

- 10 Talan DA, Guterman JJ, Overturf GD, Singer C *et al.* Analysis of emergency department management of suspected bacterial meningitis. *Ann Emerg Med* 1989;18: 856–62.
- 11 Heyderman RS, Lambert HP, O'Sullivan I, Stuart JM *et al.* Early management of suspected bacterial meningitis and meningococcal septicaemia in adults. *J Infect* 2003; 46:75–7.
- 12 Begg N, Cartwright KA, Cohen J, Kaczmarek EB *et al.* Consensus statement on diagnosis, investigation, treatment and prevention of acute bacterial meningitis in immunocompetent adults. British Infection Society Working Party. Review. *J Infect* 1999;39:1–15.
- 13 Quagliarello VJ, Scheld WM. Treatment of bacterial meningitis. Review. *N Engl J Med* 1997;336:708–16.
- 14 Schaad UB, Lips U, Gnehm HE, Blumberg A *et al.* Dexamethasone therapy for bacterial meningitis in children. Swiss Meningitis Study Group. *Lancet* 1993;342:457–61.
- 15 Molyneux EM, Walsh AL, Forsyth H, Tembo M *et al.* Dexamethasone treatment in childhood bacterial meningitis in Malawi: a randomised controlled trial. *Lancet* 2002;360:211–8.
- 16 de Gans J, van de Beek D; European Dexamethasone in Adulthood Bacterial Meningitis Study Investigators. Dexamethasone in adults with bacterial meningitis. *N Engl J Med* 2002;347: 1549–56.
- 17 Purcell B, Samuelsson S, Hahne SJ, Ehrhard I *et al.* Effectiveness of antibiotics in preventing meningococcal disease after a case: systematic review. *BMJ* 2004;328:1339.
- 18 Joint Tuberculosis Committee of the British Thoracic Society. Chemotherapy and management of tuberculosis in the United Kingdom: recommendations 1998. *Thorax* 1998;53:536–48.
- 19 Weidmann M, Meyer-Konig U, Hufert FT. Rapid detection of herpes simplex virus and varicella-zoster virus infections by real-time PCR. *J Clin Microbiol* 2003;41:1565–8.

The returned traveller

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UK residents made almost 60 million visits abroad in 2002, three times the number in 1981. Most were to the European Union but there were over four million visitors to tropical or near-tropical areas, and since 1995 there has been a steady increase in UK travel to Asia, the Caribbean and South and Central America. The number of travellers to sub-Saharan Africa has risen only slightly. However, there has been a marked increase in immigration from Africa and the distinction between traveller and immigrant is irrelevant to the acute medical team.

The public usually expects to be immunised against infections such as typhoid and hepatitis A before travelling to more exotic destinations but are largely unaware that avoiding the more significant threats to health and life depends more on their behaviour abroad and on prompt presentation to informed doctors should they become ill on return.

What is special about returned travellers?

Returned travellers most commonly present with fever, skin lesions, diarrhoea, jaundice or anxiety that they may be incubating an infection. Febrile patients require the most urgent assessment.

Being confronted with a patient recently returned from overseas can be a daunting experience for doctors concerned that they may miss unfamiliar but urgent life-threatening conditions. Although returned travellers present with a variety of symptoms, the possibility of a fatal outcome is virtually confined to those with fever. A safe management protocol for such patients is identical to what should be followed in managing any acutely febrile patient, with the important addition, when appropriate, of urgent investigation for falciparum malaria coupled with preparedness to treat for malaria even when a negative result is obtained. Timing is of the essence: treated early, malaria is simple to cure but delays of only a few days can allow progression to severe disease with full-blown sepsis necessitating intensive care.

The standard protocol for febrile patients (see below) includes a chest X-ray; this usually shows non-lobar consolidation in patients with legionellosis, often when pneumonia would not have been thought likely from the patient's symptoms. Approximately half of notified Legionnaires' disease in the UK occurs in returned travellers and the infection kills as many such individuals each year as falciparum malaria.

