


# CSP

## Common Sense Pathology

A REGULAR CASE-BASED SERIES ON PRACTICAL PATHOLOGY FOR GPs

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**Laboratory  
testing in  
acute  
diarrhoea**

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Australian  
**Doctor.**



## Laboratory testing in acute diarrhoea

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Acute diarrhoea (less than two weeks' duration) is due to infectious agents in more than 90% of cases and is most commonly the result of a viral infection. In Australia, the majority of cases are sporadic, self-limited and will be treated without any consultation with a doctor. However, about one in eight people will seek medical attention, and decisions will need to be made on the role of laboratory investigation in their management. The best use of the laboratory will depend on several factors, and requires a knowledge of the different techniques used to examine stool samples and the likely pathogen involved, usually suspected on the basis of a careful but directed history.

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For a more detailed version of this article (including references and further sample case), please go to the college web site at [www.rcpa.edu.au](http://www.rcpa.edu.au) Click on Publications and Forms then Common Sense Pathology. Or visit [australiandoctor.com.au](http://australiandoctor.com.au)



## Bacterial infection

A bacterial pathogen is often suspected if there is fever, bloody diarrhoea and tenesmus. The presence of polymorphs and red cells on microscopy may also point to a bacterial infection.

When ordering stool cultures and microscopy for acute diarrhoea, it has been traditional laboratory practice to examine three specimens; however, only 2-5% of stool cultures will be positive for a recognised bacterial isolate.

The available evidence demonstrates that multiple faeces examinations do little to improve the yield of bacterial pathogens for acute diarrhoea over single specimens.<sup>1-3</sup> If present, most recognised pathogenic bacteria will be isolated on the first specimen submitted to the laboratory (90-95%), and thus the cost-effectiveness of sending two or more specimens is doubtful.

Note that enterohaemorrhagic *E coli*, for example, 0157:H7 or 0111:H8 strains may lead to the development of haemolytic uraemic syndrome or thrombotic thrombocytopenic purpura, particularly in children. Antibiotics should not be given because they appear to increase toxin release and therefore the risk of developing haemolytic uraemic syndrome.<sup>4,5</sup>

A specific request for *C difficile* toxin should be considered if antibiotics or chemotherapy have been used in the previous six weeks for a patient in the community, or for diarrhoea that starts after three or more days in hospital. Confirmation of *C difficile* infection is usually made by identifying the specific cytotoxin in the stool, although some laboratories perform culture. The request should state “?C difficile”.

## Viral infection

Rotavirus is the most frequent pathogen in early childhood diarrhoea. Other significant viral pathogens are human caliciviruses, including Norwalk virus, enteric adenoviruses and astroviruses. Testing for viral agents is by either antigen detection or nucleic acid amplification.

Antigen detection is commonly available for rotavirus detection, and caliciviruses are usually tested for by nucleic acid amplification. Testing for the other viruses is less readily available.

The request form must indicate that viral detection is being ordered (for example, rotavirus) because viral detection is not possible on routine culture and microscopy.

Although no specific treatment is available for viral diarrhoea, its early identification is important on several fronts. There is an opportunity for empirical antibiotics, if prescribed, to be stopped, reducing the risks of antibiotic resistance. From a public health perspective, especially in child care and institutional settings, timely detection can allow for notification, lower transmission rates and the identification and control of outbreaks. Simple hand-washing remains an effective component of the battle to reduce infectious diarrhoea in the community.

**Table 1: Treatment of bacterial pathogens identified in culture**

Note: Antibiotic therapy is not normally required unless there is evidence to suggest invasion with a bacterial pathogen, for example, persistent fever with bloody diarrhoea and/or rigors. In addition, antibiotic treatment may be contraindicated in some cases of bacterial diarrhoea, such as enterohaemorrhagic *Escherichia coli*.<sup>4</sup>

**Campylobacter:** Only treat if symptoms have persisted for more than 48 hours, or if patient needs hospitalisation.

- Adults: Erythromycin or norfloxacin
- Children: Erythromycin

**Salmonella:** Only treat if symptoms have persisted for more than 48 hours, or if the patient needs hospitalisation because antibiotics can prolong the excretion of infectious organisms.

