MEDICAL PRACTICE

*Clinical Topics***The pattern of communicable diseases in the UK and abroad***

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Communicable microbial diseases display the versatility inherent in the microbes that cause them. Without a corresponding ability to adapt our methods of control, we could fail to hold the low levels of morbidity and mortality to which we have grown accustomed. We must control the spread of infection, not merely with resolution but with full intelligence—in both senses of that word. Specialists in community medicine have now seen some of the effects of the organisational changes made in the National Health Service in 1974; and we need to examine whether these changes are likely to have improved or worsened the effectiveness of the control of microbial diseases.

Types of control

What are our controls? In effect there are three: (1) hygiene; (2) immunisation; and (3) chemotherapy. All three have produced notable benefits, so that death and disease from microbes have been spectacularly reduced. But all three controls may be seriously weakened by misguided application of them. Measures of hygiene are effective if they are applied to the right places—separation of sewage from drinking water, for example, will have a striking effect upon the incidence of cholera but it will not eliminate the main sources of salmonella food-poisoning. Immunisation will stop tetanus, but it will

not halt the common cold. Chemotherapy has greatly reduced the damage done by streptococci, but it cannot yet deal with influenza. Furthermore, use of antibiotics without intelligent discrimination will soon amount to overuse and magnify the problems caused by infections with drug-resistant microbes.

Thus there is no single golden rule for wise conduct; and no evident prospect of large-scale redundancy among microbiologists. Regrettable as it must seem to many, physicians, surgeons, and proper officers of local authorities will have to understand microbiology better before they can hit microbes harder; and the best way of understanding microbiology better is to have regular, down-to-earth, question-and-answer sessions with sensible, well-informed microbiologists. Regrettably, what is true of one microbe is not necessarily any guide to the life style of another; so a one-by-one approach to the facts of microbial disease is essential, however irritating it may be to acquire correct answers only by this slow and seemingly tedious method.

Prevalent infections**INFLUENZA**

Although the causal virus was isolated over 40 years ago, influenza remains a major cause of sickness, and major epidemics cause many deaths, especially in infancy and in people over 60 years of age. Despite enormous efforts immunisation has not halted this disease. The A type of virus undergoes repeated changes in its antigenic make-up; and a vaccine that works well in one year may fail in the next. Moreover, the virus enters the human body directly on its target area—the nasopharynx. Unlike, for example, polio and yellow fever, it does not have to traverse the blood stream to reach its area of operation and is not therefore exposed to circulating antibody before it can begin to multiply where it causes pathological effects. This means that antibody must either be locally produced or must be present in high concentration in the inflammatory exudate

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produced in response to the viral invasion. There are three possible lines of approach to more effective immunisation, all difficult: success in identifying and purifying in still effective form the antigenic fraction or fractions of the virus that are relevant to protection; increasing the quantity of antibody produced by incorporating harmless adjuvants into the vaccine; and developing a live attenuated vaccine. All three approaches are being energetically explored. There have been many disappointments, but also some obvious successes under favourable conditions, especially of timing; but there is not yet enough success to justify mass immunisation. This was written before President Ford's surprising contribution to our knowledge. Despite the President's proposal, the statement may stand. Selective immunisation of particular groups is rightly being undertaken and epidemiological information is being collected and analysed on a worldwide scale; but there is no dramatic advance to report as yet.

The cause of death in influenza is usually pneumonia caused by staphylococci or pneumococci. Well-judged chemotherapy may save many lives, but not all. The use of pneumococcal vaccines at the beginning of a winter to protect selected groups, especially old people, has a rational basis and seems worthy of more study than it has yet received. Pneumonia due to mycoplasmas has, I am assured, distinctive clinical and epidemiological features; and microbiological diagnosis is within the resources of a modern service. This type of pneumonia is worth identifying because in man it responds quickly and well to tetracycline. If untreated the infection may be very slow to resolve.

OTHER VIRUS DISEASES

The advent of tissue culture of viruses opened a new era in the control of many infections. Tissue culture made the isolation and identification of many viruses readily possible; and it allowed the successful production of protective vaccines against—for example, polio, measles, and rubella. Polio can be practically eliminated. Measles can be much reduced in the incidence of the disease itself and of its more serious complications, notably encephalitis. Early problems have been overcome, and both these immunisations are now well established and accepted as effective and safe. Rubella vaccine is now in use, but its full assessment will need time.

