Advisory Committee on Dangerous Pathogens

Infection at work: Controlling the risks

A guide for employers and the self employed on identifying, assessing and controlling the risks of infection in the workplace

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This guidance is prepared in consultation with the Health and Safety Executive, by the Advisory Committee on Dangerous Pathogens, which was appointed by the Health and Safety Commission as part of its formal advisory structure and by Health Ministers.

The guidance represents what is considered to be good practice by members of the Committee. It has been agreed by the Commission and Health Ministers. Following the guidance is not compulsory and you are free to take other action but if you do follow it you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

Contents

WHAT IS THIS GUIDE ABOUT?

1 This guide deals with the risk of infection at work, but it is **not** aimed at those who deliberately work with micro-organisms, eg in laboratories. You should use this guidance if your employees could come into contact with infectious micro-organisms as a result of the kind of work they do, eg:

- working with animals (eg farming);
- working with people who might be infectious (eg patients in hospitals);
- handling waste material that may be contaminated with micro-organisms (eg refuse disposal);
- working in an environment or with equipment (eg sewer maintenance) that could be contaminated.

Did you know?

Did you know?

There were nearly 700 new cases of occupationally-acquired infection in 2001. We know this is a considerable underestimate because most infections will only be reported if they require medical attention - many infections are mild and people get better without any need for medical treatment. But, they may still cause long-term effects and the risks from such infections need to be controlled in the same way as more serious infections.

Hint 1

Hint 1

You should make sure your assessment identifies work activities where:

- workers may be at greater risk, eg pregnant employees or those whose immune system is not functioning properly, eg because they are undergoing medical treatment or are already suffering from an infection;
- workers and other people who may not be in the workplace all the time, eg cleaners, maintenance and repair workers, students on placements; and
- members of the public who might be present, eg visitors to open farms, if there is a chance that they could be exposed to infection as a result of your work.

2 This guide addresses your duties under **The Control of Substances Hazardous to Health Regulations 2002 (COSHH).** You may already know that these regulations deal with the control of chemicals in the workplace, but they also cover infectious micro-organisms.

WHAT DO I HAVE TO DO?

3 You can deal with the risks from infection at work in the same way as any other health and safety issue. You need to:

- identify the hazards;
- assess the risks;
- control the risks.

4 As well as considering the risks to your employees, you also need to decide whether the work that you do puts others at risk of infection. For example you may run a farm that is also open to the public. You have a duty under health and safety law to protect your visitors too (see Hint 1).

5 Although some jobs involve dealing with lots of people, eg driving a bus, the risk of infection in the course of such work is likely to be no greater than that of, say, the passenger who uses the bus every day. The risk of infection has to be **foreseeable** before you need to carry out an assessment and take measures to control the risks. For example someone who cleans buses in certain areas may be at risk from contact with dirty needles and other rubbish. They need to be protected during the course of their work.

6 Although your employees may well pick up infections from workmates (just as they might from their friends and family outside work) – these infections are not your responsibility under health and safety law. This is because the infection is just as likely to be caught outside the workplace as in it. But there may be other laws which require you to take action (see Hint 2).

7 Carrying out a risk assessment is your responsibility as the employer. You may be able to carry out the assessment yourself but, if not, you should call on help and advice from within your own organisation, or if this is not available, from outside sources, eg consultancies.

8 If you employ more than five people you must write down the significant findings of your assessment. You should record the significant hazards identified in your assessment, and the controls that are in place or are to be used (see Appendix 1). If you have fewer than five employees, you do not need to write anything down, but you may find it useful to keep a written record of what you have done.

9 Your risk assessment is a living document and should reflect any changes in the work that you do, new equipment that is used or a new work activity is added **if this changes the risk or leads to new hazards being introduced.** It is also good practice to review your assessment from time to time to make sure that the controls you are using are working and still appropriate.

10 If any of your employees catch an infection as a result of their work, these must be reported to HSE under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.

Note: This guide uses the term 'infectious micro-organisms' but you should note that health and safety law uses the term 'biological agents'. By infectious micro-organisms/biological agents we mean the bacteria, viruses, fungi and internal parasites (such as tapeworms) that create a hazard to human health. Most harm you by infection but they can also cause allergies or be toxic.

11 Further information about risk assessment, as well as information about infections and controls for certain occupations, is given in Appendix 3.

Hint 2

Hint 2

There are other regulations (not health and safety at work regulations) that deal with risks from micro-organisms that you may also need to consider, on:

- food safety;
- environmental protection; and
- public health.

IDENTIFYING THE HAZARD

12 Micro-organisms are found virtually everywhere in the natural environment. Most of these are harmless to humans and do many important jobs. They are used to make medicine. They can break down the oil from oil spills. They make about half of the oxygen we breathe.

Did you know?

Did you know?

Bacteria live on or in just about every material and environment, from soil to water to air, and from the deep ocean to Arctic ice to volcanic vents. There are more bacterial cells in the human body than there are human cells, and some are absolutely necessary to our survival. On each square centimetre of our skin there are about 100 000 bacteria and a single teaspoon of topsoil contains more than a billion bacteria.

