surgery was also carried out in the health centre by the senior dental surgeon with the help of a visiting anaesthetist. Table III shows the categories of serious cases that would have needed hospital treatment if they had not been admitted to the health centre.

During the academic year 1975-6 316 hospital bed days were saved by the facilities in the Cripps Health Centre and the liaison with the university department of surgery. A full report on this aspect of the university health service is being prepared in co-operation with the department of surgery. The advantages to the patient were enormous as they were in their own environment in contact with friends and tutors; and those who required prolonged treatment could keep term and do any necessary examinations in the health centre.

Conclusion

A health service that provides comprehensive medical cover for registered patients and their families throughout the year, is tailored to the needs of the environment, meets the occupational medical and industrial health needs of the environment has visiting consultants and a full dental unit, and has provision for inpatient care is perhaps an ideal form of general medical practice. No university quite meets this ideal, as the funding of health services is expensive, and much of the money has to come from non-university—that is, National Health Service and other—sources. Nevertheless, many universities now approach this ideal, and their health services could serve as models for such developments in industrial complexes. This would surely enhance the stability of industrial relations.

It is the task of a doctor working in a university health service to know the students and the staff and the problems and pressures arising in the environment. A doctor helps his patients to understand themselves and to cope, preferably without drugs, by maximising the constructive and minimising the destructive elements in the personality, and by dealing with all health problems as expenditiously as possible. The knowledge of the environment and of the personalities of staff and students and the illnesses to which they are prone is of great advantage in the university. Certainly, it presents a challenge which does not diminish with the years.

The information in this paper is extracted from a series of papers published in the annual reports of the Nottingham University Health Service to the University Senate and Council during the past five years. A limited number of the different papers containing full details from which the information has been extracted, are available to those interested on application to me.

I am grateful to Dr T Pollock and his colleagues of the Epidemiological Research Laboratories, Colindale, for the investigations on infectious mononucleosis; and to the following from Nottingham University: Professor J Hardcastle and his colleagues of the department of surgery for dealing with the surgical cases in the way described; Professor E M Symonds and his colleagues of the department of obstetrics and gynaecology for help over unmarried pregnancies, contraception, and sexual problems; Mr A Plumb and his colleagues in the registrar's department for their co-operation over the studies on the students' academic performance; Professor A J Willcocks and his colleagues of the department of social administration for help over the statistical analyses; and to the staff of the Nottingham University Health Service for making the studies possible.

Today's Treatment

Diseases of the alimentary system

Treatment of intestinal worms

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Most of the intestinal worms that affect man live unobtrusively in the gut and do little to impair the health of their host. Symptoms and signs usually appear only with heavy infections. Rapid air travel and the greater immigration into Europe from the tropics in recent years has resulted in helminthic infections, some of them long-standing and serious in their pathological effects, being increasingly encountered in Britain.

While infections with particular types of worms are sometimes patchy in distribution and vary greatly in intensity in different localities, in rural areas of the tropics many of the inhabitants harbour one or more intestinal worms. In non-endemic areas it is justifiable to treat all infections however light, while in areas where reinfection is likely to occur only heavy or moderate infections are worth treating unless simultaneous attempts are also made to improve environment hygiene. In endemic areas, therefore, the main aim of anthelmintic treatment should be to reduce the load of infection below the level of clinical significance. Complete parasitological cure is unnecessary. Nevertheless, in patients who are severely ill from other causes such as protein-calorie malnutrition, marasmus, tuberculosis, or sickle-cell anaemia worm infections, however light, should be treated even though reinfection is certain to occur.

In the past, laxatives before and after treatment were routinely given; they are now usually considered unnecessary except in the presence of constipation. Davis[1] has written an excellent monograph on drug treatment in intestinal helminthiases.

Ascariasis

At least four drugs are available for treating ascariasis; starvation before treatment is unnecessary.

Levamisole

Many regard levamisole as the drug of choice in ascariasis. It is given by mouth as a single dose of 2·5 mg/kg of body weight. Adverse

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reactions occur in about 1% of cases; they are mild, transient, and non-specific—for instance, nausea, vomiting, anorexia, abdominal discomfort, headache, or dizziness.

Piperazine derivatives

Four piperazine salts are generally available—adipate, calcium edetate, citrate, and phosphate. The most widely used preparation is piperazine citrate prepared as a flavoured syrup or as tablets, and some evidence suggests that the syrup gives slightly superior therapeutic results. Worldwide experience over more than 20 years has confirmed the excellent therapeutic and safety record of these derivatives.

An accepted and safe schedule for adults is a single oral dose of 75 mg/kg* with a maximum individual dose of 4 g. Two doses on successive days give a slightly higher cure rate.

Side effects—Nausea, vomiting, abdominal pain, and diarrhoea have occasionally been reported. Temporary ataxia has been described while large doses have occasionally caused convulsions in children. Piperazine derivatives are contraindicated in renal disease, liver disease, or epilepsy.

