these arrangements. In the small hospitals the relative youthfulness and lessened morbidity of day patients was probably a function of selection, as such patients are usually considered most likely to benefit from group therapy and other types of treatment offered in these units.¹¹

It is emphasized that the findings of this study in no way imply any adverse criticism of the day facilities under review. Rather, the findings indicate a distinction between two patient populations which has wider and more far reaching implications than a difference of location and is highly relevant to the controversy about the planning of future psychiatric services. A large proportion of the total day population were patients with chronic disorders of poor prognosis (mainly psychogeriatric and schizophrenic) who were maintaining a high rate of daily attendance over long periods of time. Many of the latter had become long-term day patients as a direct result of the closure of mental hospital beds.

If the mental hospitals continue to run down and eventually close, as envisaged by the Department of Health and Social Security, the numbers of such patients in the community will multiply greatly. A vital question is: how far can the requirements of this chronic mentally sick population be met by the psychiatric departments of the district general hospitals together with the community services? Even if these hospital departments could cope with the numerical burden (which is improbable¹²) it is doubtful whether they could be "comprehensive clinically"³ in providing treatment suited to both long-term and short-term patients. For this reason the findings of the present study support the views of the Committee: "it appears to us that the problem of the treatment and care of the long term psychiatrically disabled patient (usually a chronic schizophrenic) as well as the psychogeriatric, has not been adequately faced . . . a high priority should be given to their needs."

In discussing the needs of such patients the *British Medical Journal* stated: "community care remains a near myth."⁸

There is certainly no evidence that any existing alternative to the mental hospitals would meet the need. This being so it is illogical to close down the mental hospitals until some other provision is proved better. The main conclusion to be drawn from the present study is therefore in complete agreement with that of the Tripartite Committee: "the future of the existing hospitals for the mentally ill needs much more study than appears to have been undertaken as yet . . . we urge most strongly that they should be sustained in every way until adequate alternative services of high quality are available."

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References

- ¹ Department of Health and Social Security, Hospital Services for the Mentally Ill, H.M. (71) 97. London, D.H.S.S., 1971.
- ² Tripartite Committee (Royal College of Psychiatrists, the Society of Medical Officers of Health, and the British Medical Association), *The Mental Health Service after Unification*. London, B.M.A., 1972.
- ³ *British Medical Journal*, 1972, 3, 2.
- ⁴ Bierer, J., *Social Welfare*, 1955, 9, 172.
- ⁵ Farndale, J., *The Day Hospital Movement in Great Britain*. Oxford, Pergamon Press, 1961.
- ⁶ Silverman, M., *International Journal of Social Psychiatry*, 1965, 11, 204.
- ⁷ Department of Health and Social Security, *Pilot Survey of Patients Attending Day Hospitals*, Statist. Rep. Ser. No. 7. London, H.M.S.O., 1969.
- ⁸ Baker, A. A., *Lancet*, 1969, 1, 1090.
- ⁹ Hassall, Christine, Gath, D., and Cross, K. W., *British Journal of Preventive and Social Medicine*, 1972, 26, 112.
- ¹⁰ Cross, K. W., Hassall, Christine, and Gath, D., *British Journal of Preventive and Social Medicine*, 1972, 26, 199.
- ¹¹ Sethna, E. R., and Harrington, J. A., *British Journal of Psychiatry*, 1971, 118, 641.
- ¹² Bleden, F. A., and Price, J. H., *British Medical Journal*, 1972, 1, 624.

A New Look at Infectious Diseases

Enteric Fever, Salmonellosis, and Food Poisoning

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Infections acquired from food and drink are an important cause of morbidity in the United Kingdom. While the incidence of some infectious diseases such as diphtheria and whooping cough, and more recently, measles, has sharply declined as a result of prophylactic immunization, salmonella infections are a continuing problem necessitating hospital admission for individual patients and causing outbreaks of gastroenteritis in residential institutions and hospitals. The very young and the elderly are particularly susceptible to salmonella infections, which may be fatal at these ages.

