

Controlling the risks of infection at work from human remains

A guide for those involved in funeral services (including embalmers)
and those involved in exhumation

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What is this guide about?

1 This guide deals with the risk of infection when dealing with human remains. It provides advice for:

- funeral directors and their staff, including part-time/casual workers and the self-employed, for example 'trade embalmers'; and
- those involved in exhumations, for example cemetery employees, specialised companies, the Police, Environmental Health Officers (EHOs), archaeological researchers and redevelopment/construction companies,

about the sorts of risks they face and how to control them. Although the term 'your employees' is used throughout, the duties etc described apply equally to you as an individual if you are self-employed.

2 The guide covers your duties under health and safety law as they relate to controlling the risks of infection, in particular the **Control of Substances Hazardous to Health Regulations**. You may already know that these regulations deal with chemicals risks at work but they also cover infection risks (from micro-organisms) too.

3 Information about other relevant guidance on infections risks and other health and safety risks, for example chemical, manual handling, construction, that are an issue in the funeral/exhumation process can be found in Appendix 4: Further reading and information.

Did you know?

In England, though the major infectious diseases are responsible for the death of only a small number of people compared to the past, infection still accounts for 70 000 deaths each year. You should also be aware that although infection may not have been the cause of death (as officially recorded), individuals may have either had an infectious illness at the time of death or else have been infected without showing any obvious signs or symptoms.

The Home Office issues over 1000 licences for the exhumation of individual human remains each year. Most exhumations are planned, but some will result from an accidental disturbance in road or building construction. The main reasons for planned exhumations are:

- redevelopment of old cemeteries or crypts, often with associated archaeological investigations;
- medical/criminal investigations;
- individual requests for exhumation from family or relatives for reburial or cremation; or
- archaeological reasons.

What do I have to do?

4 You can deal with the risks from infection in the same way as any other health and safety issue such as manual handling or chemical risks. You need to:

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

5 In addition to the intentional contact with human remains that may occur, there may be circumstances where there is unintentional contact, for example accidental disturbance during an archaeological dig, or else where a body may be found by an EHO called to investigate an odour problem in a domestic setting. The likelihood of such contact should be assessed, and appropriate controls used.

6 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 relatives who come to view the deceased, police officers attending an exhumation. You have a duty under health and safety law to protect these people too (see Information box 7).

Information box 1: Working with contractors

If you use a contractor, such as a trade embalmer or specialist exhumation company, to carry out work for you, you need to remember that you both have duties under health and safety law. You may decide to address these responsibilities in a written contract of work, but both sides should be clear as to where responsibilities lie. You need to:

- check on their competence;
- agree the risk assessment;
- agree the controls that will be used, including how and where waste will be disposed, and how exposure to chemicals will be monitored;
- provide information to the contractor about risks in your premises; and
- make sure the work is appropriately managed and supervised.

Further guidance on the use of contractors can be found in HSE guidance (see Appendix 4: Further reading and information).

7 If someone working under your control and direction is treated as self-employed for tax and national insurance purposes, they may still be treated as your employee for health and safety purposes. You may need therefore to take appropriate action to protect them.

8 If you do not wish to employ workers on this basis, you should seek legal advice. Ultimately each case can only be decided on its own merits by a court of law (see Information box 1).

9 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, together with the controls that are in place or are to be used. 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.

10 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 that 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.

11 If any of your employees catch an infection as a result of their work, these must be reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. If you are self-employed, you still need to make a report.

Information box 2: Other relevant legislation

There are other regulations (not health and safety), which also deal with infection risks that you should consider.

Public health law: Doctors in England and Wales have a statutory duty to notify a 'proper officer' of the local authority of suspected cases of certain infectious diseases. There is also a requirement that those in charge of premises where there is a body of a person who died while suffering from a notifiable disease take reasonable steps to prevent others unnecessarily coming into contact with, or proximity of that body. Similar duties exist in Scotland, although the diseases that have to be notified are slightly different to those in England and Wales.

Environmental protection law: Any waste which consists wholly or partly of human or animal tissue, blood or other body fluids, excretions, drugs or other pharmaceutical products, swabs or dressings, or syringes, needles or other sharp instruments, and any other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice, investigation, treatment, care, teaching or research, or the collection of blood for transfusion, which may cause infection to any person coming into contact with it is defined as 'clinical waste' (see paragraph 38). If you intend to discharge waste into the sewer, this is classified as trade effluent (liquid waste that is discharged from any premises being used for carrying on a trade or industry), and you need permission from your statutory sewerage undertaker before discharging into a foul sewer. (See the Environment Agency (EA) and Scottish Environment Protection Agency (SEPA) websites for further details.)

Burial law: You must have a licence from the Home Office (Crown Office in Scotland via the local Sheriff) before carrying out an exhumation, or else a Bishop's faculty if the exhumation is from consecrated ground, although you may need both. An EHO should be invited to attend the exhumation to ensure that, amongst other things, the health and safety of all workers is maintained, for example protective clothing, including masks and gloves, task lights and all other necessary equipment, and any disinfection required is carried out safely (see Table 2). Both the Home Office licence and the faculty allow for EHOs to impose additional local requirements on the process.

