THE USE AND ABUSE OF ANTIBIOTICS IN GENERAL PRACTICE

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From inability to let well alone; from too much zeal for the new and contempt for the old; from putting knowledge before wisdom, science before art, and cleverness before common sense; from treating patients as cases, and from making the cure of the disease more grievous than the endurance of the same, Good Lord, deliver us.
Sir Robert Hutchison

A wise old doctor once said to me, "When I started in practice there was nothing I could do for the patient with pneumonia except fan him between the rounds and hope the better man would win; now, with antibiotics I can step into the ring and stop the fight". This well describes the revolution which has transformed the practice of medicine. In general practice we are engaged in a never-ending struggle with bacteria and viruses: in 1957 in my practice of 2,178 patients 37 per cent of all the illness was due to infection; 19.8 per cent was due to respiratory infections and otitis media. In the same year the drug most frequently used was penicillin, which was given to 145 persons, or 6.7 per cent of those on my list. The use of antibiotics enables us to alter the progress of a disease by striking at its cause, to take a crack at the enemy instead of just cheering from the ring-side. The general practitioner must frequently ask himself in the course of his day's work—Should this patient be given an antibiotic?

Antibiotics are not harmless drugs, they bring the risks of sensitized patients and resistant germs; rarely, they kill people. The benefit they bring is bought at a price, paid not only by the patients we treat with them today, but others who become infected with virulent antibiotic-resistant organisms. Indiscriminate use has brought back to our hospitals some of the perils that Semmelweiss banished a hundred years ago.

The discriminate use of these powerful weapons is a perpetual challenge; we have to weigh the good we can do to individual patients in our care today against the risks to them and to others tomorrow.

This paper is an attempt to review the use of antibiotics in a rural

general practice of 2,550. From 1 November 1959 to 31 October 1960 records were kept of the antibiotics used and the diseases for which they were given.

The figures in tables 1 and 2 are presented with temerity, since it is clear that the prescribing habits of an individual practitioner are of little interest to anyone except himself; they cannot be taken to be representative, since individuals vary so much in their use of antibiotics, and I am not so vain as to suggest that they should be used as a guide for others to follow. It would be valuable to examine comparable figures from many different practices and this paper will serve a useful purpose if it stimulates other doctors to publish theirs. In the meantime the figures from this practice serve to direct attention to the diseases most commonly treated with antibiotics, so that answers may be found to such questions as—To what extent were antibiotics used and for what conditions?; and, perhaps more important—With what aim and purpose in mind?

In this study sulphonamide drugs are included in the broad term "antibiotics". The topical use of antibiotics as ointments, eye drops, etc. is excluded.

During the year 308 courses of antibiotics were prescribed and table 1 shows that penicillin accounted for half, tetracyclines for just over a quarter, and sulphonamides, with or without streptomycin, for the rest. No case of tuberculosis was having antibiotic therapy, the two courses of streptomycin were for non-tuberculous infections. This is the more remarkable when one considers that, within the memory of some of my patients, tuberculosis was rife in the village, carrying off many of its young people.

Table 2 shows the diseases for which antibiotics were used. These will be considered in detail in the following section.

The diseases treated with antibiotics

1. *Tonsillitis and sore throat* were epidemic during the year and many were due to β-haemolytic streptococci. Fifty throat swabs were taken from the 180 cases and 25 grew β-haemolytic streptococci. Forty one cases were treated with antibiotics, usually penicillin. There were no cases of rheumatic fever or acute nephritis.

Many of the patients were but slightly ill and their throats got better in a week or less, regardless of the treatment. There was no correlation between the severity of the illness and the bacteriological findings, since in many of the streptococcal cases there was little fever and no exudate on the tonsils, while some of the dirtier throats proved not to be streptococcal. It is impossible to recognize the streptococcal cases from the appearance of the throat and, since it is pointless to give penicillin for sore throats not due to this organism,

TABLE I

ANALYSIS OF ALL COURSES OF ANTIBIOTICS

Penicillin	153
Tetracyclines	83
Sulphonamides	39
'Streptotriad'	29
Streptomycin	2
Chloromycetin	1
Furadantin	1
Total	308