Several factors account for the prevalence of salmonella infections in Britain. Salmonellae are intestinal pathogens which inhabit the bowels of man, animals, and birds and are disseminated by contamination of food or drink. The domestic

fowl is the largest single source of salmonellae¹ and modern methods of poultry husbandry involving battery-rearing and deep-freezing of carcasses encourage the spread and transmission of infection. Salmonellae survive in the frozen birds and if these are not adequately de-frozen or are undercooked, or both, viable organisms will be ingested by the diner. Salmonella infection may also be acquired from eggs and their products, such as uncooked synthetic cream.² Beef and pork may be contaminated with salmonellae, and sausages and pies may be the source of infection.

Salmonella typhi and *S. paratyphi* differ from the other 1,000 or so salmonellae in that they do not normally infect animals and are primarily human pathogens. As a result, typhoid and paratyphoid fevers usually have a human source of infection. Enteric fever in endemic or epidemic form is unusual in Northern Europe, though outbreaks occur from time to time—as in Zermatt in 1963 and Aberdeen in 1964. Sporadic cases, however, are constantly being reported in holiday-makers who have visited Mediterranean countries and other areas of the world where enteric fever is endemic. The present flow of travellers between Britain and Asia also results in the importation of

typhoid fever. Package tours to Africa, Asia, and South America will provide a continuing source of salmonella infections for many years to come.

Salmonellae are an important cause of food poisoning but this condition may also be produced by other bacteria and also by non-infective agents.

Enteric Fever

In the ten years from 1961 to 1971, 1,549 cases of typhoid fever were notified to the public health authorities in England and Wales. In 1969, 162 cases of typhoid and 193 of paratyphoid were reported, the figure for the former disease being the highest since 1963.³ Six of these patients died, three from typhoid and three from paratyphoid.

TYPHOID FEVER IN THE U.K.

Seventy-four patients suffering from typhoid fever were admitted to the East Birmingham Hospital during the years 1965 to 1970.⁴ Of these patients 25 were children under the age of ten years (Table I), while 20 of the total had not been abroad during the preceding 10 years; the remainder had recently arrived in England, 41 travelling from India or Pakistan. The time between onset of illness and diagnosis of typhoid fever varied considerably (Table II).

TABLE I—Age Distribution of Patients with Typhoid Fever

	Age (Years)					
	0-9	10-19	20-29	30-39	40-49	50 +
No. of patients	25	16	11	9	9	4

TABLE II—Duration of Symptoms before Diagnosis of Typhoid Fever

	Days							
	0-3	4-6	7-9	10-12	13-15	16-18	19-21	22 +
No. of patients	0	14	12	13	9	5	11	10

The features of this small series emphasizes several of the important features of typhoid fever as seen today in the United Kingdom. Though most infections are contracted abroad, typhoid fever does occur in patients who have never travelled outside this country. Carriers are the usual source of infection in the latter group although food can occasionally be responsible, as in the Aberdeen outbreak when corned beef imported from South America was the source of infection. Several children in the Birmingham series were infected by typhoid carriers, usually a parent or grandparent.

After an incubation period of 10 to 14 days the symptoms of typhoid fever develop insidiously and are frequently non-specific, leading to delay in diagnosis of up to three weeks from the onset of illness. All patients have a fever and severe headache. One-half of the 74 patients in the Birmingham series, mostly adults, were referred to hospital for investigation of pyrexia of unknown origin. Cough is common and also confusion or inappropriate behaviour. A relative bradycardia is noted in some patients and also constipation and abdominal distention. In adults, diarrhoea is a relatively late feature of typhoid fever, but in childhood diarrhoea and vomiting are common presenting features of the disease and "gastroenteritis" was a common referral diagnosis in the Birmingham series. The spleen was palpable at the time of admission in 27 of the 74 patients and "rose spots" were noted in the peri-umbilical region in 23. None of the 74 patients developed the classical complications of

typhoid fever of intestinal perforation or haemorrhage and there were no deaths.

PARATYPHOID FEVER

The clinical features of paratyphoid fever may be identical with those of typhoid but are normally less severe. The incubation period and duration of illness are often shorter and gastrointestinal symptoms more prominent than in typhoid. Maculopapular rashes on trunk and limbs may develop in paratyphoid fever.