Key Points

The most urgently life-threatening conditions in returned travellers are falciparum malaria, leptospirosis and Legionnaires' disease

Early treatment of life-threatening infection is vital and circumstantial evidence often justifies treatment before the diagnosis can be confirmed

Reference to incubation periods is helpful in diagnosing conditions that are rarely or never acquired in the UK

Primary HIV infection is increasingly recognised as a cause of fever in returned travellers. HIV testing should readily be offered

KEY WORDS: foreign travel, Legionnaires' disease, malaria, primary HIV infection

Febrile returned travellers occasionally pose threats to public health. Any febrile patient who was in rural Sierra Leone or 'middle-belt' Nigeria in the three weeks before the onset of symptoms should be kept where they are and assessed for possible Lassa fever. The local infectious diseases (ID) physician or consultant in communicable disease control (CCDC) will advise. Other zoonotic infections such as severe acute respiratory syndrome are likely to present in the UK only when there is an outbreak elsewhere. It is thus essential that those assessing acutely ill patients be aware of the current status of such infections.

Febrile returned travellers

Assessment

A travel history **must** be obtained from all patients who present with fever. As Table 1 shows, travel-acquired febrile illnesses can present up to three months after leaving the place where they were acquired. Most exotic conditions can safely be ruled out if symptoms begin after the longest period of incubation has elapsed.

The travel history

In addition to obtaining details of dates of foreign sojourns to compare with incubation periods, the travel history must ask the open question 'What did you do?'

supplementing it, when appropriate, with a number of closed questions:

'Did you have unprotected sex with a new partner?'. Primary HIV infection usually presents as a febrile illness.

'Were you immersed in a lake, canal or river?'. Leptospirosis is acquired by adventurous travellers such as canoeists and white-water rafters who are exposed to fresh water contaminated with rat urine; seroconversion illness of schistosomiasis (Katayama fever) presents 4–6 weeks after immersion in Southern African lakes, notably Lake Malawi.

'In Southern Africa did you walk or ride a horse in a game park?'. Tick typhus results from the bite of a tick and is a common infection in those who walk in scrubland in or near Southern African game-parks.

Investigations

The basic first-line investigations of all febrile patients are listed in Table 2. Tests for malaria parasites must be urgently requested in all patients in an area endemic for falciparum malaria within the preceding three months. The request must be explicit as automated cell counters do not currently detect malarial parasites so the diagnosis will not be made incidentally. The haematology laboratory must be informed that the result should be communicated to the clinician on the same day.

Nearly all (90%) cases of falciparum malaria are acquired in sub-Saharan Africa but the test should also be requested for travellers who have visited endemic areas in South and Central America and Asia. A second sample for malaria parasites should be sent the day after a negative test.

Synopsis of travel-acquired infections presenting with fever

Dengue fever

Status: currently pandemic; highest burden is South-East Asia and western Pacific but increasing in South America and the Caribbean; about 100 laboratory confirmed cases in the UK in 2002 but many milder cases must go untested.

Transmission: mosquito-borne (*Aedes aegyptii* – a day and night biter).

Clinical: fever; often erythematous rash and thrombocytopenia.

Diagnosis: convalescent serology (exclude malaria in acute phase).

Management: self-limiting; no specific treatment.

Falciparum malaria

Status: 1,500 notifications and about 10 deaths in the UK each year.

Transmission: mosquito-borne (*Anopheles* species – mostly evening and night biters).

Clinical: fever; often headache and general aches.

Diagnosis: by specifically requested blood films.

Management: urgent treatment required (discuss with local ID unit and refer to current British National Formulary (BNF)).

Hepatitis A and E

Status: true incidence unknown; many unrecognised/subclinical infections; hepatitis A and E more frequent in back-packers than package tourists.

Transmission: faecal/oral.

Table 1. Incubation periods of travel-acquired infections presenting with fever.

Infection	Incubation period	
	Range (days)	Modal range (days)
Dengue fever	3–14	(5–7)
Falciparum malaria	8–90	(10–30)
Hepatitis A	15–50	(28–30)
Hepatitis E	15–64	(26–42)
Primary HIV infection	20–60	(25–35)
Lassa fever	6–21	
Legionnaires' disease	4–12	(8–10)
Leptospirosis	4–19	(8–10)
Seroconversion illness of schistosomiasis	14–40	
Typhoid fever	5–40	(7–21)
Tick typhus	7–18	

Clinical: fever, with or without diarrhoea, typically precedes jaundice.

Diagnosis: serological by detection of immunoglobulin (Ig) M.

Management: no specific treatment, but supportive treatment may speed recovery and, rarely, save lives.

Consider: Ig to household contacts of hepatitis A cases.

HIV infection

Status: heterosexual intercourse overseas, sometimes as part of deliberate sex-tourism to destinations such as Thailand, is a significant source of HIV infection in British citizens.