Pyrantel embonate

Pyrantel ambonate is a relatively new synthetic anthelmintic. A single oral dose of 10 mg/kg is more effective than a single dose of piperazine.

Side effects are mild and transient and occur in about 20% of cases; they include headache, dizziness, vomiting, abdominal pains, and diarrhoea.

Mebendazole

Mebendazole is also an effective ascaricide. It is taken by mouth in a dose of 100 mg twice a day for three days.

Side effects include mild diarrhoea and abdominal pain.

Enterobiasis

Although many compounds are active against *Enterobius vermicularis*, I will mention only three that combine efficacy, single-dose schedules, and mild unwanted effects. With all these drugs successful treatment can be effected only if infected members of the family are treated simultaneously. Examination for test of cure should be deferred until seven days after treatment.

Viprynium embonate

Viprynium embonate is generally regarded as the drug of choice. An acceptable and efficient dose is 5 mg base of the suspension (≡7·5 mg embonate) per kg on three occasions at 15-day intervals.

Side effects—The drug is well tolerated; nausea, vomiting, diarrhoea, and abdominal cramps occur only in a few patients. The stools may be stained and lead to red staining of underwear, a disadvantage.

Pyrantel embonate

Pyrantel embonate given as a single dose of 10 mg/kg is also effective in enterobiasis with cure rates of about 80-95%.

Mebendazole

A single oral dose of 100 mg of mebendazole repeated after one week has also given high cure rates.

Trichuriasis

Until recently the treatment of *Trichuris trichiura* infections has been most unsatisfactory. The only effective drug available to date is mebendazole. This is given in a dose of 100 mg by mouth twice daily for three days.

*The dose is customarily expressed in terms of the hydrate equivalent; 100 mg of piperazine hydrate ≡ 125 mg citrate, 120 mg adipate, 104 mg phosphate and 214 mg calcium edetate.

Strongyloidiasis

As with trichuriasis chemotherapy in strongyloidiasis is unsatisfactory. The most effective drug is thiabendazole with mebendazole a relatively satisfactory alternative.

Thiabendazole

Thiabendazole is at present the drug of choice. It is given by mouth at a dose of 25 mg/kg for three days (maximum dose 3 g/day). The tablets must be chewed and the drug is better tolerated if given after meals.

Side effects are fairly common. They may occur three or four hours after ingestion of the drug and include nausea, vomiting, anorexia, diarrhoea, and dizziness. Rarely drowsiness, pruritus, xanthopsia, bradycardia, and hypotension may occur. The urine often smells of asparagus; a gelatinous olive-grey substance may be visible to the naked eye in centrifuged urine.

Mebendazole

Mebendazole is given, 100 mg twice daily, for four days.

Hookworm infections

The geographical distribution of the two human hookworms, *Ancylostoma duodenale* and *Necator americanus*, used to be regarded as relatively distinct, the former being prevalent in the Far East and Mediterranean coastal regions and the latter in Central and South America and tropical Africa. During the past few decades, however, both parasites have become widely distributed throughout the tropics and subtropics, and rigid demarcations are no longer justifiable.

Several drugs are available for treating hookworm infections; their efficacy varies according to the species in question.* Repeated treatments are usually necessary except in light infections, and this generalisation is valid for all the drugs mentioned below.

For *A duodenale* infections treatment may be given with pyrantel embonate, bephenium hydroxynaphthoate, or mebendazole. For *N americanus* treatment with tetrachlorethylene, pyrantel embonate or mebendazole is available. Drugs that have a better effect on one species usually also have some effect on the other species.

Tetrachlorethylene

Tetrachlorethylene (TCE) is possibly more effective against *N americanus* than against *A duodenale*. The dose is 0·1 ml/kg by mouth with a maximum adult dose of 5 ml. Alcohol and fats should be avoided for 24 hours before and after treatment. The drug should be taken on an empty stomach (light meal the night before), with water only for three hours after ingestion. Purging is unnecessary and may be harmful. Repeat treatment at four-day intervals is necessary to cure heavy infections.

TCE is available as a liquid that should be stored in dark bottles in a cool environment, or as soft gelatin capsules of 0·2 ml, 1 ml, and 5 ml. Broken capsules should never be used.

Toxic effects include burning in the epigastrium, abdominal pain, nausea, and vomiting. Occasionally drowsiness, vertigo, symptoms like drunkeness, and transient syncope from hypotension have been described but are infrequent. Ideally, bed rest for four hours after treatment with TCE should be enforced, and in mass treatment patients should be advised to avoid excessive activity for the same period. Rarely TCE stimulates ascarids to migrate "en masse" and may cause intestinal obstruction, especially in children. In mixed infections of ascaris and hookworm, therefore, ascarids must be treated first with one of the drugs mentioned earlier (see ascariasis) before TCE is given.

*Bitoscanate, given in three doses, appears to have equal effects against both species of hookworms, but this drug is not available in Britain.