DIAGNOSIS

The diagnosis of enteric fever is confirmed by culture of *S. typhi* or *S. paratyphi* from the patient's blood, stool, or urine. In typhoid fever the white blood count in the peripheral blood is usually below normal. The Widal reaction normally becomes positive in the second week of the illness, rising "O" antibody titres signifying active infection. Interpretation of the Widal can be complicated by previous T.A.B. immunization, though this normally produces raised "H" antibody titres.

MANAGEMENT

All patients in whom enteric fever is suspected should be admitted to an isolation unit where facilities are available for barrier nursing and safe disposal of excreta. Intravenous fluid therapy is necessary in many patients as dehydration is frequent and oral fluids may be vomited. Chloramphenicol is the traditional antibiotic for the treatment of enteric fever and is given for 14 days, initially in a dose of 3g per day, reducing to 2g as the patient responds to treatment. The risk of chloramphenicol-induced aplastic anaemia, the incidence of relapse and carrier states after therapy with this antibiotic, and reports of chloramphenicol-resistant *S. typhi* strains⁵ have led to a search for alternative antibiotics for the treatment of enteric fever. Ampicillin has not proved superior to chloramphenicol⁶ but there have been encouraging reports of the treatment of enteric fever with co-trimoxazole.⁷ Co-trimoxazole is administered in a dose of 2 tablets (each containing 80 mg of trimethoprim and 400 mg of sulphamethoxazole) given every six hours for 14 days. Patients who are seriously ill and profoundly toxic should be given corticosteroids until toxicity subsides.

Controversy exists as to the management of intestinal perforation in typhoid. Archampong,⁸ reporting on his extensive experience in Ghana recommends operation, while Wicks *et al.*⁹ in Rhodesia favour a conservative approach in patients in whom the diagnosis of typhoid is certain.

PREVENTION

The prevention of enteric fever in the individual patient depends on T.A.B. inoculation, which should be offered to all persons travelling outside Northern Europe and North America. Two intradermal injections of 0.1 ml are given at an interval of 4-6 weeks. In cases of urgency the time between doses can be reduced to not less than 10 days. Reinforcing doses are given every three years.¹⁰ T.A.B. does not give complete protection against enteric fever.

Other Salmonella Infections

Whereas *S. typhi* and *S. paratyphi* cause septicaemic illnesses, most infections produced by other salmonella species are confined to the gastrointestinal tract. Diarrhoea and vomiting are therefore prominent features of these infections. The incubation period is normally short, varying from 12 to 48 hours. Diarrhoea

and vomiting usually develop abruptly and may be profuse and frequent, leading to dehydration and collapse. Abdominal pain is common and the stools frequently contain blood. The severity of the abdominal pain can lead to the patient being referred to a surgeon while profuse bloody diarrhoea may suggest ulcerative colitis. Acute renal failure can develop in dehydrated patients.

Fever and toxicity are common at the onset of the illness but usually subside as diarrhoea and vomiting respond to therapy. Persistence of fever and toxicity suggests that blood-stream invasion has occurred and that the patient has developed salmonella septicaemia. Septicaemia may lead to metastatic foci of infection causing endocarditis, meningitis, cholecystitis, or osteomyelitis. The diagnosis of salmonella gastroenteritis is confirmed by isolation of the infecting organism from cultures of the patient's stool. Blood cultures must be taken if septicaemia is suspected.

TREATMENT

The treatment of salmonella gastroenteritis is primarily symptomatic and supportive. Ten ml of kaolin mixture should be given for diarrhoea. Vomiting patients may be unable to retain kaolin but can usually tolerate codeine phosphate tablets in a dose of 30 mg 8-hourly. Codeine phosphate should be discontinued immediately diarrhoea ceases as it can cause profound constipation. Patients who are vomiting should be given an anti-emetic such as cyclizine lactate 25-50 mg 6-8 hourly as required. Analgesics are indicated for abdominal pain.

The patient should be instructed to stop all solid and semi-solid food and to drink only "clear" fluids. Half-strength Hartmann's solution is a useful electrolyte-containing fluid for this purpose. Patients at home can add a half teaspoonful of table salt to a pint of water and flavour the fluid with a small quantity of fruit juice. Evidence of dehydration or persistence of diarrhoea and vomiting in spite of the above measures are indications for hospital admission.