- Ciprofloxacin or azithromycin

**Shigella:** Only treat if symptoms have persisted for more than 48 hours, or if the patient needs hospitalisation.

- Adults: Norfloxacin
- Children: Trimethoprim + sulfamethoxazole

**Clostridium difficile:** Metronidazole



## Parasites

In contrast to bacterial infections, more than one specimen is of value when ordering microscopy for ova, cysts and parasites due to the more variable excretion of these pathogens.

It is important that the patient is aware that specimens should be collected at different times, rather than one specimen divided into separate containers. There is no evidence that performing a third examination in a week will improve diagnosis.<sup>1</sup>

In patients with bloody diarrhoea and few polymorphs, amoebiasis should be considered (see table 2).<sup>4,5</sup>

## Testing

Correct collection and transport of the stool specimen will also help in obtaining an accurate result. Patients should be given clear instructions, preferably in writing, as to the best ways to collect the liquid or semi-liquid stool (solid faeces is not helpful) in an opaque container before transport to the lab. It is preferable that samples reach the laboratory as soon as possible. Writing down the time and date of collection will also help when multiple samples are requested or collected. Specimens should not be refrigerated. Testing should be considered in groups listed in Table 3.

## Management

Management of acute diarrhoea can be viewed from two perspectives - that of the individual patient and the public health perspective.

Clinicians vary significantly in their practice of ordering laboratory investigations in acute diarrhoea, highlighting the differences in perceived benefits for the individual versus the community.

For an individual, cultures can be considered as a relatively high cost for a relatively low yield, with results that may often only become available after the self-limiting illness has resolved.

Conversely, under-testing of individuals could allow serious outbreaks that were potentially controllable in the community to go undetected, for example, an outbreak of salmonella in a commercially distributed product.

Individuals may not be impacted by detection because antibiotics are generally not recommended, but notifications of increased isolates could alert public health authorities to the possibility of a contaminated product, and steps to identification and control.

An effective history<sup>6</sup> will address both individual clinical aspects and potential epidemiological factors.

**Table 2: Parasites identified in stool and notes on treatment**

***Giardia lamblia***: A strong association with child care centres; secondary spread within a family common. Also seen in waterborne outbreaks. No treatment of asymptomatic passage of cysts.

- Adults and children: Tinidazole

***Blastocystis hominis***: Pathogenicity is disputed; therapy only if severe. Infection associated with poor hygiene (travel, pets, dam/tank water).

- Adults and children: Metronidazole

***Cryptosporidium parvum***: Review cause — water, farm animals, immunosuppression.

- Supportive therapy is usually sufficient in immunocompetent patients

***Entamoeba histolytica***: Eradication post-treatment should be documented.

- Adults and children: Metronidazole plus either diloxamide or paromomycin (available under the special access scheme). Seek specialist advice.

**Table 3  
Consider laboratory tests if:**

- Dehydration secondary to profuse watery diarrhoea or inability to tolerate fluids
- Fever - temperature higher than 38.5°C
- Stools containing blood or mucous
- Passage of six or more stools in a 24-hr period or duration of illness greater than 48 hrs
- Diarrhoea with severe abdominal pain in patients older than 50
- Patients older than 70
- Patients with known immunosuppression (eg, HIV, transplant, recent chemotherapy)



## History taking

### Individual factors:

- How did the diarrhoea begin? Was it an abrupt or gradual onset?
- Duration of symptoms?
  - A short interval after ingestion is suggestive of preformed toxins.
- Stool characteristics — watery, bloody, mucous, etc.
- Frequency of bowel movements and relative quantity — large quantity, watery stools suggest small bowel diarrhoea, while frequent, smaller-volume stools suggest colitis.
- Presence of dysenteric symptoms — fever, tenesmus, blood in stool.
- Symptoms of dehydration — thirst, decreased urine output, lethargy, postural dizziness.
- Associated symptoms, their frequency and intensity — nausea, vomiting, abdominal cramps,

headaches, myalgia.