Large-scale exhumations as have happened in the past have also been carried out under private acts of Parliament. Coroners may also issue warrants for exhumations either for the purposes of their investigation, or else for the purposes of a criminal investigation by police (Coroners Act 1988).

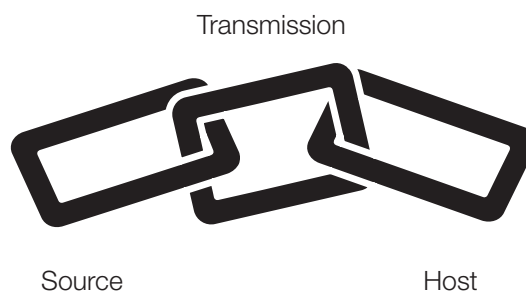
12 You have a duty under health and safety law to consult with employees about health and safety matters; this includes safety and union representatives. As well as giving employees information, you need to listen, and take account of what employees say before making any health and safety decisions. Employees may be able to tell you about hazards that they have come across when carrying out their work.

13 Further information about general health and safety management, for example risk assessment is given in Appendix 4: Further reading and information.

Identifying the hazard

14 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.

15 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 the chain and so control the risk.



Sources

16 There are four main sources of infection that you need to consider when dealing with human remains:

- blood and other body fluids (for example saliva, pleural fluids);
- waste products, such as faeces and urine;
- aerosols of infectious material, such as might be released when opening the body; and
- skin, direct contact.

Transmission

17 In order 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.

18 Infection can occur via:

- putting contaminated hands and fingers (or pens etc) into the mouth, nose or eyes;
- breathing in small infectious droplets (aerosols) from the air;

- 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, for example via a contaminated needle or other sharp.

Host

19 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.

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

21 Some people may be naturally immune to disease, for example because they had the disease as a child or else have been immunised – again you need to check on this before work starts.

22 If you do advise that employees are immunised as part of your control regime, you need to remember that health and safety law says that your employees should not be asked to pay for this. You should also remember that immunisation should only be used as a useful supplement to the basic control measures and not as a replacement.

23 If you need further help and advice on fitness for work, immunity or immunisation issues, you should contact your local HSE office or occupational health service provider.

Assessing the risks

24 You need to find out how your employees might come into contact with infectious micro-organisms at work, this includes direct contact with human remains as well as contact with objects, for example clothing, coffins, soil, vehicles etc that may have been contaminated with infectious micro-organisms, originating from human remains.

25 If you are dealing with human remains, there are a number of activities carried out that could bring your employees into contact with a source of infection. Table 1 shows these key tasks together with potential sources of infection, and issues to consider when carrying out your assessment.

26 As well as identifying the hazard, ie 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; and
- how many employees are exposed.

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

Information box 3: Embalming: The risks

Embalming is defined as the preservation of a body from decay, originally with spices, and now through the use of injection of a chemical embalming fluid. It involves replacing blood with a preservative solution (the embalming fluid) and treatment of the body cavity and organs with a similar preservative. You or a member of your staff may carry out the process, or else a trade embalmer may use your premises to carry out the work.

As the process involves direct contact with the body, exposure to blood and other body fluids, and the use of sharps (and hazardous chemicals), this process, of all those carried out involving human remains, is likely to present the greatest risk of exposure to infectious micro-organisms.

There may be additional risks when embalming individuals that have been involved in an accident or else have undergone post-mortem examination, for example damaged bones/bone splinters. The assessment needs to reflect such risks, for example:

- increased likelihood of sharps injuries;
- increased exposure to blood and other body fluids;
- time taken to carry out procedures.

Those that have died of certain infectious diseases should not be embalmed – these are indicated in Part 1 of Appendix 1.

28 Further information on the types of micro-organisms and the sources of infection that might be found when dealing with human remains is given in Part 1 of Appendix 1. This is not an exhaustive list, but it does include those most likely to be encountered. Additional information is given in Part 2 on particular infectious micro-organisms of significance in exhumation. Other micro-organisms may create a risk, so further information may be required.

Table 1: Activity and sources of infection

Activity	Source	Notes for guidance
Initial collection of remains	Body fluids, waste, direct skin contact	<p>If you are collecting a body from a mortuary, you should be informed about any potential infection risks. Mortuary staff should give you sufficient information so that you can carry out your own assessment – although you may not be told the identity of the infection, you should be informed about the means of transmission – see Appendix 2 for the type of information you should receive – shown as an example form. Remember, you also need to pass this information on to non-employees who handle the body directly, eg an embalmer, relatives.</p> <p>If collection is from the community, you should try and find out as much as possible about the state of the remains, eg from the coroner, the police or medical examiner, so that additional controls measures, eg special protective equipment, are available (see Table 2).</p>
Transport of remains from initial collection point	Body fluids, waste, direct skin contact	<p>When transporting a body, eg from a mortuary to the funeral home or from the collection point to a mortuary, if there is a known infection risk, a body bag should be used. Some hospitals may use body bags for all deceased patients or else when there is a possibility of leakage of body fluids – if in doubt, ask the mortuary staff why the bag has been used. If a body collected from the community has undergone significant deterioration, a body bag should be used. Consider also additional waterproof containers.</p>
Storage of remains prior to burial or cremation	Body fluids, waste, direct skin contact	<p>Handling of the remains should be minimised to control the risk of exposure. Keeping the remains cool controls further deterioration by controlling further growth of any bacteria present (see Information box 4). You should try to minimise the number of times the remains are removed from cold storage, eg have controlled viewing times.</p>
'Hygienic' treatment, such as first offices, washing, dressing, trimming hair, nails etc and embalming	Body fluids, waste, direct skin contact	<p>Apart from direct physical contact with the remains, your assessment should take into account the likelihood of exposure to blood when carrying out activities that could involve cutting or piercing of the skin. This could be intentional, eg during suturing or embalming or unintentional, eg when cutting hair or nails (see also Information box 3).</p> <p>Some procedures carried out as part of first offices may also involve emptying the contents of the bowel and bladder and entail the plugging of orifices. Such procedures could result in exposure to body fluids such as urine and faeces, which should be addressed in your assessment. You will also need to take into account the condition of the remains in your assessment as certain cases, eg those who have undergone a <i>post mortem</i> examination or have undergone significant deterioration before any hygienic treatment may require additional precautions to control the risk of exposure to sources of infection.</p>