Antibiotics are not indicated for salmonella gastroenteritis for the following reasons: (1) The course of the patient's illness is not altered by antibiotic therapy.¹¹ (2) Antibiotics may prolong faecal salmonella excretion after the acute illness.¹² (3) Antibiotics encourage the development of transmissible antibiotic resistance among bowel flora which can be transferred to other bacteria.¹³ (4) Oral antibiotics may irritate an already inflamed intestinal mucosa and thus exacerbate diarrhoea and vomiting. (5) The patient is subjected unnecessarily to the risk of side effects of the antibiotic. (6) Antibiotics are expensive and should not be prescribed for conditions for which they are ineffective.

If salmonella septicaemia is confirmed or suspected the patient should be given a parenteral antibiotic—for example, ampicillin 1 g 6-hourly by intramuscular injection.

Other Forms of Food Poisoning

BACTERIAL

Clostridium welchii

This anaerobic, spore-bearing organism is a not infrequent contaminant of raw meat and multiplies rapidly in cooked meat at

certain temperatures. The spores germinate and vegetative bacilli multiply in meat which has been cooked and allowed to cool slowly through the temperature range of 50°C to 20°C.² Clostridia and their toxins produce severe colicky abdominal pain and diarrhoea within 12 to 24 hours of a meal of pre-cooked meat. As in salmonella food poisoning treatment is symptomatic.

Staphylococcus aureus

Enterotoxin-producing staphylococci—often from the hands of kitchen workers—may contaminate food, especially meat, and cause food poisoning, particularly if the food is inadequately cooked and allowed to cool slowly. The toxin probably acts both centrally and on the intestinal mucosa and as it is preformed in the food, symptoms develop shortly after a meal—often in less than an hour, though they may take several hours. The principal symptom is usually vomiting, which may be copious and of sudden onset, leading to prostration in some instances. Diarrhoea is not normally a prominent feature of the illness and fever is unusual.

Staphylococcal food poisoning is frequently a self-limiting condition but an antiemetic such as cyclizine lactate 25-50 mg intramuscularly may be necessary if vomiting is persistent. Dehydration or collapse necessitate hospital admission.

NON-BACTERIAL

Food poisoning can result from contamination of food or drink by chemicals such as insecticides or fertilizers, or by metals from cooking vessels or utensils. Poisonous fungi—for example, *Amanita phalloides* and certain hedgerow berries—may also produce severe gastrointestinal upset. The treatment of non-bacterial food poisoning is similar to that of other forms of food poisoning, though in some instances hepatic or renal failure may necessitate more intensive therapy.

Tables I and II are based on the article "Typhoid Fever in the Midlands" published in the *Practitioner*, March 1972, and are reproduced by kind permission of the editor.

References

- 1 Quist, K. D., *Public Health Reports, Washington*, 1963, 78, 1071.
- 2 Christie, A. B., in *Infectious Diseases: Epidemiology and Clinical Practice*, p. 30. Edinburgh and London, Livingstone, 1969.
- 3 *Health Trends*, 1970, 2, 52.
- 4 Molyneux, M. E., Dorken, P. R., and Geddes, A. M., *Practitioner*, 1972, 208, 388.
- 5 Anderson, E. S., and Smith, H. R., *British Medical Journal*, 1972, 3, 329.
- 6 Geddes, A. M., and Murdoch, J. McC., *Postgraduate Medical Journal*, 1964, 40, 81.
- 7 Geddes, A. M., and Goodall, J. A. D., *British Medical Journal*, 1972, 3, 525.
- 8 Archampong, E. Q., *British Medical Journal*, 1969, 3, 273.
- 9 Wicks, A. C. B., Holmes, G. S., and Davidson, L., *Quarterly Journal of Medicine*, 1971, 40, 341.
- 10 Department of Health and Social Security, *Communicable Diseases Contracted Outside Britain*, p. 16. London, H.M.S.O., 1972.
- 11 Joint Project by Members of the Association for the Study of Infectious Disease, *Lancet*, 1970, 2, 1159.
- 12 Aserkoff, B., and Bennett, J. V., *New England Journal of Medicine*, 1969, 281, 636.
- 13 Datta, N., in *Current Antibiotic Therapy*, ed. A. M. Geddes and J. D. Williams. Edinburgh and London, Churchill Livingstone, in press.