Section 4. OCCUPATIONAL INJURY

4.1 Occupational exposure

Although there have been no confirmed cases of occupational transmission of TSE to humans, cases of CJD in healthcare workers have been reported in which a link to occupational exposure is suggested. Therefore, it is prudent to take a precautionary approach. In the context of occupational exposure, the highest potential risk is from exposure to high infectivity tissues through needle-stick injuries with inoculation; however exposure to either high or low infectivity tissues through direct inoculation (e.g. needle-sticks, puncture wounds, 'sharps' injuries, or contamination of broken skin) must be avoided. Exposure by splashing of the mucous membranes (notably the conjunctiva) or unintentional ingestion may be considered a hypothetical risk and must also be avoided. Healthcare personnel who work with patients with confirmed or suspected TSEs, or with their high or low infectivity tissues, should be appropriately informed about the nature of the hazard, relevant safety procedures, and the high level of safety which will be provided by the proposed procedures described throughout this document.

4.2 Post-exposure management

Appropriate counselling should include the fact that no case of human TSE is known to have occurred through occupational accident or injury. A number of strategies to minimize the theoretical risk of infection following accidents have been proposed, but their usefulness is untested and unknown. For the present the following common-sense actions are recommended:

- Contamination of unbroken skin with internal body fluids or tissues: wash with detergent and abundant quantities of warm water (avoid scrubbing), rinse, and dry. Brief exposure (1 minute, to 0.1N NaOH or a 1: 10 dilution of bleach) can be considered for maximum safety.
- Needle sticks or lacerations: gently encourage bleeding; wash (avoid scrubbing) with warm soapy water, rinse, dry and cover with a waterproof dressing. Further treatment (e.g., sutures) should be appropriate to the type of injury. Report the injury according to normal procedures for your hospital or healthcare facility/laboratory.
- Splashes into the eye or mouth: irrigate with either saline (eye) or tap water (mouth); report according to normal procedures for your hospital or healthcare facility/laboratory.
- Health and safety guidelines mandate reporting of injuries, and records should be kept for no less than 20 years.

Section 5. LABORATORY INVESTIGATIONS

5.1 Safety in the healthcare laboratory

Adherence to the following routine precautions during any diagnostic procedure or laboratory work will reduce the risk of infection. General protective measures and basic precautions as outlined in Table 6 are recommended for hospital-based diagnostic laboratories as well as during decontamination procedures in those laboratories. Detailed descriptions of these general protective measures can be found in the WHO document:

Safety in Health-care Laboratories[14] from which Table 6 is adapted. Where local or national regulations and guidelines exist, these should also be consulted. Only persons who have been advised of the potential hazards and who meet specific entry requirements (i.e. training) should be allowed to enter the laboratory working areas, or to participate in the collection of high infectivity tissues from patients with confirmed or suspected TSEs.

Table 6 General protective measures

1.	Eating, drinking, smoking, storing food and applying cosmetics must not be permitted in the laboratory work areas.
2.	Laboratory coveralls, gowns or uniforms must be worn for work and removed before entering non-laboratory areas; consider the use of disposable gowns; non-disposable gowns must be decontaminated by appropriate methods (see Section 7 Waste Disposal and Annex III).
3.	Safety glasses, face shields (visors) or other protective devices must be worn when it is necessary to protect the eyes and face from splashes and particles.
4.	Gloves appropriate for the work must be worn for all procedures that may involve unintentional direct contact with infectious materials. Armoured gloves should be considered in post mortem examinations or in the collection of high infectivity tissues.
5.	All gowns, gloves, face-shields and similar re-usable or non re-usable items must be either cleaned using methods set out in Annex III, or destroyed as per Section 7.
6.	Wherever possible, avoid or minimize the use of sharps (needles, knives, scissors and laboratory glassware), and use single-use disposable items.
7.	All technical procedures should be performed in a way that minimizes the formation of aerosols and droplets.
8.	Work surfaces must be decontaminated after any spill of potentially dangerous material and at the end of the working day, using methods described in Section 6 and Annex III.
9.	All contaminated materials, specimens and cultures must be either incinerated, or decontaminated using methods described in Section 6 and Annex III and Section 7 before disposal.
10.	All spills or accidents that are overt or potential exposures to infectious materials must be reported immediately to the laboratory supervisor, and a written record retained.
11.	The laboratory supervisor should ensure that adequate training in laboratory safety is provided and that practices and procedures are understood and followed.