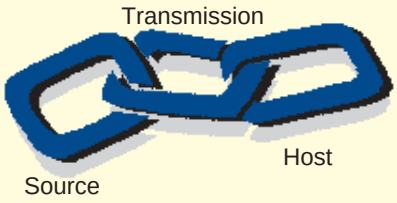
13 However, certain micro-organisms can cause disease and your employees may be exposed to them at work.

14 Further detail about sources and the process of infection is given in the following section 'The chain of infection'.

15 The good news is that controlling the risk of infection is relatively straightforward – usually, simple good personal hygiene measures, such as washing hands, are sufficient.

Chain of infection

16 The process of infection can be represented as a chain - breaking a link in the chain at any point will control the risk of infection. When you identify the hazard, you need to find out about the links in the chain to help you identify the best way to break it and so control the risk.

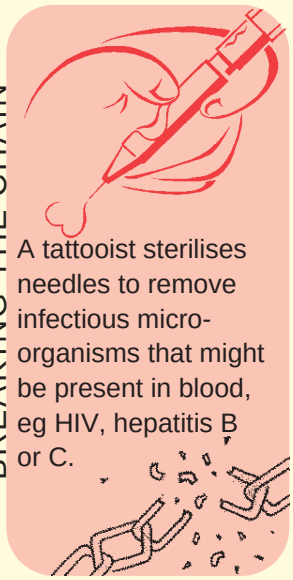


Sources

17 There are four main sources of infection that you need to consider in a workplace:

- blood and other body fluids (eg saliva) and sources of blood/body fluids such as human bodies, animal carcases and raw meat;
- human or animal waste products such as faeces, urine and vomit;
- respiratory discharges such as coughs and sneezes; and
- skin – direct contact.

BREAKING THE CHAIN



A tattooist sterilises needles to remove infectious micro-organisms that might be present in blood, eg HIV, hepatitis B or C.

18 Outside work, people can also become infected if they eat and drink contaminated food and water or through sexual intercourse, but these routes are not covered in this guide.

Transmission

19 To become infected, the micro-organism has to get from the source into the host by some means. Most micro-organisms usually have a particular route of entry, but in some cases infection can occur by more than one route.

20 Infection at work can occur via:

- putting contaminated hands and fingers (or pens etc) into the mouth, nose or eyes;
- breathing in infectious aerosols/droplets from the air, eg respiratory discharges such as coughs and sneezes, contaminated dust or spray from a cooling tower;
- splashes of blood and other body fluids into the eye and other mucous membranes, such as the nose and the mouth;
- broken skin if it comes into direct contact with the micro-organism (or something contaminated by micro-organisms);
- a skin-penetrating injury, eg via a contaminated needle or other sharp object or through a bite by an infected animal or insect.

21 Infection can be transmitted person to person or animal to person – diseases transmitted from animals to people are called **zoonoses.**

Host

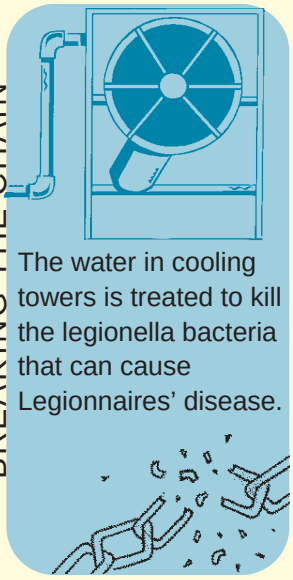
22 Unbroken skin and the lining of the mouth, throat, gut and airways all serve to provide a barrier to infection. The cells of these linings and the substances they produce are the body's first line of defence. If a micro-organism does manage to cross this barrier, the next line of defence is the immune system. Whether or not an infection occurs depends on the outcome of a contest between the micro-organism and the immune system. The outward signs and symptoms of disease such as fevers or rashes are a result of this contest.

23 Some people may be more susceptible to infection than others, eg those with reduced immunity because of a pre-existing illness. You should check this before employees start work, so you can make sure they are protected or give them less hazardous work to do.

24 Some people may be naturally immune to disease, eg because they had the disease as a child or else have been immunised – again you need to check on this before work starts (see 'Things to remember: Controlling the risks').

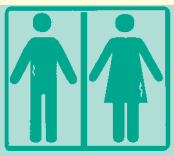
25 If you need further help and advice on fitness for work, immunity or immunisation issues, you should talk to your occupational health service provider.

BREAKING THE CHAIN



The water in cooling towers is treated to kill the legionella bacteria that can cause Legionnaires' disease.

BREAKING THE CHAIN



A cleaner of public toilets wears protective gloves and washes their hands when finished to prevent infectious micro-organisms being transmitted from their hands to their mouth.

ASSESSING THE RISKS

26 You need to find out how your employees might come into contact with infectious micro-organisms at work. This may be as a result of contact with people or animals, or else your workplace itself may be a source of contamination. This includes any tools you use and the structures and services in the workplace.

27 You also need to find out if there are conditions that could allow infectious micro-organisms found in the natural environment to contaminate and grow in your workplace, if you don't take steps to control them. For example legionella bacteria are equally at home in cooling towers or deadlegs of hot and cold water services as they are in the natural aquatic environment.