continued overleaf

Table 1: Activity and sources of infection *continued*

Activity	Source	Notes for guidance
Domestic duties, eg cleaning of vehicles, removal shells, storage facilities, laundering, disposal of waste	Blood and body fluids, waste	Although there may be no direct contact with the remains, the risk of infection here comes from contact with contaminated items, eg soiled linen, clothing, sharps.
Exhumation	Blood and body fluids, soil	In addition to the infectious micro-organisms that may be present in the recently deceased, soil in a burial site could also present a source of infection, either because of environmental micro-organisms or because of contamination. It is possible that the organisms that cause anthrax or smallpox may survive for significant periods of time in the deceased. You may find it helpful to examine such items as parish records or similar records that may give information on the cause of death for a particular exhumation site (see Appendix 1 for further detail).

Controlling the risks

29 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 that you work so that 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.

30 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.

31 Controlling the risk of infection is fairly straightforward and there are a number of basic measures that you should use for most activities that you carry out. These are shown in Table 2, and they cover basic good occupational hygiene measures, in the areas where work activities are carried out and the equipment/tools that are used.

32 Supplementary measures, ie those used in addition to the basic controls shown, and/or specific measures for embalming and exhumation are shown in separate columns in Table 2.

33 For control measures to work you need to provide information, instruction and training so that your employees know 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.

34 This information could be given in the form of verbal instructions, or else it may form part of their written job instructions/the local code of practice or standard operating procedure. You should also encourage employees to obtain relevant vocational and educational qualifications, for example, the Diploma in Funeral Directing or other relevant qualifications offered by the British Institute of Embalmers, ICCM Diploma, SCOTVEC or BTEC.

Information box 4: Storage of remains before burial/cremation

Keeping the remains cold limits the rate of decomposition by slowing the growth of bacteria which contribute to the decomposition process. Certain drugs (administered before death) may also influence the rate of decomposition.

Ideally, a refrigerated body store should be used for this purpose, but this may not be practicable in smaller premises where only a limited number of bodies are handled. However, there are a number of other means by which cooling could be achieved, for example, by:

- using cold tables;
- installing air chillers;
- using facilities at larger premises (if site is a satellite premises);
- making arrangements with local hospitals to delay collection.

If bodies are to be held for less than 48 hours, storage at 6°C or less is appropriate. If you need longer term storage, this should be carried out at temperatures of 5°C or less.

Information box 5: Ventilation

The Workplace (Health, Safety and Welfare) Regulations require you, as the employer, to make sure that your workplace is ventilated by a sufficient quantity of fresh or purified air.

In many cases, windows or other openings will provide sufficient ventilation in some or all parts of the workplace. Where necessary, mechanical ventilation systems should be provided where appropriate.

Whatever the means of providing fresh air, (natural or mechanical), you need to ensure that measures are taken to control the entry of pests such as flies and rodents.

In areas where embalming is carried out, additional local exhaust ventilation may be required to control levels of formaldehyde; this should be decided on the basis of a local risk assessment. The need for personal and workplace monitoring should also be addressed in the assessment.

Further guidance on general workplace ventilation can be found in *General ventilation in the workplace* (see Appendix 4: Further reading and information).

35 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. As well as providing on-site first aid facilities, you may need to make arrangements with your local hospital's emergency department to provide post-exposure prophylactic treatment, for example antiviral drugs or antibiotic treatment, if this is indicated by your assessment.

Information box 6: Clean vs dirty

To manage the risk of infection, you need to be able to distinguish between the clean and dirty areas in your premises. By 'clean' we mean offices, viewing rooms, staff rest rooms and reception areas. Dirty areas include those where embalming and other treatments are carried out. Keeping the areas separate, either physically or separated in time, eg work carried out at the beginning or end of a working day, allows you to control the number of employees exposed to the risk of infection, and target controls where they are needed. Guidance on this and managing the movement of employees between clean and dirty areas is given in Table 2.

A similar approach should be taken when carrying out an exhumation. The site should have a clear boundary, so that employees can wash and leave contaminated clothing, waste etc on site, before leaving or moving to clean areas, eg site offices.