TABLE II

DISEASES TREATED WITH ANTIBIOTICS

	Total Number of Cases	*Treated with Antibiotics*	*Penicillin*	*Tetracyclines*	*Sulphonamides*	*'Streptotriad'*	*Penicillin + Sulphonamides*	*Penicillin + Tetracyclines*	*Furadantin*	*Streptomycin + Chloramphenicol**
Tonsillitis and sore throat	180	41	39	0	1	0	1	0	0	0
Diarrhoea and sickness	100	32	0	0	3	29	0	0	0	0
Septic infections	99	35	24	9	1	0	0	1	0	0
Otitis media	77	42	41	0	0	0	1	0	0	0
Acute bronchitis ..	52	28	7	16	4	0	0	1	0	0
Sinusitis	41	25	19	6	0	0	0	0	0	0
Cystitis and pyelitis ..	28	26	0	2	22	0	0	0	1	1
Chronic bronchitis and bronchiectasis ..	23	19	1	16	0	0	0	1	0	1
Asthma	19	7	0	5	0	0	0	2	0	0
Pneumonia	17	14	12	0	0	0	0	2	0	0
Miscellaneous	11									

*Different antibiotics given consecutively to the same patient for the same disease. Different antibiotics were not given simultaneously. "Septic infections" includes boils, abscesses, cellulitis, septic fingers, septic cuts and abrasions, and lymphangitis.

the logical use of antibiotics demands a throat swab in each case. It is difficult to believe that this is feasible in most practices—certainly not in mine. The more severe streptococcal infections clearly need penicillin for the tonsillitis alone, since some may run a protracted course and go on to cervical abscess or quinsy; the milder cases represent short lived self-limiting infections, which the body's defences are capable of dealing with unaided. There remains, however, the risk of acute rheumatism and acute nephritis. Should all cases of streptococcal tonsillitis be given penicillin to avert these complications? I think this is the most difficult problem of antibiotic therapy in general practice and one to which I cannot see a clear answer. My only consolation is that from a study of the literature it seems that nobody else can either.

Rheumatic fever is a rare disease in general practice, though there is evidence that it is becoming more common. In seven years, using penicillin infrequently for tonsillitis I have seen one case among 2,000—2,500 patients and this was preceded by a sore throat so slight that I was not consulted. In the same period I have seen two cases of acute nephritis, one following a cold and the other a severe attack of tonsillitis, treated with penicillin. The incidence of rheumatic fever following streptococcal tonsillitis has been estimated to be of the order of one in a thousand, but this figure is likely to be too high, since many people with mild sore throats do not consult their doctors. When dealing with risks of this order it is as well to remember that the treatment itself carries a risk of complications and indeed of death. The incidence rises to higher levels during epidemics, presumably associated with a particularly virulent strain of organism. It would be of great practical value if the laboratory could recognize the dangerous types of streptococci and warn the doctor while there was time to take action.

The prompt elimination of streptococci from infected throats with penicillin has been shown to reduce the risk of complications. Wannamaker in 1951 described an epidemic of acute streptococcal tonsillitis among recruits at Fort Warren, an American Air Force base; of 1,178 cases treated with penicillin only two developed rheumatic fever, while 28 cases were reported among 1,168 controls. This was a susceptible population of young people in a closed community and the results cannot be applied directly to conditions seen in general practice. There are several reports of epidemics in Britain and America, with no cases of rheumatic fever.

The opinion of most physicians and paediatricians would, I think, be in favour of treating all cases of streptococcal tonsillitis with penicillin, but they see all the cases of rheumatic fever and few of the uncomplicated mild cases of tonsillitis. Specialists and general

practitioners are looking at this problem from opposite ends of the telescope. The general practitioner who sets out to treat all cases of streptococcal tonsillitis with penicillin in order to prevent rheumatic fever and acute nephritis is faced with a dilemma; either he must take throat swabs from all patients with sore throats, in order to identify the streptococcal ones, or he must treat all sore throats—a wasteful policy since many will not be streptococcal. He will have to do this on an average for five years before he prevents one case turning to rheumatic fever. I maintain that the case has not been established and it may never be possible to give a certain answer, since circumstances vary so much. Acute rheumatic fever may become more common. Different epidemics carry different risks, and epidemics among young people in schools and barracks are more dangerous than those among the general population. It is not possible to lay down hard and fast rules and the decision must be made by the man on the spot in the light of all the circumstances. Constant vigilance is necessary but I do not, as things are at present, shoot the streptococcus on sight.

There can, however, be no question of the wisdom of giving patients who have had acute rheumatism or acute nephritis penicillin for at least five years to prevent relapses. This is essential and to do otherwise would be negligent.