28 Work through the questions in Table 1 and identify which sources of infection are present in your workplace. When you have identified the source(s) of infection, you need to consider how likely it is that infection will result - think about:

- how often the task is carried out;
- how many employees are exposed; and
- how much infectious material is handled.

29 If you determine that there is a risk, then you need to decide whether existing controls are sufficient or you need to do more.

30 You can use the form in Appendix 1 to record your assessment, or you could include infection hazards in your general workplace risk assessment. There are a number of example assessments in Appendix 1.

31 Further information on the types of micro-organisms found in the various sources of infection is given in Appendix 2. This is not an exhaustive list, but it does include the most commonly occurring occupationally acquired infections. Other micro-organisms may create a risk, so further information may be required.

BREAKING THE CHAIN

Mortuary technicians are immunised against hepatitis B because they have significant contact with blood.

THINGS TO REMEMBER: ASSESSING THE RISKS

Although micro-organisms can cause harm by infection, they can also cause allergies and/or be toxic.

When considering direct contact with people or animals, you need to address risks from the living and the dead, as well as risks from handling material such as raw meat.

You have a duty under health and safety law to consult with employees about health and safety matters. As well as giving employees information, you need to listen and take account of what they say before making any health and safety decisions. Ask your employees if they have come across any hazards you haven't identified, eg areas where dirty/used needles might be dumped.

Make sure you identify all those who might be affected, not just employees – remember contractors, members of the public and others.

There may be animals, including insects, in your workplace that you cannot see or that you have no direct control over: pests such as rats, pigeons, cockroaches, ticks etc.

If your work involves people or animals, they may appear healthy, because infection may not be associated with obvious signs. But if you know they are suffering from an infection, or that there is an increased risk of infection because of:

- behaviour, eg animals can be unpredictable and bite and scratch when unsettled); or
- background, eg recent immigrants may be from countries where there are diseases that are not usually found (or are only rare) in the UK,

you should take this into account in your assessment.

TABLE 1: IDENTIFYING THE HAZARDS (SOURCES OF INFECTION)

If your employees come into direct contact with people, do they …?

		Source of infection	*Example occupations*
Have direct physical contact?	Do they provide assistance with personal tasks such as washing, dressing, feeding?	Direct skin contact, infectious aerosols, body fluids, human waste	Nurses, care workers in nursing homes, undertakers
	Do they work with those whose behaviour could be unpredictable – consider the likelihood of spitting, biting or scratching?	Body fluids, blood	Doctors, nurses, social work, custodial work eg police, prison officers
Have contact with waste?	Is there direct contact with human waste or things contaminated by it, eg soiled laundry, clothing?	Human waste	Nurses, ancillary healthcare workers such as cleaners, porters, emergency service workers, care workers, laundry workers, refuse collectors
	Is there contact with things contaminated by blood, eg used dressings?	Blood	Doctors, nurses, dentists, ancillary healthcare workers such as cleaners, porters, emergency service workers, care workers, refuse collectors, motor vehicle repairers
Carry out activities that involve cutting or piercing of skin?	Is this intentional?	Blood	Doctors, nurses, dentists, emergency service workers, post-mortem technicians, embalmers, tattooists, acupuncturists, ear and body piercers
	Is this unintentional?		Hairdressers, beauticians, chiropodists, undertakers

If your employees come into direct contact with animals, do they...?

		Source of infection	*Example occupations*
Have direct physical contact?	Do they carry out animal husbandry tasks such as feeding, grooming, mucking out?	Direct skin contact, infectious aerosols, body fluids, animal waste	Farmers, veterinary workers, kennel/cattery workers, grooms, animal rescue workers, zookeepers
Have contact with waste?	Is there direct contact with animal waste or things contaminated by excreta, eg bedding, raw meat?	Animal waste	Farmers, veterinary workers, kennel/cattery workers, grooms, animal rescue workers, zookeepers, abattoir workers, poultry processors, slurry spreaders
	Is there contact with things contaminated by blood, eg used dressings, raw meat?	Blood	Veterinary workers, farmers, abattoir workers, poultry processors, butchers
Carry out activities that involve cutting or piercing of skin?	Is this intentional?	Blood	Veterinary workers, abattoir workers, poultry processors, butchers
	Is this unintentional?		Farmers, grooms, veterinary workers

Does the work activity involve ...?

		Source of infection	*Example occupations*
Coming into contact with contaminated sharp objects?	Is there contact with needles, broken glass etc?	Blood	Care workers, refuse collectors, motor vehicle repairers, cleaners (eg public transport, parks, street)
Working in an area contaminated by human waste?	Is there direct contact?	Human waste	Sewage workers, plumbers, drain cleaners
	Do they carry out activities which could create sprays or dust, eg water jetting/hosing, sweeping?	Infectious aerosols	Sewage workers, cleaners of public toilets
Working in an area contaminated with animal waste?	Do they come into direct contact?	Animal waste	Water sports teachers, ditch clearers, groundsmen, foresters, local authority park keepers, local authority environmental heath services such as pest control, gardeners, park keepers
	Do they carry out activities which could create sprays or dust eg water jetting, sweeping?	Infectious aerosols	Local authority environmental heath services such as pest control
Direct contact with?	Soil?	Naturally occurring micro-organisms that cause tetanus	Grave diggers, ditch clearers, gardeners
	Water in the form of a spray?	Naturally occurring micro-organisms that cause legionellosis	Metalworking, plastics injection moulding, heating and ventilation engineers, plumbers
	Hay or straw?	Naturally occurring micro-organisms that cause apergilliosis	Grooms, farmers

CONTROLLING THE RISKS

32 Once you have carried out your risk assessment, your first duty under COSHH is to stop your employees from being exposed to a source of infection. You should consider, if you can:

- changing the way you work so the job/task/equipment that exposes your employees to a source of infection isn't needed any more; or

- modifying your work to cut out any hazardous by-products or waste.

