investigation.—Antenatal clinics perform blood tests as a routine precaution to exclude syphilis, but few take tests for gonorrhoea or other genital infection, unless the patient complains of symptoms. It sometimes happens that genital infection is not diagnosed until the infant has developed ophthalmia neonatorum.

(d) Suppression of the Quack and Charlatan.—The lay public is protected from unqualified practitioners...
by the Venereal Diseases Act of 1917, which imposes heavy fines or imprisonment on any unqualified person who gives advice or offers facilities for the diagnosis or treatment of any venereal disease.

(e) Sources of Infection.—From time to time, during national emergencies, attempts have been made to secure by legal compulsion the attendance of individuals reported as sources of infection. The last of these was the war-time Emergency Regulation 33b, which was allowed to lapse in 1947. Since then the procedure for tracing contacts has depended upon the voluntary co-operation of infected patients. At the clinics “contact slips” are given to the patients to hand to infecting or infected contacts. In spite of the aid given in this matter by social workers, the “casual” infecting contact is most difficult to trace and bring to a clinic. As one might expect, it is much easier to secure the attendance of a wife, fiancée, or regular friend for investigation.

(f) Control of Prostitution.—Keighley (1960) examined and tested 387 prostitutes out of 464 admitted to Holloway Prison during the year 1958, and 35 per cent. were found to be suffering from gonorrhoea. Of the 464 prostitutes, 36 per cent. were in the age group 15 to 20; 145 of these teenagers were examined and 48.9 per cent. of them found to be suffering from gonorrhoea. The number of cases of gonorrhoea found among teenagers accounted for more than 50 per cent. of the cases among prostitutes.

In September, 1957, the Report of the Committee on Homosexual Offences and Prostitution (Wolfenden Report) was published. As a result of this report the Street Offences Act of 1959 was passed and became effective on August 16, 1959. This Act made the following provisions:

(1) It shall be an offence for a common prostitute to loiter or solicit in a street or public place for the purpose of prostitution.

(2) A person guilty of an offence under this section shall be liable, on summary conviction, to a fine not exceeding £10 or, for an offence committed after a previous conviction, to a fine not exceeding £25 or, for a third or subsequent conviction, a fine of £25 or imprisonment for a period not exceeding 3 months, or both.

In the past a prostitute who solicited in a public place was charged under the Metropolitan Police Act of 1839, and it was necessary for the police who brought the charge to give evidence of annoyance of passers-by. The maximum penalty was £2.

Under the heading “Punishment of offences in connexion with night cafés”, the Street Offences Act fixes the penalties for allowing prostitutes to be in these establishments, as follows:

(a) In the case of a person not previously convicted of an offence to which the section applies, £20 (instead of £5),

and

(b) In the case of a person previously convicted, £50 (instead of £20).

An order for the forfeiture of the club or café’s licence may also be made.

Under the heading “Punishment for living on earnings of prostitution”, the Act increases the maximum term of imprisonment on conviction from 2 to 7 years.

(3) Laboratory Methods

Diagnosis by Smear.—Price (1954) recommended that smears should be made with a platinum loop, thinly and evenly spread on the glass slide, mixing a drop of sterile water or saline with a drop of the discharge if necessary. They should be fixed by moderate heat, that is, the slide should not feel uncomfortably hot when placed on the back of the hand. Gram’s method should be used for staining.

Diagnosis by Culture.—The superiority of reliable methods for culturing the gonococcus over microscopic smears in the diagnosis of gonorrhoea in women and of chronic gonococcal infections in men was shown 30 years or more ago in Great Britain by Osmond, Price, and others, and has been confirmed in many countries since that time. It is generally accepted that the identity of the organism should be confirmed in culture, not only by the oxidase test but also by sugar fermentation tests and, in cases of difficulty, by serological tests. Apart from the proven superiority of this method in the female, cultural tests in both sexes constitute the only certain medico-legal proof of such infection and may also distinguish cases of acute gonorrhoea from those of primary urethritis due to other Neisserian organisms.

Techniques of Culture.—The difficulties of the techniques of culture are reflected in the variety of new media and modifications of old media which have been recommended and used from time to time. Some media have given excellent results in the hands of those who have first devised them and indifferent or variable results in the hands of others.
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Batches of the same media have given highly variable results at different times for no obvious reasons. In consequence there has been constant search for media which could easily be prepared and would give consistent results, in an endeavour to raise the admittedly indifferent standard of cultural work outside certain highly specialized laboratories.

It cannot yet be claimed that such an ideal medium has been discovered, but a good deal of useful information has been acquired. The medium which has been most widely used and has stood the test of time in Great Britain is that devised by McLeod, Coates, Happold, Priestley, and Wheatley (1934).