Clinical: as many as half those infected with HIV experience 'primary HIV', a glandular fever-like illness around the time that they develop antibodies to the virus; fever; pharyngitis, lymphadenopathy, erythematous and/or papular rashes are typical; biochemical hepatitis and viral-type meningitis in a significant minority of cases.

Diagnosis: by standard HIV serology.

Management: treatment usually not indicated for self-limiting primary HIV illness, but diagnosis enables monitoring so that treatment can be optimally timed before progression to advanced infection.

Lassa fever

Status: one or two cases per decade in the UK; currently, British troops serving in rural Sierra Leone at low but significant risk.

Clinical: fever, headache, sore throat, cough, chest pain.

Diagnosis: requires prior exclusion of malaria, which may extend to the need for a therapeutic trial of antimalarials; if the patient has malaria, this typically leads to defervescence within 48 hours; serology for Lassa fever must be arranged via local HPA laboratory.

Management: requires isolation and specialist treatment; laboratory investigation and movement of suspect patient

must wait until after immediate discussions with local ID consultant or CCDC.

Legionnaires' disease

Status: 146 travel-acquired cases in England and Wales in 2002, almost all acquired in Europe and Turkey.

Transmission: air-borne from aerosolised water contaminated by *Legionella pneumophila*.

Clinical: ranges from severe sepsis to a flu-like illness; pneumonia may not be evident clinically and early chest X-ray is essential in assessment of all pyrexial returned travellers.

Diagnosis: most rapidly by detection of antigen in urine by polymerase chain reaction (ca 80% sensitive).

Management: all standard protocols for treating community-acquired pneumonia must include use of macrolide or quinolone to cover legionellosis; addition of rifampicin is recommended in severe cases of proven or probable legionellosis.

Leptospirosis

Status: widespread in tropics and temperate regions; 78 cases acquired overseas identified in England and Wales from 1994–2002, 42 from South-East Asia (virtually all associated with behaviour which had put the patient at risk, usually recreational).

Transmission: exposure to water or soil contaminated by infected animal urine.

Clinical: symptoms range from mild, non-specific flu-like illness to fulmi-

nating sepsis with multi-organ involvement; jaundice is common in more severe cases; jaundice coinciding with fever (as opposed to succeeding it, as typical with viral hepatitis) should suggest the diagnosis which is supported by the findings of a polymorphic leucocytosis.

Diagnosis: treatment should be started on clinical suspicion; confirmation is by positive blood culture on serology (IgM enzyme-linked immunosorbent assay).

Management: penicillin or tetracycline given as early as possible in the illness with supportive care.

Schistosomiasis

Status: 100–200 cases identified in England and Wales annually; in British travellers, virtually confined to adventurous young in Southern Africa, especially those who swim and/or wind-surf in Lake Malawi (usually, a test is requested by those who have done so); occasionally, a traveller presents with the seroconversion illness (Katayama fever) within six weeks of swimming in an African lake.

Clinical: fever, hepatosplenomegaly and eosinophilia are likely in seroconversion illness.

Diagnosis: serology.

Management: treatment with praziquantel which can be prescribed only by an ID unit.

Typhoid and paratyphoid

Status: probably about 400 cases in UK annually.

Table 2. Basic first-line investigations for all febrile returned travellers.

All pyrexial patients	If diarrhoea add:	If in malaria endemic areas in last 18 months* add:
Full blood count	Stool culture	Malarial parasites
Liver function tests		(*if in last 3 months this request is urgent)
Blood culture		
Mid-stream urine		
Chest X-ray		

Transmission: faecal/oral.

Clinical: fever often the only symptom in the first week of illness; diarrhoea or constipation common.

Diagnosis: by blood culture.

Management: currently, treatment is usually initiated with ciprofloxacin pending sensitivity results; with early diagnosis, complications are rare but defervescence often takes up to one week, even with sensitive strains.

Tick typhus

Status: perhaps 100 cases in UK annually; high attack rate in those taking walking safaris in Southern African game parks.

Clinical: fever with headache; eschar, typically a 1-cm diameter black scab with local oedema and lymphadenopathy, at site of tick bite.

Diagnosis: clinical, coupled with exclusion of falciparum malaria confirmed by convalescent serology.

Management: single dose of doxycycline 100 mg leads to rapid clinical recovery.

Approach to management of skin lesions in returned travellers

Table 3 provides guidance on the management of skin lesions in returned travellers. Referral to a dermatologist or an ID physician is clearly advisable for confirmation and management of unfamiliar conditions (these will not be discussed in detail here). Scabies does not usually need referral, but remember that in travellers it is usually sexually-acquired. Referral to a genitourinary medicine clinic should be considered in case other sexually transmitted diseases (STDs) (including HIV) have been acquired.