33 If you can't prevent exposure, then COSHH requires that you adequately control it. This means controlling exposure, ie the risk of infection, to a level that won't harm people's health. However, you need to remember that, unlike some chemicals, there are no exposure limits for micro-organisms. And your control measures need to take into account the fact that:

- micro-organisms can grow and multiply; and

- infection could be caused by exposure to only a few micro-organisms.

There are two main approaches that you should use for the control of infection:

- for work with people or animals, the basic control principles of **good occupational hygiene** should be applied in **all** situations (Checklist 1). You may also need to supplement these measures with other controls depending on the work activity (as shown in the supplementary controls list); and

- the principles of **good environmental hygiene and design** (Checklist 2) to stop or limit the growth of the micro-organisms in the workplace. These measures should be applied in **all** workplaces. This applies especially whenever contamination is suspected in the workplace, but also on a routine basis to keep the equipment you use and the workplace clean.

CHECKLIST 1: GOOD OCCUPATIONAL HYGIENE: BASIC CONTROLS

- Wash hands (and arms if necessary) before eating, drinking, smoking, using the telephone, taking medication, applying make-up, inserting contact lenses.
- Cover all new and existing cuts and grazes with waterproof dressings and/or gloves before starting work. If cuts and grazes occur, wash immediately with soap and running water and apply a waterproof dressing.
- Take rest breaks and meal breaks away from the main work area.
- Wear appropriate protective clothing to stop personal contamination, eg waterproof/water-resistant protective clothing, plastic aprons, gloves, rubber boots/disposable overshoes. Ensure its safe disposal or cleaning.
- Avoid hand-mouth or hand-eye contact – don't put pens/pencils in mouths.
- Dispose of all contaminated waste safely.

Supplementary controls

- If the work activity could result in a **skin piercing/cutting injury,** the risk of puncture wounds, cuts or grazes should be controlled by avoiding the use of sharp objects, eg needles, glass, metal, knives etc. If this is not possible, safe working practices for handling and disposal of sharps should be used and appropriate protective equipment provided.
- If the work activity could result in the **splashing of any body fluid,** the eyes and mouth should be protected with a visor or goggles/safety glasses and a mask.
- If work activity could **generate aerosols** of either dust or liquid, you should take steps to avoid their generation, by:

  - altering the work activity, eg using a vacuum rather than a brush to clean a dusty workplace; or
  - containing the work activity, eg using drift eliminators in cooling towers to reduce the release of water droplets from the tower.

  If this is not possible, appropriate respiratory protective equipment should be used.

CHECKLIST 2: GOOD ENVIRONMENTAL HYGIENE AND DESIGN

- Use equipment that is easy to clean and decontaminate.
- Clean all work surfaces/work areas regularly.
- Ensure, where possible, that the workplace and its services, eg water systems, air conditioning systems, are designed to be safe to use and easy to clean and decontaminate.
- Treat water systems, to either kill or limit micro-organisms' ability to grow.
- Control pests, eg rats, insects within the workplace.

Handwashing

HANDWASHING

It's simple advice, but one of the most important ways of controlling the spread of infection is to remember to wash your hands. You need to wash your hands:

before:

- you eat, drink, take medicine, put on make-up, insert contact lenses etc;

and after:

- any work activity where you may have become contaminated.

How to wash your hands

You may think you know but you should:

- use soap and warm, running water;

- wash all surfaces thoroughly, including wrists, palms, back of hands, fingers and thumbs and under the fingernails;
- rub hands together for at least 10-15 seconds;

- rinse and dry hands - if towels are used, these should be clean or disposable.

THINGS TO REMEMBER: CONTROLLING THE RISKS

If you provide your employees with a uniform that also serves as personal protective equipment, eg a boiler suit, you need to make sure that it is cleaned regularly. You may provide laundry facilities yourself. But if staff have to wash it themselves, it should be washed at the highest temperature possible and separately from other uncontaminated clothing.

As well as controlling the risks on a day-to day basis, you also need to consider what you would do in an emergency situation. For example if an employee suffered a skin-penetrating injury from a blood-contaminated sharp.

Most micro-organisms will be physically removed and/or killed if you clean your work surfaces/areas with hot water and detergent. If you chose to use a disinfectant, eg bleach, you need to make sure that it kills the micro-organisms that you want killed and that it doesn't damage your work surfaces/areas - or cause any health problems for your employees. You also need to make sure that the process of cleaning doesn't create any risk, eg use low pressure hosing for cleaning large areas to avoid creating infectious aerosols.