Table 2: Control measures

<i>All work</i>	<i>Embalming</i>	<i>Exhumation</i>
Good occupational hygiene measures		
<p>Hands (and arms, if necessary) should be washed before eating, drinking, smoking, using the telephone, applying make-up, inserting contact lenses etc. There should be suitable facilities provided for staff to wash, with hot running water and soap. Hands should still be washed even if gloves have been worn, alternatively alcohol hand-rubs can be used on physically clean hands.</p> <p>If your employees don't have direct access to warm running water to wash their hands, for example when collecting remains from the community, you may be able provide a suitably designed vehicle with facilities on board. Alternatively, you may provide alternatives such as wipes or antiseptic hand cleansers.</p>	<p>There should be a wash-hand basin available (with soap and paper towels) for employees to use before they leave the work area. If there is significant contamination with blood and other body fluids, employees may also need to shower.</p>	<p>Washing and decontamination facilities should be provided on site.</p>
<p>All existing cuts and grazes should be covered with waterproof dressings and/or gloves before starting any work that involves contact with the remains. If cuts and/or</p>	<p>There should be suitable facilities for staff to change into protective clothing before they start work.</p>	

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<i>All work</i>	<i>Embalming</i>	<i>Exhumation</i>
<i>Good occupational hygiene measures continued</i>		
grazes occur during work, these should be washed immediately.		
Hand to mouth/nose or hand to eye contact should be avoided. Care should be taken with pens etc, these should not be put in the mouth, or taken from dirty to clean areas.		
Rest breaks and meal breaks should be taken away from the main work area (see also guidance on work areas). Employees should remove any personal protective equipment and contaminated clothing when leaving a dirty work area and not enter clean areas wearing protective equipment.		
<i>Work areas</i>		
There should be a clear demarcation between 'clean' and 'dirty' areas. Employees should not eat, drink, smoke etc in areas where there may be contact with human remains. The need to separate clean and dirty activities does not necessarily mean having separate rooms although this would be the preferred solution. Work could be carried out at different times of the day. Certain areas should always be designated as clean, eg offices, staff rest rooms and kitchens, and should not be used for 'dirty' activities.	Embalming should be carried out in a separate room from other activities in the premises. If the room is also used for general hygienic preparations, then embalming should not take place at the same time as other activities being carried out on another cadaver.	When exhuming from a soil burial, most of the soil will be used to refill the excavation; the soil that was removed from immediately above and around the coffin should be replaced first. Where there are mass exhumations, there may be large quantities of coffin waste, which should be securely bagged and sent to landfill. Almost all mass exhumations will be from old burial grounds, so the infection risk is low and landfill disposal is usually appropriate. However, you should check with the EA/SEPA as to the exact classification and disposal of waste associated with such activities.
Access to 'dirty' areas should be restricted when work is being carried out, eg office staff, observers should not enter unless wearing appropriate protective equipment. If space is limited and a work area also needs to be used as a clean area, for example for viewing purposes, then the area needs to be cleaned before change of use.	When embalming is in progress, access to the area should be limited to those carrying out the work – everything that is needed should be ready for use before work starts.	If soil from exhumation becomes contaminated with body fluids or the results of body decomposition, disinfectants will have little effect because the soil would soak up the disinfectant making it ineffective. The risks from using disinfectants (see Appendix 3) outweigh any minor benefits. Refilling the excavation site with the soil and other waste, without disinfection, is the safer approach.

Continued overleaf

All work	Embalming	Exhumation
Work areas continued		
Work areas should be designed to be safe to use and easy to clean and decontaminate, and should be cleaned at the end of every working day.	Work surfaces (eg preparation areas, embalming tables) and flooring need to be easy to clean and decontaminate. They need to be resistant to the chemicals used for embalming and disinfection. The work area should first be cleaned and then disinfected at the end of the working day.	
Work equipment		
All equipment should be easy to clean and decontaminate, eg vehicles, removal shells, trolleys, excavation equipment etc and should be cleaned and disinfected at the end of every working day.	Instruments should be clean, sharp and ready to use, but the use of sharps should be minimised, for example using blunt-ended scissors.	
	Single use scalpels and other sharps should be disposed of immediately after use into a 'sharps bin' – needles should not be re-sheathed.	
	All instruments should be cleaned after use in warm water and detergent (not in the wash hand basin). They can be disinfected by boiling for 10 minutes or soaking in an appropriate disinfectant (See Appendix 3) or else autoclaved.	
Personal protective equipment		
Appropriate protective clothing should be worn – the clothing selected will depend on the nature of the risk. Gloves and plastic aprons will control personal contamination for most routine activities. If there is a risk of splashing of blood or body fluids onto mucous membranes such as the eyes or the mouth, then a face visor or goggles and a suitable face-mask should be worn.	Everyday clothing should be removed before entering the embalming area, and replaced with a one piece overall/boiler suit or scrubs (can be disposable), together with: <ul style="list-style-type: none"> ■ a full length plastic apron; ■ waterproof boots; ■ protective single-use gloves – these should be latex free. 	Basic protective clothing should include: <ul style="list-style-type: none"> ■ heavy duty overalls; ■ waterproof trousers and jackets; ■ working boots with toe and sole protection; ■ waterproof heavy duty gloves; ■ a standard construction site helmet (hard hat); ■ a face visor, if there is a likelihood of splashing.
Additional protection will be necessary when collecting remains that have undergone significant deterioration, for example a one-piece overall/boiler		