5.2 Clinical diagnostic laboratories

The vast majority of diagnostic examinations in clinical laboratories are performed on blood (e.g. complete blood counts) and serum (e.g. chemistries), usually with automated analyzing equipment. As discussed in Section 2.4.2, blood and its components, although found to contain very low levels of infectivity in experimental models of TSE, have never been identified to be responsible for any case of CJD in humans, despite numerous exhaustive searches. The consultation felt that this epidemiological evidence was more relevant and more persuasive than the experimental evidence, and strongly recommended that blood specimens from patients with CJD not be considered to be infectious, and that no special precautions were needed for its handling in clinical laboratories. Similarly, except for CSF, other body fluids, secretions and excretions contain no infectivity, and need no special handling (Section 2.4.2, Table 2).

[14] Safety in Health-care Laboratories. Second Edition. Geneva, World Health Organization, 1992. ISBN 92 4 154450 3. This edition is under revision.

CSF may be infectious and must be handled with care. It is recommended that analysis not be performed in automated equipment, and any materials coming in contact with the CSF must either be incinerated or decontaminated according to one of the methods listed in Section 6 and Annex III. There is no reason for a diagnostic test to be denied if these measures are observed.

5.3 Surgical pathology

Although brain biopsy tissue is (at least historically) the most likely tissue from a patient with a TSE to be examined in the surgical pathology laboratory, it may also occur that other tissues are sent to the laboratory for examination, when patients with TSE undergo surgical procedures of one sort or another for intercurrent problems during the course of their neurological illness. The tissue categories of high infectivity, low infectivity, and no detectable infectivity are listed and discussed in Section 2.4.2 and Table 2. Precautions to be taken when handling different tissue specimens are presented in Table 7. Since histopathological processing of brain tissue is most often conducted upon autopsy (WHO does not recommend brain biopsy for the diagnosis of CJD), detailed instructions for histopathological processing are described in Section 8.2 (Post Mortem Examination, sub-Section 8.2.2, Histopathological Examination).

Table 7 Precautions for working with high and low infectivity tissues from patients with known or suspected TSEs

1. Whenever possible and where available, specimens should be examined in a laboratory or centre accustomed to handling high and low infectivity tissues; in particular, high infectivity tissue specimens should be examined by experienced personnel in a TSE laboratory.
2. Samples should be labelled 'Biohazard'.
3. Single-use protective clothing is preferred as follows:
   - liquid repellent gowns over plastic apron;
   - gloves (cut-resistant gloves are preferred for brain cutting);
   - mask;
   - visor or goggles.
4. Use disposable equipment wherever possible.
5. All disposable instruments that have been in contact with high infectivity tissues should be clearly identified and disposed of by incineration.
6. Use disposable non-permeable material to prevent contamination of the work surface. This covering and all washings, waste material and protective clothing should be destroyed and disposed of by incineration.
7. Fixatives and waste fluids must be decontaminated by a decontamination method described in Section 6 and Annex III or adsorbed onto materials such as sawdust and disposed of by incineration as a hazardous material.
8. Laboratories handling large numbers of samples are advised to adopt more stringent measures because of the possibility of increased residual contamination, e.g. restricted access laboratory facilities, the use of 'dedicated' microtomes and processing labware, decontamination of all wastes before transport out of the facility for incineration.

Note: This document contains recommendations designed for healthcare laboratories and is not intended as a guideline for scientific research laboratories. WHO has identified a number of reference laboratories[15] which may be contacted for advice on safety protocols for investigational laboratory environments.

[15] Global Surveillance, Diagnosis and Therapy of Human Transmissible Spongiform Encephalopathies: Report of a WHO Consultation. Geneva, World Health Organization, 1998. WHO/EMC/ZDI/98.9.

5.4 Transport of specimens by air

The transportation of pathology samples by air must comply with the International Air Transport Association (IATA) Restricted Articles Regulations and any additional requirements of the individual carriers. Documentation required by the IATA includes Shipper's Certificate for Restricted Articles, which requires that the content, nature and quantity of infectious material to be disclosed. The WHO Guidelines for the Safe Transport of Infectious Substances and Diagnostic Specimens[16] provides more information on the safe transport of material. Where properly packaged according to these guidelines, there is no danger to the carriers.