If your employees don't have direct access to warm running water to wash their hands, for example because they aren't based at any one location, you may be able provide a suitably designed vehicle with facilities on board. Alternatively, you may provide alternatives such as antiseptic wipes or hand cleansers.

For control measures to work, you need to tell your employees about the risks that you have identified and the measures you have put in place to control exposure. They need to know and understand when and how to apply the controls, including the use of personal protective equipment; and what to do in an emergency. You may decide to tell your employees this information or else it may form part of their job instructions/the local code of practice or standard operating procedure.

Make sure you let anybody else who might be at risk know about the controls too, eg members of the public.

APPENDIX 1: RISK ASSESSMENT

Risk assessment form

Name of organisation			
Name of assessor		Date of assessment	
General description of work			
Specific activity assessed			
List source(s) of infection here. Consider quantities handled/frequency of contact. Consider whether hazard can be eliminated			
List those who are at risk from sources of infection here			
List control measures here			
Further information			

Example assessments

Name of organisation	Gosford Borough Council – Environmental Services Department		
Name of assessor	W McCordle	Date of assessment	1/1/03
General description of work	Park/open space maintenance		
Specific activity assessed	Collection and disposal of litter from parks and other council - maintained open spaces, eg playing fields		
List source(s) of infection here. Consider quantities handled/frequency of contact. Consider whether hazard can be eliminated	Contact with contaminated sharp objects in the form of discarded needles/syringes. Often hidden among leaves and other rubbish/debris. Also found in waste bins Happens at least once a week, can be up to 20 needles in some places Not possible to eliminate the hazards, there are sharps bins in the public toilets in the parks, but these are not always used		
List those who are at risk from sources of infection here	All park-keepers/groundsmen		
List control measures here	Use rubbish picker or dustpan and brush to remove rubbish. If hand removal required, heavy-duty gloves must be worn. Any sharps found should be removed from general litter wearing heavy-duty gloves and then disposed of into a sharps container, closing lid when finished. When 3/4 full the container should be disposed of as clinical waste		
Further information	In the event of a skin-penetrating injury, any wound should be *gently* encouraged to bleed and washed with soap and water. Advice should be sought from Occupational Health/Local Accident and Emergency Department immediately		

Name of organisation	Old Trout Fish Farm		
Name of assessor	I Walton	Date of assessment	1/1/03
General description of work	Trout farming		
Specific activity assessed	Feeding and handling fish, eg removal of dead fish, movement of fish to other pens		
List source(s) of infection here. Consider quantities handled/frequency of contact. Consider whether hazard can be eliminated	Direct contact with water potentially contaminated with rat urine, also contact with fish food contaminated with same Also potential for splashing when pens are full Daily contact with water and feed Not possible to eliminate rats, but they are controlled by pest control company		
List those who are at risk from sources of infection here	All staff		
List control measures here	All cuts and scratches covered with waterproof dressings Heavy-duty waterproof arm length gloves worn when working in fish pens. Waders worn when working in pens. All protective equipment cleaned under fresh running water after use and dried before being stored. Consider use of face visors when working in full pens Fish food stored in secure containers, and any spillages cleaned up immediately		
Further information	All staff issued with HSE pocket card *(Leptospirosis: Are you at risk?)* which gives information about symptoms of the disease and informs GP that the nature of the work puts employee at risk		

Name of organisation	CC Farm Holdings		
Name of assessor	A D Starkadder	Date of assessment	1/1/03
General description of work	City farm		
Specific activity assessed	General animal husbandry tasks, eg feeding, mucking out. Also supervision of general public on farm, especially when in contact with animals		
List source(s) of infection here. Consider quantities handled/frequency of contact. Consider whether hazard can be eliminated	Contact with animal body fluids and animal waste directly and indirectly on a daily basis. Not possible to eliminate hazard		
List those who are at risk from sources of infection here	All staff and most visitors to farm		
List control measures here	For staff: All cuts and grazes covered with waterproof dressings before starting work. Waterproof boots and gloves worn when handling animals. Low pressure hoses used when cleaning animal pens. Pregnant women excluded from lambing duties For visitors: As per HSE information sheet – AIS23, in particular providing suitable washing facilities, putting up signs reminding visitors when to wash hands and providing a separate eating area		
Further information	All school parties are issued with the teachers' supplement to AIS23 before the visit		

Name of organisation	Sowerberrys Ltd		
Name of assessor	N Claypole	Date of assessment	1/1/03
General description of work	Undertaking		
Specific activity assessed	Collection of bodies from hospitals and other premises		
List source(s) of infection here. Consider quantities handled/frequency of contact. Consider whether hazard can be eliminated	Direct skin contact, body fluids and human waste. Contact on a daily basis. Hazard cannot be eliminated		
List those who are at risk from sources of infection here	All collection staff		
List control measures here	When collecting from hospital, contact is minimal as bodies are wrapped to prevent leakage of body fluids. Staff should be informed of any danger of infection. Staff to wear disposable gloves when collecting body, washing hands before leaving premises/eating or drinking		
Further information	Hepatitis B vaccination not considered appropriate for all staff but arrangements made with local Accident and Emergency Department to carry out post-exposure prophylaxis if there is a sharps injury		