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<i>All work</i>	<i>Embalming</i>	<i>Exhumation</i>
<i>Personal protective equipment continued</i>		
suit with waterproof boots. Additional protection should also be used during subsequent handling, for example carrying out first offices, dressing etc.		Respiratory protective equipment should be used when carrying out exhumations in crypts. This will protect against the inhalation of infectious micro-organisms, but the main purpose of wearing this equipment is to protect workers from wood and lead dust.
		Respiratory protective equipment may also be required, even when working in the open, if there is evidence that a newly deceased person has died from a respiratory pathogen such as tuberculosis. Surgical masks do not provide suitable respiratory protection, staff need to wear a filter mask or a ventilated helmet fitted with a fine particulate filter to P3 standard to control any aerosol risk. RPE with tight-fitting facepieces, eg a full-face mask, a half facemask, or a filtering facepiece (commonly referred to as a disposable mask) needs to be fit-tested to ensure adequate protection for individual wearers. You should ensure that employees are trained how to wear and use the RPE correctly.
		You need to remember that masks should be worn for only relatively short periods of time. Ventilated helmets should be properly maintained and stored safely when not in use.
All single-use clothing should be disposed of as clinical waste. Reusable clothing should be washed (at the highest temperature possible and separately from other uncontaminated clothing). Equipment such as boots and face visors should be washed and decontaminated, dried and stored in a clean area.		

Information box 7: Controlling the risk of exposure in non-employees***Religious/ritual preparations***

There are considerable variations between people of different faiths, ethnic backgrounds and national origins in their approach to, and practices for death and dying, as regards preparation for burial.

At the time of death, these practices may require involvement in last offices/first offices. If there is a requirement for involvement, you need to inform those carrying out washing, dressing etc of any risks and advise them of the control measures that should be used.

Viewing

When relatives and others wish to view remains, you will need to advise them if there is a risk of infection if they touch or kiss the deceased, as well as advising them of any controls they need to take after contact, for example washing of hands.

Certain infectious disease will present a significant risk, so relatives should be informed about the risks involved, and provided with protective equipment if appropriate. Alternatively, viewing could take place either at a distance or by use of a viewing panel in the coffin. Or, a viewing room with a glass screen could be used (see Appendix 1 for details).

Cleaning, disinfection and disposal of waste

36 Cleaning (and disinfection) is one of the basic control measures that should be in place but you should remember that you need to control the risk of exposure to infectious micro-organisms and other hazardous substances when carrying out these processes, for example:

- using wet brushing for cleaning large areas to avoid creating infectious aerosols;
- making sure the disinfectant doesn't cause any health problems for your employees;
- making sure that any chemicals used for cleaning are compatible with each other and/or with other chemicals that might be in use, for example when formaldehyde comes into contact with a source of free chlorine, for example in hypochlorite disinfectants, it is possible that bis-chloromethyl ether, a potent lung carcinogen, may be formed.

37 Additional guidance on disinfection and disinfectants is given in Appendix 3.

38 Any waste (including that generated off-site), for example disposable protective clothing, soiled linen, dressing etc that is contaminated with potentially infective fluids, for example blood, has to be disposed of as clinical waste (see also Information box 8). You need to have arrangements in place to:

- segregate clinical waste from other waste and make sure that the correct packaging is used, for example sharps bins;
- store the waste safely until it is collected for disposal; and
- make sure the waste is collected and disposed of by a licensed contractor and that you pass on relevant information to them about the risks.

39 Blood and waste embalming fluids can be disposed of to drain provided this discharges directly to the foul sewerage system (see Information box 2).

40 You will need to make arrangements for the safe handling and transport of soiled linens or clothes that are to be returned (to hospitals/relatives etc).

41 As well as carrying out routine cleaning, you also need to have arrangements in place to deal with spillage, for example of blood and other body fluids. Spillages should be dealt with immediately, using an appropriate disinfectant and the area then cleaned.

Information box 8: Medical devices

Certain implantable medical devices need to be removed before cremation because of the potential for explosion when such devices are heated. The removal process may be carried out within a hospital mortuary, or at the funeral director's premises. You should first check to see if they have already been removed by looking at the doctor's declaration on Cremation Form B. You may also get information from the deceased's GP, hospital or relatives.

Guidance on safe removal of implantable defibrillators has been issued by the Medicines and Healthcare Products Regulatory Authority (MHRA) (see Appendix 4). These and other devices, for example pacemakers, should be returned to the local hospital for decontamination and return to the manufacturer for final disposal. This requires written consent from the relatives of the deceased.

Information box 9: Repatriation/expatriation of human remains

The movement of human remains, either those being transported abroad, or those being received from abroad, is governed by a number of authorities as regards control of infection:

- the receiving country (normally regarded as being the body of law that controls how the remains should be handled as regards control of infection);
- the country of origin; and
- the carrier (whose requirements will be governed by the International Air Transport Association (IATA)).