Approach to management of diarrhoea in returned travellers

Travellers' diarrhoea is defined as the passage of three or more unformed stools in 24 hours plus at least one of the following:

- cramps
- nausea
- vomiting
- fever or tenesmus.

Enterotoxigenic *Escherichia coli*, strains of *E. coli* which cause secretory diarrhoea, are the commonest cause of travellers' diarrhoea, followed by salmonella,

campylobacter and cryptosporidium. Antibiotics speed recovery if given within 24 hours of onset. However, patients presenting as returned travellers will often have had symptoms for more than 48 hours; most of them will recover without antibiotics – which are best reserved for patients with significant systemic symptoms including persistent fever or with pre-existing inflammatory bowel disease.

When pyrexial patients present with diarrhoea in the first week after return the immediate issue is hydration. Hospitalisation may be required if dehydration is significant or the patient is vomiting (especially if diabetic). Diuretics should be stopped until diarrhoea settles unless the patient is in overt heart failure.

Returned travellers with diarrhoea and fever or blood diarrhoea (dysentery) should be referred to hospital. Blood and stool cultures are required. They may have invasive salmonella food poisoning, typhoid or paratyphoid fever or bacillary or amoebic dysentery.

Scrupulous hygiene is advised (ie thorough hand washing after defecation) until stools are back to normal consistency.

If watery diarrhoea persists after a week, send stool for culture and microscopy. This may reveal trophozoites (adult forms) or cysts of *Giardia lamblia* or other parasites such as cryptosporidium or

Table 3. Approach to management of skin lesions in returned travellers.

	Appearance	Possible diagnosis	Global distribution	Incubation period (days)
Generalised	Itchy; papular	Scabies	Ubiquitous	14–40
	Erythema and/or maculo-papular	Primary HIV	Ubiquitous	20–60
	Erythema and/or purpuric	Dengue	Tropical	3–14
Localised	Papule(s), max 2 or 3 evolving to superficial ulcer	Cutaneous leishmaniasis	Central America, South America except Chile and Uruguay, Mediterranean, Middle East	7 days to many months
	Papule evolving to black scab	Eschar of tick typhus	Southern Africa	5–7
	Erythema	Erythema chronicum migrans of Lyme disease	Patchy in USA, especially Massachusetts to Maryland and California to Oregon, Europe	3–32
	Boil-like	Myiasis (flesh-eating fly larvae)	South America, Africa	30
	Worm-like	Cutaneous larva migrans	Tropical, notably Caribbean beaches	1–4

isospora. If the report is negative, treat empirically for giardiasis with tinidazole 2 g as a single dose repeated after one week. If there is no response, refer for consideration of small-bowel endoscopy; this is the most sensitive test for strongyloidiasis, a worm usually acquired by walking barefoot or in sandals in warm, moist areas contaminated with human faeces. It is found in all continents. The infectious larva enters the host skin and migrates to the small intestine where it may cause diarrhoea and may lead to partial villous atrophy. Other conditions which may be diagnosed by endoscopy in returned travellers include giardiasis or cryptosporidiosis or previously unsuspected coeliac disease.

- 2 Office for National Statistics. *Transport, Travel and Tourism MQ6*. Overseas travel and tourism, Quarter 4 2002. London: HMSO, 2003.

The anxious returned traveller

Returned travellers may request testing for the presence of subclinical infections, notably:

- HIV and other STDs in the sexually adventurous
- schistosomiasis in individuals who swam or wind-surfed in African lakes, and
- rabies in those bitten by animals.

When anxiety seems out of proportion to the severity of presenting symptoms, direct questioning may uncover specific fears or anxieties. Testing for HIV and schistosomiasis should be advised if the risk seems significant as there are clear advantages to detection at an asymptomatic stage in both conditions. Anyone bitten by any mammal in rabies-endemic areas should be prescribed post-exposure rabies vaccine (see BNF) with the five doses (days 0, 3, 7, 14 and 28) starting as soon as the risk is recognised.

Bibliography

- 1 All statistics for incidence of infection in returned travellers are taken from *Illness in England, Wales and Northern Ireland associated with foreign travel* by the National Travel Health Network and Centre (NaTHNaC www.nathanac.org), published by the Health Protection Authority as a 'baseline report to 2002'. It is a comprehensive source of epidemiological information on illness in travellers.