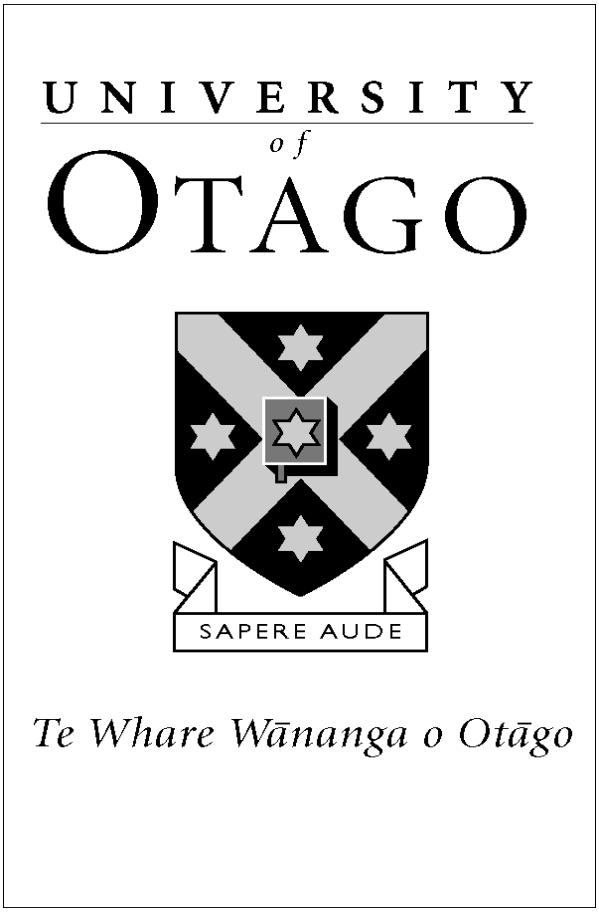

March 2014

BIOHAZARD SAFETY MANUAL

WELLINGTON CAMPUS

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Acronyms

A/NZ	Australian/New Zealand
AS/NZS	Australian/New Zealand Standards
BBFE	Blood/Body Fluid Exposure
EPA	Environmental Protection Authority
ERMA	Environmental Risk Management Authority
GMO	Genetically Modified Organism
HEPA	High Efficiency Particulate Air
HSE	Health and Safety in Employment
HSNO	Hazardous Substances and New Organisms
IBSC	Institutional Biological Safety Committee
MAF	Ministry of Agriculture and Forestry
MPI	Ministry for Primary Industries
MSDS	Material Safety Data Sheet
PC	Physical Containment
PPCE	Personal Protection Clothing Equipment
UOW	University of Otago, Wellington

Introduction

The University of Otago, Wellington is involved in activities in numerous areas of research and teaching that use biological products of human or animal origin. Such activities have the potential to cause harm arising from exposure to toxic or infectious agents and thus require compliance with strict operational standards.

Biohazardous Substances

A biohazard is defined as:

- An infectious agent or hazardous biological material that presents a risk or potential risk to the health of humans, animals or the environment.

Exposure to a biohazardous agent may occur through puncture wounds, or by absorption via the respiratory tract, gastro-intestinal system, skin or mucous membranes while handling chemicals, animals, tissues, body fluids or diagnostic specimens. Human and animal materials are well known to contain specific infectious biohazards. In addition, it is accepted that ill-defined or unknown pathogens exist in the environment. The principles applied to the handling of biological materials of human or animal origin must therefore deal with the broad issues involved and not focus narrowly on individual infectious agents.

Despite the potential problems arising from the presence of infectious agents in biological materials it is acknowledged that there are circumstances where the use of animal or human blood and body fluids in the University is fundamental to its activities. Where use of this material is necessary, the University must ensure that satisfactory safety standards and operating procedures exist and are followed. The low probability that infectious agents are present in samples may create only a low overall level of risk for students/staff, but these hazards could potentially have such an impact on affected individuals, that the risk of potential problems must be addressed in a comprehensive manner. Potential hazards must be avoided where possible, and minimised to an acceptable level in all other circumstances.