For any movement, the remains must be accompanied by a 'free from infection' certification. This should involve embalming to a recognised standard, but your risk assessment should take into account the varying standards of such treatments that might be encountered, and the consequent effect on the condition of the remains.

Your assessment will also need to address the transfer of the remains, as would be necessary for cremation, since the transport coffin has to be zinc (or lead) lined in accordance with IATA requirements.

Appendix 1

Part 1: Key infections

<i>Infection</i>	<i>Causative agent</i>	<i>Is a body bag needed?</i>	<i>Can the body be viewed? (see also Information box 4)</i>	<i>Can hygienic preparation be carried out?</i>	<i>Can embalming be carried out?</i>
Intestinal infections: Transmitted by hand-to-mouth contact with faecal material or faecally contaminated objects					
Dysentery (bacillary)	Bacterium - <i>Shigella dysenteriae</i>	Advised	Yes	Yes	Yes
Hepatitis A	Hepatitis A virus	No	Yes	Yes	Yes
Typhoid/ paratyphoid fever	Bacterium – <i>Salmonella typhi/paratyphi</i>	Advised	Yes	Yes	Yes
Blood-borne infections: Transmitted by 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	Human immunodeficiency virus	Yes	Yes	Yes	No
Hepatitis B and C	Hepatitis B and C viruses	Yes	Yes	Yes	No
Respiratory infections: Transmitted by breathing in infectious respiratory discharges					
Tuberculosis	Bacterium - <i>Mycobacterium tuberculosis</i>	Advised	Yes	Yes	Yes
Meningococcal meningitis (with or without septicemia)	Bacterium – <i>Neisseria meningitidis</i>	No	Yes	Yes	Yes
Non-meningococcal meningitis	Various bacteria including <i>Haemophilus influenzae</i> and also viruses	No	Yes	Yes	Yes

Part 1: Key infections *continued*

Infection	Causative agent	Is a body bag needed?	Can the body be viewed? (see also Information box 4)	Can hygienic preparation be carried out?	Can embalming be carried out?
Diphtheria	Bacterium – <i>Corynebacterium diphtheriae</i>	Advised	Yes	Yes	Yes
Contact: Transmitted by direct skin contact or contact with contaminated objects					
Invasive Streptococcal infection	Bacterium – <i>Streptococcus pyogenes</i> (Group A)	Yes	Yes	No	No
MRSA	Bacterium – methicillin resistant <i>Staphylococcus aureus</i>	No	Yes	Yes	Yes
Other infections					
Viral haemorrhagic fevers (transmitted by contact with blood)	Various viruses, eg Lassa fever virus, Ebola virus	Yes	No	No	No
Transmissible spongiform encephalopathies (transmitted by puncture wounds, 'sharps' injuries or contamination of broken skin, by splashing of the mucous membranes)	Various prions, eg Creutzfeldt Jacob disease/ variant CJD	Yes	Yes	Yes	No

Part 2: Additional infection information for exhumation

The infectious micro-organisms listed above may present a risk to those carrying out exhumation of the recently deceased, however, the majority of these micro-organisms will no longer be viable after a period of about six months. However, if the deceased has died from a transmissible spongiform encephalopathy such as Creutzfeldt-Jakob Disease (CJD) this may be present in the body for a substantial period of time.

None of the organisms that caused mass death in the past, for example plague, cholera, typhoid and tuberculosis are likely to survive in buried human remains when exhumed from an old internment. There is however a possibility that those

organisms that caused death from anthrax or from smallpox may have survived and these need to be considered in any assessment. Further information on these agents, and others that may be present in the environment, is given in the table below.

Agent/disease	Means of transmission	Survivability	Notes for guidance
<i>Bacillus anthracis</i> / anthrax	Breathing in aerosols, direct contact with broken skin, and by hand to mouth contact	Probably indefinitely in the spore form	Anthrax spores may be found in the exhumed body, and also in items such as pillows and linings stuffed with horsehair. Anything stuffed with animal hair should be bagged and disposed of as clinical waste
Variola major virus/ smallpox	Inhalation and contact	Can survive for long periods of time in dry scabs (13 years has been documented). However, in normal environmental conditions, the virus is very unlikely to survive for more than 48 hours	The virus that caused smallpox has been eliminated from the world population and the last cases that occurred in this country were mainly in the 1930s, however there were sporadic cases after that date but none after the 1970s. Intact virus was found in a body exhumed at Spitalfields in 1985, this body was more than 100 years old. But the virus could not be grown, so was not considered to be infective
<i>Clostridium tetani</i> / tetanus	Skin-penetrating injury	Commonly found in soil	Employees should be immunised against tetanus. You should ensure that this remains current
<i>Leptospira icterohaemorrhagiae</i> / Weil's disease	Contact with broken skin	Found in association with rats	Agent is excreted in infected rat urine, so soil/water present on site may be contaminated

Part 3: Special precautions when a smallpox-infected body is suspected

When a body is exhumed, particularly in a lead-lined coffin, there may be good preservation of the skin surface. Before work starts, you should check whether there is any evidence that smallpox was the cause of death. If so, those carrying out the exhumation should try to make sure that the coffins remain intact. Such coffins should not be opened, even for archaeological reasons. If archaeologists wish to open coffins, particularly from crypt burials, an additional risk assessment must be carried out, bearing in mind the serious consequences of a release of smallpox. If the integrity of a lead lined coffin fails when exhumed, or the coffin is deliberately opened by archaeologists, the body must be examined *in situ* to see whether intact skin is present, and if there is evidence of smallpox scabs or scars. If so, you should then:

- clear the area of all personnel. All PPE and other clothing should be disinfected and disposable PPE bagged and sent for incineration;

- contact a suitably qualified expert (such as a pathologist with virological expertise) to inspect the body (while wearing appropriate PPE) to see if the body shows evidence of smallpox. If there is no evidence of smallpox, then the exhumation may resume.

