



# INFORMATION CIRCULAR

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Date

May 1969

Classification

Public Health

LIBRARY

**SOUTH PACIFIC  
COMMISSION**

Serial No.

8

SPC Library



41271

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## DIARRHOEAL DISEASES IN ADULTS

### 13836 1. Importance and incidence

Few escape the occasional unpleasantness and discomfort of diarrhoeal disease, for it is one of the illnesses most commonly occurring throughout the world, both in developing and developed countries. In both, it presents a large public health problem but in developing countries it is particularly important as its occurrence constitutes a continuing hazard as precursor to gastroenteritis of infants, thus contributing to infant mortality and morbidity. Some adults, regarding the condition as inevitable and transitory, do not seek medical attention and this untreated group constitutes a 'pool' of infection which maintains this hazard to infants - a pool of infection which is very difficult to reduce. Many adults do however seek attention and their treatment represents a very considerable and continuing expenditure both of medical time and resources. The occurrence of the condition is important, too, as an indicator of unsatisfactory environmental hygiene, signalling the need for specific improvements.

The measurement of incidence is not easy as it is only an indication that is given by notifications. Examples from Fiji, Tonga and Western Samoa are shown in Table 1.

Table 1. Diarrhoeal disease, notifications in  
Fiji, Tonga and Western Samoa, 1967

Country	Total major disease notifications	Diarrhoeal Disease Notifications	
		Number	% of total
Fiji	37,607	1,921	5.1
Tonga	12,042	3,714	30.8
W. Samoa*	3,102	1,178	38.0

\* Hospital notifications only.

Few adults require hospitalization so that the burden of treatment falls on outpatient and district services. Some idea of this proportion is provided by the figures from two hospitals in the Gilbert and Ellice Islands. There, 2,935 patients were treated but, of these, only 195 or 5.4% required admission.

2. Causes: Food poisoning, the dysenteries and protozoal infections

Many medical and surgical conditions have diarrhoea as a symptom but this circular will be confined to discussion of the most commonly occurring infections and infestations which give rise to diarrhoea within the South Pacific area. In the differentiation of these, much can be learned from a careful history, thorough clinical and epidemiological examination as well as macroscopic and olfactory examination of faeces. A microscope if essential for final confirmation but it should be borne in mind that this is important only to identify those patients requiring specific treatment.\*

2.a. The dysenteries

Unlike food poisoning organisms whose action depends on their proliferation in food, dysentery organisms are transmitted by fingers, water, milk or by means of food, such as eggs, oysters, clams and shrimps (without proliferation), i.e. by the faecal-oral route. Together, bacillary and amoebic dysentery, are the most commonly occurring diarrhoeal diseases in tropical areas in the present context, and both may require specific treatment. It is important, therefore, that specific diagnosis be made and the following table summarizes differentiating clinical and stool features.

2.a.1. Shigellae

Bacillary dysentery is most common where conditions are crowded and unhygienic, frequently exhibiting seasonal variation in incidence. Malnutrition is known to increase susceptibility.

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\* Methods of laboratory diagnosis in remote situations will constitute part of the SPC Training Course in Laboratory Techniques to be held from 25 August to 15 September 1969.