Genetically Modified Organisms

Work with genetically modified organisms (GMOs) must comply with the Hazardous Substances and New Organisms (HSNO) Act 1996 and HSNO (Low-Risk Genetic Modification) Regulations. The University of Otago Institutional Biological Safety Committee (IBSC) has delegated authority to approve projects generating low-risk GMOs and will assign the containment controls required. The Environmental Protection Authority (EPA), formerly known as ERMA, must approve and apply controls for high-risk genetic modifications. Work with GMOs must be carried out under Physical Containment Level 1 (PC1) or Physical Containment Level 2 (PC2) conditions. UOW laboratories graded PC2 are listed in the Containment and Transitional Manual. This manual is the reference document for genetic modification projects at the UOW.

Containment

The term "containment" is used to describe safe methods for managing infectious agents, or hazardous substances, in the laboratory environment where they are being handled or maintained.

The three elements of containment include laboratory practice and technique, safety equipment, and Facility design. The risk assessment of the work to be done with a specific agent will determine the appropriate combination of these elements that should be employed. The most important element of containment is strict adherence to standard microbiological practices and techniques. The level of containment required is dictated by the risk of the microorganism being handled. Microorganisms of risk group 1 require PC1 level of containment; microorganisms of risk group 2 require PC2 containment, etc. An indication of the risk group category of a selection of microorganisms, and a description of physical containment requirements is given in the A/NZ Standard 2243.3:2010 *Safety in Laboratories Part 3: Microbiological aspects and containment facilities.*

Please note: ALL teaching and research that utilises unscreened human blood must be carried out under PC2 conditions.

Transitional Facility

A "Transitional Facility" is required to house "uncleared goods" which are imported goods that have not been given biosecurity clearance by MAF.

The UOW has a Containment and Transitional Facility comprising laboratories undertaking work with uncleared biological products. The Containment and Transitional Facility is divided into sectors, each with a Sector Manager, and is described in the Containment and Transitional Manual.

Storage of GMOs and Uncleared Biological Products

GMOs and uncleared biological products must be stored securely with appropriate containment in the UOW Containment and Transitional Facility. There must be a register indicating the location of the GMO or uncleared biological product, and a record of the usage and disposal of uncleared biological products must be kept. Disposal of GMOs must be by autoclaving.

Transfer of GMOs and Uncleared Biological Products

GMOs can only be imported into New Zealand with EPA approval, which can be given under delegation by the University of Otago IBSC. Uncleared biological products can only be imported into New Zealand if the importer holds a current MPI permit to import uncleared biological products of animal origin on which the material to be imported is listed.

Approval by MPI is required before a GMO or uncleared biological product can be transferred to another Transitional Facility, or out of New Zealand. See the Containment and Transitional Manual for details. GMOs or uncleared biological products must be transported between sectors or Facilities in a sealed container that is within a second sealed container.

Hazard Identification

The Health and Safety in Employment (HSE) Act 1992 and HSE Amendment Act 2002 require the identification and control of actual and potential hazards in a place of work. The hazards identified should be listed in the Departmental Hazard Register and the control measures defined. The hazard must be eliminated where practical; where elimination is not practical, the hazard must be isolated; and where it is not practical to eliminate or isolate the hazard, the hazard must be minimised. The risks associated with the handling and/or exposure to blood and body fluids are a significant hazard, and full application of the hazard controls is required.

Scope of Hazard Identification

Hazard identification requires consideration of both the task and also the environment/location.

Laboratory-based blood and body fluid handling is a task with a high risk of exposure; however, there are other activities with risk of exposure that require consideration. The following are examples of exposure risks; however, the list is not exhaustive:

- First Aid provision: all first aiders are at risk to exposure to blood and body fluids. First aiders should have Hepatitis B immunisation status ascertained as per the Vaccination Policy.
- Human Bites: human bites have occurred within the University. The blood and body pack should be obtained from the Laboratory Manager or the Laboratory Compliance Officer in the event of an incident.
- Animal Bites: animal bite wounds to personnel handling experimental animals occur occasionally. The blood and body fluids policy covers the procedure to follow in such an event.