- Underlying medical conditions - immunosuppression, oral steroid use, concurrent medication
- Extremes of age — infants and the elderly.

### Epidemiological factors:

- Recent travel to a developing area
- Child care, aged care or hospital attendance or employment
- Consumption of “at-risk” foods - undercooked or raw meats, eggs, shellfish, unpasteurised milk
- Swimming in or drinking untreated water, eg, lake or stream
- Visiting a farm or animal contact, eg, petting zoos
- Knowledge of other contacts with similar illness, eg, office environment, social function
- Employment as food handler/preparer

## Case study one

In the middle of a mild flu season, Tyler, 18 months, is brought in by his grandmother, who is caring for him while his parents work. He was too unwell for day care today, having had watery diarrhoea since the early hours of this morning, a few small vomits usually preceded by crying and a low-grade fever. Urine output is difficult to gauge due to the profuse diarrhoea, but you estimate him to be less than 5% dry on the basis of his general interest in your soft toy collection, and his skin turgor and respiratory rate.

### What, if any, investigations would you perform?

Given the age of the child and the nature of the diarrhoea, rotavirus is a prime suspect, so specific viral detection is indicated, and the request should specify this. Rotavirus can be detected by identifying viral antigen using the ELISA or latex agglutination methods, depending on the laboratory used. One sample only is required. In the day care setting, giardia and cryptosporidia are also possibilities, so a request for “rotavirus, OCP if negative” is reasonable.

Rotavirus is most common in infants and young children, especially in the winter and spring months, accounting for 30-50% of diarrhoeal illness admitted to hospital. The virus is easily transmissible, and person-to-person spread is well documented. Most children have developed antibodies to rotavirus by the age of 24 months. The incubation period is 48 hours, and presentation is with watery diarrhoea, vomiting, fever and abdominal pain. Although the disease is self-limiting, management of fluid balance is crucial, with oral rehydration the preferred option.

## Case study two

Tamsin, 23, has just returned from a 21-day surfing holiday in Indonesia. Towards the end of her trip, she was struck down with lower abdominal pain, diarrhoea 4-5 times daily which was loose with some blood. A mild fever initially has settled, although she continues to have low abdominal cramps and loose stools 3-4 times a day, but there is no longer any blood present.

### 1. What faeces tests, if any, would you perform?

The differential diagnosis includes bacteria such as *E coli* (responsible for about 50% of traveller’s diarrhoea), shigella, salmonella and campylobacter, protozoa such as *G lamblia*, cryptosporidium and *E histolytica*, viruses and a large number of “unknowns”.



Traveller's diarrhoea affects 20-50% of people travelling to tropical and semi-tropical areas. It is mostly self-limited, lasting less than seven days. A minority will experience a more protracted course, with one overview suggesting 3-10% will have diarrhoea lasting longer than two weeks and 0.8-3% will still have symptoms in four weeks.<sup>8</sup>

A single stool sample with a request for MCS (bacterial culture) and OCP (microscopy for ova, cysts and parasites) should be sent. A second sample for OCP in a day or so may be considered.

**2. Is there a place for antibiotics here or in general?**

In cases suggestive of giardia (persistent diarrhoea, bloating, abdominal cramps), it is common medical practice to make a presumptive diagnosis and treat with tinidazole or metronidazole.

In this patient, the illness is relatively mild and ideally antibiotics would be avoided at this point.

In travellers who have moderate to severe symptoms but must continue their journey, empiric treatment with norfloxacin or trimethoprim plus sulphamethoxazole can be considered.

The possibility of an alternative diagnosis would need to be considered if symptoms persist for longer than four weeks and investigations are negative. These include post-infectious sequelae such as inflammation and malabsorption, and the unmasking of non-infectious GI disease, such as inflammatory bowel disease or coeliac disease.

**Case study three**

Tony, 45, has been unwell since yesterday with intermittent fever, generalised aches and pains and a headache. He has had loose, watery diarrhoea associated with lower abdominal cramps since the early hours of today, and looks exhausted.