Table 2. Diarrhoeal Diseases, summary of principal features

Type	Incubation period	Symptoms in usual order of appearance	Pyrexia	Nature of Stool	Duration of Symptoms	Treatment
Salmonellar food poisoning	6-24 hr.	1. Pyrexia with chills; headache sometimes. 2. Diarrhoea with or without vomiting.	Yes	Watery and some blood and mucus	2-5 days	Symptomatic Chloromycetin
Clostridium perfringens food poisoning	8-24 hr.	Diarrhoea with abd. colic.	Seldom	Loose, watery.	8-24 hr.	Symptomatic Serotherapy
Staphylococcal food poisoning	2-6 hr.	1. Abdominal colic. 2. Vomiting. 3. Diarrhoea. Collapse may occur.	No	Very loose, watery. No blood.	Short, about 6 hrs.	Symptomatic
Botulism	12-36 hr.	In type E. 1. Nausea and vomiting. 2. Neurologic symps.	No	-	-	Maintain respiration
Bacillary Dysentery	about 24 hrs.	1. Abdominal cramps and tenderness with malaise. 2. Diarrhoea with tenesmus.	Yes	Very loose, blood and mucus. odourless.	3-4 days	Tetracyclines Oral Sulphonamides & Streptomycin
Amoebic Dysentery	7-27 days	1. Abdominal cramps and tenderness. 2. 5-50 stools a day.	Seldom	Very loose, bulky, blood, mucus. Offensive	long	Emetine Synthetic Amoebicides
Giardiasis	?	1. Morning Diarrhoea with some abdominal cramps. Recurrent.	No	Loose, grey bulky. Fishy odour.	long	Mepacrine or Metronidazole

The incubation period may be as short as 24 hours but may be as long as 7 days. Onset is sudden with abdominal cramps, accompanied by malaise, chills and pyrexia. Diarrhoea, with straining and tenesmus follows shortly. The abdomen is hyperaesthetic and tender overall with local tenderness over the sigmoid flexure. Stools are liquid, scanty and contain, in most cases, mucus and blood. The infection is usually self-limiting and subsides within a few days, but, in that period, dehydration and electrolyte disturbance are not uncommon. Following infection, the carrier state does not appear to persist although some individuals may suffer from recurrent episodes. It appears that some immunity follows an attack as the incidence of the infection is higher in children than in adults and as second infections are rare in endemic areas.

Table 3. Bacillary and Amoebic Dysenteries - differentiation

	Bacillary Dysenteries	Amoebic Dysentery
Clinical Picture	<ol style="list-style-type: none"> <li>1. Acute diseases with tendency to epidemic spread - "lying down dysentery"</li> <li>2. Incubation period 7 days or less.</li> <li>3. Onset acute.</li> <li>4. Pyrexia common.</li> <li>5. Dehydration may occur.</li> <li>6. Tenderness over whole abdomen, more marked over sigmoid flexure.</li> </ol>	<p>Chronic endemic disease - "Walking dysentery"</p> <p>Incubation period at least 20 to 90 days.</p> <p>Onset insidious (usually).</p> <p>Pyrexia rare.</p> <p>Dehydration uncommon.</p> <p>Local tenderness and thickening, mostly over sigmoid flexure, transverse colon and caecum.</p>
Stool, macroscopic	<ol style="list-style-type: none"> <li>1. Faecal element decreasing with severity.</li> <li>2. Bright red blood with gelatinous mucus, resembles red current jelly.</li> <li>3. Odourless.</li> <li>4. Alkaline.</li> <li>5. Scanty, many in number.</li> </ol>	<ol style="list-style-type: none"> <li>1. Faecal element always present.</li> <li>2. Faeces intermingled with blood and mucus.</li> <li>3. Offensive, smelling of decomposed blood.</li> <li>4. Acid.</li> <li>5. Copious semi-solid or liquid.</li> </ol>
Stool, microscopic	<p>Red cells discrete. White cells normal in morphology, few micro-organisms, non motile.</p>	<p>Red cells clumped. White cells degenerate. Numerous micro-organisms. Entamoeba histolytica present.</p>

The vast majority of patients, with mild or moderate diarrhoea due to shigellar infection, requires symptomatic or supportive therapy only. Indications for specific treatment are pyrexia, toxaemia, dehydration, obvious blood in the stools or where diarrhoea persists after 24 hours of symptomatic therapy. Choice of drug for specific treatment is not easy as many strains are resistant to sulphonamides, some are resistant to tetracyclines and some to streptomycin. Such resistance varies from place to place and local experience will dictate the drugs or combinations to be used. Generally, the drug of choice is tetracycline and this may be given in a single dose of 250 mg. (Stosstherapy). The best alternative to tetracycline is a combination of oral sulphonamides (4.0 gram daily) with oral streptomycin (1.0 gram daily) but antibacterial agents have a limited proven activity.