Oxidase Test.—This has been of great value in the detection of gonococcal colonies in mixed culture. From the first, Gordon and McLeod (1928), who introduced it, and Price (1929), who described its practical application in the diagnosis of gonorrhoea, fully appreciated that it was not a specific test and that positive tests occurred with other than gonococcal colonies, including other Neisseria.

Methods of Transporting Cultures and Material for Culture.—The problem of efficient cultural tests for the gonococcus in clinics and hospitals which have not the advantage of a first-class bacteriological service on the spot is a perennial one, and has been closely investigated in various countries during the last 20 years. In Great Britain considerable success has been achieved with a simple method described by Stuart (1946). Stuart believed that the death of the gonococcus by drying was caused by increased speed of oxidation. If the organism could be kept under conditions of reduction, this would not occur. He used small screwwapped bottles filled with 0·3 per cent. agar, giving the suitable physical conditions. The agar contained one part in 1000 thiglycolic acid neutralized with NaOH, and the whole was buffered with 1 per cent. glycerophosphate and 1 : 10,000 calcium chloride. One part per 500,000 methylene blue was added to give evidence of persistence of conditions of reduction, the agar remaining colourless as long as these were satisfactory. The swab containing the specimen for culture was pushed into the bottle, its stem was cut off flush with the rim, and the cap was screwed down. Stuart’s results indicated that, by this method, the gonococcus remained capable of sub-culture for up to 2, 3, or 4 days, and that there was no tendency for excessive growth of contaminants. Stuart was able to add an additional point in technique. It was found that certain batches of agar had a bactericidal action on Neisseria. This action could be neutralized by charcoal which, however, could not be incorporated in the medium without absorbing the methylene blue indicator. The swabs for taking specimens were therefore dipped in a 1 per cent. watery suspension of finely-ground charcoal before being dried and sterilized. Wilkinson (1951) suggested that, even when specimens had to be held in the transport medium for 25 to 52 hours, as for example over a weekend, the chances of isolating gonococci were not greatly diminished.

Moffett, Young, and Stuart (1948) found that the method employing Stuart’s medium was also applicable to the detection of *Trichomonas vaginalis*, which remained alive and active in the medium.

Complement-Fixation Test for Gonorrhoea.—The evidence indicates that this test has only a limited value and considerably less value now than formerly. Whether it can actively mislead, as some of its critics maintain, is an open question. Provided that it is performed by the technically expert and cross-fixation due to infection with other members of the Neisserian group of organisms is excluded, it seems unlikely that false positive reactions present a serious problem. The chief difficulty in its interpretation seems to lie in those positive results obtained from patients who are free from clinical signs and in whom the bacteriological findings are negative after apparently successful treatment. The problem is a serious one for the clinician, whose patient is perhaps anxious and introspective, and may wish to marry. It is tempting for the clinician to disregard the positive result and to spare his patient harmful uncertainty and stress. There is no doubt that there are cases in which that risk must be taken; but it should always be taken with full appreciation that it is a risk and that the answer to this difficult question is not yet known. Everyone will agree with Harkness (1944) that “In all cases great care should be exercised in the interpretation of this test as an aid to differential diagnosis”.

(4) CLINICAL ASPECTS

Asymptomatic Infection.—Before the days of chemotherapy and antibiotics, it was well known that men who had been treated for gonorrhoea and were not cured could remain infectious although they had no symptoms. Bittiner and Horne (1955) drew attention to the existence of “carriers” of infection who had been treated with penicillin. They defined a “carrier” as a man who had the disease and was capable of transmitting it, but who had no symptoms or symptoms so slight as to be ignored.
Re-infection and Relapse.—King, Curtis, and Nicol (1950) considered it impossible to differentiate clinically between re-infection and relapse. Dallas (1958) stated that, even if the patient denied further sexual intercourse, the reappearance of gonococci in the discharge more than 3 weeks after the original infection suggested re-infection rather than relapse.

Local Complications.—Rees (1952) stated that the para-urethral glands were common sites of infection in the female. In 25 (27 per cent.) of her 92 cases of infection of the para-urethral glands she found evidence of infection in the glands but not in the urethra, and in 22 of these the gonococcus was isolated.

Nicol (1948) stressed the importance of rectal examination and tests in the female. He found gonococci by smear or culture in 26 of 74 patients tested; in five of these cases the gonococcus was not found in the genital tract.

Urethral Stricture.—Mayne (1956) pointed out the value of urethrography in the diagnosis of urethral stricture. Dunlop (1961) gave evidence that stricture formation may be found in patients recently treated with antibiotics for gonorrhoea, but giving no past history of urethritis.

Common practice has been to keep patients under observation for 3 months after an apparently successful treatment for gonorrhoea, and the routine tests of cure are performed during this period. It has been usual to repeat the serological tests for syphilis after a further 3 months in case signs of syphilis have been suppressed by treatment with antibiotics during the incubation period of the disease (see also Section 5).