**1. Are investigations warranted at this stage?**

Tony's diarrhoea is of short duration, but the presence of fever and constitutional symptoms raises the possibility of a bacterial infection. The absence of bloody stools does not rule out this possibility. After discussion with Tony, you elect to hold off stool tests and recommend clear fluids, with instructions to call if his symptoms worsen.

**2. What about loperamide?**

The use of loperamide is not recommended if the person is at home and can get to a toilet. It is potentially harmful and should be limited to travellers or others needing to continue with activity.

Antimotility agents should be avoided in children or where fever or bloody diarrhoea is present.<sup>4</sup> Remember that loperamide is available without prescription.

You arrive back from lunch to an "urgent" message from Tony's wife. The pain and diarrhoea are no better, and he now reports "foul" motions with blood. In addition, a couple they visited the local markets with on the weekend, where they lunched on

**Table 4: Food sources of common pathogens**

**Incubation 1-6 hours**

*S aureus* toxin: Ham, poultry, potato or egg salad

*B cereus* toxin (with vomiting): Fried rice  
Incubation 8-16 hours

**Incubation 8-16 hours**

*B cereus* not due to preformed toxin (rarely vomiting): Meats, vegetables

**Incubation more than 16 hours**

Salmonella: Usually contaminated food such as poultry, eggs, milk

Campylobacter: Poultry, raw milk

*E coli*: Main pathogen enterohaemorrhagic *E coli*, also known as shigella

toxin producing *E coli*: Usually undercooked ground beef, eg, hamburgers.

For enterotoxigenic *E coli*: Salad, meats, cheese. A specific serotype, 0157:H7, is associated with haemolytic uraemic syndrome

Shigella: Potato or egg salad, lettuce, raw vegetables

*C difficile*: Post-antibiotics and hospitalisation

Non-cholera vibrio sp: Shellfish

Source: *Harrison's Principles of Internal Medicine* 15th edition.



chicken salad, have called to say they have similar illness and are on antibiotics prescribed by their GP.

### What next?

Fever and bloody diarrhoea suggest invasive or enterotoxic bacterial infection.

The shared lunch, if associated, suggests an incubation period of about 48 hours. You suspect campylobacter, although *E coli*, shigella and salmonella are all possible.

You arrange for one stool sample for microscopy, culture and sensitivity while starting Tony on norfloxacin, although you are aware that supportive management is also an option.

Results of the microscopy confirm the presence of leukocytes and RBCs, and the culture grows campylobacter, sensitive to erythromycin.

Community-acquired diarrhoea/food poisoning is usually due to the ingestion of bacteria in food (see table 4, previous page). The two main agents are campylobacter (four times more common than salmonella) and salmonella, with incubation periods of 72 hours and 12-24 hours respectively. *E coli* (enterotoxigenic, enterohaemorrhagic, enteroinvasive, enteropathogenic and enteroaggregative types are described), shigella, non-cholera vibrio spp and *C difficile* are other bacteria of note.

Guidelines state that for campylobacter, antibiotics are only indicated in severe or prolonged cases and there are risks associated with using antibiotics in patients with bloody diarrhoea who are infected with enterohaemorrhagic *E coli*. Otherwise, the causative agents are toxins that have been produced by the bacteria before ingestion, for example, *Staphylococcus aureus* and *Bacillus cereus*. Because of the pre-formed toxin, onset of symptoms is much earlier, usually within six hours of ingestion of the contaminated food, and often settles in 12-24 hours.

### Key points

- Acute diarrhoea (less than two weeks' duration) is due to infectious agents in more than 90% of cases, most commonly a virus. In Australia, the majority of cases are sporadic and self-limited, and treatment involves supportive therapy only.
- Stool culture, microscopy for ova and cysts and viral detection need specific requesting, with adequate clinical notes on the form. One sample is sufficient for all tests performed in the one day
- The best use of the laboratory will depend on several factors including a knowledge of the different techniques used to examine stool samples and the likely pathogen involved, usually suspected on the basis of a careful but directed history.

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