Section 6. DECONTAMINATION PROCEDURES

6.1 General considerations

TSE agents are unusually resistant to disinfection and sterilization by most of the physical and chemical methods in common use for decontamination of infectious pathogens. Table 8 lists a number of commonly used chemicals and processes that cannot be depended upon for decontamination, as they have been shown to be either ineffective or only partially effective in destroying TSE infectivity. Variability in the effectiveness appears to be highly influenced by the nature and physical state of the infected tissues. For example, infectivity is strongly stabilized by drying or fixation with alcohol, formalin or glutaraldehyde. As a consequence, contaminated materials should not be exposed to fixation reagents, and should be kept wet between the time of use and disinfection by immersion in chemical disinfectants.

Table 8 Ineffective or sub-optimal disinfectants

Chemical disinfectants	Gaseous disinfectants	Physical processes
Ineffective[17] alcohol ammonia ß-propiolactone formalin hydrochloric acid hydrogen peroxide peracetic acid phenolics sodium dodecyl sulfate (SDS) (5%)	Ineffective ethylene oxide formaldehyde	Ineffective boiling dry heat (<300°C) ionising, UV or microwave radiation
Variably or partially effective chlorine dioxide glutaraldehyde guanidinium thiocyanate (4 M) iodophores sodium dichloro-isocyanurate sodium metaperiodate urea (6 M)		Variably or partially effective autoclaving at 121°C for 15 minutes boiling in 3% sodium dodecyl sulfate (SDS)

[16] Guidelines for the Safe Transport of Infectious Substances and Diagnostic Specimens. Geneva, World Health Organization, 1997. WHO/EMC/97.3.

[17] Some of these chemicals may have very small effects on TSE infectivity and are not adequate for disinfection.

6.2 Decontamination of instruments

Policy makers should be guided by the infectivity level of the tissue contaminating the instrument and by the expectations of how the instrument will be re-used, as per Section 2.4. In this way, the most stringent recommendations are applied to instruments contacting high infectivity tissues of a person with a known TSE, which will also subsequently be re-used in the CNS or spinal column. Policy makers are encouraged to adopt the highest decontamination methods feasible until studies are published which clarify the risk of re-using decontaminated instruments.

Annex III lists the decontamination methods recommended by the consultation in order of decreasing effectiveness. It was emphasized that the safest and most unambiguous method for ensuring that there is no risk of residual infectivity on surgical instruments is to discard and destroy them by incineration. While this strategy should be universally applied to those devices and materials that are designed to be disposable, it was also recognized that this may not be feasible for many devices and materials that were not designed for single use. For these situations, the methods recommended in Annex III appear to remove most and possibly all infectivity under the widest range of conditions.

Those surgical instruments that are going to be re-used may be mechanically cleaned in advance of subjecting them to decontamination. Mechanical cleaning will reduce the bio-load and protect the instrument from damage caused by adherent tissues. If instruments are cleaned before decontamination, the cleaning materials must be treated as infectious waste, and the cleaning station must be decontaminated by one of the methods listed in Annex III. The instruments are then treated by one of the decontamination methods recommended in Annex III before reintroduction into the general instrument sterilization processes. A minority opinion held that instruments should be decontaminated before mechanical cleaning, and then handled as per general instrument sterilization processes.

Annex III recommends that, where possible, two or more different methods of inactivation be combined in any sterilization procedure for these agents. Procedures that employ heat and NaOH (either consecutively or simultaneously) appear to be sterilizing under worst-case conditions (e.g., infected brain tissue partly dried on to surfaces). Moreover, hot alkaline hydrolysis reduces biological macromolecules to their constituent sub-units, thereby cleaning as well as inactivating.