APPENDIX 2: COMMON OCCUPATIONAL INFECTIONS

Common infections and their sources

	Source of infection			
	Blood, body fluids and body parts	**Waste, eg faeces, urine and vomit**	**Significant skin contact**	**Infectious aerosols, eg coughs and sneezes, dusts, water droplets**
People	Hepatitis B and C, HIV	Haemorrhagic colitis/ haemolytic uraemic syndrome, Viral gastroenteritis, Shigellosis, Salmonellosis, Hepatitis A	Ringworm	Tuberculosis
Animals – domestic/pets				
Horse		Salmonellosis	Ringworm	
Cattle	Bovine tuberculosis, Q fever	Leptospirosis, haemorrhagic colitis/ haemolytic uraemic syndrome, Q fever, Cryptosporidiosis Salmonellosis	Ringworm	Bovine tuberculosis
Sheep and goats	Chlamydiosis	Q fever, Haemorrhagic colitis/haemolytic uraemic syndrome, Salmonellosis, Cryptosporidiosis, toxoplasmosis	Orf	
Pigs	Streptococcosis		Ringworm	
Poultry	Chlamydiosis (Ornithosis), Campylobacteriosis	Campylobacteriosis, Salmonellosis		Chlamydiosis (Ornithosis)
Cats		Toxoplasmosis	Ringworm	
Dogs		Toxocariasis, Leptospirosis	Ringworm	
Parrots etc	Chlamydiosis (Psittacosis)			
Animals – wild/exotic				
Rats		Leptospirosis		
Pigeons and other birds	Chlamydiosis	Salmonellosis		Chlamydiosis
Reptiles and amphibians eg terrapins		Salmonellosis		

Environmental micro-organisms

Tetanus (soil)
Legionellosis (natural and artificial water systems)
Fungi and moulds
Lyme disease (ticks found on animals and vegetation)

Key infections: Summary statements

Bovine tuberculosis	
Causative agent	*Mycobacterium bovis* (bacterium)
Natural hosts	Cows, also been found in deer and badgers
Disease in humans	Chronic, progressive disease with fever and weight loss
Transmission	Originally through drinking of unpasteurised milk, now via breathing in of infectious aerosols of respiratory discharges or possibly when handling meat from infected animals
Campylobacteriosis	
Causative agent	Most human illness is caused by *Campylobacter jejuni* (bacterium)
Natural hosts	Farm animals, chickens, wild birds and household pets
Disease in humans	Abdominal pain, fever and nausea
Transmission	Hand-to-mouth contact with faeces or contaminated objects, handling of raw poultry during processing (contaminated with faeces)
Chlamydiosis	
Causative agent	Chlamydia psittaci (bacterium)
Natural hosts	Birds – caged, wild exotic birds, also poultry and pigeons. Sheep and goats
Disease in humans	Two forms of the disease: Birds – causes ornithosis/psittacosis – flu-like illness which may lead to pneumonia and in severe cases, endocarditis, hepatitis and death Sheep – causes ovine chlamydiosis – may cause abortion; flu-like illness
Transmission	Birds – breathing in infected respiratory discharges from infected birds or breathing in dust contaminated with faeces and/or respiratory discharges Sheep – contact with products of gestation, eg placentae, amniotic fluid or contaminated objects, eg bedding
Cryptosporidiosis	
Causative agent	*Cryptosporidium parvum* (a protozoan parasite)
Natural hosts	Calves and lambs, goats and kids
Disease in humans	Diarrhoea and abdominal pain
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Fungi and moulds	
Causative agent	Various species – likely to be found contaminating damp areas or naturally occurring in soil, eg *Aspergillus*
Natural hosts	Found widely in the environment
Disease in humans	Can cause infection and allergy (Farmer's lung)
Transmission	Breathing in spores, for example in dust liberated when sweeping or handling mouldy hay, also when carrying out building work
Haemorrhagic colitis/haemolytic uraemic syndrome (HUS)	
Causative agent	*Escherchia coli* O157 (bacterium)
Natural hosts	Cattle, sheep, goats and deer
Disease in humans	Haemolytic uraemic syndrome (HUS) and haemorrhagic colitis are the most severe forms of the disease caused by this micro-organism. It can cause a range of symptoms from a mild diarrhoea to bloody diarrhoea (haemorrhagic colitis) and HUS. Haemorrhagic colitis is characterised by frank bloody diarrhoea, often accompanied by severe abdominal cramps but usually without fever. HUS is characterised by acute renal failure. Disease can be severe in young children
Transmission	Hand-to-mouth contact with faeces or contaminated objects