Risk Assessment

There are varying levels of risk for the transmission of blood-borne pathogens which must be taken into consideration:

High risk:

- Large-bore hollow needle
- Deep puncture wound
- Needle from patient's artery or vein
- Cuts with sharp instruments – especially when blood is visible

Medium risk:

- Splashes of blood or other body fluids onto mucous membranes
- Bite
- Contact of blood onto broken skin
- Prolonged contact of blood with intact skin

Low risk:

- Contact with urine or faeces.

Hazard Management

Elimination and substitution controls:

The HSE Act 1992 and Amendments requires identified hazards to be assessed for their significance. A significant hazard is one that can cause serious harm as defined by the HSE Act 1992. All biohazards must be identified as significant hazards.

The hierarchy of hazard control as per the legislation is:

- Elimination, where practicable; or
- Isolation, where elimination is not practicable; or
- Minimisation, where elimination and isolation are not practical controls.

Elimination Controls:

Elimination is the preferred level of control. Can the research or teaching be achieved without the use of the biohazard substance?

Elimination could involve the substitution of a less hazardous substance. When planning research the first consideration is the type of biological products to be used.

Isolation Controls:

Isolation of the exposure to the hazard may include some of the following:

- Exclusion of individuals not involved in the procedures from the immediate environment
- Appropriate cleaning of equipment, management of spills, and use of hazardous waste disposal methods to prevent exposure to other parties
- Automation of laboratory procedures

Minimisation Controls:

In many situations blood and body fluids will continue to be used for the purpose of research or teaching. Minimising the exposure to biohazards includes the following:

- Laboratory design
- Experiment design
- Staff training
- Standard operating procedures
- Safe waste management
- Staff vaccinations
- Personal protective clothing and equipment

These steps minimise but do not eliminate exposure risk. Where exposure is known or suspected to have occurred, the health of the individual must be monitored - see the BBFE kits and Vaccination policy (Appendix 1).

Vaccination

The process of hazard identification should include consideration of any work practices that have the potential to expose employees to human blood and body fluids. A practical step for the management of such hazards is for the employer to provide vaccination where available. It must be remembered that vaccinations are not available for all of the identified risks, and that the universal precautions remain the most critical preventive control. Hepatitis B is one vaccination that should be available to staff who are at risk of exposure to blood and body fluids. The process for vaccination requires: an education session on the vaccine, its potential side effects, and its effectiveness; consent by staff for vaccination; often pre-testing for current immunisation status; and then the actual vaccination administration.

Standard Operating Procedures for Work in Biological Laboratory

The Australian/New Zealand Standard 2243.3:2010 Part 3: *Microbiological aspects and containment facilities*, and MAF *Facilities for Microorganisms and Cell cultures: 2007a* are the guiding documents for the operational procedures within a Containment Facility. For further details, see your Sector Manager listed in the Containment and Transitional Manual.

Please note: Biological laboratories are likely to contain chemical hazardous substances in addition to biological hazardous substances. The laboratory requirements for HSNO Exempt Laboratories must be met in addition to biological requirements in these situations. Consult your Laboratory Supervisor, the Laboratory Manager and/or the UOW HSNO Exempt Manual for further information on chemical hazards.

Procedures for Work requiring PC1 or PC2 Containment Conditions

These procedures should be widely displayed in all biological laboratories (see Appendix 2). Appropriate Personal Protective Clothing and Equipment (refer Appendix 3 for PPCE Policy) including footwear (refer Appendix 4 for Footwear Requirements) must be used or worn where required.

Biological Safety Cabinets

Biological safety cabinets reduce the risk of airborne infection by preventing the escape of aerosols into the laboratory environment. They minimise the potential contact between the operator and the pathogens through the use of directional airflow, HEPA filtration of supply and/or exhaust air, and a physical barrier (cabinet door). For further details on biological safety cabinets, refer to *AS/NZS 2647:2000 Biological safety cabinets – installation and use*. Safety cabinets must be turned on before use to be effective.

HEPA Filters:

HEPA (High Efficiency Particulate Air) filters have particle removal efficiencies of 99.07% or better for 0.3 micron diameter particles. This size of particle is used as the basis for filter definition because it is the most difficult size of particle to remove. The filters are very delicate and easily damaged. If the cabinet is moved for any reason, the cabinet will need testing and certification prior to use. HEPA filters are effective in removing air particles, but will not filter chemical gases or vapours. Therefore, recirculating Class II cabinets should not be used when volatile hazardous substances are being used. Please refer to the HSNO Exempt Laboratory Manual for use of fume cupboards.