The consultation recognized that complex and expensive instruments such as intracardiac monitoring devices, fiberoptic endoscopes, and microscopes cannot be decontaminated by the harsh procedures specified in Annex III. Instead, to the extent possible, such instruments should be protected from surface contamination by wrapping or bagging with disposable materials. Those parts of the device that come into contact with internal tissues of patients should be subjected to the most effective decontaminating procedure that can be tolerated by the instrument. All adherent material must be removed and, if at all possible, the exposed surfaces cleaned using a decontamination method recommended in Annex III. Some instruments can be partly disassembled (e.g. drills and drill bits). Removable parts that would not be damaged by autoclaving, NaOH, or bleach should be dismounted and treated with these agents. In all instances where unfamiliar decontamination methods are attempted, the manufacturer should be consulted. These cleaning procedures should be applied even if the instrument has been re-used before discovery of its potential contamination.

Contaminated instruments or other contaminated materials should not be cleaned in automated washers without first having been decontaminated using a method recommended in Annex III.

6.3 Decontamination of work surfaces

Because TSE infectivity persists for long periods on work surfaces, it is important to use disposable cover sheets whenever possible to avoid environmental contamination, even though transmission to humans has never been recognized to have occurred from environmental exposure. It is also important to mechanically clean and disinfect equipment and surfaces that are subject to potential contamination, to prevent environmental build-ups. Surfaces contaminated by TSE agents can be disinfected by flooding, for one hour, with NaOH or sodium hypochlorite, followed by water rinses (see Annex III for detailed instructions). Surfaces that cannot be treated in this manner should be thoroughly cleaned; consider use of a partially effective method as listed in Table 8. Cleaning materials treated as potentially contaminated (see Section 6.4).

6.4 Decontamination of wastes and waste-contaminated materials

Decontamination of waste liquid and solid residues should be conducted with the same care and precautions recommended for any other exposure to TSE agents. The work area should be selected for easy containment of contamination and for subsequent disinfection of exposed surfaces. All waste liquids and solids must be captured and treated as infectious waste.

Liquids used for cleaning should be decontaminated in situ by addition of NaOH or hypochlorite or any of the procedures listed in Annex III, and may then be disposed of as routine hospital waste. Absorbents, such as sawdust, may be used to stabilize liquids that will be transported to an incinerator; however, this should be added after decontamination.

Cleaning tools and methods should be selected to minimize dispersal of the contamination by splashing, splatters and aerosols. Great care is required in the use of brushes and scouring tools. Where possible, cleaning tools such as brushes, towelling and scouring pads, as well as tools used for disassembling contaminated apparatus, should either be disposable or selected for their ability to withstand the disinfection procedures listed in Annex III.

Upon completion of the cleaning procedure, all solid wastes including disposable cleaning materials should be collected and decontaminated. Incineration is highly recommended. The cleaning station should then itself be decontaminated using one of the methods in Annex III.

Automated cleaning equipment must not be used for any instrument or material that has not previously been thoroughly decontaminated following the recommendations in Section 6.2 and Annex III.

6.5 Personal protection during decontamination procedures

Persons involved in the disinfection and decontamination of instruments or surfaces exposed to the tissues of persons with TSE should wear single-use protective clothing, gloves, mask and visor or goggles, as noted in Section 5.1, Table 6. The recommendations found in Table 6 can be adapted to different situations. All individuals involved with disinfection and decontamination procedures should be familiar with these basic protective measures and precautions. Handling of contaminated instruments during transfers and cleaning should be kept to a minimum.

6.6 Decontamination risk categories

The recommended levels of decontamination are shown in Table 9 for different patient and tissue risk categories (including patients at risk of TSE, and patients with vCJD). The table reflects the consensus of the consultation, and should be used in conjunction with Section 2.4.2 (Table 2) which lists specific high and low infectivity tissues, and Annex III, which describes specific decontamination options.

Table 9 Decontamination levels for different risk categories

Patient category	Tissue category	Decontamination options
Confirmed or suspect cases of TSE	High infectivity	Annex III
	Low infectivity	Annex III (but note that CSF, and peripheral organs and tissues are regarded as less infectious than the CNS)
Persons with known prior exposure to human pituitary derived hormones, cornea or dura mater grafts	High infectivity	Annex III
	Low Infectivity	Routine cleaning and disinfection procedures
Members of families with heritable forms of TSE	High Infectivity	No consensus was reached. The majority felt that TSE decontamination method should be used, but a minority felt this was unwarranted.
	Low Infectivity	Routine cleaning and disinfection procedures
All of the above categories	No detectable Infectivity	Routine cleaning and disinfection procedures
Confirmed or suspect cases of vCJD	All tissue categories	Annex III

Section 7. WASTE DISPOSAL

Infectious healthcare waste is defined as the discarded materials that have been in contact with blood and its derivatives, or wastes from infection isolation wards. These include but are not limited to cultures, tissues, dressings, swabs or other items soaked with blood, syringe needles, scalpels, diapers, and blood bags. The term 'TSE infectious healthcare waste' applies to high and low infectivity tissues from persons with confirmed or suspected TSEs, or high infectivity tissue from persons with known prior exposure to cornea, dura matter or human growth hormone, and any disposable items that have come in contact with these tissues.