#### 2.a.2. Entamoeba Histolytica

The pathogenicity of *entamoeba histolytica* is very variable and many people in apparently good health pass cysts which can lead to infection and illness in others. Transfer of cysts is effected in food, water or milk contaminated by faeces and the incubation period appears to vary between seven and twenty-seven days. Onset may be sudden, simulating bacillary dysentery, or it may be more insidious with the appearance of diarrhoea, abdominal cramps and tenderness. Pyrexia is uncommon and the stools are bulky, contain a considerable amount of blood and are offensive.

The infection runs a chronic course and may involve the liver. The traditional treatment of amoebic colitis consists of the administration of emetine hydrochloride but many other efficient synthetic amoebicides are now available. These are less toxic than emetine, are pleasanter to take and some are nearly as effective. In spite of this, it is probably best to initiate the treatment of acute amoebic dysentery with three subcutaneous injections of emetine or dihydroemetine hydrochloride in a dosage of 1.0 mg per kg body weight, with a maximum of 8 mg daily for ten days. This gives rapid relief from the diarrhoea and gives protection to the liver against amoebae which may have metastasised. Subsequently, to eradicate amoebae from the bowel, the most effective drug is diloxanide furoate (furamide) which gives about 95% cure. Alternate drugs, almost as effective, are dihydroemetine resonate (20 mg. thrice daily) or metronidazole (Flagyl) (800 mg thrice daily for 10 days). There is, however, increasing evidence that metronidazole by itself may constitute adequate treatment. With its low toxicity, its easy administration by mouth and its method of action, it appears to have great potential in the treatment of all forms of amoebiasis.

## 2.b. Food Poisoning

### 2.b.1. Salmonellae

Many strains of salmonellae cause food poisoning but those most common are: S. typhimurium, S. enteriditis, and S. anatum. Organisms of this species commonly occur as infections of rodents, pigs, ducks and cattle but man is not infrequently a carrier (0.3 to 30% of the population). Spread results from contamination of cooked by uncooked food harbouring the organism. Following contamination, proliferation occurs and infection is the result of consumption of food containing fairly large numbers of organisms. Following consumption, there is an incubation of 6 to 24 hours when there is sudden onset with initial chill, pyrexia, nausea and vomiting, followed shortly by abdominal pain and persistent diarrhoea. Symptoms generally subside after a few days but both severity and duration are very variable. In debilitated patients, septicaemia may occur, giving rise to chronic infections of the gall bladder, bowel wall or bone (especially with S. cholerae-suis). Chronic infections of the first two mentioned may result in recurrent episodes of diarrhoea. Such complications are rare and that most usual is dehydration.

In almost every patient, treatment of salmonellar food poisoning is symptomatic. The administration of sulphonamides or antibiotics has no value but rehydration may be necessary. Should 'satellite' infection occur, the drug of choice is chloromycetin given in a dosage of 50 mg per kilogram body weight per day for two weeks.

### 2.b.2. Clostridium perfringens

The anaerobic C. perfringens is found in the bowel of many animals and is important as a cause of food poisoning on account of its common occurrence, rather than its severity. Its spores are resistant to heat with the ability to survive 100°C for a period of 30 minutes and the organism thrives in anaerobic warm conditions. Incubation period is generally 8 to 24 hours when profuse diarrhoea with cramping abdominal pain occurs. Pyrexia, chills, headache and other signs of infection are absent. Symptoms subside within 24 hours, and treatment is purely symptomatic. Severe enteritis necrotica may require antitoxic therapy, but this condition seldom presents as diarrhoea.

### 2.b.3. Clostridium botulinum

Botulism is a specific and often fatal type of food poisoning which results from the toxin produced by C. botulinum. It is, fortunately, extremely rare in the South Pacific area and has symptoms which, with most strains, are related to the nervous rather than the enteric system. With type E, however, nausea and vomiting may be

severe, presenting symptoms and the toxication may present in this manner. Neurological symptoms, namely blurred vision, diplopia, dysphonia, dysphagia and muscle weakness, soon appear. Confusion is therefore unlikely to occur between this and other types of food poisoning.