Laminar Flow Cabinets:

Laminar flow cabinets are NOT biological safety cabinets.

These cabinets blow HEPA filtered air across the work surface towards the operator, blowing any generated aerosols into the operator's face. This type of cabinet only provides protection for the sample, not the worker.

Class I biological safety cabinets:

These cabinets protect the worker, but not the work.

These cabinets are open fronted, protect both the operator and the environment and are for work with low and moderate risk agents, where the protection of the sample is not critical. They work by dragging air inwards from the room away from the operator and prevent the escape of airborne pathogens into the laboratory. The air is exhausted through a HEPA filter, either back into the laboratory or externally.

Class II biological safety cabinets:

These cabinets protect the worker and the work.

These cabinets are open fronted; protect the worker, the work and the environment involving low to moderate-risk agents. They work by an inward flow of room air that enters the front opening without crossing the work area. The air is HEPA filtered and generates a downward flow over the work, protecting the work, as well as filtering any exhaust air released into the laboratory environment, protecting the workers. The amount of room air drawn into the intake grill and the amount of air exhausted through the exhaust filter are equal. The balance is critical; positive pressure will allow the outflow of pathogens, while negative pressure will result in inflow of room contaminants. Again, volatile hazardous substances will not be filtered out by the HEPA filter and can be recirculated into the laboratory environment.

The placement of the biological safety cabinet within the laboratory is critical, to ensure uninterrupted inward flow. Ideal locations are in a “dead end” corner of the laboratory; away from doorways, throughways, room air supply diffusers, fume hoods and heating equipment.

Biological safety hoods at UOW must be certified annually by an external provider. The report on the cabinets and any deficiencies will be discussed with the Sector Manager. Repairs are generally completed at the time of certification, however, if cabinets are non-certified or non-functional they must be clearly labelled to prevent use.

Sterilisation and Disinfection

Sterilisation is the destruction of all forms of microbial life. Disinfections destroy specific pathogenic organisms by physical or chemical means. There are levels of disinfection:

- High level disinfection: inactivates fungi, viruses and bacteria. High level disinfectants may be ineffective against bacterial spores if the spores are present in large numbers. Extended exposure time may be required.
- Intermediate level disinfection: destroys fungi, some viruses, and some bacteria including mycobacterium.
- Low level disinfection: kills vegetative forms of bacteria, some fungi and some medium-sized and lipid-containing viruses. Low-level disinfectants do not reliably kill bacterial spores, mycobacteria or small or non-lipid viruses.

Microorganisms vary in their resistance to physical or chemical agents. It is important that the method used will destroy the microorganisms present – the Material Safety Data Sheet (MSDS) for the disinfectant should provide information. Generally, liquid chemical germicides are used for the decontamination of large surfaces or for equipment that cannot tolerate high temperatures, and requires high concentrations and long exposure or soaking time, with the potential to create other (chemical) hazards. Any substance used for chemical disinfection or sterilisation must be used in accordance with instructions, including the use of personal protective equipment when required. Direct contact between the microorganism and the germicide is essential for effective disinfection. Therefore, all items must have gross contamination removed prior to or during the cleaning period, or the efficacy may be reduced.

Chemical Disinfection

Principles:

1. Use phenolic disinfectants for most organic matter, tuberculous material and general bacteriology, but not for blood or viruses.
2. Use hypochlorite or Virkon for minimal organic matter including blood and viruses.
3. Use aldehydes for special purposes only.

See Appendix 5 for more detail of chemical disinfectants.

Emergency Biohazardous Spill Management

(A) Small, manageable spills

It is important that the Laboratory Supervisor is informed as soon as possible regarding ALL spillages.

Clothing:

1. Promptly remove affected article carefully and place in a biohazard plastic bag.
2. Wash article in **hot** water containing soap powder. A normal hot wash cycle is considered sufficient to inactivate pathogens. There is a washing machine on Level B that may be used for this purpose.