If there is evidence of smallpox scabs/lesions, the expert should remove some of the skin, which should then be transported to HPA (Centre for Emergency Preparedness and Response at Porton Down or Centre for Infections at Colindale, London) using a safe means of transport (see the smallpox pages on the HPA website for further details).

Following the removal of this tissue, you should:

- make the area secure and post 24-hour security to ensure that there is no entry into the area until a final report is received. You should inform local police who may wish to put in place additional security arrangements;
- inform the local Environmental Health Officer (EHO) who may in turn contact Specialist Inspectors from the Biological Agents Unit of the Health and Safety Executive (HSE).

If you are informed that viable smallpox virus has been isolated from the skin sample, you should tell the local EHO and the local HSE office.

Appendix 2

Infection control notification sheet

Name of deceased		
Date and time of death		
Source hospital and ward		
The deceased's remains are a potential source of infection:		
Yes	Unknown	(Ring as appropriate – see note 1 below)
If yes (see note 2), the remains present a risk of transmission by (ring as appropriate)		
Inoculation	Aerosol	Ingestion
Instructions for handling remains (tick as appropriate)		
Body bagging is necessary		
Viewing is not recommended		
Embalming presents high risk, eg HIV		
Signed (note 3)		
Print name		
On behalf of	(hospital/mortuary/general practitioner)	
<p>Notes</p> <p>Note 1: Not all infected patients display typical symptoms, therefore some infections (including blood-borne viral infections) may not have been identified at the time of death.</p> <p>Note 2: In accordance with health and safety law.</p> <p>Note 3: In hospital cases, the doctor certifying death, in consultation with ward nursing staff, is asked to sign this notification sheet; where a post-mortem examination has been undertaken, the pathologist (or qualified Anatomical Pathology Technologist) is asked to sign this sheet; in non-hospital situations, the doctor certifying death is asked to sign this sheet.</p>		

Appendix 3

Disinfectants and disinfection

Definitions

Disinfection: The destruction of micro-organisms, but not usually bacterial spores. The process does not necessarily kill all micro-organisms, but reduces them to a level acceptable for a defined purpose, for example a level which is considered not harmful to health.

Sterilisation: a process which renders an item sterile, ie free from all living micro-organisms.

In the funeral services and exhumation, disinfection is the more appropriate treatment where sterile conditions are not required, or because sterilisation may cause damage to equipment or surfaces. More than one type of disinfectant may be needed depending on the type of micro-organism that might be present.

The main use of disinfectants is to ensure that work areas and equipment are decontaminated and safe to work in/handle. This is particularly important for personal protective equipment. Any disinfectant chosen must be effective against a wide range of potentially pathogenic micro-organisms and care must therefore be taken in their selection and use.

Considerations

When carrying out disinfection, regardless of the type of disinfectant used, you need to consider:

- the need for different types of liquid disinfectant, you need to ensure the efficacy of the products available and the hazards that each may pose when used. The manufacturer's instructions for use and the safety data provided need to be taken into account as part of the evaluation process;
- the choice and microbial spectrum, many different chemical disinfectants are available and each is effective against a different range of micro-organisms. You should consider what micro-organisms may be present and their susceptibility to the chosen disinfectant;
- the presence of inactivating agents or other factors, the activity of a disinfectant is usually affected by the presence of organic/inorganic material such as soil or wood, incompatible soaps or detergents, or the presence of other chemicals. In addition, the correct dilution needs to be used for the disinfectant to be effective;
- contact and duration of exposure, adequate physical contact is needed for a disinfectant to be effective. Items to be disinfected should be properly wetted or immersed, as appropriate. Organic material is best removed before disinfection. Adequate contact time is also required for the disinfectant to perform its function. This will vary according to the disinfectant type, any interfering factors and the biological load;

- the concentration of the disinfectant, disinfectants should be freshly prepared, as some diluted disinfectants will lose their activity;
- selecting and using disinfectants, the use of the disinfectant can be assessed by looking at the active components of the product. It is essential to select the right disinfectant, ensure that it is correctly used and avoid any other factors that can adversely affect its efficacy. Disinfectants should be used in accordance with the manufacturer's instructions. Full details of a product's effectiveness, use, storage compatibility and safe handling should be obtained from the supplier.

Main types of disinfectant

The disinfectants that are most likely to be used are the clear soluble phenolics, the chlorine-based hypochlorites, quaternary ammonium compounds (QUATs) and the halogenated tertiary amines.

Phenolics

- broad spectrum (disinfectant of choice against the bacteria that cause tuberculosis);
- activity against a limited range of viruses;
- no activity against bacterial spores;
- all products contain a compatible soap or detergent so disinfection and cleaning can be carried out at the same time;
- stable in undiluted form and less inactivated by organic materials than other disinfectants.