#### 2.b.4. Staphylococcal enterotoxin

Some phage types of staphylococci produce a thermostable enterotoxin which, when ingested, causes severe intestinal irritation. The organism is transferred from superficial staphylococcal lesions such as paronychia, furunculosis or external otitis to food, where it proliferates following cooking. During proliferation, enterotoxin is produced and subsequent reheating may destroy the organism but not the toxin. "Incubation" time is short, between 2 and 4 hours, followed by sudden onset of nausea, vomiting, abdominal cramps and diarrhoea. Both vomiting and diarrhoea may be severe and may lead to collapse with dehydration even though the duration is short. Pyrexia does not occur. No specific treatment is available and only symptomatic and supportive therapy can be administered.

#### 2.c. Protozoa (excluding Entamoeba histolytica)

As the result of surveys of diarrhoeal diseases, WHO concluded that the role of parasites in the causation of such diseases is important and has largely been neglected. The principal parasites, which are known to cause diarrhoeal disease, are Giardia lamblia and Balantidium coli. Heavy severe infestation with Trichuris trichiura may also be causative in some instances.

##### 2.c.1. Giardia lamblia

Of all the intestinal parasites G. lamblia probably has the best claim to be pathogenic. Infection may cause recurrent diarrhoea, which may be severe, accompanied by anorexia, nausea, vomiting and weight loss. Characteristically, the diarrhoea occurs in the morning and it is seldom that defaecation occurs more than 4 or 5 times in the day. Stools are bulky, grey in colour and have an offensive fishy odour. Giardiasis is not infrequently associated with Entamoeba histolytica infection. Treatment by the administration of mepacrine (atabrin) (100 mg three times daily) or metronidazole (Flagyl) (250 mg three times daily for seven days) gives a high rate of success. It is important that stools are examined following a course of treatment to ensure elimination of G. lamblia and the absence of E. histolytica.

##### 2.c.2. Balantidium coli

Balantidiasis is an infection of the large intestine giving

rise to disturbances varying from mild colitis to acute diarrhoea. Trophozoites are the pathogenic stage and, under unfavourable conditions, cysts may be formed. The parasite is found commonly in pigs and transfer of infection may occur as the result of contamination of water by the faeces of man or pig. Other sources of infection occur but these are less well defined. Symptoms displayed are very similar to those of amoebic dysentery. In severe infections there is diarrhoea, with 6 to 15 bowel movements per day, abdominal pain, nausea, vomiting, headache, weakness and fever. Differentiation between balantidiasis and amoebic dysentery may require microscopic examination of the faeces. The large size of the trophozoite and its constant movement, ploughing through the liquid faecal film, make it easy to find. The treatment of choice is di-iodohydroquinilone in a dosage of 650 mg three times daily for 21 days. Supportive therapy, consisting of fluids and adequate nutrition may be necessary.

## 2.d. Miscellaneous causes

### 2.d.1. Intestinal candidiasis

The administration of broad spectrum antibiotics may be followed by diarrhoea as the result of suppression of susceptible flora with proliferation of resistant organisms - staphylococci, coliforms and Candida albicans. With proliferation of bacterial elements, diarrhoea is generally mild but with C. albicans it may be severe and intractable. Oral nystatin affords the best treatment and prevention of the condition.

### 2.d.2. Viruses

The role of viruses in the causation of diarrhoeal diseases has not yet been defined. Recent investigations in N. America have shown that there is a high incidence of adenovirus, Coxsackie virus and ECHO virus in children suffering from diarrhoea and in whom no other pathogen was isolated than in a control group of symptomless children.

## 3. Epidemiologic factors, prevention

Many factors, all interrelated, are involved in the maintenance of diarrhoeal disease within a community but principally among these are the nature of water supplies, the standard of food hygiene and the method of faecal disposal.