Benches, floors, etc:

1. Ensure all non-essential personnel are immediately moved out of the affected area.
2. Sector Manager or other trained persons should clean up all spills of a potentially hazardous nature.
3. Wear disposable gloves, and mop up excess liquid with paper towels. Calcium hypochlorite granules may be used to decontaminate a liquid spill before cleaning up. The paper towels should then be sealed in bags that are in turn placed in a biohazard bag and disposed of appropriately.
4. The contaminated area should then be thoroughly wetted with disinfectant. Freshly prepared Virkon solution should be used for surface decontamination. For larger spills, or bulk items, a bleach (5% sodium hypochlorite) solution freshly diluted 1:3 should be used to soak items. Once treated, the biohazard waste should be bagged and disposed of as per guidelines.

(B) Contaminated equipment

Where possible supervisory staff should carry out these procedures:

Centrifuges

Mop up excess liquid with paper towels and dispose of in biohazard bags. Spray or wipe out the inside with 70% isopropanol or Virkon. Pour some isopropanol or Virkon into contaminated buckets and leave for 10 minutes contact time before washing out in soapy water.

Small portable items

Treat with 70% alcohol or Virkon and then wash in hot soapy water. Virkon can be used to wash contaminated equipment but metal items should not be soaked in it.

(C) Large or unknown biohazardous spills

This is a Biological Substances Spill/Incident:

- If the spill is unmanageable or of known significant risk – inform Sector Manager and Laboratory Manager.
- If the spill is manageable but not sure how to clean up – clear the area/take necessary precautions, contact Sector Manager and Laboratory Manager.

Waste Management

The waste management process provides protection for individuals and the community from exposure to blood and body fluids, or biohazardous agents. The University has adopted the *New Zealand Standard 4304:2002 Management of Healthcare Waste* (which includes laboratory, mortuary and pharmaceutical waste) as guidelines for waste management.

Waste segregation

All waste products should be categorised as either hazardous or non-hazardous. Non-hazardous waste can be disposed of through landfill or general waste streams. Hazardous waste is further categorised into sharps and non-sharps. For additional information on hazardous substances, please refer to the HSNO Exempt Laboratory Manual and the Radiation Safety Management Plan.

Non-hazardous waste

Non-hazardous waste should be categorised as recyclable or general waste. Recycle where possible, bag general non-hazardous solid waste for landfill and dispose of liquid non-hazardous waste down the sewer.

Hazardous waste

All biological waste must be stored in biohazard yellow bags or sharp containers labelled with the biological hazard symbol.

Disposal of biohazard sharps

E.g. contaminated hypodermic syringes, needles.

Sharps containers should be readily available wherever sharps are in use. Only approved containers may be used. Containers must not be over-filled. When these are filled to an appropriate level they are placed in the hospital biohazard room for removal.

Disposal of biohazardous waste – general

E.g. blood and body fluid contaminated materials, tissues, laboratory cultures, genetically modified organisms.

Contractor Removal Process

Biohazardous non-sharps waste must not enter the general waste system. All contaminated and potentially contaminated items must be collected into yellow biohazard bags. All bags must be labelled with the biohazard symbol. Ensure that the bag is not overfilled – about two-thirds full is perfect. Tie the bag securely. Take bag to the hospital biohazard room. Waste should be removed regularly to prevent build up.

Internal Treatment Process

Biohazard waste may be sterilised by autoclaving prior to disposal into the general waste stream as non-biohazardous waste. All treated biohazardous waste must be removed from yellow biohazard bags prior to being discharged into the general waste stream. Use clear autoclave bags.

Disposal of human blood, body fluids and uncleared biological products

The recommended means of disposal of human samples and uncleared biological products is by autoclaving or via biohazard containers. The samples to be disposed must be in sealed tubes and then placed in the biohazard container. If any tubes that are made of glass require disposal, a solid biohazard container with sealable lid should be used. Sealed plastic tubes can be placed in polythene biohazard bags, but these should be put in a secondary, solid container for transport from the laboratory to the hospital biohazard room.

If disposal through the biohazard container is not practicable (e.g. large volumes of liquids), the material can be autoclaved before disposal either down a sink (liquids) or through the general waste stream (solid waste). Use of a dedicated sink, flushing and then cleaning the sink with Virkon afterwards are recommended for disposal of disinfected liquid wastes.