In view of his findings, Dunlop (1961) advocated that urethroscopy should still be included in the tests of cure of all patients treated for gonococcal or non-gonococcal urethritis.

Metastatic Complications.—Harkness (1949) suggested that metastatic infection producing polyarthritis and other manifestations was usually caused by associated non-gonococcal infection and not by the gonococcus, even when this organism was present in the genital tract. This view has been supported by Levy (1951) and by Ford (1953).

Associated Infections.—King and Gallagher (1946) noted the frequent co-existence of gonorrhoea and trichomonal vaginitis in the female; they found T. vaginalis in the secretions of 135 of 266 women suffering from gonorrhoea.

(5) Treatment

Sulphonamides.—The introduction of penicillin for the treatment of gonorrhoea caused a virtual abandonment of sulphonamides for the treatment of this disease and, in consequence, there is little evidence as to the present value of sulphonamides and the incidence of "sulphonamide resistance" in recent years.

However, Cradock-Watson, Shooter, and Nicol (1958) tested 200 strains of gonococci for sensitivity to sulphathiazole and found to their surprise that 199 of them were inhibited by 8 mg. or less of sulphathiazole per 100 ml. medium.

Penicillin.—Methods of treating gonorrhoea by parenteral injections of penicillin have been so simple and so effective that the indications for oral penicillin have been few. There has been some scope for the method in the treatment of children, of highly nervous patients, and possibly of seamen and others who have only occasional access to medical supervision. The main disadvantages of such treatment have been the irregularity and uncertainty of absorption, the necessity for prolonged treatment if moderate dosage has been used, and the danger of promoting over-confidence in the results of treatment which is so easily given and to which the signs of infection respond so readily.

There was considerable division of opinion on the matter of observation for possible syphilis after treatment of gonorrhoea with penicillin. The precautions recommended by Leifer and Martin (1946) were obviously sound and were generally accepted. The only point in dispute was how long observation was to continue. The evidence was strong that masking of syphilis or delay of early syphilis could occur in these circumstances although it was probably uncommon. A considerable proportion of these patients default early, irrespective of advice. For the remainder, the conscientious ones, it seemed reasonable to adopt a procedure which would give the fullest method of protection for them and for their families. The routine adopted in many clinics was observation and repeated tests for 3 months, with an additional and final clinical examination and serological tests after 6 months.

In recent years early syphilis has become a rarity and the tendency has been to limit observation and testing to 3 months in spite of the fact that gonorrhoea is treated with considerably larger doses of penicillin. In cases of doubt as to associated syphilitic infection, the substitution of streptomycin in small dosage for penicillin in the treatment of gonorrhoea has seemed to provide a satisfactory answer to the problem.
Penicillin Resistance.—Curtis and Wilkinson (1958) noticed, at the end of 1956, that a small proportion of men with uncomplicated gonococcal urethritis who attended a large clinic for venereal diseases in London failed to respond to routine treatment of 300,000 units procaine penicillin given intramuscularly, and that their secretions continued to show gonococci. In some of these cases further treatment with larger doses of penicillin was equally unsuccessful.

Between November, 1956, and December, 1957, they saw 1,267 cases of gonorrhoea in men, of whom 1,116 were treated with penicillin in routine dosage. Of these 1,116, 124 continued to have gonococci in their secretions after treatment. Curtis and Wilkinson measured the sensitivity of 302 strains of these organisms before treatment was given. They used tube sensitivity tests which proved to be more accurate than plate tests. Of these strains, 19·5 per cent. were sensitive to penicillin at levels of 0·125 to 0·5 units per ml. The failures of treatment after the injection of 300,000 units procaine penicillin in watery suspension, or in oily suspension with 2 per cent. aluminium monostearate, occurred for the most part with these relatively insensitive gonococci; in no case did failure occur when the sensitivity was below 0·03 units per ml.

These significant findings were confirmed by Cradock-Watson, Shooter, and Nicol (1958), who tested 200 strains of gonococci and found that 38 of them needed 0·128 units or more of penicillin per ml. for inhibition, and that patients infected with these strains were five times more prone to relapse after treatment than those infected with more sensitive strains.

It appears that this problem is not limited to London. Alergant (1958), writing from Liverpool, stated that, in a recent series of 46 men suffering from acute gonorrhoea treated with single injections of 300,000 units penicillin in oily suspension with 2 per cent. aluminium monostearate, seven failed to respond and gonococci persisted in their urethral discharges following treatment. In these cases, the sensitivities of the gonococci were not measured in vitro, but the findings were thought to be significant when compared with a report from the same centre some years earlier (Alergant, 1953), when no failures were reported from the same treatment in a larger series of cases.