2. *Diarrhoea and vomiting.* Scarcely a week went by without one or more cases of this tiresome condition. The majority were sudden in onset and settled in two or three days. Most cases were not due to an organism that the laboratory could isolate and identify. Stool samples were sent to the laboratory from 31 of the 100 cases seen during the year and from four was *Sh.sonnei* isolated. Many cases do not need antibiotics and are best treated with rest, a fluid diet and opium pills or a kaolin mixture. I have used a compound tablet of streptomycin and sulphonamides (streptotriad) by mouth for those cases from which *Sh.sonnei* has been isolated, for severe cases with fever, much abdominal pain or blood in the stools, and for those cases which do not improve with 48 hours observation. It may seem illogical to use specific therapy when no pathogens have been isolated, but I believe it is justified in the above circumstances. It takes at least 48 hours to identify these organisms in the laboratory and when the disease is severe I prefer to start treatment immediately. Further, the disease may be in part due to normally harmless bacteria acting as secondary invaders. Finally, I have seen patients where simple measures had brought no relief recover promptly following antibiotic treatment. About one third of all cases in the practice during the year were given antibiotics and this is probably more than was necessary.

3. *Septic infections.* Boils, septic fingers, and infected minor

injuries make up most of this group. *Staphylococcus aureus* was isolated from 23 cases and 14 of these were sensitive to penicillin. Of the 99 cases during the year 35 were given antibiotics.

Many minor septic infections resolve readily with rest, heat, and applications such as 1 per cent aqueous gentian violet or magnesium sulphate paste and it seems wise to give them a chance to do so for 48 hours while the laboratory is finding out to which antibiotic the organism is sensitive. Difficulty arises from more severe, deep infections in the earlier stages of the disease when there is no pus available to send to the laboratory. One of the tetracyclines would seem to be the drug of choice and so far in this country practice it has been my experience that all staphylococci are sensitive to them.

4. *Otitis media.* Often during the winter months the family doctor must decide whether one of his young patients with this condition should be given an antibiotic. The study published by the Medical Research Council's Working Party for Research in General Practice in 1957 (*Lancet*) revealed that individual doctors decided very differently, since in this study of 1,323 attacks of otitis media the proportion of cases treated with antibiotics varied from less than 40 per cent to more than 90 per cent in different practices. This is a good example of how ill-formed are our ideas on the indications for antibiotic therapy and underlines the need for some clear thinking on the subject. Only one per cent of patients in the above study were referred to hospital, so that the teaching of otologists must be accepted with reserve, being based on a highly selected sample.

Otitis media is a common, painful condition carrying the risk of becoming chronic and inflicting permanent damage. Chronic otitis media with discharge and deafness is a dreadful condition and one that used to be common; in the last war two per cent of all recruits for the armed forces were rejected owing to it. Today, thanks to antibiotics it is rare. In the last 7 years, while treating 70—100 cases of acute otitis media a year, I have had no cases go on to mastoiditis and have never had to do a myringotomy; of the five cases of chronic otitis media in my practice all but one date from the bad old days before antibiotics.

Cases seem to vary in severity from epidemic to epidemic. Some years one sees predominantly mild infections that settle rapidly. At other times most cases are severe, with much pain and angry bulging drums, leading rapidly to perforation. The proportion needing antibiotics will vary from epidemic to epidemic, an important point to remember when conducting therapeutic trials. My practice is to reserve antibiotics for the more severe cases with much pain and bulging of the drum, for cases that perforate and discharge and for

those that do not improve after 48 hours of conservative treatment. The milder cases I consider should be kept comfortable for 48 hours with aspirin, ear drops such as ' auralgicin ', and vasoconstrictor nose drops. Of the 77 cases seen during the year 43 were given antibiotics, mostly penicillin.

Most of the cases needing antibiotics must be treated without the guidance of the bacteriologist, since the drum is still intact. In most, the organisms are those sensitive to penicillin, which is still the drug of choice. In a minority, the organism is Gram negative or a penicillin resistant staphylococcus and then treatment must depend on the sensitivity tests. It is my experience that penicillin G and V by mouth are not always effective; many cases respond, some do not. Hitherto I have found it necessary to give one or two daily injections of penicillin G and to follow on with oral penicillin when the infection is coming under control. Penicillin G by injection can be excruciatingly painful and I give penicillin injections to children with the greatest reluctance. It is to be hoped that phenethicillin (broxil) by mouth will be reliably effective and render it unnecessary to inflict further suffering on children already demoralized by pain.

5. *Acute bronchitis.* About half the patients I treated needed antibiotics, either penicillin or a tetracycline. Those with a distressing cough, fever, and mucopurulent sputum are rapidly relieved and the illness shortened.