Rubella is important as a cause of fetal deformity. When, in 1964, it became possible to put up a case for a pilot scheme for laboratory diagnosis I was challenged to say how serious the problem really was. To my mind, the fetal deformities actually caused were only one part of the misery which a good laboratory diagnostic service could prevent. I thought of the many mothers who had been, or thought they had been, exposed to rubella at an early stage of their pregnancies, and of the many months of anxiety they spent wondering if they would give birth to deformed babies. The diagnostic service, properly used, soon reduced that particular form of misery to vanishing point. Moreover, the accurate studies made possible by this service showed, firstly, that 85% of women were already immune and had no cause for worry, and, secondly, that repeated contact within the family rather than casual contact in brief meetings was what constituted the real risk to the 15% of susceptible women. The other thing that emerged was that gamma-globulin given after a suspected exposure was not an effective prophylactic in this disease, as it was in the so-called A type of hepatitis. Now, good studies are showing us the important role of cytomegalovirus infection in causing congenital malformations.

Thanks to tissue culture we now have good information about the prevalence of other viruses. We recognise epidemics of infection due to the Cocksackie viruses, echoviruses, and adenoviruses, and their pathological effects—some serious, some trivial—are now well documented. We have now a fair

catalogue of the viruses that cause aseptic meningitis and we are now better able to assess non-paralytic poliomyelitis and encephalitis.

RESPIRATORY VIRUSES

There is a popular belief that the medical profession is not interested in the common cold. The reverse is true. Vast efforts have gone into studying all the upper respiratory viruses. We now know them by names and numbers, and they are legion. Unhappily, our vast accumulation of true facts has not yet brought us a ready and acceptable means of preventing or cutting short these troublesome infections. Vaccines against respiratory viruses have been inclined to produce hypersensitivity rather than protection, and chemotherapy is still in the experimental stage.

Smallpox

Smallpox is definitely on the way out; and I wholly agreed with the decision to stop recommending the vaccine as a routine immunisation for infants in the UK. It had become a greater cause of morbidity than smallpox itself under our highly favourable conditions. The World Health Organisation's effective campaign of eradication depends on the vaccine and it gave us good reason to recommend that smallpox vaccine should become a routine measure only for special categories—notably the staff of hospitals, travellers to certain countries, and members of the armed Forces. In the UK we have relied on rapid laboratory diagnosis of suspected cases and on our system of tracing and isolating all contacts of proved or suspected cases until a negative diagnosis is confirmed or the incubation period is over. In the laboratory immunodiffusion methods and the electron microscope have greatly helped rapid and accurate diagnosis. What needs to be assured is that our index of suspicion does not fall and that our scheme for contact tracing is realistically planned in detail and rehearsed at regular intervals. Gaps in these arrangements have sometimes let us down in the past; there have been curious failures of communication and examples of ill-defined and therefore confusing responsibility.

Undoubtedly in this, as in other areas of microbial disease control, a small, capable team with all the necessary expertise must be assembled and regularly rehearsed during periods of calm. In dealing with epidemics and episodes that create justified moods of public alarm it is necessary that a group of people, already well known to each other, can be at once assembled to deal correctly with the many aspects of control needed for rapid and effective action. These aspects deal with public administration, provision of medical staff and hospital beds, laboratory organisation, epidemiological inquiry, and public relations. This team needs a head—in two senses—but the days are past when one person may expect to have a real understanding of all that is necessary and possible. My opinion is that smallpox has now virtually ceased to worry us. Between 1963 and 1973 it never ceased to trouble my mind. Many entries of viruses were rapidly and successfully contained; and it was only the London episode of 1973 that drove home the lesson that divided and uncertain responsibility and plain lack of knowledge and understanding could still breach our defences.

Smallpox, I am sure, is going; but let us keep hold of the lessons it has taught us about what is needed for an effective control team and let us apply these lessons with understanding and good will to the control of other microbial infections that may still spread within the community and cause justifiable alarm. In saying this I permit myself two glances—one longingly backward and one hopefully forward. Backward to the powers, knowledge, and clear responsibility that resided in the

medical officers of health in the days when infectious diseases were their main preoccupation; and forward, hopefully, to the possibility that the unique resources of the Public Health Laboratory Service—central, regional, and peripheral—may soon be fully understood and now fully used both in detecting and controlling the spread of microbial disease. Effective local organisation of the control team is vital, but so is the help which can come from a national and expert service, unhampered by administrative boundaries or inhibitions, which are certainly ignored by microbes.

Other microbial diseases

The essence of art is selection, so I choose only two further important groups of microbial diseases for rather brief discussion—namely, intestinal infections and infections imported from abroad. To some extent these obviously overlap, and I select these two categories to emphasise about both that I think we need only better information and better understanding to make significant advances in their prevention.