An alternative for disinfection before disposal, where autoclaving or relocation is not practicable, is the use of household bleach (5% sodium hypochlorite) at an appropriate dilution for the biological load present. For most purposes a solution at 500-1000 ppm available chlorine will be appropriate – this equates to a 1 in 50 or 1 in 100 dilution of household bleach.

For pipette discard jars, use of bleach at 2000 – 2500 ppm (i.e. 1 in 20 to 1 in 25 dilution of household bleach) is recommended. An alternative is bleach at 1 in 100 dilution combined with a non-ionic detergent at 0.7% (v/v).

In all cases a 15 minute exposure of the biological material to bleach is adequate but a minimum of 30 minutes is recommended. For effective biocidal action of bleach, a pH range of 6 to 8 is optimal; acidic solutions are likely to give off chlorine gas. All bleach solutions should be freshly prepared and changed daily. Do not add fresh bleach to old solutions.

The use of Haz-Tabs for chlorine disinfection may provide an easier alternative to household bleach and is at least as effective. Quantity of tablets used depends on their size; the 1.8 gram tablets may be most useful for laboratory applications. Haz-Tabs can be purchased from Global Science.

Biohazardous Waste: Blood Disposal

For material with a high biological load such as whole blood or serum, autoclaving or medical waste disposal must be used wherever possible. If chemical disinfection must be used, dilute household bleach 1 in 5 (to give 10,000 ppm) and add in a 1:1 ratio to the liquid to be disinfected.

Biohazardous Waste: Body Parts Disposal

Human body parts use and disposal are subject to the Human Tissue Act 1964. Contact InterWaste for disposal. For animal carcasses also contact InterWaste.

Biohazardous Waste: Body Fluid Waste other than Blood

Samples of urine, saliva, etc. should be treated as infectious waste, with disposal through a dedicated sink to the sewer or pre-treated with Virkon or Bleach.

Biohazardous Waste: GMOs and uncleared biological products

All waste containing GMOs or uncleared biological products must be autoclaved. Animal waste products contaminated with GMO should be autoclaved prior to disposal.

Disposal of animal blood and body fluids

If practicable the procedures outlined above for human material should be used. However, direct flushing of animal blood and body fluids to the sanitary sewer may be acceptable. A dedicated sink is recommended and must not be used for hand washing. Care should be taken to ensure that blood is collected only from healthy animals. If infection is suspected, the guidelines for material of human origin must be followed. Animal carcasses should be disposed of through InterWaste.

Blood Collection Procedures

Collection of finger prick samples

Blood must be collected at a work area that has:

1. suitable PC2 bench coverings;
2. approved spring-loaded lancets (not simple lancets; contact IBSC for advice);
3. an adequate supply of lancets to ensure that there is no reuse even by the same subject;
4. container for sharps;
5. container for used swabs;
6. supply of swabs and disinfectant;
7. 70% ethanol for swabbing skin prior to pricking;
8. supply of non-porous dressings;
9. an uncluttered, uncrowded environment;
10. an eyewash station available;
11. a chair or couch for those who feel faint.

Training:

All staff, including demonstrators, must be specifically instructed in the particular procedures being used. This training should be documented and copies forwarded to the Laboratory Manager.

Other blood samples

Some staff and postgraduate students may be involved with research projects in which blood or other body fluids that have not been made safe or screened are used.

It is important that as part of the research protocol a signed consent form is obtained from the subjects, which gives consent for testing, in the event of a hazardous exposure of staff at a later date. It is important to remember that samples may be stored for some considerable period of time before testing is done. It may be very difficult or impossible to track subjects down, particularly at short notice, to gain their consent for testing. Contact details of the subjects need to be taken so that, should

testing be required as a result of a hazardous exposure, the results of those tested can be communicated to the original subject.

If a subject refuses consent, it is advised that blood should not be taken from that individual.

It needs to be carefully explained to the individual that the blood will be tested for Hepatitis B, Hepatitis C and HIV only in the event that a potentially hazardous exposure to a researcher has occurred.