Hepatitis A	
Causative agent	Hepatitis A virus
Natural hosts	Humans
Disease in humans	Depends on age – more severe in adults, common symptoms include fever, headache, jaundice, loss of appetite, vomiting and abdominal pain
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Hepatitis B	
Causative agent	Hepatitis B virus
Natural hosts	Humans
Disease in humans	Infection may cause acute inflammation of the liver (hepatitis) which may be life-threatening. A person showing no symptoms may still carry the infection
Transmission	Contact with blood (and other body fluids which may be contaminated with blood) via a skin-penetrating injury or via broken skin. Through splashes of blood (and other body fluids which may be contaminated with blood) to eyes, nose and mouth
Hepatitis C	
Causative agent	Hepatitis C virus
Natural hosts	Humans
Disease in humans	Acute infection may be without symptoms or mild. If disease progresses, most common complaint is fatigue. At least 50% of those with acute infection develop chronic hepatitis
Transmission	Contact with blood (and other body fluids which may be contaminated with blood) via a skin-penetrating injury or via broken skin. Through splashes of blood (and other body fluids which may be contaminated with blood) to eyes, nose and mouth
HIV (AIDS)	
Causative agent	Human immunodeficiency virus
Natural hosts	Humans
Disease in humans	Acquired immune deficiency disease and related conditions affecting the immune system
Transmission	Contact with blood (and other body fluids which may be contaminated with blood)
	via a skin-penetrating injury or via broken skin. Through splashes of blood (and other body fluids which may be contaminated with blood) to eyes, nose and mouth
Legionellosis	
Causative agent	*Legionella pneumophila* (bacterium)
Natural host	Humans – but found naturally occurring in the aquatic environment
Disease in humans	Ranges in severity from a mild flu-like illness to the more severe pneumonic form, Legionnaires' disease
Transmission	Breathing in contaminated water droplets, eg from cooling towers, showers, spa baths
Leptospirosis	
Causative agent	*Leptospira icterohaemorrhagiae, L. hardjo* (bacterium)
Natural hosts	Rodents (*L. icterohaemorrhagiae*) Cattle (*L. hardjo*)
Disease in humans	Rodents – Weil's disease – fever, headache, vomiting, muscle pain, can lead to jaundice, meningitis and kidney failure – can be fatal Cattle – cattle-associated leptospirosis – flu-like illness of short duration, often with headache
Transmission	Rats – direct contact through breaks in the skin with infected urine or water contaminated with urine Cattle – splashing of urine during milking and other close contact

Lyme disease	
Causative agent	*Borrelia burgdorferi* (bacterium)
Natural hosts	Ticks
Disease in humans	Begins with skin rash, often associated with flu-like illness. Later cardiac, arthritic and/or neurological diseases may develop
Transmission	Via the bite of infected ticks which are often found on the tips of vegetation waiting for a host to pass
Orf	
Causative agent	Orf virus
Natural hosts	Sheep and goats
Disease in humans	Causes ulcerative lesions on face, hands and arms
Transmission	Direct skin contact with lesions on animals or by contact with virus on infected wool, hedges/fences etc where it can survive almost indefinitely
Q fever	
Causative agent	*Coxiella burnetii* (bacterium)
Natural hosts	Sheep and cattle
Disease in humans	Mild illness – chills, headaches and general malaise, but rarely can progress to pneumonia, liver and heart valve damage and death
Transmission	Usually by breathing in dust contaminated by placental tissue, amniotic fluids, urine and faeces. Also direct contact with the animal and these secreta/excreta. Micro-organism is resistant to drying and can survive for long periods in the environment
Ringworm	
Causative agent	Trichophyton - various species of the fungus
Natural hosts	Humans, cows (and some other farm animals, eg horses, pigs, sheep)
Disease in humans	Causes inflamed, swollen, crusty skin lesions mainly on hands, forearms, head and neck
Transmission	Direct skin contact with infected animal, spores enter through breaks in the skin
Salmonellosis	
Causative agent	Various species of the bacterium *Salmonella*
Natural hosts	Wild and domestic animals, birds (especially poultry), reptiles, amphibians (for example, terrapins), and occasionally humans
Disease in humans	Diarrhoea, vomiting, fever
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Shigellosis	
Causative agent	Various species of the bacterium *Shigella*
Natural hosts	Humans
Disease in humans	Bloody diarrhoea – disease severity depends on infecting species
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Streptococcosis	
Causative agent	*Streptococcus suis* (bacterium)
Natural hosts	Pigs
Disease in humans	May be a severe and serious disease with meningitis and septicemia
Transmission	Breathing in infectious respiratory discharges, also direct contact (via broken skin) with contaminated meat

Tetanus	
Causative agent	*Clostridium tetani* (bacterium)
Natural hosts	Humans and animals, but spores of the micro-organisms occur widely in the environment, eg soil
Disease in humans	Exaggerated reflexes, muscle rigidity and uncontrolled muscle spasms – lockjaw
Transmission	Organism enters via breaks in skin
Toxocariasis	
Causative agent	*Toxocara canis*, *Toxocara cati* (roundworm – a parasite)
Natural hosts	Dogs (canis) Cats (cati)
Disease in humans	Following ingestion of the eggs, these hatch and the larvae migrate to the liver, lungs, eyes and brain
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Toxoplasmosis	
Causative agent	*Toxoplasma gondii* (a parasite)
Natural hosts	Cats
Disease in humans	May be without symptoms, but can vary from persistent acute fever to rare infection in the brain, muscle and eye leading to death, abortion in pregnant women
Transmission	Hand-to-mouth contact with faeces or contaminated objects
Tuberculosis	
Causative agent	*Mycobacterium tuberculosis* (bacterium)
Natural hosts	Humans
Disease in humans	Disease develops slowly, usually takes several months for symptoms to appear, symptoms include fever and night sweats, coughing, losing weight and blood in phlegm or spit
Transmission	Breathing in infectious respiratory discharges
Viral gastroenteritis	
Causative agent	Mostly commonly small round structured viruses – Norwalk-like viruses
Natural hosts	Humans
Disease in humans	Vomiting, diarrhoea, fever
Transmission	Hand-to-mouth contact with faeces or contaminated objects, also from breathing in aerosols of projectile vomit – this can lead to environmental contamination, especially of toilets