In the absence of a national standard, disposal of biological waste contaminated by a TSE is to be performed in accordance with the best practice that is most consistent with this document or equivalent standards. Practitioners should review guidelines prescribed under the laws, procedures, codes of practice or other regulatory provisions in force in the relevant state or territory. All material classified as clinical waste should be placed in secure leak-proof containers and disposed of by incineration at an authorized incineration site. Avoid external contamination of the container to ensure safe handling of clinical

waste. The WHO guide, Safe Management of Wastes from Health Care Activities,[18] provides recommendations on medical and laboratory waste disposal.

TSE infectious waste should be incinerated or treated by a method that is effective for the inactivation of TSE agents (see Annex III). In regions where no incineration facilities are available, it is recommended that these wastes be chemically disinfected and then burnt in pits dedicated to final disposal. Residues should be checked for total combustion. Authorities should ensure that waste is adequately managed, as in certain big cities of the developing world it has been estimated that as much as one half of infectious waste is cleaned, re-packaged and sold in the marketplace.

In hospital or healthcare facility environments, drainage equipment, linens or swabs contaminated by high infectivity tissues or CSF should be collected into tough plastic bags or containers labelled 'Biohazard' and incinerated. Low infectivity tissues and drainage from low infectivity tissues[19] should be handled cautiously.

For tissues, secretions, or excretions with no detectable infectivity, no special requirements beyond Standard Precautions are required for the handling of body fluids or body-fluid contaminated linen, equipment or environments. Other infectious wastes from home care require no special precautions beyond those taken for any other disease. Sharp waste items (i.e. syringe needles) used during home care of TSE patients should be collected in impermeable containers and returned to the treating physician or healthcare establishment for disposal.

The use of enamel, heat-stable plastic or disposable trays when working with infectious specimens will help to confine contamination. If re-usable, they should be treated by a method listed in Annex III. Disposable items should be incinerated after use, although methods listed in Annex III may be used before disposal. Use absorbent material to soak up spills, which can then be contained and incinerated or treated by a method described in Annex III. Spills of potentially TSE infectious materials in the ward should be removed using absorbent material and the surface disinfected according to Annex III.

Use secure leak-proof containers, e.g. double bagging, for the safe handling of clinical waste. Avoid external contamination of the waste container. Disposable gloves and an apron should be worn when removing such spills and should subsequently be disposed of by incineration, together with the recovered waste and cleaning materials, although a method described in Annex III may be used.

Section 8. AFTER DEATH

8.1 Precautions for handling of the deceased patient

On the death of a patient with confirmed or suspected TSE, the removal of the body from the ward, community setting, or hospice, should be carried out using normal infection control measures. It is recommended that the deceased patient be placed in a sealed body bag prior to moving, in line with normal procedures for bodies where there is a known infection risk. Where the skull is open or there is CSF leakage, and where sutures do not completely control this leaking, the bag should be lined with materials to absorb any fluid, and the body should be moved in a sealed body bag. Refer to

[18] A. Prüss, E. Giroult, P. Rushbrook, eds. Safe Management of Wastes from Health Care Activies. Geneva, World Health Organization, 1999.

[19] Drainage from *low infectivity tissue* that has not been specifically tested for infectivity, however, may retain infectivity.

country-based guidelines and regulations for more information on care and handling of a deceased and infected patient.

8.2 Post mortem examination

Post mortem examinations remain an essential element in confirming the clinical diagnosis and the cause of death as TSE. Ideally, three people should be present during the examination: the pathologist assisted by one technician, and one further person to handle and label specimen containers. Except for training purposes, observers should be prohibited or kept to a minimum. All personnel should be made aware of the relevant history of the patient and fully informed of procedures for such post mortem examinations.