6. *Chronic bronchitis and bronchiectasis.* The treatment of these disabling diseases with tetracyclines is surely one of the most notable advances in medicine in recent years; now we can do something to relieve these poor victims who previously had to be content with bottles of cough mixture. I have 23 cases in my practice and all but four needed one or more courses of treatment during the winter. I prefer to give intermittent therapy rather than continuous and I keep the patients supplied with tetracycline tablets which they take for 5 days when they feel a cold going down to their chests. Continuous therapy is wasteful and the risks of infection with resistant organisms and yeasts are too great. Only in those cases with profuse mucopurulent sputum throughout the winter is it likely to be worth it and I believe many of these cases have bronchiectasis. I provide patients with containers in which they collect sputum samples before starting the tablets and have had some unpleasant surprises at the organisms which have been isolated, particularly during the recent influenza epidemics. *B. coli*, *Proteus vulgaris* and *B. aerogenes* are some of the culprits and these infections have been resistant to tetracyclines and have needed streptomycin or chloramphenicol. Pneumococci and *H. influenzae* are not the only bacteria that

prey on the bronchitics and tetracyclines are not the whole answer; treatment must be tailored to the individual patient.

7. *Sinusitis.* This common, debilitating, and depressing disease tends to run a protracted course and leave chronic damage behind it. Some of the mild cases clear up with simple measures such as inhalations and vasoconstrictor drops, but I do not hesitate to use penicillin if there is no improvement or if the patient has had sinusitis before. Twenty five out of 41 cases needed antibiotics during the year, and the response was usually good.

8. *Cystitis and pyelitis.* The danger of urinary infections becoming chronic and causing permanent damage to the kidneys would seem an adequate reason to treat them promptly. Most respond rapidly to sulphonamides. The urine should be examined in each case and treatment withheld until pus cells have been seen with the microscope since urinary frequency is not uncommonly a symptom of anxiety. Recurrent urinary infections, of course, call for investigation to exclude abnormalities of the urinary tract.

For what reasons are antibiotics given?

1. *To save life.* Acute infections threatening life are not common in general practice; severe cases of pneumonia, septicaemia, and meningitis may be given as examples of emergencies that provide antibiotics with their most spectacular triumphs. To appreciate miracles like these one must have memories of sitting up through the night with a young patient dying of septicaemia. Obviously there is no question in this kind of situation; the right antibiotic must be given in adequate dosage as soon as the diagnosis is made until the patient is out of danger.

2. *To preserve health.* More common in general practice are the infections which do not kill but maim, leaving the patient with a permanent disability. For example, the child with otitis media whose discharging ear leaves him partially deaf, the woman with an ascending urinary infection which will scar her kidneys, and the man with chronic bronchitis, whose lungs are damaged a little more with each relapse. In this situation antibiotics are necessary because permanent damage is prevented or minimized.

3. *To save the patient suffering.* Many infections will resolve on their own in time but treatment with antibiotics will reduce the length of the illness and spare the patient some of the misery. While there would be no question that antibiotics should be given for such prolonged infections as typhoid, tuberculosis, or undulant fever, the conditions met with in general practice offer less well-defined indications. For example, acute bronchitis will clear in a week or two with rest, plentiful fluids, aspirin and inhalations, leaving no

permanent damage behind. Give the patient antibiotics and he will be better in half the time. Is it worth it? The ghost of my elderly predecessor in this practice looks over my shoulder and says "My boy, I can't think what you want with all these damned injections; these people would have got better fifty years ago without them". No doubt the patient will think it is worth it and he is in a better position to assess his suffering than his doctor is, who may underestimate the unpleasantness of common conditions until he becomes a victim himself.

It is in this situation that I think the advice "Wait and see" is the right one. After all, we do not have to decide at the first consultation; forty-eight hours of sensible symptomatic treatment will usually show whether the patient or the bacteria are winning. The "quick on the draw" attitude is right and proper in severe infections threatening life, but in the vast majority of infections seen in general practice procrastination is a virtue. Wait and see for 48 hours; many of the patients will be well on the road to recovery and unnecessary antibiotic treatment will have been avoided. This problem will become more pressing in the future as the pharmaceutical industry provides us with drugs active against viruses. Already we are offered a drug which, it is claimed, will reduce the course of influenza from 6 days to 4 and is active against measles, mumps, chicken-pox, and shingles as well. Should it be given to every patient suffering from these short and in most cases harmless infections?