### 3.1. Water supplies

Water supplies may contribute to incidence by being contaminated, by being inadequate or by being inconvenient.

Contamination may occur at the source of the water, in wells, springs or catchments, or in the course of its distribution whether by multipurpose bucket or as the result of negative mains pressure in a reticulation.

Inadequate or inconvenient water supply, even where it is of good quality, results in poor hand, utensil and carcass hygiene thus contributing to the contamination of food.

Where contamination exists, reduction in the incidence of diarrhoeal disease is difficult to achieve until the quality of the water is improved, as constant reinfection occurs within the community. The provision of a good water supply, however, is only a first step as this must be followed by other measures, including improvements in faecal disposal and in food hygiene, or no great reduction will result.

The most satisfactory results from improvements in water supplies are achieved when uncontaminated water is made available in food preparation and animal slaughtering areas.

### 3.2. Food

Food contributes to incidence as the result of contamination in the process of production, preparation and storage. Contamination may occur directly in the natural habitat, in the process of preparation or during storage.

In the natural habitat, foods such as vegetables or shellfish acquire organisms as the result of direct contact with faecal material deposited in their immediate vicinity: in preparation, the organisms may originate from the gut of a slaughtered animal or from infection of the person handling the food.

The practice of hand mixing vegetable preparations in the immediate vicinity of slaughtered animals during the production of feasts offers conditions particularly favourable for spread. Kitchens without water for hand or utensil washing, without preparation surfaces and with inadequate cooking facilities make their contribution and make contamination and proliferation almost inevitable. Spread is further facilitated by existing high ambient temperatures when food prepared from these conditions is offered for sale in market or store. Canned foods, damaged in transit, offer their share of organisms.

In prevention, action is required to reduce the conditions outlined, by satisfactory faecal disposal, by improvements in food

preparation areas so that hand, utensil and carcass hygiene is possible and by the provision of safeguards regarding the preparation and storage of foods offered for sale or during feasts. At the same time it is necessary to provide education both to commercial food handlers and to the general public. In this activity a great deal can be accomplished by ensuring that the prescription of medication for a patient with diarrhoeal disease or staphylococcal lesion is accompanied by advice in relation to food handling, with prohibition regarding handling for adults or children.

### 3.3. Faecal Disposal

Contamination of food or water by faecal material is a major factor in the maintenance of diarrhoeal disease. It may result directly, when faeces are used as fertilizer, when disposal is made into any water used for shell-fishing or when faeces find access to well or other water source, or indirectly when toilet facilities are poor or where flies have access both to faeces and food. Improvements in water supplies may facilitate contamination by increasing the quantity of waste water produced.

To reduce the possibilities of contamination, satisfactory disposal can be effected, in the absence of septic tanks or sewers, by deep pit latrines or by pour-flush toilets. In both, however, it is important that maintenance is satisfactory and, once again, education is necessary to ensure adequate care and use of these facilities.

Generally, disposal in field, stream or shallow sea water is not satisfactory and can create conditions favourable to the spread of diarrhoeal disease. Such disposal is best avoided where possible.

Adequate and satisfactory disposal is particularly important where food is prepared or offered for sale.

Table 4. Diarrhoeal disease, summary of control information

Type	Origin of Organism	Spread by:	Investigation, look for:	Prevention
Salmonellar Food Poisoning	Gut of rodents, pig, cattle, poultry, man	Contamination of cooked food by: 1. Uncooked food. 2. Hands or water with gut contents or faeces. 3. Access of rats or poultry.	1. Person handling food with current or recent diarrhoea. 2. Poor slaughtering practice. 3. Poor food storage.	1. Prohibit patient from handling food. 2. Adequate hand, utensil and carcass washing. 3. Adequate faecal disposal.
Staphylococcal Food Poisoning	Staphylococcal lesions, such as external otitis furunculosis, paronychia	Contamination of food: 1. By unwashed hand. 2. From lesion.	Food handled with staphylococcal lesion.	1. Educate people in good practices and existence of hazard. 2. Have cooked food eaten immediately after cooking. 3. Supervise food handlers. 4. Adequate hand washing facilities.
C. Perfringens Food Poisoning	Gut of most animals	Contamination of uncooked thick meat by hands or water, subsequent inadequate cooking.	1. Poor slaughtering practice. 2. Consumption of thick meat inadequately cooked.	1. Adequate hand, utensil and carcass washing. 2. Adequate cooking of meat in thin flat segments.