APPENDIX 3: FURTHER READING AND INFORMATION

General

Five steps to risk assessment Leaflet INDG163(rev1) HSE Books 1998 (single copy free or priced packs of 10 ISBN 0 7176 1565 0)

COSHH a brief guide to the regulations: What you need to know about the Control of Substances Hazardous to Health Regulations 2002 (COSHH) Leaflet INDG136(rev2) HSE Books 2003 (single copy free or priced packs of 10 ISBN 0 7176 2677 6)

Control of substances hazardous to health. The Control of Substances Hazardous to Health Regulations 2002. Approved Code of Practice and guidance L5 (Fourth edition) HSE Books 2002 ISBN 0 7176 2534 6

RIDDOR explained: Reporting of Injuries, Diseases and Dangerous Occurrences Regulations Leaflet HSE31(rev1) HSE Books 1999 (single copy free or priced packs of 10 ISBN 0 7176 2441 2)

Infection risks to new and expectant mothers in the workplace: A guide for employers Guidance HSE Books 1997 ISBN 0 7176 1360 7

A short guide to the Personal Protective Equipment at Work Regulations 1992 Leaflet INDG174 HSE Books 1995 (single copy free or priced packs of 10 ISBN 0 7176 0889 1)

Safe disposal of clinical waste (Second edition) Guidance HSE Books 1999 ISBN 0 7176 2492 7

Occupational guidance

Working with sewage: The health hazards - A guide for employees Pocket card INDG197 HSE Books 1995 (single copy free or priced packs of 20 plus two leaflets INDG198 ISBN 0 7176 0987 1)

Working with sewage: The health hazards - A guide for employers Leaflet INDG198 HSE Books 1995 (single copy free or priced packs of two plus 20 pocket cards INDG197 ISBN 0 7176 0987 1)

Common zoonoses in agriculture Agriculture Information Sheet AIS2(rev2) HSE Books 2000

Avoiding ill health at open farms: Advice to farmers (with teachers' supplement) Agriculture Information Sheet AIS23(rev1) HSE Books 2000

Deer farming Agriculture Information Sheet AIS7(rev) HSE Books 1996

Working safely with metalworking fluids: Good practice manual HSG231 HSE Books 2002 ISBN 0 7176 2544 3

Guidance on specific micro-organisms

Blood-borne viruses in the workplace: Guidance for employers and employees Leaflet INDG342 HSE Books 2001 (single copy free or priced packs of 10 ISBN 0 7176 2062 X)

Legionnaires' disease: A guide for employers Leaflet IAC27(rev2) HSE Books 2001 (single copy free or priced packs of 15 ISBN 0 7176 1773 4)

Controlling legionella in nursing and residential care homes Leaflet INDG253 HSE Books 1997 (single copy free)

The occupational zoonoses Guidance HSE Books 1992 ISBN 0 11 886397 5

Leptospirosis: Are you at risk? Pocket card INDG84 HSE Books 1990 (single copy free or priced packs of 20 ISBN 0 7176 2546 X)

Anthrax: Safe working and the prevention of infection HSG174 HSE Books 1997 ISBN 0 7176 1415 8

BSE (Bovine Spongiform Encephalopathy): Background and general occupational guidance Guidance HSE Books 1996 ISBN 0 7176 1212 0

Essential information for providers of residential accommodation Leaflet INDG376 HSE Books 2003 (single copy free or priced packs of 10 ISBN 0 7176 2207 X)

HSE priced and free publications are available by mail order from: HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops and free leaflets can be downloaded from HSE's website: www.hse.gov.uk)

For information about health and safety ring HSE's Infoline Tel: 08701 545500 Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

For general information about non-health and safety microbiological issues, contact:

The Food Standards Agency or your local Environmental Health Department for information about food safety legislation

Website: www.food.gov.uk

Telephone:
England: 0207 276 8000
Scotland: 01224 2851000
Wales: 0292 067 8999
NI: 02890 417711

The Department for the Environment, Food and Rural Affairs or the Environment Agency for information about environmental protection issues

Website: www.defra.gov.uk

Telephone:
England: 08459 335577
Scotland: 0131 556 8400 or 01786 457700 (Scottish Environment Protection Agency)
Wales: 029 20 825111

The Department of Health or your local Trust for information about public health issues

Website: www.doh.gov.uk

Telephone:
England: 0207 210 4850
Scotland: 0131 244 2440
Wales: 029 20 825111