INTESTINAL INFECTIONS

Of intestinal infections, we now have relatively little typhoid and paratyphoid. Most of it comes into the country from abroad, brought by holidaymakers and immigrants. Neither disease is highly communicable from person to person, although in Egypt urinary carriers really constitute the greatest and most dangerous source of infection. But in the UK it is usually true of typhoid and paratyphoid that "to get it you must eat it." It is remarkable how many times a chronic carrier is discovered only late in life, when the old person has become a little uncertain about cleanliness and has infected grandchildren through their food—the same carrier having reared children without infecting them. So in our conditions typhoid is not highly communicable from person to person. Large-scale outbreaks have come from widely distributed infected water, ice-cream, and corned beef. Spread from one meat to another within a shop was the explanation of our last really large outbreak, in Aberdeen in 1964. The original infection was of corned beef canned in the Argentine.

Unlike typhoid and paratyphoid, salmonella food poisoning is really a zoonosis. It is a widely prevalent infection introduced into families and communities not by chronic human carriers but by contaminated animal flesh, milk, and eggs. To stop it, as we should, we have to direct our efforts to cleaning up the sources—infected raw materials fed to animals, infected animals and premises, badly managed slaughter houses, and large-scale poultry-processing plants. These are the first steps that need to be taken. Secondly, we have to emphasise the need for scrupulously good hygiene in food-processing plants, early detection of infected employees so that they do not spread an infection of which they are victims rather than causes, education of shopkeepers and housewives on the need for adequate thawing of frozen foods, and the adequate cooking of all foods derived from animals. The time has come when we should turn our vast accumulated knowledge of the epidemiology of salmonella food poisoning into more purposeful actions for its elimination.

By contrast, we have much less information about dysentery because its epidemiology is not so easily studied. But in this disease, and in infantile gastroenteritis, what we principally need are better facilities for washing of hands and bodies; better decontamination of lavatories in schools, public places, and homes; and better hygiene in the preparation and sterilisation of infant feeds. Shiga dysentery may come to us from abroad, as recent studies show.

In the treatment of typhoid and paratyphoid, chloramphen-

icol is the drug of choice. Long may it so remain; to ensure this we must firmly resist every attempt to promote its overuse and wrong use. In the treatment of salmonella food poisoning, dysentery, and infantile gastroenteritis antibiotics will usually do more harm than good. When life is endangered rehydration and carefully regulated control of electrolytes is the real requirement, as it is in cholera.

INFECTIONS CONTRACTED ABROAD

The main thing is always to remember the possibility that an apparently mild illness may become acute and endanger life and to realise how rapidly this may occur. This is true above all of the malaria caused by *Plasmodium falciparum*. This is the often fatal type, causing death by haemoglobinuria or cerebral invasion. But the symptoms may at first be deceptively few and slight. Early diagnosis and treatment are essential. Malaria may come from any part of the tropical world, the *falciparum* variety being commonest in West and Central Africa. Anyone taken ill within six months of returning from abroad should be closely questioned and examined with this possibility in mind.

Among other protozoal infections there are the other three types of malaria, amoebiasis, giardiasis, leishmaniasis, and trypanosomiasis. Russia has recently been a source of giardia infection. Typhoid and paratyphoid most often come from India, Pakistan, Bangladesh, and Spain. Cholera may come from the same countries, but also from any part of the Middle East, North and West Africa, the Mediterranean countries, Spain, and Portugal. The few identified infections here have caused only mild illnesses or none, and the likelihood of any wide spread of infection here is very low indeed. *Vibrio parahaemolyticus* infection can produce a fairly sharp illness; it is conveyed by seafood and may be acquired on aircraft.

Helminth and other worm infections are not a serious risk to the community under our present conditions of sanitation, but they may cause some trouble to the individual sufferer. Ancylostomiasis and schistosomiasis are probably the most important.

The laboratory diagnosis and the treatment of these infections are straightforward, the main difficulty usually being to remember that many patients with vague illnesses may have recently come from abroad and should be thoroughly investigated if they have. Lassa fever, Marburg disease, leprosy, rabies, and tuberculosis are other infections to remember. Special arrangements are required for diagnosis of the first two.

Conclusions

The pattern revealed by this review is necessarily incomplete, omitting as it does any detailed reference to such diseases as syphilis, gonorrhoea, leptospirosis, toxoplasmosis, tuberculosis, hepatitis, leprosy, anthrax, whooping-cough, ornithosis, and brucellosis; as well as streptococcal, staphylococcal, meningococcal, clostridial, bacteroides, urinary, and wound infections.

Selection, however, was necessary and the choice of infections considered rested partly on their significance for medical officers of environmental health and because it seemed necessary to make some particular points of general principle about the possibility of their control by measures of hygiene, immunisation, or chemotherapy, and because they offered a basis for examining the philosophy underlying the present realities and future possibilities of controlling microbial diseases. Thus the emphasis has been upon influenza and other respiratory infections, measles, rubella, smallpox, intestinal infections, and infections acquired abroad.

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