Table 4 (contd.)

Type	Origin of Organism	Spread by:	Investigation, look for:	Prevention
Shigellosis	Human, patient or, more rarely, carrier.	Contamination of food, water or milk by a) unwashed hand b) faeces c) shellfish, prawns in contaminated water.	1. Food handler with current or recent diarrhoea. 2. Poor water supply and faeces disposal. 3. Source of prawns or shellfish.	1. Prohibit patient from handling food. 2. Education in food hygiene. 3. Adequate water supply and faeces disposal.
Amoebiasis	Human, patient or carrier	Faecal contamination 1. Directly to water, milk or vegetables. 2. Indirectly from hand.	1. Poor faeces disposal. 2. Food handler with chronic diarrhoea or who is a symptomatic cyst passer.	1. Prohibit patient from handling food. 2. Good faecal disposal. 3. Education in food hygiene. 4. Adequate water for food and hand washing.

### 3.4. Investigation

Investigation into the extent, source and method of spread of any episode of diarrhoeal disease within a community serves several purposes: it provides substantiative information to corroborate tentative diagnosis; it provides information which enables the episode to be controlled and the accumulated results of episodic investigations will provide information on common sources within the community so that more precise overall preventive action can be taken. This accumulation of information is also valuable to demonstrate the need for environmental improvements.

Any investigation should be systematic, with a standard form of recording, and be routine in its application. While it would be quite impractical to investigate each isolated case, the use of a very simple individual questionnaire can be useful in alerting the physician to any unusual incidence or to infective foci existing within the Community.

The desirability of investigation is signalled by the obvious occurrence of an episode, by the recognition of unusually high incidence or by the identification of a possible common source. The investigation itself is aimed at ascertaining:

1. The number of people affected
2. Any common social occurrence
3. Any common food consumed
4. Any common source of food consumed
5. The circumstances of food preparation and handling
6. The state of water and toilet facilities.

A simple form of investigation form is illustrated in Table 5.

Table 5. Sample investigation form, diarrhoeal disease

1.1	Name	Sex	Age
1.2	Address		
1.3	Date of Examination		
2.1	Other persons known to be affected. Yes/No.		
2.2	Number of other persons affected:		
	a) Family		
	b) Family neighbours		
	c) Neighbours		
	d) Others.		

- 3.1 Recent family gathering, feast, celebration or communal entertainment: Yes/No.
- 3.2 If Yes: a) Where food served \_\_\_\_\_  
 b) Where foods prepared \_\_\_\_\_  
 c) Who prepared food? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- 3.3 If No: d) Foods consumed in day before onset \_\_\_\_\_  
 e) Foods consumed in week before onset \_\_\_\_\_  
 f) Where foods obtained: Stores \_\_\_\_\_  
 Naturally \_\_\_\_\_

4. Summary of prevention, a 7 Point programme.

- 1) Investigate episodes, unusual incidence or suspected common source.
- 2) Have medical treatment combined with enquiry and advice. Ban patient from food handling for commercial or baby care purposes.
- 3) Provide food handlers' courses and general health education programme.
- 4) Have good water piped to houses (reticulation, roof water tanks, etc.)
- 5) Have adequate faecal disposal of a type which is safe and will be used.
- 6) Ensure hygienic preparation and storage of food offered for sale, prevent sale of damaged tins.
- 7) Supervise feast food preparation whenever possible.

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Original Text: English

Nouméa, April 1969

ISSUED IN THIS SERIES

Classification

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