8.2.1 Conducting the autopsy

To the extent possible, disposable protective clothing should be worn including surgical cap and gown, apron, double gloves, and a face visor which completely encloses the operator's head to protect the eyes, nose and mouth. Consideration should be given to the use of hand protection, such as armoured or cut-resistant gloves.

Disposable or dedicated reuseable instruments are recommended in order to minimize the risk of environmental contamination. Manual saws are recommended in order to avoid the creation of tissue particulates and aerosols and for ease of decontamination after use. Electric saws, if used, should be operated inside an aerosol-containing bag unless ventilated helmets with an appropriate filter are worn. Instruments and mortuary working surfaces should be decontaminated following the guidance in Section 6 and Annex III.

Restricted post mortem examinations on TSE cases can be undertaken in any mortuary. If examination is limited to the brain, a plastic sheet with absorbent wadding and raised edges is first placed underneath the head to ensure containment of tissue debris and body fluids (e.g., CSF). The scalp is reflected in the normal way and the cranium is opened. After removal of the brain, replacement of the skullcap and suturing of the skin, the plastic sheet containing all tissue debris and drainage is bagged and sealed and sent for incineration. A full post mortem examination is discouraged except in dedicated facilities, unless special circumstances warrant the added difficulty of infectivity containment.

8.2.2 Histopathological examination

Only persons who have been advised of the potential hazards and trained in the specific methods used for TSE infectious tissues should be permitted to work in laboratories where high infectivity tissues are being processed. Facilities conducting a large number of histological examinations on high infectivity tissues should dedicate laboratory space, processors, instruments, glassware and reagents for this purpose. Guidelines in some countries and regions require Bio-Safety Containment Level 3 for handling these tissues.

It is important to note that formalin and glutaraldehyde-fixed TSE tissue retains infectivity for long periods, if not indefinitely. As a result, they should be handled with the same precautions as fresh material and be considered infectious throughout the entire procedure of fixation, embedding, sectioning, staining, and mounting on slides, until or unless treated with formic acid. Treatment with formic acid reduces infectivity to negligible levels. Although exact procedures may vary, formic acid treatment consists of

placing small pieces of fixed tissue, no more than 4 to 5 mm thick, in 50 to 100 ml of 95% formic acid for an hour, and then transferring them to fresh formalin for another two days before further processing. The entire procedure is conducted using continuous, gentle agitation.

All of the serial steps involved in bringing the blocks from formalin into paraffin and, after sectioning, bringing the mounted paraffin sections back into aqueous staining solutions, can be carried out manually, or in an automatic processor dedicated to TSE tissues. Similarly, it would be advisable to dedicate a microtome for sectioning non-formic acid treated tissue blocks, as there is no practical way to disinfect the instrument. Formic acid treated sections can be cut on a standard microtome (if possible, using a disposable knife or dedicated blade) and processed as usual. Processing fluid should be decontaminated and debris (such as wax shavings) from section cutting should be contained and disposed of by incineration (see Annex III for decontamination methods). Formic acid treated sections tend to be brittle, but show good preservation of histologic morphology.

Slides made from sections which have been treated with formic acid can be considered non-infectious. Slides made from sections that have not been treated with formic acid may also be handled without specific precautions, once the cover slip is sealed to the slide and chemically disinfected to ensure external sterility, but should be labelled as a hazardous material. These slides, if damaged, should be treated using a method described in Annex III, and destroyed.

Containers used for the storage of formalin-fixed tissues should, after secure closing, be cleaned using a method in Annex III, marked "Hazardous", and stored separately (e.g., in sealed plastic bags). When tissue is needed, the container can be removed from the bag, set upon a water-resistant disposable mat, and manipulation of the tissue confined to the mat. After the tissue is replaced, the area and container are cleaned according to methods described in Annex III, and the container put into a new plastic bag for further storage.

8.2.3 Electron microscopy

Electron microscopic examination of tissue sections is not indicated for diagnostic purposes, and is not recommended except as an investigational research tool. Preparation of specimens for electron microscopy should be performed with the same precautions as for histopathology. Electron microscopy of tissue sections poses negligible risk both to the microscope and the operator due to the very small amount of tissue deposited on a grid. An electron microscope section 0.01 micron thick x 0.1 mm x 0.05 mm contains approximately 50 pg of tissue. Even the most infectious models of the disease producing $10^{10}ID_{50}/g$ of brain would result in less than 0.5 ID_{50} immobilized on the grid. Handling requires no special precautions except for disposal of such grids as infectious waste through incineration.