Hypochlorites and other chlorine-releasing agents

- broad spectrum (disinfectant of choice for blood-borne viruses);
- limited activity against bacterial spores and the bacteria that cause tuberculosis;
- widespread application, but as they corrode metals they should be selected carefully;
- readily inactivated by organic matter and stability in solution is affected by temperature and concentration so working solutions need to be prepared freshly (daily);
- other chlorine-releasing disinfectants are also available in tablet or granular form. Granules are particularly useful for treating spillages especially when blood-borne or viral diseases are known or suspected;
- should not be mixed with strong acids as gaseous chlorine can be released.

Quaternary ammonium compounds

- effective against most bacteria;
- not activity against spores, viruses and the bacteria that cause tuberculosis;
- inactivated by low pH and organic matter;
- bactericidal effect enhanced by alcohol.

Halogenated tertiary amines

- broad spectrum;
- biodegradable;
- has some detergent action.

Other disinfectants

There are a number of other disinfectants that are available including the alcohols, peroxidases (for example Virkon) and hand antiseptics containing chlorhexidine. Glutaraldehyde-based disinfectants should not be used as these are respiratory sensitisers. There are a number of other safer alternatives available.

Control measures

As with all other work activities, disinfectant use needs to be properly assessed. You need to ensure that those using the disinfectants:

- wear suitable gloves when handling disinfectants;
- use suitable safety spectacles, goggles or a full-face visor and a disposable plastic apron to protect from splashing when handling concentrated stock solutions of disinfectants;
- work in an area with adequate ventilation when preparing the working solution of disinfectant from the concentrated form; and
- receive suitable instruction and training on the safe usage of these disinfectants.

Appendix 4

References and further reading

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)

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)

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)

Consulting employees on health and safety: A guide to the law Leaflet INDG232 HSE Books 1996 (single copy free or priced packs of 15 ISBN 0 7176 1615 0)

Use of contractors: A joint responsibility Leaflet INDG368 HSE Books 2002 (single copy free or priced packs of 10 ISBN 0 7176 2566 4)

Workplace health, safety and welfare: A short guide for managers Leaflet INDG244 HSE Books 1997 (single copy free or priced packs of 10 ISBN 0 7176 1328 3)

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

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(rev3) HSE Books 2005 (single copy free or priced packs of 10 ISBN 0 7176 2982 1)

Control of substances hazardous to health (Fifth edition). The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance L5 (Fifth edition) HSE Books 2005 ISBN 0 7176 2981 3

Getting to grips with manual handling: A short guide Leaflet INDG143(rev2) HSE Books 2004 (single copy free or priced packs of 15 ISBN 0 7176 2828 0)

Safe disposal of clinical waste Guidance (Second edition) HSE Books 1999 ISBN 0 7176 2492 7, out of print but due to be replaced by NHS guidance

Safe working and the prevention of infection in the mortuary and post-mortem room Guidance (Second edition) HSE Books 2003 ISBN 0 7176 2293 2

Funeral services including embalming

Embalming with formaldehyde solutions (formalin) Service and retail control guidance sheet SR10 COSHH essentials: *Easy steps to control chemicals. Control of Substances Hazardous to Health Regulations* HSG193 (Second edition) HSE Books 2003 ISBN 0 7176 2737 3

General ventilation in the workplace: Guidance for employers HSG202 HSE Books 2000 ISBN 0 7176 1793 9

Manual handling in the health services (Second edition) Guidance HSE Books 1998 ISBN 0 7176 1248 1

Latex and you Leaflet INDG320 HSE Books 2000 (Internet version only available at www.hse.gov.uk/pubns/indg320.pdf)

Removal of implantable cardioverter defibrillators (ICDs) SN2002/(35) MHRA Internet version only available at www.medical-devices.gov.uk

Guidance on the sale, transfer of ownership and disposal of used medical devices DB9801 Supplement 2 MHRA 2003 Internet version only available at www.medical-devices.gov.uk

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)

Exhumation

Fit testing of respiratory protective equipment facepieces OC228/28 HSE 2003 Internet version only available at www.hse.gov.uk/pubns/fittesting.pdf

Safe work in confined spaces Leaflet INDG258 HSE Books 1997 (single copy free or priced packs of 20 ISBN 0 7176 1442 5)

Safety in excavations Construction Information Sheet CIS8(rev1) HSE Books 1997

Lead and you: A guide to working safely with lead Leaflet INDG305(rev1) HSE Books 1998 (single copy free or priced packs of 15 ISBN 0 7176 1523 5)

Further information

HSE produces a wide range of documents. Some are available as printed publications, both priced and free, and others are only accessible via the HSE website, www.hse.gov.uk.

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: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

HSE thanks the Funeral Industry, Infection Control Working Party* for their input to the guidance.

*Representatives from: British Institute of Embalmers, British Institute of Funeral Directors, National Association of Funeral Directors, National Society of Allied and Independent Funeral Directors, and The Co-Operative Group Ltd.

This guidance is issued by the Health and Safety Commission. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance 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.

This document is available web only at: www.hse.gov.uk/pubns/web01.pdf

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