Guidelines for Venepuncture Procedures

Principles:

a) Protocols must be referred to the IBSC for review.
b) Wherever possible, venepuncturists should be recruited or trained to take venepuncture samples.
c) PC2 conditions are required for the collection of unscreened blood (refer AS/NZS 2243.3:10 section 3.4).
d) A staff member must directly supervise blood collection and handling of blood specimens at all times.

Blood collection and handling:

Physical facilities used to collect venepuncture samples must provide the following:

a) The site must not have extensive movement of other people and should provide a measure of privacy;
b) Good lighting;
c) The subject should be seated comfortably. A couch must be available for subjects who feel faint or who prefer to lie down during collection of samples;
d) Adequate bench and shelf space must be available for supplies and waste containers, and the work environment must be uncluttered and set out in an ergonomically appropriate manner so that the risk of accidents is minimised;
e) Surfaces must be impervious to blood, have an intact surface and be capable of withstanding disinfection after blood spills;
f) Waste containers must be durable. They must be designed and located in a manner that minimises any risk of tipping over or spilling wastes. The containers must include:
    - A tough-walled container for sharp wastes that has minimum risk for spilling contents or being tipped over and that can be sealed securely before disposal;

- A durable container for other wastes (e.g. yellow biohazard bags). Any waste container that holds blood, tissues or body fluids must be labelled with the biohazard symbol, or be placed in an outer wrapper that displays this symbol;

g) An eyewash station should be available.

Supervision:

a) The Supervisor must be able to recognise unusual levels of anxiety that may preclude safe venepuncture or require special care in the procedure;
b) The Supervisor must be able to recognise adverse events or outcomes including fainting, formation of a haematoma and arterial puncture in the subjects and be able to provide first aid;
c) A professional trained venepuncturist should perform the procedure unless it is a training exercise. Where training is required, direct supervision in proportion to their degree of inexperience is required.

Supplies:

a) Approved disinfectants for swabbing skin prior to venepuncture: 70% alcohol (ethanol or isopropanol), 70% alcohol-based or iodophor products;
b) Cotton swabs supplied in a form that avoids cross-contamination risks;
c) Non-porous dressings;
d) The preferred method for blood collection is vacuum tube systems and double-ended needles. Disposable syringes and needles may also be used. Reusable syringes and needles should not be used;
e) A clean tourniquet. A quick release catch or Velcro fastening is preferred;
f) Waste containers (see above);
g) Needles must **never** be recapped following use;
h) Suitable racks that will accommodate sample tubes and that are not easily tipped over.

Venepuncture:

a) A procedure checklist should be available for individuals who are not familiar with venepuncture procedures;
b) All necessary tubes, new disposable collection equipment, labels and racks should be put out on the workspace before each procedure is commenced;
c) The subject must be seated comfortably, or be recumbent, during the collection procedure;
d) The tourniquet should be applied, a suitable vein selected in good lighting and the skin prepared with a fresh antiseptic swab. The antiseptic should be allowed to dry before the venepuncture is performed. After removal of the needle, firm pressure should be applied on the puncture site with a dry swab;
e) An occlusive dressing should be applied when bleeding has stopped as a small amount of blood will usually ooze from the site during the next 15 minutes and the amount may be increased if a dressing is not used. The dressing may be removed after approximately 30 minutes;
f) All wastes must be disposed of in appropriate containers. Sharp waste containers should be reserved for appropriate wastes **only.** Waste containers **must not** be overfilled;
g) The surface must be cleaned if any blood was spilled before the next subject is processed;
h) It is not essential that gloves are worn during venepuncture procedures, as the procedure does not normally result in spilling of blood. Gloves should be worn if the person taking the blood has any cuts, scratches or abrasions on their hands;
i) The laboratory environment must be uncluttered and staff must use supplies and equipment that are unlikely to lead to puncture accidents or contamination of individuals or laboratory surfaces with samples. Disposable items must be used when handling human specimens and should not be reused;

j) All equipment that comes into contact with blood or its derivatives must be regarded as potentially infected. Particular care must be taken to disinfect appropriate parts of equipment after use. Wastes must be regarded as potentially infective. Viruses are unlikely to be destroyed by most assay procedures.