8.3 National and international transport of bodies

If there is a need to transport the deceased patient nationally or internationally, it will be necessary to comply with the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA) Restricted Articles Regulations, and any additional requirements of the individual carriers. It should be noted that the IATA Regulations require the embalming of the body.

8.4 Undertakers and embalmers

8.4.1 General measures

Mortuary procedures may be performed on the bodies of patients who have died from CJD with a minimum of inconvenience to ensure the safety of personnel and avoid contamination of the workplace. Transportation of the unembalmed body to the mortuary should be in an sealable, impermeable plastic pouch. Ordinary contact or handling of an intact, unautopsied body does not pose a risk, and cosmetic work may be undertaken without any special precautions. If the body has undergone autopsy, care should be taken to limit contamination of the workplace by any leaking bodily fluids (especially from the cranium) when transferring the body from its transport bag to the mortuary table that has been covered with an impermeable sheet. No other precautions are required, except for embalming (see Section 8.4.2).

8.4.2 Embalming

An intact (unautopsied) body can be safely managed with only minor adjustments to the usual procedures. The body should be placed on an impermeable sheet or body pouch to avoid surface contamination from perfusion drain sites, and all drainage fluids should be collected into a stainless steel container. Perfusion sites should be closed with cyanoacrylates (super glue) and then wiped with bleach.

Embalming an autopsied or traumatized body is not encouraged, but may be safely performed when the following precautions are observed. Disposable masks, gowns, and gloves should be worn, just as is done by pathologists performing an autopsy. The body should be placed on an impermeable sheet or body pouch so that suture site leakage can be contained, and perfusion drain sites should be similarly arranged to avoid surface contamination. All drainage fluids should be collected into a stainless steel container. Perfusion and autopsy incision sites should be closed with cyanoacrylates (super glue). The entire body should be wiped down with bleach, and special care taken to ensure contact of bleach with perfusion sites and closed autopsy incisions.

At the conclusion of the perfusion procedure, the container of drainage fluids should be decontaminated by adding sodium hydroxide pellets at the rate of 40g per litre of fluid. The mixture should be stirred after a few minutes and care should be taken to avoid spillage, as the fluid will be hot. It should then be left undisturbed for at least one hour, after which it can be disposed of as for any other mortuary waste. Plastic sheets and other disposable items that have come into contact with bodily fluids should be incinerated. Mortuary working surfaces that have accidentally become contaminated should be flooded with sodium hydroxide or bleach, left undisturbed for at least one hour, then (using gloves) mopped up with absorbent disposable rags, and the surface swabbed with water sufficient to remove any residual disinfectant solution.

Non-disposable instruments and tools should be decontaminated using one of the methods recommended in Annex III. At the conclusion of the decontamination procedure, the instruments are washed with water to remove residual disinfectant fluid before drying and re-use. Sodium hydroxide or bleach can be disposed of as uninfectious (but corrosive) waste fluid.

8.5 Funerals and cremations

Relatives of the deceased may wish to view or have some final contact with the body. Superficial contact, such as touching or kissing the face, need not be discouraged,

even if an autopsy has been conducted. Interment in closed coffins does not present any significant risk of environmental contamination, and cremated remains can be considered to be sterile, as the infectious agents do not survive incineration-range temperatures (1000°C). Transport and interment are subject to local and national guidelines, and transport overseas is governed by international regulations.

8.6 Exhumations

Standard procedures are conducted according to local and national guidelines. The body should be considered as having the same infectivity as at the time of burial and the precautions used for an autopsy should be followed.

8.7 Body donation for teaching purposes

Anatomy departments should not accept, for teaching or research purposes, any body or organs from persons confirmed, suspected, or at risk for TSE, unless they have specific training or research programs for TSEs, including access to specialized equipment, procedures, appropriate containment facilities and training for managing TSE contaminated tissues. Departments should make inquiries of those responsible for donating the body, and of the medical staff involved in the care of the donor, to insure the rigorous adherence to this recommendation.