Bephenium hydroxynaphthoate

Bephenium hydroxynaphthoate is more effective against *A duodenale* than against *N americanus*. The standard treatment is a single dose of 5 g of the salt (2·5 g base). For necator infections three daily doses of 5 g are usually needed to ensure a high cure rate. The drug in small granules is given with water on an empty stomach usually before breakfast.

Bephenium is also effective against ascarids, and this is an added advantage in mixed infections.

Toxic effects are minimal. Nausea and vomiting may occur, and sometimes diarrhoea. Purgatives are unnecessary.

Pyrantel embonate

Pyrantel embonate is more active against *A duodenale* than against *N americanus*. In treating hookworm infections it compares favourably with bephenium and like this compound it is also active against ascaris infection. It is given as a single oral dose of 20 mg/kg.

Mebendazole

Mebendazole seems to be equally effective against *A duodenale* and *N americanus*. The standard dose is 100 mg by mouth twice a day for three days.

Broad-spectrum anthelmintics

Multiple intestinal helminth infections are common in the rural tropics. In these cases anthelmintics that are effective against more than one parasite may be useful. Even so, their activity against one species may be selectively lower than against another. Mebendazole, pyrantel embonate, and thiabendazole are good examples of broad-spectrum anthelmintics that have been used both for individual and mass treatment. When the multiple infections are generally light, the convenience, range, and economic advantages of using such compounds are well worth considering. With heavy infections, however, selective treatment for the appropriate species of helmintic infection is preferable.

Intestinal flatworms (Cestodiasis)

The intestinal flatworms or cestodes that give rise to disease in man are *Taenia saginata*, *Taenia solium*, *Diphyllobothrium latum*, and *Hymenolepis nana*.

Taeniasis

One differential property of the two common parasites *T solium* and *T saginata* is that cysticercosis may follow infection with the pork tapeworm after regurgitation of the gravid proglottids into the gastroduodenum. While this is theoretically possible, few data are available on the association of cysticercosis with the taenicidal drugs mentioned below.

Niclosamide

Niclosamide is generally considered the drug of choice in treating human taeniasis, although some authorities refrain from using it in *T solium* infections.

The standard adult dose is 2 g before breakfast as two divided oral doses with a one-hour interval between the doses—that is, 1 g—1 hour interval—1 g. The tablets should be chewed thoroughly and washed down with a small draught of water. It is wise to restrict the diet to fluids only, starting from the evening before treatment.

The use of niclosamide in *T solium* infections should be attended by the following precautions: (*a*) an antiemetic drug should precede treatment, and (*b*) a saline purge should be given two hours after the taenicide to rid the bowel of all dead segments before digestion can occur.

Side effects of niclosamide are few, generally being restricted to mild gastrointestinal disturbances.

Dichlorophen

Dichlorophen has been superseded by niclosamide for treating human taeniasis. The usual recommended dose is 75 mg/kg with a maximum of 6 g for adults given either as a single dose or in three divided portions for one to three days.

Side effects are mild and include nausea, colic, diarrhoea, and occasionally vomiting. Jaundice has been rarely reported. Dichlorophen should not be used in the presence of jaundice or in any patient with overt liver disease.

Fish tapeworm

Niclosamide in the same dose and administered in the same way as for taeniasis is effective in treating *D latum* infections.

Dwarf tapeworm

Niclosamide, 2 g on the first day followed by 1 g daily for the next six days, is recommended for *H nana* infections. Prolonged treatment is needed because of the presence of developing stages (onchospheres) in the jejunal villi. Retreatment a month later is recommended.

Economic considerations

In many parts of the tropics economic considerations must determine the choice of drug that is given. Drugs such as tetrachlorethylene have justifiably maintained their place in both individual and mass treatment of hookworm infections for nearly 50 years on grounds of low cost, ease of administration, and tolerance.

Diagnosis

The diagnosis of gastrointestinal helminthiasis depends on the demonstration of the characteristic eggs in the stool or the recovery of adult worms or segments of worms. Examination of a direct saline smear of faeces is often successful in establishing a diagnosis; alternatively, various concentration techniques are available. In some instances ancillary methods such as radiology, sigmoidoscopy, serology, or other specialised techniques are required.

Human taeniasis is commonly diagnosed through the macroscopic and microscopic identification of expelled proglottids; eggs may be present only intermittently in the stools in the presence of known infections.

Reference

[1] Davis, A, *Drug treatment in intestinal helminthiases*. Geneva, World Health Organisation, 1973.

A patient with retinitis pigmentosa is getting married but is concerned that pregnancy might cause deterioration of her condition. She wishes to take the pill. Are pregnancy or the pill contraindicated in retinitis pigmentosa?

I know of no evidence that pregnancy or taking the pill have any deleterious effect on the course of retinitis pigmentosa. I would strongly advise genetic counselling if pregnancy is contemplated, so that the risk to any offspring can be assessed. There is now a Retinitis Pigmentosa Society in Britain that gives help and advice. The address is: 12 Ridge Green, South Nutfield, nr Redhill, Surrey.