To meet the problem arising from increased resistance to penicillin, Cradock-Watson and his collaborators increased the routine dosage of procaine penicillin for treatment of gonorrhoea from 300,000 to 600,000 units. Curtis and Wilkinson also recommended increasing the dosage from 300,000 units procaine penicillin in watery suspension to 600,000 or 1,200,000, but they believed that efforts should be made to devise a preparation of penicillin which would give blood levels of not less than one unit per ml. for not less than 24 hours, though preferably for not much longer, owing to the risk that long-lasting low levels of penicillin might produce further resistant strains of gonococci or symptom-free carriers.

It seems unlikely that these measures will provide more than a temporary solution to this problem. The matter is one which calls urgently for a closer study of the gonococcus and its susceptibilities. This organism is susceptible to many other antibiotics, but the cost of most of them is likely to be prohibitive for the treatment of so prevalent a disease.

Some misunderstanding has arisen from use of the term “resistant”. Ideally, this should be restricted to the case in which an organism is inhibited only by a concentration of an antibiotic which cannot be obtained and maintained in the blood and tissues. This has occurred with streptomycin-resistant gonococci but penicillin “resistant” strains would be more accurately described as “insensitive” or “partially resistant”.

Streptomycin.—This has been an accredited remedy for gonorrhoea since 1946 but, perhaps because the early evidence from the United States was so clear-cut, there has been little attempt at a systematic assessment of its value for this disease in Great Britain.

There have, however, been several reports indicating the emergence of streptomycin resistant strains. (Ryan, 1952; Davey, 1957).

Abortive Treatment of Gonorrhoea.—Willcox (1954) advocated the giving of penicillin to patients possibly exposed to gonococcal infection but not known to be suffering from gonorrhoea, in certain circumstances. He was in favour of giving such treatment to female consorts of men known to have gonorrhoea, whether or not signs of infection were present. Similarly, he was disposed to treat women with clinical signs of gonorrhoea in whose secretions no gonococci were found. He also favoured the giving of abortive treatment to prostitutes, to individuals who might be incubating disease and thus expose their partners in marriage to infection, and, in certain circumstances, to Service personnel. In all cases the persons treated were to be followed up as if the disease were known to be present.
King (1954) believed there was no case for abortive treatment and that all efforts should be directed to discourage a method which made a considerable appeal to many colleagues who were not in a position to weigh the evidence and discern the disadvantages. There was a principle involved, embodied in the aphorism "diagnosis before treatment". It was a fundamental rule from which departure should be considered only in very special circumstances. Even so, departures from the rule should be regarded as undesirable expedients which should be carefully and critically examined before they were adopted. They should not be advocated as proper and scientific procedures. It had not been shown that abortive treatment was effective in diminishing the incidence of venereal infection and was thus in the interest of the public health or of world health.

**Summary**

The problem of gonorrhoea in England and Wales since 1945 is reviewed under the following headings:

1. **INCIDENCE**
2. **PREVENTIVE MEASURES**
   - (a) Health education
   - (b) Facilities for diagnosis and treatment
   - (c) Prenatal care
   - (d) Suppression of the quack and charlatan
   - (e) Sources of infection
   - (f) Control of prostitution
3. **LABORATORY METHODS**
   - (a) Diagnosis by smear
   - (b) Diagnosis by culture
   - (c) Techniques of culture
   - (d) Oxidase test
   - (e) Methods of transporting cultures and material for culture
   - (f) The complement-fixation test for gonorrhoea
4. **CLINICAL ASPECTS**
   - (a) Asymptomatic infection
   - (b) Re-infection and relapse
   - (c) Local complications
   - (d) Urethral strictures
   - (e) Metastatic complications
   - (f) Associated infections
5. **TREATMENT**
   - (a) The sulphonamides
   - (b) Penicillin
   - (c) Penicillin resistance
   - (d) Streptomycin
   - (e) Streptomycin resistance
   - (f) Abortive treatment

**REFERENCES**

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Section 2

Section 3

Section 4

Section 5

Le problème de la gonorrhée en Angleterre et au Pays de Galles

**Résumé**

Le problème de la gonorrhée en Angleterre et au Pays de Galles depuis 1945 est passé en revue sous les rubriques suivantes:

1. INCIDENCE

2. MESURES PRÉVENTIVES
   - (a) Éducation du public
   - (b) Facilités de diagnostic et de traitement
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(c) Soins prénataux
(d) Suppression du guérisseur et du charlatan
(e) Sources d’infection
(f) Contrôle de la prostitution

(3) MÉTHODES DE LABORATOIRE
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(e) Techniques du transport des cultures et matériel de culture
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(4) ASPECTS CLINIQUES
(a) Infection asymptomatique
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(e) Complications métastatiques
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(5) TRAITEMENT
(a) Sulfamides
(b) Pénicilline
(c) Résistance à la pénicilline
(d) Streptomycine
(e) Résistance à la streptomycine
(f) Traitements abortifs
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