4. *To prevent the spread of infection.* Cases of Sonnei dysentery should be given antibiotics to prevent them becoming chronic carriers and spreading the disease. Epidemics of streptococcal tonsillitis in schools can be curtailed by treating all cases with penicillin.

Antibiotics in the situation described above have shortened the illness and saved the patient his life, his health, or some suffering. They have done good and if it was not that there were risks attached to their use a case could be argued for giving antibiotics open-handedly to every patient, with as little hesitation as we prescribe aspirin. But there are occasions when we give antibiotics without doing the patient any good. For example, the sore throat not due to the streptococcus, the common cold, and the mild diarrhoea and sickness that is constantly with us, are all short lived infections, not caused by bacteria sensitive to antibiotics; treatment will have no influence on the illness and yet most of us (and I count myself among the guilty) more or less commonly use antibiotics in these conditions. Why do we do it and what do we hope to gain?

To save time, trouble and worry. At the best of times general

practitioners with big lists find little time to spare and in the worst of times—the winter and spring months—each day is a race against the clock, just to get around and visit all those who have called us. It is little wonder that judgement becomes clouded and we resort to short cuts. A child with a sore throat may well recover with an aspirin mixture but he will need frequent visiting and a throat swab. The busy doctor is tempted to start treatment with antibiotics at the first visit and not see the patient again for five days at the end of the course of treatment. In an epidemic when he has to see six or eight new patients a day this short cut may save the doctor 60 to 70 visits a week. He has given the patient the most effective treatment there is and it is better to be blamed for over-treating patients than neglecting them. I am sure this attitude is responsible for much of the indiscriminate use of antibiotics, and goes with the argument "antibiotics may do some good and anyway they can't do any harm".

To save face. Doctors find themselves under pressure from patients who expect to be treated with the latest wonder drug. The anxious parent may not be satisfied with the doctor who advises such measures as rest, warmth, plenty to drink, aspirin, and tepid sponging for a feverish child, especially if the doctor down the street is giving all his patients the latest antibiotics. It is difficult to avoid being swayed by medical fashions, but the doctor who spares the time to explain to his patients what he thinks is right and what he is trying to do will usually win their confidence. I have met patients recently who have been very critical of the medical profession's way of turning to antibiotics for minor conditions.

The final reason is because a generation of doctors is growing up which has forgotten that the body's defences are able to deal unaided with many infections. Medical teaching in hospitals is based on a selected sample of the most severe cases of any disease and the student comes to think that as soon as a pathogenic organism is isolated it should be killed with the appropriate antibiotics. This "trigger-happy" attitude is no doubt justified when treating infections selected for their severity but it leads to indiscriminate use of antibiotics when the doctor comes to general practice. It is a major defect in our medical education that the cases the student learns about are so unrepresentative; the medical student would get a better sense of proportion if more of his teaching was in the hands of general practitioners.

Which antibiotic and by which route?

Having decided to give a patient antibiotic therapy an effective antibiotic must be given by the most effective route. I believe that penicillin is the drug of choice in otitis media, streptococcal tonsillitis,

pneumococcal lobar pneumonia, acute sinusitis, and in septic infections due to a penicillin sensitive staphylococcus. It should be given to adults by intramuscular injection of 1 mega unit of crystalline penicillin G a day for two or three days until the infection comes under control and the fever and pain are relieved, when penicillin V by mouth may be used to complete the five to seven days of treatment. Penicillin by injection is on occasions exceedingly painful. I once saw a very tough friend of mine who used to box for the Navy faint with pain after an injection I had given him. To give penicillin injections to children is justified only when penicillin by mouth is ineffective. Unhappily, this is true of many cases of otitis media and it is to be hoped that phenethicillin will remove the need for this ordeal by needle.

The chief indications for the tetracyclines are chronic bronchitis in its acute exacerbations, septic infections due to penicillin resistant staphylococci and some cases of acute bronchitis.

Sulphonamides are the drugs of choice for urinary infections and, with streptomycin, for diarrhoea and vomiting.

I believe that for any infection one should select from the antibiotics to which the organism is sensitive that which has been in clinical use the longest, excluding the sulphonamides and including with penicillin its latest derivatives. In this way one will always have something in reserve against resistant organisms. In this respect it is a virtue to be old fashioned and it is wrong to use the latest antibiotic when one of the older ones would do. I have never used erythromycin, novobiocin, vancomycin, spiramycin, or oleandomycin, and do not intend to until confronted with an organism so sophisticated that nothing else will get the better of it.

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