Training:

All staff supervising procedures must be specifically trained and competent in the procedures being used and should have carried them out. Other staff must be trained in safe working practices when involved in laboratory work that uses human blood. Staff must be aware that the subjects do sometimes faint during venepuncture and must be able to recognise when this is about to happen. They must be able to manage the subject and prevent injury.

Use of Animals or Animal Products

Provided educational targets are met, animal blood is preferred to human blood, since it carries less risk. Animal blood is regarded by experienced veterinary practitioners as "remarkably safe" to handle. However, a number of microbial diseases transmissible from animal to human (zoonoses) have a phase during which the infective agent may be present in the peripheral blood. It is therefore possible for zoonoses to be transmitted. Zoonoses may be acquired through animal bites and scratches, contact with tissue and cultures, body fluids, and exposure to aerosols produced as a result of activities such as cage cleaning.

Risk Assessment

It is important that risks are assessed. Two factors need to be taken into consideration, these are: the likelihood and potential severity of harm. For example, research using rodents is common and allergic disorders related to working with rodents are common, hence this is an important and common risk that needs appropriate prevention and monitoring. Rabies is a fatal disease, but does not occur in animals in New Zealand and therefore specific precautions are not routinely needed. However, researchers handling material from overseas or travelling overseas may need protective measures.

Preventive Measures

Preventive measures involve a wide range of approaches. These include:

- Administrative procedures
- Education and training
- Environmental/engineering
- Personal protective clothing and equipment
- Immunisation

Laboratory Animal Allergies

Exposure to laboratory animals can result in allergic responses in susceptible individuals. Allergies can develop following inhalation of airborne animal allergens or after eye or skin contact with hair, dander, urine, saliva and serum or body tissue of laboratory animals. Symptoms can be mild (itchy eyes, runny nose, sneezing, red raised itchy patches on skin) to severe (wheezing, chest tightness, shortness of breath).

Controls:

To reduce the risk of allergic responses, the following may be applied:

- Ventilation and other engineering controls;
- Selection of staff to eliminate employing staff with known allergic response syndromes;
- Filtered cage systems;
- Respiratory protection such as masks;
- Protective clothing – gloves, gowns, shoe covers restricted to use within the Facility;
- Regular hand washing and showering after handling laboratory animals;
- Regular cleaning and decontamination of animal facilities.

Guidelines for the Use of Animal Products

1. Animals should be well maintained and have a history of good health, or the carcass should have been inspected by a veterinarian;
2. It is preferable to use mature animals rather than juveniles;
3. Small laboratory animals should be obtained from a reputable supplier. Animal Ethics Committee Approval will be required for the use of animals and/or tissues;
4. Large animals should be maintained under the direction of the Director of Animal Welfare or an approved veterinarian;
5. Normal precautions for handling blood and dealing with accidents must be followed.

Zoonoses

Zoonoses is a disease of animals (where the animal is the primary host) where the disease is transmissible to humans. It may be acquired through animal bites and scratches; contact with tissue and culture, body fluids; or exposure to aerosols produced as a result of activities such as cage cleaning.

Modes of Transmission

Zoonoses can be transmitted by a number of routes:

- Direct contact
- Food and water
- Fomites
- Aerosols
- Vectors

Appendix 6 provides examples of zoonoses, causative microorganisms and animals most commonly associated with transmission to humans. This has been developed form the publication: *Zoonoses in New Zealand, CR Wilks, MW Humble, Veterinary Continuing Education, Massey University, Palmerston North 1997.*

Health Monitoring

As the hazard of handling laboratory animals cannot be eliminated in all cases, medical monitoring of individuals exposed to laboratory animals should be implemented. This will not reduce the risk, but will monitor staff for changes in health status. Health Monitoring is required under the Health and Safety in Employment Act 1992 section 11. Health monitoring requirements should be discussed with the Laboratory Manager.

The following monitoring programme is advised:

Procedure	**Applicable to**
Pre-placement assessment	Every employee in direct or indirect contact with animals
Annual lung function test	Every employee in direct or indirect contact with animals
Tetanus immunisation booster every 10 years	Every employee in direct or indirect contact with animals
Rabies immunisation and follow up boosters	Direct contact with non-domestic animals
Tuberculosis test	Direct contact with non-human primates